Using Fiscal Data to Estimate the Evolution of Top Income Shares in Belgium from 1990 to 2013

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USING FISCAL DATA TO ESTIMATE THE EVOLUTION OF TOP INCOME SHARES IN BELGIUM FROM 1990 TO 2013[1]

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Abstract: Belgium is notoriously absent from the World Wealth and Income Database (http://wid.world/), the rapidly expanding international source of comparable data for research on income and wealth inequality. This paper reports on a first attempt to fill this gap. We correct and complete published data on net taxable incomes for the period 1990-2013 to comply with the standards set by the WID database, as expressed in the population control and the income control.

Our results show that inferring evolutions of the income share of the top 10% or 1% from published tables of net taxable income is highly misleading. After correction, there is little evidence that top income shares in Belgium have increased during the last 25 years. In contrast to similar analyses for the UK, US, Germany, and to a lesser extent France and the Netherlands, we do not find a clear increase in the income share of the top decile. Also, the significant increase in the income share for the top one percent in many countries, cannot easily be replicated for Belgium. However, some caution is needed. The correction for missing income, preliminary though it is, points to the crucial role played by both our definition of the income reference total and of changing definitions and/or conventions in the National Accounts.

JEL-codes: D31, D63, H20

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1.   INTRODUCTION

The recent revival of empirical research on the evolution of income inequality in rich countries is only partially matched by comparable research or insights in Belgium.[2] At the launch of the refreshed and expanded website of the World Wealth and Income Database (http://wid.world/) in December 2017, Belgium's place on the rapidly filling world map of countries present in this internationally comparable dataset of income and wealth inequality, remained uncoloured, indicating absence of reliable comparable information.[3] This paper reports on a first attempt to fill this gap.

There are of course papers and books which describe and analyse the evolution of Belgian income inequality. The Herman Deleeck Centre for Social Policy (CSB) at the University of Antwerp has a long tradition of charting Belgian income inequality, going back at least to one of the first books by Deleeck in 1977. According to the latest estimates from CSB based on survey data, Belgian income inequality was rather stable between 1985 and the late 2000s (Horemans et al. 2011, Table 2 on p.5, and Van Rie and Marx 2014). Some degree of caution is needed, since the estimates are based on three different surveys, which use different income concepts and survey methodologies.[4] If we restrict the evolution to subperiods covered by one and the same survey methodology, inequality of equivalised disposable income was either declining (from 0.281 in 1993 to 0.259 in 2000), or stable (from 0.255 in 2004 to 0.258 in 2007). Only between 1985 and 1997 was there a rise to be noted, with a rise in the Gini coefficient from 0.220 in 1985 to 0.233 in 1997. Also, measures of relative income poverty, like the equivalised disposable income being below the poverty threshold of 60 per cent of the median, indicate a stable trend. Van Rie and Marx (2014) conclude that the Belgian income inequality has remained remarkably stable over the past thirty years. That is noteworthy, given the political and economic shifts of the past decades and the fact that Belgium ranks among the most globalised countries in the world. This conclusion is echoed by the OECD (2008, 2011, 2015), which also reports only a minor change in the Belgian Gini from 0.257 in 1983 to 0.264 in 2011.[5]

Interesting though these results may be, they are not really fit to be integrated in the WID database for two main reasons. Firstly, and most importantly, the income concept underpinning the results described above is disposable household income, which is income after taxes paid and transfers received,

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[2]   A non exhaustive overview of the rapidly expanding empirical research contains Atkinson and Piketty (2007, 2010), Atkinson, Piketty and Saez (2011), Alvaredo, Atkinson, Piketty and Saez (2013), Nolan et al. (2014), OECD (2008, 2011, 2015), Roine and Waldenström (2015) and evidently the publicly available estimates of many countries in the World Wealth and Income Database (http://wid.world/).

[3]   As far as top income shares are concerned, other EU-countries still absent in the WID database and/or website are: Austria, Cyprus, Bulgaria, Croatia, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Luxembourg, Malta, Poland, Romania, Slovakia, Slovenia. Moreover, the Belgian absence is not limited to the WID database, but also in recent top income analysis by OECD (Förster, Llena-Nozal and Nafilyan 2014).

[4]   The surveys are Sociaal Economisch Panel (SEP) for 1985, 1988, 1992 and 1997, European Community Household Panel (ECHP) yearly for the years 1993-2000, and Statistics on Income and Living Conditions (EU-SILC) yearly since 2004.

[5]   According to the OECD (2015, Figure 1.3), Belgium is one of the few countries together with the Netherlands, France, Greece and Turkey where income inequality did not rise substantially in the last three decades. The OECD reports an increase of the Gini for 22 OECD-countries from 0.289 in 1985 to 0.318 in 2013, with large increases in the US (0.340 to 0.401), Germany (0.251 to 0.291), the UK (0.309 to 0.344), but also Sweden (0.198 to 0.274), be it from a much lower level.

registered for a sociological household. By contrast, the WID data primarily focus on income *before* taxes and transfers. Secondly, most of the data in the WID framework originate from administrative datasets of taxable income extracted from the fiscal forms entered by taxpayers. The above results for Belgium are all based on income reporting by respondents in *surveys*, such as SILC since 2004 (the European wide Survey on Income and Living Conditions). EUROSTAT, international institutions like OECD, IMF or World Bank and specialised think tanks like the Luxembourg Income Study mostly rely on these same datasets of disposable incomes obtained from surveys, in order to study income inequality. Not surprisingly therefore and as noted above for OECD, they also reach the same conclusion: income inequality in Belgium has not noticeably changed in the last three decades.[6]

Therefore, it is all the more surprising that the public at large, journalists and opinion makers, and many politicians seem to take it for granted that also in Belgium, like in many other Western countries, income inequality *is* on the rise. Illustrative of this is the series published in the newspaper De Standaard in 2014, under the heading "De kloof" ("The Gap"). The conclusions from the newspaper were outspoken: "as in so many other countries, *inequality in Belgium is also on the rise*". The reasons for the divergence of the public perception from the results cited above can be manifold. One reason might be that—at least in the public debate—statements about inequality are often not clearly distinguished from statements about poverty. Secondly, studies use different measures of inequality—Gini, Theil, income shares—the different properties of which do not always trickle down into popularisations of results of inequality studies. Furthermore it is unclear whether these different measures and their properties do indeed capture the intuitions of what the public at large understands by 'inequality'.[7] Finally, the way in which the inequality is analysed also plays a crucial role. Wage inequality, measured between individuals, may evolve differently from inequality in disposable income measured at the level of the sociological household. There is no prior reason to assume that inequality of the latter evolves in line with inequality of gross income of the household, when gross incomes are composed of gross earnings of all individuals active on the labour market, of gross replacement incomes and of gross incomes from capital.

As far as this income concept is concerned, the WID project has chosen income before taxes from the beginning, preferably measured as fiscal income filed by income tax filers.[8] As is clearly spelt out by Roine and Waldenström (2015), this WID choice is a return to the original idea of Kuznets (1953,

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[6]   Compared to the studies mentioned in the main text which are mostly based on survey data of disposable incomes, Valenduc (2017) is the exception, describing the evolution of Belgian inequality since 1982 based on administrative fiscal data. However, contrary to our approach, explained in Section 3, the results of Valenduc (2017) are based on the concept of taxable income *after* deductions, and the large changes in enrolment at the bottom of the distribution are corrected by trying to mimic the situation of the beginning of the period, whereas we adopt the concept of an external population control total of the WID framework.

[7]   The most obvious example is the scale or translation invariance of an inequality measure, embodying different views on how additional income of a growing pie has to be distributed to keep inequality unchanged (or how income losses have to be allocated when the pie is shrinking).

[8]   In WID language a distinction is made between 'fiscal income', which is taxable income before any deduction is applied, and 'taxable income', which is the income concept on which the rates of the — mostly — progressive personal income tax system is applied. In Belgian administrative files (like IPCAL) taxable income is referred to as 'net taxable income', where the adjective 'net' refers to the application of deductions (and hence not to the concept of disposable income after taxes).

1955), revived and extended first by Piketty (2001, 2003).[9] The main ideas of Kuznets—and the underlying motivation of its revival by Piketty—were that income tax data:

1. allow for long run comparisons of inequality changes (since income taxes have been with us since the late 19th or early 20th centuries in most Western countries);

2. have to be corrected for the income which is not present in the tax files (since not all income has to be declared); this is called the 'income control'-issue;

3. have to be corrected for the population which is not present in the tax files (since not all people have to file); this is called the 'population control'-issue.

The backbone of the WID project has been to apply this 'Kuznets-methodology' as consistently as possible across different countries, to obtain comparable series of top income shares for as many countries as possible. The two volumes of Atkinson and Piketty (2007, 2010) were the first outcome of this consistency, containing estimates for 22 countries. These are now followed by the launch of the new WID website which contains series for 57 countries from all over the world.

This paper makes a first attempt to include Belgium in this project by using income tax data to assess the change in the income shares of the top 1% and top 10% from 1990 to 2013. We are aware that this rather short period, contradicts the first of the three Kuznets-elements above (the long run analysis). But of course we hope that all is not lost, that is delayed. In this paper we mainly report on the application of population and income control to Belgian data for the cited period to investigate how crucial these corrections are for assessing the evolution of income inequality. This boils down to three major issues. First, tabulated and publicly available information concerns "net taxable income (NTI)", whereas the WID standard is gross taxable income (GTI). The difference between the two concepts consists of the numerous deductions applied to the filed gross taxable income, to arrive at the net taxable income which enters the progressive rate scheme (see section 3.2.2 for details). The gross income concept is not published, at least not in recent years.[10] Second, according to the Belgian tax legislation, most capital income is taxed by a liberating withholding tax. This means that these incomes no longer have to be declared on the tax form, leading to a serious lack of information on an important income component. Third, the actual inclusion of tax forms with zero net taxable incomes in the original administrative dataset of fiscal forms (IPCAL) has changed drastically over time. The necessity of these corrections is illustrated in section 2, where we give some preliminary prima facie evidence about the dangers of using uncorrected published tables with income tax data to analyse the evolution of income inequality. In section 3 we then describe the two essential ingredients of the WID framework, i.e. the population control (section 3.1), and the income control (section 3.2), and how we applied them to the Belgian context. Section 4 contains the main results. Limiting the description of inequality in this paper to the evolution of top income shares, we describe how the top 1% and top 10% income shares of gross

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[9] The study of inequality based on large representative household surveys, ideally even constructed as panel-data, could — in some sense, and notwithstanding their undisputed valued added in terms of newly developed econometric techniques and conceptual frameworks — be viewed as a bit of a 'detour' of the 'wishlist' of Kuznets (1953). Indeed, since these large micro-surveys only became available during the last decades, they "*shifted attention away from some issues, and in particular questions regarding long-run developments*" (Roine and Waldenström 2015, p. 471).

[10] In the published tables of earlier years, we find information on amounts that have been deducted.

income might have evolved over the last 25 years. We also compare this evolution to some other comparable countries.

A final remark concerns the fact that methodological choices made in this paper do not necessarily reflect discussions and moves made in the recent widening of the WID framework from a 'top income' literature to the broader framework of Distributional National Accounts (DINA). This DINA research agenda aims to produce annual estimates of the distribution of income and wealth that are consistent with the macroeconomic national accounts; see Alvaredo et al (2017) for a summary. Our paper more closely mimics the papers belonging to the first wave in this by now abundant literature of estimating top income shares based on fiscal data (and brought together in the two volumes by Atkinson and Piketty 2007 and 2010). But given the delay in the work on Belgian fiscal data we thought that it was useful to catch up first with the estimates of 'top income' shares based on micro data of fiscal incomes, rather than further postponing any release of comparable Belgian research. In the conclusion we outline different research tracks which necessarily have to follow this first attempt.

2.   WHAT DO WE (NOT) LEARN FROM PUBLISHED BELGIAN DATA AND WHY?

On its website http://economie.fgov.be/, Statistics Belgium makes data of filed income tax forms available in different tabulated forms (deciles, percentiles for the top decile, fixed brackets). Although the data now covers the time span 2005-2015, we obtained analogous tables for income years going back to the income year 1977.[11] These tabulations are generated from the fiscal database IPCAL, which contains microdata of the whole population of administrative tax return data. At first sight, therefore, it cannot be the unavailability of income tax data which explains the absence of Belgium in the WID dataset.

Indeed, these datasets have been used on several occasions to make statements about the evolution of income inequality in Belgium during the past four decades. Statistics Belgium itself publishes income shares of different income groups. They are based on the central concept in the fiscal dataset of 'net taxable income' for a 'fiscal unit'.[12] The newspaper series in De Standaard in 2014, cited above, was also based on this publicly available information. However, direct calculation of income shares on this information is — to put it mildly — not without its problems. We illustrate this by showing three graphs in the next three subsections, each trying to answer a straightforward question by using these uncorrected data.

2.1   EVOLUTION OF INCOME SHARES AT FIRST GLANCE

We first show income shares when only using the total net taxable income of the published tables in the denominator. figure 1 shows the evolution of this income share for three income groups: the bottom

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[11]   The last release dates from October 2017, which made the tables available for the income year 2015. The website mentions that these data are available up to income year 1976, but the earliest income year that we obtained was 1977.

[12]   Until some years ago, Statistics Belgium also displayed a steeply upward sloping time series of Gini-coefficients on its website. This Gini coefficient was calculated on the strictly positive net taxable incomes (omitting the many zero entries in the data file). At the time of writing this graph of the Gini-coefficient based on net taxable income is no longer displayed, but it can still be found e.g. in Figure 6.1 in OECD (2012).

decile, indicated as D1 and displayed as a red line on the right vertical axis; the top decile, denoted as D10, displayed as a blue line with squares and measured on the left axis; and the top percentile, denoted as P100, and displayed as the grey line with circles on the left axis. All data underlying the graphs are also tabulated in the Appendix 1. For figure 1, the details of all decile shares can be found in Table 3 in Appendix 1, and the details of the percentiles of the top decile in Table 4.

The evolution of the share of the top decile suggests that in Belgium the share of the top has increased since about 1984. Starting from a share of 33.1% in 1973, it reached a minimum of 25.4% in 1984, but rose uninterruptedly to 32.1% in 2007. In the aftermath of the financial crisis and the two recessions triggered by it, the top decile fell slightly fell back from 32.1% to 31.4% in 2013. The final two years display a minor increase to 31.7% in 2015. The evolution of the share of the top 1% of net taxable income follows a similar pattern: a substantial decrease from the start of the series—in this case 1977—from 7.5% to 5.1% in 1984, and then a restoration of the initial share up to 7.8% in 2007. Since 2007 the top percentile income share in net taxable income remains more or less stable (7.7% in 2015).

FIGURE 1: SHARE OF TOP (D10) AND BOTTOM (D1) DECILE AND OF TOP PERCENTILE (P100) BASED ON PUBLISHED DATA OF NET TAXABLE INCOME FOR THE PERIOD 1973-2013
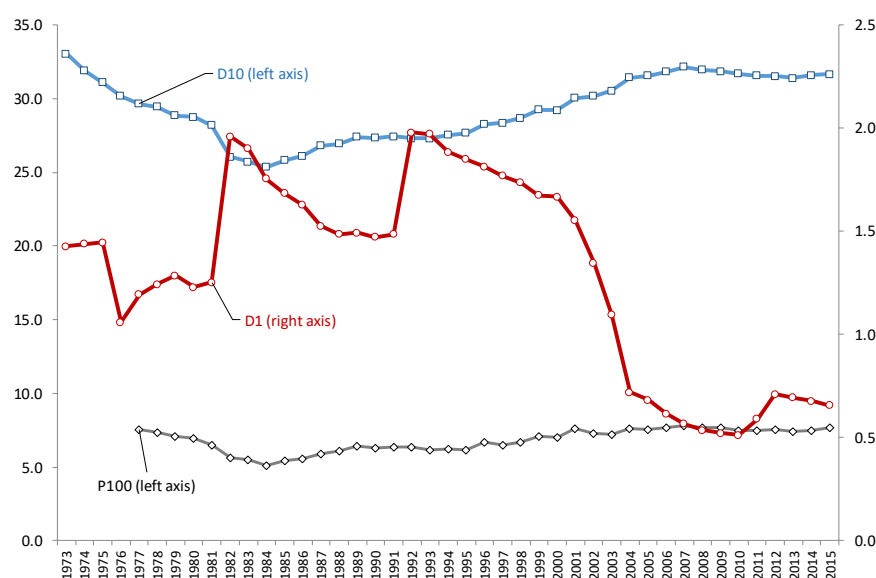
Source: own calculations based on the tables with net taxable income for deciles 1 to 10 and percentiles 91 to 100 obtained from Statistics Belgium (website 2005-2015; obtained upon request for 1977-2004). For the years 1973, 1975 and 1976 we obtained the decile shares from De Standaard. The year 1974 was absent in that file, and we simply linearly interpolated 1974 from the data of 1973 and 1975.

