# KEY ISSUES WHEN USING TAX DATA FOR CONCENTRATION ANALYSIS: AN APPLICATION TO THE SPANISH WEALTH TAX

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# KEY ISSUES WHEN USING TAX DATA FOR CONCENTRATION ANALYSIS: AN APPLICATION TO THE SPANISH WEALTH TAX♦

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**Abstract**:
Tax data offers the opportunity to estimate income or wealth shares, as recent studies on different countries show for the upper groups. In this study we focus on wealth concentration in Spain by using Wealth Tax data, in the line carried out by Alvaredo and Saez (2008). However, the particular aim of our work is to identify the main critical points that must be considered when using data from the Spanish WT to avoid misleading conclusions: interpolation, underassessment of real estates, owner-occupied housing exemption, tax unit and tax fraud. Taken these key issues into account we obtain that our results offer a higher concentration than Alvaredo and Saez's one (2008) (on average 19.11% *vs*. 17.31% for the period 1988-2003). In addition, we observe that the boom of the housing market has been regressive and, moreover, has not been translated into a higher level of housing reported wealth in the WT due to tax fraud.

*Keywords***:** wealth distribution, wealth tax, tax data.

*JEL classification*: D31, H24.

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## 1. Introduction

Tax data offers the opportunity to estimate income or wealth shares, as recent studies on different countries show for the upper groups (Atkinson and Piketty, 2007). Based on the seminal study of Kuznets (1953), those studies calculate income shares (*i.e.*, income concentration) employing income data from tax returns to compute the income of upper groups and national accounts data to compute total income. If a wealth tax is levied, a similar process can be carried out for wealth concentration, as different studies for the Nordic countries show (Spant, 1987; Tuomala and Vilmunen, 1988; or Ohlsson *et al.*, 2006)[1]. In this line, Alvaredo and Saez (2008) have recently carried out an impressive study on wealth and income concentration for Spain using available tax data.

Spain and its economy have enormously changed over the last decades. The consolidation of democracy, the political decentralization of the country, the accession to the European Union in 1986, the internationalization of the economy, or the booming periods of both the stock and the housing markets are examples of outstanding circumstances that may have had an important effect on the distribution of wealth. In fact, the concern about inequality was one of the main reasons given to justify the overall tax reform carried out in the late seventies with the arrival of democracy, which introduced both a comprehensive income tax (IT) and an annual net wealth tax (WT) to reinforce the progressivity of the tax system. And the reform of WT in 1991 underlined its redistributive role, additional to the IT one[2]. Therefore, redistribution seems to have played an important role in the configuration of the Spanish tax system. However, paradoxically there has not been a concern about checking its real effect and there are not assessments of wealth distribution over time.

Indeed, in Spain there has been an historic lack of data about wealth distribution. Only quite recently, the Bank of Spain has started the conduction of a household wealth survey in order to have a better knowledge of the wealth situation of Spanish

[1] Kopczuk and Saez (2004) also do the same kind of study for the United States, although using data from estate tax returns.
[2] The WT was introduced in 1977, but after being applied for two decades, Spain eliminated WT since 2008, following the international trend in removing WT.

households and of their financing decisions[3]. The survey, which is supposed to be conducted periodically in the future, for the time being it is only available for 2002 (see Bover (2004) and Bover *et al.* (2005)), and so cannot solve the lack of data for the last decades. This is precisely what tax data can offer, since public tax statistics are available since the early eighties.

The Spanish WT levies the difference between the value of the assets and rights and the value of their liabilities and obligations, therefore, the value of natural persons' net wealth[4]. That includes real estates, goods necessary for individual business, savings accounts, life insurance, bonds, closely held and traded shares, among others. However, as common in WT, there are certain exemptions, such us consolidated rights of members of pension plans, family business (individual or incorporated) whenever certain conditions are met (since 1994) and owner-occupied housing (since 2000 and up to about 150,000 euros). Likewise, the law establishes the valuation rules of the taxable assets, which is particularly important as far as real estates are concerned, the main asset in the Spaniard's portfolio, whose fiscal value may be far from market price, as we will see in the paper.

When only aggregate data is available, as it happens in our case, it is necessary to interpolate to estimate the level of revenue or wealth for a specific percentile (*e.g.*, the top 1%). Likewise, the use of tax data for distribution analyses has other disadvantages, as Atkinson (2005) points out: tax evasion, tax avoidance, legal definitions not suitable for distributional studies and no contextual data to better understand the determinants of the distribution. Further, legal amends (*e.g.*, the above mentioned new exemptions) may cause additional problems. All these circumstances may occur in Spain and subsequently we will study them, but before it is important to bear in mind that using tax data for distribution analysis also has advantages, as the very Atkinson indicates. Alternative sources (for example, surveys) are not free of problems, due to non-reporting or under-reporting or failure to correctly tailor questions particularly if the employed survey is conducted for other purposes. Therefore, tax data is particularly

[3] The new survey is similar to the *Survey of Consumer Finances* (SCF) of the Board of Governors of the Federal Reserve System in the United States and the survey *Indagine sui bilanci delle famiglie* of the Bank of Italy.

[4] The tax is payable by residents on Spanish territory and non residents. For residents the liability is *ad personam*, that is, in respect of all assets and rights. For non-residents, the liability is *in rem*, in respect of assets situated in Spanish territory and rights which can be exercised therein.

relevant when no other sources exist, as it happens in the Spanish case, but we must be cautious about the potential problems regarding the use of tax data.

Consequently, similar to Alvaredo and Saez (2008), we try to analyse wealth concentration in Spain by using tax data, but our particular aim is to identify the main critical points that must be considered when using tax data: interpolation, underassessment of real estates, owner-occupied housing exemption, tax unit and tax fraud. Our results show that wealth distribution at the top is very well approximated by a Pareto distribution, and so a Pareto interpolation seems a good way to obtain the wealth share for top 1%[5], as many other studies have already shown. However, the consideration of other fiscal issues just mentioned enriches the results from Alvaredo and Saez. Thus, we obtain that wealth concentration is higher than that estimated by Alvaredo and Saez (2008), being on average 19.11% *vs*. 17.31% for the period 1988-2003 for which we obtain most reliable estimates; while the boom of the housing market has been regressive (having, though, reached its maximum in 2002), and moreover has not been translated into a higher level of housing reported wealth in the WT due to tax fraud.

The rest of the paper is organized as follows. In the next section, we offer a review and analysis of all the main problems that might imply using Spanish tax data to estimate series of wealth concentration, and compare our results with those recently obtained by Alvaredo and Saez (2008). In the third section, once reviewed and calculated wealth concentration for top 1%, we analyze how wealth composition explains the evolution of wealth shares along the analyzed period (1988-2003). Finally, section 4 concludes.

## 2 Tax data: methodological issues

In absence of other statistical sources, or even as a complement to them, tax data may be a good statistical source to estimate series of wealth or income concentration. This is particularly right in Spain, where WT can provide very useful information about wealth distribution throughout a period (1983-2003) for which no other data is available.

