

Measuring Top Incomes and Inequality in the Middle East*

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Abstract. This paper discusses the data limitations associated with the measurement of top incomes and inequality in the Middle East. We come with two main conclusions. First, data sources at the national level are insufficient to derive reliable estimates of top income shares. One would need reliable fiscal sources in order to make precise comparisons with other countries. Unfortunately, such sources are lacking in most of the region. Next, and irrespective of these uncertainties on within-country inequalities, there is no doubt that income inequality is extremely large at the level of the Middle East taken as whole - simply because regional inequality in per capita GNP is particularly large. According to our benchmark estimates, the share of total Middle East income accruing to the top 10% income receivers is currently 55% (vs. 48% in the United States, 36% in Western Europe, and 54% in South Africa). Under plausible assumptions, the top 10% income share could be well over 60%, and the top 1% share might exceed 25% (vs. 20% in the United States, 11% in Western Europe, and 17% in South Africa). Popular discontent might reflect the fact that perceptions about inequality and the (un)fairness of the distribution are determined by regional (and/or global) inequality, and not only on national inequality.

Keywords: Inequality, top incomes, Middle East, Egypt

JEL classification: D3, O53

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1. Introduction

This paper discusses the data limitations associated with the measurement of top incomes and inequality in the Middle East, and attempts to present new estimates.

The distribution of income and wealth is surely of today's most controversial issues at the global level. Access to reliable statistical data on inequality is an important precondition for an informed public debate to take place. The primary objective of this paper is to assess the problems associated with the measurement of inequality in the Middle East and to put them into a broader international perspective.

In addition, it has been noted by a number of commentators that high inequality might have contributed to the Arab spring revolt movement. Some studies, however, have argued that measured inequality in Middle East countries is not particularly high by international standards, and that popular discontent mostly reflects the perceived level of inequality, and the perceived (un)fairness of the distribution. In this paper we attempt to address this debate by reviewing the evidence and by presenting new inequality estimates.

We come with two main conclusions. First, the data sources that are currently available at the national level are insufficient to derive reliable estimates of top income shares in a country like Egypt (or in other Middle East countries, for that matter). In particular, household income and expenditure surveys that are generally used by economists and international organizations almost certainly underestimate the level of inequality, possibly by a very large margin. One would need reliable fiscal sources in order to make a precise comparison between the top decile or percentile income shares prevailing in Middle East countries and the top shares prevailing in other emerging or developed countries. Unfortunately, such sources are lacking in the region, so that no satisfactory comparison is possible at this stage. This is true both in low-income and high-income Middle East countries. While the lack of transparency on income and wealth is an important issue in many (if not most) areas of the world, it appears to be particularly extreme in the Middle East, and arguably raises in itself a problem of democratic accountability, quite independently from the actual level of inequality.

Next, and irrespective of these uncertainties on within-country inequalities, we demonstrate that income inequality is extremely high at the level of the Middle East taken as whole. This comes simply because regional inequality in per capita GNP is particularly high. We present a number of alternative estimates based on various plausible assumptions on within-country inequality. According to our benchmark estimates, the share of total Middle East income accruing to the top 10% income recipients is currently 55% (vs. 48% in the United States, 34% in Western Europe, and 52% in South Africa). The top 10% income share could be well over 60%, and the top 1% share might exceed 25% (vs. 20% in the United States, 9% in Western Europe, and 18% in South Africa). In each realistic scenario, we find that income inequality in the Middle East is substantially higher than in the US or Europe. It appears to be at least as large as in the most unequal emerging or developing regions (e.g. in Latin America or South Africa). In some scenarios, it is considerably higher than pretty much everywhere else in the world. Popular discontent about inequality in the Middle East might reflect the fact that perceptions about inequality and the (un)fairness of the distribution are determined by regional (and/or global) inequality, and not only on a national level.

By and large, this paper should be viewed as an exercise in aggregation. That is, we have little to contribute to the measurement of within-country inequality, but we show how changing the level of regional aggregation affects considerably the overall level of inequality. In that sense, this paper is closely related to the literature on the world distribution of income (see Milanovic, 2002; Bourguignon and Morrisson, 2002; Lakner and Milanovic, 2013). In particular, the recent paper by Lakner and Milanovic (2013) attempts to correct upwards the top income shares estimated by national household surveys in order to study how much this impacts the measurement of the world distribution of income. Our approach is similar, except that we focus upon "regional" inequality (i.e. inequality measured at the level of a broad region such as the Middle East) rather than global inequality.

The rest of this paper is organized as follows. In sections 2 and 3, we relate this paper to the existing literature on top incomes, Pareto laws and inequality measurement in the Middle East. In section 4, we present our data sources and

methodology. Our main results on inequality the Middle East are described in section 5. Finally, section 6 concludes and discusses research perspectives.

2. Relation to existing literature: top incomes and Pareto laws

This paper is closely related to the recent literature on the historical evolution of top income shares. By using income tax data together with national accounts, homogenous top income shares series covering most of the 20th century have been constructed for a growing number of countries. The resulting "World Top Incomes Database" (*WTID*) now includes twenty-nine countries while over forty countries are under study (see Atkinson and Piketty (2007, 2010) for detailed country studies; see Atkinson, Piketty and Saez (2011) and Alvaredo, Atkinson, Piketty and Saez (2013, 2014) for recent surveys and for the up-to-date database).

One key advantage of administrative income tax data over household surveys is that fiscal data is available on an annual basis (rather than a few isolated years) and over much longer time periods. In addition, administrative income tax data - despite all their limitations - tend to be more reliable than self-reported survey data, especially at the top of the distribution. Of course, income tax data suffer from their own deficiencies, and they should be viewed as a complement - rather than a substitute - to survey data. In countries where tax evasion is pervasive, the top income levels reported in fiscal declarations should certainly be considered as a lower bound for the true economic levels. However our experience from using such data is that even in countries where tax administration is usually regarded as far from perfect (e.g. in Latin America) this absolute lower bound is generally much higher than the top income levels reported in household surveys (which are often ridiculously low).

One way to see this - and to understand how tax data can be used to correct survey data at the top of the distribution - is to analyze the Pareto coefficients that characterize the top of the income distribution. The Pareto law is usually considered as a good approximation of the top segment - say, the top 10% - of the observed income distribution. In its simplest form, the Pareto law applies with a constant coefficient to the top $\mu\%$ of the distribution (typically with $\mu=10\%$) and is given by the following equation:

$$1-F(y) = \mu (y_\mu/y)^a$$

Where $1-F(y)$ is the distribution function (i.e. the fraction of the population with income above y), y_μ is the income threshold that one needs to pass in order to belong to the top $\mu\%$, and a is the Pareto coefficient.¹

The characteristic property of the Pareto law is that the ratio $b(y)$ between the average income above y and y does not depend on the income threshold y . That is:

$$b(y) = E(z|z \geq y)/y = b = a/(a-1)$$

Intuitively, the constant $b=a/(a-1)$, which can be viewed as the “inverted Pareto coefficient”, measures the fatness of the upper tail of the income distribution. For instance, a coefficient $b=2$ means that the average income above 100 000€ is equal to 200 000€, the average income above 1 million € is equal to 2 millions €, and so on. In case $b=3$, the average income above 100 000€ is equal to 300 000€, the average income above 1 million € is equal to 3 millions €, and so on. This typically corresponds to a society with higher top income shares. The “inverted Pareto coefficient” $b=a/(a-1)$ generally moves in the same direction as inequality and is arguably more intuitive than the standard Pareto coefficient $a=b/(b-1)$ (which runs counter to inequality).

Pareto laws provide a very useful statistical approximation technique to study the top parts of income distributions. In particular, income tax data - which is often available in the form of tabulations reporting the numbers of taxpayers and the amounts of income for a certain number of tax brackets - can easily be used to estimate the (inverted) Pareto coefficients within the top 10% or the top 1%.

There are two important caveats to have in mind, however. First, although the general Pareto shape does provide a relatively good fit for the top parts of observed distributions in pretty much every country and time period for which we have data, it is important to note that the Pareto coefficients do vary widely over time and across countries (see Atkinson, Piketty and Saez (2011)). In the nearly 30 countries that are currently available in the WTID, we find that the (inverted) Pareto coefficients b

¹ Alternatively, the density function can be written as: $f(y) = a\mu y_\mu^a/y^{1+a}$.

typically 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 inegalitarian 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.² In order to estimate the correct inequality level of a given country, it is critical to know the level of the coefficient b . This will play an important role in the estimates that we present below.

Next, it is also important to note that, for a given country and year, the (inverted) Pareto coefficient $b(y)$ is not exactly constant, even in the upper part of the distribution. For any given distribution function $1-F(y)$, one can always define the “empirical” inverted Pareto coefficient $b(y) = E(z|z \geq y)/y$. One can also express this empirical coefficient $b(p)$ as a function of the percentile p at which it is computed. With observed distributions, one finds that $b(p)$ is only approximately constant within the top 10% of the distribution, and generally rises quite substantially between $p=0.1$ and $p=0.01$ (i.e. between the level of the top 10% and the level of the top 1%).³ This can entail important consequences for the computation of top decile and percentile income shares, so it is critical to be careful about this.

