

## The Rise and Fall of Top Incomes in Iran 1985-2015<sup>1</sup>

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Received: May 20, 2017      Accepted: August 22, 2017

### **Abstract**

This paper studies top income shares in Iran, using 26 Household Expenditure and Income Surveys conducted by the Statistical Center of Iran over the period 1985-2015. It is shown that after the imposed Iran-Iraq war, top income groups were raising their real income and income share by 2006; however, both their share and real income fell immediately after 2006 such that the numbers are now below their wartime level. It is explained that the fall is caused by the negative effects of the United Nations Security Council sanctions on the top capital income earners. The paper also measures the concentration of income by the inverted Pareto coefficient and finds that the concentration had been generally increasing by 2000; however, the upward trend reverses from 2000 onwards. Although the concentration of income and the top income groups' share have fallen significantly in Iran in recent years, the numbers are still large, and Iran is among the most inegalitarian countries.

**Keywords:** Top Income Shares, Income Inequality, Concentration of Income, Sanctions, Iran.

**JEL Classification:** D31, D63, O53.

### **1. Introduction**

There is an increasing interest in studying top income shares in recent years (see, e.g. Atkinson, Piketty, & Saez, 2011; Dell, 2005; Piketty & Saez, 2013; Piketty, 2001, 2014; Roine & Waldenström, 2008; Saez & Zucman, 2016). Atkinson (2007) explains that analyzing the top

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1. This research was financially supported by a postdoctoral Fellowship from the National Elites Foundation of Iran (Grant 140-209040). Special thanks go to the Foundation, and Professor Mohammad Rahimian, vice chancellor for research at the University of Tehran, for his support during this study. Many thanks also to the experts of the Statistical Center of Iran for providing the data.

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groups is important because of their command over resources and people, and their global/local influence. We do not go into the details of his discussion and only highlight briefly three points: First, top income earners represent a small portion of people, while they earn a large share of total income and pay the most part of taxes. Therefore, inequality and economic growth is affected significantly by inclusion or exclusion of this small group into economic analyses (Alvaredo, 2011). For example, we show in empirical results that the behavior of the Gini coefficient is pretty similar to the behavior of the top income shares in Iran.

Second, a question that policy makers always face with is that does an increased tax on the very rich people release considerable revenue for redistributing toward low income groups or funding public projects? To answer this question, we can calculate the “taxable capacity” of the top income groups. Third, the top income groups’ share determines the power of the groups over the people in any society. If the share is too much high, then the democratic institutions are affected negatively and access to political voice gets too unequal. When democratic institutions cannot operate well, it is expected that inequality goes up further. As can be seen, there are many different reasons for analyzing top income groups.

There is another reason that makes analyzing top income groups an interesting topic specifically in Iran. After removing the United Nations Security Council<sup>1</sup> (UNSC) nuclear sanctions against Iran, foreign investors have been rushing toward Iran. The top income groups are potential customers, colleagues, or rivals for the foreign investors; therefore, it would be interesting for the investors to know what is happening for top income groups in Iran.

In this paper we inspect top income groups in Iran. To the best of our knowledge, this subject has not yet been studied in Iran. Alvaredo and Piketty (2015) look at the top income groups in the Middle East

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1. There have always been some economic sanctions, imposed by the US, against Iran since 1979. However, during the period 2006-12, the UNSC passed eight resolutions to impose many widespread and deep economic sanctions against Iran. At the same time, the US was tightening its sanctions, and even the European Union (EU) imposed the toughest sanctions ever made against any other country by the EU during 2010-12. These sanctions hurt intensively Iran's economy (Farzanegan, Mohammadikhabbazan, & Sadeghi, 2015), and even Iran's Health sector (Gorji, 2014).

(ME). However, they do not study exclusively Iran; they study the Middle East as a whole<sup>1</sup> and Egypt. Therefore the main contribution of this paper is that it studies specifically an income group that has not yet been studied exclusively in Iran.

In this research, household is taken as the unit of analysis; because, the sampling weights of the surveys are defined at the level of household. We calculate a “single-adult equivalent income” for each household based on gross income, and then deflate it by the consumer price index. This adult-equivalent deflated gross income is used across the paper.

It is shown that the real income and the income share of the top income groups rise substantially after the Iran-Iraq war during the 1985-2006 period. However, after imposing the sanctions, both numbers decline sharply in only 5 years such that the real income returns to its wartime level, and the share goes below its wartime level. A comparison of top income shares in Iran with the most inegalitarian countries show that, although the shares fell substantially in recent years in Iran, the shares are still high.

We discuss that the fall of the top income groups comes from the negative effects of the UNSC sanctions on capital owners. The capital income earners have been leaving the top income groups after the sanctions, and their position has been replaced by the wage income earners. To show this fact, we decompose income into four components: wage, capital, investment, and transfers. The investment income and the transfers are negligible within the top income groups. Therefore, we analyze only the changes of the wage income and the capital income. It is shown that the top 5% group’s income is largely composed of capital income rather than wage income, and as we move upward at the top of the income distribution, the portion of the capital income increases. In other words, the capital owners generally earn more gross income than the wage income earners in Iran. Therefore, top income earners are generally capital income earners. Our results

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1. They find that income inequality in the Middle East is much higher than almost all inegalitarian countries of the world. They show that the share of the top 10% income recipients in the Middle East is between 50% and 55% in 2010, while the share in the Western Europe, the US and the South Africa is respectively equal to 36%, 48% and 54% at the same time.

show that the amount of the capital income had been increasing during the 1985-2006 period; however, it falls sharply in only 2-3 years after the first UNSC resolution, and does not recover after that, while the amount of the wage income has been continuously increasing within the top income groups since 1985 till now. It will be also shown that, at the top of the total income distribution, the portion of the capital income is larger in 2006 than the portion during the war; however, the portion falls considerably after 2006 due to the negative effects of the sanctions on the capital income earners. Therefore, capital income earners are affected adversely by the sanctions, and the fall of the top income groups comes from the fall of capital owners.

This paper also measure the concentration of income within the top income groups using the inverted Pareto coefficient, and find that the concentration has been generally ascending during the 1985-2000 period; however, the upward trend reverses from 2000 onwards. We discuss that the concentration is still high, and Iran is among the most inegalitarian countries. It seems that the reduction of the concentration comes from fiscal decentralization policies made from the second development plan onwards.