[5] Our aim is to explain the key issues derived from the use of tax data. For that reason, we only focus on top 1% of adult population, but the same methodology could be used for other top percentiles (*i.e.* top 0.5% or 0.1%).

Therefore, from WT data we carry out a distribution analysis for Spain, in a similar way as Alvaredo and Saez (2008) have recently done[6].

However, Atkinson (2005) stresses some caveats that must be taken into account, as tax data is not free of problems. In this paper, we focus on three possible limitations: (i) the reliability of the method of interpolation, which will depend on how fiscal information is gathered; (ii) the consideration of fiscal changes that may produce discontinuities in the series, or simply level effects, depending on how the tax base is defined; and finally, (iii) the impact of tax fraud, which is a potentially important factor in this tax as we will justify in section 2.3. The considerations of (ii) and (iii) make a difference and enrich the results obtained by Alvaredo and Saez (2008)[7].

### 2.1 Interpolation

Our aim is to estimate the level of wealth for the top 1% of the adult population[8]. However, only aggregate data is available from the Spanish WT, where taxpayers are gathered into several brackets according to their level of reported wealth, regardless of the number of people in each interval[9]. Therefore, it is necessary to interpolate. The most common method employed in the literature, and also by Alvaredo and Saez (2008), is the Pareto interpolation (from now on, PI) based on the assumption that income or wealth at the top follows a Pareto distribution[10]. However, Atkinson (2005) argues that the potential error in making such interpolation depends on the width of the ranges. This is an especially important issue for the Spanish case because the number

[6] Although 1982 data is also available, an analysis of data often shows statistical errors. For that reason, we start the study in 1983.

[7] The calculus of the denominator of the wealth share would be another possible caveat, but we take it for granted from Alvaredo and Saez (2008). The denominator is calculated from several statistical sources, mainly from the Bank of Spain, as they explain in Appendix C.1.

[8] This accounts for an average of about 280,000 people every year. The Spanish WT has only levied a small percentatge of adult population, between 2% and 4%, as a threshold, following the progressivity aim, seeks to concentrate on wealthiest individuals. By considering adult population instead of just taxpayers, our target group remains more stable and the number of members is less sensitive to legal modifications, for instance, in the threshold or the exemptions.

[9] Fiscal data is based on WT return statistics published yearly by the Spanish Ministry of Economy and Finance in the *Memoria de la Administración Tributaria* (available on www.aeat.es since 1998). This publication excludes two regions, Navarre and the Basque Country, as they have their own WT, due to a particular financing system. Therefore, our analysis does not include these regions, which only account for about 6% of the Spanish adult population.

[10] Among many others, see Feenberg and Poterba (1993 & 2000) and Piketty (2001 & 2003). Atkinson (2005) explains that this follows an honorable tradition, since a Pareto interpolation was used in a 1906 report on Income Tax by the House of Commons Committee.

and width of intervals in the fiscal data are not the same along the studied period (1983-2003), and the changes are quite important (first 14 brackets, from 1988 to 1998 10 and later on 20). Moreover, it is possible to obtain more than one value for the interpolated share. For that reason we calculate a lower bound and an upper bound for wealth shares. As long as those bounds are tight, it would confirm the reliability of assuming wealth distribution at the top is Pareto in form.

The calculus of gross bounds is explained in Cowell (1995). The gross lower bound implies that within the range of the bracket where we have to interpolate, the mass of the population is concentrated at the average of the range. Hence, this bound implies maximum equality in the distribution of wealth within that interval. In contrast, the gross upper bound implies that there is maximum inequality within the interval, which is calculated by assuming that within that range a certain percentage of taxpayers is concentrated at the minimum amount of wealth of the interval, while the rest is concentrated at the maximum. However, as suggested and explained in detail by Atkinson (2005), it is still possible to obtain tighter bounds if it is simply assumed that density at the top of the whole distribution of taxpayers is non-increasing (Gastwirth, 1972). In Table 1, we show the results of those tighter bounds, that is, of the so-called refined bounds.

From Table 1, it can be checked that the bounds are quite tight, being the average width for the whole period 1.15% and 3.23% the maximum value in 1992[11]. In general, as expected, the wideness of bounds is greater during 1988-1998 when there were only 10 brackets (on average, the width of this period is 1.67%). Therefore, we can conclude that the PI approximates very closely the wealth distribution for top 1% even when the width of intervals is greatest[12]. Hence, from now on, we will use the values obtained using PI. However, as we will see next, the data shown in Table 1 is not directly useful

[11] In contrast if we calculate the gross bounds, on average the width is 3.61% (maximum: 10.40% in 1992).

[12] In order to calculate the average wealth assuming a Pareto distribution at the top, we have followed the same steps than Alvaredo and Saez (2008) in Appendix D.1. In the second step, once the wealth threshold above which we have the top 1% has been computed ($W_p$), they calculate the wealth between $W_p$ and the extreme value ($t$) of the bracket where $W_p$ lies. This wealth is added to the declared wealth above $t$, from which it is immediate to calculate the average wealth of top 1%. However, doing so, on some occasions, that average does not lay within the refined bounds. In those cases, instead we have calculated the wealth between between $W_p$ and the lowest value ($s$) of the bracket where $W_p$ lies. Then, we have deducted that amount from total wealth of that bracket in order to obtain total wealth between $t$ and $W_p$. Hence, the calculus of those bounds becomes useful when more than one value might be obtained from PI.

to analyze how wealth concentration has evolved, since before important fiscal issues must be taken into consideration.

**Table 1. Average wealth of the top 1%: PI and refined bounds**

| | Refined Lower Bound | Pareto Interpolation | Refined Upper Bound | Width |
|---|---|---|---|---|
| | 14 brackets | | | |
| 1983 | 579,504 | 581,235 | 581,411 | 0,33% |
| 1984 | 554,180 | 556,694 | 558,149 | 0,72% |
| 1985 | 564,827 | 567,095 | 567,877 | 0,54% |
| 1986 | 610,893 | 612,930 | 618,166 | 1,19% |
| 1987 | 649,361 | 651,248 | 651,873 | 0,39% |
| | 10 brackets | | | |
| 1988 | 661,606 | 661,757 | 661,930 | 0,05% |
| 1989 | 691,109 | 693,859 | 696,958 | 0,85% |
| 1990 | 686,920 | 689,838 | 702,852 | 2,32% |
| 1991 | 690,157 | 696,227 | 710,821 | 2,99% |
| 1992 | 662,234 | 675,713 | 683,650 | 3,23% |
| 1993 | 695,671 | 705,229 | 716,994 | 3,07% |
| 1994 | 684,199 | 688,344 | 700,757 | 2,42% |
| 1995 | 692,202 | 695,570 | 705,269 | 1,89% |
| 1996 | 739,219 | 741,803 | 747,673 | 1,14% |
| 1997 | 815,023 | 816,421 | 818,140 | 0,38% |
| 1998 | 889,300 | 889,646 | 889,870 | 0,06% |
| | 20 brackets | | | |
| 1999 | 960,947 | 965,200 | 965,445 | 0,47% |
| 2000 | 949,720 | 952,984 | 952,984 | 0,34% |
| 2001 | 984,105 | 984,105 | 988,024 | 0,40% |
| 2002 | 1003,172 | 1006,424 | 1006,514 | 0,33% |
| 2003 | 1047,138 | 1047,374 | 1058,573 | 1,09% |

**Note:** Expressed in 2003 Euros. The data is obtained from fiscal information. It includes reported wealth net of debts and exempted business assets (from 1994 onwards) as they must be reported. Wealth is expressed according to fiscal assessment criteria. In order to calculate the average, we have divided wealth from tax data between 1% of adult population (source: Alvaredo and Saez, 2008, Table A2).

