Rethinking the Lebanese economic miracle:

The extreme concentration of income and wealth in Lebanon

2005-2014

Appendix

Lydia Assouad

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This appendix supplements the main paper and describes the full set of data files and computer codes (Assouad2017.zip) that were used to construct the series. The zip file Assouad2017.zip includes the following files (in addition to the pdf files of the main paper and present appendix):

- Assouad2017MainFiguresTables.xlsx : figures and tables presented in the main paper

- Assouad2017MainFiguresTables.xlsx : figures and tables presented in the main paper without outside links to other files

- Assouad2017DistributionSeries.zip: all distribution series files including all raw income distribution files.

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Appendix A. Income and wealth distribution series

The methodology to construct the income distribution series is summarized in the main paper (section 2). It consists of three steps: (1) first, I use household income survey tabulations and generalized Pareto interpolation techniques (Blanchet, Fournier and Piketty, 2017) to estimate the distribution of raw survey income, by g-percentile (before any correction); (2) second, I use micro tax data to correct upwards the top of the survey distribution and obtain corrected estimates of the distribution of fiscal income, by g-percentile; (3) third, I use national accounts and government reports on tax revenues to estimate missing capital incomes (such as dividends, interests, undistributed profits and other "non-fiscal income") and to obtain corrected estimates of the distribution of pre-tax national income by g-percentile. The main results are displayed in Figures A1-A3.

In this section, I discuss a number of additional issues about robustness checks. The detailed income and wealth distribution series are given in the zipped directory Assouad2017DistributionSeries.zip. The subdirectories GpinterIncome and GpinterWealth include my final benchmark distribution series, alternative series, the complete computer codes and all detailed computations and raw material used to construct the income and wealth series. All results can be replicated by using the WID.world/gpinter interface, based upon generalized Pareto interpolation techniques (Blanchet, Fournier and Piketty, 2017). For more details on the organization of these files and on the replication of the results see (file "ReadMe" in each directory, in pdf format).

The main robustness checks and variant series are presented in Assouad2017Appendix.xlsx and are summarized on Figures A4-A27, which I briefly describe below.

Appendix A.1 Household Survey Series

The first step consists of generating raw income distributions, using survey data. There are three nationally representative surveys in Lebanon, in 1997, 2004 and 2007. As discussed in the main paper, I could not access data for the 1997 survey, either in the form of tabulations by range of income, or in the form of micro data. For the 2004 and 2007 surveys, micro-data are also inaccessible. The Lebanese Central Administration of Statistics however publishes survey reports including tabulations for the 2004 and 2007 survey. The raw tabulations are available in the directory "HouseholdSurveyData". The paper is based on tabulations from the 2007 survey report.

I use the tabulation titled "before the war" to estimate the 2005 and 2006 distributions and the tabulation "after the war" for the following years. I simply upgrade the 2007 distribution by the ratio of per adult national income and use the generalized Pareto interpolation techniques developed by Blanchet, Fournier and Piketty (2017) to all tabulations, to estimate the full distribution of income expressed in generalized percentiles (or g-percentiles) between 2005 and 2014.

The unit of observation is the adult individual and I assume income is equally split between adult household members, that is I divide household income by the number of adults in each household. As no additional information is available, I apply the same adults/children ratio to all brackets: if high earners have fewer children than average, inequality is slightly underestimated. I generate input files to be used with the WID.world/gpinter interface from the raw tabulations in the excel file "GenerationSurveySeriesLeb.xlsx". The Stata format do-file to generate the raw survey series afterwards is do_SurveySeries.

Appendix A.1.1 Hypothesis on the tail of the distribution

The standard generalized Pareto interpolation technique relies on tabulations providing three pieces of information: income thresholds, household frequencies and the average income per group. Unfortunately, the latter was not available in the Lebanese tabulations. To perform the estimation, I need to make an assumption on the form of the tail of the distribution at the top. In the benchmark estimates, I assume that the last group (approximately the top 0.5 percent in both tables) is characterized by an inverted Pareto coefficient of 2[1]. This assumption has no impact on the final series (this is why I do not display them). The inequality statistics for the raw survey distribution under the three cases are presented in the sheet SurveyVariants in Assouad2017Appendix.xlsx.

Appendix A.1.2 Choice of the raw tabulations

I also generate series using tabulations from the 2004 survey (the raw tabulations and input files are in the same directory as the 2007 survey). The Stata format do-file generating the variants based on the 2004 tabulations is do_SurveyYearsVariants). Concerning the choice of the raw data, I did not use the 2004 survey for two main reasons.

First, the share of income accruing to the top 1 and 10 percent is more affected by the assumption on the inverted Pareto coefficient in the last bracket (see sheet SurveyVariants). As a consequence, using the 2004 modifies the trends in the top 1 percent income share (see Figures A4 and A5).

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[1] The assumption seems reasonable given the empirical findings for other countries currently available in WID.world. Existing studies indicate that the inverted Pareto coefficients go from 1.5 to 3: a coefficient close to 1.5 corresponds to very egalitarian societies (such as Scandinavian countries in the 1980s), while a coefficient close to 3 corresponds to the most unequal countries (such as European countries in the early 20th century, or the United States today). The coefficients that we observe for poor and emerging economies for which we currently have adequate income tax data generally fall in the 2-to-3 range.

Second, with the 2004 survey the bottom 50 percent of the adult population receives 25 percent of total national income, and the ratio between the average income within the top 10 percent over the overall average equals 37 percent. These statistics imply that there is almost no poverty in Lebanon, which is inconsistent with findings of existing studies on poverty.

Generally speaking, the raw survey data are incomplete. As shown in Figure FA24, the share of national income covered by the survey data is around 40 percent "Before the war" which is small but not unheard of by international standards. The ratio however decreases to 30 percent "after the war", which means that a very large fraction of national income is missing from self-reported household survey income. To the extent that missing income components benefit to relatively smaller groups of the population, this implies that the tabulations are likely to severely underestimate income inequality in Lebanon.

Appendix A.2 Fiscal Series

The computation of inequality statistics for the top 1 percent using the fiscal micro data is presented in the Stata format do file "do_TopIncomeSeries" in the directory FiscalData. The do file generates the excel file "FiscalSeries.xlsx", used to derive the upgrade factors that correct the survey income distribution. All details on the correction procedure are available in the do-file "do_FiscalSeries". The excel file "CompCorrectionCoeffLeb.xlsx" describes the computations of the upgrade factors.

As discussed in the main paper, there are three important issues at this stage: (1) the definition of income; (2) the profile of upgrade factors (that is how to link the survey and the fiscal distribution), (3) the treatment of outliers in the fiscal micro-files.

Appendix A.1.1 Definition of income

I start with the first issue. As explained in the DINA Guidelines (Alvaredo et al 2016), it is critical to be very precise about income concepts when combining survey and fiscal data. Unfortunately, the survey data do not enable me to precisely define income. As for the fiscal data, they are based upon a "taxable income" concept (i.e. income subject to income tax, after a number of deductions allowed by the tax legislation). The deductions are very extensive in the Lebanese case (see Appendix B). In particular, there are large lump-sum deductions for professional expenses of self-employment income. Additionally, taxable income, from which benefits and allowances are deduced, is significantly smaller than the fiscal income, defined as the sum of all income items legally subject to taxation, before any deduction (Alvaredo et al. (2016).

I therefore assume for my benchmark estimates that the ratio between taxable income and fiscal income is equal to r=80 percent. I also provide as robustness checks a number of variant estimates using other ratios (r=70 and r=90 percent). Figures FA6 and FA7 show that this hypothesis can have a relatively large effect on the final series, mainly due to the small share of survey income in total national income (see Alvaredo, Assouad, Piketty 2017 for a discussion on this issue). This is why I take a relatively conservative hypothesis (80 percent) given the deductions allowed in the Lebanese tax law.

Appendix A.1.2 Correction profiles

I now come to the second issue that is the profile of upgrade factors. Top incomes are massively underestimated in survey data, in Lebanon as in many other countries. Figures A1-A3 and Table A1 show that the two corrections lead to

substantially larger income shares estimates than the one computed with survey data.

As displayed in Table A2, the ratios between fiscal and survey incomes fall in the 1.7-2.3 range if I look at the quantile function $q(p)$ that is the income threshold $q(p)$ corresponding to percentile $p = 0.99$ and in the 2.4-3.7 range when look at the upper incomes $y(p)$ that is the average income $y(p)$ above percentile $p = 0.99$. In particular, the inverted Pareto coefficient $b(p)=y(p)/q(p)$ is as low as 1.5 in the survey, as opposed to 3.5 or more in the tax data (see Figure A8). The Lebanese figures are relatively high when we compare them to the Pareto coefficients in France, Russia or the United States.

Now that we see that incomes are substantially higher in the fiscal data, a critical issue is to link the two sources of information. My benchmark correction is based upon the following assumption: the survey data is reliable below percentile $p_1 = 0.8$, the fiscal data is reliable above $p_2 = 0.99$ and I assume that the quantile ratio upgrade factor $f(p)$ rises piecewise-linearly from $f(p_1) = 1$ to the observed fiscal/survey ratio $f(p_2)$ between p_1 and p_2, with a small and rising slope between $p_1 = 0.8$ and $p=0.9$ and a constant linear slope between $p=0.9$ and $p_2 = 0.99$. I also provide as robustness checks a number of variant estimates using four profiles for the curve $f(p)$ (see CompCorrectionCoeffLeb.xlsx, sheet "CompUpFactorLeb" for a definition of the four profiles and the corresponding factors). In particular, I consider a profile where I assume the survey data to be reliable below percentile $p_1 = 0.9$, the fiscal data to be reliable above $p_2 = 0.99$, and a linear profile of $f(p)$ between p_1 and p_2 (profile 2). In other profiles, I assume a concave (declining slope) and a convex (increasing slope) of $f(p)$ between p_1 and p_2 (profile 3 and 4). Unsurprisingly, the more

the rising part of the f(p) profile is pushed toward p_2, the smaller the total upgrade to the top 10 percent share; and the more the rising part of f(p) is pushed toward p_1, the larger the total upgrade to the top 10 percent share. As long as there is no income tax data covering the entire top 10 percent, there is no way to be sure about this.

The main reasons for the benchmark assumptions described above is that, first, they lead to a smooth and convex profile of inverted Pareto coefficients b(p) (Figure A9, A10 and A11), in line with what we can find in countries with high-quality fiscal data (see Blanchet, Fournier and Piketty, 2017). Other profiles tend to lead to not well behaved that is non-convex and/or very steep Pareto curves. Second, as displayed in Figures A12 and A13, beginning the correction at the percentile 0.8 or 0.9 affects the final series in a greater extent that the variants on the last correction (see below). For this reason, I make rather conservative assumptions.

In any case, two main conclusions should be made: (1) the fiscal correction is the largest in magnitude and leads to a large upward correction of the survey-based distributions (2) the variants on the fiscal correction can have a strong effect, this is why I chose relatively conservative hypothesis.

Appendix A.1.3 Cleaning procedure

Finally, given the schedular form of the Income Tax and the fiscal micro-files, there are two options to clean the database: the first is to drop the individual observation if one or several income variables are considered unreliable, the second

is to replace the amounts by zero[2], therefore keeping the other income variables. I choose the latter option, which amounts to keep more information and change the rank of the individual in the distribution rather than deleting the observation.

Concerning the cleaning rules chosen, I drop or replace by 0 (1) all variables that cannot be negative (turnovers of partners and individuals in S-corporations, wages, self-employment income and built property revenues and taxes levied), (2) Labor and self-employment incomes for which the net amount was greater than the gross income[3] (3) Variables for which the amounts of tax levied are greater than gross and taxable income (4) implausibly high values (wages equal 200 percent of GDP). These two procedures lead to the files "FiscalSeries.xlsx" used in my computations, and "FiscalSeriesdropped.xlsx". As shown in the excel file "ComparaisonCleaning.xlsx" (sheets 2005-2014), that displays the difference in percentage point of the statistics according to the procedure chose, this has a relatively small effect (see do_CleaningFiscalData and do_CleaningVariants in the file FiscalData).

A last issue concerns the identification of outliers. The excel sheet "Variants Top 1" in "ComparaisonCleaning.xlsx" displays the variation of the top 1 percent fiscal income (I take 45 percent of national income as denominator) when I drop the 2 first to 100 first observations (ranked in descending order). The variation is important for the years 2005-2007 only. As shown in the sheets "Top distrib" by type of income, which display the ratio of the income to the mean, in descending order, this is mostly due to very high amounts of rental income, that I dismiss. I next also dismiss the

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[2] More precisely, if an inconsistency concerning one type of income is noticed, I replace by zero the gross and net income as well as the amount of tax paid for this income source only.
[3] Net labor income is computed by removing deductions and benefits from the gross income. The net profit is assessed as a percentage of the taxpayer's gross income (under the lump-sum profit method).

variables greater then the average over the period of the top variable over the distribution mean (see FiscalData/Do/do_Outliers). These are relatively conservative assumptions, as some individuals who however pay taxes on their income sources are removed.

Appendix A.3 Missing Capital income

Finally, I proceed to a last correction for non-reported and tax-exempt capital income. There are two steps.

Appendix A.3.1 Estimating the amount of missing capital income

The first step consists of estimating the amount of missing capital income. Here again, important differences with Piketty, Yang and Zucman (2017) and Novokmet, Piketty and Zucman (2017) should be noted. First, the amounts of capital income absent from the Lebanese fiscal data are significantly higher. The correction includes both tax-exempt and movable capital income, which are taxed by the law, but not reported. Hence the denomination "missing" capital income as opposed to solely "non-fiscal". Second, national accounts are not disaggregated enough to estimate the missing amounts. This is why I complement them with government reports on tax revenues and recover proxies for the amounts of income missing, by dividing the amount of taxes collected by the corresponding tax rates applied in the law. I find that missing capital incomes represent approximately 20 percent of national income. In what follows, I describe in more details how I estimate this amount.

The Lebanese national accounts tabulations do not display detailed enough subcomponents of national income. Only the generation and allocation of primary income accounts of the national economy (S1) are displayed, without details for the

different sectors[4]. The only subsectors present are the general government (S13) and Banks (S122). The amounts recorded are themselves not disaggregated enough to identify each income source[5]. This is why I complement the national accounts with government reports on tax revenues. The idea is to recover the amounts of income generated in the economy by dividing the amount of taxes collected by the tax rates defined in the fiscal law.

I derive from the government reports: (1) the amount of capital gains and dividends accruing to the households, and taxed at flat tax rate of 10 percent under the third title of the personal income tax law (2) the amount of interest income received in the private sector in the total economy and hit by a rate of 5 percent[6] (3) the imputed rents from housing taxed at 4 percent[7] (4) undistributed profits of privately owned corporations[8].

All computations can be found in the file "EstimatingMissingCapitalIncome.xlsx", in the directory GpinterIncome. I find that they respectively represent 3, 8, 3 and 8 percent of national income on average over the period.

Note that the computations are highly limited due to the lack of disaggregation of the different sources[9]. Table 5 in the file "EstimatingMissingCapitalIncome.xlsx" shows

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[4] The Household Sector (S14), non-financial corporate sector (S11) and non-profit institutions sector (S15) are not reported. Within the public administration, I have the general government sector (S13a) and within the financial corporations sector, the banks only (S122). This is an important issue as I cannot isolate personal income.

[5] For example, compensation of employees and property incomes (D1 and D4) are displayed altogether, with a distinction only for interest income (D41 within D4), for the total economy. We nevertheless have the amounts of dividends (D42) for the General government and Bank sectors.

[6] I use however national accounts to compute the ratio of private vs. public interest income.

[7] The tax revenues include both revenues from the property tax (on the stock, not reported in the micro file) and on the revenues (reported in the micro file). I therefore remove the total amount of tax reported in the fiscal data before dividing by the 4 percent rate.

[8] As for housing income, the tax revenues collected on profits include amounts taxed under the personal income tax and under the corporate tax (15 percent), hit at the company level. Note also that the post tax post tax profits are then distributed as dividend, invested or privately owned.

[9] For an example, after the application of the corporate tax, the remaining profits are distributed as dividend, invested or privately owned, so I may count twice some amounts while adding the dividends

that the amounts estimated vary between 14 and 22 percent of national income[10]. I chose to reallocate 20 percent of national income.

As displayed in Table A4, adding 20% lead to a total amount of capital income of 26-28 percent. Note that this total does not include the capital income captured by the survey data in the bottom 80 percent of the adult population. There is however approximately 25-30 percent of income missing to reach national income (see Figure A28). Table A3 sums up incomes that can be inferred from the fiscal data or the national accounts and the finance reports. It also displays the amounts left (that include tax evasion, deductions and exemptions and other non-fiscal income and finally income from the informal sector, in part captured by the survey data)[11]. Given this large amount of income not included in the final series, before normalization, assuming that the amount of missing capital income represents 20 percent of total national income seems to be reasonable. Additionally, as shown in Figures FA14-A15, the final income shares do not vary much when we allocate 15 or 10 percent of national income (which should be viewed as lower bounds).

Appendix A.3.1 Estimating the joint distributions of fiscal and non-fiscal income

Next, in order to estimate the distribution of total personal income (y_p), I need to make an assumption about the distribution of missing capital income (y_{mf}) and its structure of the correlation with fiscal income (y_f). Regarding the distribution of $y_{mf,}$ I assume it follows the same distribution as the distribution of wealth, which I estimate

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to the profits estimates. When I do not take into accounts dividends, I find an aggregate of 19 percent against 23 percent when they are included

[10] To be consistent with the sources used, I first compute the share using the gross national income displayed in the national accounts between 2003 and 2010. For the years 2011 and 2014, I use the national income from WID.world, adjusted by the average ratio of the GNI and national income between national accounts and WID.world.

[11] Existing estimations suggest that such activities represent approximately 30 percent of GDP (Schneider, 2002, p8-9).

by applying generalized Pareto interpolation techniques and wealth rankings (see section bellow). Finally, I apply a proportional upgrade factor to transform the distribution of personal income $y_p = y_f + y_{nf}$ into the distribution of national income y. By construction this has no impact on income shares (the objective is to make income levels comparable across countries and over time).

Regarding the correlation structure between y_f and y_{nf}, I use the family of Gumbel copulas, characterized by the following functional form:

$$F(u,v)=\exp[-((-\log u)^{\theta}+(-\log v)^{\theta})^{1/\theta}]$$

Where 0≤u,v≤1 are the ranks in the two distributions and F(u,v) is the two-dimensional cumulative distribution, that is the fraction of the population with ranks below u in the first dimension and below v in the second dimension.

If θ=1 then F(u,v)=uv, i.e. the two distributions are entirely independent. Conversely if θ=+∞ then both dimensions are perfectly correlated. On the basis of observed two-dimensional distributions in countries with high-quality fiscal data (such as the United States or France), we find that Gumbel parameters are typically in the 2.5-3.5 range. I use θ=3 for our benchmark simulations. The choice of the parameter has a relatively small impact on the final series, as illustrated by the variant estimates with different Gumbel parameters (see Figures A16-A17).