² See Appendix A, figures A1 to A4, where we report the evolution of Pareto coefficients for a number of developed and developing countries over the past century.

³ See Appendix A, figures A5 to A6.

3. Relation to existing literature: inequality measurement and the Middle East

Our paper is also closely related to existing work on inequality in the Middle East. There exists a well-established tradition of using household surveys in order to measure the evolution of income and consumption inequality in a number of countries in the Middle East, in particular in Egypt (see e.g. Wahba (1996, 2009), Said (2007)). There has been renewed interest in inequality measurement in the region following the Arab Spring movement (see e.g. Ncube and Anyanwu (2012)). A number of recent papers, however, have suggested that inequalities in countries like Egypt - or more generally in Middle East countries - are not particularly high by international standards, and that the source of dissatisfaction must be found elsewhere (see in particular Halsny and Verne (2013); see also World Bank (2012)).

In this paper, we question the validity of this view. Of course, we agree that there are potentially many sources of dissatisfaction other than the value of the Gini coefficient or the top decile income share. Generally speaking, popular discontent about inequality has probably more to do with the perceived fairness or unfairness of the inequality generating processes than with the inequality level per se. However we disagree about the claim that income inequalities in Egypt or the Middle East are quantitatively small by international standards.

More precisely, we make two points. First, we argue that the data sources that are currently available at the national level are insufficient to derive reliable estimates of top income shares in a country like Egypt (or in other Middle East countries, for that matter). Next, and irrespective of these uncertainties on within-country inequalities, we argue that income inequality is extremely large at the level of the Middle East taken as whole.

Regarding the first point, our main argument is that it is currently impossible to properly estimate the level of the Pareto coefficient (and hence of top income shares) in Middle East countries. For instance, Halsny and Verne (2013) use household income surveys for Egypt between 1999 and 2010, and find relatively small Gini coefficients (below 0.35). They then argue that the inverted Pareto coefficient b is

about 1.5-1.7, and is in line with other countries.⁴ The problem is that they compare the Egyptian b to coefficients that also come from household surveys, which are always artificially small. If we compare their 1.5-1.7 coefficient to the more reliable inverted Pareto coefficients estimated using tax data, then the Egyptian b coefficient is actually extremely small by international and historical standards. Of course, it is possible that Egypt is currently as egalitarian as the most egalitarian countries in history (such as Scandinavian countries in the 1980s). However this does not seem overly plausible - and in any case this should be demonstrated rather than assumed. The problem is that household surveys almost systematically lead to excessively low b coefficients.⁵ Also, the coefficients $b(p)$ that one can estimate using household surveys are often highly volatile: whether one estimates them at the level of top 10% or top 1%, one often obtains radically different results (while the patterns derived from more reliable tax data are typically much smoother). This typically comes from fact that surveys often suffer from various truncations and top coding problems at the top (with top coding, or self censored top incomes, b naturally becomes very close to 1 at the very top). Naturally, surveys have other merits and include detailed socio-demographic information that one could never obtain using tax data. However for the study of the top decile - and also for the study of the total inequality level of a country, given the importance of the income share going to the top decile, typically between one third and one half – we feel that it is preferable to supplement surveys with other sources and methods.

⁴ See their figure 10, p.28.

⁵ See e.g. the position of China in figure A4 (appendix A).

4. Data sources and methodology

The methodology that we follow in this paper can be described as follows. We use data on the distribution of the population and average income in the Middle East region using available national accounts. We then make assumptions on the within-country inequality of income, using available household survey estimates for the bottom 90% of the distribution, and on the basis of plausible hypothesis for the Pareto coefficients that characterize the top 10% of the distribution. We should make clear that these are highly exploratory methods and estimates, which we plan to refine in the near future. However, some of the conclusions - in particular the fact the distribution of income in the Middle East taken as a whole is highly unequal by international and historical standards - appear to be robust.

Basic descriptive statistics about population and income in the Middle East in 2012 are reported on Table 1. Although all simulations are done separately at the country level, it is useful to divide the region into four blocs: (i) Egypt; (ii) Iran; (iii) Iraq-Syria-Jordan-Lebanon-Yemen; and (iv) oil countries (UAE-Qatar-Kuwait-Saudi Arabia-Oman-Barhain). As of 2012, Egypt represents about 27% of total Middle-East population (81 millions out of 294 millions), and 9% of the region's gross national income (256 billions US\$ out of 2,718 billions US\$). Iran makes 26% of the population and 18% of GNI. The bloc Iraq-Syria-other makes 30% of population and 13% GNI. Oil countries make 16% of the population but 59% of GNI. Within this group, UAE-Qatar-Kuwait make less than 5% of the total population in the Middle East, but 29% of GNI.

As a first approximation, the regional distribution of population and income has been relatively stable since 1990 (see Figures 1, 2 and 3). There are a number of significant changes, however (see Figures 4 and 5 and Tables 2 and 3). The population shares of Egypt and Iran have declined, while those of Iraq-Syria-other and oil countries have increased. The share of oil countries in Middle East GNI has increased, particularly in the early 1990s (from less than 50% to almost 60%). However, over 1990-2012 their share in population has increased more than their share in GNI, so that the relative average income of oil countries has declined slightly. In particular, the population share of UAE-Qatar-Kuwait has almost doubled (from 2.4% to 4.9%), while their share in GNI rose from 18.9% to 28.8%. As a

consequence, per capita GNI dropped from 797% of Middle East average in 1990 to 585% of Middle East average in 2012. It should be noted, however, that this fast population growth has been largely due to the rise of foreign workers; excluding those workers, average income in UAE-Qatar-Kuwait has probably increased substantially (we return to this point later on).

Note that the GNI/GDP ratios appear to be relatively low in oil countries. Given the large foreign reserves, one might have expected larger inflows of foreign capital income. This is an issue that would deserve further attention in the future. Existing estimates of cross-border capital income flows and cross-border unilateral transfers (particularly remittances) in the region are notoriously imperfect, however.

Our assumptions on within-country inequality are summarized in Tables 4-5. For the bottom 90% of each country's distribution, we assume a log-normal distribution, and we choose the variance parameter sigma in order to reproduce the Gini coefficients reported on Table 4. In our benchmark estimates, we use the Gini coefficients coming from household surveys for the countries for which such surveys are available, and we assume middle-of-the-range coefficients for countries for which surveys are not available (in particular oil countries). Details are given in the data appendix. In the low-inequality scenario we assume very low Gini coefficients for oil countries (as low as countries like Egypt). This should be viewed as an absolute lower bound. In the high-inequality scenario we assume high Gini coefficients for oil countries.

For the top 10% of the distribution, we consider a large number of variants that we summarize in Table 5. In our benchmark estimate, we take an inverted Pareto coefficient b equal to 2. This is roughly what we currently have in most European countries, and this is much less than what we have in the United States or in a number of high-inequality developing countries. In our low-inequality scenario, we take $b=1.8$. It is difficult to imagine that the true coefficient can be below 1.8. In the high inequality variant, we take $b=2.2$. This is still much lower than today's United States, South Africa or Latin America. For simplicity we assume a fixed coefficient within the top decile. We plan to improve this in the future.

5. Inequality in the Middle East: estimation results

Our main results are summarized in Table 6 and in Figures 6, 7 and 8 (comparison with Europe and the United States), and Figures 9, 10 and 11 (comparison with emerging and developing countries).

According to our benchmark estimates, the share of total Middle East income accruing to the top 10% income recipients is currently 55% (vs. 48% in the United States, 36% in Western Europe, and 54% in South Africa).

In our high-inequality scenario, which, as noted above should not be viewed as an upper bound, the top 10% income share reaches 61%, and the top 1% share exceeds 25% (vs. 20% in the United States, 11% in Western Europe, and 17% in South Africa).

In every variant, we find that income inequality in the Middle East is substantially higher than in the US or Europe (in spite of the fact that we probably underestimate within-country inequality in the Middle East). The total of the Middle East (280 million), Western Europe (410 million) and the US (320 million) are relatively close, so from an aggregation viewpoint the comparison is meaningful.

It also appears that inequality in the Middle East is at least as large as in the most unequal emerging or developing regions (e.g. in Latin America or South Africa). Here the comparison is less meaningful and would deserve further attention. The detailed simulation results for the twenty-one scenarios are presented in the appendix.

The Western Europe average was computed as an average of Germany, France, UK and Sweden. In the future we plan to include more detailed estimates including Eastern Europe. Preliminary computations suggest that this will substantially increase top decile and percentile shares as well as Gini coefficients, but that the inequality levels will still be much below Middle East levels (in spite of a much higher population).