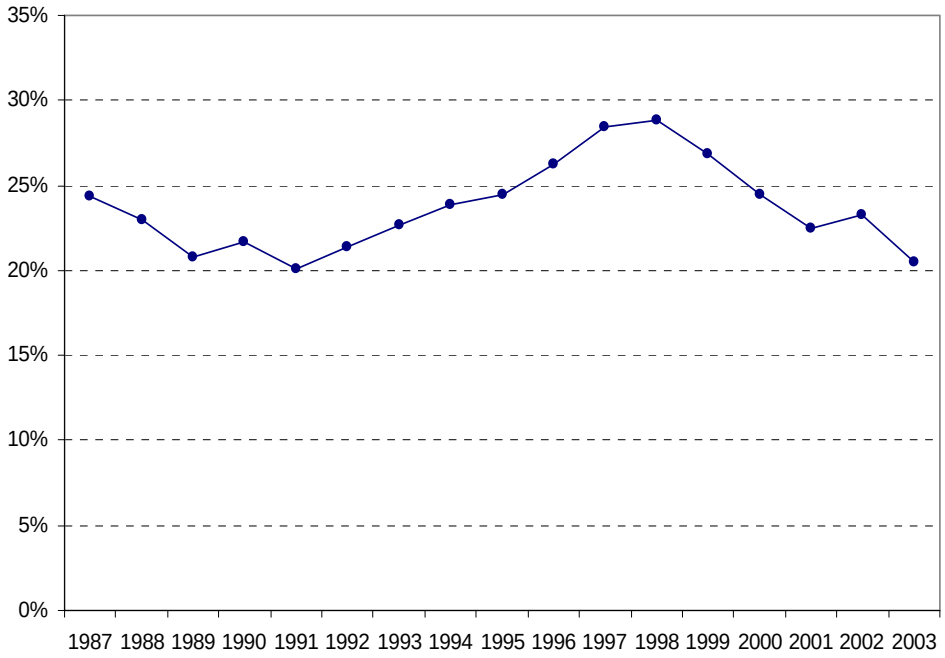
## 2.2. Fiscal issues

### 2.2.1 Tax base: exemptions and assessment

The approval of new exemptions may alter the value of reported wealth, particularly if the exempted assets are important in the taxpayer's capital. This happens in Spain because two new noteworthy exemptions have been approved throughout the studied period: one for business assets (the so-called family-business exemption), since 1994, and another for owner-occupied housing, since 2000. Fortunately, in spite of being exempt, the values of family-business exempted assets must be reported. Therefore they can be included in the assessment of wealth. Nonetheless, regarding owner-occupied

housing there is not public data about the distribution of exempted values among taxpayers[13]. Consequently, we will have to estimate the value of the owner-occupied housing; otherwise, we could reach misleading conclusions. Housing is by far the main asset of Spanish families, as we will show in section 3. We include this second exemption by taking the estimated values obtained by Durán and Esteller (2007).

**Graph 1. Under-assessment of real estate property in WT: CV/MP**




**Note**: The series is calculated as the ration between average cadastral value (CV) and average market price (MP), which is only available since 1987. In published statistics, CV is expressed per housing. We have supposed each house has 125 $m^2$ in order to make comparable both series of prices. In this way, the ration follows very closely the series calculated by García-Vaquero and Martínez (2005).
**Source**: Ministry of Public Works ("market price") and Cadastral Office ("cadastral value"), several years.

Likewise, the assessment of assets must be homogeneous for the distribution analysis, which would mean to apply one sole criterion: market price (MP). This should not be a problem, as in theory a WT ought to fix the same criterion for all assets. Nonetheless, this is not the case for the Spanish WT, whose law establishes different valuation rules

[13] In fact, taxpayers must also report the exempted values, but published statistics for the 2000-2003 period do not offer them. The data is only available since 2004.

for certain assets due to administrative constrains[14]. For instance, real estates are usually assessed at administrative values (cadastral value), unless there has been a recent acquisition, and the cadastral value is far below the MP all over the period (Graph 1). Therefore, reported values must be converted into MP. However, this conversion into MP is not always possible for other assets, which in any case are certainly much less important than real estates[15].

In order to correct the top 1% wealth and as far as real estates are concerned, we take into account underassessment and the exemption of owner-occupied housing. In Table 2 we show the corrected values of estates. From PI the average percentage of real estates over total wealth during 1983-2003 is 28.05%[16], which is a relatively small percentage. However, once we convert the fiscal values into MP and also take into account the exemption (in both cases, using the assumption that MP is used on very few occasions), that average increases up to 59.52%, which is more than twofold. Therefore, in order to obtain sensible conclusions about wealth shares it is very important to estimate as accurately as possible the corresponding corrections of reported real estate values. In Graph 2, we show the evolution of the reported real estate values depending on the assumption on how to correct them for the market value and the exemption. The bottom line shows the evolution of declared values, that is, according to fiscal criteria and without considering the exemption. The other two series correct for both issues. Obviously, as long as we suppose MP is very often used, the correction is not so severe in comparison with the assumption that MP is rarely used when taxpayers fill in their tax returns.

[14] In fact this is a common problem when a WT is levied. For instance, in Germany the Constitutional Court declared unconstitutional the WT in 1995, because the law gave an unequal treatment to different types of wealth. Some were valued according to their market price, while others where assessed according to other values well far away from the market price. Real estates were valued according to administrative values dated from 1964, because since that year revaluations, scheduled to occur every six years, had not been carried out. Decision from 22nd June 1995, 93/121. A similar inequity might also raise as far as personal income tax is concerned, due to the taxation of imputed rent of owner-occupied housing (Onrubia *et al*., 2009).

[15] For example, the value of unincorporated business assets is based on historical prices, but for business real estates, which must also be assessed according to the common rule for all real estates. Therefore, business assets are generally under-assessed but it is not possible to know how much.

