



Working Paper Series

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ECINEQ WP 2016 - 417

Fiscal policy, inequality and poverty in Iran: Assessing the impact and effectiveness of taxes and transfers*

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Abstract

Using the Iranian Household Expenditure and Income Survey for 2011/12, we estimate the impact and effectiveness of various components of Iran's fiscal system on reducing inequality and poverty. We utilize the marginal contribution analysis to determine the impact of each component, and we introduce newly developed indicators of effectiveness to calculate how well various taxes and transfers are operating to reduce inequality and poverty. We find that the fiscal system reduces the poverty-head-count-ratio by 10.5 percentage points and inequality by 0.0854 Gini points. Transfers are generally more effective in reducing inequality than taxes while taxes are especially effective in raising revenue without causing poverty to rise. Although transfers are not targeted toward the poor, they reduce poverty significantly. The main driver is the Targeted Subsidy Program (TSP), and we show through simulations that the poverty reducing impact of TSP could be enhanced if resources were more targeted to the bottom deciles.

Keywords: Incidence analysis; marginal contribution; effectiveness; energy subsidy reform; Iran.

JEL Classification: D31, H22, I38.

*This paper was produced under the research program on fiscal incidence in low and middle income countries of the Commitment to Equity Institute at Tulane University (www.commitmenttoequity.org) and the Economics Research Forum (ERF grant number 2015-006). An earlier version of this work was published as ERF Working Paper Number 1020. The authors are very grateful to ERF for its financial and intellectual support. The contents and recommendations do not necessarily reflect ERF's views and any remaining errors are the sole responsibility of the authors. The authors are thankful of the Statistical Center of Iran for providing additional documents and data beyond what is available online.

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I. Introduction

In December 2010, Iran's government replaced its energy and bread subsidies with a lump-sum cash transfer known as the Targeted Subsidy Program (TSP) (Guillaume et. al. 2011).⁵ The transfer was set at \$37-\$44 (depending on the exchange rate⁶) per person per month for all Iranians, including children of any age. The government justified this reform on two main grounds: the high fiscal burden of the energy subsidies, which amounted to 20% of GDP in 2010 (or \$70 billion US dollars), and the fact that fiscal resources disproportionately were benefitting the non-poor (Guillaume et. al. 2011; Salehi-Isfahani et al. 2015).⁷

To what extent did the reform accomplish its objectives? To answer this question, we first assess the impact of TSP on inequality and poverty, comparing it with the "no reform" scenario in which we assume that energy subsidies are still in place. Although Salehi-Isfahani et al. (2015) find that TSP reduced inequality and poverty when compared to the hypothetical case of households receiving neither TSP nor a consumption subsidy, they only looked at the impact of this reform three months into its implementation. Moreover, they relied on indirect methods to determine who received TSP because the survey they used did not include an explicit question about this program. After their paper was published, Iran released the Household Expenditure and Income Survey (HEIS) for 2011/12 (1390 by the Iranian calendar) which did include specific

⁵ Energy here refers to subsidies on electricity, water, natural gas, and oil-based fuels.

⁶ The amount was 455,000 Rials. Throughout 1390 Iranian year which is equivalent to March 2011 to March 2012, the official exchange rate changed from 10,364 to 12,260 Rials per dollar. Using these official exchange rates, the value of the monthly cash transfer was between \$43.90 and \$37.11 respectively. (Source: Central Bank of Iran's Exchange Rates available at http://www.cbi.ir/exrates/rates_en.aspx and author's calculations).

⁷In addition to the fiscal burden and the failure of the energy subsidies to target the poor, other justifications also have been used to gain public support for this reform: the excessive amount of energy consumption per GDP as compared to Iran's neighbors and other developing countries, the excessive waste in the use of subsidized goods, the environmentally negative side effects of cheap fossil fuels, the problem of smuggling subsidized fuel out of the country, and the fear of a potential international embargo on importing gasoline (a main fuel for cars) precipitating a need to reduce consumption of this product (Guillaume et. al. 2011; Salehi-Isfahani et al. 2015).

questions on how much the household received in TSP transfers and how many people in the household received them. Therefore, we can estimate the impact of TSP transfers with actual data on benefits, rather than relying on the indirect method. This is the first contribution of this paper.