However, the display of the evolution of the income share of the bottom decile can but alarm us about the underlying data. The bumps in several single years are illustrative of the vulnerability of administrative datasets of income tax data, which are, naturally, dependent on changes in the tax legislation. Between 1981 and 1982 the share of the bottom 10% jumped from 1.3% to 2%, and something similar happened between 1991 and 1992 (from 1.5% to 2%). The jump in 1982 is probably due to changes in the tax treatment of replacement incomes, which from 1982 onwards, switched from a deduction to a tax reduction. The deductions, applied before 1982, lowered net taxable income, which

is calculated net of deductions. The replacement of the deductions by tax reductions hence increased the registered net taxable income, although gross income and income after taxes might have been unaffected. In 1992 also, deductions of gross taxable income were transformed into tax reductions (i.e. the deductions for life insurance premiums, for group insurances (supplementary pension schemes) and for the part of capital repayment in the mortgage of an owner-occupied house), although it is doubtful whether this might have been of considerable importance for the bottom decile. Thus, the administrative decision to start with the enrolment of the (small) taxable incomes of student jobs in the IPCALfile, might be more relevant to explain the jump in 1992.[13]

Anyhow, it seems as if analysing shares in net taxable income to study the evolution of income inequality, is a non-starter, since the results will be affected too much by changes in tax legislation, which affects the content of concepts like net taxable income. The least we should aim for is to try to work with gross taxable income to neutralise these changes in tax legislation. Only then can we answer the question of whether the decline of the share of the bottom decile from its maximum of 2% in 1992 to 1.7% in 2000, the further rapid acceleration of this decline during the period 2000-2004, and the levelling off of the decrease to a low of 0.5% in 2010 (which is a share four times smaller than two decades earlier) captures a 'real' phenomenon, or is an artefact of the data.

2.2   GROWTH IN TAXABLE INCOME

The hazardousness of relying on the published net taxable income data is confirmed by figure 2, which displays year by year growth of net taxable income (for details see Table 6 in the appendix). In the upper panel we show the growth rate of net taxable income for the whole population of fiscal households, and for income subgroups (the bottom decile, the top decile, and the top percentile). In the bottom panel we compare growth in total net taxable income for the fiscal population to growth of nominal GDP.

The capriciousness of the growth rate of net taxable income for the bottom decile (+80.7% in 1982, +43.7% in 1992, but -9.3%, -15.5% and -31.2% in 2002, 2003, and 2004 respectively) again betrays changes in the tax legislation which have either incited people with low taxable incomes to file when they had no incentive to do so before, and/or changes in deduction possibilities that have produced more low net taxable incomes. The outspoken increases in taxable income in the bottom decile in 1982 and 1992 confirm the explanations already listed above when discussing the share of the bottom decile in figure 1. The significant decrease of net taxable income in the period 2001-2004 probably has to do with personal income tax reform in that period (the so-called Reynders reform) which turned the tax reduction for dependent children into a genuine, i.e. refundable, tax credit. Taxpayers who had not been enrolled before, were now enrolled, because otherwise they would not get their reimbursement.

The behaviour of the growth rate of net taxable income at the top of the distribution is at least as worrying. Net taxable income of the top 1% decreased (e.g. by 4.4% in 1984), but was then followed by a 10.4% increase in 1985. An increase of 12.2% in 1996 is followed by 0.7% in 1997. To explain this capricious movement at the top of the distribution is less straightforward than for changes at the

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[13]   We are grateful to Christian Valenduc of the Ministry of Finance for providing us with at least some explanations for the observed kinks and jumps in Figures 1, 2 and 3.

bottom, but it is nonetheless difficult to imagine that this volatility would only reflect real changes in taxable incomes for this subgroup.[14]

FIGURE 2: COMPARISON OF GROWTH OF NET TAXABLE INCOME FOR DECILE 1, AND PERCENTILE 100 WITH AVERAGE GROWTH OF NET TAXABLE INCOME IN PUBLISHED DATA
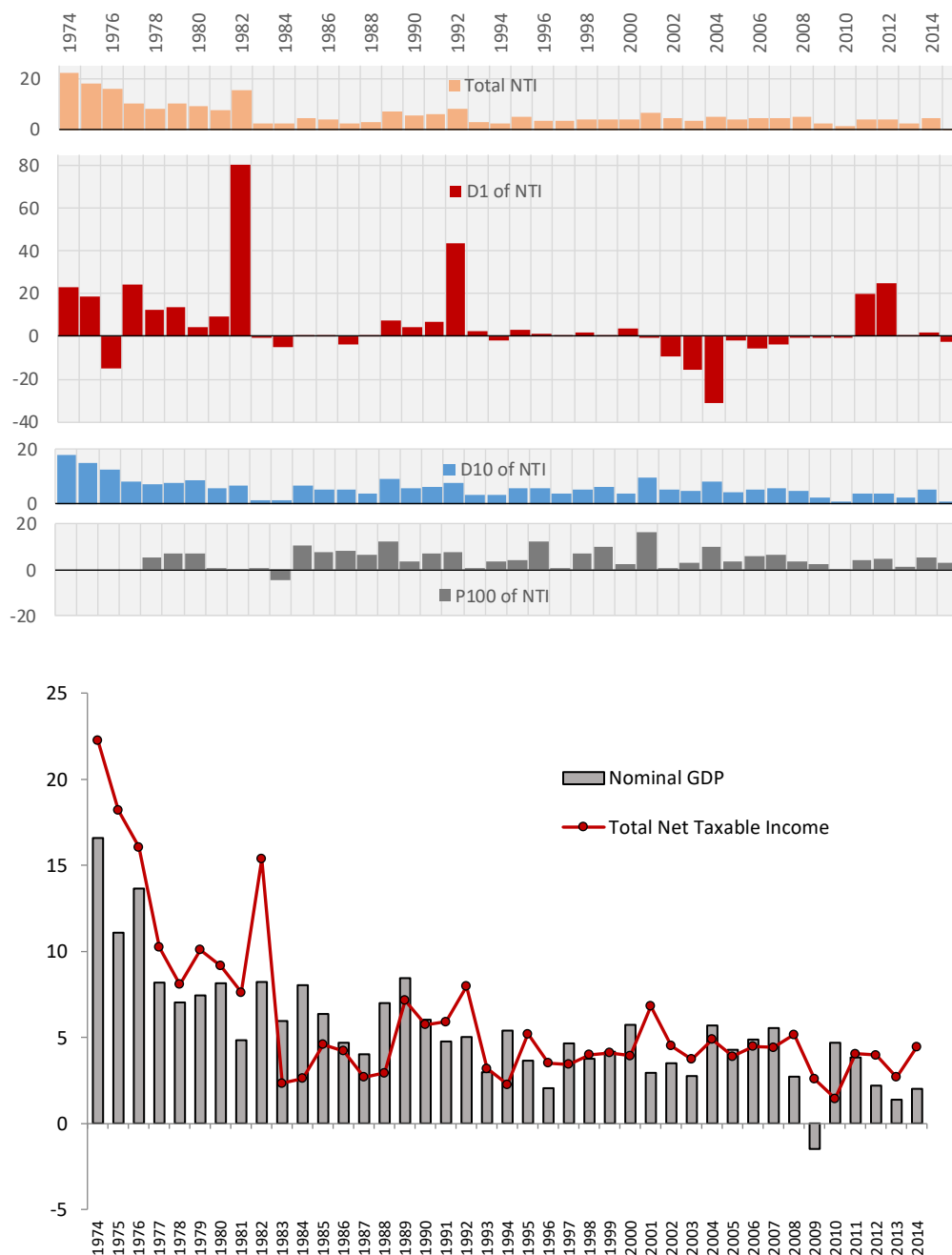
Source: own calculations based on the information on net taxable income as explained in the note of figure 1.

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[14]   In the period 1981-1984 social security contributions for incomes exceeding 3 million euros have been introduced as part of the fiscal consolidation plan in that period. Since net taxable income is an income concept net of social security contributions, the decrease of taxable income at the top, might be a genuine effect here.

The bottom panel of figure 2 illustrates that the comparison of growth in net taxable income with the growth of nominal GDP is also mixed. From the start of the period until about 1982, net taxable income grew faster than nominal GDP. In 1982 the difference in growth rates even amounted to 7.2%, with nominal GDP increasing by 8.2%, and net taxable income by 15.4% (whereas the growth in NTI fell back to 2.3% in 1983).[15] This was followed by a period until 2007 in which taxable income mostly grew slower than nominal GDP, except in certain years (1991-1992, 1995-1996 and 2001-2003). One of the crucial elements in the Kuznets and WID methodology is to at least compare aggregate net taxable income with national accounts aggregates (which, as we will show below, will of course not be nominal GDP, but a concept relating to household income).

2.3   THE NUMBER OF FISCAL FORMS WITH ZERO NET TAXABLE INCOME

Finally, figure 3 (and Table 5 in the appendix) shows the number of tax forms with a net taxable income equal to zero. Net taxable income can be zero, either because a taxpayer filed a gross taxable income of zero (and had an incentive or an obligation to do that), or because with a strictly positive gross taxable income, deductions were large enough to reduce the corresponding net taxable income to zero. All calculations by Statistics Belgium are only based on records which have a strictly positive net taxable income, but Statistics Belgium also reports the number of zeroes in the file. That is what is shown in figure 3. Although aggregate net taxable income is of course unaffected by tax payers who have a net taxable income equal to zero, the boundaries of income groups might be severely affected by the changing presence (or absence) of zeroes in the income tax dataset.

The conclusion from figure 3 is still more outspoken than in the previous two figures: only changes in tax legislation and/or administrative practice can explain the rapid and sudden increase of the number of zeroes between 2001 (27 586) and 2004 (473 982). Again the change to refundable tax credits partially explains the observation. Previous to the existence of refundable tax credits, a tax officer who got a tax form from an unemployed person who filed a strictly positive unemployment benefit, but who had to pay no taxes due to the deductions, was not enrolled. Once the tax reduction became refundable, this tax officer effectively enrolled this person.[16] In 2002 the tax administration therefore decided to start the systematic enrolment of all possible fiscal units, even if the expected net taxable income would be zero.

The continued increase from 2004 to 2010 (up to 664 674 zeroes in 2010) might be testimony to the gradual implementation of the decision to enrol everybody in 2002. We have however no immediate explanation for the significant decline of the number of zeroes after the peak in 2010 (the number of zeroes dropped by nearly 90 000 in 2011).

In summary: both the concept of net taxable income, and the form in which the tables are produced (by omitting the zeroes) hinder a robust analysis of the evolution of income shares over time. This all

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[15]   As explained above, part of the explanation for this discrepancy might be found in the transition from tax deductions to reductions of the tax liability itself. When the income data for 2014 was released at the end of 2015, Statistics Belgium explicitly pointed to the transformation of remaining tax deductions into tax reductions in the context of the regional split of personal income taxes due to the 6th institutional reform, to explain the growth of net taxable income in 2014.

[16]   It was even possible that, based on experience of previous years, tax officers decided not to send a tax form to fiscal units of whom they anticipated that they would not be liable for paying a positive tax.

supports the fact that external totals for the reference population and the control income are needed for Belgium, something discussed and developed in the following sections.

FIGURE 3: EVOLUTION OF THE NUMBER OF TAX FORMS WITH ZERO NET TAXABLE INCOME IN PUBLICLY AVAILABLE INCOME TAX DATA
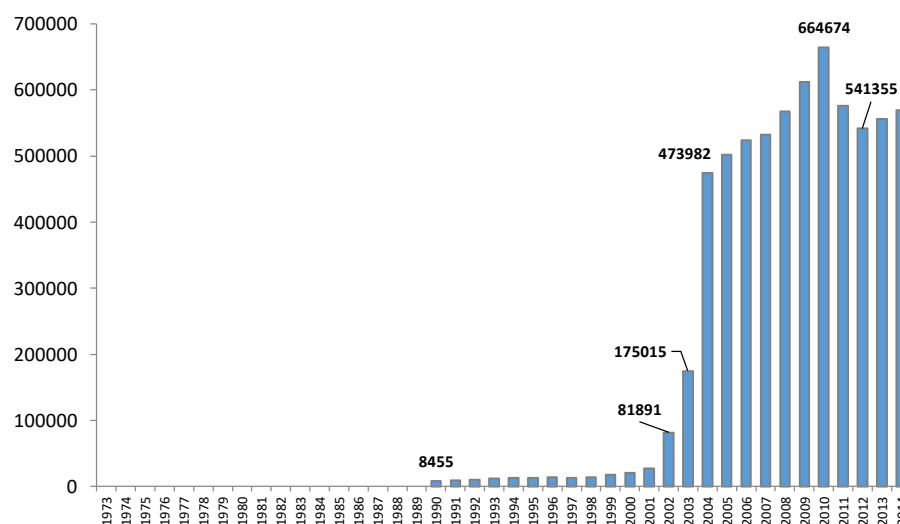
Source: series obtained from Statistics Belgium starting in 1990.

3.   THE FRAMEWORK OF THE WORLD WEALTH AND INCOME DATABASE (WID)

In this section we mainly follow Atkinson (2007) to explain the choices we made to construct a reference total for population and for aggregate income which are as independent as possible from the changing tax legislation. As noted at the end of the introduction, this is mainly inspired by the choices made in the original wave of WID work, and does not necessarily fit with the latest proposals for integration of the work into the DINAframework as discussed by Alvaredo et al. (2017).

3.1   THE POPULATION CONTROL

figure 3 made clear how administrative decisions about enrolment in the micro-dataset with fiscal forms have a huge impact on the 'bottom' of the distribution of net taxable income. Statistics Belgium takes this into account by removing the zero net taxable incomes when calculating income shares for subgroups. As far as the aggregate income in the numerator of income shares is concerned, this is of course an innocuous operation. But it does influence the composition of the different income subgroups, such as deciles and percentiles. Moreover, since we will try to estimate shares based on taxable income before deductions (called 'fiscal income' in WID), some — many? — zero taxable incomes are not effectively zero, but follow from a strictly positive taxable income before deductions. In section 3.2 we describe how we reconstruct fiscal income (before deductions) starting from observed net taxable income. Here we focus on the reference population.

The reference for the population is determined as the maximum possible number of fiscal households. We determined this maximum by starting from the age structure in EUROSTAT demographic data,

and selecting the population of all individuals strictly older than 15 years (see column 4 in Table 5 in the appendix). Since fiscal households consist either of married or cohabitating couples, or of singles, we subtract from the population of individuals the number of married or cohabitating couples (column 5 in Table 5 in the appendix). The result is depicted as the red line in figure 4, and is our population control total, with which we can compare the actual number of fiscal households in the administrative data.

FIGURE 4: EVOLUTION OF FISCAL UNITS, ZERO NET TAXABLE INCOMES AND COMPARISON WITH POPULATION CONTROL
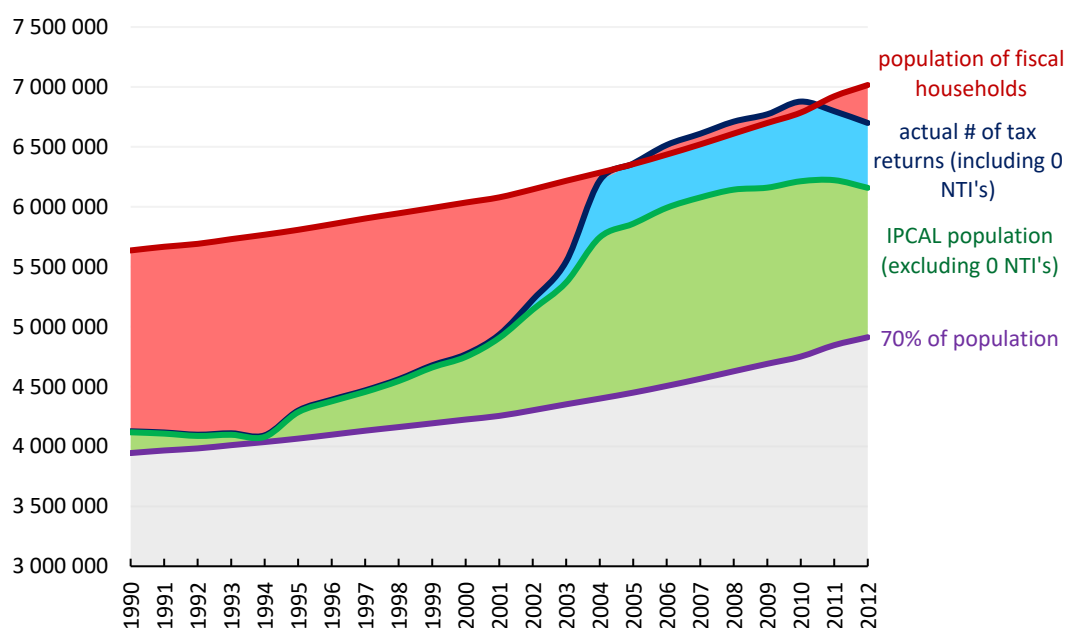
Source: own calculations based on EUROSTAT demographic data, and the number of tax returns published by Statistics Belgium. We only have information on the number of zero net taxable incomes since 1990.

The actual number of tax returns, both with strictly positive net taxable income and the zeroes, is depicted as the dark blue line in figure 4. The green line represents the number tax forms with a strictly positive net taxable income. The largest distance between the number of strictly positive net taxable incomes and the reference total was a bit less than 30% of the reference population in 1994. We have therefore, for comparison purposes only, also drawn a line for 70% of the reference population of fiscal households. The administrative decision to gradually enrol all potential tax filers in the dataset from 2002 onwards is revealed here as the widening gap between the blue and the green curve. Before 2002, taxpayers with zero net taxable income belonged to the red zone (the difference between the reference population and the actual number of administrative tax records).