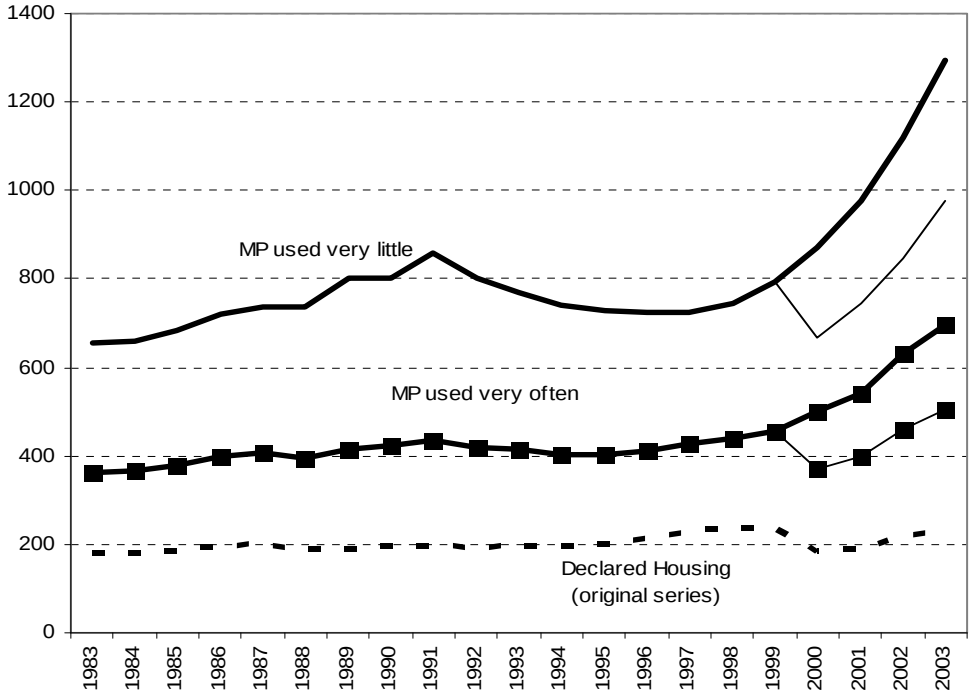
[16] Reported real estate values are divided into urban and rural ones. We only consider the former as the latter had different assessment criteria before 1992, which in any case account for a small proportion over all real-estate wealth (according to reported values of top 1%, on average less than 10%). Hence, the MP for real estates refers only to urban ones.

**Table 2: Real estates: transformation into market value and estimated value of owner-occupied housing exemption**

| | | | (Inverse of) Conversion factor into market value (%) | | Exemption owner-occupied housing | | Totally corrected value of real estate (from PI) | | % reported real estate over reported total wealth |
|---|---|---|---|---|---|---|---|---|---|
| Year | % Declared real estate over total declared wealth | Value of real estate (from PI) | MP used very little | MP used very often | MP used very little | MP used very often | MP used very little | MP used very often | MP used very little |
| 1983 | 29.28% | 177.294 | 27.11% | 49.02% | *n.i.f.* | *n.i.f.* | 653.884 | 361.685 | 61.81% |
| 1984 | 30.86% | 179.045 | 27.11% | 49.02% | *n.i.f.* | *n.i.f.* | 660.343 | 365.258 | 63.62% |
| 1985 | 31.43% | 185.075 | 27.11% | 49.02% | *n.i.f.* | *n.i.f.* | 682.580 | 377.558 | 64.12% |
| 1986 | 30.44% | 195.197 | 27.11% | 49.02% | *n.i.f.* | *n.i.f.* | 719.913 | 398.209 | 63.28% |
| 1987 | 29.39% | 200.191 | 27.11% | 49.02% | *n.i.f.* | *n.i.f.* | 738.333 | 408.397 | 62.08% |
| 1988 | 27.24% | 188.241 | 25.62% | 47.53% | *n.i.f.* | *n.i.f.* | 734.626 | 396.060 | 60.81% |
| 1989 | 26.42% | 187.485 | 23.37% | 45.20% | *n.i.f.* | *n.i.f.* | 802.119 | 414.782 | 61.30% |
| 1990 | 27.47% | 195.156 | 24.35% | 46.22% | *n.i.f.* | *n.i.f.* | 801.536 | 422.231 | 61.84% |
| 1991 | 26.99% | 194.047 | 22.65% | 44.43% | *n.i.f.* | *n.i.f.* | 856.715 | 436.739 | 63.04% |
| 1992 | 27.52% | 192.168 | 24.01% | 45.87% | *n.i.f.* | *n.i.f.* | 800.466 | 418.979 | 62.34% |
| 1993 | 26.75% | 195.140 | 25.32% | 47.22% | *n.i.f.* | *n.i.f.* | 770.710 | 413.265 | 60.17% |
| 1994 | 28.62% | 196.174 | 26.54% | 48.45% | *n.i.f.* | *n.i.f.* | 739.141 | 404.900 | 60.03% |
| 1995 | 28.86% | 197.803 | 27.17% | 49.07% | *n.i.f.* | *n.i.f.* | 728.007 | 403.066 | 59.39% |
| 1996 | 29.57% | 210.306 | 29.07% | 50.92% | *n.i.f.* | *n.i.f.* | 723.460 | 413.016 | 57.65% |
| 1997 | 29.83% | 226.933 | 31.27% | 52.99% | *n.i.f.* | *n.i.f.* | 725.678 | 428.240 | 55.18% |
| 1998 | 29.36% | 235.133 | 31.63% | 53.32% | *n.i.f.* | *n.i.f.* | 743.494 | 440.997 | 53.18% |
| 1999 | 27.75% | 235.240 | 29.64% | 51.47% | *n.i.f.* | *n.i.f.* | 793.573 | 457.078 | 52.09% |
| 2000 | 22.51% | 181.287 | 27.22% | 49.12% | 205.469 | 131.944 | 871.580 | 501.020 | 53.04% |
| 2001 | 23.51% | 186.876 | 25.11% | 47.01% | 231.568 | 144.682 | 975.677 | 542.211 | 55.05% |
| 2002 | 27.88% | 220.134 | 26.00% | 47.91% | 273.088 | 172.528 | 1119.817 | 632.037 | 58.75% |
| 2003 | 27.43% | 225.869 | 23.09% | 44.90% | 315.835 | 191.493 | 1294.134 | 694.563 | 61.17% |

**Notes:** Monetary amounts expressed in 1,000 Euros 2003. *n.i.f.*: not in force. MP: market price. In "MP used very little", we suppose MP is used on 1 out of 10 occasions; while in "MP used very often" we suppose it is used on 1 out of 2 occasions. "% reported real estate over reported total wealth" is the ration between real estate wealth (obtained using a linear interpolation) and total wealth for top 1% (using PI).