As Salehi-Isfahani et al. (2015) indicate, the reform did increase the fiscally-induced reduction in inequality and poverty from the start, but it did not reduce the government's fiscal burden. Spending on TSP exceeded the additional revenue generated from the increase in the prices of previously subsidized energy goods in large part because energy consumption was lower without the subsidies, but also because of the reduction in international oil prices. (Salehi-Isfahani et al. 2015). In the first eighteen months of this reform, spending on TSP was almost twice the amount of the increase in government revenue that resulted from eliminating the energy subsidies (Iranian Labour News Agency, 2013).⁸ To address this problem, the Iranian government decided in 2014 to switch from a universal cash transfer to one that prevented the top 20 percent of the population from receiving TSP. The government called this change the "second phase" of the subsidy reform. Here, we analyze what would have been the impact on inequality and poverty, and the fiscal resources saved, if the design of the transfer had excluded the top 20 percent from the start. In a way, one can consider the extra budgetary outlays as an estimate of the fiscal cost associated with making the reform politically palatable to the population as a whole. This is the second contribution of this paper.

While TSP is no longer available to the richest households, its effectiveness in reducing poverty could be enhanced if the resources were more targeted to the poor. Therefore, a third

⁸ The estimated total cash transfer for this period (December 2010 – June 2012) is about 62,000 billion Rials (about \$5.4 billion) and the government revenue from the increase in prices is about 30,000 billion Rials (about \$2.7 Billion). The dollar values in parentheses are based on the average exchange rate for this period from the Central Bank of Iran (CBI).

contribution of this paper is an assessment of the extent to which making the TSP more targeted would be more effective in protecting the poor and would reduce fiscal outlays. Specifically, we analyze how much the contribution of this program to reducing inequality and poverty, and TSP's overall effectiveness, would change if pre-fiscal income deciles VII and VIII were no longer eligible and the resulting savings were transferred to the remaining income deciles (policy simulation 1) or to the bottom 30 percent (policy simulation 2).

To estimate the impact of both the universal and “second phase” of TSP, as well as policy simulations 1 and 2, we rely on standard fiscal incidence analysis as described in Lustig (forthcoming). Fiscal incidence analysis is used to assess the distributional impacts of a country's taxes and transfers.⁹ Essentially, it consists of allocating taxes (particularly the personal income tax and consumption taxes) and public spending (particularly social spending) to households or individuals in order to compare incomes before taxes and transfers to incomes after taxes and transfers. Transfers include: direct cash transfers; in-kind benefits, such as free government education and health care services, and consumption subsidies, including food, electricity, and fuel subsidies. Our analysis includes: personal income taxes and contributions to health insurance and social security, Social Assistance, TSP and other direct transfers, sales taxes, and in-kind transfers in education and health (net of user fees). Because standard fiscal incidence analysis, such as the one applied here, ignores behavioral responses and general equilibrium effects, and due to the lack of an input-output table, our exercise estimates the direct effects of subsidies (and their removal)

⁹The tax incidence literature includes a long list of studies with empirical estimates going back more than half a century (Musgrave et al., 1951; Musgrave, 1959; Musgrave, Case, and Leonard, 1974; Pechman and Okner, 1974). Similarly, on the expenditure side, there are decades of work using the traditional approach (Meerman, 1979; Selowsky, 1979) and a behavioral approach (Gertler and Glewwe, 1990; Gertler and van der Gaag, 1990; Younger et al., 1999). For more recent work see, for example: Alm and Wallace (2007), Martinez-Vazquez (2008), Förster and Whiteford (2009), Immervoll and Richardson (2011), Bucheli et al. (2014), Higgins and Pereira (2014), Jaramillo (2014), Lustig and Pessino (2014), Arauco et al. (2014), Scott (2014), Cabrera, Lustig and Moran (2015), Higgins and Lustig (2016), Higgins et al. (2016), Lustig (2015, 2016a, 2016b), Younger, Myamba, and Mdadila (forthcoming), and Younger, Osei-Assibey, and Oppong (2017).

only. Thus, it is a useful first-order approximation of the effects of this fiscal policy. Furthermore, this analysis is one of the very few available for Iran, especially since its sweeping energy subsidy reform.

To measure the contribution of taxes and transfers to fiscally-induced changes in inequality and poverty, we use the marginal contribution approach (Lambert, 2001; Enami, Lustig, and Aranda, forthcoming). By this method, the contribution of a tax or a transfer to a change in inequality is measured by comparing the existing fiscal system to a counter-factual that excludes the tax (or transfer) of interest.¹⁰ This approach is superior to using progressivity indicators (such as the Kakwani index) for determining whether a tax (or transfer) is inequality-increasing (or decreasing). This is because standard progressivity indicators can yield the wrong prediction, in terms of the impact of a particular intervention, when the number of fiscal instruments is greater than one. When a fiscal system is composed of multiple taxes and transfers, a progressive tax (or transfer) can actually increase inequality and a regressive tax (transfer) can reduce inequality.¹¹

While a specific tax (transfer) can have a large effect on reducing inequality (or poverty), one key concern for economists and policymakers is to determine whether that tax (transfer) is effective. In this paper, we follow Fellman et al. (1999) and Enami (forthcoming [b]), and define effectiveness by comparing how close the actual marginal contribution of a tax (transfer) comes to achieving its maximum potential. We show, for example, that despite its relatively large effect on poverty and inequality, TSP is relatively less effective compared to some other components of

¹⁰ For example, the marginal contribution of direct taxes to reducing inequality is measured by comparing the Gini of the system with direct taxes to the Gini of the same system without direct taxes. One also can think of this counter-factual as having the tax or transfer replaced with an alternative tax or transfer of the same size but with no effect on inequality or poverty.