In 2005 the actual number of tax forms (including the zeroes) nearly exactly matched our estimated reference population. But, remarkably, between 2005 and 2010, the number of tax forms even exceeded the reference total (which was constructed as the maximal possible number of tax returns). We see two possible reasons. Either we underestimated the maximal size of population of fiscal units (e.g. by overestimating the number of married or cohabitating couples). Or, some minors (15 years or younger) file a tax form independently from their parent(s). This might be the case if they have their own income,

such as an alimony directly paid to the child, which will be declared on a separate tax form.[17] This comparison of the actual number of tax forms with the reference population nonetheless deserves further scrutiny in future research, also because we have no immediate explanation for the recent drop in the ratio of actual tax forms over the reference population (in 2012 it had dropped back to 95.5% from 101.4% in 2010).

To correct the published net taxable income data for the varying number of zeroes, we have contented ourselves in this paper with filling the bottom of the distribution with zero gross taxable incomes until the gap between the actual number of tax returns and the reference population was closed for each year. As mentioned in footnote 6 in the introduction, this is one of the important differences with Valenduc (2017). To remove the effect of changes in the practice of enrolment, Valenduc (2017) tries to keep the effective enrolment fixed as it was in the beginning of the period, by *removing* low and zero incomes in later periods. In our view this introduces a quite ad hoc and arbitrary reference point in time. We prefer an external population reference total which itself evolves over time. Our inserting of zero gross taxable incomes at the bottom evidently has no impact on the income aggregates. These are corrected anyway, as explained in section 3.2. But it does redefine the income groups, by changing the quantile value, i.e. the income value where a decile or percentile starts.

3.2   *INCOME CONTROL*

Income shares are calculated with aggregate income in the denominator. To dispose of a consistent aggregate income series is therefore crucial in the description of the evolution of income shares. Section 2 sufficiently showed that, even for the relatively brief history since 1977, the uncorrected total of published net taxable income, cannot play this role. This is mainly due to (changes in) tax legislation and hence this deficiency will only become more pronounced when, in future work, we will try to expand the analysis to previous time periods.

From the outset, the Kuznets-approach and its revival tried to reconcile the choice for income tax data as the main data source with the aim to obtain a description of the distribution of a broader income concept than the one available in the income tax data. The construction of the preferred reference total of income will always depend on the research questions one wants to answer, and in essence two routes can be followed. Either one starts from the income tax data, and adds missing income to arrive at the broader income concept. Or one starts from this broader concept and identifies the elements which make up for the difference with the income recorded in the income tax data. These two possibilities are summarised in figure 5, a slightly adapted version of a table in Atkinson, Piketty and Saez (2011), which already appeared in Atkinson (2007).

When starting on top of the table, the national accounts aggregate, called 'personal sector income' (row 1) plays the leading role. It is mentioned separately here from the more relevant 'household sector income' in row 3 since in some countries only the macro-economic aggregate from row (1) is available as the sum of the national accounts sectors S14 and S15. In Belgium though, the information on row 3 is separately available in the form of the account of sector S14.

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[17]   Other income of minors (e.g. rental income or from inherited financial assets) is added into the fiscal form of the parents. We are grateful to Christian Valenduc for clarifying this.

FIGURE 5: STEPS FROM MACROECONOMIC AGGREGATE 'PERSONAL SECTOR INCOME' TO OBSERVED NET TAXABLE INCOME OF FILERS IN PERSONAL INCOME TAX RECORDS

(1)		**Personal sector total income**
(2)	minus	Non-household income (Non-profit institutions such as charities)
(3)		Household sector total income
(4)	minus	Items not included in tax base (e.g employers' social security contributions and—in some countries—employees' social security contributions, imputed rent on owner-occupied houses and non-taxable transfer payments)
(5)		**Reference Income: Household gross income returnable to tax authorities**
(6)	minus	Taxable income not declared by filers in the personal income tax declaration
(7)	minus	Taxable income of non-filers
(8)		Declared gross taxable income of filers
(9)	minus	deductions of gross taxable income
(10)		**Published net taxable income**

Source: Based on Atkinson, Piketty and Saez (2011), p. 17, also available in Atkinson (2007), p. 30.
Row numbers and the addition in the description of row (6) 'in the personal income tax declaration' is ours.
We also added rows (9) and (10).

The income reference we have used to determine how much income is missing in the published taxable income, is found on row 5. It differs from row 3 by subtracting income items which are not—and have never been—included in the tax base, such as social security contributions (both from employers and employees), but also non-taxable transfer payments such as child allowances, study grants, social minima, etc.. Note that imputed rent on owner-occupied houses, (mentioned in figure 5 as not belonging to the tax base), effectively belongs to the personal income tax base in Belgium, be it that the estimation of imputed rent is way below the market rental value. Hence, in the construction of the income control for Belgium, we have integrated the national accounts estimate of owner occupied housing into the income control. Due to the liberating withholding tax on income from financial assets, row (6) consists of most of the income from financial assets accruing to natural persons. In fact, personal income tax files in Belgium mainly provide information on wage and salary earnings and on taxable transfer incomes, which are mostly replacement incomes such as pensions, unemployment benefits, and sickness and invalidity payments. The other differences between the income reference in row (5) and the taxable income we observe in the published tables consist of the income of non-filers and of the difference between gross taxable income and the published net taxable income after deductions have been applied.

The final aim of embedding the income distribution analysis in a comprehensive national accounts perspective is to describe the distribution of the income control total across households or individuals in the population. This consist of two distinct steps:

(a) calculate the income reference from the national accounts (calculating row (5) in figure 5); we describe this in detail in Section 3.2.1 below;

(b) when starting from administrative files, such as published net taxable income in row (10) in figure 5, complement this published taxable income with information on the magnitude

and the distribution of rows (6), (7) and (9) to bring it as closely as possible to the income concept of row (5).

In this paper we only partially succeeded in reconstructing the distribution of the income control itself. As we will describe in in Section 3.2.2., we were able to move up from row (10) to row (9) by adding back applied deductions to the net taxable income at the levels of individual tax filers. We hence recover total 'declared gross taxable income of filers' in row (8), and also its distribution. However, we have no information about row (6) and (7) at the level of individuals or households. This confines the analysis in this paper to a description of the evolution of the income we are missing, the latter being defined as the difference between the income control in row (5) and the total declared gross income in row (8). Only by making additional assumptions about how this missing income might be distributed, could we progress further in the distributional analysis. We now discuss each of these two steps in turn in sections 3.2.1 and 3.2.2.

3.2.1   Calculation of the income reference from the national accounts

Two important choices underlie the construction of the income control in this paper. First, we base the income control total on national accounts aggregates within institutional sector S14 (i.e. the household sector) only. That means that balances of primary incomes in other sectors do not belong to the income control.[18] Certainly for the balance of primary income in sectors S11 and S12, also known as 'undistributed profits' or 'retained earnings' one might put forward arguments to integrate this non distributed part of valued added – in full or partially – in the income reference total.

Second, we construct the income control as the sum of separate entries in the account of sector S14. Table 1 illustrates – for income year 2013 – how we have constructed the income control based on these national accounts itemisation in sector S14. We distinguish four income components: wages and salaries, replacement incomes, rental income (actual and imputed rents), and income from property (interests, dividends etc.). For each aggregate in the national accounts, we indicate whether we include it in the income control ("+" in the column with header 'Role in IC'), subtract it ("-"), or neglect it ("0"). For example since wages and salaries (code D.11, €150 331 million in 2013) are exclusive of employer social security contributions, but inclusive of employee social security contributions, we subtract the employee social security contributions (code D.613, €23 655 million in 2013). This illustrates how we still aim at a reference total which is aligned with or determined by tax legislation. In some countries social (employee) security contributions do effectively appear on the tax form, but are deductible. In that case they could be included in the construction of 'fiscal income'. This again illustrates how necessary the standardisation accomplished by the WID project is, if one wants to obtain intercountry and intertemporal comparability.

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[18]   The other sectors being S11 (non-financial corporations), S12 (financial corporations), S13 (general government) and S15 (non-profit institutions serving households). We consider the sum of net balances of primary incomes (B5n in the national accounts) over the five institutional sectors as 'net national income', NNI.

TABLE 1: CONSTRUCTION INCOME CONTROL ON BELGIAN NATIONAL ACCOUNTS AGGREGATES SECTOR S14 - ILLUSTRATION FOR 2013 IN MILLION €

Description	Code	SUT	Account	Account Description	Role in IC	value	Fiscal Data in mio €	% NA
Labour Income components in National Accounts								
Wages and salaries	D.11	Resources	II.1.2	Allocation of primary income account	+	150 331		
Households' actual social contributions	D.613	Uses	II.2	Secondary distrib. of income account	-	23 655		
Households' social contributions supplements	D.614	Uses	II.2	Secondary distri. of income account	-	2 241		
Gross mixed income	B.3g	Resources	II.1.2	Allocation of primary income account	+	25 362		
Consumption fixed capital on gross mixed income	P51C2			*see note (a)*	-	2 689		
(1)				*NA- Taxable Labour Income*		**147 108**	**159 955**	**107.8**
Replacement Income components in National Accounts								
Social security benefits in cash	D.621	Resources	II.2	Secondary distrib. of income account	+	52 990		
Other social insurance benefits	D.622	Resources	II.2	Secondary distrib. of income account	+	21 733		
Social assistance benefits in cash	D.623	Resources	II.2	Secondary distrib. of income account	**0**	4 610		
Non-life insurance claims	D.72	Resources	II.2	Secondary distrib. of income account	+	3 737		
(2)				*NA-Taxable Replacement Income*		**78 461**	**57 433**	**73.2**
Actual and Imputed Rents in National Accounts								
Gross operating surplus	B.2g	Resources	II.1.2	Allocation of primary income account	+	22 020		
Consumption fixed capital on gross operating surplus	P51C1			*see note (a)*	-	14 857		
(3)				*NA-Taxable Rental Income*		**7 163**	**5 207**	**72.7**
Property Income components in National Accounts								
Total interest before allocation of FISIM	D.41g	Resources	II.1.2	Allocation of primary income account	+	6 819		
Dividends	D.421	Resources	II.1.2	Allocation of primary income account	+	12 970		
Investment income attrib. to insurance policy holders	D.441	Resources	II.1.2	Allocation of primary income account	+	6 558		
Investment income payable on pension entitlements	D.442	Resources	II.1.2	Allocation of primary income account	+	2 010		
Investm. income attrib. to coll. invest. fund shareholders	D.443	Resources	II.1.2	Allocation of primary income account	+	2 440		
Rents	D.45	Resources	II.1.2	Allocation of primary income account	+	527		
(4)				*NA-Taxable Income from Property*		**31 323**	**1 009**	**3.2**
(5) = (1) + (2) = (3) + (4)				**NA-Income Control**		**264 054**	**224 063**	**84.9**
Net Balance of Primary Income in Sector S14 (B5n)						266 868		84.0
Net National Income						321 402		69.7
Pre Tax Personal Factor Income						329 340		68.1
GDP						392 699		57.1

Source: Own calculations based on download of National Accounts from NBB.Stat in October 2015, except for Net National Income and Personal Sector Pre Tax Income, downloaded in November 2017.

(a)   split of consumption of fixed capital between mixed income and gross operating surplus obtained from National Bank of Belgium

Less ad hoc is the subtraction of the depreciation (or consumption of fixed capital, code P51), both for mixed income of unincorporated business and for the gross operating surplus, which is mainly imputed and actually received rents.[19] In the component 'Replacement Incomes' we have not yet corrected the national accounts aggregate for elements which are not (and have never been) taxable, as for instance child allowances, or study grants.[20] They are included in the item under code D.622. Social assistance benefits in cash however are separately available in the national accounts (code D.623), and we have not included them in the income control total.

For the income year 2013, this gives us an income reference of €264 054 million. This income reference is the in principle taxable income which we would like to find in comprehensive tax files, and the distribution of which we would like to follow over time. The two rightmost columns of Table 1 allow to compare this income reference with what we observe in the fiscal data (after the operation described in section 3.2.2 to calculate back up to gross taxable income). Overall the fiscal data reveal 84.9% of income in 2013, and hence we miss a bit less than 15% of what we consider as 'in principle' taxable income in the tax files. Not surprisingly, this fraction varies considerably across the four income components. Compared to the income total in the national accounts, nearly all of the income from property is missing in the tax files (96.8%). For income from dwelling services and replacement income the fraction reported is about 73%. For labour income we have even more income reported in the administrative tax files than the corresponding item in the national accounts. Below we will describe how the missing income evolves over time.

Other income control totals are possible than the one illustrated in Table 1. This is illustrated in the bottom rows of Table 1. First we could have taken the net balance of primary incomes (code B5n in the national accounts) directly from the aggregate in sector S14, instead of calculating it from the bottom up. This would give a very similar income control in 2013: € 267bn instead of €264. The other three candidates in the three bottom rows of Table 1 differ much more, since in this case income aggregates from other institutional sectors are added to the household sector. The broadest net income concept is 'net national income' calculated here as the sum of the net balances of primary incomes of the five sectors. If we would take this as the external income control, then the coverage of the fiscal data is reduced to 69.7%. A more reasonable other candidate for an external income control is what is called by Alvaredo et al. (2017) 'Pre tax Personal Factor Income', amounting to €329bn in 2013. It mainly differs from our income control in adding the net balance of primary incomes in sector S11 and S12, and hence also considering the retained earnings or undistributed profits as part of the potential tax base.[21] The coverage of the fiscal data compared to this broader reference income is now further reduced to 68.1% in 2013.

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[19]   The split of code P51 into a part attributed to consumption of fixed capital for the mixed income from unincorporated business, and a part to be applied on the gross operating surplus, was obtained confidentially from the National Accounts team of the National Bank.

[20]   Again, it is an ongoing discussion whether child allowances, which have never been taxed, should be included in the income reference when the latter aims to measure "in principle taxable income". Several studies have made different choices in this respect, and both options can be defended.

[21]   To be precise, following Alvaredo et al. (2017), we calculated Pre Tax Personal Factor Income as the sum of net balance of primary incomes (B5n) of sector S14, the B5n's for sectors S11 and S12, plus the net taxes on production (D2-D3) received by the sector S13 (General Government). In some cases one

We applied the summation and subtraction of the national accounts aggregates as described in Table 1 for the years 1985-2014. For 1995 to 2014 we downloaded the Annual Detailed Sector Accounts for Sector S14, which are in ESA10 format.[22] From the National Accounts team at the Belgian National Bank we obtained the historical series of the S14-sector account 1985-1995, which is still in the ESA-95 standard. To obtain a series for the whole period in the ESA10-standard, we first defined a similar income control as the one for the ESA10 standard on the ESA95 data for 1985-1995. To transform this income control for the years 1985-1994 from ESA95 terms into ESA10 terms, we used the information of the overlapping year 1995. For each income component we applied the growth rate backwards from 1995 to 1985.[23] We show the evolution of the income control, compared to other reference totals in figure 6.

FIGURE 6: RATIO OF THE INCOME CONTROL TO GDP AND OTHER REFERENCE TOTALS
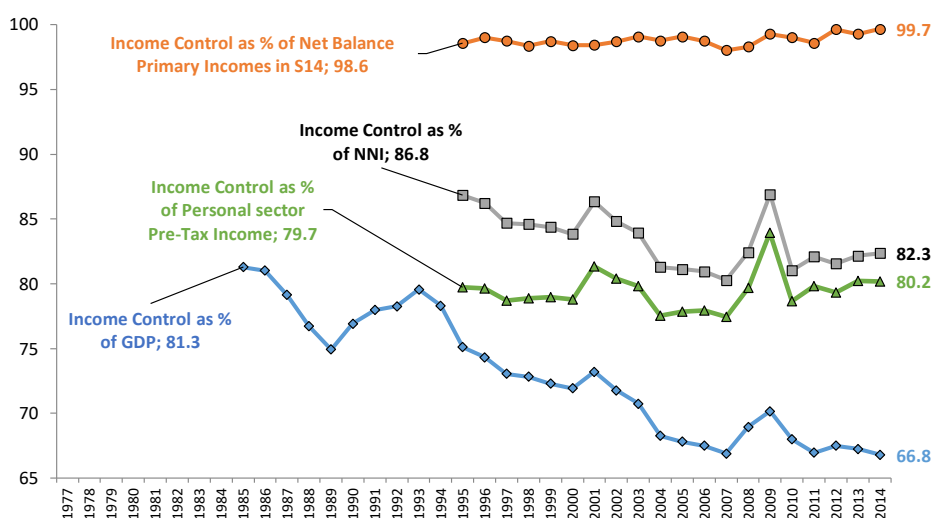
Source: own calculations based on the National Accounts from NBB.Stat, see Table 7 in appendix 1

If we consider the Income Control total as the potential tax base, the strongly declining share of the income control in % of GDP is striking (the blue line in figure 6). It might suggest that a steadily

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can advocate to add only part of the S11and S12 net balance of primary incomes. We have added the full amount here.

[22] The national accounts data we use in this paper have been downloaded on October 15 2016 from NBB.Stat.