Our data comes from the Household Expenditure and Income Survey (HEIS) conducted by the Statistical Center of Iran (SCI) during the period of 1985-2015. These surveys are nationally representative, collected in both urban and rural areas, and contain information on consumption expenditures, income, household demographics, schooling, employment and asset ownership. The sampling weights of the surveys are not available in years 1984, 1987, 1992 and 1994-96. Therefore, these years are excluded from our analysis.

The rest of the paper is organized as follows: Section 2 describes data and explains how our key variable is constructed. Section 3 talks about the changes of the top income groups' share and their real income. Section 4 decomposes the income and shows that the fall of top incomes is caused by the fall of capital incomes after the sanctions. Section 5 measures the concentration of income using the inverted Pareto coefficient. And finally, section 6 concludes.

## 2. Key Variable and Data

### 2.1 Data

Some studies use income tax data to analyze top income shares (e.g. Piketty, 2001, 2014), and some use household survey data (e.g. Leigh & Van der Eng, 2009; Piketty & Qian, 2009). Both data sets have advantages and disadvantages. Survey data sets might not be much precise since they usually suffers from the problems of sampling and self-reporting (incomes are usually understated) in all countries. Tax data is not enough precise as well; because, there is a rigid correlation between wealth and income in tax data which makes us unable to distinguish properly between wealth and income, and also very rich income earners are able to adjust the way they receive and report income to minimize their taxes (for more information about the differences between these two types of data, see, Bricker, Henriques, Krimmel, & Sabelhaus, 2016; Burkhauser, Feng, Jenkins, & Larrimore, 2012). Lack of transparency on wealth and income exists in all countries; however, it seems that this problem is more serious in developing countries rather than developed countries. Burkhauser et al. (2012) suggest that it is better to use both data sets conditional on being available.

We do not have access to the tax data, so we can only use surveyed data. In addition, in Iran, tax data suffer severely from the problem of under-reporting. Except for official governmental jobs, there is almost no control on the accuracy of the reported incomes by people. Therefore, even if there is a tax data set, the results may not be much different as long as there is no control on the accuracy of the reported incomes. Furthermore, our main purpose is to analyze the trend of the changes of the top income shares, which is not affected by the problem of under-reporting. In the research conducted by Burkhauser et al. (2012), we see that the trend of top income shares is similar using both types of data, and only the amount of the top income shares is different.

Our data come from the Household Expenditure and Income Survey (HEIS) conducted by the Statistical Center of Iran (SCI). These data sets are collected annually since 1963; however, they are available for public use only from 1984. These surveys are nationally representative, collected in both urban and rural areas, and contain

information on consumption expenditures, income, household demographics, schooling, employment and asset ownership. The sampling weights are not available for years 1984, 1987, 1992 and 1994-96. Therefore, these years are excluded from our analysis. The number of households increases gradually over time. For example, there are 5689, 21950 and 38252 households respectively in 1985, 1997 and 2015.

The Iranian calendar is different from the Gregorian calendar. The HEIS is conducted from March to March. When we talk about 2015, we mean the survey period between March 2015 and March 2016.

## 2.2 Key Variable

This paper prefers gross income to net income; because, we do not want to lose some information about the amount of income by subtracting deductions when we decompose income into different components (wage, capital, investment and transfers). For example, we are interested in knowing gross salary rather than salary net of interest paid for villa/car/ house purchase. Because, the amount of the interest paid for the house reflects tastes and preferences of different people, not the economic condition of the country. Therefore, we prefer gross income to net income<sup>1</sup>.

For studying the distribution of income, we can take either individual or household as the basic unit of the population. In this study, household is taken as the unit of analysis, because, our sampling weights are defined at the level of household.

Consider that household spending increases with each additional member. However, because of economies of scale in consumption, the spending does not increase proportional to the household size. For example, the amount of electricity consumption of a household with four members is not two times larger than the consumption of a household with two members. Therefore, in poverty and inequality studies, the total household income (or wealth) is generally converted into a 'single-adult equivalent income' using an equivalence scale. Suppose  $A$  and  $C$  show respectively the number of adults and children

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1. We repeated our analysis using net income as well, and the results were similar to the analysis done by the gross income.

within a household. Two common equivalence scales are: OECD modified scale (dividing income by  $I + 0.5(A - I) + 0.3C$ ), and square root scale (dividing income by  $\sqrt{A + C}$ ). In this study, we use square-root scale because of its simplicity.

After calculating the adult-equivalent income, we deflate it by consumer price index<sup>1</sup> (CPI). The base year is 2011. Across this paper, whenever we talk about income or adjusted income, we mean the adult-equivalent deflated gross income.

### 3. Top Income Shares

In this section, we study top percentiles, and the income share of the top income groups. Figure 1 shows top percentiles<sup>2</sup> ( $P_{99}$  and  $P_{95}$ ). The percentiles are calculated using the adjusted gross income; therefore, they are deflated; that is, they are comparable over time.

As can be seen,  $P_{99}$  was  $3.5 \times 10^8$  Iranian Rials (IRR) per year in 1986 (wartime); by 2006 the number increased to  $6.9 \times 10^8$  IRR per year. However, the number fell to  $3.6 \times 10^8$  IRR per year by 2011, and almost did not change after that. In other words, after war, it took 21 years for the very rich people to double their real income. However, after the first UNSC resolution, in only five years, their real income was back to its wartime level. As can be seen, the negative effects of the sanctions on the very rich people are dramatic.

The pattern of changes of  $P_{95}$  and other top percentiles is similar to  $P_{99}$ . They all peaked in 2006, and after the first resolution, they all fell to a level that is below or equal to the wartime level. Therefore, all top income groups are now backed to their wartime position.

There might be many different reasons for the reduction of the real income of the very rich people. It is shown in the next section that the most of the very rich people are capital income earners. They are

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1. We use CPIs reported by the Central Bank of Iran. The CPIs are reported for urban areas. However, they are often used for the entire country included rural areas, because: first, prices in rural and urban areas are pretty close to each other. Second, most of the population of Iran lives in urban areas. Third, rural households purchase most of their needs such as cloths, furniture, hospital, construction materials and etc. from urban areas.