¹¹ Lambert (2001) and Enami, Lustig, and Aranda (forthcoming) show this mathematically. Also, Enami (forthcoming (a)) shows what happens when taxes and transfers end up reranking individuals.

the fiscal system in Iran. This finding highlights the importance of better targeting of cash subsidies, and motivates our policy simulations.

Our results show that the fiscal system in Iran (including direct and indirect taxes, direct transfers, and in-kind transfers for education and health) reduces the Gini coefficient by 0.0854 points, or 20%, compared to the Market Income Gini. Excluding the in-kind transfers for education and health, the reduction equals 0.0574 Gini points, or 13% of the Market Income Gini. Moreover, Iran's fiscal system is quite powerful in reducing poverty. The headcount ratio falls from about 21% to 11%.^{12,13} We find that compared to the benefits previously received in subsidies, the TSP cash transfer exceeds the foregone energy subsidy of the previously subsidized goods for about 95% of "non-rich" households.¹⁴ Most families, regardless of where they belong in the income distribution, benefit from this reform, but the average benefit for an ultra-poor family¹⁵ is almost eight times that of a "rich" family.

We also find that taxes are very effective in raising revenue without increasing poverty, and are moderately effective in reducing inequality. In contrast, because transfers are universal and not targeted to poor households, they realize only about 16% of their potential to reduce poverty. In terms of inequality, transfers are more similar to taxes: they moderately realize their potential. The "Social Assistance" program leads other interventions, with a realized power of about 40% to 43%. Among taxes, only the Income Tax displays an effectiveness of this magnitude.

¹² Unless otherwise specified, throughout this paper we use \$4 per day in 2005 purchasing power parity (PPP) as the poverty line.

¹³ We calculate the poverty indices using the international poverty lines defined without accounting for the "consumption" of education and health. To be consistent with the definition of these poverty lines, we do not include the in-kind transfers for education and health as part of the fiscal system when evaluating its effect on poverty.

¹⁴ That is, those with the per capita daily income of less than \$50 purchasing power parity (PPP) in 2005 dollars.

¹⁵ That is, those with the per capita daily income of less than \$1.25 PPP in 2005 dollars.

Based on the size of its marginal contribution, TSP has the greatest impact in reducing inequality and poverty. TSP actually reduced inequality by about 0.0552 Gini points. Without TSP, the poverty headcount ratio would have been about 22% rather than 12%. This reduction in poverty comes mainly from the large effect of this program in rural areas. Without it, the headcount ratio in rural areas would have been about 44%, not the observed 23% (while the headcount ratio in urban areas would have been 13%, not the observed 6%).¹⁶ However, TSP's "success" is mainly due to its size. Because it is basically universal, it is not effective in the sense that much more could be achieved in terms of reducing inequality and poverty if the resources were better targeted to the poor.

Given the importance of the TSP, we also evaluate two alternative scenarios of allocating its resources. We show that removing the subsidy from deciles VII and VIII, and allocating the additional savings to the bottom 60 percent (policy simulation 1), or just to the bottom 30 percent (policy simulation 2), would significantly reduce inequality and poverty. This is mainly because the program is already very successful in reaching the low-income groups, especially in rural areas.

The rest of this paper is organized as follows: Section II briefly reviews Iran's fiscal system and lists the programs that are included in the analysis. It also explains the method and assumptions used to construct items not directly observed in the household survey. Section III discusses the data and methodology used in this paper, specifically the marginal contribution approach to calculating the effect of different taxes and transfers on reducing (increasing) inequality and poverty. We also describe the effectiveness indicators used in our analysis. Section IV presents the results of our inequality and poverty analysis. We pay special attention to the Target Subsidy

¹⁶ Note that these estimates rely on the concept of Consumable Income which is described later in Section III.

Program because of its significant role in reducing inequality and poverty. Finally, Section V concludes and presents policy recommendations for moving forward in managing the TSP in Iran.

II. Overview of Iran's Fiscal System and the Taxes and Transfers Included in This Analysis

Iran's fiscal system is composed of taxes, transfers, subsidies, and pensions which are briefly described below. In each sub-section, we indicate which components are included in the analysis and what assumptions are used to construct their values if they are not directly observed in the household survey. Note that the information in this section closely relates to Figure 1 and Section III on methodology.