[23] This was done income component by income component. E.g. for 1994, we calculated the income component x_{1994}^{ESA10} where x denotes the income component (e.g. wages and salaries), and the superscript the ESA-systems as follows:

$$x_{94}^{ESA10} = x_{95}^{ESA10} \times \underbrace{\frac{x_{95}^{ESA95}}{x_{94}^{ESA95}}}_{\substack{\text{growth rate of this} \\ \text{component} \\ \text{in ESA95-system}}},$$

and then add these different rescaled components into an income control for 1994 in ESA10-terms. This smoothly connects the series up to the new series starting in 1995.

increasing part of income escapes taxation. However, the other lines in figure 6 add nuance and explanation. The grey line shows the income control in % of net national income. The difference between net national income and GDP is, besides the rather unimportant net factor incomes from abroad, made up of depreciation. The percentage of depreciation increases from 15.7% of GDP in 1995 to 19.5% in 2014, explaining why an increasing part of gross value added is not found back in the taxable base. The second explanation is revealed by comparing the grey line which expresses the Income Control with respect to national income, with the green one, which uses the so-called 'Pre-tax Personal Factor Income' as the denominator. The decline of the ratio of the income control w.r.t. the broader concept has now completely been removed. This points to the explanation that an increasing part of national income is no longer located in sectors S11, S12 or S14. Indeed, the net balance of primary income of the general government sector increased from 3.1% of net national income in 1995 to 9.3% in 2013. This mainly reflects the fact that during that period interest payments on government debt were significantly reduced. Overall the income control we use in this paper makes up about 80% of pre-tax personal factor income, and the part we do not include in the income control – the retained earnings or undistributed profits – remains stable over time at about 20%.[24] Finally the line above confirms that the income control we use closely tracks the net balance of primary incomes of sector S14 in isolation.

Figure 7, which shows the relative importance of the four income components in the income control (the data can be found in Table 9 in the appendix), shows that also the composition of the income control has changed over time. The figure illustrates the unsurprising result that labour and replacement income accounts for 85% of the income control, and that the share of replacement income has increased (from 24.7% in 1985 to 29.8% in 2014). However, the figure also reveals two other important elements in the construction of the income control. The first is the importance of the transition to the new ESA10 standard in 1995. In 1995 the national account aggregate for income from property dropped from €13 945 million to €8 548 million. It was partially offset by an increase in income from property (from 24.0bn to 28.3bn). Before we can confidently add this missing income into the analysis of the top income shares, we certainly have to better understand what caused this jump.[25]

The second surprising element is that, besides the jump in the series in 1995, there is a clear decline in the share of income from property and from actual and imputed rents in the income control after 1995. In Table 10 in the appendix we tabulate the yearly growth rates of the four income components. One might indeed expect some negative growth rates of income from property and from rents in the years shortly after the financial crisis. In 2009 rental income declined by 14.4% in the national accounts, and income from property by 4.6%. But the below average growth of these two income components occurs much more frequently across the period of analysis than only during the financial crisis. Whereas labour income growth mostly mimics the growth in the income control, there are large deviations for the growth rates of rental and property income. We leave it for further research to fully understand why

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[24] This stable pattern of undistributed earnings is somehow contradicting our prior expectations. We had expected that the tendency to shift income from non-incorporated to incorporated activities (also noticed by Atkinson, Saez en Piketty 2011, p. 36) would have led to a declining ratio of the income control over the concept of pre tax personal factor income which includes undistributed profits. We leave an explanation for this surprise finding for further research.

[25] Or, still better, to dispose of a series of national account aggregates which is defined and set-up according to the same standard across the whole period of analysis. However, if we extend the analysis further back in time, this becomes less and less realistic.

rental income in the national accounts declined by 7% in 2004, or why income from property fell by 5.6%, by 3.1% and by 1.4% in three consecutive years (2002-2004). For now, we keep in mind that the income control (the denominator in income shares) deserves as much scrutiny as the income of income groups in the numerator.

FIGURE 7: SHARES OF FOUR INCOME COMPONENTS IN THE INCOME CONTROL OF THE NATIONAL ACCOUNTS (IN %)
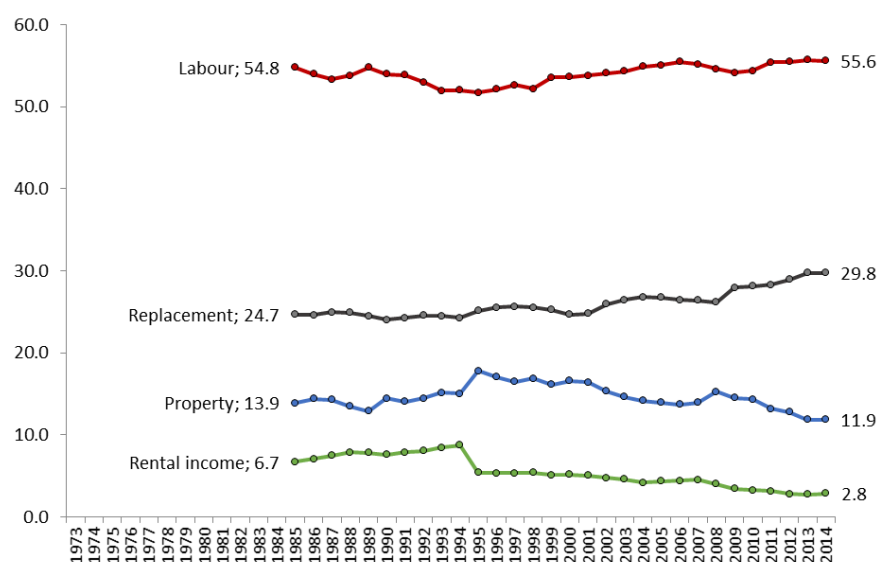
Source: own calculations based on the National Accounts from NBB.Stat, see Table 9 in appendix 1

3.2.2   Recalculating gross taxable income

We gratefully acknowledge the service by Statistics Belgium to reconstruct gross taxable income for the whole population of taxpayers in the microdata files at their disposal. They added back all deductions: for professional expenses (either the lump sum scheme, but also, if applied for by the taxpayer, the itemized deductions which had been accepted by the tax officer), and all other deductions such as for mortgages of owner occupied housing, gifts, pension savings etc.[26] They then delivered us tables with gross taxable amounts for four income components (labour income, replacement income, rental income and income from property), ordered by percentile of either labour and replacement income, or of total gross taxable income.[27]

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[26]   The deductions for professional expenses are, strictly, the costs of running business or earning the professional income, and hence they should not be considered part of the individual's taxable income. We included them in gross income for two reasons. First, to close the gap with national accounts aggregates as much as possible. Second because the use of itemized professional costs is one of the channels of tax avoidance.

[27]   We also asked Statistics Belgium to remove the income component of capitalised pension funds in the second pillar, since this seriously distorted the distributional picture by moving recipients of these one-shot large income increases into the top of the income distribution. For income from dwelling services, filed income mainly consists of an non-indexed estimated rental value of the house ('Cadastral Income').

On the one hand the service offered by Statistics Belgium allowed us to perform the calculation for the whole population of tax filers. On the other hand, since we do not have the micro-data files, our analysis—at least for now—is limited to the years for which we could have this reconstruction done, i.e. income year 1990 to income year 2013.[28] Moreover, additional analysis by re-ordering or restructuring the data beyond the delivery in percentiles, is impossible.

3.2.3   Evolution of the taxable income missing from the income tax files

figure 8 summarises the evolution of the recorded net and gross taxable income in the administrative tax files, as compared to the constructed income control. The blue line with squares shows a pronounced increased coverage of the income control by the published net tax income information. Net taxable income now makes up about three quarters of the income control (74.1% in 2014), whereas this ratio was only 57.3% in 1985. Not surprisingly the increased coverage also appears in the evolution of the gross taxable income as a percentage of the income control. The red line with dots shows that, in terms of gross taxable income, coverage of the income control total increased from 66.2% in 1990 to 84.9% in 2013. This translates into a decline of 'missing income', defined as the difference between the corresponding totals of gross taxable income in the administrative personal income tax files, and the comparable aggregate in the income control, from 33% in 1990 to about 15% in 2013.

FIGURE 8: RATIO OF NET TAXABLE INCOME IN PUBLISHED NTI-DATA TO INCOME CONTROL AND OF GROSS TAXABLE INCOME TO INCOME CONTROL AND GDP
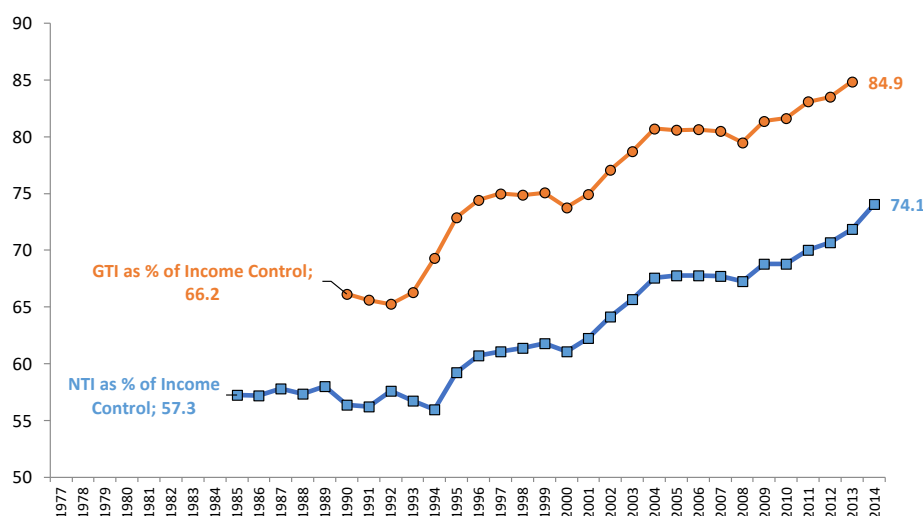
Source: own calculations based on the National Accounts from NBB.Stat and data obtained from De Standaard and Statistics Belgium. See Table 11 in appendix 1

Statistics Belgium indexed this income component with the official price index, listed year by year in Appendix 3.

[28]   In the context of other research projects – mainly the construction and use of personal income tax microsimulation models – we do dispose of samples of the tax files for the assessment years 1994, 1997, 1998, 1999, 2000, 2009, 2010, 2011, 2012 and 2013. The size of this sample mostly consists of around 30 000 tax units and contains all income variables. We leave it for future research to investigate how serious the sampling variability would affect the estimation of top income shares.

We show this steep decline of the fraction of missing income, and its decomposition in the four income components, in Figure 9. The extent to which income is missing evidently varies widely across the four components, and the overall percentage of missing income of 15% is the result of offsetting components. As already mentioned above (in footnote 24) the decline of 'missing income' is not explained by an increasing share of retained earnings or undistributed profits. It mostly has to do with an increasing enrolment of low incomes, due to the introduction of a tax credit for replacement incomes. In Figure 9, this shows up as a significant decrease in missing replacement income (from 45% of this income control component in 1990 to 26.8% in 2013). Nearly no income from property is visible in the fiscal data (missing income of 97%), mainly due to the separate taxation through the liberating withholding tax. The decline of missing income from housing from 63.5% in 1990 to 27% in 2013 however, is mainly explained by the decline of the reference total for rental income in the national accounts. Surprisingly, since 1994, we consistently find more gross labour income in the tax files, than the corresponding national accounts aggregate in the constructed income control. These two last observations clearly need further research in the future, either in scrutinising the national accounts' definitions better, or in refining the suitable income control.

FIGURE 9: EVOLUTION OF MISSING INCOME IN % OF INCOME CONTROL OF NATIONAL ACCOUNTS FOR GTI AND THE FOUR COMPONENTS
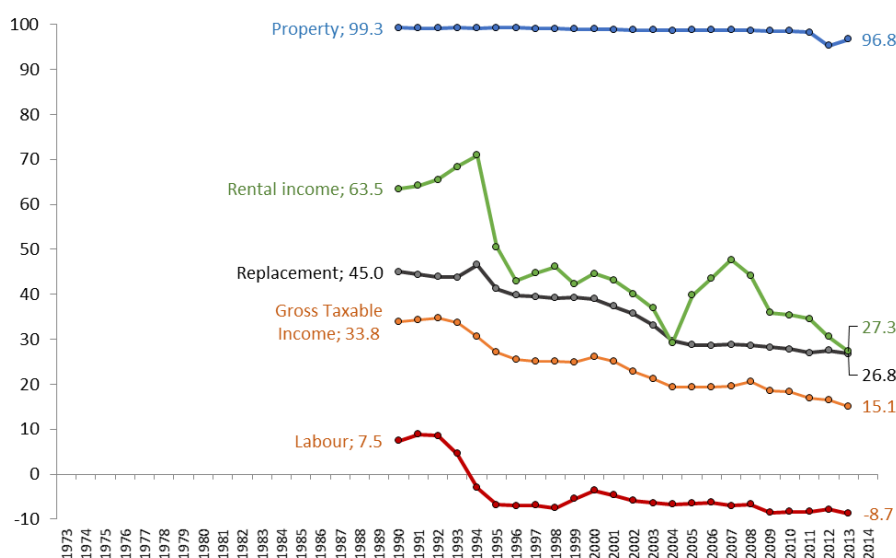
Source: own calculations based on the National Accounts from NBB.Stat, see Table 11 in appendix 1.

4.   TOP 10% AND TOP 1% SHARE OF GROSS INCOME IN THE WID-FRAMEWORK

In this section we present estimates of the evolution of the income share of the top 10% and the top 1%, taking into account the correction from net taxable income to gross taxable income and the addition of non-filers at the bottom (Section 4.1), and the allocation of missing income (Section 4.2). In Section 4.3 we compare this evolution with comparable data in the WID database.

4.1   TOP INCOME SHARES IN THE CORRECTED FISCAL DATA

figure 10 and Figure 11 compare the evolution of the income share for the top decile and the top percentile respectively, emerging from the published tables (i.e. based on net taxable income and often used in public debates) with the one based on gross taxable income and correcting for variation in filing population.

FIGURE 10: COMPARISON OF SHARE OF THE TOP DECILE (IN %) IN PUBLISHED NET TAXABLE INCOME (NTI) AND AFTER RECONSTRUCTING GROSS TAXABLE INCOME (GTI) AND CONTROLLING FOR POPULATION

Source: own calculations based on data obtained from Statistics Belgium.

Note: The blue series of gross taxable income (GTI) differs from the red series of net taxable income (NTI), by both adding the deductions, and also inserting zeroes at the bottom to comply with the population control. The grey line shows the effect of only adding additional zero incomes at the bottom. Missing income has not yet been added.

The red line displays the share when calculated on the published net taxable income without any correction. The blue line shows the income share after the two corrections have been implemented. The results are striking. If we recalculate quantile values where top decile and top percentile start by inserting zeroes at the bottom, and if we add deductions (the difference between net taxable income and gross taxable income) to come closer to the income control, the result of increasing income shares at the top of the distribution vanishes. The result is most outspoken for the top percentile (Figure 11), where the income share declines from a maximum of 9.8% in 2001 to 8.3% in 2013. Note that the level itself of the top percentile income share is much higher than the corresponding level measured on the basis of net taxable income. The same holds for the evolution of the income share of the top decile in figure 10: the income share is significantly higher than the one measured on the net taxable income

concept (35.2% compared to 31.4% in 2013). But, contrary to what is observed on the basis of the net taxable income data, since 1990 the top decile income share has not been increasing. In actual fact, it fell from a maximum of 37.5% in 1994 to 35.2% in 2013.

FIGURE 11: COMPARISON OF SHARE OF THE TOP PERCENTILE (IN %) IN PUBLISHED NET TAXABLE INCOME (NTI) AND AFTER RECONSTRUCTING GROSS TAXABLE INCOME (GTI) AND CONTROLLING FOR POPULATION

Source: own calculations based on data obtained from Statistics Belgium.

Note: The blue series of gross taxable income (GTI) differs from the red series of net taxable income (NTI), by both adding the deductions, and also inserting zeroes at the bottom to comply with the population control. The grey line shows the effect of only adding additional zero incomes at the bottom. Missing income has not yet been added

To investigate whether this striking result is mainly due to the addition of deductions, or to the redefinition of the population subgroups which form the top decile and the top percentile after we have added the bottom of the distribution, we isolated the effect of the insertion of the zero incomes on the basis of an estimated Pareto distribution. In Appendix 3 we explain how we estimated the Pareto-parameter on the basis of the tabulated information of net taxable income for the deciles and the percentiles in the top decile. We then used this Pareto-distribution in the top to infer how the quantile values and hence also the income shares for D10 and P100 changed after insertion of zeroes at the bottom to comply with the population control. The result is the grey line with diamonds in figure 10 and Figure 11. The result shows that for both the top decile and the top percentile, both corrections to the published tables are important. For the top decile the increase in the share, observed in the published tables, is removed completely when the correction needed to comply with the population control is added. For the top percentile there is still a small increase, but much less outspoken. The correction induced by adding back the income tax deductions are much more outspoken in the top percentile than in the top decile.

4.2   *ADJUSTING TO THE INCOME CONTROL OF THE NATIONAL ACCOUNTS*

The conclusion of the previous subsection is of course preliminary, since we have not yet adjusted the shares of gross fiscal income to make up for the missing income in the income control. Above, we have identified the size of the missing income. The question remains however as to how to allocate this

missing income across the distribution. Without additional information there are three obvious possibilities.