Appendix A.4 Wealth Series

As explained in the main paper, the methodology used to estimate the Lebanese wealth distribution is similar to the one used by Novokmet, Piketty and Zucman

(2017) for Russia. The data sources available to estimate wealth inequality in Lebanon are very limited and at this stage I only have billionaire data. I therefore proceed as follows.

First, I compute average standardized distributions of wealth for the US, France and China from WID.world series (that is, I divide all thresholds and bracket averages for all 127 generalized percentiles by average wealth, and I compute the arithmetic average for the three countries). Variations across countries and over time in these standardized wealth distributions mostly happen above $p_0=0.99$. Below $p_0=0.99$, the ratios of the different percentile thresholds to average wealth are relatively stable. Therefore I choose to use the same normalized distribution for Lebanon below $p_0=0.99$ as the average US-France-China normalized distribution.

The second issue is to determine the personal wealth per adult, so as to adjust this average US-France-China normalized distribution to Lebanon. Contrarily to the Russian case, there is for the moment no estimate of the total stock of personal wealth in Lebanon. I therefore take the average wealth/income ratios available in WID.world, and apply it to the Lebanese national income. I hereby assume that (1) wealth is as concentrated in Lebanon as what is currently observable in other countries with adequate data and (2) that if, on average, countries own a stock of capital equals to 300 percent of their national income, Lebanon owns as least as much (see sheet DataWealth in "Assouad2017Appendix.xlsx).

Finally, I use information on Lebanese billionaires to adjust the top of the distribution and to take into account the extremely high share of billionaires' wealth in total national income. The difficult question is to know how to link the distribution from $p_0=0.99$ to billionaire level, and also to make an assumption about the average

number n of adults per billionaire family (sometime Forbes includes very large family groups in the same billionaire family, sometime it is just one individual or one married couple). I first re-estimate 127 generalized percentile within the top 1 percent of the normalized distribution in order to reach billionaire level. In the benchmark series I assume n=5 and a linear correction factor f(p) from $p_0=0.99$ up to billionaire level (because this seems to work relatively well for the US, France and China).

Figure FA18 displays the main series obtained using this procedure, while Figure FA19 compares them with the average normalized "WID" wealth distribution. In the main, I only present average over the period given the uncertainty surrounding the total amount of billionaires' wealth (assumed to be constant over the period and equal to 30 percent of national income). I use the year 2016 to reallocate the missing capital for each year.

I also compute variant series based upon alternative assumptions: n=2,4,6,8 instead of n=5, and also a piecewise linear f(p) with a fraction f=0,0.2,0.4,0.6,0.8,1 of the total correction between $p_0=0.99$ and $p_1=0.999$ (and a fraction 1-f between $p_1=0.999$ and billionaire level). The variants on the wealth distributions are presented on Figures A20-A23 and the effect of the hypothesis on the final series on Figures FA24 to FA27. The assumptions lead to relatively large differences in the wealth distribution (of 4 percentage points) and in the final income distribution, although the effect is smaller for the latter). In any case, even the most conservative series lead to high wealth shares.

All variants, computer codes and robustness checks are presented in the subdirector GpinterWealth in zipped directory Assouad2017DistributionSeries.zip.

Appendix B. Lebanese Income Tax

Appendix B.1 Presentation of the Personal Income Tax Law

The Lebanese Income Tax was created in 1944 (Law 12/4/1944) and amended in 1959 (Decree-Law 144, 6/12/1959). The text of 1959 is still the basis of the current fiscal system. The 1959 income tax is a schedular, progressive and individual tax which taxes the different sources of income separately. It is divided into three main categories: a tax on profits from industrial, commercial and non-commercial activities levied according to a real or lump sum scheme (Title I), a tax on wages and salaries (Title II) and a tax on incomes from movable capital including interests and dividends (Title III). This section draws extensively from Daher (2002).

I) Title I: tax on profits from industrial, commercial and non-commercial activities

Are taxed under the Title I:

1. Business income made by a sole proprietor (professional and individual company) or by a general partnerships **(personal income, reported in the database).** These profits are taxed at progressive rates between 4 percent and 21 percent.

2. Business income made by a limited partnership (joint stock companies and limited liability companies).

   a) Realized profits taxed at the corporation level, at a flat corporate tax of 15 percent **(non-personal income)**

   b) After the application of the corporate tax:

      i. Either the corporate income is put in reserve and serve for the company self-financing: in this case, the remaining profits are not taxed

ii.   Either the remaining corporate income is distributed as interests or dividends to the partners: in this case it is subject to the individual income tax burden defined under chapter III, for revenues from moveable capital **(personal income, not reported in the database)**

The profits of a partnership are immediately taxable on behalf of the partners, even if they are not distributed yet and are taxed only once. Concerning the allocation of charges and expenses, only the charges directly linked to the company's activity can be deduced from the total profits to be distributed. Personal expenses are not deduced from the profits made (however they can be deduced from the share of profits granted to each partner). All profits not subject to the income tax of another schedule are taxed under this schedule. The tax hits the net profit recorded at the end of the financial year, after deducing from the gross annual revenues the expenses and charges inherent to the activity. Profits are taxed according to three different schemes:

i)   **An actual taxation scheme**, which implies a regular accountancy to determine the annual real turnover. This scheme concerns large companies.

ii)   **A lump-sum taxation scheme**, which concerns profits of smaller companies, self-employed professionals and taxpayers with fixed profits. According to this method, the net profit is defined as a fixed percentage of the taxpayer's total turnover, varying between 3 and 65 percent depending on the activity[12].

iii)   **An estimated profit scheme**. This taxation scheme relies on an administrative evaluation made directly by the fiscal authorities, which determines the taxable income. It is a simplified scheme concerning

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[12] In the micro-tax data, net self-employment income is on average 30 percent of the gross amount, that is on average 70 percent of income are deduced as charge and expenses for this schedule, a relatively high share.

taxpayers with modest levels of income who are not subject to the previous schemes.

II) Title II: Salaries and wages and pension salaries.

The labor income tax concerns all types of labor income: wages and salaries, including bonuses, commissions, compensation, allowances, grants, benefits in cash and kind, overtime hours, pensions and annuities (Article 46 of D.L. no. 144/1959), after deductions of the allowances and charges. The tax is levied at source and declared annually by the employers, at progressive rates between 2 percent and 20 percent (**personal income, reported in the database**).

III) Title III: Revenues from moveable capital

Chapter III mainly covers all types of dividend income, board member appropriations from profits, and interest income, including interest on bonds and treasury bills. It is a withholding tax of 10 percent of the following taxable incomes (Article 72 of D.L. 144/1959, modified in 1981, 1985 and in 1999): (1) Distributed dividends, interests, income from shares (see above) (2) Directors' and shareholders' fees (3) Distribution of reserves or profits (4) Interests from loans to corporation.

This tax is borne by individual taxpayers (associate, employee, partner) but is paid to the Treasury through the company. For partnerships and individual enterprises, incomes are taxed when realized. For incorporated companies, net profits are taxed at a flat tax rate of 15 percent, when realized. The sold can either be invested, or be distributed as dividends among each associate. In this case, it is taxed again under the income tax on movable capital. The amounts declared and taxed under this Title are not reported in our database.

Other taxes levied at the individual level – Built property revenues and Inheritance, estate, and gift taxes

1. Built Property tax: It is charged on the stock (4 percent of the value of the real-estate, non reported in the database) and on the flow of income generated by the ownership of a built property, according to a progressive tax scale (4-14 percent), on built property (**personal income, reported in the database).**

2. Tax on interests: income, revenues, and interest earned from accounts opened at Lebanese banks and from treasury bonds are subject to a 5 percent withholding tax **(personal income, not reported in the database).**

To sum up, our database does not report the following capital income, which however represents a large part of top income shares: (1) Distributed corporate income, (2) Income from movable capital, (3) Interest and income earned from bank accounts.

Appendix B.2 Income definition and deductions

In this section, I present in further detail the variables reported in the database, by referring to the Lebanese Income tax Law and the 2010 tax forms (displayed at the end of the Appendix). As explained in the main paper, three variables are reported for labor income, and business income:

1) Salaries and wages:

i) **The labor gross income**, which comprises the main salary/daily wages, representation remuneration, bonuses, commissions and overtime, family compensation for the spouse, family compensation for the children, allowances given to bear the expenses of the activity (transportation compensation, car allowance,

residence allowance, food allowance, clothing allowance), fund compensations, health insurances of all types, educational grants, marriage grants, birth grants, assistance in case of illness, assistance in case of death, other grants and benefits (tax form R.6).

.   ii) **The labor income subject to tax**, obtained after deducing from the gross labor income the compulsory social contributions, the allowances covering expenses linked with the professional activity and all the grants and benefits[13].

.   iii) **Amount of tax paid**

2) Self-employment income:

.   i) **Total turnover** made in a given year

.   ii) **The corresponding profit subject to tax**, equal to the turnover multiplied by a given rate in order to take into account charges and expenses endured during the activity[14]. Self-employment incomes are taxed according to a lump-sum scheme. The rate applied varies between 3 percent and 65 percent depending on the activity[15]. In the database, the effective coefficient applied is on average 30 percent for all years.

3) Other business incomes. For partners in partnerships and individuals in S-corporations:

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[13] Article 50, Law 144 (06/12/1959) modified by Laws 27 (07/19/1980), 7 (08/10/1985) and 89 (09/07/1991).

[14] The charges are "Sales of merchandise, consumption material, wages, salaries and other benefits, employees and wage-earners insurance, social security subscriptions, commissions paid to third parties, car and transportation expenses, banking commissions, interests and expenses, legal expenses, consultancies and similar expenses, maintenance and repair expenses, rent or investment, other office expenses, taxes, fees, and permits, accommodation, traveling expenses, promotion and advertisement., institution/profession activity insurance expenses, amortization" (tax form F3).

[15] Decree 4169/1 (8/16/1993) modified by the Decree 5/1 (11/1/2000).

.   i) **The actual total revenue**, defined as the turnover plus the overall financial and non-financial investment revenues[16].

.   ii) **The corresponding profit subject to tax**, which is equal to actual total revenue minus the expenses and costs incurred during the activity[17], minus the exonerated incomes (grants and donations). The non-deducible revenues are capital interests, investments and expenses made to earn capital gains, taxes paid to a foreign government, losses incurred by branches settled abroad, representation remuneration distributed to employees and exceeding 10 percent of their wages,

4) Built property revenues, excluding persons living in their own dwelling: the taxable income after deduction and amount of tax paid are available.

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[16] Common operations dividends, placement and participation bonds revenues, net profit from placement bonds wavering, revenues from other movables, similar interests and revenues, positive exchange rate differences, recoveries from financial provisions (tax forms F16-1 and F16-2)

[17] The costs comprise: "the overall cost (sold merchandise, sold production, work and services provision cost), external services (royalties, rents etc.), employees charges (including social security contributions), tax fees and charges, the depreciation and investment provision allocations, interests on loans for the company's needs".
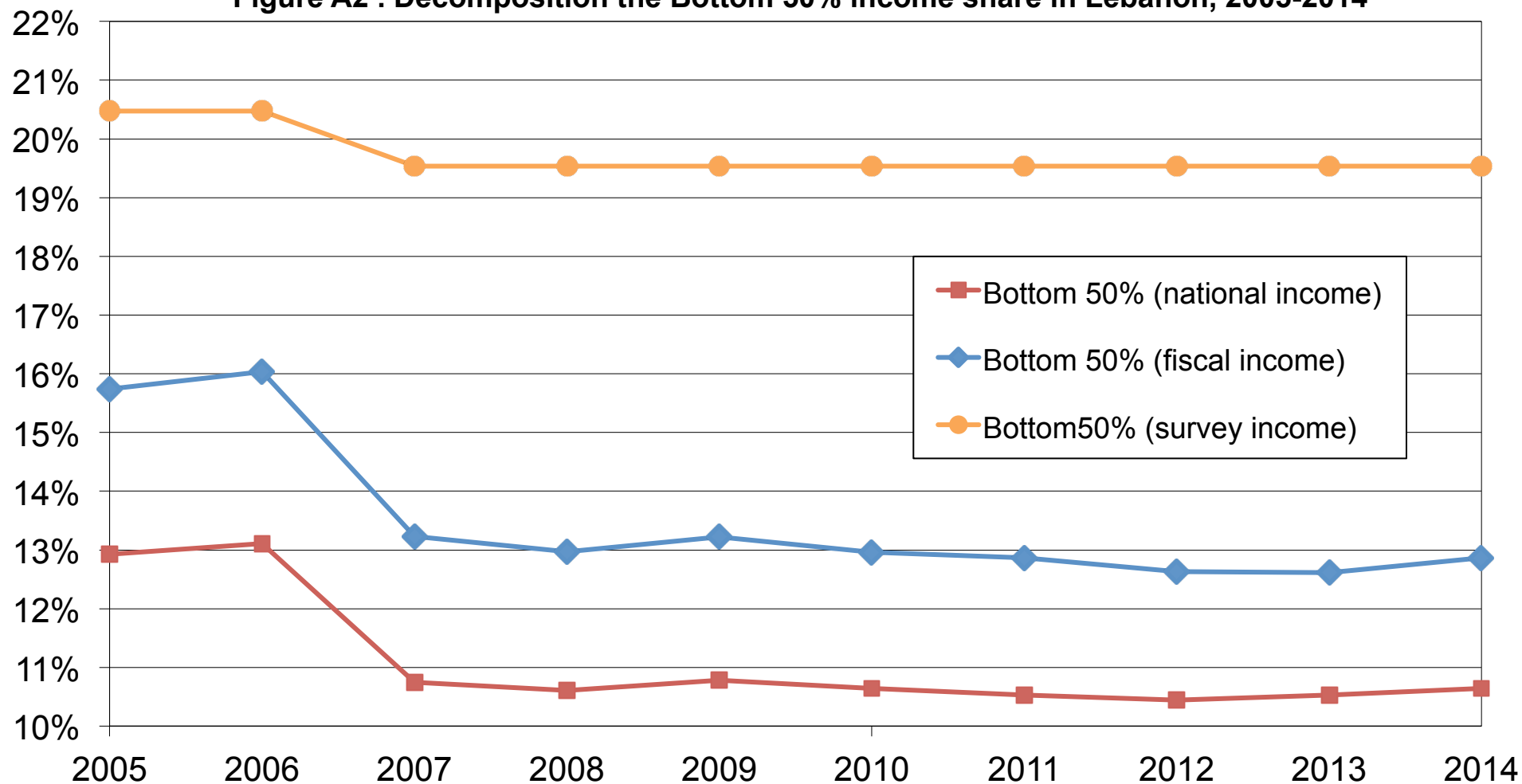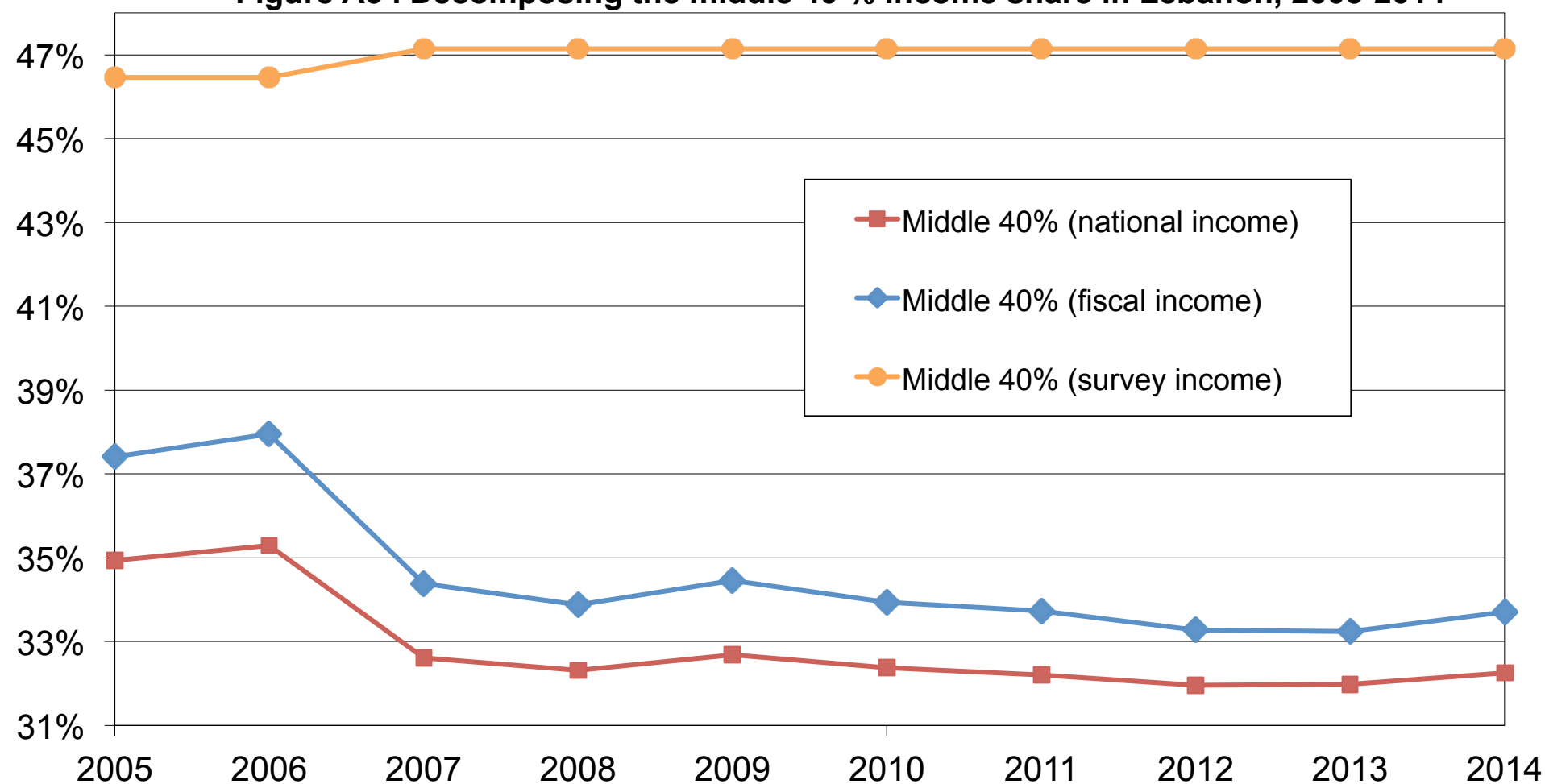
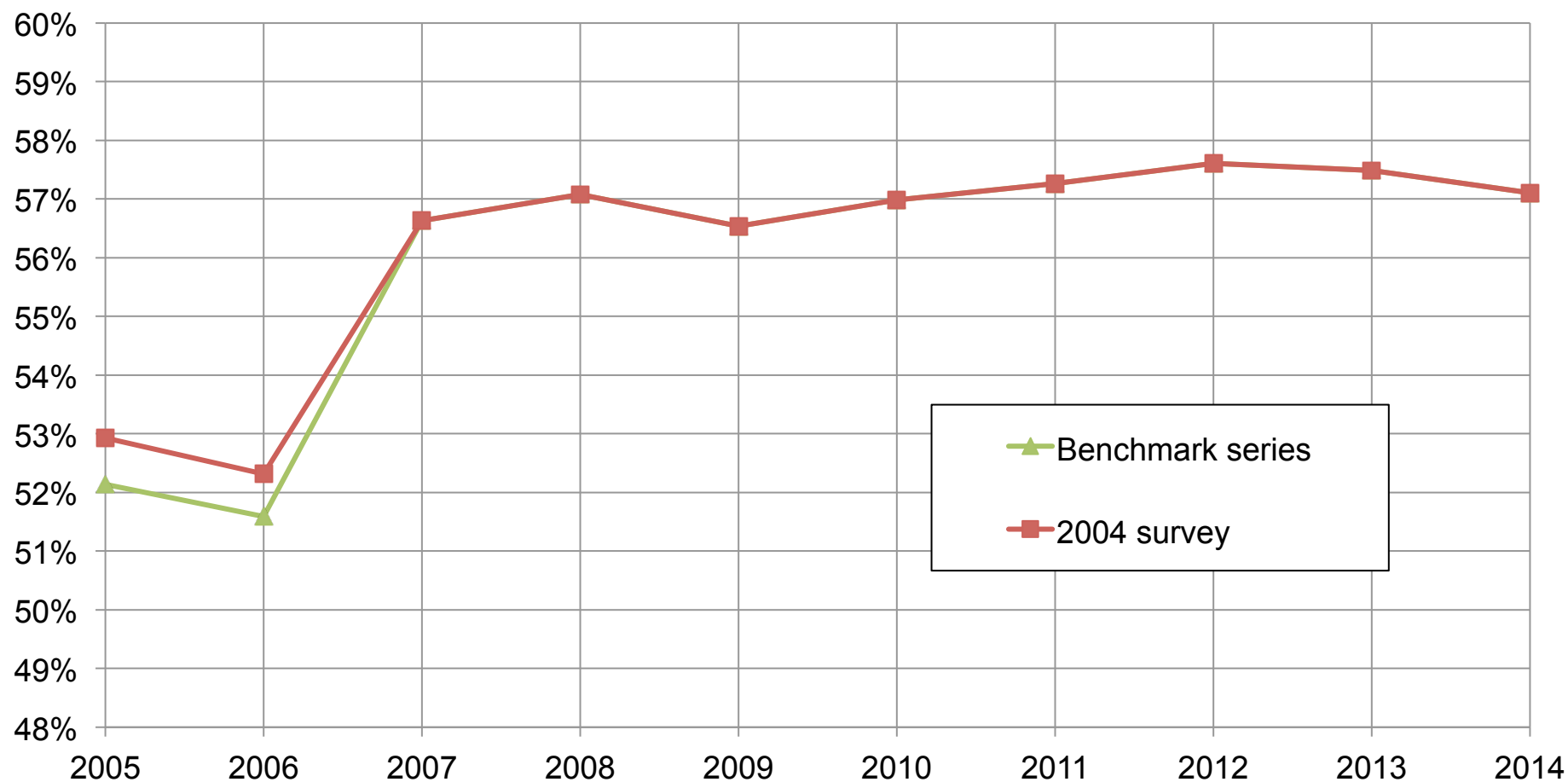## Figure A1 . Decomposing the Top 10 % income share in Lebanon, 2005-2014
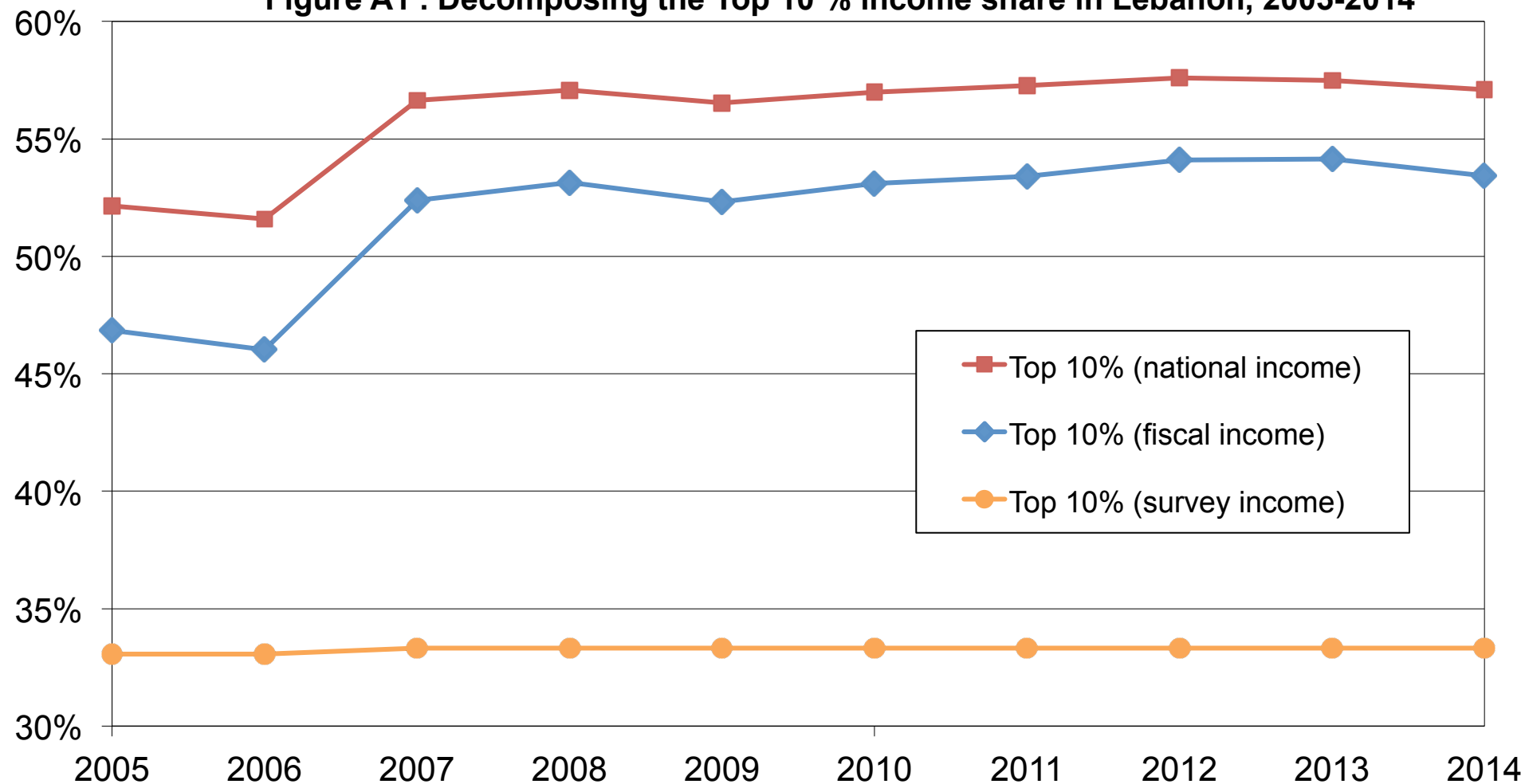
Distribution of income among equals-plit adults, aged 20 and more (household income divided by the number of adults in the household for the bottom of the distribution). National income estimates combine survey, fiscal, wealth and national accounts data, normalized to the total average income per adult. Fiscal income estimates combine survey and income tax data (but do not use wealth data to allocate tax-exempt capital income). Survey income series solely use self-reported survey data.