We also present in the on-line appendix simulation results regarding the evolution of top decile and percentile income shares in the Middle East over the 1990-2012 period.⁶ We find that the top decile and percentile income shares in the Middle East have been approximately constant over the past two decades, with an increase at the beginning of the period that was reversed at the end. In other words, the Middle East has always been a relatively high-inequality place as compared to other regions, and as a first approximation this did not change very much between 1990 and 2012. It should be noted, however, that these estimates rely on a very strong assumption, namely fixed within-country inequality throughout the period. In other words, all what we are measuring - by construction - is the impact of the change in the distribution of population and average income between countries. In particular, the inequality decline at the end of the period simply comes from the fact that the relative average income of rich oil countries has declined to some extent, due to the very large rise in their population. However it could well be that inequality has increased within these countries, e.g. due to the fact that population growth largely comes from the rise of foreign workers, who presumably receive a relatively small share of gross national income. We plan to better take this into account in future versions of these estimates. It is possible that the corrected top decile and percentile income shares will then rise in the Middle East over the 1990-2012 period.

⁶ See Appendix Figures C4 to C7.

6. Concluding comments and research perspectives

In this paper, we have presented exploratory and preliminary estimates of income inequality in the Middle East taken as a whole. These estimates should be refined in the future. Several directions of research seem to be particularly worthwhile.

First, as we repeatedly stressed, the correct way to estimate Pareto coefficients and top income shares in the Middle East would be to use income tax data (or other administrative sources of data such as inheritance tax or wealth tax data). This would be the only way to make proper comparisons with other countries. Unfortunately it is unclear at this stage whether such data exists - or is likely to exist in the near future - in the region.

In the meantime, we feel that one can learn much by improving and refining the simple simulation techniques that were presented in this paper. In the absence of adequate fiscal data, an alternative way to estimate Pareto coefficients at the very top is to use data on wealth rankings published by magazines and financial institutions (sometime using private banking data). Wealth rankings typically deliver relatively large inverted Pareto coefficients - around 2.5-3.5. These could be used to simulate distributions with varying coefficients $b(p)$ within the top decile and percentile of the distribution. One difficulty is that wealth rankings are not highly developed in the Middle East, and often refer to family or sovereign fortunes that are difficult to attribute to a specific number of individuals.

Another complementary way to supplement household surveys – particularly in oil countries - would be to use data on foreign workers and wages paid to foreign workers. This should allow us to better estimate the level and evolution of income inequality within oil countries and the entire region.

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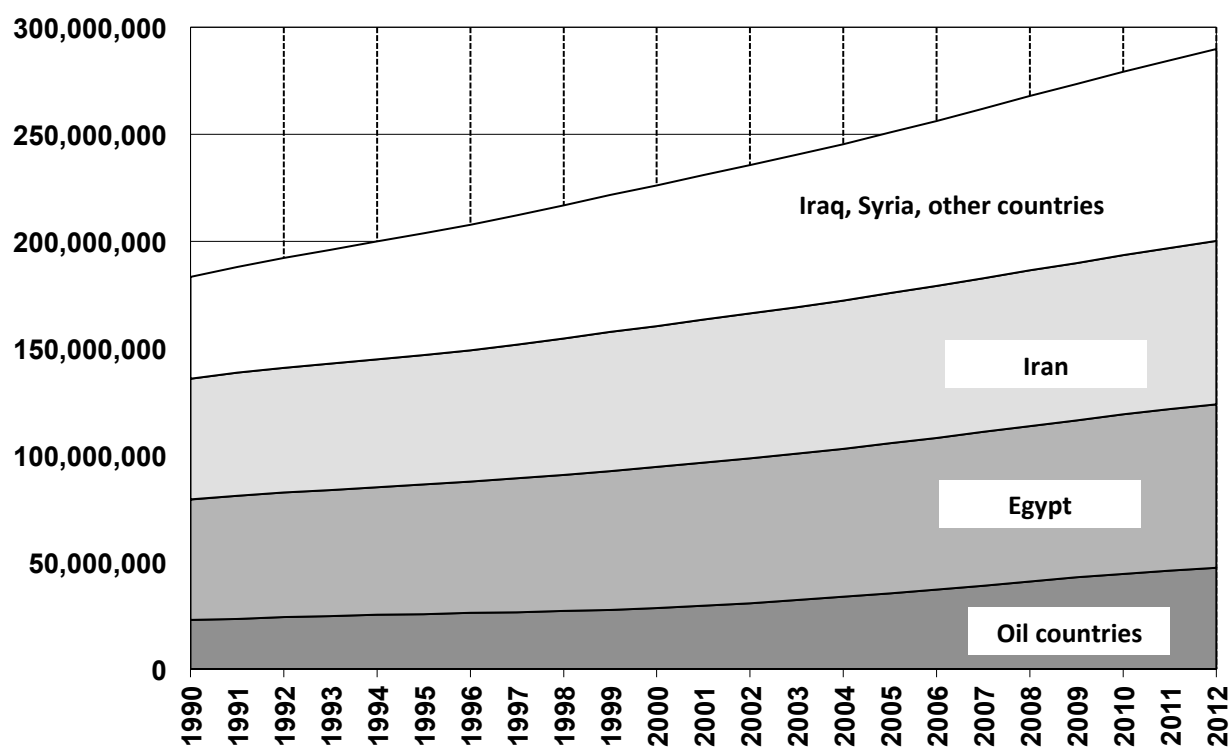


Figure 1. Population growth in the Middle East 1990-2012

Notes: "Oil countries" include Bahrain, Qatar, UAE, Kuwait, Saudi Arabia and Oman. "Other countries" include Jordan, Lebanon, and Yemen.

Source: Table B1

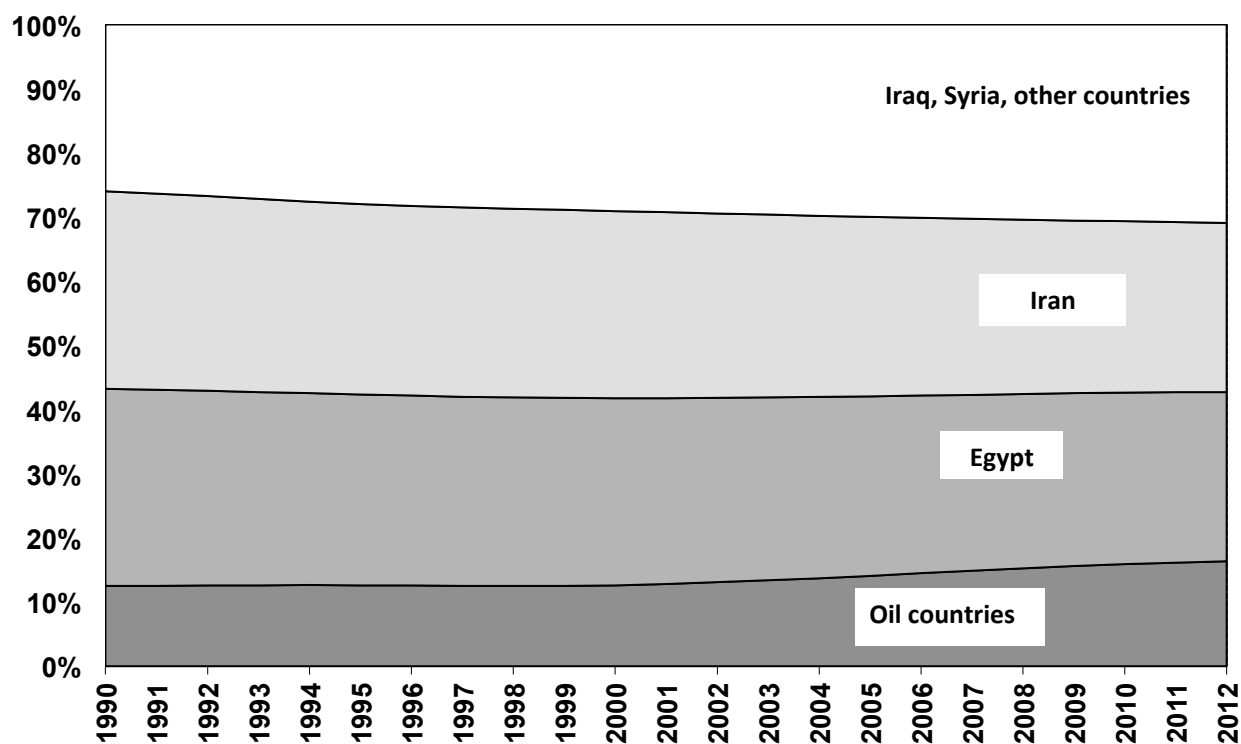


Figure 2. Distribution of the population in the Middle East

Notes: "Oil countries" include Bahrain, Qatar, UAE, Kuwait, Saudi Arabia and Oman. "Other countries" include Jordan, Lebanon, and Yemen.