First we can calculate a *lower bound* on the income share of a given income group by adding all missing income to the other income groups. In practice this means that we use filed gross taxable income for the top decile or percentile in the numerator, and put the income control in the denominator. The point is not whether this assumption is realistic. It obviously is not, and we definitely underestimate the true income share of the top income groups (otherwise it would not be a lower bound). But the lower bound is calculated consistently over the whole time period. The mirror image of the lower bound, is the *upper bound* on the income share by adding all missing income to the top decile or percentile. The same considerations as the ones in the previous paragraphs apply here. Finally, we could assume that missing income is distributed across the income distribution in proportion to the observed income. In that case, the observed income shares would remain unaffected, and are the ones that we have already described in figure 10 and Figure 11.

The result of these three benchmark cases of allocating the missing income are tabulated in Appendix 2 Table 12 and Figure 14 for the top decile and Table 13 and Figure 15 for the top percentile). The results show – unsurprisingly – that the assumption about how to allocate the missing income is absolutely crucial to state whether the income shares of the top income groups have increased or decreased. It is indeed possible to produce an increasing share for both the top decile and the top percentile, but only when we allocate the missing income disproportionately outside these income groups, which is quite an unrealistic assumption. Moreover, the other side of the coin is that this assumption leads to a low level of the top decile income share as compared to other countries (see below, Figure 12 in Section 4.3).[29]

4.3   COMPARISON WITH OTHER COUNTRIES

In Figure 12 we compare the newly constructed income shares for the top decile with the shares of some other countries available in the WID database: neighbouring countries France, the Netherlands, Germany and the UK, and also the United States. We find that the lower bound of the income share of the top decile is much lower than in other countries, but that it is rising. If we allocate the missing income proportionately – our preferred series for the moment – , we conclude that in 1990 the income share of the top decile was higher than in France and the Netherlands, but that, contrary to the evolution in the UK, US, Germany, and to a lesser extent France and the Netherlands, the income share has not increased.

The same holds mutatis mutandis for the evolution of the top percentile, as displayed in Figure 13. As it is increasingly unrealistic to assume that all missing income has to be allocated to the top percentile, we have not displayed the upper bound in this case. But the conclusion from the analysis is that the

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[29]   In appendix 2 we also show how we can further refine the assumptions about the allocation of the missing income, by e.g. decomposing the missing income into its four income components, and differentiating the allocation according to assumed income shares of the different income components for the top decile and the top percentile. The results are in the column with header 'adjusted by income component' in Table 12 and Table 13 in appendix 2. But besides the influence on the level of the share, this more elaborate allocation confirms the decline of the top decile income share. For the top percentile even the lower bound is not increasing, except at the very beginning of the period.

pronounced increase in the income share for the top one percent in many countries, can—at least in this preliminary analysis—not easily be replicated for Belgium; the income share of the top one percent is lower than in many other countries (except for the Netherlands), and anyhow, it is not increasing.

FIGURE 12: COMPARISON OF SHARE OF TOP DECILE WITH OTHER COUNTRIES IN WID-DATABASE
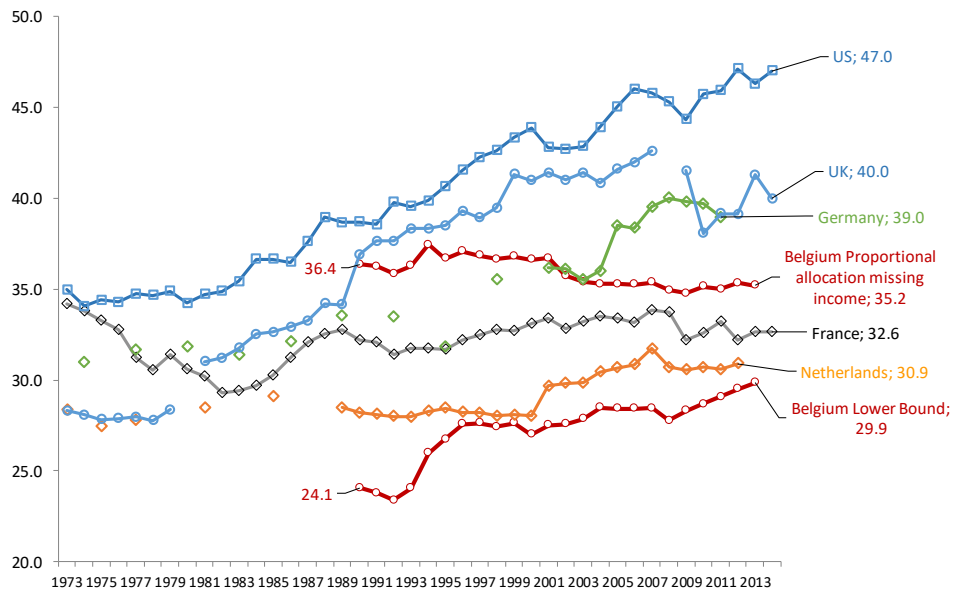
Source: Table 14 in Appendix 1

FIGURE 13: COMPARISON OF SHARE OF TOP PERCENTILE WITH OTHER COUNTRIES IN WID-DATABASE
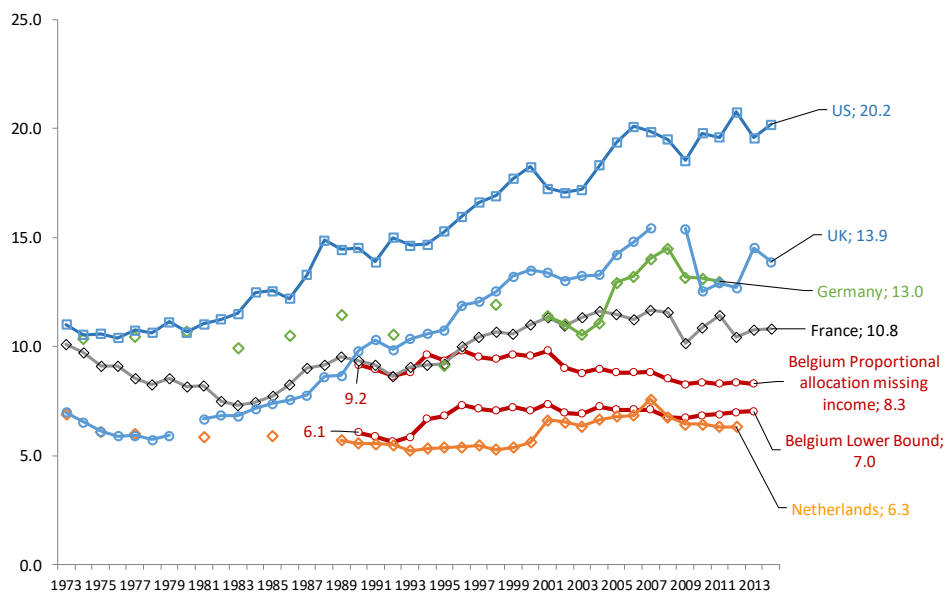
Source: Table 15 in Appendix 1

Finally we can also summarize the findings by comparing the Pareto-parameter, estimated on the gross taxable income data, both through time, and cross country. We estimated the Pareto parameter on the percentile information for the gross taxable income concept provided by Statistics Belgium, as explained in Appendix 3. In Table 2 we provide both the estimated Pareto-parameter (α) as the transformation of it (β) which can act as an inequality measure.[30]

TABLE 2 PARETO'S α FOR BELGIUM 1990-2013 AND COMPARISON WITH SELECTED OTHER COUNTRIES BASED ON THE TRANSFORMED PARAMETER β

Year	α	$\beta = \dfrac{\alpha}{\alpha - 1}$					
	Belgium	Belgium	France	Netherlands	Germany	UK	US
1990	2.50	1.67					
1991	2.56	1.64					
1992	2.63	1.61					
1993	2.60	1.63					
1994	2.44	1.70					
1995	2.47	1.68					
1996	2.36	1.73					
1997	2.43	1.70					
1998	2.44	1.70			2.49		
1999	2.40	1.72		1.43			
2000	2.40	1.71					
2001	2.35	1.74					
2002	2.49	1.67					
2003	2.54	1.65					
2004	2.47	1.68					
2005	2.53	1.66	1.83			2.28	2.82
2006	2.52	1.66					
2007	2.52	1.66					
2008	2.58	1.63					
2009	2.67	1.60					
2010	2.66	1.60					
2011	2.68	1.59					
2012	2.68	1.60					
2013	2.70	1.59					

Source:. own calculations for Belgium as explained in Appendix 3. For the other countries Atkinson, Piketty and Saez (2011), Table 6 on p. 45.

Note: See footnote 30 for the interpretation of α and β

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[30]   The Pareto-parameter α can be interpreted as the elasticity of the fraction of people above a given income level w.r.t. that income level. E.g. if $\alpha = 1.5$ then an increase of the income level by 10%, reduces the fraction of people above that income level with 15%. The lower α, the slower the fraction declines as we move up the income scale. It is easy to show that the transformation $\beta = \alpha/\alpha - 1$ gives an estimate of the ratio of average income above a given income level over that income level (see equation (16) in Appendix 3). E.g. if $\alpha = 1.5$, then $\beta = 3.0$, and – if the Pareto-distribution is the appropriate assumption, for any chosen income level, the average income above that income level is three times the chosen income level.

The results show that inequality in the top part of the distribution is lower in the Belgian fiscal data than in the other countries. For a common year 2005, the ratio of average income above a given – high – income level and the that threshold income level is 2.82 in the US and only 1.60 in Belgium. Moreover in the Belgian fiscal data this ratio is declining through time.

5.   CONCLUSION

In this paper we have made a first attempt to use filed personal income tax data to estimate income shares for the top 1% and top 10% of the income distribution, in line with the by now well established practice of the WID network. The cumulative effect of the dependency of net taxable income on changing tax legislation, and of changes in administrative practices of enrolment, renders the published tables unsuited for an assessment of the evolution of top income shares. We tried to comply with international standards by correcting the published income data from 1990 to 2013 to match a reference total for aggregate income and a reference total for the population. This correction consisted of three steps: calculating back from net taxable income to gross taxable income, redefining the borders of the top income groups by accounting for the large and changing amount of non-filers at the bottom, and assessing the magnitude of personal income which does not appear in personal income tax files due to tax legislation, tax evasion or tax fraud.

The effect of the first two corrections is substantial and unequivocal. The increasing income share for the top decile and percentile disappears and is transformed into a more or less stable income share. This is an important result when related to the finding we described in the introduction: on the basis of disposable income surveys (after taxes and transfers), there is no outspoken increase in inequality in recent decades. This might be stretched too easily into the conclusion that this points towards an increasing role of redistributive activities of the tax and transfer system, implicitly assuming that this is needed to counter increased inequality of before-tax income. If our result on the top income share is a first indication that also inequality in income before taxes has not significantly increased, the result of stable inequality in the distribution of disposable incomes comes much less as a surprise, and can be obtained without enhancing redistributive activities.

The effect of the non-observed missing income is more difficult to assess, and the results have to be interpreted with caution. First, there is the choice of how to allocate the missing income. If we apply a conservative – but obviously unrealistic – assumption, that all missing (or unobserved) income is attributed to the income groups outside the 'top', we indeed find mildly increasing top income shares. These increasing shares disappear however once we choose less unrealistic assumptions. Second, and more importantly, the size of the missing income strongly declines over the time-period considered. This is partly due to better enrolment and filing, but this effect plays mainly for replacement incomes and enrolment of other low incomes. Contrary to our prior expectations, the decline in missing income is probably not due to an outspoken shift of the allocation of net valued added from the non-incorporated to the incorporated sector (from S14 to S11 and S12). If there has been a change in the relative magnitude of the sectors in national income, it is not the increasing share of e.g. the retained earnings – i.e. the net primary balance of S11 and S12 – which catch the eye. The mild decrease in the income of the household sector is the other side of the increasing net primary balance of general government in S13, due to decreasing interest payments on government debt. However, this does not diminish our worry that, based on national accounts information on which we construct our income control, the role of rental income and of income from property within sector S14 has substantially

diminished through time. This is surprising to us, and reinforces the arguments to develop distributional analysis which fits into and is consistent with a macro-economic national accounting framework (as advocated in the DINA research agenda).

This first, but also preliminary, exercise has to—and hopefully will—be extended in several directions. The first one is the most obvious. Most studies reported in Atkinson and Piketty (2007 and 2010) stretch the analysis several decades into the past, preferably back to the First World War, and some even into the nineteenth century. Also in Belgium we have published tables of personal income taxes and related net taxable income back to the 1920's. Up until 1977, records are even available in digital and comparable form as the tables currently published on the website of Statistics Belgium. This should make the extension up to 1977 quite straightforward. Extension to 1963 – the year in which personal income taxes have been introduced in their current form – should be not that difficult neither. Second, we have already begun to explore possibilities to impute capital incomes based on microdata available in the Household Finance and Consumption Surveys of the ECB. We will compare whether this imputation can put the allocation of missing income from financial assets on a firmer footing than the benchmarks used in this paper. Third, we plan to fill in other missing parts of the distribution, such as missing replacement or subsistence incomes at the bottom, and the underestimation of property income, which is spread more uniformly across the distribution. Finally, if the preliminary results that Belgium does not follow the trend of increasing inequality in before tax income are corroborated in the further research described above, we need to understand why this is the case. By focussing on pre-tax incomes, we – at least partly – eliminate the effect of the redistributive tax and transfer system. This means that an explanation will probably lie in the working of labour and capital markets themselves.

This list of additional work to be done is sufficient testimony to the preliminary character of the results. Yet, we are convinced that this first application of the WID framework to Belgian data was useful. It allows us to determine more precisely which further data and analysis are needed, and has identified, in a proper scientific way, at least some known unknowns.

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APPENDIX 1: DETAILED TABLES

TABLE 3: SHARE OF DECILES BASED ON PUBLISHED DATA OF NET TAXABLE INCOME (IN %)

Year	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
1973	1.43	2.87	4.40	5.76	6.93	8.27	9.79	11.91	15.58	33.06
1974	1.44	2.97	4.47	5.90	7.11	8.44	10.00	12.11	15.65	31.90
1975	1.45	3.04	4.51	6.00	7.24	8.56	10.14	12.25	15.70	31.10
1976	1.06	2.76	4.60	6.23	7.59	9.00	10.43	12.44	15.73	30.16
1977	1.19	3.04	4.80	6.32	7.66	8.98	10.38	12.37	15.61	29.64
1978	1.24	3.06	4.76	6.30	7.67	8.99	10.41	12.44	15.68	29.46
1979	1.29	3.03	4.61	6.18	7.55	9.03	10.82	12.94	15.71	28.84
1980	1.23	2.97	4.58	6.15	7.53	8.99	10.80	13.04	15.95	28.77
1981	1.25	3.06	4.59	6.15	7.54	9.04	10.88	13.14	16.15	28.20
1982	1.96	4.53	5.64	6.63	7.70	8.98	10.56	12.53	15.42	26.03
1983	1.90	4.54	5.72	6.70	7.77	9.04	10.61	12.58	15.43	25.73
1984	1.75	4.40	5.75	6.77	7.85	9.12	10.71	12.71	15.57	25.36
1985	1.68	4.30	5.70	6.71	7.78	9.05	10.66	12.70	15.58	25.83
1986	1.63	4.27	5.68	6.70	7.75	9.01	10.61	12.65	15.57	26.13
1987	1.53	4.07	5.53	6.59	7.66	8.92	10.55	12.66	15.70	26.79
1988	1.49	4.12	5.54	6.57	7.64	8.90	10.52	12.62	15.64	26.95
1989	1.49	4.16	5.51	6.51	7.56	8.81	10.43	12.53	15.61	27.40
1990	1.47	4.16	5.48	6.50	7.57	8.81	10.42	12.55	15.69	27.34
1991	1.49	4.16	5.44	6.46	7.54	8.79	10.41	12.55	15.72	27.43
1992	1.98	4.27	5.38	6.38	7.45	8.70	10.33	12.50	15.70	27.31
1993	1.97	4.23	5.35	6.36	7.44	8.69	10.32	12.52	15.79	27.32
1994	1.88	4.10	5.26	6.31	7.42	8.68	10.32	12.56	15.91	27.55
1995	1.85	4.14	5.27	6.29	7.37	8.63	10.26	12.53	15.99	27.68
1996	1.81	4.09	5.22	6.24	7.31	8.55	10.15	12.44	15.94	28.25
1997	1.77	4.04	5.17	6.19	7.28	8.53	10.13	12.46	16.07	28.36
1998	1.74	3.99	5.12	6.15	7.25	8.48	10.08	12.43	16.08	28.68
1999	1.68	3.92	5.02	6.06	7.18	8.42	10.00	12.37	16.10	29.26
2000	1.67	4.00	5.10	6.10	7.18	8.38	9.94	12.33	16.09	29.21
2001	1.55	3.87	4.93	5.97	7.09	8.31	9.87	12.27	16.11	30.03
2002	1.35	3.74	4.82	5.88	7.06	8.35	9.93	12.36	16.34	30.18
2003	1.10	3.61	4.74	5.81	7.01	8.35	9.95	12.40	16.50	30.54
2004	0.72	3.28	4.54	5.58	6.86	8.32	10.00	12.50	16.78	31.43
2005	0.68	3.25	4.52	5.56	6.85	8.29	9.98	12.48	16.80	31.58
2006	0.61	3.19	4.50	5.55	6.85	8.28	9.95	12.46	16.81	31.81
2007	0.57	3.15	4.48	5.54	6.82	8.23	9.90	12.40	16.77	32.14
2008	0.54	3.16	4.56	5.60	6.86	8.26	9.92	12.41	16.75	31.95
2009	0.52	3.16	4.60	5.64	6.89	8.28	9.92	12.40	16.71	31.87
2010	0.51	3.15	4.63	5.66	6.90	8.30	9.96	12.44	16.75	31.70
2011	0.59	3.29	4.66	5.69	6.90	8.29	9.95	12.41	16.68	31.55
2012	0.71	3.42	4.68	5.69	6.88	8.24	9.89	12.35	16.59	31.54
2013	0.69	3.39	4.69	5.71	6.91	8.27	9.93	12.40	16.63	31.38
2014	0.68	3.33	4.59	5.61	6.83	8.23	9.91	12.43	16.78	31.60

Source: own calculations based on data from Statistics Belgium and data obtained from De Standaard.