2. The changes of the other top percentiles (e.g.  $P_{99.5}$ ,  $P_{90}$ , and  $P_{80}$ ) look like Figure 1. We do not show them for the sake of the clarity of the Figure 3;  $P_{99.5}$ ,  $P_{90}$ , and  $P_{80}$

generally the producers of the products/services. Therefore, it is expected that the sanctions have affected adversely in somehow the supply of (or the demand for) goods and services. For example, the cost of the production might have increased because of the higher costs of import of the necessary inputs in comparison to before, or the producers might have lost their foreign costumers or cannot export their products, or they might have lost their local costumers because of the fall of the real income of the middle/poor class, or they might have stopped investing in their business due to uncertainty in economic activities, or they might have emigrated to abroad or have transferred their money to other countries, or all of these. In this paper, we do not explore specifically for the reasons of the income inequality fall. We only show that capital holders were affected negatively due to the sanctions, and this negative effect explains the fall of the top incomes and consequently the fall of income inequality in Iran over the recent past years.

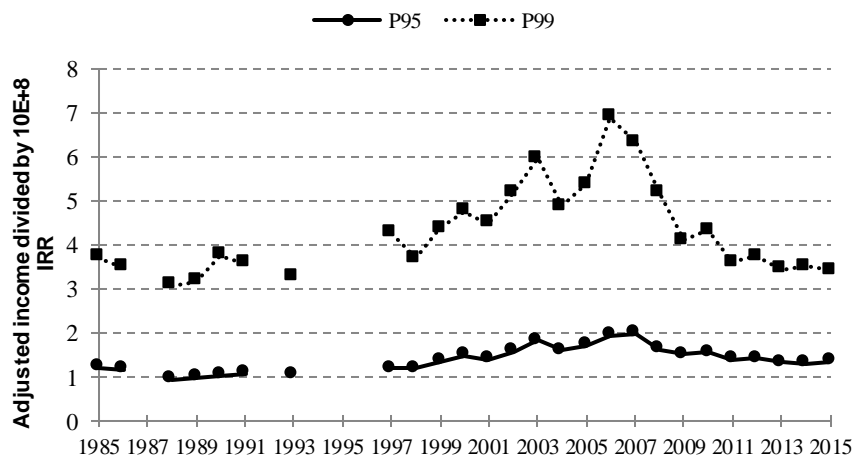


Figure 1: Top Percentiles, Gross Income, Iran, 1985-2015

Figure 2 shows the Gini coefficient and the income share of the top<sup>1</sup> 1% and 5% from 1985 to 2015. All variables are calculated using adjusted gross income. As can be seen, the behavior of the Gini coefficient looks like the behavior of the top income shares. It was

1. The behavior of the other top income groups is similar to Figure 2. We do not present them for the sake of clarity of the Figure.



stated in the introduction that although top income groups represent a small portion of country, inequality in whole of the country can be largely affected by this small group. In this paper, we do not talk about the Gini coefficient since our focus is on the top income shares; however, as can be seen, the changes of the Gini coefficient are pretty similar to the share of the top income groups. In other words, the changes of the top income shares can explain the changes of the overall income inequality. As can be seen, first, any income inequality reduction is not necessarily good news. Sometimes inequality falls because of the fall of top producers of goods and services, which is shown in section 4. Second, although the Gini coefficient is sensitive to the changes in the middle<sup>1</sup> of the income distribution not to the changes in the top of the income distribution, the pattern of the changes of the Gini coefficient is pretty similar to the pattern of the changes of the income share of the top income groups. Therefore, the income share of the top income groups is the main driver of the income inequality in Iran and most of other countries (Atkinson, 2007).

In Figure 2, we split our data into two parts: before the first UNSC resolution (1985-2006) and after the first resolution (2006-2015). In addition, a linear trend line for each part is also drawn. As can be seen, the top income shares were increasing moderately by 2006; however, they both fell quickly after 2006. The share of the top 1% (top 5%) group was about 15.1% (35.3%) in 1986; that is, the average income of the top 1% (5%) was around 15.1 (7.06) times larger than the average income of the entire population in 1986. The numbers increased to 24.6% (42%) by 2006. That is, the average income of the top 1% (5%) was around 24.6 (8.4) times higher than the average income of the entire population in 2006. However, the numbers fell by 3.3 (3) percentage points in only one year after the first UNSC resolution, and by a further 8 (12) percentage points over the next four years, and they did not almost change after that. In other words, the average income of the top 1% (5%) was around 13.5 (5.4) times larger than the average income of the entire population in 2011.

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1. Consider that some of the famous inequality indices are sensitive to income changes in the top of the income distribution, some are sensitive to the bottom, and some are sensitive to the middle.

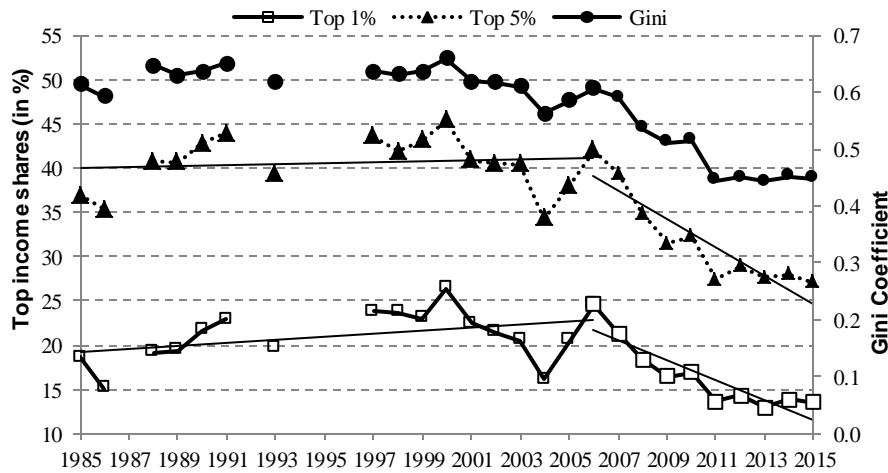


Figure 2: The Gini Coefficient and Top Income Shares, Iran, 1985–2015

As can be seen, it took 21 years for the top 1% (5%) income group to raise its share by about 10 (7) percentage points after the war, while it took only 5 years to lose its share by about 11 (15) percentage points after the sanctions. It is pretty clear that top income groups were affected very negatively such that their share is now even below its wartime level.