Source: Table B1

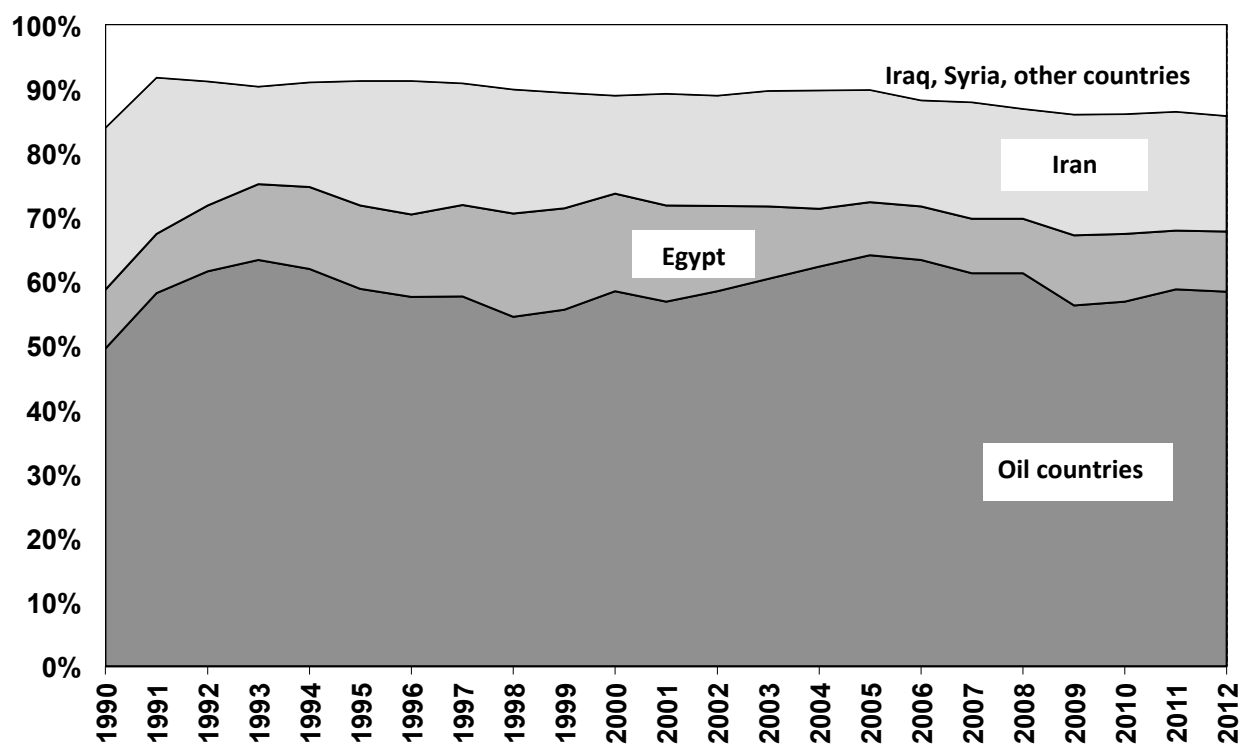


Figure 3. Distribution of income in the Middle East

Notes: "Oil countries" include Bahrain, Qatar, UAE, Kuwait, Saudi Arabia and Oman. "Other countries" include Jordan, Lebanon, and Yemen.

Source: Table B1.

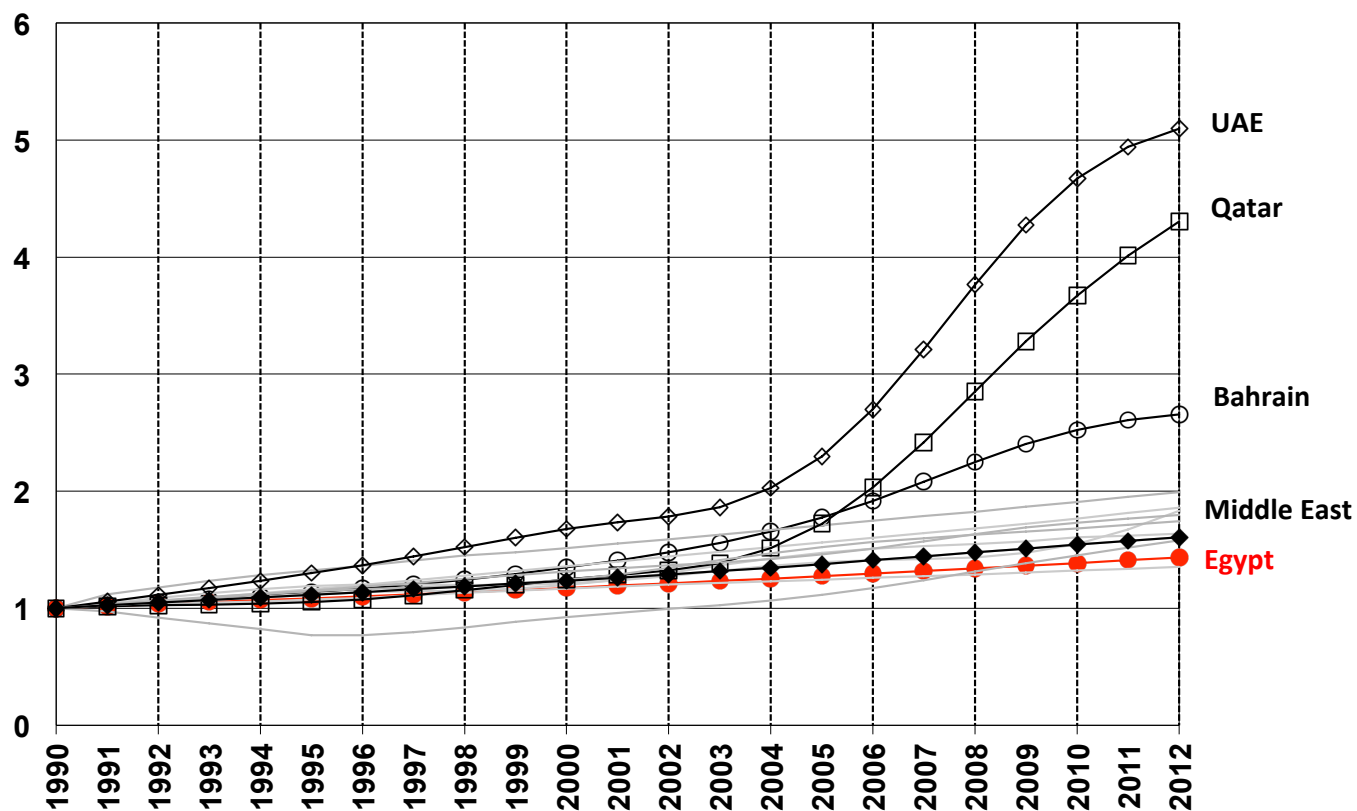


Figure 4. Population growth in the Middle East 1990-2012
Population indexed at 1990=1

Note: The figure shows the population in each country and in the Middle East as an index equal to 1 in 1990.
Source: Table B1.