TABLE 4: SHARE OF TOP TEN PERCENTILES IN PUBLISHED NET TAXABLE INCOME (IN %)

Year	P91	P92	P93	P94	P95	P96	P97	P98	P99	P100
1973										
1974										
1975										
1976										
1977	1.86	1.94	2.03	2.14	2.28	2.45	2.68	3.04	3.71	7.52
1978	1.86	1.94	2.04	2.15	2.28	2.45	2.68	3.04	3.70	7.33
1979	1.84	1.91	2.00	2.11	2.24	2.41	2.63	2.97	3.61	7.11
1980	1.85	1.93	2.02	2.12	2.25	2.42	2.64	2.98	3.60	6.97
1981	1.86	1.93	2.02	2.12	2.25	2.41	2.62	2.94	3.53	6.51
1982	1.79	1.86	1.94	2.03	2.13	2.27	2.46	2.72	3.22	5.62
1983	1.78	1.85	1.92	2.01	2.12	2.25	2.43	2.69	3.17	5.51
1984	1.80	1.86	1.94	2.02	2.13	2.26	2.43	2.68	3.12	5.13
1985	1.80	1.87	1.95	2.04	2.14	2.28	2.45	2.71	3.17	5.42
1986	1.81	1.88	1.95	2.05	2.15	2.29	2.47	2.73	3.21	5.59
1987	1.83	1.90	1.98	2.08	2.19	2.33	2.52	2.79	3.28	5.89
1988	1.82	1.90	1.98	2.07	2.18	2.33	2.51	2.78	3.29	6.09
1989	1.83	1.90	1.98	2.08	2.20	2.34	2.53	2.81	3.33	6.40
1990	1.84	1.91	1.99	2.09	2.21	2.35	2.54	2.82	3.34	6.26
1991	1.84	1.92	2.00	2.09	2.21	2.35	2.53	2.81	3.32	6.34
1992	1.84	1.91	1.99	2.09	2.20	2.34	2.52	2.79	3.29	6.34
1993	1.86	1.93	2.01	2.11	2.22	2.36	2.55	2.82	3.31	6.14
1994	1.87	1.95	2.03	2.13	2.24	2.38	2.56	2.83	3.32	6.23
1995	1.89	1.96	2.05	2.15	2.26	2.40	2.59	2.86	3.35	6.17
1996	1.89	1.96	2.05	2.15	2.27	2.41	2.60	2.87	3.37	6.69
1997	1.91	1.99	2.07	2.17	2.29	2.44	2.63	2.91	3.43	6.52
1998	1.91	1.99	2.08	2.18	2.31	2.45	2.65	2.93	3.46	6.71
1999	1.92	2.00	2.09	2.20	2.32	2.47	2.67	2.97	3.52	7.09
2000	1.92	2.00	2.10	2.20	2.33	2.48	2.68	2.98	3.53	6.99
2001	1.93	2.01	2.11	2.21	2.34	2.50	2.71	3.02	3.59	7.60
2002	1.97	2.05	2.15	2.26	2.39	2.56	2.77	3.09	3.67	7.27
2003	2.00	2.08	2.18	2.30	2.43	2.60	2.82	3.14	3.73	7.24
2004	2.04	2.13	2.23	2.35	2.49	2.67	2.89	3.23	3.84	7.58
2005	2.05	2.14	2.25	2.37	2.51	2.69	2.92	3.25	3.86	7.55
2006	2.05	2.15	2.25	2.37	2.52	2.70	2.93	3.27	3.90	7.67
2007	2.05	2.15	2.26	2.38	2.53	2.71	2.95	3.31	3.97	7.83
2008	2.05	2.14	2.25	2.38	2.53	2.71	2.95	3.30	3.94	7.71
2009	2.04	2.14	2.25	2.37	2.52	2.70	2.94	3.29	3.93	7.67
2010	2.05	2.14	2.25	2.38	2.52	2.71	2.94	3.29	3.91	7.51
2011	2.04	2.13	2.24	2.36	2.51	2.69	2.93	3.27	3.89	7.50
2012	2.03	2.12	2.23	2.35	2.50	2.68	2.92	3.27	3.90	7.54
2013	2.03	2.12	2.23	2.35	2.50	2.68	2.91	3.25	3.87	7.43
2014	2.05	2.14	2.25	2.37	2.51	2.69	2.93	3.27	3.89	7.50

Source: own calculations based on data from Statistics Belgium.

TABLE 5: POPULATION OF FISCAL HOUSEHOLDS

Year	# of fiscal forms (1)	# of f.f. with NTI>0 (2)	# of f.f. with NTI=0 (3)=(1)-(2)	# individ. older 15 (4)	# ind. marr. or cohab. (5)	reference fiscal pop. (6)=(4)-(5)	(1) in % of (6)
1973							
1974							
1975							
1976							
1977		3 428 738					
1978		3 488 147					
1979		3 579 269					
1980		3 641 035					
1981		3 709 283					
1982		3 766 919					
1983		3 801 161					
1984		3 859 523					
1985		3 918 638					
1986		3 972 177					
1987		4 092 165					
1988		4 106 092					
1989		4 095 355					
1990	4 126 549	4 118 094	8 455	8 146 622	2 510 825	5 635 797	73.2
1991	4 116 552	4 107 291	9 261	8 175 704	2 509 170	5 666 534	72.6
1992	4 098 230	4 087 829	10 401	8 200 735	2 509 833	5 690 902	72.0
1993	4 109 982	4 097 444	12 538	8 238 912	2 508 992	5 729 920	71.7
1994	4 092 745	4 079 895	12 850	8 269 827	2 502 778	5 767 049	71.0
1995	4 299 155	4 285 858	13 297	8 303 744	2 495 799	5 807 945	74.0
1996	4 390 443	4 376 513	13 930	8 326 037	2 471 560	5 854 477	75.0
1997	4 468 343	4 454 892	13 451	8 359 014	2 456 667	5 902 347	75.7
1998	4 560 718	4 546 244	14 474	8 384 961	2 439 500	5 945 461	76.7
1999	4 676 952	4 659 358	17 594	8 408 502	2 418 631	5 989 871	78.1
2000	4 768 220	4 747 506	20 714	8 434 300	2 399 103	6 035 197	79.0
2001	4 933 209	4 905 623	27 586	8 458 324	2 379 650	6 078 674	81.2
2002	5 223 902	5 142 011	81 891	8 504 480	2 358 934	6 145 546	85.0
2003	5 544 667	5 369 652	175 015	8 553 145	2 336 069	6 217 076	89.2
2004	6 218 664	5 744 682	473 982	8 598 982	2 314 167	6 284 815	98.9
2005	6 360 935	5 858 996	501 939	8 650 994	2 294 968	6 356 026	100.1
2006	6 515 804	5 991 864	523 940	8 715 280	2 279 158	6 436 122	101.2
2007	6 609 770	6 077 874	531 896	8 786 805	2 266 254	6 520 551	101.4
2008	6 710 716	6 143 173	567 543	8 866 411	2 255 588	6 610 823	101.5
2009	6 771 747	6 159 576	612 171	8 938 204	2 238 798	6 699 406	101.1
2010	6 877 802	6 213 128	664 674	9 007 671	2 221 974	6 785 697	101.4
2011	6 797 689	6 221 984	575 705	9 133 341	2 211 633	6 921 708	98.2
2012	6 699 350	6 157 995	541 355	9 208 910	2 192 712	7 016 198	95.5
2013	6 749 995	6 193 498	556 497				
2014	6 831 327	6 261 830	569 497				

Source: own calculations based on demographic data from EUROSTAT and data obtained from Statistics Belgium.

TABLE 6: GROWTH OF NEXT TAXABLE INCOME (NTI) BASED ON PUBLISHED DATA FOR TOTAL NTI, D1, D10 AND P100 AND COMPARISON WITH NATIONAL ACCOUNTS (1974 – 2014) - IN %

Year	Published Net Taxable Income (NTI)					National Accounts (NA)			
	NTI	D1	D10	P100	GDP	B.5n (S14)	NNI	Pre Tax Pers.Sector Inc	Income Control
1974	22.3	23.3	18.0		16.6				
1975	18.2	18.9	15.2		11.1				
1976	16.1	-15.1	12.6		13.7				
1977	10.2	24.3	8.3		8.2				
1978	8.1	12.5	7.4	5.3	7.0				
1979	10.1	13.9	7.8	6.8	7.5				
1980	9.2	4.3	8.9	7.0	8.2				
1981	7.6	9.6	5.5	0.5	4.8				
1982	15.4	80.7	6.5	-0.5	8.2				
1983	2.3	-0.7	1.1	0.3	5.9				
1984	2.6	-5.3	1.2	-4.4	8.0				
1985	4.6	0.4	6.5	10.4	6.4				
1986	4.2	0.7	5.4	7.6	4.7	5.2			4.3
1987	2.7	-3.7	5.3	8.2	4.0	2.1			1.6
1988	2.9	0.2	3.5	6.5	7.0	3.7			3.7
1989	7.2	7.7	8.9	12.6	8.4	6.2			5.9
1990	5.7	4.3	5.5	3.5	6.0	8.6			8.8
1991	5.9	6.9	6.2	7.3	4.8	6.4			6.2
1992	8.0	43.7	7.5	7.8	5.0	5.1			5.4
1993	3.2	2.8	3.2	0.0	3.0	4.5			4.7
1994	2.3	-2.2	3.1	3.8	5.4	4.0			3.7
1995	5.2	3.2	5.7	4.2	3.7	2.7			-0.6
1996	3.5	1.5	5.7	12.2	2.0	0.5	1.7	1.1	1.0
1997	3.4	0.9	3.8	0.7	4.6	3.1	4.7	4.0	2.8
1998	4.0	2.1	5.2	7.1	3.8	3.9	3.5	3.2	3.5
1999	4.1	0.4	6.2	10.0	4.2	3.0	3.7	3.3	3.4
2000	3.9	3.4	3.8	2.5	5.7	5.5	5.9	5.5	5.2
2001	6.8	-0.5	9.8	16.1	2.9	4.7	1.7	1.4	4.8
2002	4.5	-9.3	5.1	0.1	3.5	1.1	3.3	2.7	1.4
2003	3.7	-15.5	4.9	3.2	2.8	0.9	2.4	2.0	1.3
2004	4.9	-31.2	7.9	9.9	5.7	2.3	5.3	5.0	2.0
2005	3.9	-1.7	4.4	3.4	4.3	3.3	3.8	3.2	3.6
2006	4.5	-5.7	5.2	6.1	4.9	4.7	4.6	4.3	4.4
2007	4.4	-3.8	5.5	6.7	5.5	5.3	5.4	5.3	4.6
2008	5.2	-0.4	4.6	3.5	2.7	5.6	3.1	2.9	5.9
2009	2.6	-0.2	2.3	2.1	-1.5	-0.8	-4.9	-4.8	0.2
2010	1.4	-0.6	0.9	-0.7	4.7	1.7	8.8	8.2	1.4
2011	4.0	19.9	3.6	3.9	3.8	2.7	1.0	0.8	2.3
2012	4.0	25.2	4.0	4.7	2.2	2.4	3.7	3.6	3.0
2013	2.7	0.3	2.2	1.2	1.4	1.2	0.2	-0.2	1.0
2014	4.5	1.8	5.2	5.4	2.0	0.8			1.4

Source: own calculations on data Statistics Belgium and data from NA (AMECO and NBB.Stat).

Note: B5.n_S14 stands for net balance of primary incomes in sector S14; NNI stands for Net National Income, the sum of B5n's for all sectors. Pre Tax Personal Sector Income is B5n of sectors S14, S11 and S12, and net production taxes.

TABLE 7: SECTORAL COMPOSITION OF NATIONAL INCOME AND RELATION WITH THE INCOME CONTROL (IN %)

Year	Income control as % of GDP	NNI as % of GDP	Sectoral components of NNI				Income Control as % of	
			S11+S12	S13	S14	S15	NNI	Pre Tax Pers.Sect or Inc
1985	81.3							
1986	81.0							
1987	79.1							
1988	76.7							
1989	74.9							
1990	76.9							
1991	78.0							
1992	78.3							
1993	79.6							
1994	78.3							
1995	75.1	86.5	8.8	3.1	88.1	0.019	86.8	79.7
1996	74.3	86.2	8.8	4.1	87.1	0.017	86.2	79.6
1997	73.0	86.3	9.0	5.3	85.7	0.015	84.7	78.7
1998	72.8	86.1	8.5	5.5	86.0	0.014	84.6	78.9
1999	72.3	85.7	8.1	6.4	85.5	0.018	84.4	79.0
2000	71.9	85.8	8.1	6.7	85.2	0.017	83.8	78.8
2001	73.2	84.8	5.6	6.6	87.7	0.017	86.3	81.3
2002	71.8	84.6	6.7	7.3	85.9	0.012	84.8	80.4
2003	70.7	84.3	7.7	7.6	84.7	0.013	83.9	79.8
2004	68.3	84.0	9.4	8.3	82.3	0.013	81.3	77.5
2005	67.8	83.6	9.6	8.5	81.9	0.016	81.1	77.8
2006	67.5	83.4	9.5	8.6	82.0	0.016	81.0	77.9
2007	66.9	83.3	9.8	8.3	81.9	0.018	80.3	77.4
2008	68.9	83.6	8.1	8.0	83.9	0.017	82.4	79.7
2009	70.2	80.7	4.4	8.1	87.5	0.033	86.9	83.9
2010	68.0	83.9	10.0	8.1	81.8	0.028	81.0	78.6
2011	67.0	81.6	8.3	8.4	83.3	0.032	82.1	79.8
2012	67.5	82.7	9.3	8.8	81.9	0.044	81.6	79.3
2013	67.2	81.9	7.9	9.3	82.8	0.045	82.2	80.2
2014	66.8	81.2	8.3	9.0	82.6	0.072	82.3	80.2

Source: own calculations on data Statistics Belgium and data from NA (AMECO and NBB.Stat).

Note: Net National Income has been calculated as the sum of the net balance of primary incomes in all 5 sectors. Pre Tax Personal Sector Income is B5n of sectors S14, S11 and S12, and net production taxes.

TABLE 8: GROWTH OF NET TAXABLE INCOME (NTI) FOR D10 AND P100 AND COMPARISON WITH GROWTH OF RECONSTRUCTED GROSS TAXABLE INCOME (GTI) FOR D10 AND P100 IN %

year	Income Control	Total Taxable Income		D10		P100	
		NTI	GTI	NTI	GTI	NTI	GTI
1974		22.3		18.0			
1975		18.2		15.2			
1976		16.1		12.6			
1977		10.2		8.3			
1978		8.1		7.4		5.3	
1979		10.1		7.8		6.8	
1980		9.2		8.9		7.0	
1981		7.6		5.5		0.5	
1982		15.4		6.5		-0.5	
1983		2.3		1.1		0.3	
1984		2.6		1.2		-4.4	
1985		4.6		6.5		10.4	
1986	4.3	4.2		5.4		7.6	
1987	1.6	2.7		5.3		8.2	
1988	3.7	2.9		3.5		6.5	
1989	5.9	7.2		8.9		12.6	
1990	8.8	5.7		5.5		3.5	
1991	6.2	5.9	5.3	6.2	5.0	7.3	2.8
1992	5.4	8.0	4.8	7.5	3.7	7.8	1.2
1993	4.7	3.2	6.4	3.2	7.6	0.0	8.8
1994	3.7	2.3	8.4	3.1	12.0	3.8	18.4
1995	-0.6	5.2	4.6	5.7	2.4	4.2	1.4
1996	1.0	3.5	3.1	5.7	4.1	12.2	8.4
1997	2.8	3.4	3.6	3.8	3.0	0.7	0.3
1998	3.5	4.0	3.3	5.2	2.7	7.1	2.4
1999	3.4	4.1	3.7	6.2	4.1	10.0	5.8
2000	5.2	3.9	3.4	3.8	2.9	2.5	2.6
2001	4.8	6.8	6.4	9.8	6.7	16.1	9.2
2002	1.4	4.5	4.3	5.1	1.6	0.1	-4.1
2003	1.3	3.7	3.4	4.9	2.4	3.2	0.8
2004	2.0	4.9	4.6	7.9	4.3	9.9	6.8
2005	3.6	3.9	3.4	4.4	3.4	3.4	1.4
2006	4.4	4.5	4.5	5.2	4.4	6.1	4.7
2007	4.6	4.4	4.4	5.5	4.6	6.7	4.4
2008	5.9	5.2	4.6	4.6	3.3	3.5	1.1
2009	0.2	2.6	2.6	2.3	2.2	2.1	-0.5
2010	1.4	1.4	1.7	0.9	2.8	-0.7	3.0
2011	2.3	4.0	4.1	3.6	3.7	3.9	3.0
2012	3.0	4.0	3.5	4.0	4.5	4.7	4.6
2013	1.0	2.7	2.6	2.2	2.2	1.2	1.7
2014	1.4	4.5		5.2		5.4	

Source: own calculations based on data obtained from Statistics Belgium and De Standaard.