The reduction of the share of the top income groups is equivalent to the increase of the share of the middle and low groups. This redistribution of income might be harmful for economic growth in the countries in which the main source of growth is physical capital rather than human capital; because, top income groups save and invest more than other groups. Therefore, the reduction of their share results in less saving, and hence less physical capital accumulation, and thereby less economic growth.

Put the reduction beside the reduction of the rich people's real income (Figure 1), which makes rich people less affordable to invest in high-yield risky projects. These two reductions together raise concerns about economic growth. But, consider that these reductions do not necessarily prove that the economic growth must be affected negatively. Because the middle class also play an important role in economic growth, if their share increases, we may expect the rise of the economic growth because of the higher incentives and entrepreneurial activities of the middle class (see, for example, Easterly, 2001).

If inequality is not too much high (below a threshold), there is enough mobility and incentive for innovation and entrepreneurial activities, so inequality is useful for growth. However, beyond a threshold, inequality affects democratic institutions negatively and leads to very unequal access to political voice, which is harmful for growth (Reuveny, 2003). And also, the theory of capital market imperfection says that when credit markets are imperfect, which is a case in Iran and many other countries, high inequality affects adversely social mobility and economic growth.

The relation between economic growth and income inequality depends on many other factors too. For example, if the economic growth of a country is mainly derived from human capital (HC) rather than physical capital (PC), and the rate of return to HC is larger than the rate of return to PC, then lower inequality can be better for economic growth since the middle and the low income groups can afford a better education, consequently, the level of HC increases, and thereby economic growth increases. Or as another example for an opposite situation, suppose that the majority of wealth is owned by active entrepreneurs that invest their wealth in high yield projects. In such a situation, inequality is good for growth; because, when the entrepreneurs get richer, their ability for investing on entrepreneurial activities increases, and thereby economic growth rises. But, if the top income group is composed of many retired rentiers, then inequality is harmful for growth, because the rentiers often invest their wealth in low-yield assets/markets with minimum risk such as public bonds, gold, land market, etc. As we see the relationship between income inequality and economic growth depends on many factors, and for the sake of the brevity of the paper, we do not study the relationship.

A comparison of the income shares of the top income groups in Iran with the most inegalitarian countries show that although the shares reduced substantially in Iran in recent years, the shares are still high. For example, the share of the top 1% group, which is calculated using survey data, was 14.3% in Iran in 2012. Compare the share (calculated using tax data) with the most inegalitarian countries at the same time: 21.8% in the US, 19.2% in the South Africa, 14% in

Uruguay, 13.6% in Singapore, 12.7% in the UK<sup>1</sup>. Consider that the income shares in these countries are calculated using tax data in which there is less underreporting problem than survey data; therefore, when we compare the income shares in Iran with the shares in these countries, we must keep in mind that the shares are biased downward in Iran because of the understating problem in survey data. Therefore, the share must be much higher than 14.3% in Iran in 2012, and consequently, Iran is one of the most inegalitarian countries of the world.

#### 4. Decomposition of Income

In this section, we look for the reason of the fall of top income groups in Iran; however, let's first look at the economic history of the developed countries since they have access to larger datasets, and they have already accomplished the process of transition from a developing economy to a developed economy, and also they have already experienced severe shocks like Iran.

Most of the developed countries experienced a sharp decline in top income shares during 1914-45 (Atkinson, Piketty & Saez, 2011). One of the countries that experienced the reduction was the US. Kuznets (1955) discussed about the reduction of the income inequality in the US by his famous hypothesis about economic development and income inequality. He explained that income inequality seems to follow an inverted U-shaped curve during the process of industrialization. His hypothesis was in the context of moving from an agricultural economy to an urban industrialized economy. However, this hypothesis can be applied to any two-sector model. After any new major innovation, the hypothesis states that: First, inequality increases, because only a few workers, which are high-skill workers, benefit from the new innovation. And after a while, inequality decreases, because low-skill workers catch up the high-skill workers through education and training over time; therefore, more individuals benefit from the new innovation, and hence inequality reduces.

Piketty (2006) explains that the relation between the new innovations (industrialization) and inequality depends on the reaction

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1. <http://wid.world>

of many different institutions (e.g. educational institutions, labor market institutions, cultural institutions, government institutions ...) to the new innovations. For example, when a new technology emerges, obviously, demand for high-skill workers increase. If educational institutions supply high-skill workers with a speed lower than the demand, then the wage inequality is expected to rise, unless we cannot expect that inequality increases. That is, contrary to the Kuznets' hypothesis, if the speed of the supply is higher than the demand, then not only the wage inequality does not increase, but also it is expected that the wage inequality decrease.

Many researchers have tried to test the hypothesis; however, the evidence is mixed (see, for example, Angeles, 2010; Kanbur, 2000; Thornton, 2001). Today, the hypothesis is not convincing (Piketty, 2006). Kuznets was himself skeptic about his hypothesis; because, he did not have sufficient data to prove his hypothesis. In his famous 1955 paper, he himself wrote: "In concluding this paper, I am acutely conscious of the meagerness of reliable information presented. The paper is perhaps 5 per cent empirical information and 95 per cent speculation, some of it possibly tainted by wishful thinking". Piketty (2006) shows that the reduction of the income inequality in the developed countries cannot be explained by the Kuznets' hypothesis. The paper and many other papers such as Atkinson, Piketty, and Saez (2011) explain that the most of the reduction came from the reduction of the top capital income. Capital owners experienced many different severe shocks due to both World Wars and the great depression. In addition, they show that the reduction of the top income shares is larger in the countries where damaged by the war more than other countries, while we see no reduction of top income share in the countries where not hit by the war such as Switzerland. Therefore, the reduction of the income inequality is explained by the fall of top capital incomes, not by the Kuznets' hypothesis.