**Graph 2. Transformed value of real estates taking into account underassessment and the estimated value of exemption (since 2000)**




**Notes:** monetary amounts expressed in 1,000 Euros 2003. See also Notes of Table 2.

Certainly, it is impossible to ascertain which assumption is the right one. In fact, there are many other choices as the labels "little use" or "much use" are arbitrary and so they could have been parameterized in some other ways. For instance, an extreme case would be to suppose MP is not used at all (either because it does not legally apply or because taxpayers simply record CV regardless of tax rules), and the (inverse of the) conversion factor would have simply been the share between CV and MP (see Graph 1). In any case, the advantage of our correction for MP is that it can be modulated according to the fiscal use of MP, and so obtain a range of transformed values of declared real estates[17]. In contrast, as explained in their Appendix D.2 (section "Top

[17] Analytically, the transformation works as follows. We suppose $CV = MP^{\delta}$, where $\delta$ identifies the underassessment (*i.e.*, if $\delta$ =1, underassessment is null), and it is calculated to replicate real data, that is, the series shown in Graph 1. The declared price per unit of housing is $CV^{1-\alpha} MP^{\alpha}$, where $\alpha$ identifies the frequency of use of MP (*i.e.*, if $\alpha = 1$ MP is used on all occasions). From both equations, it is very easy to obtain the conversion factor as the ratio between MP and $CV^{1-\alpha} MP^{\alpha}$, but also making use of the identity relation *CV* and MP. Then, that conversion factor (greater or equal to 1) depends both on the frequency of the use of MP (necessarily hypothesized in order to obtain the conversion factor) and on the degree of underassessment (obtained from real data). This is explained in more detail in Durán and Esteller (2007). Finally, take into account that statistics regarding MP are only available since 1987. Thus, for the period previous to 1987 we have supposed that the ration CV/MP is the same than in 1987. Alvaredo and Saez (2008) also operate in this way.

Wealth Shares Estimation"), Alvaredo and Saez's (2008) conversion factor is the ration between the "total real estate from the Flow of Funds accounts divided by total cadastral value reported in aggregate real estate statistics". Undoubtedly, this is also a sensible procedure, but it implicitly assumes that all real estates in WT are reported according to CV, which is only close to reality. Moreover, statistically it seems more appropriate to disentangle the evolution of prices from the evolution of housing units, especially when both statistical sources (one for real estate and another one for cadastral value) are different.

A similar reasoning applies to the calculation of the housing exemption, whose value – according to our methodology – depends again on the hypothesized use of the MP in the WT. Basically, we have estimated it by means of regressing the reported value with respect to CV and other controls (see Table 8, and equation [10] in Durán and Esteller, 2007). The value of the exemption implies a lower estimate of the impact of CV on reported values. Again, this way of operating permits us obtaining a declared monetary value of the exemption greater (lower) if MP is used very often (little), which we transform using the corresponding conversion factor. Nevertheless, given an estimated reduction in the impact of CV on declared values, the real monetary amount of the exemption becomes greater in MP the lower the use of MP. In Table 2, we show two sets of reported values of the exemption depending again on the fiscal use of MP. As the published statistics for 2004 do give the values of the exempted housing among taxpayers (see fn. 13), we have estimated the value of the exemption for top 1% using a linear interpolation, and have obtained a value of 59,158€ (euros 2003), which should still be transformed into MP. Therefore, if we suppose that MP is used very little and use the conversion factor of 2003, that amount would be 256,206€, which value is relatively close to 315,835€, the value we estimate for 2003. All the same, supposing the linear interpolation is correct, and taking into account the great increases in housing prices in real terms during that period (*e.g.*, the housing MP increased 11.44% between 2002 and 2003 in real terms), our estimate might be slightly upwards biased.

On the whole, once we take into account the fiscal issues dealt with in this section, we achieve rectifying the original series of declared estate wealth by top 1% and we will use it later to recalculate total wealth from tax data. However, that correction makes the series being within a range of values depending on the fiscal use of MP, which should

be closer to “little use” than to “very often use”.

### 2.2.2 The tax unit

In Spain the tax unit changes due to a shift to individual taxation since 1988[18]. Before, joint taxation was compulsory. Therefore the reported wealth in a tax return may belong to more than one person before 1988. As we only have aggregate data, it is not possible to identify when there is more than one person in a tax return and either how wealth is split[19]. Therefore, there is a discontinuity in 1988. If this legal amend were not considered in the distribution study, the results would show an important decrease of wealth concentration in Spain in 1988, leading to confusing conclusions.

Alvaredo and Saez (2008) have also taken this fiscal issue into account, which is explained again in their Appendix D.2[20]. Basically, they correct the 1987 wealth share supposing the growth between 1987 and 1988 is the average growth between 1988-1989 and 1986-1987. Once they obtain the corrected value for 1987, each share between 1983-1986 is obtained using 1987 as base year and employing the original growth rates between years. We have also used that methodology, but applying it both to wealth shares and to wealth amounts for top 1% (before correcting by MP and by owner-occupied housing, and afterwards we make these corrections). Although both ways of taking into account the problem of the tax unit imply a logical reduction in top 1% wealth share, the value of the reduction differs in both cases. This is shown in Graph 3.

Our series (dotted lines) are corrected according to section 2.2.1 depending on the frequency of use of MP. The top line for each one of our series, though, does not correct for the problem of the tax unit between 1983-1986, while each of our dotted thickest series does it exactly in the same way as Alvaredo and Saez (2008). Between both lines,

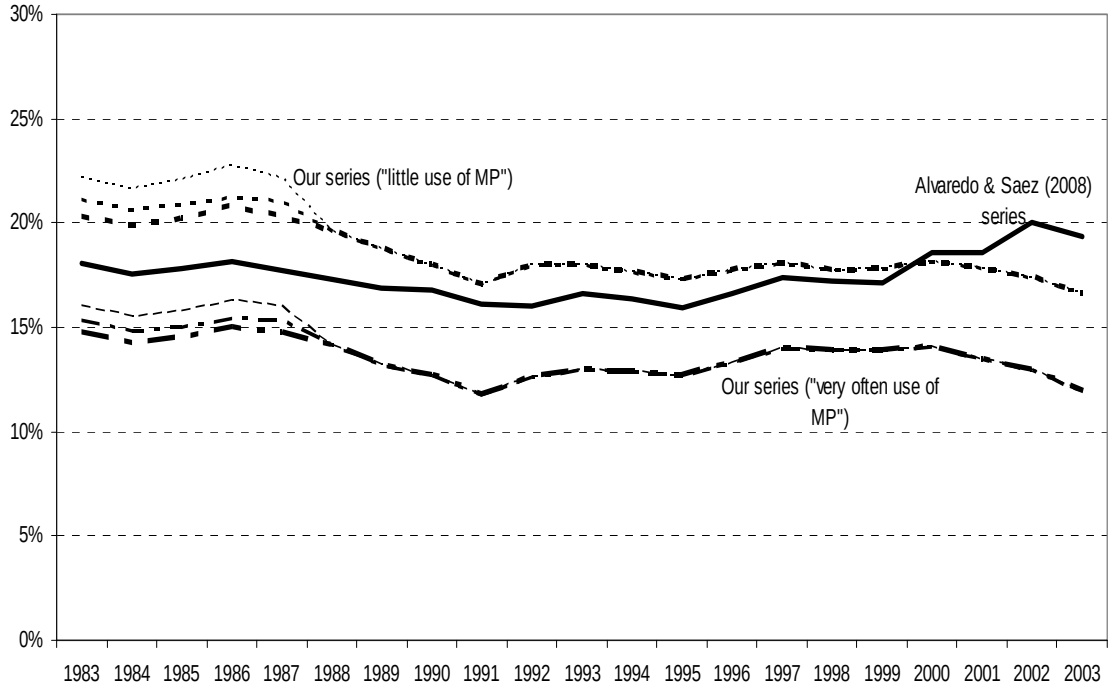
[18] The change in tax unit derives from a Constitutional Court sentence declaring unconstitutional compulsory joint taxation for marriages in the income tax. Consequently, the government also changed the tax unit of WT, which since then on is only individual. That could have provoked a rise in the number of taxpayers, but the government decided at the same time an outstanding increase in the threshold. The overall effect was as 15% fall in the number of taxpayers.