To first provide some context, Table 1 presents a summary of the revenue sources and expenditure areas of Iran's budget. Total revenues and spending are roughly the same: about 164 billion dollars, which is about 27% of GDP. The main source of revenue is natural resources (mainly oil), followed by capital and financial assets (55.23% of budget), and finally by tax revenues (24.0% of budget). Government expenditures are divided equally into social expenditures and all other types of expenditures (e.g. defense). Education, social protection, TSP, and health expenditures are the main categories of social expenditures with 16.58%, 11.84%, 10.91%, and 9.24% of the budget allocated to them respectively. Table 1 also shows the categories that were included in the analysis.

[Table 1 about here]

II.A. Taxes

In Iran, the current tax system has two main categories: direct and indirect taxes. The two main sub-categories of direct taxes are property¹⁷ and income¹⁸ taxes. The main indirect tax in Iran is the Value-added tax (VAT) (INTA, 2015).¹⁹ The movement from sales tax to VAT is a recent policy reform in Iran; it was not implemented fully in the year of the survey that is used in this study (i.e. 2011-2012). It is worth noting that in Iran the main entity in charge of taxation is the Ministry of Finance and Economic Affairs.

In this paper, we mainly focus on estimating the incidence of taxes that can be directly observed in the household survey, or inferred or simulated from the available data. For example, the income tax of self-employed individuals is directly observed in the survey. However, payroll taxes are calculated using the reported gross and net income variables, as well as the reported deductions for pensions and health insurance schemes. We simulate the incidence of sales taxes using the general rule of 3% sales tax²⁰ combined with data on household monthly consumption expenditures to impute the value of sales taxes for the whole year.²¹ We exclude corporate income taxes and stamp duties from our analysis.

II.B. Transfers

Iran has several transfer programs and subsidies. we classify them by three main categories: cash or near-cash transfers, in-kind transfers, and price subsidies. The latter group, which includes

¹⁷ Including inheritance tax and stamp duty.

¹⁸ Including real estate income tax, tax on income from agriculture, tax on salary income, tax on individual business income, tax on the profits of legal persons (i.e. Corporate income tax), incidental income tax and tax on aggregate income derived from different sources

¹⁹ A complete description of all taxable items is available (in English) from "Iranian National Tax Administration (INTA)" website: <http://en.intamedia.ir/> under the heading "Taxes in Iran".

²⁰This is a simplified rule because some goods are not taxed and some (such as cigarettes) are taxed at higher rates.

²¹ Iranian household survey has income information for each household member for the year prior to the day of survey, but only expenditure information for the whole household for the month prior to that day.

consumption and production subsidies, is not included in this analysis because we cannot identify the beneficiary households in the survey.

Cash or near-cash transfers

The first category, “cash transfer” programs, includes the Targeted Subsidy Program,²² cash transfer programs by BSOI²³ (which is an organization in charge of providing assistance to the families of those who are considered “martyrs, prisoners of war or injured in defending the Islamic revolution in Iran”), the Imam Khomeini Relief Foundation²⁴ (which mainly assists low income families), the Islamic Revolution Mostazafan Foundation²⁵ (which mainly assists low income families), and the State Welfare Organization of Iran²⁶ (which assists several groups, including individuals who are disabled, addicted, orphans, or elderly).

Cash transfers received through the TSP are directly observed in the survey. It shows that almost all of the households (about 96%) receive this subsidy. In the survey year, beneficiaries received 455,000 Rials per person per month (equivalent to \$37 to \$44 depending on the exchange rate from March 2012 or March 2011, respectively). Moreover, the average transfer received by an Iranian household²⁷ through the TSP is about 14.7 million Rials (about 15% of average “Market Income²⁸” of a household). To implement this subsidy reform, a new organization called the Targeting Subsidies Organization was established. The transfer is deposited into the bank account of the head of the household, and ATM machines were installed in remote rural areas to facilitate access to this transfer.

²² In Farsi: “Tarh-e Hadafmansazi-e Yarane-ha”.

²³ In Farsi: “Bonyad-e Shahid va Omoor-e Issargaran”

²⁴ In Farsi: “Komite-ye Emdad-e Imam Khomeini”

²⁵ In Farsi: “Bonyad-e Mostazafan-e Enghelab-e Eslami”

²⁶ In Farsi: “Sazmane-e Behzisti-e Keshvar”

²⁷ The total number of households in the extended survey is 21,159,033.

²⁸ We define “Market Income” formally later in the paper but in a nutshell, it is equal to the factor income plus pensions minus contributions to pensions.