The role of the shocks on capital holdings and income inequality was not a new idea. Kuznets (1955) also mentioned the role of economic depression, inflation and wars on income inequality. However, the new finding by Piketty, Atkinson and Saez was that there was not much else except the shocks to capital owners.

We think that the fall of the top income shares in Iran is due to the

same reason as the developed countries. Because, Iran's economy has experienced many shocks during the last four decades such as revolution, war, sanctions ... (for a historical review of Iran's Economy, see, Abbasi-Nejad, 2017; Komijani, 2006). As a result, it is pretty reasonable to believe that capital holders should be affected negatively in Iran. We do not have enough data to see the effects of the revolution and the war on the top income groups since our data set begins from 1985. Therefore, we can only look for the effects of the sanctions on the capital owners.

One may think that the fall of the top income shares in Iran can be described by the Kuznets' hypothesis; because, Iran has been industrializing quickly during the past three decades. Therefore, it might be thought that the reduction of the income inequality is due to a Kuznets-type process.

To explain why top income shares (income inequality) fell in Iran after the sanctions, we follow a procedure similar to many other papers (see, for example, Piketty, 2006; Piketty, 2014; Atkinson & Piketty, 2007). We first show that the Kuznets' hypothesis cannot explain the reduction of the income inequality (top income shares) in Iran, and then it is shown that the reduction comes from the fall of top capital incomes.

We saw in Figure 2 that there are two linear trend lines from 1985 to 2006 and from 2006 to 2015 for each top income group. It can be seen that the top 1% group's share had been generally increasing before 2006. However, after the first UNSC resolution on December 2006, the share fell immediately. This coincidence of the fall and the shock causes strong doubts about a Kuznets-type process, which is a sluggish process. In Kuznets' hypothesis, the speed of moving from a low-productive sector to a high-productive sector is very slow. Therefore, the speed of the changes of the inequality is very slow, while we see a rapid dramatic reduction in top income shares immediately after the first resolution. As can be seen, the timing of the reduction is pretty particular and it is naive to believe that the sharp reduction is due to a gradual Kuznets-type process.

Figure 3 shows the top 10% income share (calculated from the income distribution) and the top 10% wage share (calculated from the wage distribution). We draw the top wage share to see how wage

inequality varies over time; because, the Kuznets' hypothesis stands on the wage inequality, not the total income inequality. For measuring wage inequality we used the Gini coefficient as well, and the results were similar (the results are available upon request). The solid straight lines represent linear trend lines from 1985 to 2006 and from 2006 to 2015.

As can be seen, the top 10% income share did not change on average until 2006, and declined dramatically after 2006. This finding is similar to previous results. The new finding is that the wage inequality (the top wage share) remained pretty stable during all years. Therefore, the fall of the top income shares cannot be described by the Kuznets' hypothesis since the distribution of the wage income has not change over time. This finding shows that the fall in income inequality stems from capital income, not from wage income, that is, Capital owners were affected negatively by the sanctions.

These results are pretty similar to what we see in developed countries. In developed countries, there was a drastic fall in top income shares during the first half of the 20<sup>th</sup> century, and then the shares went up from 1970s onwards, while the overall wage inequality did not change over the entire twentieth century. Therefore, the fall was a capital phenomenon in the developed countries, not a Kuznets-type process (Piketty, 2006).

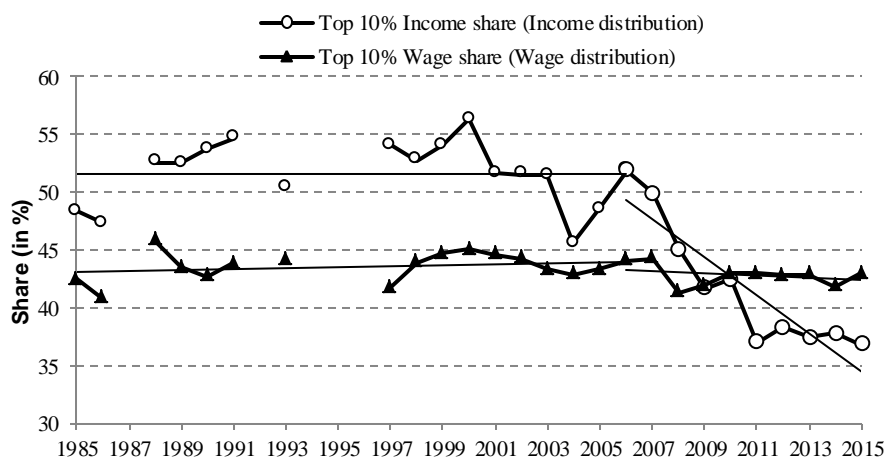


Figure 3: The Top 10% Income and Wage Shares, Iran, 1985-2015

To see how the capital income and the wage income have changed over time, we decompose the adjusted income into four components of wage, investment<sup>1</sup>, capital<sup>2</sup>, and transfers<sup>3</sup>. The summation of each component in each top income group is shown in Figure 4. The first graph is for the top 1% income group, the second one is for the next 4% income group ( $P_{95} - P_{99}$ ), the third one is for the next 5% income group ( $P_{90} - P_{95}$ ), and the last one is for the next 10% income group ( $P_{80} - P_{90}$ ).

As can be seen in all four graphs, the amount of the investment income and the transfers are small; therefore, we ignore them. However, there are two notable points about them. First, the real amount of the components is increasing over time. Second, the amount of the transfers has shifted up from 2011, in which the subsidy reform and the cash transfers<sup>4</sup> began in Iran (Salehi-Isfahani, Wilson Stucki, & Deutschmann, 2015), such that its level is even higher than wage income in the 1988-1991 period. It does not make sense that very rich people get social benefits from government. This fact that the top income groups get social benefits from government and the amount of the benefits has been increasing over time reflects this problem that the redistribution of income is not implemented efficiently in Iran, or may be the government has not precise information about the individuals' income.

Let's concentrate on wage and capital incomes. The first graph

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1. Investment income includes any income that comes from dividends, interest, and estates. Some studies combine the investment income with business and farm income, and call it capital income (Bricker *et al.* 2016). However, we distinguish between the interest/rent income and the other types of income; because, first, capital is a factor of production in the production function of the households, while interest/rent is not an input in the production function, and second, we are interested in knowing how household's ability to earn revenue from its own productive activities has changed over time. It will be shown that the investment income composes a tiny portion of the income of the top income earners; therefore, even if it is included in the capital income, the results do not change significantly.