Figure A2 . Decomposition the Bottom 50% income share in Lebanon, 2005-2014

Legend:
- Bottom 50% (national income)
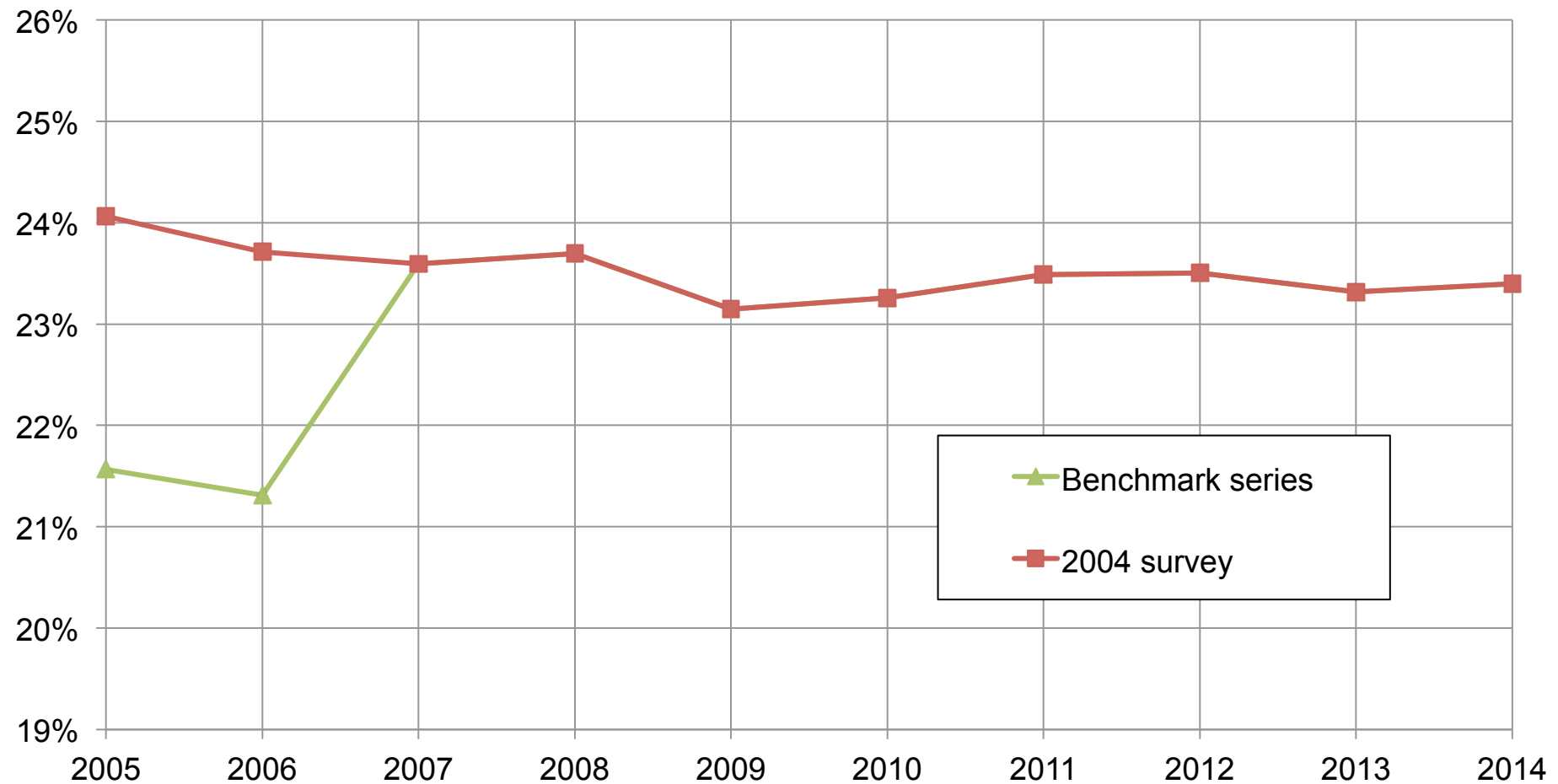- Bottom 50% (fiscal income)
- Bottom50% (survey income)

Distribution of income among equals-plit adults, aged 20 and more (household income divided by the number of adults in the household for the bottom of the distribution). National income estimates combine survey, fiscal, wealth and national accounts data, normalized to the total average income per adult. Fiscal income estimates combine survey and income tax data (but do not use wealth data to allocate tax-exempt capital income). Survey income series solely use self-reported survey data.

Figure A3 . Decomposing the middle 40 % income share in Lebanon, 2005-2014

- Middle 40% (national income)
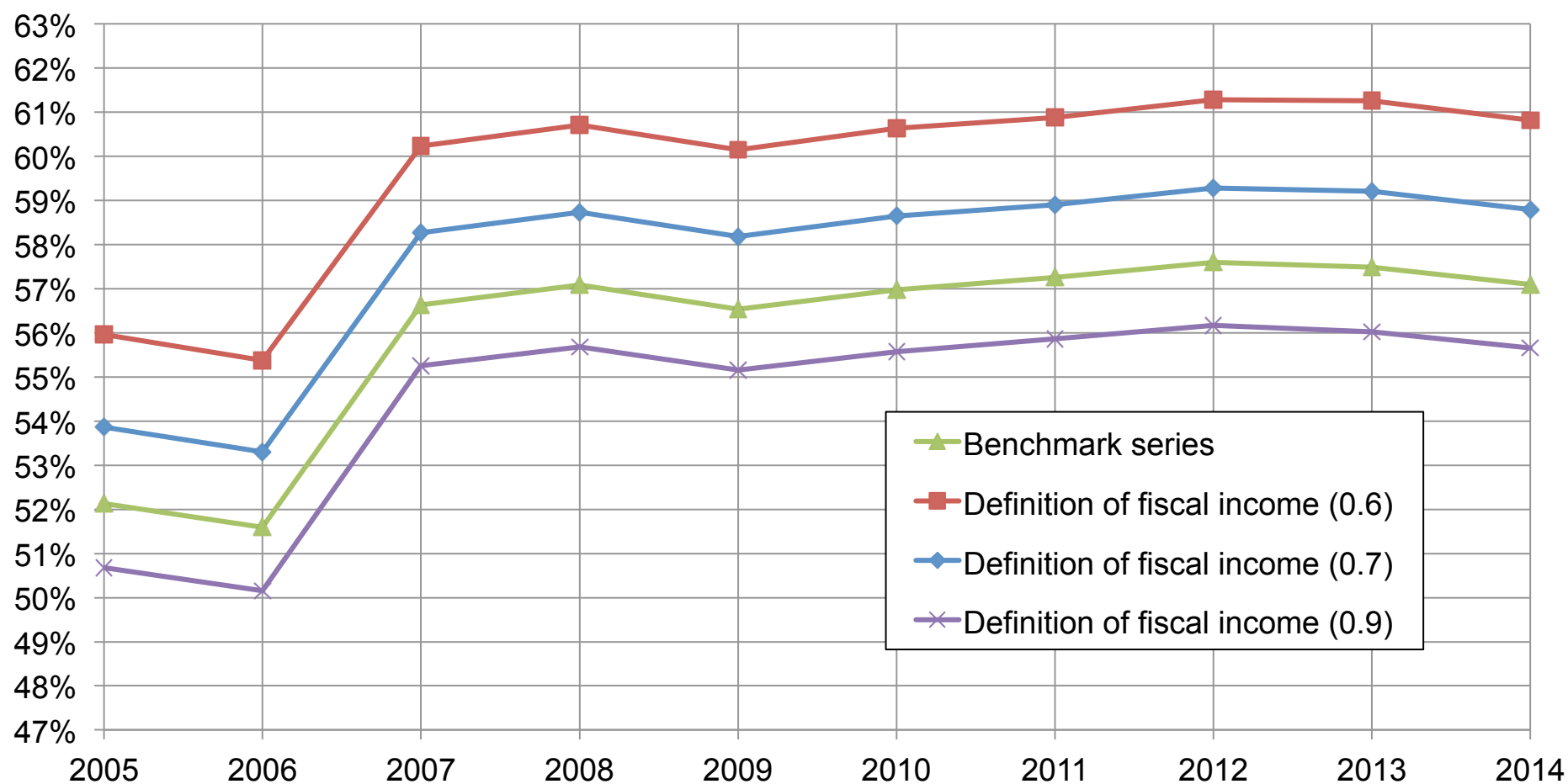- Middle 40% (fiscal income)
- Middle 40% (survey income)

Distribution of income among equals-plit adults, aged 20 and more (household income divided by the number of adults in the household for the bottom of the distribution). National income estimates combine survey, fiscal, wealth and national accounts data, normalized to the total average income per adult. Fiscal income estimates combine survey and income tax data (but do not use wealth data to allocate tax-exempt capital income). Survey income series solely use self-reported survey data.

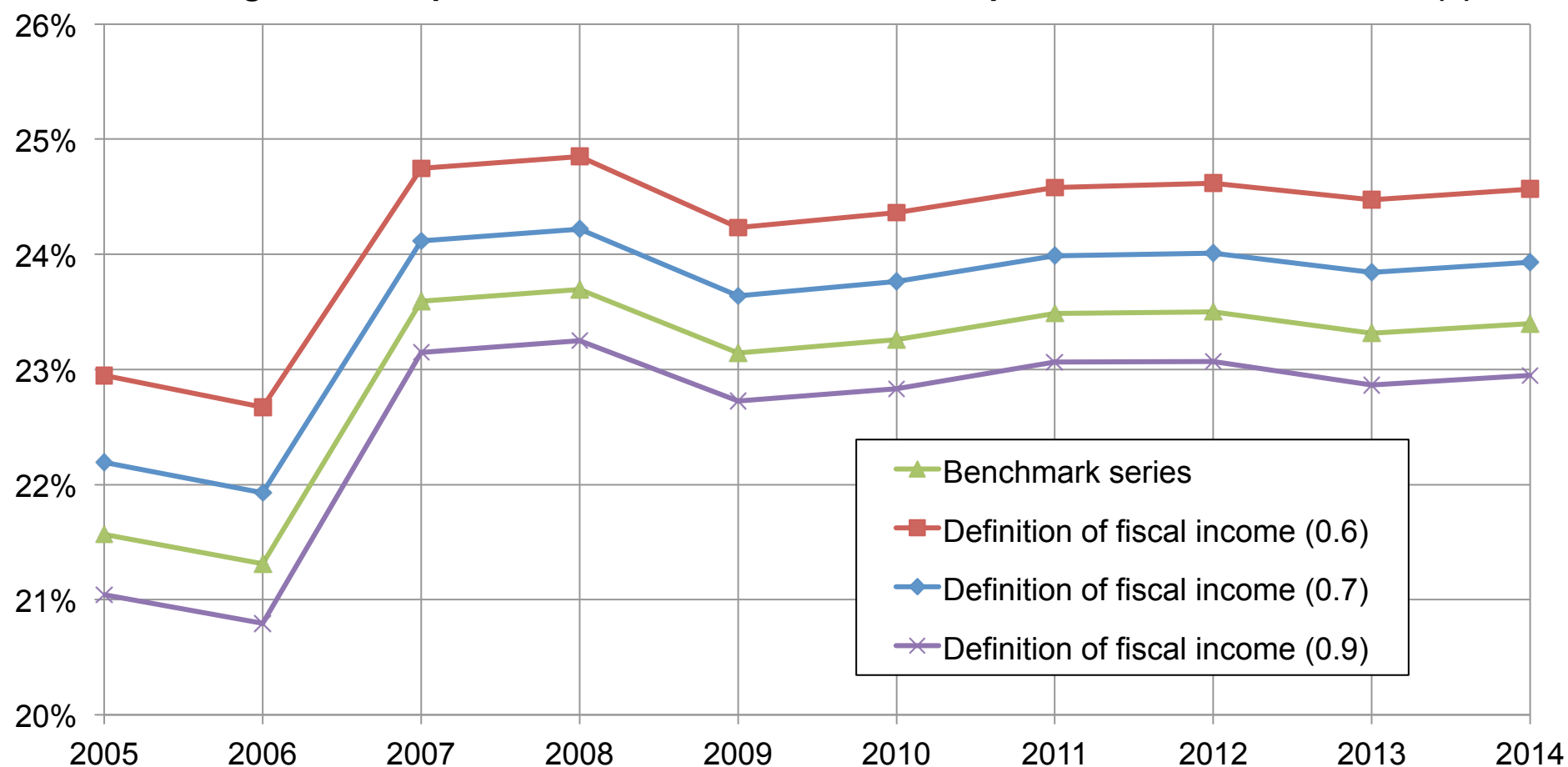# Figure A4. Top 10 % income share in Lebanon: variants for the survey data

Distribution of income among equals-plit adults, aged 20 and more (household income divided by the number of adults in the household for the bottom of the distribution). National income estimates combine survey, fiscal, wealth and national accounts data, normalized to the total average income per adult. The variants is on the survey used in the first step of the estimation procedure (the 2004 or the 2007 survey) for the years 2005-2007 in the benchmark estimate.