[19] How wealth is distributed between spouses depends on the marriage settlements, but the most common settlement in Spain establishes an equal distribution of wealth obtained during the marriage.

[20] In previous versions of their paper they did not take into account this change, which demonstrates the importance of taking into account tax regulations when working with tax data.

we also construct a new series employing the same correction for the tax unit, but on the amount of wealth instead of on wealth shares. The differences are unimportant.

**Graph 3. Wealth share for top 1%:**
**A first comparison with Alvaredo and Saez (2008)**




On the whole, once we correct for the fiscal issues regarding the tax base and the tax unit and compare our series with Alvaredo and Saez's (2008) one, we can conclude that until 1999 both series follow a similar pattern. The differences in levels might be explained by the different way of correcting real estate – even the calculus of the % of housing wealth (see fn. 16) – in order to transform it into MP and/or of estimating the value of the owner-occupied exemption. Hence, according to our series, it seems that the boom in housing prices since the end of nineties has been progressive (*i.e.*, wealth concentration has decreased), while according to Alvaredo and Saez (2008), it has been regressive. In the next section, we will be able to reconcile both contradictory results.

## 2.3. Tax fraud

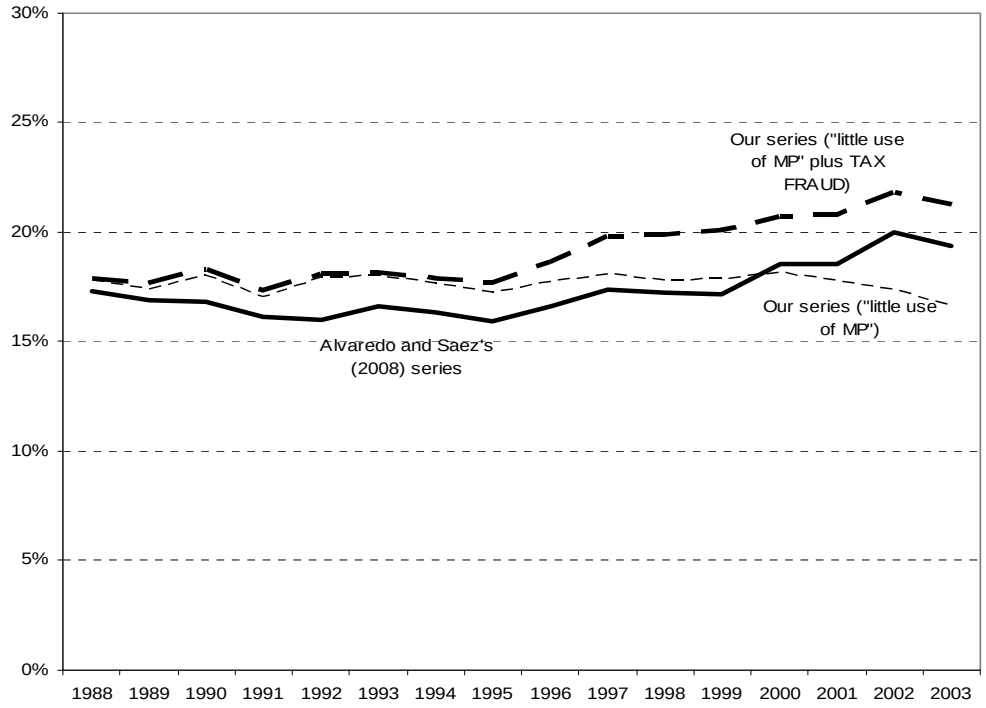
Tax data only provides comparable information along time as long as the pattern of tax evasion for richest groups of taxpayers remains equal over time. Likewise, the share of wealth (or of income) for a given year would only be reliable if tax fraud is evenly distributed among taxpayers regardless their level of wealth, which does not seem very likely. Therefore, it is important to consider the possible impact of tax fraud, particularly in the Spanish WT. Indeed, a common belief among tax specialists is that the level of fraud in WT has been high, and increasing along time (*e.g.* Enciso de Yzaguirre, 2004).

Since the mid eighties the Spanish regional governments (the so-called Autonomous Communities) have obtained all revenue raised by WT and are also responsible for their administration, along with the central government[21]. However, the number of tax audits carried out by Autonomous Communities is extremely low (on average the yearly number of regional audits between 1986-2003 is about 900[22], which only accounts for 0.11% over all tax returns). Furthermore, the average revenues raised by WT audits are 1,462 euros (expressed in 2003 terms), which are much lower than the revenue collected from auditing other taxes, such as Inheritance and Gift Tax or Transmission Tax, both also under the regional competence. Therefore, the common belief about the high level of fraud seems to be correct.

That is why, we try to estimate tax fraud and recalculate wealth shares for top 1%, which are shown in Graph 4 (only available since 1987, as we need employing MP, which is only available since then; in fact, we have eliminated the year 1987 in order to remove the correction of the tax unit)[23]. Surprisingly, once we take tax fraud into consideration, our series and Alvaredo and Saez's (2008) one show a very similar pattern (the coefficient of correlation between both series is 90.97%).

[21] See Esteller (2008) for a further explanation.
[22] This result is calculated taking data from the yearly "Informe sobre la cesión de tributos a las Comunidades Autónomas" (Report on the cession of taxes to the ACs), Spanish National Budget, Ministry of Economy and Finance
[23] See Durán and Esteller (2007), section 5.4.1., where it is explained in detail how we have estimated tax fraud.

**Graph 4. Wealth share for top 1%:**
**A last comparison (and reconciliation) with Alvaredo and Saez (2008)**




That is, we should conclude: (i) The boom of housing prices since the late nineties has been regressive, and so has contributed to increase wealth concentration at the top of the distribution, although the maximum concentration seems to be achieved in 2002; but, (ii) this effect has not been reflected in reported fiscal values, in other words, there seems to be a growing fraud in the WT when the housing market is booming. The conversion factor of declared housing values into MP used by Alvaredo and Saez (as this is probably the main difference with our methodology) seems to be implicitly considering tax fraud. Interestingly our methodology, being probably more parsimonious, permits us to infer a growing level of tax fraud during the boom of the housing market. Despite this, there is still a level difference between our series and Alvaredo and Saez's (2008) one: on average, during 1988-2003, according to our methodology (that among others implies "little use of MP", which we think is the most realistic) wealth share for top 1% has been 19.11% (maximum: 21.82% in 2002; and minimum: 17.30% in 1991), while according to Alvaredo and Saez (2008), the average has been 17.31% (maximum: 20.02% in 2002; and minimum: 15.93% in 1995%).