2. Capital income includes business income, and farm income.

3. All transfers from government and other families.

4. The program began in 2010. Cash transfers were automatically deposited into the bank account of the head of the households each month. The government was paying the money to every household who had registered electronically for the program regardless of the situation of the household in the income distribution. This program is still running with this difference that wealthy households are now dropped out of the program.



shows that the main source of income of the top 1% group is capital income in all years. We can claim that the top 1% group is only made of capital owners, not top wage-earners/executives. This situation is to some extent similar to developed countries before 1970s. The graphs of the next top income groups ( $P_{95} - P_{99}$ ,  $P_{90} - P_{95}$  and  $P_{80} - P_{90}$ ) show that the wage income has been increasing; however, wage earners have not yet got into the top 1% group.

As can be seen, the amount of the wage income has been growing up continuously in all top income groups from 1985 until now. The growth is more significant in the top 10-5% and the top 20-10% groups. In these two groups, the wage income even surpasses the capital income from 2006 onward. That is, top wage income earners have been replacing top capital income earners at the lower parts of the top of the income distribution, and this replacement has become larger after the sanctions.

We already said that the concentration of the total income and the capital income fell in developed countries during 1915-45. Piketty (2006) explains that after the period, due to progressive taxation in the countries, the concentration of capital did not return to its prewar level, while we witnessed rapid increase in economic growth; because, the wars and the depression produced new creative generations that rose economic growth by their entrepreneurial activities, and they replaced old-fashioned capitalist generations. Atkinson and Piketty (2007) explain that during the last three decades, we witnessed a significant rise in the income share of the top income groups in India, China and English speaking countries. However this rise is not produced by top capital income earners, it comes from a significant progress in top wage income earners who are generally top executives. Therefore, the top wage income earners have been replacing old-fashioned capital holders in the developed countries after 1970s. In other words, the role of the human capital has been increasing substantially in the countries.

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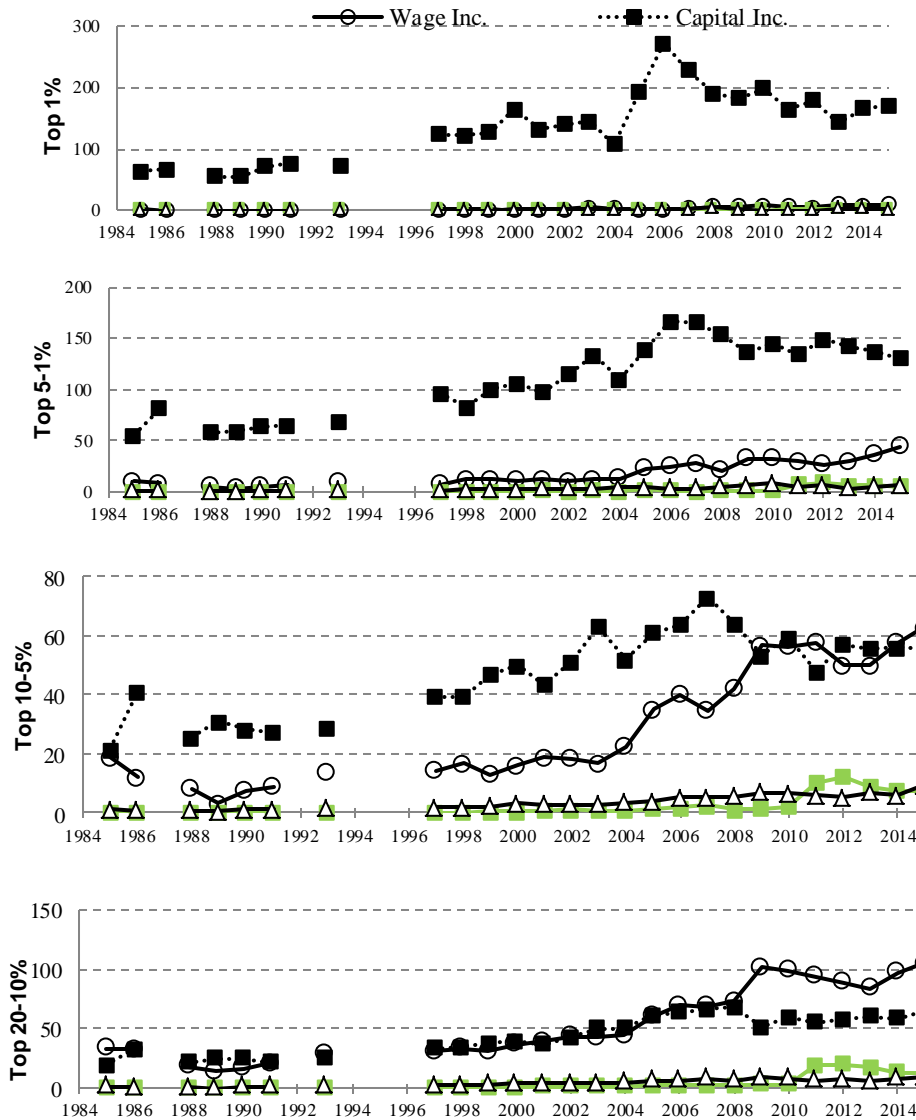


Figure 4: Composition of Adjusted Income for Top Groups, IRR Per Year Divided by 10E+12, Iran, 1985-2015

It may seem, what we see in Iran is a scenario similar to the developed countries. That is, top wage earners are replacing top capital income earners because of the rise of the role of human capital in Iran's economy. However, Figure 4 shows that the phenomenon of the replacement of capital holders by the wage income earners comes basically from the fall of the capital holders rather than the progress of the wage earners. Because, in all top income groups, the capital

income was continuously growing up during the 1985-2006 period; however, it fell suddenly after the first UNSC resolution. That is, capital owners were obviously affected negatively after the sanctions. It is clear that when a group loses its position, the position will be filled out automatically by the rival group.