Figure A5. Top 1 % income share in Lebanon: variants for the survey data

Distribution of income among equals-plit adults, aged 20 and more (household income divided by the number of adults in the household for the bottom of the distribution). National income estimates combine survey, fiscal, wealth and national accounts data, normalized to the total average income per adult. The variants is on the survey used in the first step of the estimation procedure (the 2004 or the 2007 survey) for the years 2005-2007 in the benchmark estimate.

Figure A6 . Top 10 % income share in Lebanon: impact of the fiscal correction (1)
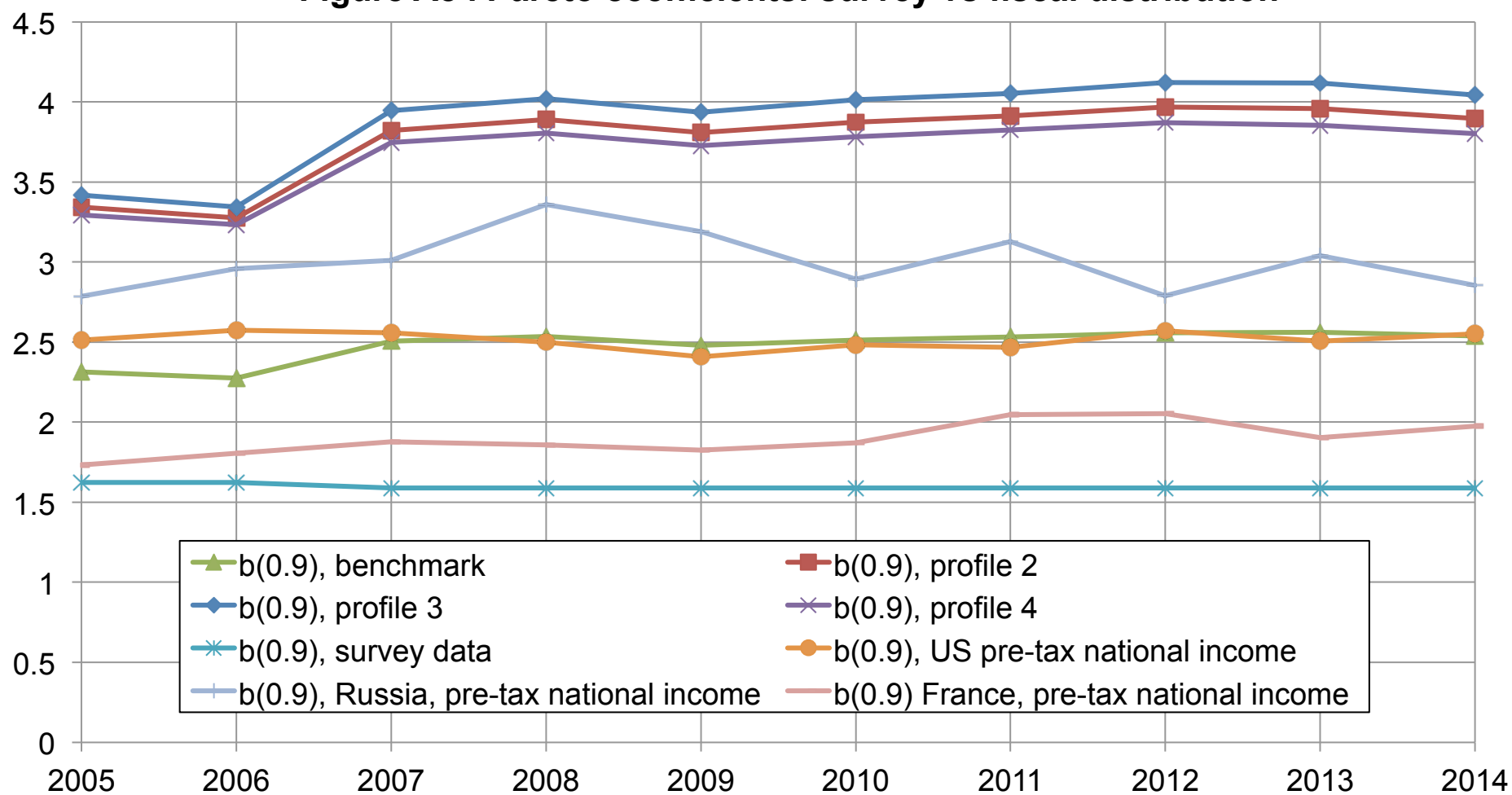
Legend:
- Benchmark series
- Definition of fiscal income (0.6)
- Definition of fiscal income (0.7)
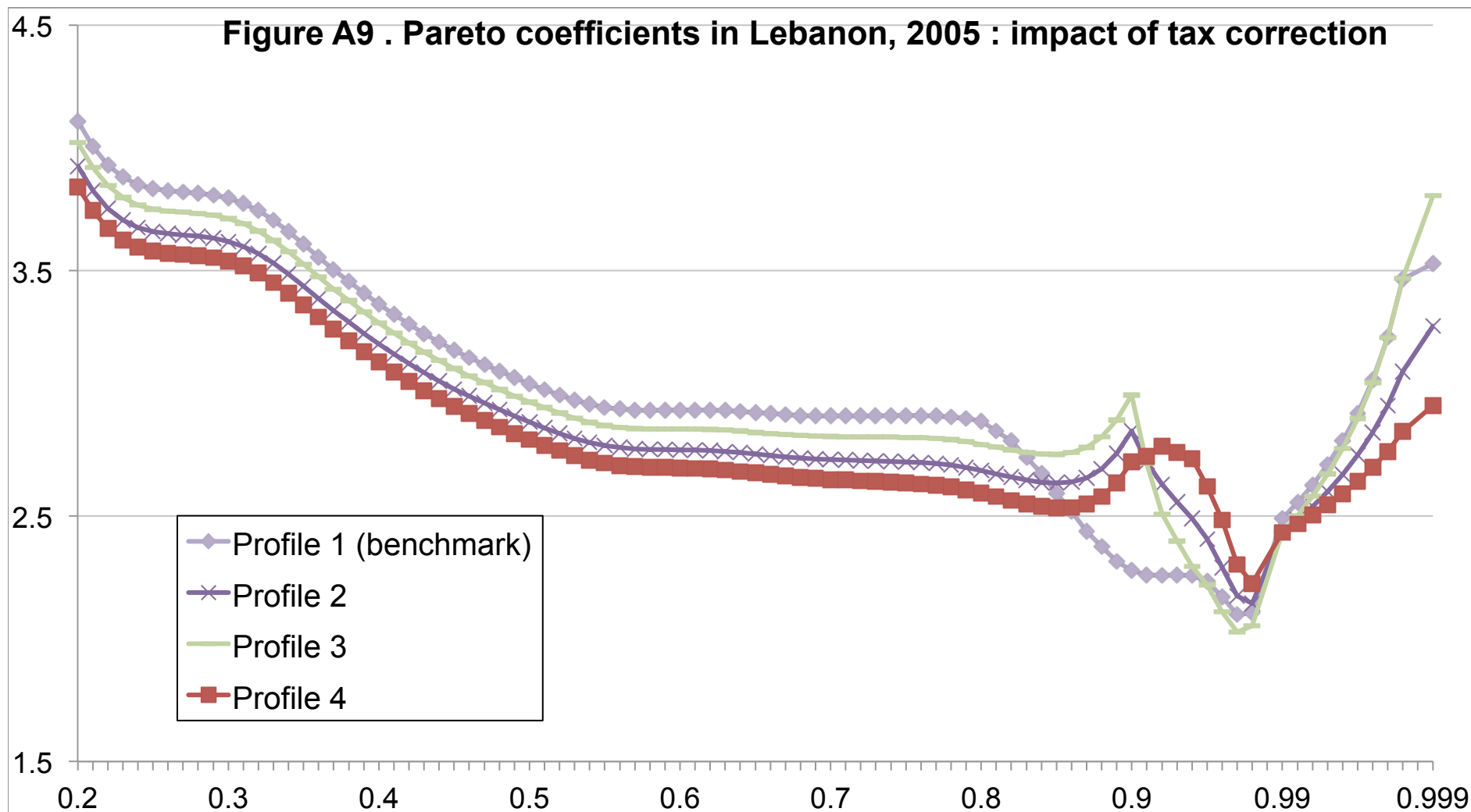- Definition of fiscal income (0.9)

Distribution of income among equals-plit adults, aged 20 and more (household income divided by the number of adults in the household for the bottom of the distribution). National income estimates combine survey, fiscal, wealth and national accounts data, normalized to the total average income per adult. The variant is on the definition of fiscal income chosen (whether taxable income equals 60, 70, 80 or 90 % of fiscal income- 80% is the benchmark assumption).

Figure A7 . Top 1 % income share in Lebanon: impact of the fiscal correction (1)

Distribution of income among equals-plit adults aged 20 and more (household income divided by the number of adults in the household for the bottom of the distribution). National income estimates combine survey, fiscal, wealth and national accounts data, normalized to the total average income per adult. The variant is on the definition of fiscal income chosen (whether taxable income equals 60, 70, 80 or 90 % of fiscal income- 80% is the benchmark assumption).

Figure A8 . Pareto coefficients: survey vs fiscal distribution

Legend:
- b(0.9), benchmark
- b(0.9), profile 2
- b(0.9), profile 3
- b(0.9), profile 4
- b(0.9), survey data
- b(0.9), US pre-tax national income
- b(0.9), Russia, pre-tax national income
- b(0.9) France, pre-tax national income

Distribution of fiscal income income among equals-plit adults aged 20 and more (household income divided by the number of adults in the household for the bottom of the distribution). Fiscal income estimates combine survey and fiscal data. Survey income use survey data only. Both distributions are normalized to the total average income per adult (from WID.world). Coefficients for other countries taken in WID.world.

Figure A9 . Pareto coefficients in Lebanon, 2005 : impact of tax correction

Profile 1 (benchmark)
Profile 2
Profile 3
Profile 4

Distribution of fiscal income income among equals-plit adultsaged 20 and more (household income divided by the number of adults in the household for the bottom of the distribution). Fiscal income estimates combine survey and fiscal data, normalized to the total average income per adult (from WID.world).
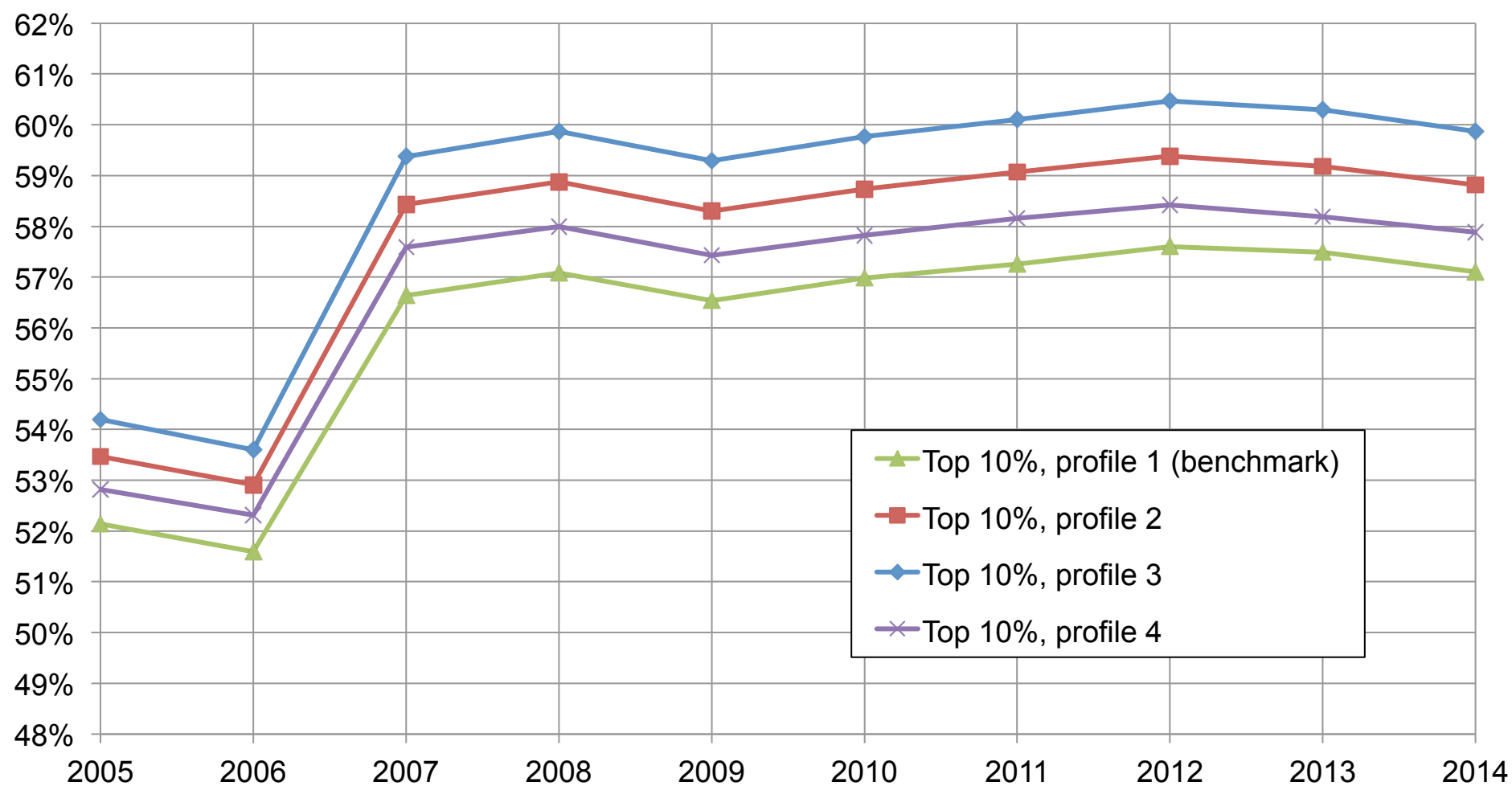
Figure A10 . Pareto coefficients in Lebanon, 2014 : impact of tax correction
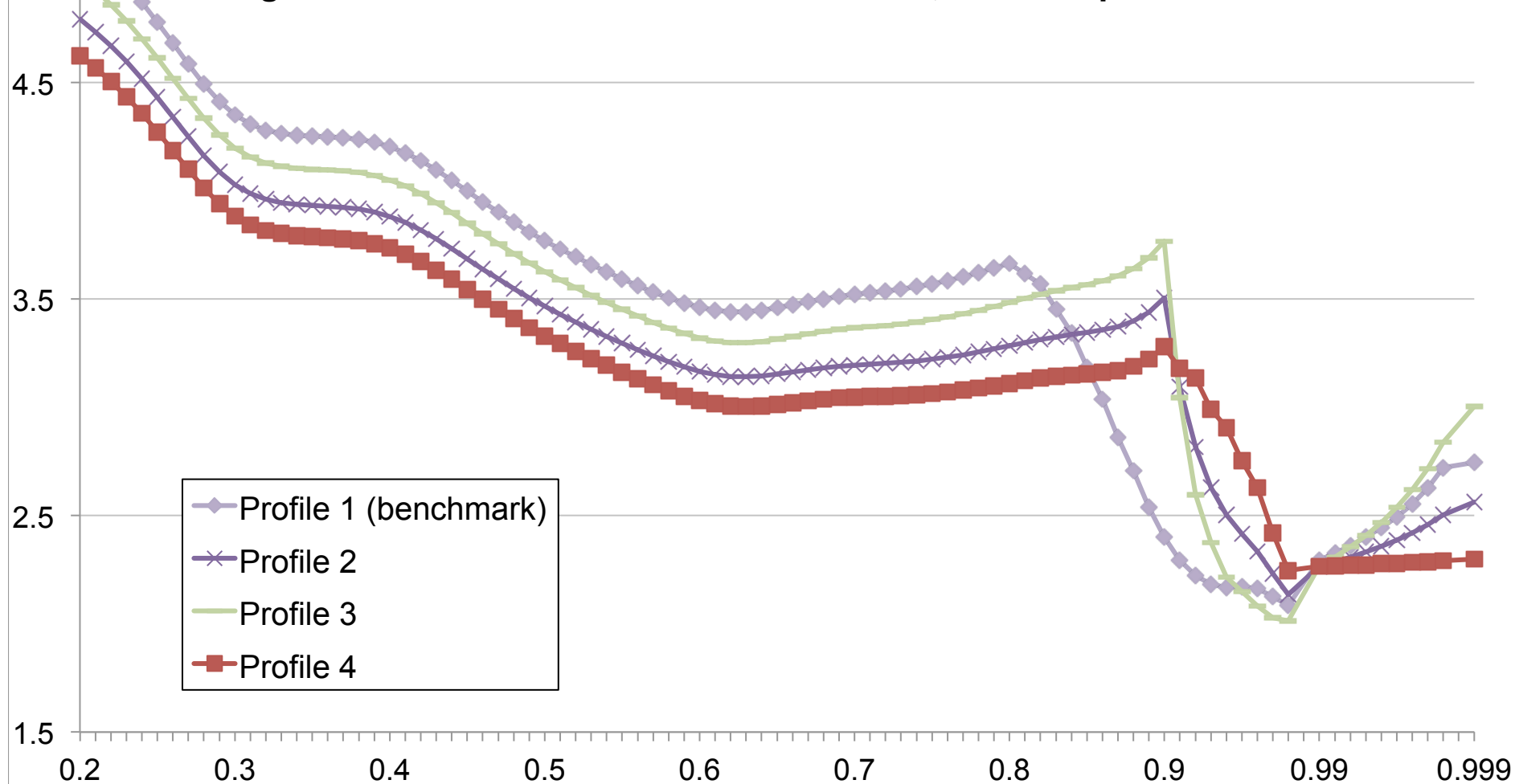
Profile 1 (benchmark)
Profile 2
Profile 3
Profile 4

Distribution of fiscal income income among equals-plit adults aged 20 and more (household income divided by the number of adults in the household for the bottom of the distribution). Fiscal income estimates combine survey and fiscal data, normalized to the total average income per adult (from WID.world).