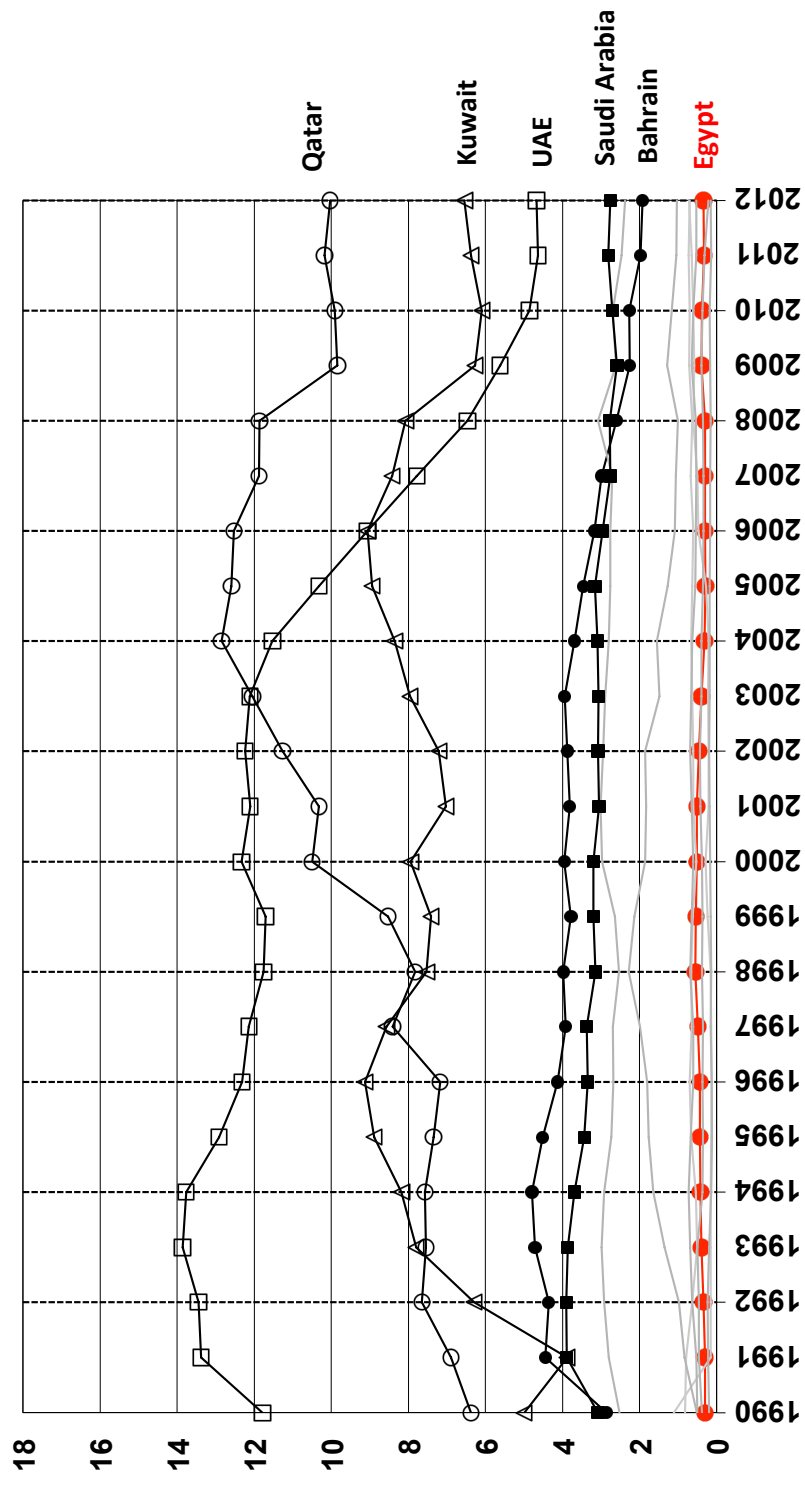
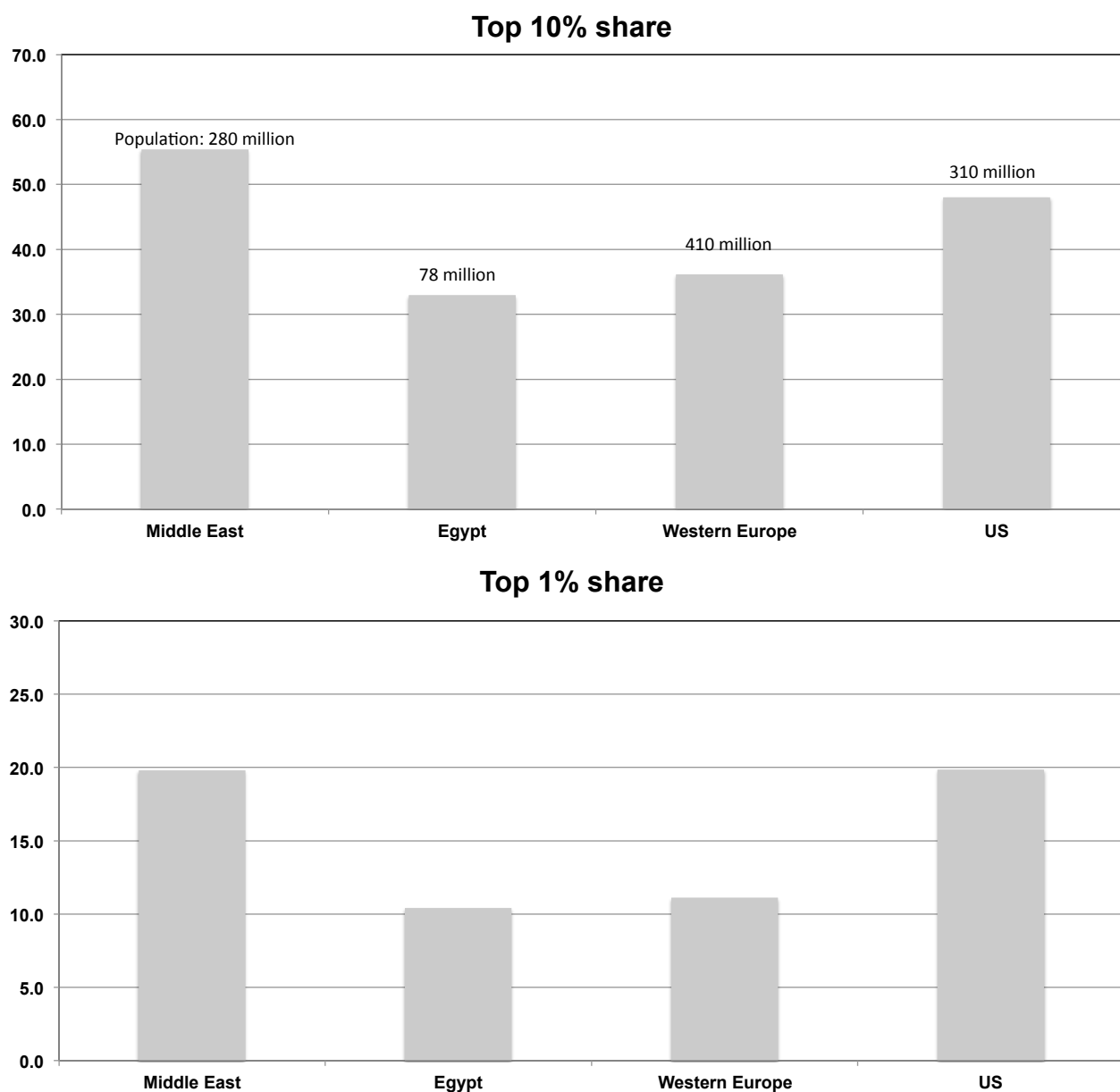


Figure 5. Income per capita relative to Middle East income per capita 1990-2012

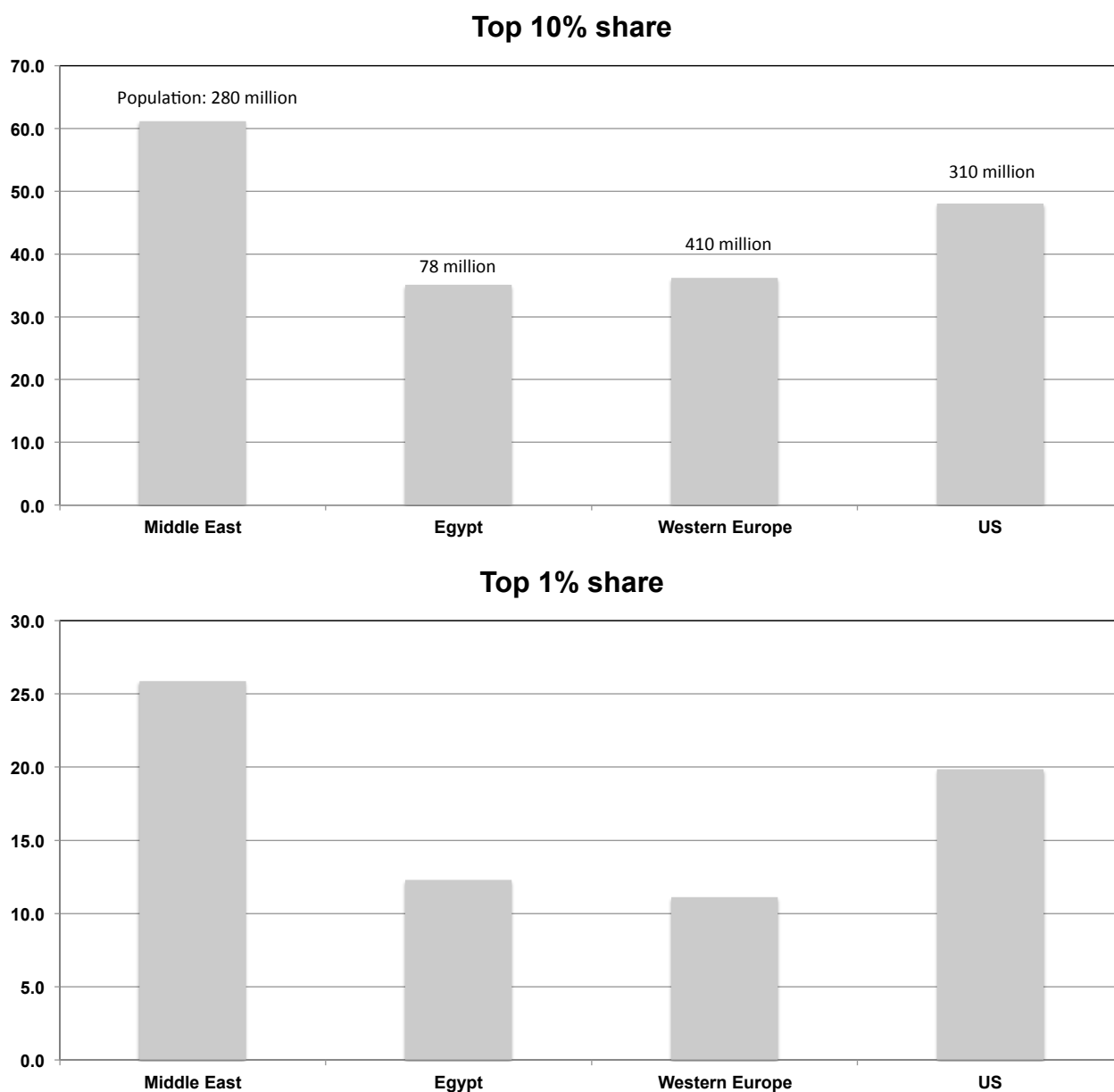
Source: Table B1.