## 3. Analysis of wealth concentration in Spain

Once tax fraud is considered and assuming MP is rarely used (parameterized as in 1 out of 10 occasions), according to our estimates the overall evolution for the homogeneous period, 1988-2003, indicates an increase in the share of the top 1%, from 17.89% in 1988 to 21.26% in 2003, 3.37 percentage points(see Graph 4). However, the evolution is not the same over the whole period and we can identify two sub periods: 1988-1995 and 1995-2003. In the first sub period, the wealth share of the top 1% remains very stable, -0.26 percentage points, regardless of annual variation may be slightly different. In the second sub period, the level of concentration increases 3.63 percentage points, reaching the maximum value, 21.82%, in 2002.

To be able to take the concentration analysis further, we focus on the evolution of the two main assets in the composition of wealth: real estates and shares. These two assets represent the bulk of all wealth for the top 1%, as Table 3 shows, although their weights vary along time[24]. Our purpose is to find out how the evolution of real estates and shares influences the evolution of all wealth. As Graph 5 shows, for instance, in 1988 the top 1% share is 17.89%, which can be decomposed into real estates (9.71%), equity shares (3.97%) and other assets (4.21%). Therefore, the top 1% share increases over the period basically because there is an important rise in the concentration of real estates, which goes up almost 7 percentage points, that is from 9.71 to 16.55. The rise takes place almost for the whole period 1988-2003, but it is clearly more pronounced during the booming period of real estates that started in the late nineties. The increase in real-estate concentration is partly compensated for by a slight decrease in the concentration of equity shares, about 0.5 percentage points. Nonetheless, the main fall in the level of concentration is due to the other assets, such as goods necessary for individual business, savings accounts or mutual funds. This latter descend, of about 3 percentage points, partly compensates the important increase in real estates.

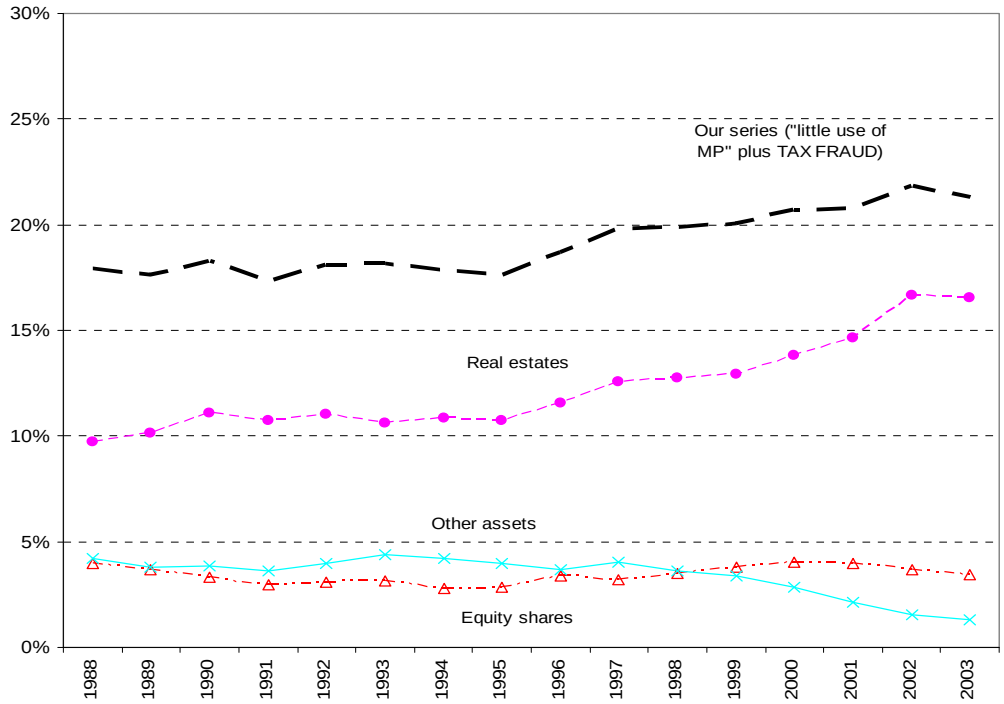
[24] In the absence of a clear-cut theory regarding the pattern of wealth composition by levels of wealth, we performed a simple linear interpolation to calculate the wealth composition of that percentile.

**Table 3. % Composition of wealth for the top 1%**

| Year | Real estates | Equity Shares | Other assets | Total |
|---|---|---|---|---|
| 1988 | 54.29% | 22.19% | 23.52% | 100.00% |
| 1989 | 57.51% | 21.00% | 21.49% | 100.00% |
| 1990 | 60.82% | 18.10% | 21.08% | 100.00% |
| 1991 | 62.04% | 17.17% | 20.79% | 100.00% |
| 1992 | 60.92% | 17.16% | 21.93% | 100.00% |
| 1993 | 58.62% | 17.29% | 24.09% | 100.00% |
| 1994 | 60.79% | 15.73% | 23.48% | 100.00% |
| 1995 | 61.03% | 16.29% | 22.68% | 100.00% |
| 1996 | 62.11% | 18.08% | 19.81% | 100.00% |
| 1997 | 62.98% | 16.75% | 20.27% | 100.00% |
| 1998 | 63.84% | 17.94% | 18.21% | 100.00% |
| 1999 | 64.27% | 18.99% | 16.75% | 100.00% |
| 2000 | 66.66% | 19.60% | 13.74% | 100.00% |
| 2001 | 70.54% | 19.18% | 10.28% | 100.00% |
| 2002 | 76.21% | 16.72% | 7.07% | 100.00% |
| 2003 | 77.88% | 16.08% | 6.04% | 100.00% |

**Note**: Based on our series for "little used of MP" and tax fraud included. Real estates refer to urban real estates net of debts. Equity shares include closely held and traded ones, regardless of they are exempted. Other assets are all the other reported assets.

**Graph 5. Wealth share for top 1%: which asset does cause the increase?**




However, the evolution of equity shares requires a further analysis, as within this category in fact we can find different types of shares: closely-held and traded, and since

1994, in turn, exempted and not exempted. In fact, there is a widely belief that taxpayers have taken advantage of the new exemption and, therefore, have reorganised their wealth in order to meet the legal criteria to apply it. This reorganisation is named by Alvaredo and Saez (2008) as "shifting effect". For that reason, we concentrate on the evolution of the four different types of shares that may be: closely-held, traded, exempted closely-held and exempted traded. This differentiation is certainly important as the weights considerably change over time, depending on the type of share. One may think of the impact of economic cycle on the reported values of equity shares, but the most import factor seems to come from the introduction since 1994 of the family business exemption, which as we mentioned before also affects incorporated business.