Figure A11. Inverted Pareto curve in Lebanon in selected years, final benchmark distribution
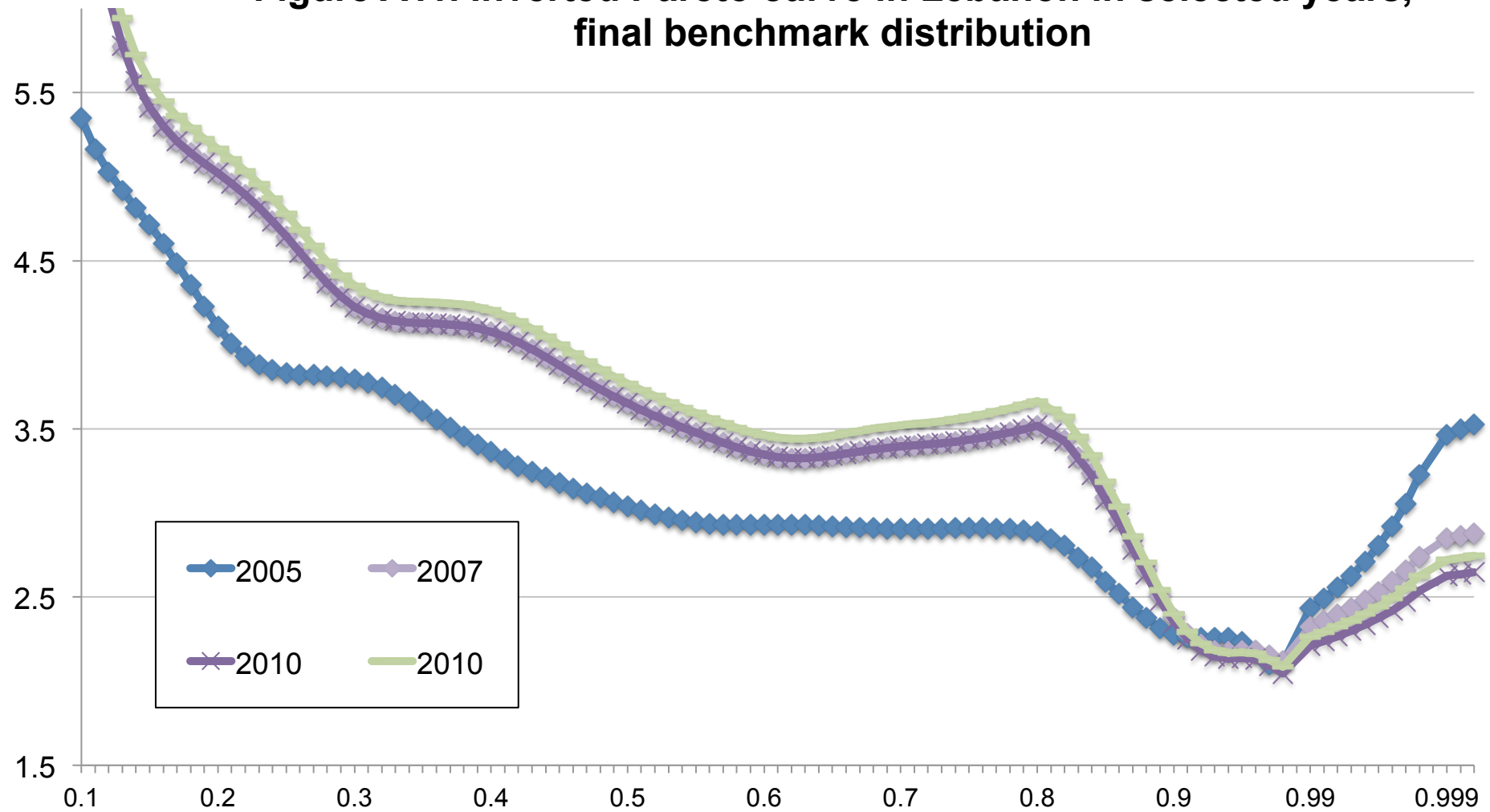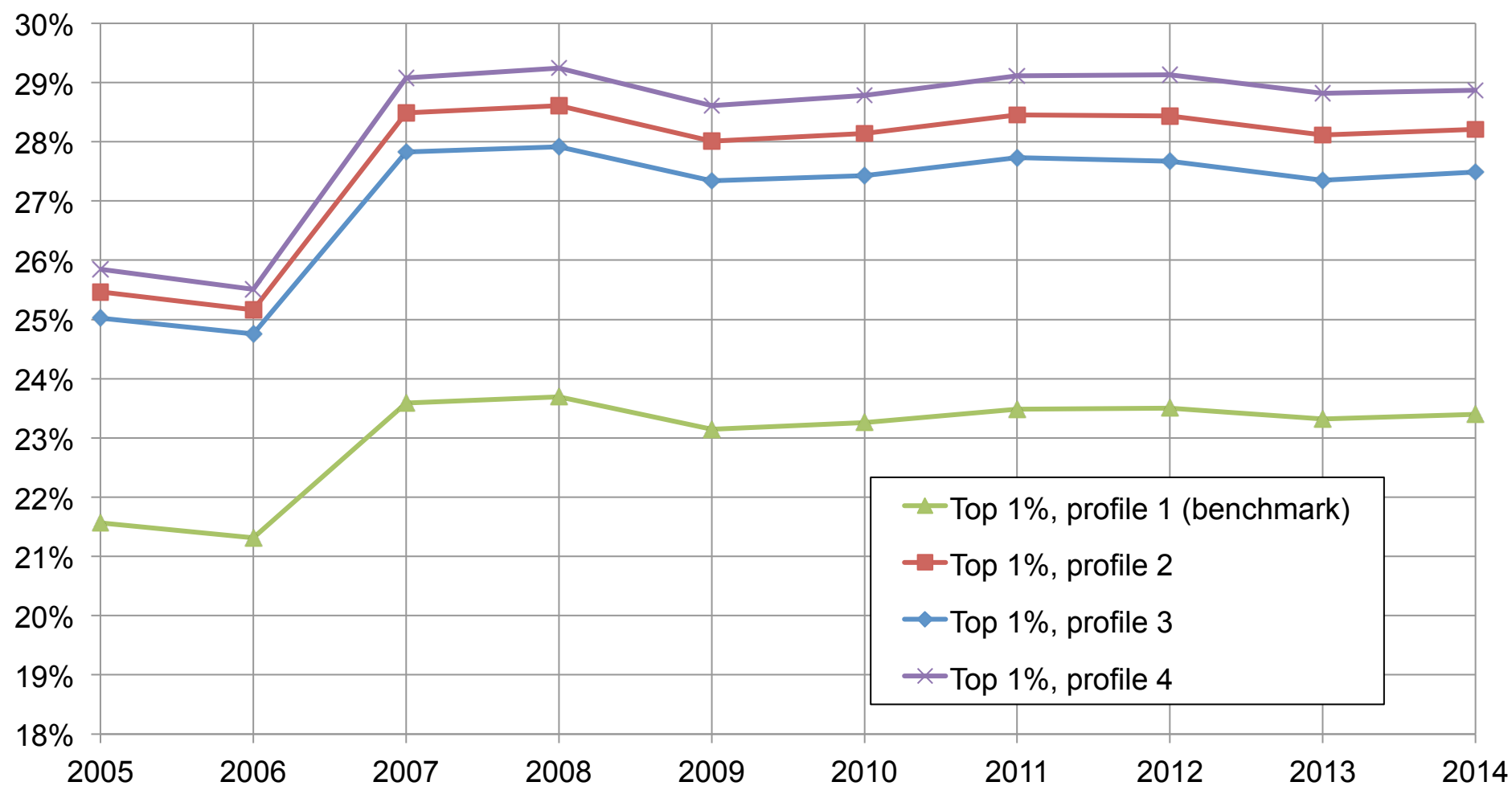
Legend: 2005, 2007, 2010, 2010

Distribution of fiscal income income among equals-plit adults (household income divided by the number of adults in the household for the bottom of the distribution). Fiscal income estimates combine surve and fiscal data, normalized to the total average income per adult (from WID.world).

Figure A12 . Top 10% income share in Lebanon: impact of the fiscal correction (2)
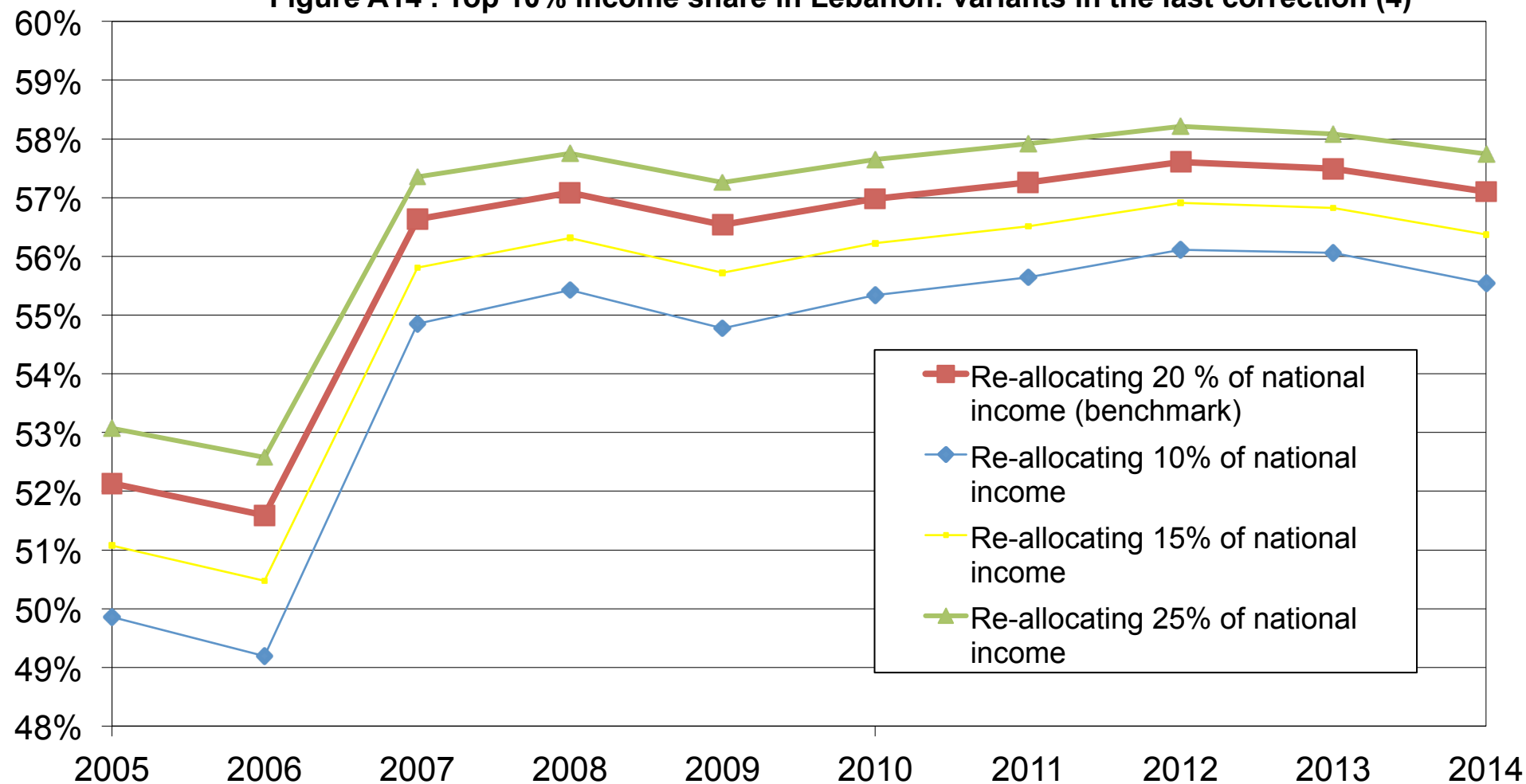
Legend:
- Top 10%, profile 1 (benchmark)
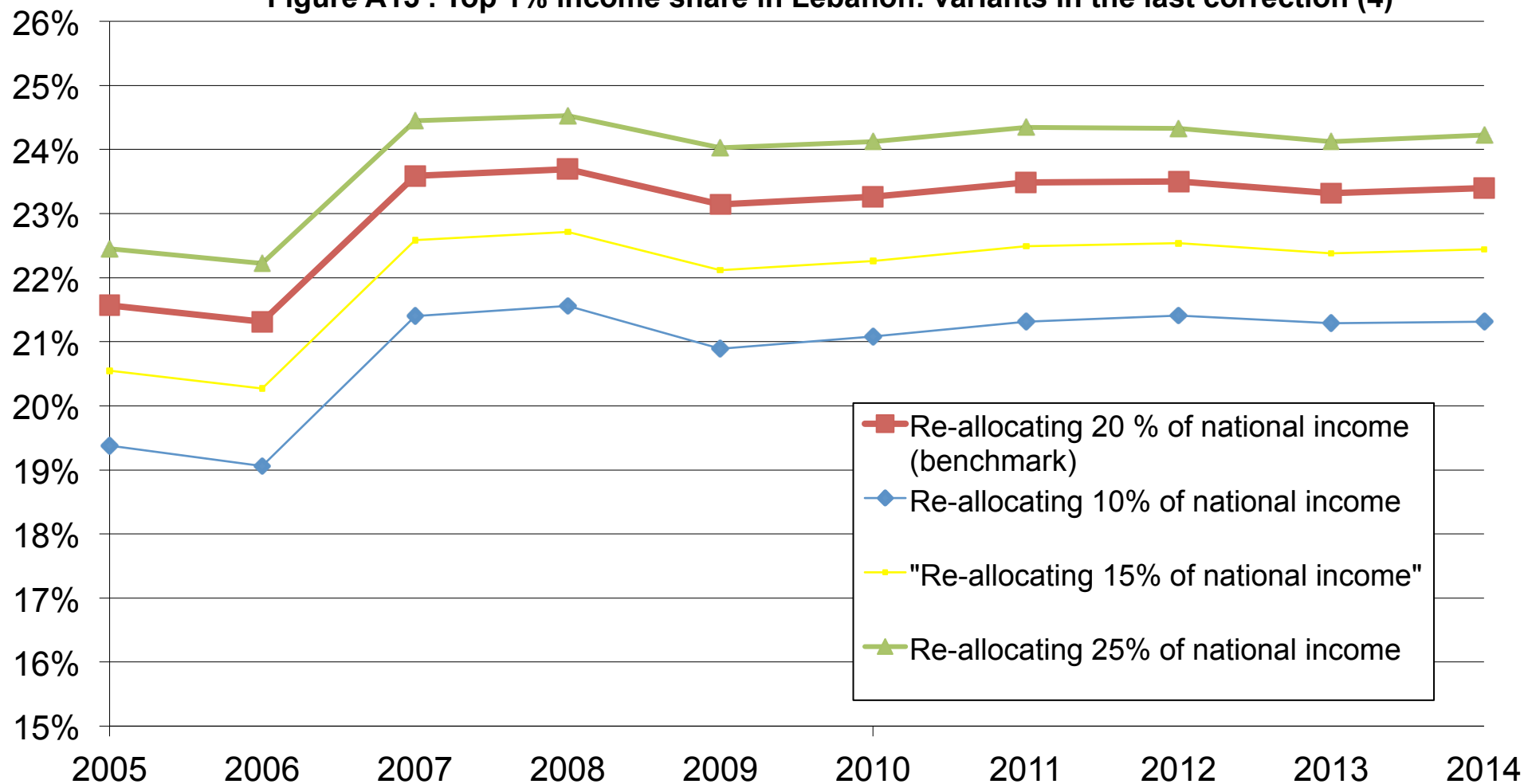- Top 10%, profile 2
- Top 10%, profile 3
- Top 10%, profile 4

Distribution of income among equals-plit adults aged 20 and more (household income divided by the number of adults in the household for the bottom of the distribution). National income estimates combine survey, fiscal, wealth and national accounts data, normalized to the total average income per adult. The variant is on the profile of correction chosen to link the survey distribution (bottom 80 or 90%) to the fiscal distribution (top 1%).

Figure A13 . Top 1% income share in Lebanon: impact of the fiscal correction (2)

Distribution of income among equals-plit adults aged 20 and more (household income divided by the number of adults in the household for the bottom of the distribution). National income estimates combine survey, fiscal, wealth and national accounts data, normalized to the total average income per adult. The variant is on the profile of correction chosen to link the survey distribution (bottom 80 or 90%) to the fiscal distribution (top 1%).

Legend:
- Top 1%, profile 1 (benchmark)
- Top 1%, profile 2
- Top 1%, profile 3
- Top 1%, profile 4

Figure A14 . Top 10% income share in Lebanon: variants in the last correction (4)

Legend:
- Re-allocating 20 % of national income (benchmark)
- Re-allocating 10% of national income
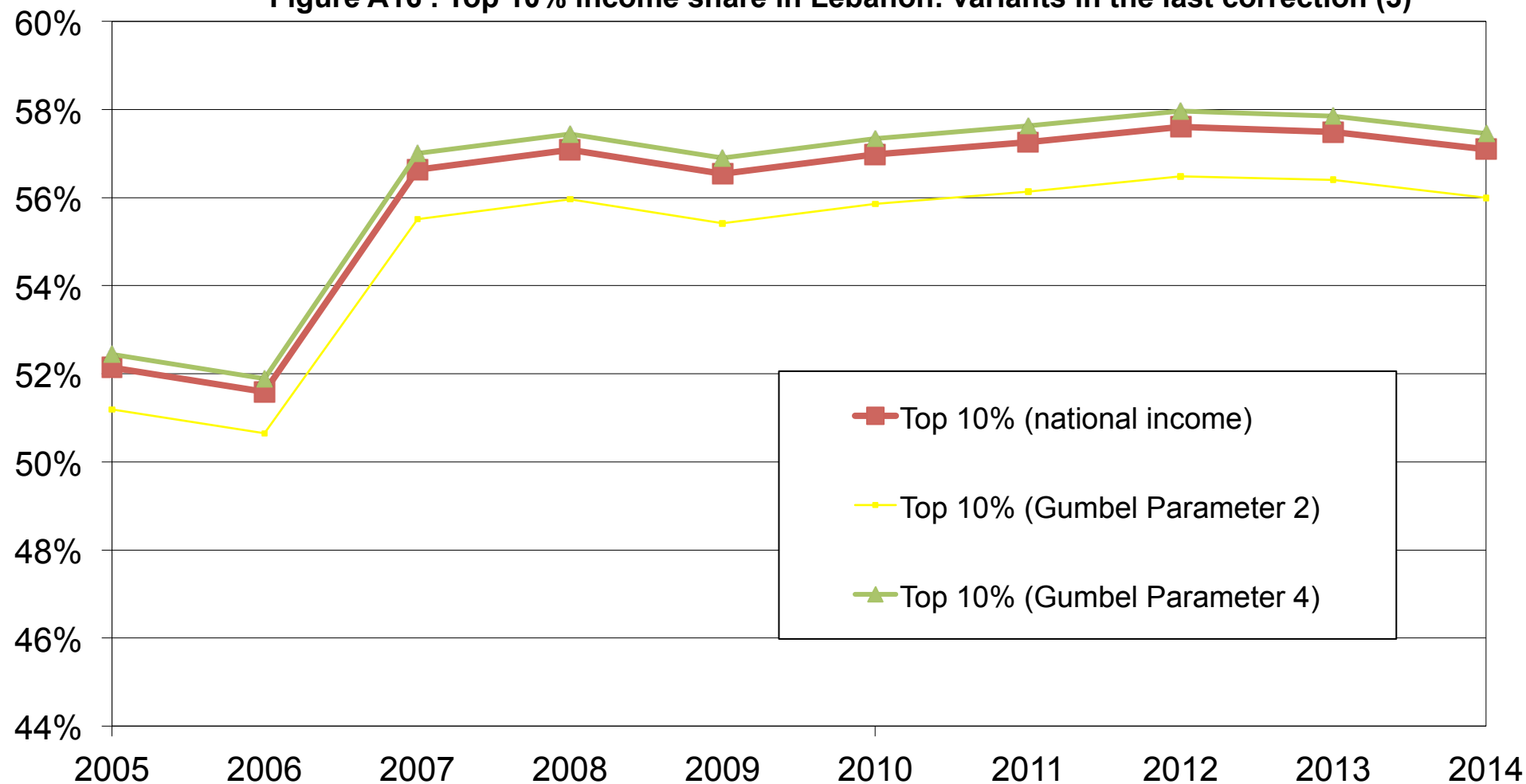- Re-allocating 15% of national income
- Re-allocating 25% of national income

Distribution of income among equals-plit adults (household income divided by the number of adults in the household for the bottom of the distribution). National income estimates combine survey, fiscal, wealth and national accounts data, normalized to the total average income per adult. The variant is on amount of missing capital income re-allocated in the last correction.