Figure 6. Top income shares in the Middle East, Egypt, Western Europe and US 2010
Benchmark scenario for the Middle East (scenario 1.1)



Notes: Data correspond to 2009 for France and 2007 for Germany.
 Data for US, Germany and Sweden include capital gains.
 Sources: WTID and authors' computations.

Figure 7. Top income shares in the Middle East, Egypt, Western Europe and US 2010
High-inequality scenario for the Middle east (scenario 3.6)

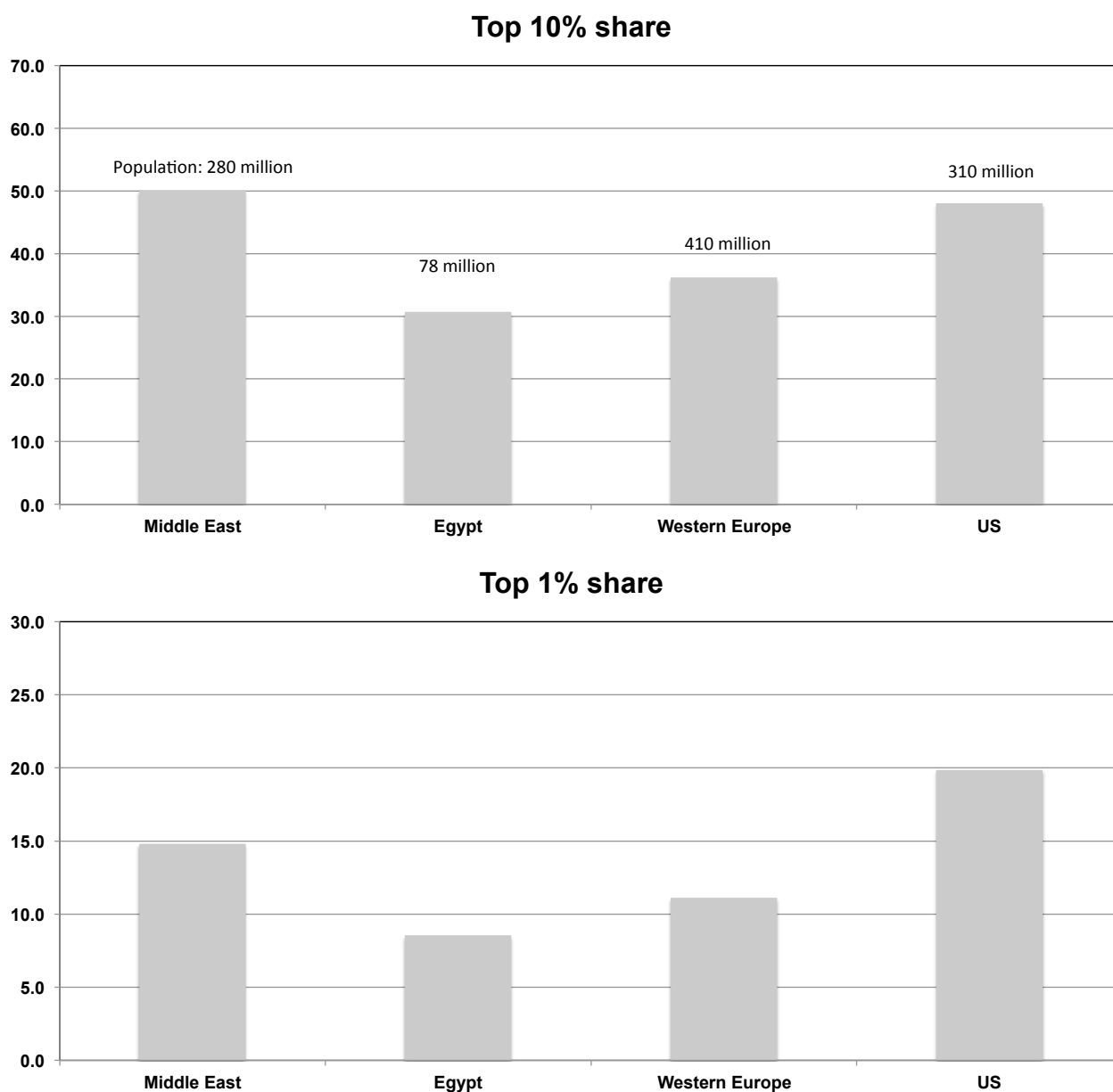


Notes: Data correspond to 2009 for France and 2007 for Germany.

Data for US, Germany and Sweden include capital gains.

Sources: WTID and authors' computations.

Figure 8. Top income shares in the Middle East, Egypt, Western Europe and US 2010
Low-inequality scenario for the Middle east (scenario 2.3)



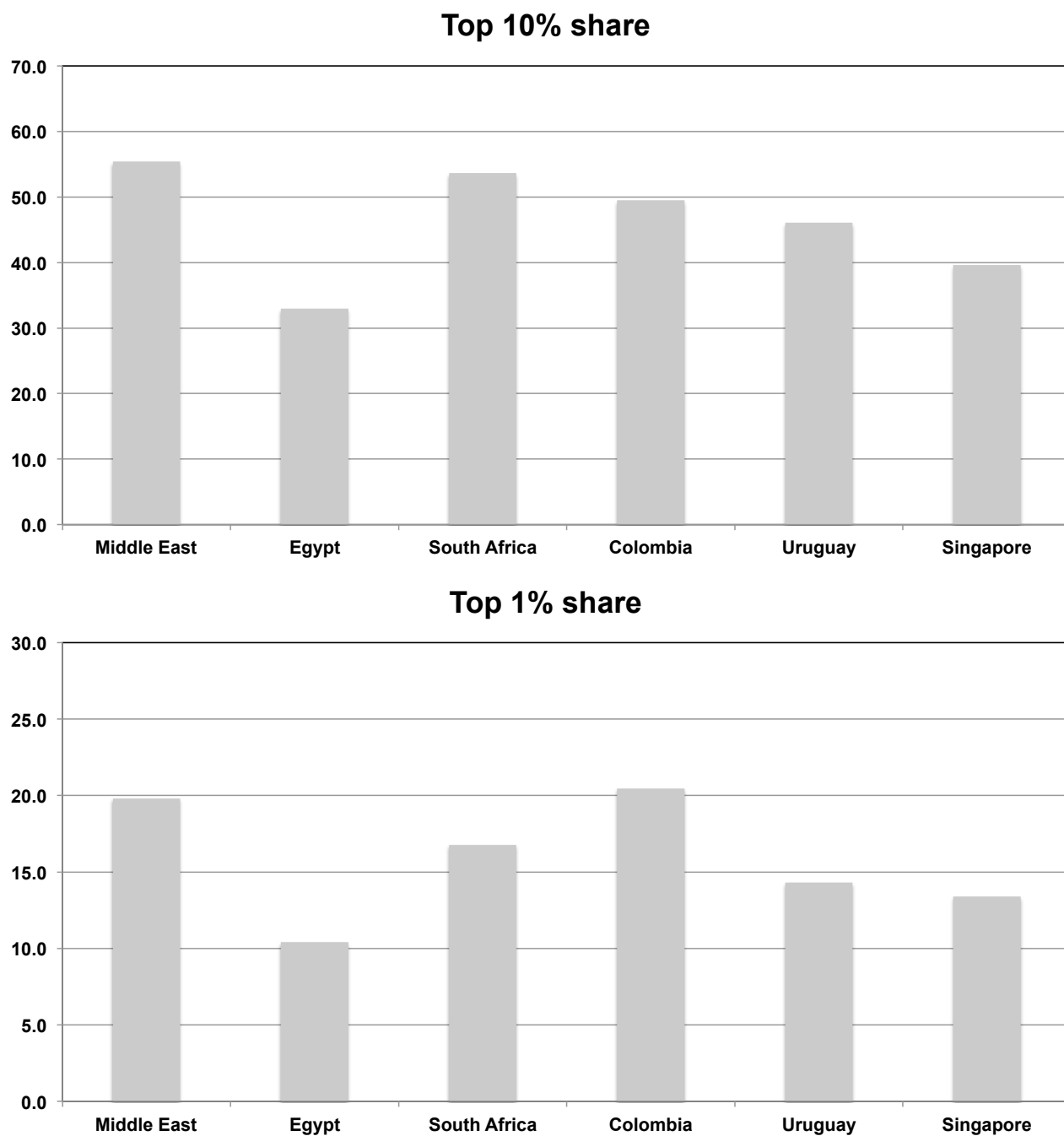
Notes: Data correspond to 2009 for France and 2007 for Germany.