Our speculation is that this pattern may not continue in the long run; because, these working rich men/women accumulate capital over time and the accumulated capital will be inherited by their next generations, as a result, there will be more capital holders in the future than today. In addition, if the sanctions are completely removed in the future, we can obviously expect that the capital holders revive in the future. However, consider that the revival of the capital is a time taking process, not an instantaneous phenomenon.

In Figure 4, we graphed the summation of each component of income for top income groups in IRR per year. Let's calculate the share of each component in the top income groups to inspect the changes of the components from another perspective.

Figure 5 shows the share of wage and capital income in each top income group for three typical years. The years are selected such that they can cover different important events: 1985 (war), 2006 (the first UNSC resolution) and 2015 (after the resolution). Each component (wage and capital) is expressed as the share of the total adjusted gross income. There are two notable points in this graph: First, as we move upward from the top 20-10% group to the top 1% group, we see that:

- in 1985, the share of capital (wage) income increases (falls) from 35.4% (61.5%) to 95.8% (3.9%).
- in 2006, the share of capital (wage) income increases (falls) from 45.0% (49.0%) to 98.4% (1.1%).
- in 2015, the share of capital (wage) income increases (falls) from 33.8% (54.3%) to 92.2% (5.1%).

Therefore, the share of capital (wage) income goes up (down) on average by around 58 (52) percentage points as we move from rich group (top 20-10%) to very rich group (top 1%).

The main part of the income of the top 5-1% and the top 1% comes from capital income rather than from wage; however, the income of the top 20-10% is generally composed of wage income rather than

capital income. In summary, capital holders generally earn more gross income than wage income earners in Iran. The larger the capital holding is, the higher the gross income is.

A comparison of our results in Iran with developed countries is informative. For example consider France. By looking at the results of Piketty and Saez (2013), we find out that in France, in 1929, wage income earners were much closer to very top income groups than wage income earners in Iran at the present time, in other words, the role/importance of wage income earners in France's economy in 1929 was higher than the role of wage income earners in Iran's economy in 2015. Piketty and Saez (2013) show that the portion of wage income in top income groups in 2007 has even become much larger than the portion in 1929. Therefore, there is a large gap between Iran and developed countries regarding the role/importance of wage income. This gap stems probably from larger importance of human capital and entrepreneurial activities in France's economy in comparison to Iran's economy. Iran's economy is largely dependent on the sale of oil by government rather than human capital and entrepreneurial activities. In France, the top wage earners are mainly composed of entrepreneurs and executives.

The second notable point in Figure 5 is that the share of the capital income went up during 1985-2006 in all top income groups; however, after the sanctions, the share fell significantly such that it is now below its 1985 level in all top income groups. As can be seen, capital holders lost substantially their share after the sanctions.

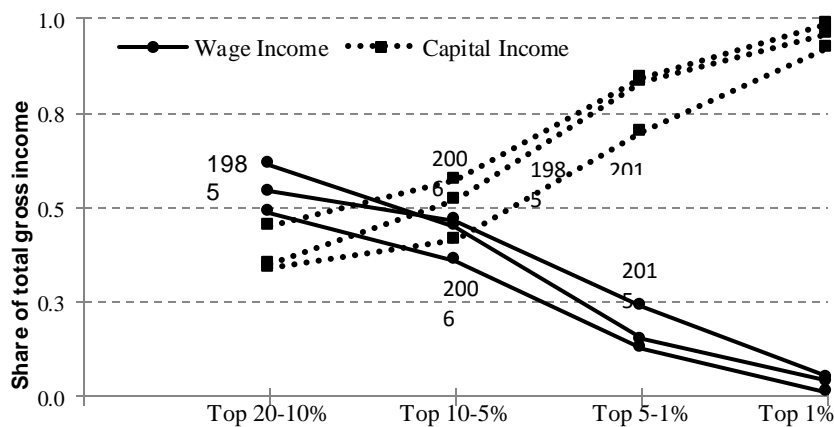


Figure 5: Share of Top Wage and Top Capital Income Earners, Different Top Income Groups, Iran

## 5. Concentration of Income

In this section, we study the concentration of income within top income groups. If the concentration of income is very high within top income groups, it means that very few people earn most of income within the top groups, which can be harmful for economic growth and democratic institutions.

A common way to study the concentration is to use the inverted Pareto coefficient (PC). The upper tail of income distribution is generally estimated by Pareto Type 1 distribution (Cowell & Kerm, 2015; Cowell, 2009) using the following distribution function in which  $F(y)$  shows the portion of population with income  $y$  or less:

$$F(y) = 1 - (k/y)^a \quad (1)$$

Where  $k$  is a positive parameter that locates the distribution, and  $a$  is a parameter greater than one that shows the thickness of the upper part of the income distribution (the lower  $a$ , the fatter the upper tail), and it is called the Pareto coefficient. The corresponding density function is as follows:

$$f(y) = ak^a y^{-a-1} \quad (2)$$

An important property of this distribution is that the relationship between income  $y$  and the average income  $z(y)$  of households (or families or individuals) with income above  $y$  is constant and independent of the amount of  $y$ :

$$z(y) = \frac{\int_y^\infty xf(x)dx}{\int_y^\infty f(x)dx} = \frac{a}{a-1}y \quad (3)$$

The ratio of the average income  $z(y)$  and the base income  $y$  is:

$$b = \frac{a}{a-1} \quad (4)$$

The above ratio is known as an inequality measure and is called the “average/base” index<sup>1</sup> or the “inverted Pareto coefficient”. If all households are sorted ascending based on their income, the index shows the gap between a household with income  $y$  and the average

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1. The PC can also be used to find many famous inequality indices such as Gini, Atkinson, General entropy ... (Cowell, 2009).

income of everybody else with income above  $y$ . As we see, the index is independent of the base income. For example, regardless of what the base income is, if  $b = 2$ , the average income above 1 milliard IRR is equal to 2 milliard IRR. The larger the PC is, the smaller the inverted Pareto coefficient index is. That is, the concentration of income within top income groups declines as the PC increases.