Figure A15 . Top 1% income share in Lebanon: variants in the last correction (4)

Legend:
- Re-allocating 20 % of national income (benchmark)
- Re-allocating 10% of national income
- "Re-allocating 15% of national income"
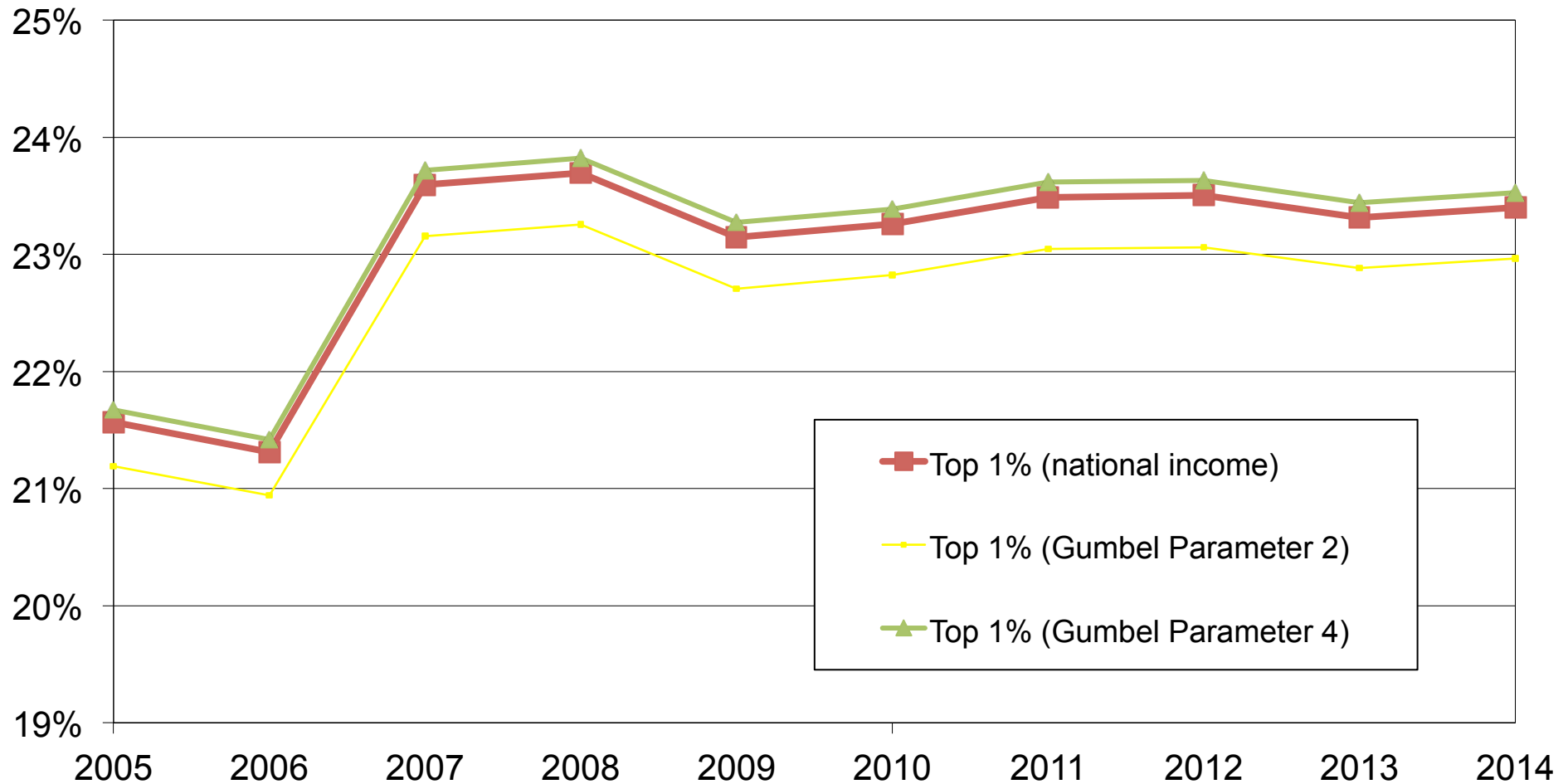- Re-allocating 25% of national income

Distribution of income among equals-plit adults aged 20 and more (household income divided by the number of adults in the household for the bottom of the distribution). National income estimates combine survey, fiscal, wealth and national accounts data, normalized to the total average income per adult. The variant is on amount of missing capital income re-allocated in the last correction.

Figure A16 . Top 10% income share in Lebanon: variants in the last correction (3)

Legend:
- Top 10% (national income)
- Top 10% (Gumbel Parameter 2)
- Top 10% (Gumbel Parameter 4)

Distribution of income among equals-plit adults aged 20 and more (household income divided by the number of adults in the household for the bottom of the distribution). National income estimates combine survey, fiscal, wealth and national accounts data, normalized to the total average income per adult. The variant is on the Gumble Parameter that determines the joint distribution of fiscal and missing capital income.

Figure A17 . Top 1% income share in Lebanon: variants in the last correction (3)

Legend:
- Top 1% (national income)
- Top 1% (Gumbel Parameter 2)
- Top 1% (Gumbel Parameter 4)

Distribution of income among equals-plit adults aged 20 and more (household income divided by the number of adults in the household for the bottom of the distribution). National income estimates combine survey, fiscal, wealth and national accounts data, normalized to the total average income per adult. The variant is on the Gumble Parameter that determines the joint distribution of fiscal and missing capital income that is the final series.
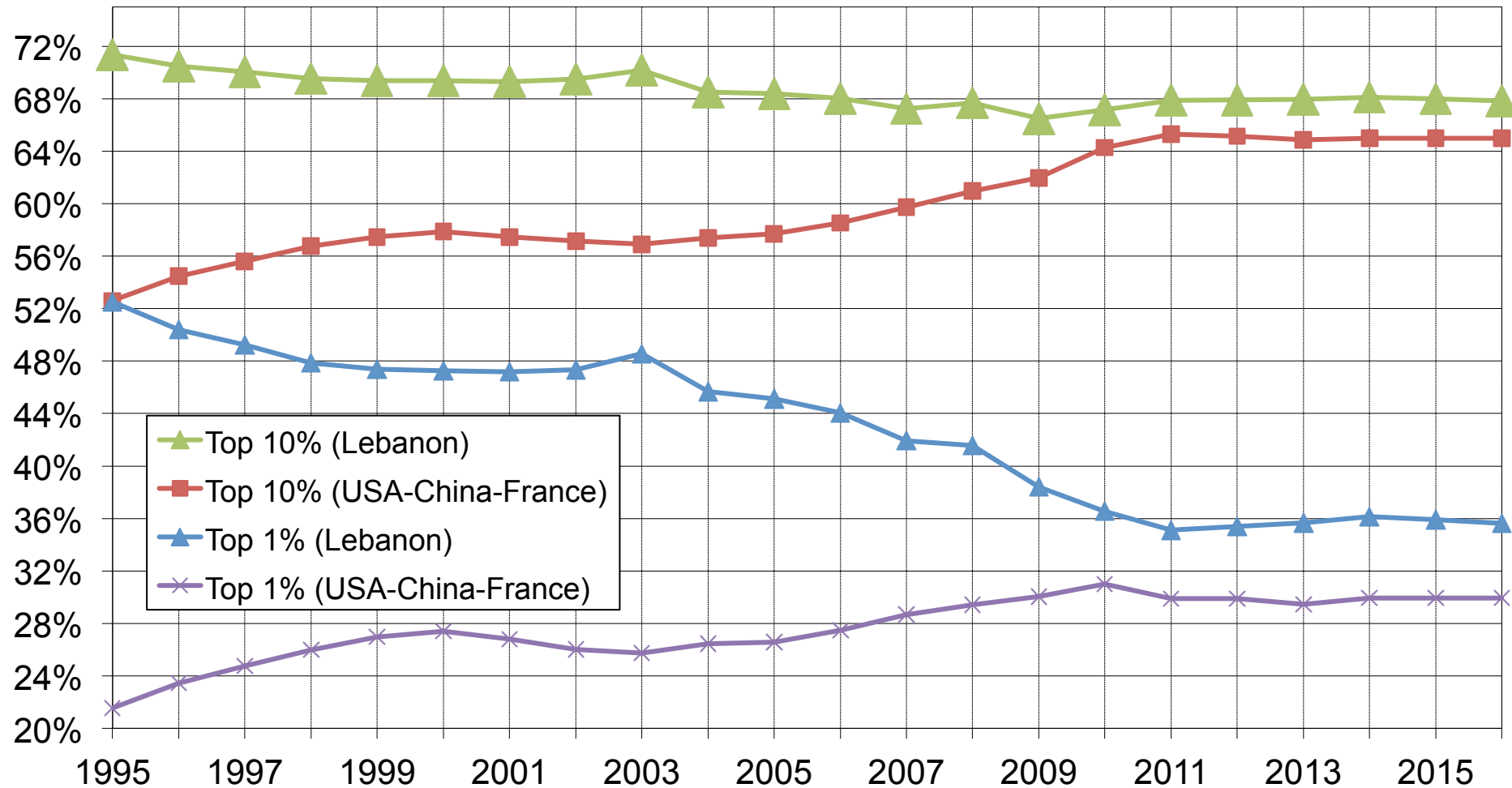
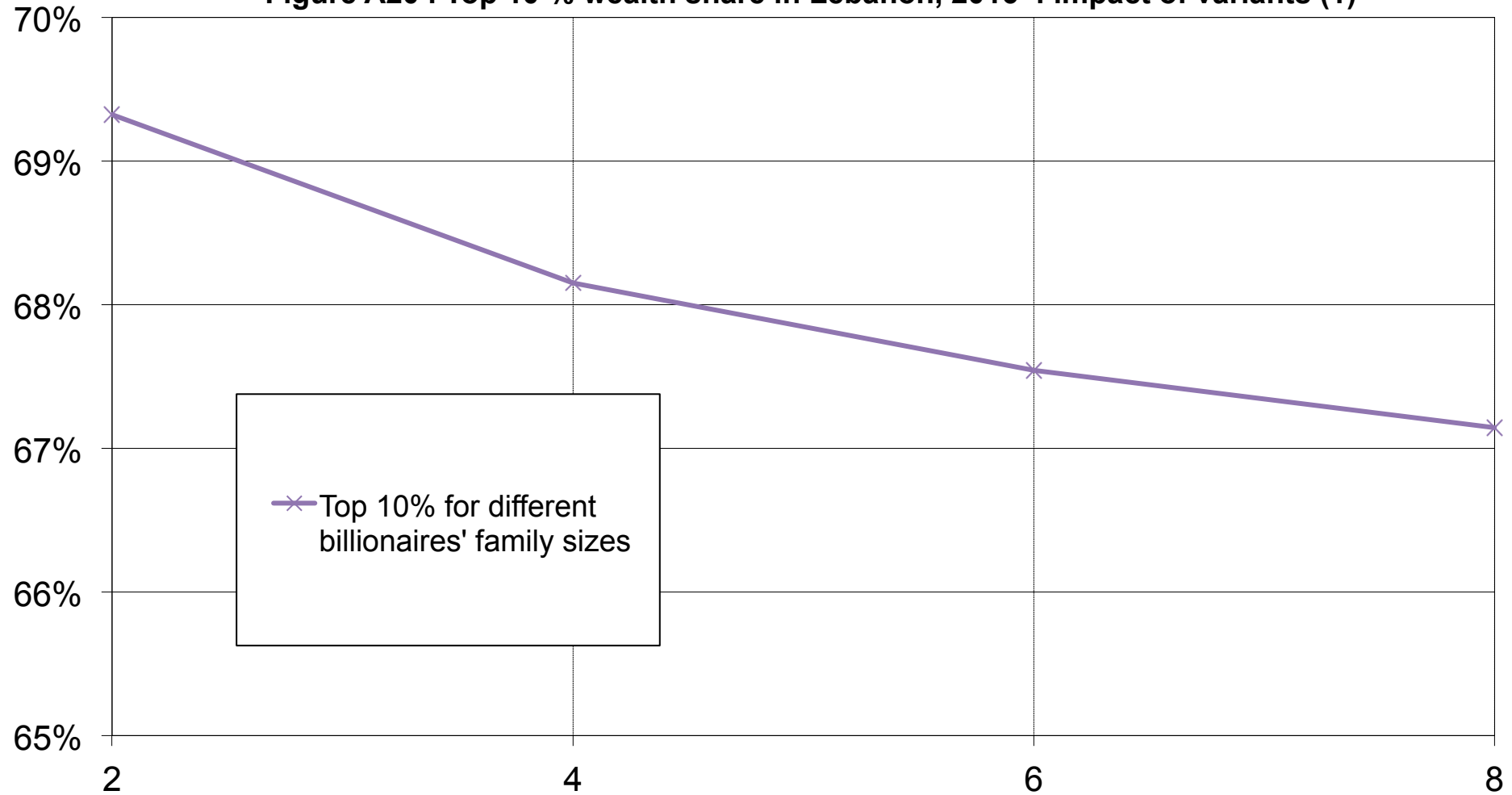# Figure A18 . Wealth shares in Lebanon: benchmark series
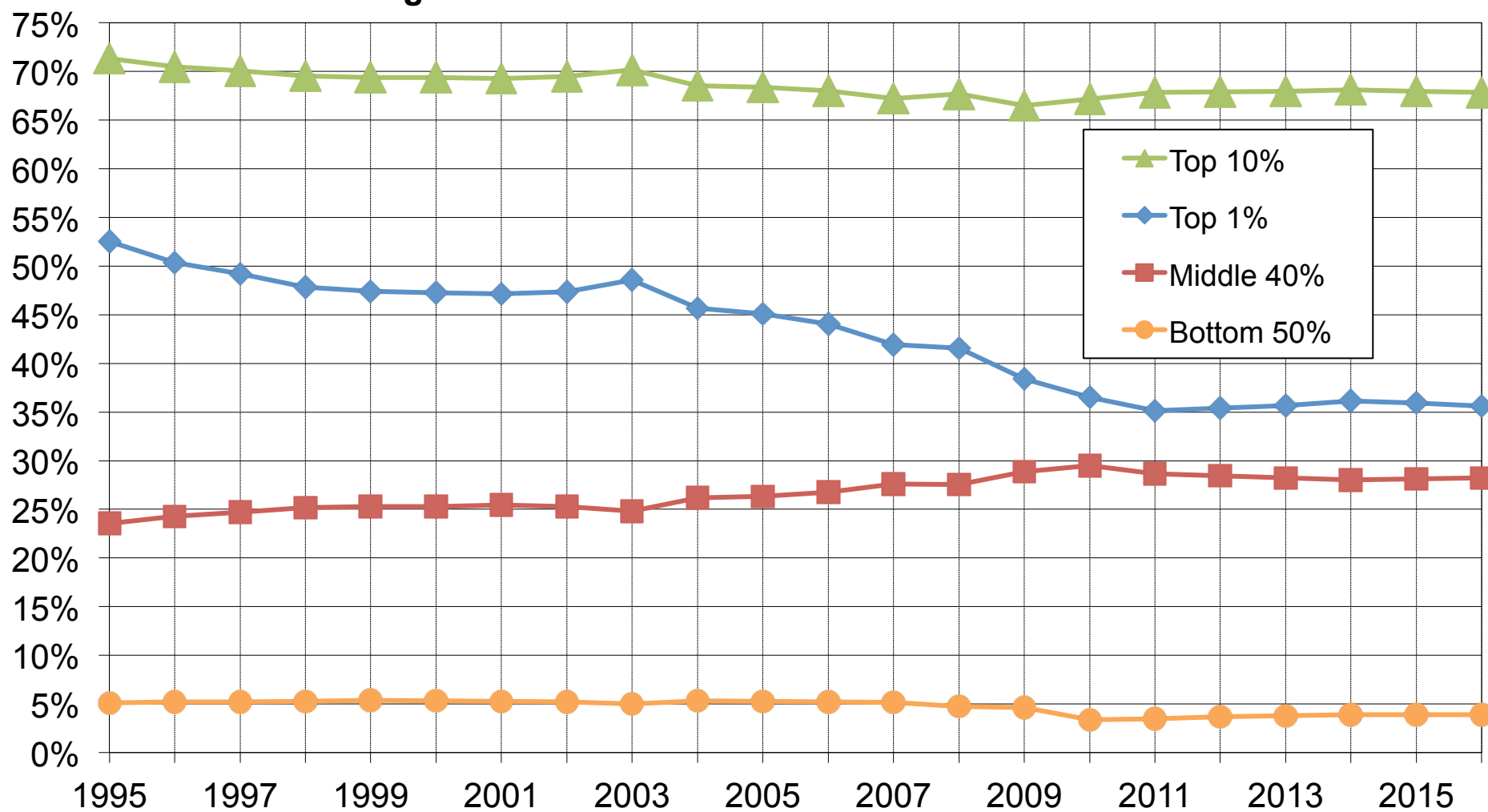
Distribution of personal wealth among adults. Estimates obtained by combining Forbes billionaire data for Lebanon, generalized Pareto interpolation techniques and average normalized wealth fistribution for USA-China-France. Benchmark series.