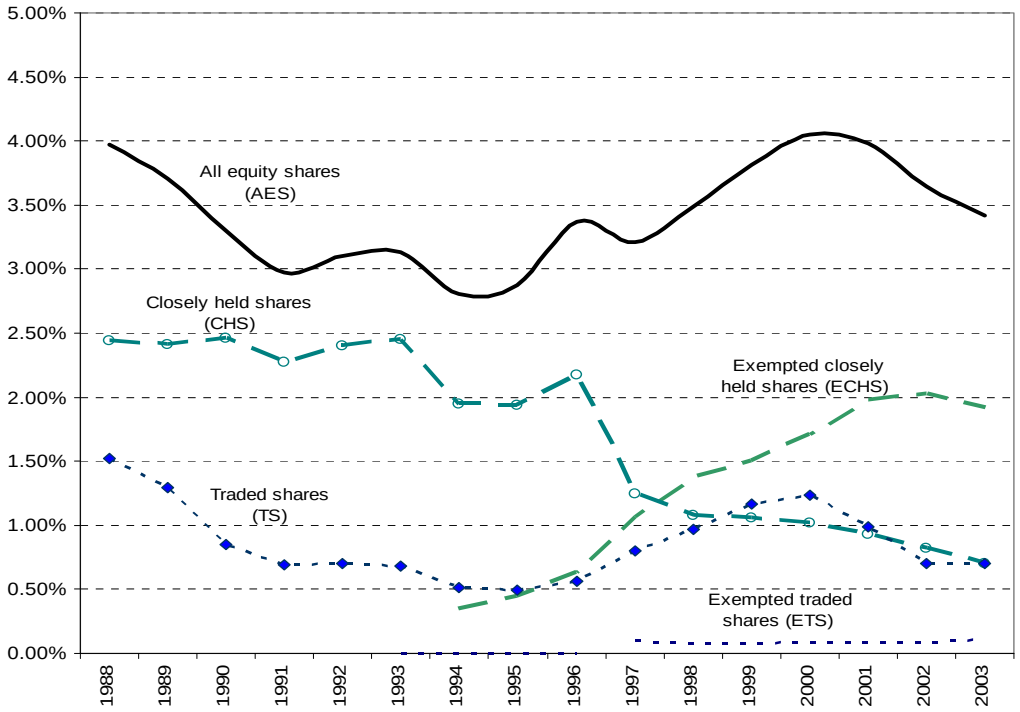
In 1994 the exempted closely-held shares only accounted for 12% of all reported shares by top 1%. In 2003, they accounted for 56% of all reported shares. In 1993, just before the introduction of the exemption, closely-held shares almost account for 80% of all shares. In 2003, they account for only 20%. As top 1% of the population reorganises his wealth, an increasing number meets the conditions to apply for the exemption. Consequently, as Graph 6 shows, the weight of not-exempted closely-held shares decreases since 1994, while before it had remained fairly stable. At the same time, the weight of exempted shares steadily rises since its adoption, at it becomes the main type of share since 1998. All closely-held shares, exempted or non-exempted, should be reported according to the same criterion of assessment and, therefore, the economic cycle should, if any, have the same effect on them. However, they follow opposite trends due to the reorganisation of businesses, as Alvaredo and Saez already (2008) show.

Traded shares are more closely related to the stock market evolution and their weights increase when the stock market rises (*e.g.* late nineties) and fall if the stock market goes down (*e.g.* the beginning of the new century). However, for traded shared, the effect of the family-business exemption is minimum, as only very few taxpayers of the top 1%, may meet the criterion for the exemption[25]. The reorganisation of businesses is less

[25] The minimum share requirement was set to 20% in 1994, between 1995 and 2002 reduced to 15% for the invidual, and to 5% since 2003. Likewise, a new minimum requirement was set to 20% for the family since 1997.

possible in this case, likely because most traded corporations belong to many shareholders and not to family groups.

**Graph 6. Equity shares for top 1%: exempted *vs.* no exempted**




**Note**: Official data about the exempted traded shares is only available since 1997. For 1997 and 1998, we assume the same distribution among taxpayers than in 1999, as for the first two years official statistics only give the whole exempted amount.

In conclusion, between 1988 and 2003 the overall level of wealth concentration clearly goes up for real estates (once we take into account fraud and update fiscal values according to MP), remains rather stable for equity shares and decreases for the other assets. Regarding equity shares, the concentration remains fairly stable because the significant increase in the exempted closely-held shares is compensated by a fall in the concentration of both not-exempted closely-held and traded shares. Nonetheless, it is commonly belief that often taxpayers do not report the exempted value, which may cause an increase in the concentration of shares for the top 1%, as the weight of exempt shares increases with wealth[26].

[26] There is a common belief that some taxpayers either did not report the exempt assets or underassessed them. In any case they would not pay WT, but they may have to pay other taxes, such as the inheritance and gift tax. Although it is difficult to demonstrate this suspicious, for instance, the comparison between the evolution in the number of taxpayers reporting business income in the income tax and the number of taxpayers reporting business assets (exempted or not) in the WT shows an opposite trend. Thus, from

Compared to other countries (Table 4), the level of wealth concentration in Spain does not seem to be high, although differences in the unit of analysis, in the data used or the consideration of tax fraud may make inter-country comparisons difficult[27]. For similar periods, the concentration of wealth also rises in Italy, Switzerland and the United Kingdom, while it goes slightly down in the United States.

**Table 4. Wealth concentration for other countries. Top 1%**

| Country | Period | Unit | Average | Minimum | Maximum |
|---|---|---|---|---|---|
| France | 1994 | Adult | 21.30% | - | - |
| Italy | 1989-2000 | Household | 11.55% | 9% in 1991 | 13.80% in 2000 |
| *Spain* | *1988-2003* | *Adult* | *19.11%* | *17.30% in 1991* | *21.82% in 2002* |
| Switzerland | 1981-1997 | Family | 33.80% | 33.04% in 1981 | 34.80% in 1997 |
| UK | 1988-2001 | Adult | 19.64% | 17% in 1988 | 23% in 2000 |
| US | 1988-2000 | Adult | 21.43% | 20.79% in 2000 | 21.96% in 1989 |

**Source**: Piketty *et al.* (2006), for France; Brandolini *et al.* (2004), for Italy; Dell *et al.* (2005), for Switzerland; Revenue & Customs (2006) for the UK; Kopczuk and Saez (2004), for the US; for Spain, our estimates based on series for "little used of MP" and including estimated tax fraud regarding real estates.

## 4. Conclusions

Tax data can be a useful source of information when carrying out concentration analysis. However, it is important to bear in mind the troubles that their use may cause. In this paper we observe that the assessment of assets (real estates), the introduction of exemptions (for owner-occupied housing), the tax unit (individual *vs.* joint taxation) and the level of tax fraud are key issues as far as the WT in Spain is concerned. Therefore, any distribution study must take into account their effects, in order to avoid misleading conclusions.

Our results show that the impact of tax fraud is a key issue regarding wealth

1994 to 2004, the number of former taxpayers reporting business income increased 11%, while the number of WT taxpayers reporting business assets went down 35%.

[27] See Davies *et al*. (2006) for a wider comparison of wealth distribution within countries and for methodology difficulties.

distribution. Thus, without taken it into account, the booming prices in real estates may be progressive, therefore, reducing the level of concentration. However, the conclusion is completely the opposite when tax fraud is considered as the top 1% share increases. According to our estimates, the overall evolution for the 1988-2003 period indicates an increase in the share of the top 1%, from 17.89% in 1988 to 21.26% in 2003, 3.37 percentage points.

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