TABLE 9: INCOME COMPONENTS IN THE INCOME CONTROL OF THE NATIONAL ACCOUNTS

Year	in million €'s					in % of income control			
	Income Control	Labour income	Replac. income	Rental Income	Inc. from Property	Labour income	Replac. income	Rental Income	Inc. from Property
1985	103 733	56 802	25 573	6 956	14 402	54.8	24.7	6.7	13.9
1986	108 239	58 400	26 636	7 661	15 541	54.0	24.6	7.1	14.4
1987	109 980	58 658	27 417	8 197	15 708	53.3	24.9	7.5	14.3
1988	114 062	61 344	28 371	8 969	15 377	53.8	24.9	7.9	13.5
1989	120 810	66 189	29 595	9 432	15 594	54.8	24.5	7.8	12.9
1990	131 500	70 931	31 614	9 938	19 016	53.9	24.0	7.6	14.5
1991	139 636	75 148	33 880	10 989	19 619	53.8	24.3	7.9	14.0
1992	147 177	77 987	36 087	11 876	21 228	53.0	24.5	8.1	14.4
1993	154 120	80 058	37 713	13 036	23 313	51.9	24.5	8.5	15.1
1994	159 838	83 129	38 739	13 945	24 024	52.0	24.2	8.7	15.0
1995	158 914	82 222	39 886	8 548	28 259	51.7	25.1	5.4	17.8
1996	160 498	83 627	40 968	8 583	27 320	52.1	25.5	5.3	17.0
1997	165 043	86 840	42 286	8 783	27 134	52.6	25.6	5.3	16.4
1998	170 741	89 086	43 617	9 238	28 800	52.2	25.5	5.4	16.9
1999	176 531	94 502	44 526	9 047	28 455	53.5	25.2	5.1	16.1
2000	185 734	99 594	45 751	9 604	30 784	53.6	24.6	5.2	16.6
2001	194 582	104 641	48 166	9 816	31 959	53.8	24.8	5.0	16.4
2002	197 379	106 707	51 134	9 377	30 162	54.1	25.9	4.8	15.3
2003	199 914	108 611	52 879	9 209	29 216	54.3	26.5	4.6	14.6
2004	203 890	111 930	54 580	8 561	28 819	54.9	26.8	4.2	14.1
2005	211 196	116 260	56 414	9 164	29 357	55.0	26.7	4.3	13.9
2006	220 505	122 244	58 356	9 659	30 246	55.4	26.5	4.4	13.7
2007	230 559	127 245	60 783	10 370	32 161	55.2	26.4	4.5	13.9
2008	244 100	133 246	63 907	9 747	37 200	54.6	26.2	4.0	15.2
2009	244 703	132 526	68 352	8 347	35 477	54.2	27.9	3.4	14.5
2010	248 219	134 927	69 732	8 035	35 525	54.4	28.1	3.2	14.3
2011	253 846	140 687	71 759	7 967	33 434	55.4	28.3	3.1	13.2
2012	261 472	145 032	75 667	7 369	33 403	55.5	28.9	2.8	12.8
2013	264 054	147 108	78 461	7 163	31 323	55.7	29.7	2.7	11.9
2014	267 652	148 716	79 634	7 564	31 739	55.6	29.8	2.8	11.9

Source: own calculations based on the National Accounts from NBB.Stat.

TABLE 10: GROWTH RATE OF THE INCOME CONTROL AND ITS COMPONENTS

Year	GDP	Income Control	Labour income	Replacement income	Rental income	Income from Property
1986	4.7	4.3	2.8	4.2	10.1	7.9
1987	4.0	1.6	0.4	2.9	7.0	1.1
1988	7.0	3.7	4.6	3.5	9.4	-2.1
1989	8.4	5.9	7.9	4.3	5.2	1.4
1990	6.0	8.8	7.2	6.8	5.4	21.9
1991	4.8	6.2	5.9	7.2	10.6	3.2
1992	5.0	5.4	3.8	6.5	8.1	8.2
1993	3.0	4.7	2.7	4.5	9.8	9.8
1994	5.4	3.7	3.8	2.7	7.0	3.1
1995	3.7	-0.6	-1.1	3.0	-38.7	17.6
1996	2.0	1.0	1.7	2.7	0.4	-3.3
1997	4.6	2.8	3.8	3.2	2.3	-0.7
1998	3.8	3.5	2.6	3.1	5.2	6.1
1999	4.2	3.4	6.1	2.1	-2.1	-1.2
2000	5.7	5.2	5.4	2.8	6.2	8.2
2001	2.9	4.8	5.1	5.3	2.2	3.8
2002	3.5	1.4	2.0	6.2	-4.5	-5.6
2003	2.8	1.3	1.8	3.4	-1.8	-3.1
2004	5.7	2.0	3.1	3.2	-7.0	-1.4
2005	4.3	3.6	3.9	3.4	7.0	1.9
2006	4.9	4.4	5.1	3.4	5.4	3.0
2007	5.5	4.6	4.1	4.2	7.4	6.3
2008	2.7	5.9	4.7	5.1	-6.0	15.7
2009	-1.5	0.2	-0.5	7.0	-14.4	-4.6
2010	4.7	1.4	1.8	2.0	-3.7	0.1
2011	3.8	2.3	4.3	2.9	-0.9	-5.9
2012	2.2	3.0	3.1	5.4	-7.5	-0.1
2013	1.4	1.0	1.4	3.7	-2.8	-6.2
2014	2.0	1.4	1.1	1.5	5.6	1.3

Source: own calculations based on the National Accounts from NBB.Stat.

TABLE 11: MISSING INCOME IN % OF THE INCOME CONTROL OF THE NATIONAL ACCOUNTS BY INCOME COMPONENT

Year	Net Taxable Income	Gross Taxable Income	Labour income	Replacement income	Rental Income	Income from Property
1985	42.7					
1986	42.8					
1987	42.2					
1988	42.6					
1989	42.0					
1990	43.6	33.8	7.5	45.0	63.5	99.3
1991	43.8	34.4	8.9	44.4	64.2	99.2
1992	42.4	34.7	8.6	43.9	65.5	99.2
1993	43.2	33.7	4.5	43.8	68.4	99.3
1994	44.0	30.7	-3.0	46.5	70.9	99.2
1995	40.8	27.1	-6.8	41.3	50.6	99.3
1996	39.3	25.6	-7.0	39.8	43.0	99.3
1997	38.9	25.0	-6.9	39.5	44.7	99.1
1998	38.6	25.1	-7.5	39.2	46.2	99.1
1999	38.2	24.9	-5.5	39.3	42.3	99.0
2000	38.9	26.2	-3.6	39.0	44.6	99.0
2001	37.7	25.0	-4.6	37.4	43.2	98.9
2002	35.9	22.9	-5.9	35.7	40.1	98.8
2003	34.3	21.3	-6.4	33.1	36.9	98.8
2004	32.5	19.3	-6.7	29.7	29.1	98.7
2005	32.2	19.4	-6.5	28.7	39.8	98.8
2006	32.2	19.4	-6.3	28.6	43.6	98.8
2007	32.3	19.5	-7.0	28.8	47.7	98.8
2008	32.7	20.5	-6.7	28.6	44.2	98.7
2009	31.2	18.6	-8.6	28.3	35.9	98.6
2010	31.2	18.4	-8.4	27.8	35.4	98.6
2011	30.0	16.9	-8.3	27.0	34.6	98.3
2012	29.3	16.5	-7.8	27.6	30.6	95.3
2013	28.1	15.1	-8.7	26.8	27.3	96.8
2014	25.9					

Source: own calculations based on data obtained from Statistics Belgium.

TABLE 12: INCOME SHARES FOR D10 BASED ON PUBLISHED DATA FOR NET TAXABLE INCOME (NTI) AND DIFFERENT CORRECTIONS OF GROSS TAXABLE INCOME (GTI)

Year	NTI	GTI	GTI lower bound	GTI upper bound	GTI adjusted by income component
1977	29.6				
1978	29.5				
1979	28.8				
1980	28.8				
1981	28.2				
1982	26.0				
1983	25.7				
1984	25.4				
1985	25.8				
1986	26.1				
1987	26.8				
1988	26.9				
1989	27.4				
1990	27.3	36.4	24.1	57.9	74.7
1991	27.4	36.3	23.8	58.2	74.0
1992	27.3	35.9	23.4	58.1	73.8
1993	27.3	36.3	24.0	57.8	77.7
1994	27.5	37.5	26.0	56.6	83.3
1995	27.7	36.7	26.8	53.8	70.3
1996	28.3	37.1	27.6	53.2	68.1
1997	28.4	36.9	27.6	52.7	67.7
1998	28.7	36.6	27.4	52.6	67.2
1999	29.3	36.8	27.6	52.5	65.6
2000	29.2	36.6	27.0	53.2	64.7
2001	30.0	36.7	27.5	52.6	65.1
2002	30.2	35.8	27.6	50.5	63.0
2003	30.5	35.4	27.9	49.1	61.2
2004	31.4	35.3	28.5	47.8	59.4
2005	31.6	35.3	28.4	47.9	63.3
2006	31.8	35.3	28.4	47.8	65.0
2007	32.1	35.4	28.5	48.0	67.8
2008	32.0	34.9	27.8	48.3	65.8
2009	31.9	34.8	28.3	46.9	62.9
2010	31.7	35.1	28.7	47.1	63.6
2011	31.5	35.0	29.1	46.0	63.1
2012	31.5	35.3	29.5	46.0	60.5
2013	31.4	35.2	29.9	45.0	59.2
2014	31.6				

Note: The difference between net taxable income (NTI) and gross taxable income (GTI) consists both in adding the deductions, and redefining the top decile by adding zeroes at the bottom. The lower bound is obtained by adding all missing income to deciles 1-9, the upper bound by adding all missing income to the top decile. The rightmost column uses a correction as described in equation (13) of Appendix 2, based on shares of the four income components for the top decile of 20%, 5%, 30% and 45% for labour income, replacement income, income from property and income from financial assets respectively, compared with an average share of 54%, 26%, 5.4% and 14.6% (average in the income control over the period 1985-2014).

Source: own calculations based on data obtained from Statistics Belgium.

TABLE 13: INCOME SHARES FOR P100 BASED ON PUBLISHED DATA FOR NET TAXABLE INCOME (NTI) AND DIFFERENT CORRECTIONS OF GROSS TAXABLE INCOME (GTI)

Year	NTI	GTI	GTI lower bound	GTI upper bound	GTI adjusted by income component
1977	7.5				
1978	7.3				
1979	7.1				
1980	7.0				
1981	6.5				
1982	5.6				
1983	5.5				
1984	5.1				
1985	5.4				
1986	5.6				
1987	5.9				
1988	6.1				
1989	6.4				
1990	6.3	9.2	6.1	39.9	24.4
1991	6.3	9.0	5.9	40.3	23.6
1992	6.3	8.6	5.6	40.4	23.2
1993	6.1	8.8	5.9	39.6	25.2
1994	6.2	9.7	6.7	37.4	29.5
1995	6.2	9.4	6.8	33.9	22.6
1996	6.7	9.8	7.3	32.9	22.2
1997	6.5	9.5	7.1	32.2	21.6
1998	6.7	9.4	7.1	32.2	21.5
1999	7.1	9.6	7.2	32.2	21.0
2000	7.0	9.6	7.1	33.3	20.7
2001	7.6	9.8	7.4	32.4	21.3
2002	7.3	9.0	7.0	29.9	19.3
2003	7.2	8.8	6.9	28.2	18.3
2004	7.6	9.0	7.2	26.5	17.8
2005	7.5	8.8	7.1	26.5	19.1
2006	7.7	8.8	7.1	26.5	19.9
2007	7.8	8.8	7.1	26.6	21.0
2008	7.7	8.5	6.8	27.3	19.7
2009	7.7	8.3	6.7	25.4	18.0
2010	7.5	8.4	6.8	25.2	18.2
2011	7.5	8.3	6.9	23.8	17.9
2012	7.5	8.4	7.0	23.5	16.8
2013	7.4	8.3	7.0	22.2	16.3
2014	7.5				

Note: The difference between net taxable income (NTI) and gross taxable income (GTI) consists both of adding the deductions, and redefining the top percentile by adding zeroes at the bottom. The lower bound is obtained by adding all missing income to percentile 1-99, the upper bound by adding all missing income to the top percentile. The rightmost column uses a correction as described in equation (13) of Appendix 2, based on shares of the four income components for the top percentile of 10%, 5%, 35% and 50% for labour income, replacement income, income from property and income from financial assets, compared with an average share of 54%, 26%, 5.4% and 14.6% (average in the income control over the period 1985-2014).

Source: own calculations based on data obtained from Statistics Belgium.

TABLE 14: COMPARISON OF D10 GTI-INCOME SHARES WITH SELECTED OTHER COUNTRIES

Year	Belgium		France	Netherlands	Germany	UK	US
	Lower Bound	proportional					
1973			34.2	28.4		28.3	35.0
1974			33.8		31.0	28.1	34.1
1975			33.3	27.5		27.8	34.4
1976			32.8			27.9	34.3
1977			31.2	27.8	31.7	28.0	34.8
1978			30.5			27.8	34.7
1979			31.4			28.4	34.9
1980			30.6		31.9		34.2
1981			30.2	28.5		31.0	34.7
1982			29.3			31.2	34.9
1983			29.4		31.4	31.8	35.4
1984			29.7			32.5	36.7
1985			30.3	29.1		32.7	36.7
1986			31.2		32.1	32.9	36.5
1987			32.1			33.3	37.6
1988			32.6			34.2	38.9
1989			32.8	28.5	33.5	34.2	38.7
1990	24.1	36.4	32.2	28.2		36.9	38.7
1991	23.8	36.3	32.1	28.1		37.7	38.6
1992	23.4	35.9	31.4	28.0	33.5	37.6	39.8
1993	24.0	36.3	31.7	28.0		38.3	39.6
1994	26.0	37.5	31.8	28.3		38.3	39.9
1995	26.8	36.7	31.7	28.5	31.8	38.5	40.7
1996	27.6	37.1	32.2	28.2		39.3	41.5
1997	27.6	36.9	32.5	28.2		38.9	42.3
1998	27.4	36.6	32.8	28.0	35.5	39.5	42.6
1999	27.6	36.8	32.7	28.1		41.3	43.4
2000	27.0	36.6	33.1	28.0		41.0	43.9
2001	27.5	36.7	33.4	29.7	36.2	41.4	42.8
2002	27.6	35.8	32.9	29.8	36.1	41.0	42.7
2003	27.9	35.4	33.2	29.8	35.5	41.4	42.9
2004	28.5	35.3	33.5	30.4	36.0	40.8	43.9
2005	28.4	35.3	33.4	30.7	38.5	41.6	45.1
2006	28.4	35.3	33.2	30.8	38.4	42.0	46.0
2007	28.5	35.4	33.9	31.7	39.5	42.6	45.8
2008	27.8	34.9	33.7	30.7	40.0		45.3
2009	28.3	34.8	32.2	30.6	39.8	41.5	44.3
2010	28.7	35.1	32.6	30.7	39.7	38.1	45.8
2011	29.1	35.0	33.2	30.6	39.0	39.2	45.9
2012	29.5	35.3	32.2	30.9		39.1	47.1
2013	29.9	35.2	32.6			41.3	46.3
2014			32.6			40.0	47.0

Source: Belgium: own calculations based on data obtained from Statistics Belgium, other countries: WID.

Note: Note: The lower bound is obtained by allocating all missing income to the first 9 deciles; in the column with 'proportional' the missing income is allocated in proportion to gross taxable income.