Figure A19 . Top wealth shares in Lebanon: benchmark series vs US-CH-FR
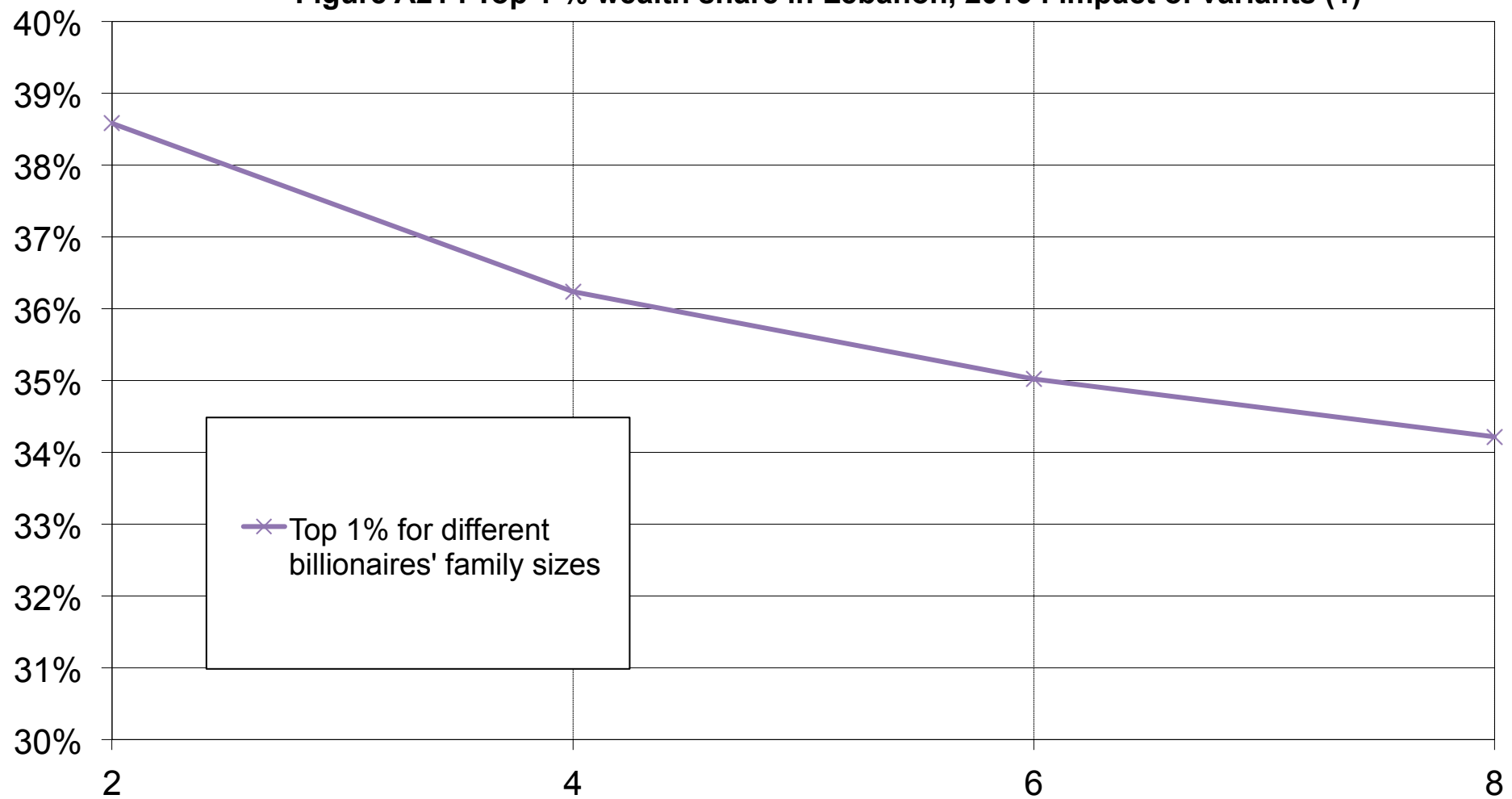

Distribution of personal wealth among adults aged 20 and more. Estimates obtained by combining Forbes billionaire data for Lebanon, generalized Pareto interpolation techniques and average normalized wealth fistribution for USA-China-France.
Benchmark seri

Figure A20 . Top 10 % wealth share in Lebanon, 2016 : impact of variants (1)

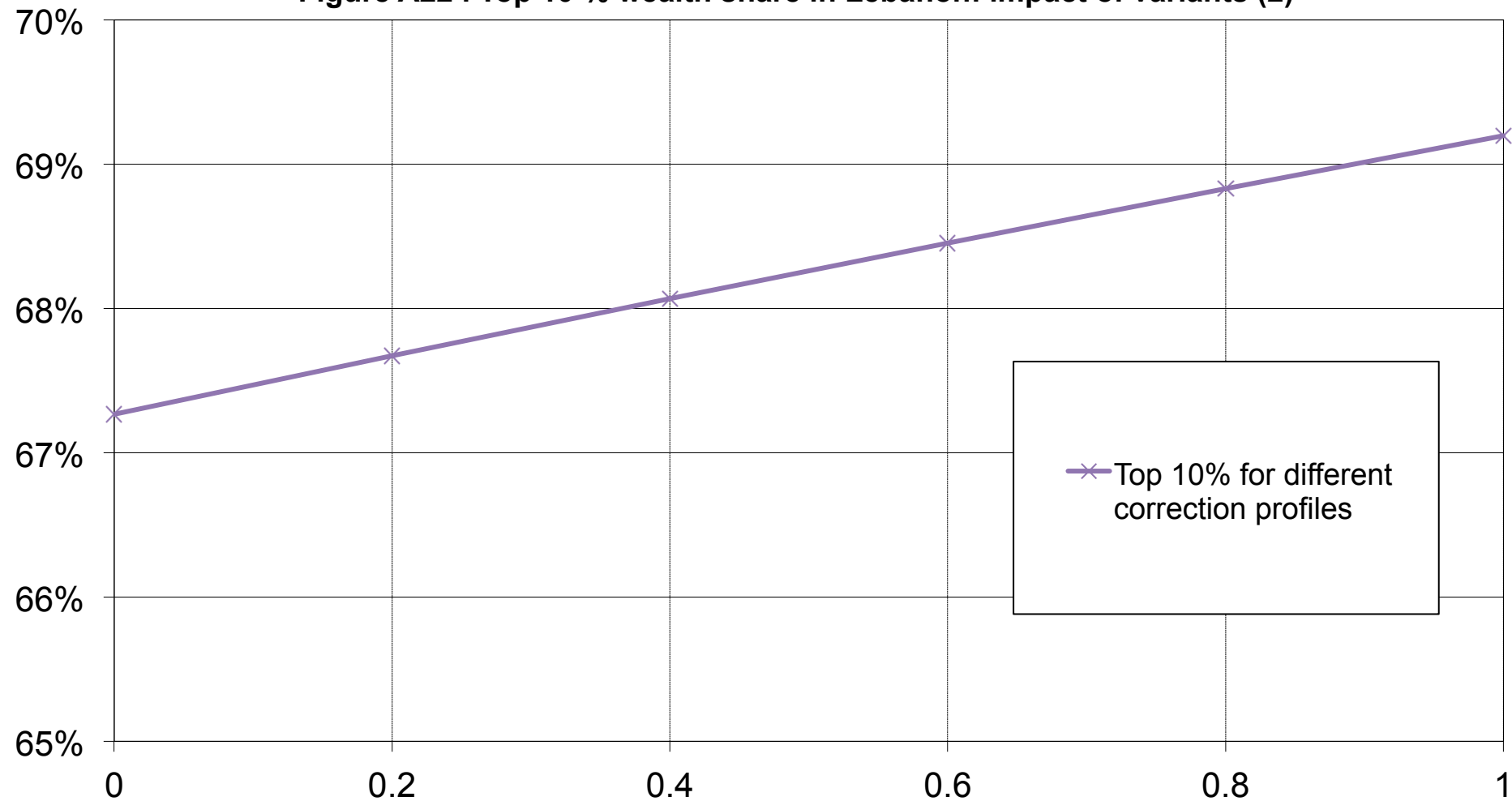Legend: —✕— Top 10% for different billionaires' family sizes

Distribution of personal wealth among adults aged 20 and more. Estimates obtained by combining Forbes billionaire data for Lebanon, generalized Pareto interpolation techniques and average normalized wealth fistribution for USA-China-France. Variants on th

Figure A21 . Top 1 % wealth share in Lebanon, 2016 : impact of variants (1)
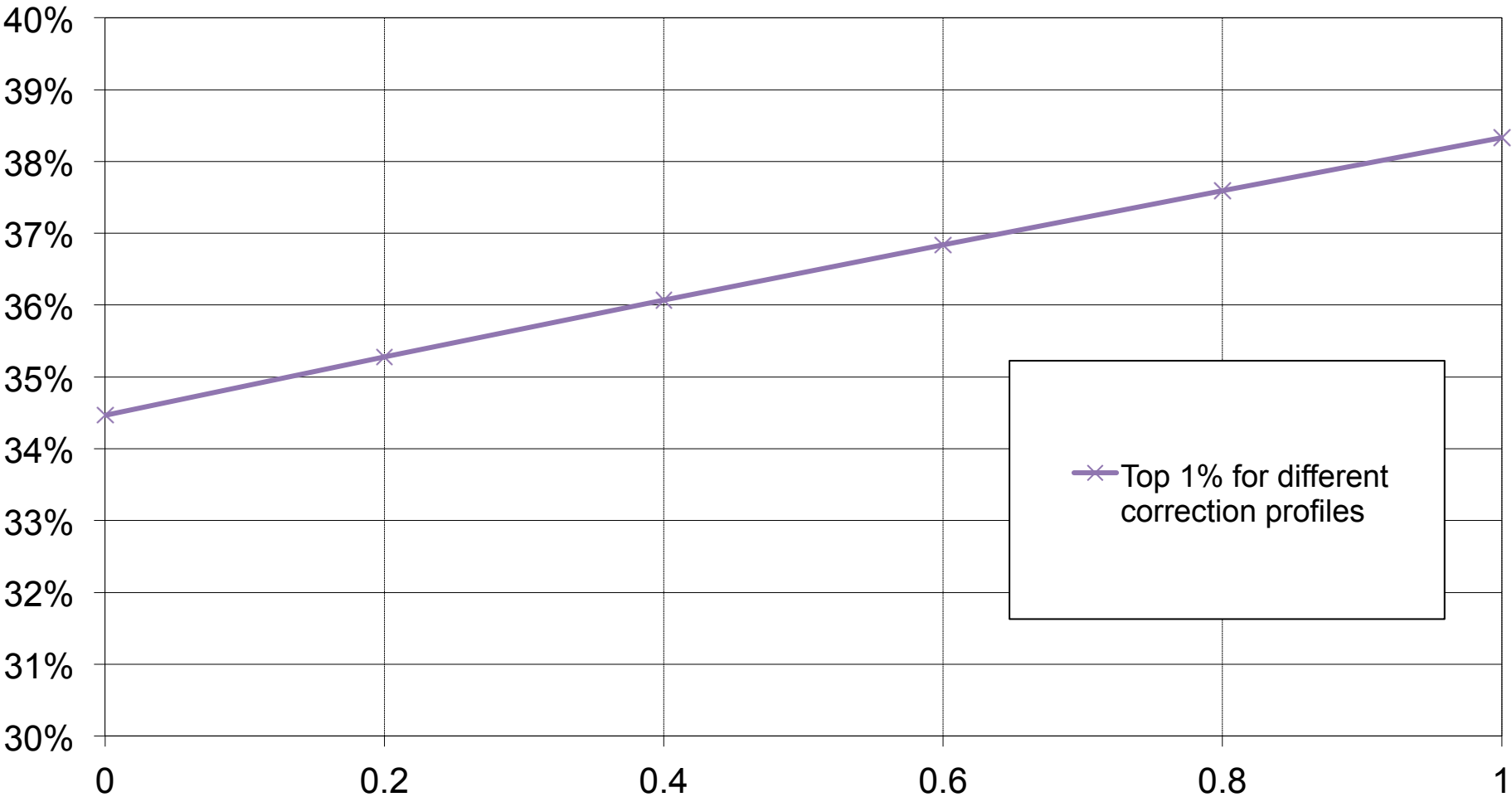

Distribution of personal wealth among adults aged 20 and more. Estimates obtained by combining Forbes billionaire data for Lebanon, generalized Pareto interpolation techniques and average normalized wealth fistribution for USA-China-France. Variants on th

Figure A22 . Top 10 % wealth share in Lebanon: impact of variants (2)

Legend: ──✕── Top 10% for different correction profiles

Distribution of personal wealth among adults aged 20 and more. Estimates obtained by combining Forbes billionaire data for Lebanon, generalized Pareto interpolation techniques and average normalized wealth distribution for USA-China-France. Variants on th

**Figure A23 . Top 1 % wealth share in Lebanon: impact of variants (2)**

Distribution of personal wealth among adults aged 20 and more. Estimates obtained by combining Forbes billionaire data for Lebanon, generalized Pareto interpolation techniques and average normalized wealth distribution for USA-China-France. Variants on th

Figure A24. Top 10% income share in Lebanon: variants in the last correction (1)
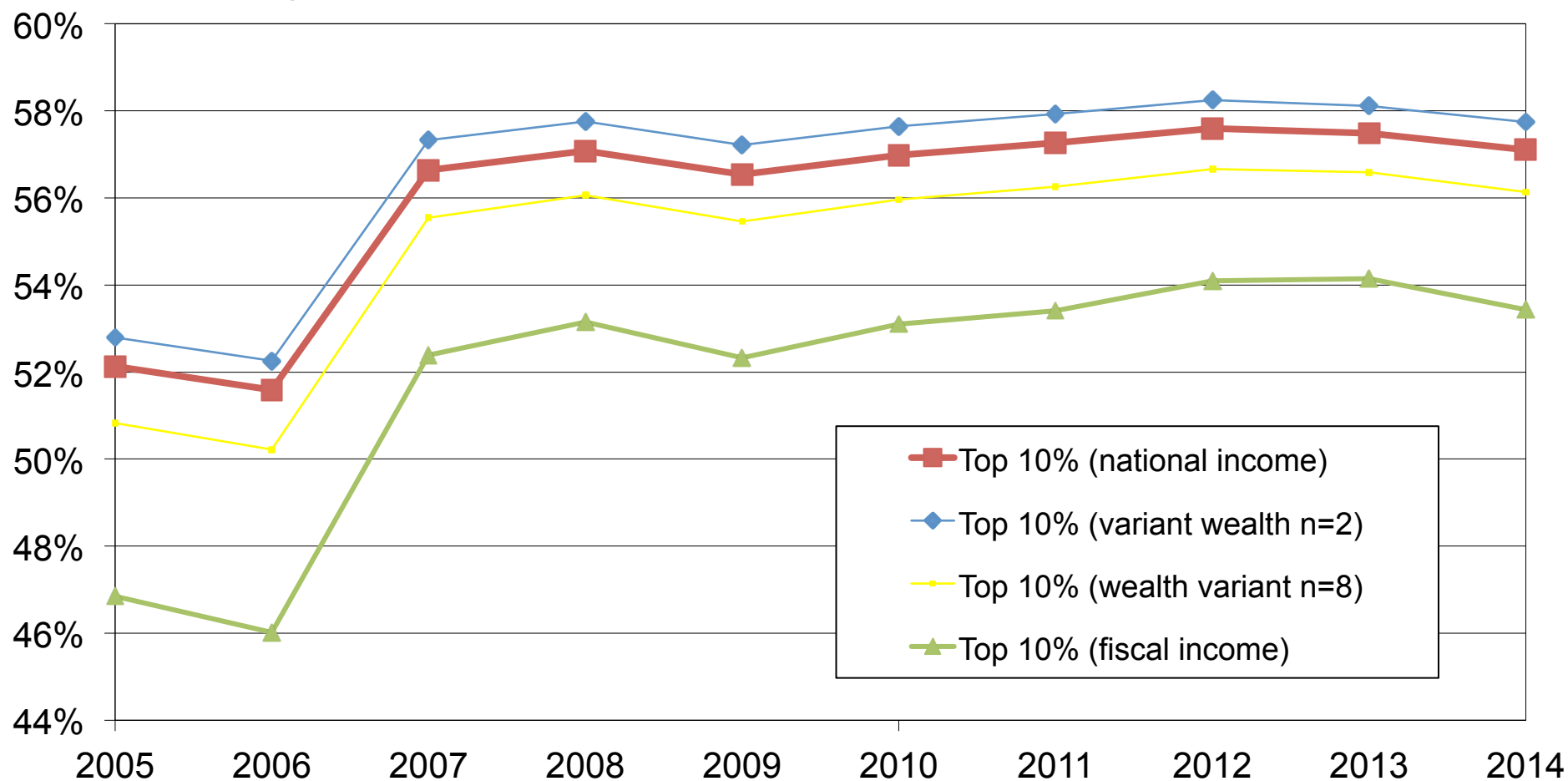
Distribution of income among equals-plit adults (household income divided by the number of adults in the household for the bottom of the distribution). National income estimates combine survey, fiscal, wealth and national accounts data, normalized to the total average income per adult. Fiscal income estimates combine survey and income tax data (but do not use wealth data to allocate tax-exempt capital income). The variant is on the size of billionaires' families (2 or 8 adults), that defines different wealth distributions, used to re-reallocate missing capital in the last correction.