All of the other cash transfer programs mentioned above are reported in the survey as a total amount, without distinguishing among them. We call these combined transfers the “Social Assistance” program. The average transfer received by an Iranian household through the Social Assistance program is 0.9 million Rials (about 0.9% of the average Market Income of a household). The third type of transfer programs included in the analysis are food, or so-called near-cash transfers: the edible goods that a household receives for free, but not from other households. The expenditure data has a code to identify goods that are consumed “free but not from other households.” Given the existence of this “self-consumption” code, we decide to consider these free edible goods as being provided by the government. The average transfer received by an Iranian household as free food is about 0.06 million Rials (about 0.07% of the average Market Income of a household).

In-kind transfers

In-kind transfers are divided into education, health, and housing transfers. The latter category is not included in this analysis because we cannot identify the beneficiary households in the survey.

Primary and secondary education in Iran are under the supervision of the Ministry of Education. There are 12 grades: 5 for primary, 3 for middle school, and 4 for high school. Compulsory education runs until the end of middle school (i.e. eighth grade). Primary and secondary education are free for all 12 grades in public schools, but people have the option to switch to private schools. Tertiary education is supervised by the Ministry of Science, Research and Technology and by the Ministry of Health and Medical Education, depending on the field of study. Tertiary education is not free, but public universities offer it freely in exchange for an obligation that a student will work in the country for some period after the end of their education.

This could be as long as three times the length of their education.²⁹ However, students, have the option of paying for their degrees from the Ministry of Science, Research and Technology before their obligation ends and leaving the country; this is harder for those who fall under the jurisdiction of the Ministry of Health and Medical Education. In addition to these education-for-work type of universities, there are both public and private universities that admit students who are willing to pay for their education. Our analysis includes education transfers calculated by using the imputation method and the per-pupil budgetary expenditures on education (as reported in Adlband, 2011; MNA, 2011).

Finally, in terms of its health care system, Iran combines medical care and education through both public and private medical schools. Each province of Iran has at least one public medical university, which is a place to train physicians and is responsible for public health in that province. These universities, which are directly supervised by the Ministry of Health and Medical Education, control a health network that expands into the rural and urban areas of each province. Every village, or a group of them, has a “health house” (with the ratio of one health house per 1,200 residents) with a trained health worker known as a “Behvarz.” The health houses are all connected to “rural health centers” (with the ratio of one rural health center to 7,000 residents), each with at least one physician. A similar structure exists in the urban areas, where “health posts” and “urban health centers” respectively replace the corresponding entities in the rural areas. All of the rural and urban health centers are supervised by “district health centers” which are controlled by the public medical university in charge of the province. Public hospitals also directly report to this university. In

²⁹For example, a person who gets a four-year B.S. degree, depending on which public university he has attended, can be required to work for 12 years in the country before his degree is released to him/her. This requirement only affects those who wish to leave the country; for the rest of population, it is as if it did not exist. The only exception is for those who receive their degree from the Ministry of Health and Medical Education. They are required to work in public-run hospitals/medical centers of the government’s choice for a period of time upon graduation.

addition to the public health system, the private sector is active in the field, with private physician offices and hospitals. Moreover, NGOs are also present and active in Iran's health care market (Asaei, 2015; Mehrdad, 2009).

Medical services are not free in Iran, but they receive a subsidy from the government. The government's budget has a specific line for a "medicine and skim milk" subsidy which amounted to 3,900 billion Rials in 1390 (2011-12), the year of the survey used in this analysis. Health insurance is available to a large fraction of population, but mostly involves large copayments. According to the Statistical Center of Iran, the total public expenditure on health in year 1390 (2011-12) was about 170,000 billion Rials (SCI, 2015). In that year, the private expenditure was about 283,000 billion Rials; the households' share was about 245,000 billion Rials. The balance was covered by private insurance, employers, NGOs, and the additional (optional) coverage provided by the public insurance companies. Finally, international sources contributed 26,000 billion Rials to health expenditures in Iran in that year (SCI, 2015). For the purpose of this analysis, we allocate the per capita health transfer of 2,250,720 Rials (which is the per capita health expenditure in the year of survey) to every member of a household that has a medical expenditure in the survey.³⁰

II.C. Pension system

The first civil servant (contributory) pension system legislation in Iran dates back to 1922 (1301 on the Iranian calendar) (CSPO, 2015). Since then, it has experienced several major changes, but it is still mainly a pay-as-you-go (PAYG) system and is known as the Civil Servants Pension Organization (CSPO). Currently, there are several ways through which a civil servant can be

³⁰ We observe medical expenditure at the household level and allocate the health subsidy to all members of a family.

retired. These include “compulsory retirement” (for employees 65 years of age regardless of the years of rendering service), “retirement based on mutual agreement” (for employees who are 50 years of age and have rendered service for at least 25 years if male and 20 years if female), “forcible retirement” (which is based on the verdicts issued by the board of investigation of administrative violations, but requiring 25 years of service for males and 20 years for females), “voluntary retirement by authority of employee” (if of age or by authority of the organization if the employee has rendered 30 years of service), and “invalidity pension” (for those experiencing a non-occupation related invalidity). The main factors in calculating one’s pension are years of service and salary and benefits in the final two years of service (CSPO, 2015).