Data for US, Germany and Sweden include capital gains.

Sources: WTID and authors' computations.

Figure 9. Top income shares in the Middle East, Egypt and developing countries. 2010

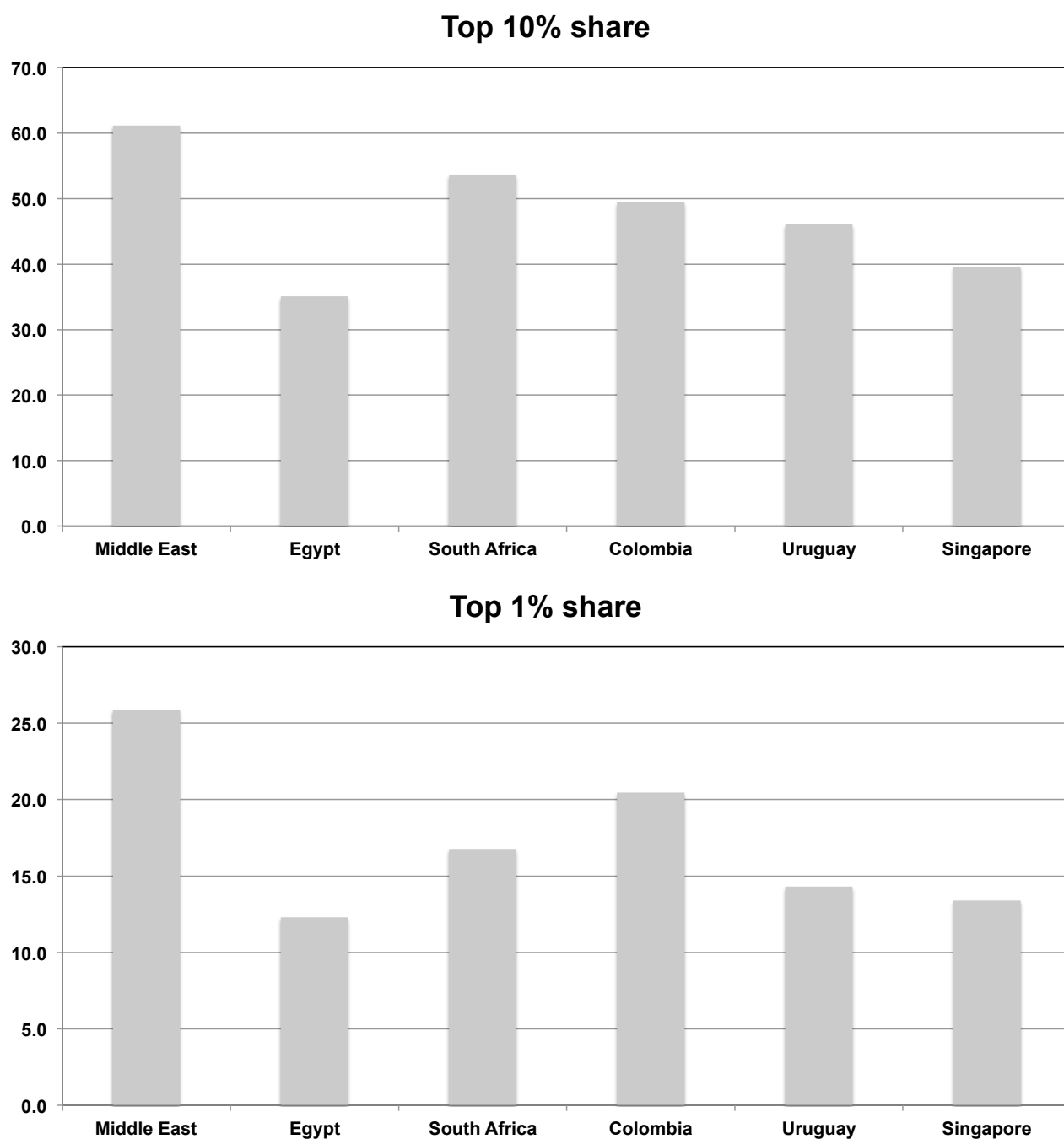
Benchmark scenario for the Middle East (scenario 1.1)



Sources: WTID and authors' computations.

Figure 10. Top income shares in the Middle East, Egypt and developing countries. 2010

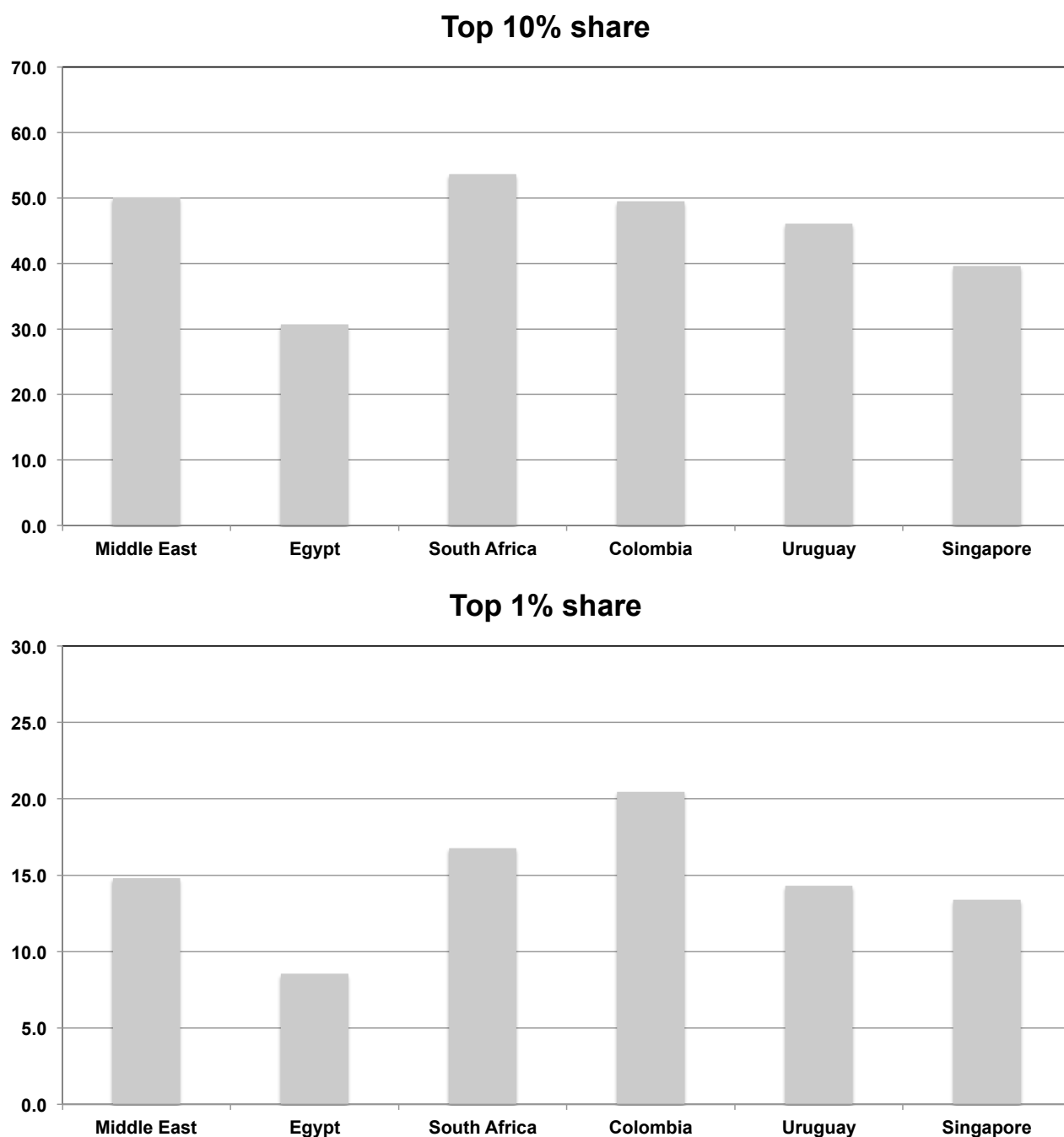
High-inequality scenario for the Middle east (scenario 3.6)



Sources: WTID and authors' computations.