Figure A25 . Top 1% income share in Lebanon: variants in the last correction (1)
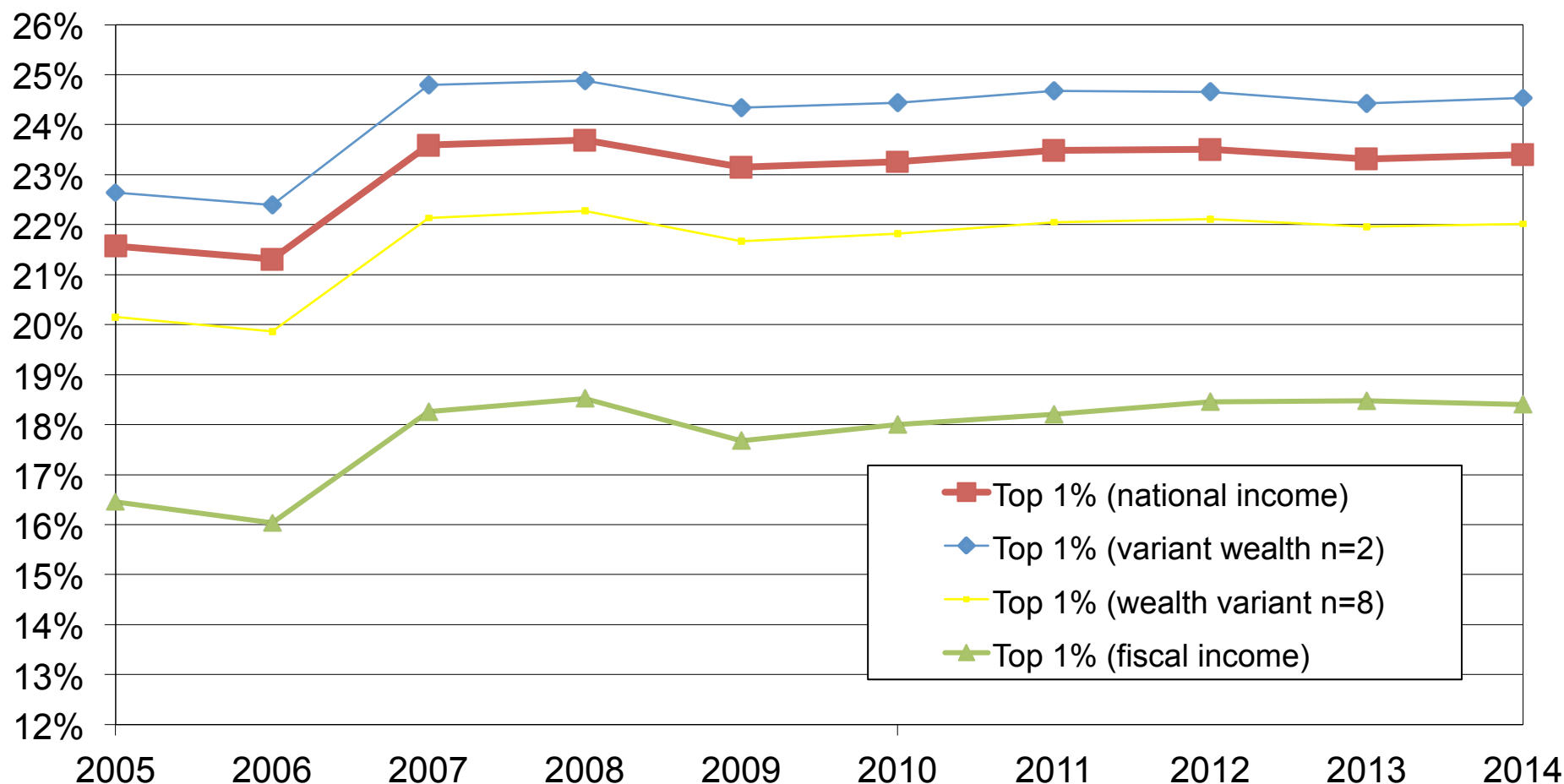
Legend:
- Top 1% (national income)
- Top 1% (variant wealth n=2)
- Top 1% (wealth variant n=8)
- Top 1% (fiscal income)

Distribution of income among equals-plit adults (household income divided by the number of adults in the household for the bottom of the distribution). National income estimates combine survey, fiscal, wealth and national accounts data, normalized to the total average income per adult. Fiscal income estimates combine survey and income tax data (but do not use wealth data to allocate tax-exempt capital income). The variant is on the size of billionaires' families (2 or 8 adults), that defines different wealth distributions, used to re-reallocate missing capital in the last correction.
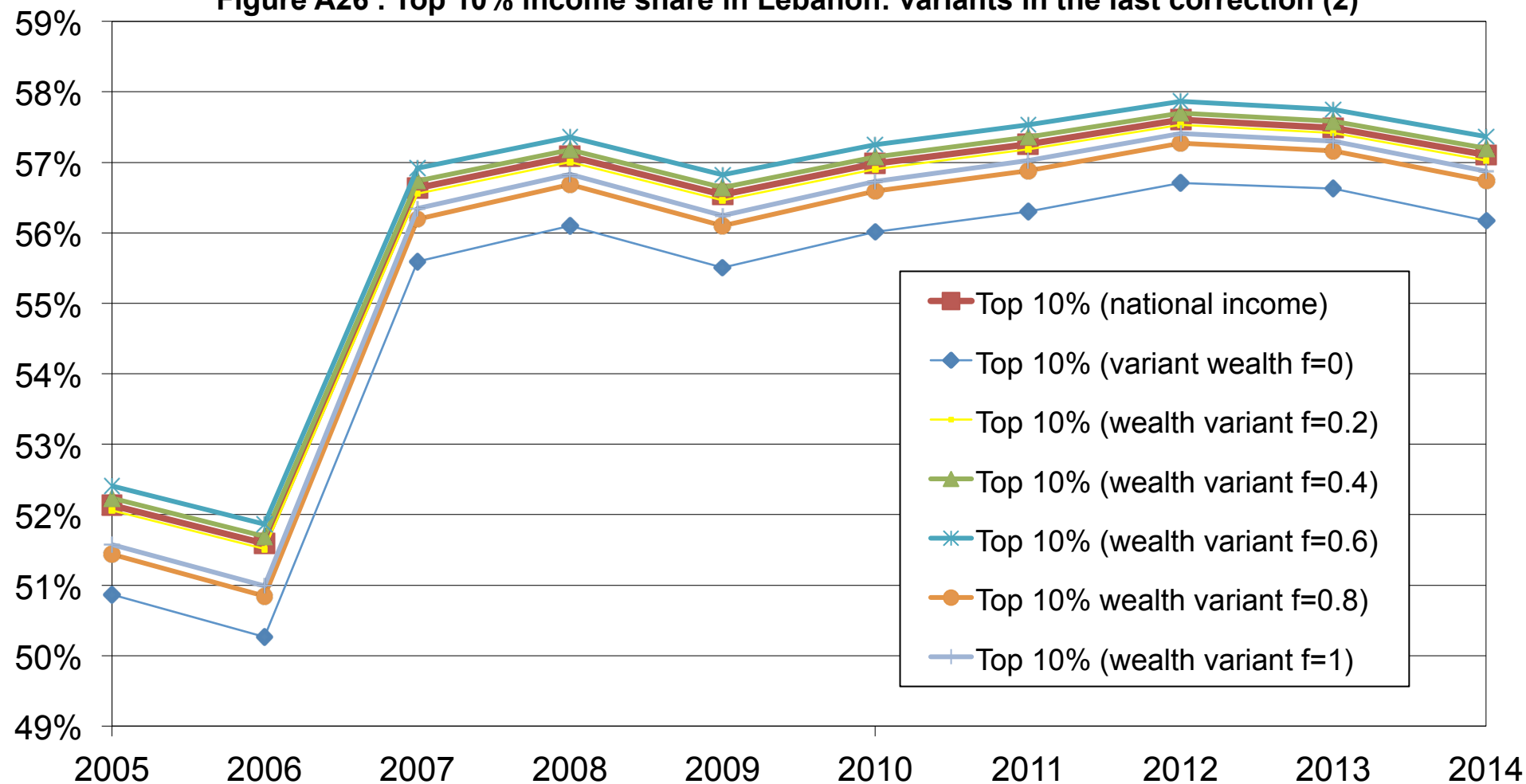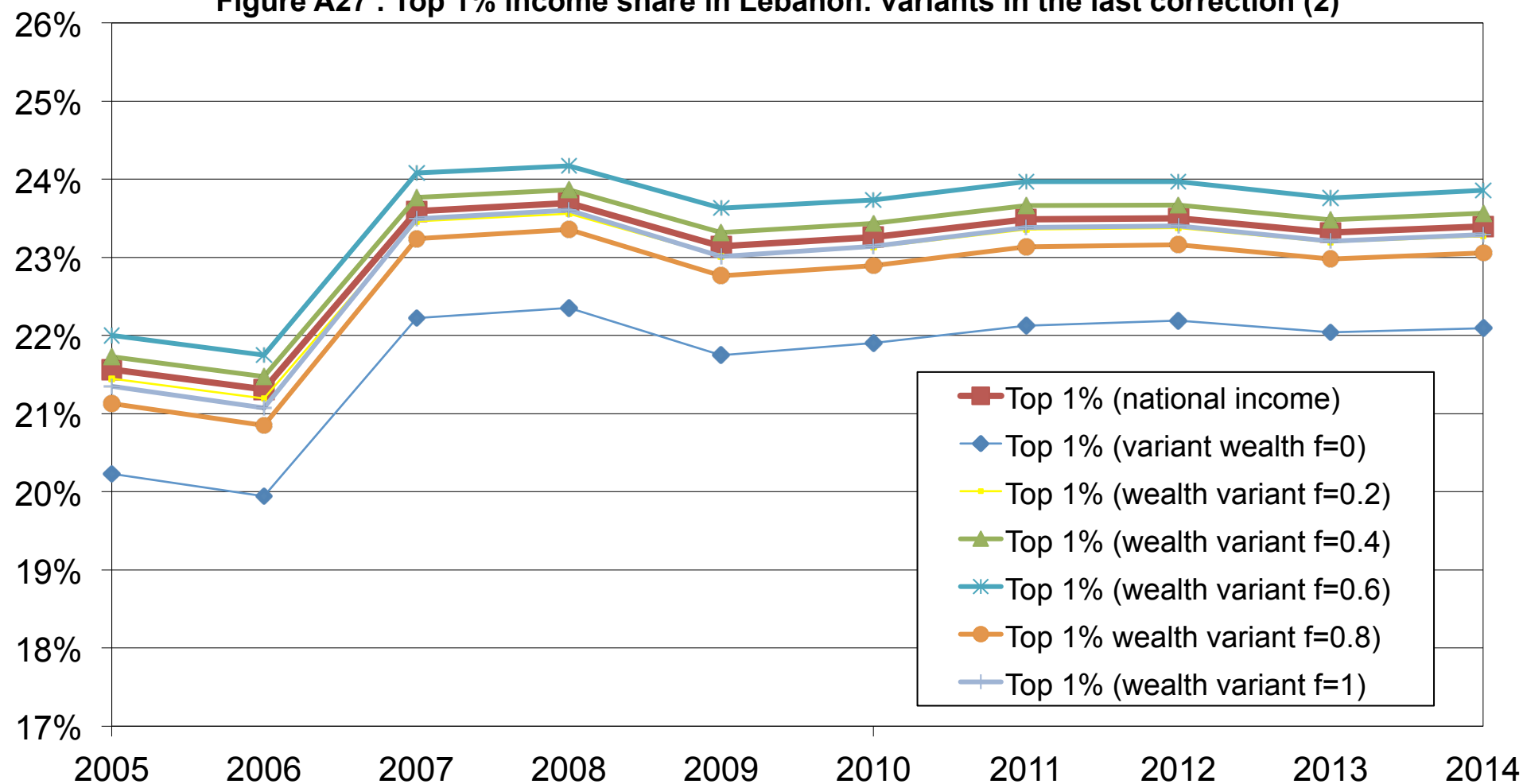
Figure A26 . Top 10% income share in Lebanon: variants in the last correction (2)

Legend:
- Top 10% (national income)
- Top 10% (variant wealth f=0)
- Top 10% (wealth variant f=0.2)
- Top 10% (wealth variant f=0.4)
- Top 10% (wealth variant f=0.6)
- Top 10% wealth variant f=0.8)
- Top 10% (wealth variant f=1)

Distribution of income among equals-plit adults aged 20 and more (household income divided by the number of adults in the household for the bottom of the distribution). National income estimates combine survey, fiscal, wealth and national accounts data, normalized to the total average income per adult. The variant is on the profile of correction chosen to link the normalized US-France-China wealth distribution with the Lebanese billionaires listed in magazines. They define different wealth distributions, used to re-reallocate missing capital in the last correction.

Figure A27 . Top 1% income share in Lebanon: variants in the last correction (2)

Legend:
- Top 1% (national income)
- Top 1% (variant wealth f=0)
- Top 1% (wealth variant f=0.2)
- Top 1% (wealth variant f=0.4)
- Top 1% (wealth variant f=0.6)
- Top 1% wealth variant f=0.8)
- Top 1% (wealth variant f=1)

Distribution of income among equals-plit adultsaged 20 and more (household income divided by the number of adults in the household for the bottom of the distribution). National income estimates combine survey, fiscal, wealth and national accounts data, normalized to the total average income per adult. The variant is on the profile of correction chosen to link the normalized US-France-China wealth distribution with the Lebanese billionaires listed in magazines. They define different wealth distributions, used to re-reallocate missing capital in the last correction.

Figure A28 . From Survey Income to National Income, Lebanon 2005-2014

Legend:
- Total National Income
- Missing Capital Income
- Fiscal Data
- Survey Data
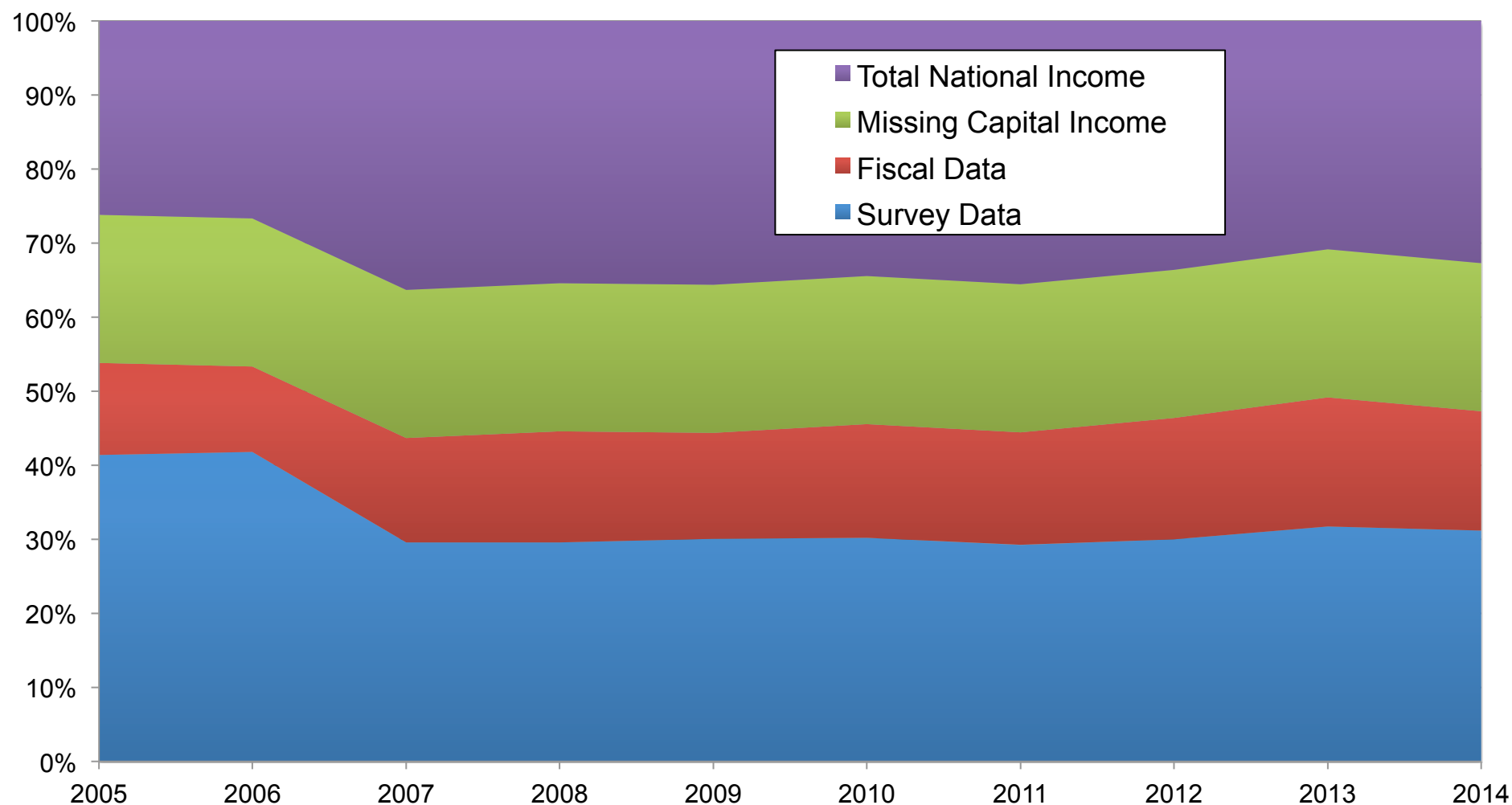
Ratio between the average income in the survey, fiscal and final distributions over total national income.

Table A1. Income shares in Lebanon, 2014

Income group	Survey Series	Fiscal Series	Final Series
Bottom 50%	19.5%	12.9%	10.6%
Middle 40%	47.1%	33.7%	32.3%
Top 10%	33.3%	53.4%	57.1%
incl. Top 1%	*7.8%*	*18.4%*	*23.4%*
incl. Top 0.1%	*2.3%*	*7.4%*	*11.1%*
incl. Top 0.01%	*0.9%*	*3.3%*	*6.0%*
incl. Top 0.001%	*0.4%*	*1.5%*	*3.3%*

Notes: This table reports statistics on the distribution of income in Lebanon in 2014. The unit is the adult individual (20-year-old and over; household income is splitted equally among adult members). Income corresponds to pre-tax national income. Fractiles are defined relative to the total number of adult individuals in the population. Corrected estimates (combining survey, fiscal, wealth and national accounts data), Fiscal estimates (combining survey and fiscal data), and survey estimates (using the survey tabulations only). Source: Appendix A.

Table A2. Fiscal vs Survey Data in the top 1 % percent

	q(p), ratio of thresholds	y(p), ratio of upper average
2005	1.8	2.5
2006	1.7	2.4
2007	2.3	3.4
2008	2.4	3.6
2009	2.4	3.3
2010	2.5	3.5
2011	2.5	3.5
2012	2.6	3.7
2013	2.6	3.7
2014	2.5	3.6

Source: Excel file CompCorrectionCoeffLeb.xlsx (in GpinterIncome). q(p) is the quantile function of the distribution that is the income threshold corresponding to percentile p = 0.99 y(p) is the average income above percentile p = 0.99. The table displays the ratio between fiscal and survey data for the two statistics.

Table A3. From fiscal income to national income

	Type of income	Data source
	Wages and pensions (including all benefits and allowances)	Fiscal micro-files
	Mixed income (Self-employment income by independent)	Fiscal micro-files
Labor income	Non filers (including informal sector)	N.A
	Tax evasion	N.A
	Employer fringe benefits & payroll taxes	N.A
	Other mixed income (made by partners in partnerships and individuals in S-corporations)	Fiscal micro-files
	Corporated profits	
	incl. Undistributed profits (i.e. retained earnings)	Government reports on tax revenues
	incl. Distributed profits (i.e. dividends)	Government reports on tax revenues
Capital income	Interest incomes	National accounts
	Rental Income	
	incl. built property revenues	Fiscal micro-files
	incl imputed rents and property tax	Government reports on tax revenues
	incl. royalties	N.A
	Non filers and others	N.A

Table A4. Total fiscal income by income source as a share of national income within the fiscal data

	Top 1%, fiscal income	Labor income	Self-Empl. income	Business income	Rental income	Total Capital income	
	Fiscal Series	*Fiscal Series*	*Fiscal Series*	*Fiscal Series*	*Fiscal Series*	*Fiscal Series*	*Final Series*
2005	16%	8%	2%	2%	5%	**7%**	**27%**
2006	16%	7%	2%	2%	4%	**6%**	**26%**
2007	18%	8%	2%	2%	4%	**6%**	**26%**
2008	19%	8%	2%	2%	4%	**6%**	**26%**
2009	18%	8%	2%	2%	4%	**6%**	**26%**
2010	18%	8%	2%	2%	4%	**7%**	**27%**
2011	18%	8%	2%	3%	4%	**7%**	**27%**
2012	18%	8%	2%	3%	4%	**7%**	**27%**
2013	18%	7%	2%	3%	5%	**8%**	**28%**
2014	18%	6%	2%	3%	5%	**8%**	**28%**