TABLE 15: COMPARISON OF P100 GTI-INCOME SHARES WITH SELECTED OTHER COUNTRIES

Year	Belgium		France	Netherlands	Germany	UK	US
	Lower Bound	Proportional					
1973			10.1	6.9		7.0	11.0
1974			9.7		10.4	6.5	10.6
1975			9.1	6.1		6.1	10.6
1976			9.1			5.9	10.4
1977			8.5	6.0	10.4	5.9	10.8
1978			8.3			5.7	10.6
1979			8.6			5.9	11.2
1980			8.2		10.7		10.7
1981			8.2	5.9		6.7	11.1
1982			7.5			6.9	11.3
1983			7.3		9.9	6.8	11.5
1984			7.5			7.2	12.5
1985			7.7	5.9		7.4	12.6
1986			8.2		10.5	7.6	12.2
1987			9.0			7.8	13.3
1988			9.2			8.6	14.9
1989			9.5	5.7	11.4	8.7	14.5
1990	6.1	9.2	9.3	5.6		9.8	14.5
1991	5.9	9.0	9.1	5.5		10.3	13.9
1992	5.6	8.6	8.6	5.5	10.6	9.9	15.0
1993	5.9	8.8	9.1	5.2		10.4	14.6
1994	6.7	9.7	9.2	5.3		10.6	14.7
1995	6.8	9.4	9.2	5.4	9.2	10.8	15.3
1996	7.3	9.8	10.0	5.4		11.9	16.0
1997	7.1	9.5	10.4	5.5		12.1	16.6
1998	7.1	9.4	10.7	5.3	11.9	12.5	16.9
1999	7.2	9.6	10.6	5.4		13.2	17.7
2000	7.1	9.6	11.0	5.6		13.5	18.3
2001	7.4	9.8	11.3	6.6	11.4	13.4	17.3
2002	7.0	9.0	10.9	6.5	11.1	13.0	17.1
2003	6.9	8.8	11.4	6.4	10.5	13.2	17.2
2004	7.2	9.0	11.6	6.7	11.1	13.3	18.3
2005	7.1	8.8	11.5	6.8	12.9	14.2	19.4
2006	7.1	8.8	11.2	6.8	13.2	14.8	20.1
2007	7.1	8.8	11.7	7.6	14.0	15.4	19.9
2008	6.8	8.5	11.6	6.8	14.5		19.5
2009	6.7	8.3	10.2	6.4	13.2	15.4	18.5
2010	6.8	8.4	10.8	6.4	13.1	12.6	19.8
2011	6.9	8.3	11.5	6.3	13.0	12.9	19.6
2012	7.0	8.4	10.4	6.3		12.7	20.8
2013	7.0	8.3	10.8			14.5	19.6
2014			10.8			13.9	20.2

Source: Belgium: own calculations based on data obtained from Statistics Belgium, other countries: WID.

Note: The lower bound is obtained by allocating all missing income to the first 99 percentiles; in the column with 'proportional' the missing income is allocated in proportion to gross taxable income.

APPENDIX 2: HOW TO ALLOCATE MISSING INCOME ACROSS THE DISTRIBUTION

Let us denote the income share for percentile p, as observed in the fiscal data as:

$$w_p = \frac{Y_p^F}{Y^F}, \tag{1}$$

where Y^F stands for aggregate income in the fiscal data, and Y_p^F aggregate fiscal income for income group p. The income control Y^{NA}, derived from the national accounts, differs from aggregate fiscal income Y^F, by missing income Z:

$$Z = Y^{NA} - Y^F, \tag{2}$$

and the missing income for percentile p is denoted as Z_p. The question is how the observed income share w_p relates to the 'true' or corrected income share ω_p:

$$\omega_p = \frac{Y_p^F + Z_p}{Y^{NA}}, \tag{3}$$

obtained by adding part of the missing income to percentile p, and assuming — for the ease of exposition — that there is no reranking.

If we define μ as missing income, expressed as a proportion of the income control:

$$\mu = \frac{Z}{Y^{NA}}, \tag{4}$$

and the *unobserved* missing income proportion as

$$\mu_p = \frac{Z_p}{Y_p^{NA}}, \tag{5}$$

then the corrected income share ω_p can be rewritten as follows:

$$
\begin{aligned}
\omega_p &= \frac{Y_p^F + Z_p}{Y^F} \cdot \frac{Y^F}{Y^{NA}} = \left(w_p + \frac{Z_p}{Y^F} \right) \cdot (1 - \mu) \\
&= \left(w_p + w_p \frac{\mu_p}{1 - \mu_p} \right) \cdot (1 - \mu), \\
&= w_p \left(\frac{1 - \mu}{1 - \mu_p} \right).
\end{aligned}
\tag{6}
$$

In the text we distinguished three possibilities.

Case 1: lower bound on the corrected income shares

If no missing income is allocated to percentile p, the third line of equation (6) reads as:

$$\omega_p = w_p \left(1 - \mu\right). \tag{7}$$

This might partially explain the evolution of the lower bound of corrected share in the text.[31] Since the fraction of the income control which is missing sharply declines over time, the correction factor $1 - \mu$ increases, and might produce an increasing top income share, only because of the changing correction factor.

Case 2: upper bound on the corrected income shares

If all missing income is allocated to percentile p, the corrected income share becomes:

$$
\begin{aligned}
\omega_p &= \frac{Y_p^F + Z}{Y^{NA}} = \frac{Y_p^F + Z}{Y^F} \cdot \frac{Y^F}{Y^{NA}} \\
&= \left(w_p + \frac{Z}{Y^F}\right) \cdot \left(1 - \mu\right) \\
&= \left(w_p + \frac{\mu}{1 - \mu}\right) \cdot \left(1 - \mu\right). \\
&= w_p + \mu\left(1 - w_p\right)
\end{aligned}
\tag{8}
$$

Again, this illustrates how the pronounced decline of the upper bound of the corrected income share might have at least as much to do with the decline in the missing income (which, as explained in the text, itself seems to have to do more with the income control than with the evolution of filed income), as with a change in the share of fiscal income w_p.

Case 3: corrected income shares are equal to the observed shares in the fiscal data

If we assume that the proportion of missing income is the same across the income distribution, i.e. $\mu_p = \mu$, then the third line of equation (6) reads as:

$$\omega_p = w_p, \tag{9}$$

and the income shares observed in the fiscal data do not have to be corrected. The assumption boils down to distributing the missing income in proportion to the corrected income distribution:

---

[31]   We write 'partially explain' since the assumption of absence of re-ranking will probably be violated if we allocate all missing income to the income groups outside the top income group (i.e. the top income group will no longer be the top income group).

$$\mu_p = \mu \Leftrightarrow \frac{Z_p}{Y_p^{NA}} = \frac{Z}{Y^{NA}}$$

$$\Leftrightarrow Z_p = Z \cdot \frac{Y_p^{NA}}{Y^{NA}} \qquad (10)$$

Finally, we have also explored possibilities to allocate missing income differently for the four different income components (labour income, replacement income, income from property and income from financial assets). The numerator $1-\mu$ of the correction factor in the third line of equation (6) can be decomposed as a weighted average of missing income fractions for all k income components, where the weights are the shares η^k of the k income components in the income control:

$$1-\mu = \frac{Y^F}{Y^{NA}} = \frac{\sum_k Y^{F,k}}{Y^{NA}} = \sum_k \frac{Y^{F,k}}{Y^{NA,k}} \cdot \frac{Y^{NA,k}}{Y^{NA}}$$
$$= \sum_k (1-\mu^k) \cdot \eta^k, \qquad (11)$$

where the superscript k is used for income component k. Analogously, we can also write the denominator $1-\mu_p$ of the correction factor in the third line of equation (6) as a weighted average of missing income fractions for all k income components, but now specific for this percentile group p as:

$$1-\mu_p = \sum_k (1-\mu_p^k) \cdot \eta_p^k, \qquad (12)$$

where the μ_p^k's denote the missing income fractions within percentile p for income component k, and η_p^k the share of income component k in the income control aggregate for percentile p. With this decomposition, equation (6), which relates the corrected income share to the observed one then becomes:

$$\omega_p = w_p \frac{1-\mu}{1-\mu_p} = w_p \frac{\sum_k (1-\mu^k) \cdot \eta^k}{\sum_k (1-\mu_p^k) \cdot \eta_p^k}, \qquad (13)$$

which allows us to make some more elaborate corrections to the observed shares.

We have no information on μ_p^k and η_p^k. But we can e.g. assume $\mu_p^k = \mu^k \quad \forall p$, i.e. within a specific income component, the missing income is distributed according to the shares of this component. This certainly is a weaker assumption than the one above ($\mu_p = \mu \quad \forall p$), because it only holds for a specific component. In that case, assumptions about the income composition of a given percentile p are sufficient to calculate the correction factors on the shares. Evidently, if one also assumes $\eta_p^k = \eta^k \quad \forall p$, the case again melts down to: no correction needed. But if we assume specific shares (e.g. $\eta_{10}^{labour} = 0.20; \eta_{10}^{repl} = 0.10; \eta_{10}^{prop} = 0.30; \eta_{10}^{fin} = 0.40$), then we can calculate corrected shares.

The result of these benchmark cases of allocating the missing income is presented in Table 12 and Table 13 of Appendix 1 (in which the rightmost column of these two tables gives the allocation based on the assumption that missing income is distributed proportionately to the four income components, but that the weight of the four income components is different). The result of the first three benchmark cases of allocating the missing income is displayed in Figure 14 (for the top decile) and Figure 15 (for the top percentile).

FIGURE 14: TOP DECILE INCOME SHARES AFTER CORRECTION FOR MISSING INCOME
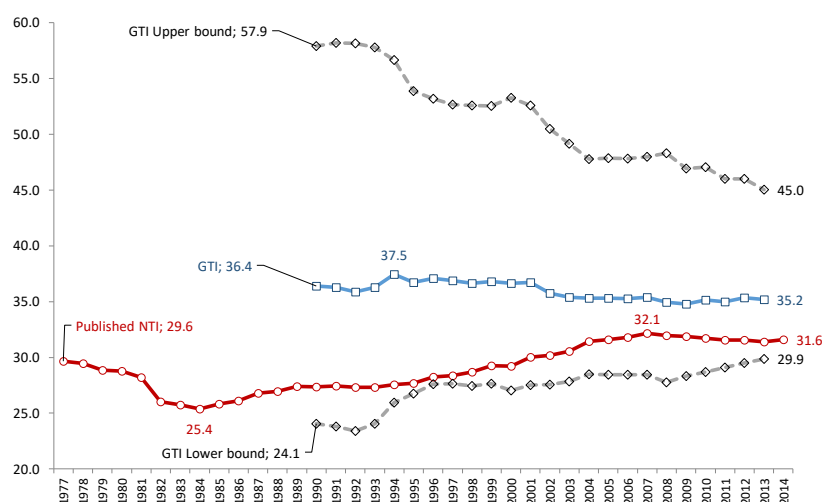
Source: Table 12 in Appendix 1

Note: The series of gross taxable income (GTI) differs from the series of net taxable income (NTI), by both adding the deductions, inserting zeroes at the bottom to comply with the population control, and allocating missing income. For the lower bound of the income share all missing income is added to deciles 1-9; for the upper bound all missing income is added to decile 10. The other line labelled 'GTI' replicates the series in figure 10 and rests on the assumption that the missing income is distributed proportionately to the income shares across the income distribution.

The results show that the assumption about how to allocate the missing income is absolutely crucial to state on whether the income shares of the top income groups have increased or decreased. It is indeed possible to produce an increasing share for both the top decile and the top percentile, but only when we allocate the missing income disproportionately outside these income groups, which is quite an unrealistic assumption. Moreover, the other side of the coin is that this assumption leads to a low level of the top decile income share as compared to other countries (see Figure 12 in Section 4.3).

FIGURE 15: TOP PERCENTILE INCOME SHARES AFTER CORRECTION FOR MISSING INCOME
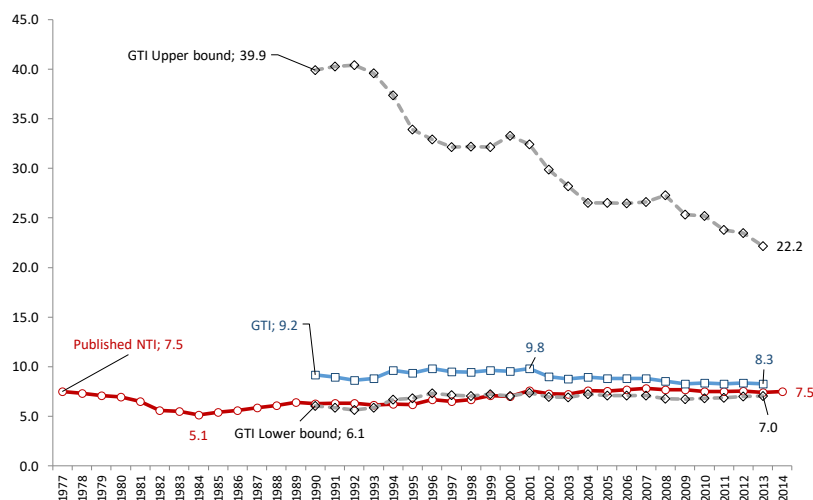
Source: Table 13 in Appendix 1

Mutatis mutandis, we reach the same conclusion for the top percentile in Figure 15. The visibility of the evolution of the income share for the top percentile becomes a bit obscured due to the scaling of the vertical axis since it has to accommodate the very high level of the top income share under the assumption that all missing income would belong to the top percentile (the upper bound). This is of course an increasingly unrealistic assumption as we focus on smaller groups at the top. But, contrary to the analysis for the top decile, even the lower bound of the top percentile share is now no longer increasing, except at the very beginning of the period.

APPENDIX 3: ESTIMATE OF THE PARETO PARAMETER ON THE TABULATED DATA

The published NTI data only contain average income by decile or percentile; moreover the quantile values are unobserved. By assuming the right tail of the income distribution to be Pareto distributed, we are able to recover both these quantile values and the underlying Pareto parameter.[32] When the latter parameter has been estimated, we assess to the impact of adding zero income observations on the top income shares by means of a closed-form expression.

Estimation of the quantile values and the Pareto parameter

If we assume a Pareto distribution f for the right tail of the income distribution, it holds that for all incomes v and w larger than the Pareto scale parameter k, with $v \le w$,

---

[32] The pdf of the Pareto distribution is as follows: $f(y) = \begin{cases} \dfrac{\alpha k^{\alpha}}{y^{\alpha+1}}, & y \ge k \\ 0, & y < k \end{cases}$.

$$\xi_v^w = \frac{\int_v^w yf(y)dy}{\int_v^w f(y)dy} = \beta\frac{w^{1-\alpha}-v^{1-\alpha}}{w^{-\alpha}-v^{-\alpha}} \;, \qquad (14)$$

in which $\beta = \alpha/(\alpha-1)$ denotes the Pareto shape parameter. The right-hand side is the closed form expression for the average income between income levels v and w.

As the Pareto distribution is only applicable to right tail of the income distribution, we only use information from the set I of top percentiles. As mentioned before, in the administrative tabulations we observe the average income ξ for every percentile $i \in I$. Making use of expression (14) this translates into

$$\xi_{i-}^{i+} = \frac{\int_{q_{i-}}^{q_{i+}} yf(y)dy}{\int_{q_{i-}}^{q_{i+}} f(y)dy} = \beta\frac{q_{i+}^{\,1-\alpha}-q_{i-}^{\,1-\alpha}}{q_{i+}^{\,-\alpha}-q_{i-}^{\,-\alpha}}, \qquad \forall i \in I \;, \qquad (15)$$

in which q_{i-} denotes percentile i's unobserved lower bound and q_{i+} its unobserved upper bound. Note that by the structure of the problem $q_{i+} = q_{(i+1)-}$. Since the left-hand side of equation (15) is observed in the tabulations, this yields a system of $|I|$ equations and $|I|+1$ unknowns.

To identify all parameters we exploit that the income share from percentile i *onwards* can also be calculated from the tabulations,

$$\xi_i^\infty = \frac{\int_{q_{i-}}^\infty yf(y)dy}{\int_{q_{i-}}^\infty f(y)dy} = \beta q_{i-}, \qquad \forall i \in I \;. \qquad (16)$$

This adds another $|I|-1$ restrictions without adding new unknowns. As we now have more equations than unknowns, the Pareto-parameter can be recovered by jointly minimizing the distance between the observed left-hand side and the unobserved right-hand side for every equation. The result is found in Table 2.

Estimation of income shares after adding zeros at the bottom

When zero income observations are added at the bottom of the income distribution, the quantile value of a given percentile p drops, causing its income share to rise. Again, let k denote the scale parameter of the Pareto distribution, and let ϕ denote the fraction of people whose income is modelled by the Pareto distribution before the addition of the zeros. Let $\nu = (N^F + N^Z)/N^F$ denote the ratio of the new population with respect to the old population, in which N^F stands for the number of observations in the fiscal dataset and N^Z for the number of zeroes added at the bottom. Let $\varphi = (100 - p + 1)/100$, in which p is the percentile of interest. The lower bound q_p of the top percentile before adding the zero observations is given by

$$\frac{\varphi}{\phi} = \left(\frac{k}{q_p}\right)^\alpha \;, \qquad (17)$$

or alternatively

$$q_p = k\left(\frac{\varphi}{\phi}\right)^{-1/\alpha} . \tag{18}$$

After adding the zeros the Pareto density function drops with factor v^{-1}, such that the new lower bound q_p^z should satisfy

$$\frac{\varphi}{\phi} = v^{-1}\left(\frac{k}{q_p^z}\right)^{\alpha} , \tag{19}$$

or alternatively

$$q_p^z = k\left[v\left(\frac{\varphi}{\phi}\right)\right]^{-1/\alpha} . \tag{20}$$

Rearranging equations (18) and (20) expresses the new lower bound as a rescaling of the old lower bound

$$q_p^z = v^{-1/\alpha} q_p . \tag{21}$$

The new top income share then follows immediately:

$$\omega_p^z = \varphi \frac{N^F + N^Z}{Y^F} \frac{\int_{q^z}^{\infty} v^{-1} y f(y) dy}{\int_{q^z}^{\infty} v^{-1} f(y) dy} = \varphi \frac{N^F + N^Z}{Y^F} \beta q_p^z = \varphi \frac{N^F + N^Z}{Y^F} \beta v^{-1/\alpha} q_p \tag{22}$$

The shares displayed as the grey lines in figure 10 and Figure 11 are calculated by means of (22).