Military members have their own pension and health insurance system. Prior to 2002 (1381 on the Iranian calendar), the different branches of Iran’s armed forces had their own pension systems, but they were combined in to one organization in that year (although the funds of each branch are still kept separate from each other). This “Retirement Organization of Armed Forces” is part of the “Social Security Organization of Armed Forces,” the centralized entity in charge of armed forces welfare. This system is PAYG and is mainly funded through fees paid by the military members and the government, a governmental budget, and the financial investments of the Organization (IPRS, 2015).

Those who are employed in the private sector are mandated to be covered by the pension and health insurance system provided by the Social Security Organization (SSO). Social security was first provided to workers in 1932 (1310 on the Iranian calendar) (SSO, 2015). This system is also PAYG, and is considered an independent organization under the supervision of the “Ministry of Cooperatives, Labour and Social Welfare.” SSO is financed through payments made by employees (7% of their base salary), employers (about 23% of the base salary of each employee), and

government (3% of the base salary of each insured employee), as well as financial activities by the entities that are controlled by SSO (SSO, 2015). Any employees who are covered by the SSO are considered “insured” employees, and the fees that are paid by them and their employer are also called an “insurance fee.” This is mainly because SSO provides both health and retirement insurance (i.e. pensions), as well as other types of insurance (e.g. invalidity and unemployment) (SSO, 2015).³¹ Those who are self-employed have the option of self-insuring through SSO. The general rule for the calculation of a pension in SSO is similar (although not identical) to that of CSPO. Male and female employees have to be at least age 50 and 45, respectively, and must have at least 30 years of paid insurance fees to be eligible for retirement. The age requirement does not apply to those who have at least 35 years of paid insurance fees. Men and women who are over age 60 and 55, respectively, and who have at least 20 years of paid insurance fees, are eligible to become retired. Under some special circumstances, women can be eligible for retirement if they are at least 42 years old (SSO, 2015).

It is important to note that all incomes from pensions are exempt from taxes (CSPO, 2015). Moreover, the pension deduction for all Civil and Military servants is 9% of their salary, and the government pays 1.5 times their fee as its contribution to the pension funds (HVM, 2015). The household survey that we use in this study has information about the pension that is received by any member of a household, as well as the deductions for the social security system and the related health insurance.

III. Methodology and Data

³¹ There are exceptions as to which employers are mandated to pay their share, or which employees are qualified for mandatory participation in SSO. Interested readers are encouraged to review the complete law (available on the SSO website).

Fiscal incidence analysis begins with constructing basic income concepts. Figure 1 presents the generally defined income concepts. In the Methodological Appendix, we describe in greater detail how these income concepts are constructed for Iran. In broad terms, we begin with Market Income,³² then subtract direct taxes and add cash transfers to obtain Disposable Income. Next, we subtract indirect taxes to generate Consumable Income. Because TSP replaced consumption subsidies, there are no consumption subsidies in our model. Finally, we add the monetized value (at average government cost) of In-kind transfers (i.e. health and education), net of user fees, to obtain Final Income.

[Figure 1 about here]

This study relies on the concept of marginal contribution (Lambert, 2001; Enami et al., forthcoming) to estimate the contribution of taxes and transfers to reducing inequality and poverty. Theoretically, marginal contribution analysis asks what the distribution of income would have been in the absence of a tax³³ (or transfer). It defines the difference between this counterfactual and the actual distribution of income as the marginal contribution of that tax (or transfer). The mathematical formulation can be found in the Methodological Appendix.

We use “Impact and Spending Effectiveness Indicators” to evaluate how well taxes and transfers reduce inequality. In order to assess the effectiveness of taxes, transfers, or changes in them, we rely on the notion of “optimal tax (transfer)” (Fellman et al., 1999),³⁴ using the indicators proposed in Enami (forthcoming [b]) and summarized in the Methodological Appendix. The optimal effect is obtained as follows: a given amount of taxes (or transfers) can be collected

³²The survey actually includes pre-tax income for employees. For the self-employed, market income is generated by subtracting Business Costs from Sales since both items are in the survey.

³³Or replacing that tax (or transfer) with another tax (or transfer) that is neutral in reducing inequality (or poverty).