Here two questions arise: how the PC can be estimated in practice? And what should be the amount of the base income  $y$ , or in other words, what is the proportion of the data that can be modelled using the Pareto distribution? A property of the Pareto distribution is that there is a linear relationship between the log of the share of the population with income above  $y$  and the log of  $y$ . To see how, rearrange equation (1) and take log on both sides of the equality:

$$\log(1 - F(y)) = a \cdot \log(k) - a \cdot \log(y) \quad (5)$$

We can use this property to answer both questions: First, the above equation shows that  $a$  can be estimated using an ordinary least square through regressing the log of the share of the population with income above the base income  $y$  and the log of the base income  $y$ . Second, the base income should be chosen such that we can see a linear relationship between  $\log(1 - F(y))$  and  $\log(y)$ . Obviously, we do not see the linear relationship across whole of the income distribution. Cowell and Kerm (2015) claim that the linear relationship is usually seen beyond the 75th percentile of the data in most countries, that is, the base income is usually equal to  $P_{75}$ . However, they explain that in practice, the base income is selected by eye, that is we look at the distribution of income and pick a base income such that the linear relationship between  $\log(y)$  and  $\log(1 - F(y))$  can be seen by eye.

Atkinson, Piketty, and Saez (2011), and Alvaredo and Piketty (2015) use  $P_{90}$  as the base income, and report the inverted Pareto coefficient for many countries. In this paper, we choose  $P_{90}$  as the base income in order to compare our results with their results. We repeated our calculations using  $P_{75}$  as the base income as well, and the pattern of the changes of the PC was similar to  $P_{90}$ .

The results are shown in Figure 6. As can be seen, the  $b$  coefficient

rose from 2.8 in 1985 to 4.2 in 2000; however, it decreased to 3.6 in 2006, and decreased further to 2.2 by 2011, and did not almost change after 2011. In other words, the coefficient increased about 50% during the 1985-2000 period, and then fell about 14% during the 2000-06 period, and fell further by about 42% during the 2006-2011 period, and it is now bellows its wartime level. These results show that the concentration of income within top income groups has been generally ascending during 1985-2000; however, the concentration begins to reduce from 2000, and the reduction speeds up from the first UNSC resolution in 2006 onwards.

We do not look for the reason of the reduction of the concentration in this paper; however, it seems that the reduction of the concentration comes from fiscal decentralization policies made from the second development plan (1996-2000). During the war, the size of the government was logically growing up; however, after the war, Iran began to transform its economy from a very centralized public economy to a free market economy. In the second development plan, the role of the fiscal decentralization in economic growth was highlighted, and the implementation of the decentralizing policies started mainly from the third development plan (2000-2004).

Some part of the reduction of the concentration in recent years comes probably from the negative effects of the sanctions. We already saw that the top income groups lost their income share in recent years, and their real income fell substantially after the sanctions. It is expected that when the groups' real income and share fall, the concentration of income at the top of the income distribution falls as well. Therefore, some part of the reduction of the concentration in recent years might be related to the shocks.

Although the concentration of income has fallen substantially since 2000, it is still large. In very egalitarian countries, the inverted Pareto coefficient is around 1.5, and in inegalitarian countries it is close to 3 (Alvaredo and Piketty, 2015). These numbers are calculated using tax data in which there is less underreporting problem than survey data; therefore, when we compare our coefficients with the above coefficients, we should consider that the coefficients calculated in this study are expected to be biased downward due to understating income in survey data. That is, the coefficient should be larger than 2.2 in

Iran; therefore, Iran is clearly among the most inegalitarian countries.

Another way to measure the concentration of income is to examine the “shares within shares”<sup>1</sup>. We measured the share of the top 1% within the top 10% to check whether our results are robust. The pattern of changes of the concentration were similar (the results are available upon request).

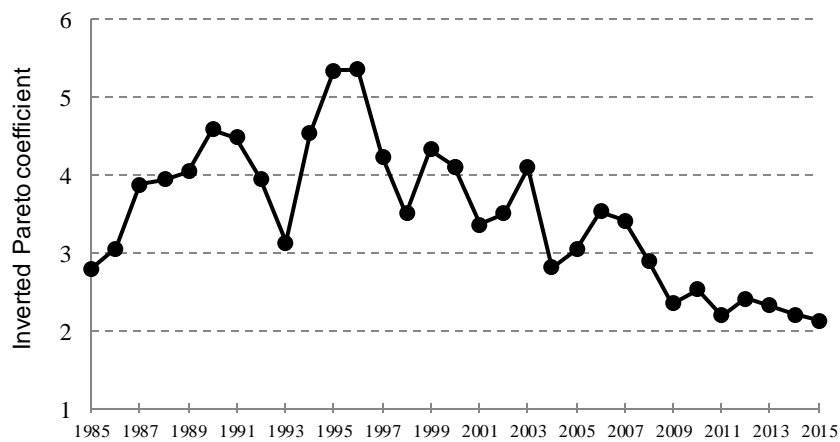


Figure 6: Inverted Pareto Coefficient for Adjusted Gross Income, Iran, 1985-2015

## 6. Conclusion

This paper found a downward trend in top income groups' real income and share in recent years. The top income groups were raising their real income and income share after the war by 2006; however, both their real income and share fell substantially after the first UNSC resolution such that the numbers were broadly back to their wartime level. It was explained that the main cause of the reduction was the negative effects of the sanctions on the capital owners. We found that the portion of the capital income in the top income groups was increasing over time by 2006. However, the portion fell sharply after 2006 such that it is now below its wartime level. The capital owners are the dominant income earners of the top income groups, and their capital holding was affected adversely by the sanctions, as a result,

1. This simple method has some advantages and disadvantages relative to the inverted Pareto coefficient (for more details, see, Atkinson, Piketty, and Saez, 2011; Atkinson, 2007).



their real income and share fell which led to the fall of the top income groups.

It was shown that the amount of the wage income has been increasing continuously within the top income groups over all years, and the wage income earners have been replacing the capital income earners since 2006 onwards due to the fall of the capital owners.

It was also indicated that the concentration of income within the top income groups has been generally increasing during 1985-2000; however, the upward trend reversed from 2000 because of the implementation of the fiscal decentralization policies, and the reduction of the concentration sped up after the first UNSC sanctions. It was explained that, although the concentration of income and the top income groups' share have fallen significantly in Iran, the numbers are still large, and Iran is among the most inegalitarian countries.

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