Figure 11. Top income shares in the Middle East, Egypt and developing countries. 2010

Low-inequality scenario for the Middle east (scenario 2.3)



Sources: WTID and authors' computations.

Table 1. Population and income in the Middle East countries. 2012

	Population (million)	Population (% of ME total)	GDP (current billion US\$)	GNI (current billion US\$)	GNI (% of ME total)	Ratio GNI/GDP (%)	90% of GNI per capita (current US\$)	90% of GNI per capita (% of ME average)
Bahrain	1.3	0.4%	26.7	23.4	0.9%	88%	15,967	192%
Egypt	80.7	27.4%	262.8	256.3	9.4%	98%	2,858	34%
Iran	76.4	26.0%	538.0	495.6	18.2%	92%	5,836	70%
Iraq	32.6	11.1%	210.3	213.1	7.8%	101%	5,887	71%
Jordan	6.3	2.1%	31.0	30.7	1.1%	99%	4,375	53%
Kuwait	3.3	1.1%	182.6	196.6	7.2%	108%	54,440	655%
Lebanon	4.4	1.5%	42.9	42.3	1.6%	99%	8,608	104%
Oman	3.3	1.1%	78.1	72.7	2.7%	93%	19,750	237%
Qatar	2.1	0.7%	192.4	190.0	7.0%	99%	83,377	1003%
Saudi Arabia	28.3	9.6%	711.0	722.0	26.6%	102%	22,972	276%
Syria	22.4	7.6%	45.6	44.2	1.6%	97%	1,775	21%
UAE	9.2	3.1%	384.7	397.6	14.6%	103%	38,871	467%
Yemen	23.9	8.1%	35.6	33.6	1.2%	94%	1,270	15%
Egypt	80.7	27.4%	262.8	256.3	9.4%	98%	2,858	34%
Iran	76.4	26.0%	538.0	495.6	18.2%	92%	5,836	70%
Iraq-Syria-Jordan-Lebanon-Yemen	89.6	30.5%	365.5	364.0	13.4%	100%	3,657	44%
Oil countries (Qatar-UAE-Kuwait-Saudia Arabia-Bahrain-Oman)	47.4	16.1%	1,575.6	1,602.3	58.9%	102%	30,406	366%
incl. Qatar-UAE-Kuwait	14.5	4.9%	759.7	784.2	28.8%	103%	48,650	585%
Middle East	294.1	100.0%	2,741.9	2,718.2	100.0%	99%	8,317	100%

Source: Table B1.

Table 2. Population and income in the Middle East countries. 1990

	Population (million)	Population (% of ME total)	GDP (current billion US\$)	GNI (current billion US\$)	GNI (% of ME total)	Ratio GNI/GDP (%)	90% of GNI per capita (current US\$)	90% of GNI per capita (% of ME average)
Bahrain	0.5	0.3%	4.2	3.5	0.8%	84%	6,428	286%
Egypt	56.3	30.8%	43.1	42.0	9.2%	97%	671	30%
Iran	56.4	30.8%	116.0	115.9	25.3%	100%	1,851	82%
Iraq	17.5	9.6%	62.4	48.7	10.6%	78%	2,500	111%
Jordan	3.2	1.7%	4.2	3.9	0.9%	95%	1,120	50%
Kuwait	2.1	1.1%	18.4	25.7	5.6%	140%	11,238	500%
Lebanon	2.7	1.5%	2.8	3.5	0.8%	122%	1,152	51%
Oman	1.8	1.0%	11.7	11.4	2.5%	97%	5,658	252%
Qatar	0.5	0.3%	7.4	7.6	1.7%	103%	14,319	637%
Saudi Arabia	16.2	8.8%	116.8	124.8	27.3%	107%	6,928	308%
Syria	12.5	6.8%	12.3	12.0	2.6%	97%	864	38%
UAE	1.8	1.0%	50.7	53.2	11.6%	105%	26,498	1178%
Yemen	11.8	6.4%	5.6	5.6	1.2%	99%	428	19%
Egypt	56.3	30.8%	43.1	42.0	9.2%	97%	671	30%
Iran	56.4	30.8%	116.0	115.9	25.3%	100%	1,851	82%
Iraq-Syria-Jordan-Lebanon-Yemen	47.6	26.0%	87.4	73.6	16.1%	84%	1,391	62%
Oil countries (Qatar-UAE-Kuwait-Saudi Arabia-Bahrain-Oman)	22.9	12.5%	209.2	226.2	49.4%	108%	8,906	396%
incl. Qatar-UAE-Kuwait	4.3	2.4%	76.5	86.5	18.9%	113%	17,924	797%
Middle East	183.2	100.0%	455.7	457.7	100.0%	100%	2,249	100%

Source: Table B1.

Table 3. Population and income in the Middle East countries. 2012 vs 1990

	Population (% total)		GNI (% total)		per capita GNI (% ME average)	
	1990	2012	1990	2012	1990	2012
Egypt	30.8%	27.4%	9.2%	9.4%	29.9%	34.4%
Iran	30.8%	26.0%	25.3%	18.2%	82.3%	70.2%
Iraq-Syria-Jordan-Lebanon-Yemen	26.0%	30.5%	16.1%	13.4%	61.9%	44.0%
Oil countries (Qatar-UAE-Kuwait-Saudi Arabia-Bahrain-Oman)	12.5%	16.1%	49.4%	58.9%	396.0%	365.6%
incl. Qatar-UAE-Kuwait	2.4%	4.9%	18.9%	28.8%	797.0%	585.0%
Middle East	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Table B1.

Table 4. Parameters for lognormal distribution (bottom 90%)

	benchmark (scenario 1)		low inequality (scenario 2)		high inequality (scenario 3)	
	sigma	Gini	sigma	Gini	sigma	Gini
Bahrain	2.595	0.500	1.860	0.340	4.330	0.700
Egypt	1.860	0.340	1.860	0.340	1.860	0.340
Iran	2.180	0.420	2.180	0.420	2.180	0.420
Iraq	1.860	0.340	1.860	0.340	1.860	0.340
Jordan	2.050	0.390	2.050	0.390	2.050	0.390
Kuwait	2.595	0.500	1.860	0.340	4.330	0.700
Lebanon	1.860	0.340	1.860	0.340	1.860	0.340
Oman	2.595	0.500	1.860	0.340	4.330	0.700
Qatar	2.595	0.500	1.860	0.340	4.330	0.700
Saudi Arabia	2.595	0.500	1.860	0.340	4.330	0.700
Syria	2.080	0.396	2.080	0.396	2.080	0.396
UAE	2.595	0.500	1.860	0.340	4.330	0.700
Yemen	2.178	0.418	2.178	0.418	2.178	0.418

Table 5. Parameters a and b for Pareto distribution (top 10%)

		Pareto coefficient b	Pareto coefficient $a=b/(b-1)$		
scenario 1 (see table 2)	variant 1	2.00	2.00	scenario 1.1	benchmark
	variant 2	1.50	3.00	scenario 1.2	
	variant 3	1.80	2.25	scenario 1.3	
	variant 4	1.90	2.11	scenario 1.4	
	variant 5	2.10	1.91	scenario 1.5	
	variant 6	2.20	1.83	scenario 1.6	
	variant 7	3.00	1.50	scenario 1.7	
scenario 2 (see table 2)	variant 1	2.00	2.00	scenario 2.1	low inequality
	variant 2	1.50	3.00	scenario 2.2	
	variant 3	1.80	2.25	scenario 2.3	
	variant 4	1.90	2.11	scenario 2.4	
	variant 5	2.10	1.91	scenario 2.5	
	variant 6	2.20	1.83	scenario 2.6	
	variant 7	3.00	1.50	scenario 2.7	
scenario 3 (see table 2)	variant 1	2.00	2.00	scenario 3.1	high inequality
	variant 2	1.50	3.00	scenario 3.2	
	variant 3	1.80	2.25	scenario 3.3	
	variant 4	1.90	2.11	scenario 3.4	
	variant 5	2.10	1.91	scenario 3.5	
	variant 6	2.20	1.83	scenario 3.6	
	variant 7	3.00	1.50	scenario 3.7	

Table 6. Summary results. 2010

	Top 10% income share	Top 1% income share
Benchmark scenario (1.1)		
Egypt	33.0	10.4
Middle East	55.4	19.8
High-inequality scenario (3.6)		
Egypt	35.1	12.3
Middle East	61.1	25.9
Low-inequality scenario (2.3)		
Egypt	30.7	8.5
Middle East	50.1	14.8
Western Europe	36.2	11.1
US	48.0	19.9
South Africa	53.6	16.8
Colombia	49.5	20.5
Uruguay	46.1	14.3
Singapore	39.6	13.4