³⁴Fellman et al. (1999) call a tax (transfer) optimal when it optimizes the social welfare index of interest (e.g. Gini index or poverty head count ratio) comparing to the class of all taxes (transfers) that raise (distribute) an identical amount of funds.

(allocated) in such a way as to maximize the impact on inequality (or poverty) reduction. In the case of the Gini coefficient, for example, the maximum effect comes from collecting taxes from the richest individual until his/her income becomes equal to that of the second richest, then taxing both of them until their income becomes equal to that of the third richest person. This process continues until all of the required tax is collected. This procedure maximizes the reduction in the Gini coefficient while keeping the size of the collected tax constant. An “optimal” transfer would follow a similar procedure, but would start with the poorest individual and move him/her up the income distribution.³⁵ By comparing the optimal effect to the actual effect of a given tax or transfer, we obtain an “Impact Effectiveness Indicator.” Alternatively, one can keep the change in inequality constant and estimate the minimum size of a tax or transfer that would achieve the same marginal contribution. This reduction in the size of a tax or transfer can be obtained by the same optimal redistribution process that was described above. Again, by comparing the optimal amount of a tax or transfer to its actual size (keeping the marginal contribution of that tax or transfer constant), we obtain the “Spending Effectiveness Indicator.”

To evaluate how taxes and transfers reduce poverty, we need a different index. Higgins and Lustig (2016) show that fiscal policies usually create both fiscal gain to the poor (FGP) and fiscal impoverishment (FI). Thus, one should differentiate between the two effects. Therefore, we use FI-FGP effectiveness indicators to account for these two effects. Although FI-FGP indicators are conceptually similar to our Impact Effectiveness indicators, one should not compare the FI-FGP effectiveness of taxes to transfers. Taxes can only hurt the poor (i.e. by increasing FI), while transfers can only benefit the poor (i.e. by increasing FGP). The FI-FGP indicators are defined so that the higher their value, the better a tax or transfer is. But the interpretations are different: the

³⁵Although we showed results using the Gini coefficient here, the indicators can be calculated with any other inequality measure.

higher the value of the FI-FGP indicator for a tax, the more successful that tax is in raising revenue without increasing poverty; the higher the value of this indicator is for a transfer, the more successful it is in reducing poverty. A more detailed discussion and a mathematical demonstration of FI-FGP indicators is presented in the Methodological Appendix.

The main data base for this study is the Iranian Household Expenditure and Income Survey (HEIS) for the calendar year 1390 (2011-12)³⁶. The Statistical Center of Iran conducts this survey every year, and its sample represents all rural and urban areas of Iran. In the survey year that we use, there are 18,727 urban and 19,786 rural households in the sample. These households represent about 56.4 million urban and 23.1 million rural individuals. For each of the households in the sample, we follow Figure 1 and construct the core income concepts as well as income components (i.e. taxes and transfers) as described in Table A1 in the Methodological Appendix. As mentioned earlier, the marginal contribution technique used in this paper is not sensitive to the order of adding taxes and transfers.

Table 2 shows the distribution of individuals and households based on their income group and the average household size in each income group. About 21% of the population live in poverty and 41% are economically vulnerable. Together, about 62% of Iranians are considered low-income. The middle class is also large, and includes about 37% of the population. The remaining 1% belong to the high-income group.

[Table 2 about here]

IV. Results

³⁶ Most of the survey data is available at <http://goo.gl/pcG70N>. Please note that the online database does not include the survey weight variables. These variables are, however, available for researchers who visit the Statistical Center of Iran in person.

In this section, we first review the change in inequality and poverty between different income concepts. Then we analyze each component of the fiscal system and evaluate its marginal contribution to reducing inequality and poverty, as well as its effectiveness in doing so. Finally, we focus on the “Targeted Subsidy Program,” and evaluate how much it would contribute to the change in poverty and inequality (in terms of marginal contribution) and its effectiveness in different policy scenarios.

IV.A. Inequality and Poverty from Market Income to Final Income

Table 3 shows the change in different inequality indices from “Market Income” to “Final Income.” The total change in inequality from Market to Final income is about 0.0854 Gini points, which is equivalent to about a 20% reduction in the Gini index of Market Income. The largest reduction in inequality happens when direct transfers are added to the system. In other words, the biggest reduction in Gini happens when one compares the Gini of Market Income to Gross Income, and also Net Market Income to Disposable Income. A second and much less noticeable drop in inequality occurs when In-kind Transfers (net of user fees) are added to the system (i.e. comparing Consumable Income to Final Income). However, given the amount of imputation and the type of assumptions made in calculating In-kind Transfers (as explained in the previous sections), these results should be viewed with caution. Other inequality indices in Table 3 tell the same story: the considerable role of direct transfers in reducing inequality.

[Table 3 about here]

Similarly, Table 4 shows how different poverty indices compare across income concepts. As a whole, the fiscal system reduces the headcount of the poor population (i.e. those with a daily

income of less than \$4 PPP) from about 21% in Market Income to 11% in Consumable Income.³⁷ Again, the major reduction occurs with the addition of direct transfers, which cut poverty by about two thirds. The reduction in the poverty headcount is even higher for the other two poverty lines. The increase in poverty due to direct and indirect taxes is relatively low, and of second order importance.

[Table 4 about here]

IV.B. Contribution of Fiscal Interventions to Changes in Inequality and Poverty

In the previous section, we show that direct transfers are the main piece of Iran's fiscal system that contributes to reducing inequality and poverty. To further analyze this result, we turn our attention to the sub-components of the fiscal system. Table 5 shows the progressivity of each income component, as well as their marginal contribution to reducing (or increasing) inequality for three of the main income concepts (i.e. Disposable, Consumable, and Final Incomes). The interpretation of marginal contributions is as follows: how much the Gini of an income concept would have been higher (or lower) if a specific income component (i.e. a tax or transfer) were removed from the fiscal system. Positive values mean that the Gini would have been higher; therefore, removing that component increases the inequality. Put differently, positive values for the marginal contribution mean that an income component has a positive effect in increasing equality (or reducing inequality). Among all the income components, Semi-cash Transfers (Food), indirect taxes (i.e. Sales Taxes), and Health User-fees have a negative effect on equality. As expected, direct transfers make the highest marginal contribution to reducing inequality in all three income concepts. However, the main contribution comes from the Targeted Subsidy Program with

³⁷ The poverty indices are not calculated for Final Income because these international poverty lines do not account for the "consumption" of education and health.

a marginal contribution of about 0.05 Gini points. This is in line with findings of Cockburn et al., (2017), that utilize ex-ante simulations of energy subsidy reform proposals in Egypt and Jordan (two countries that are also in the Middle East region) to show that using cash transfers to reallocate part of the freed-up resources would have a significant effect on reducing poverty in these two countries.

Table 5 also reveals two examples of a phenomenon known as the Lambert Conundrum (Enami, Lustig, and Aranda, forthcoming). The commonly used rule of thumb regarding the effect of a tax or transfer on reducing inequality states that a progressive tax or transfer (as measured by the Kakwani index) reduces inequality and a regressive tax or transfer increases it. However, this rule is not always correct, because adding a regressive tax (or transfer) can result in higher equality, or adding a progressive tax (or transfer) can increase inequality. In Iran's case, the Semi-Cash Transfer (Food) and Health User-fees are progressive (have a positive Kakwani index) but their marginal contributions to the inequality of Final Income (and other Income concepts for the Semi-Cash Transfer) are negative. In other words, removing these progressive interventions would result in lower (instead of higher) inequality over the whole income distribution.

[Table 5 about here]

Table 6 does the same marginal contribution analysis for the poverty headcount ratio. In this table, positive values have a positive connotation, similar to that of the previous table. In other words, a transfer with a positive marginal contribution would reduce poverty; if it is removed from the fiscal system, the result would be an increase in the poverty headcount ratio equal to the size of the marginal contribution. As expected, taxes always can do harm, i.e. increase poverty, but they are not a concern in the case of Iran except for the Sales Taxes. With respect to Consumable Income, Direct Taxes increase the poverty headcount ratio by about 0.2 percentage points and

Sales Taxes increase it by about 1.2 percentage points. On the other hand, direct transfers reduce this poverty index by about 12.8 percentage points. Most of this effect is due to the Targeted Subsidy Program, which reduces poverty by about 11.9 percentage points. To put this value in context, note that the poverty headcount ratio of Consumable Income is about 10.6%, so without the Targeted Subsidy Program, the value of this indicator would have been about 22.5%.

[Table 6 about here]

Now we turn to measuring the effectiveness of taxes and transfers in reducing inequality and poverty. The previous analysis focused on the observed outcome of these fiscal interventions, but what follows provides a context for evaluating the observed marginal contributions. As was mentioned before, these indicators show how effective taxes and transfers are in reducing poverty and inequality when compared to their full potential. Tables 7 through 9 present the results for Impact Effectiveness, Spending Effectiveness, and FI-FGP Effectiveness indices, respectively.

Focusing on Table 7, and with respect to Final Income, the Income Tax has the highest Impact Effectiveness of the direct taxes, fulfilling about 38% of its potential in reducing inequality. However, the highest effectiveness belongs to Social Assistance (a direct transfer), which fulfills about 43% of its potential. Among interventions with a positive marginal contribution the lowest Impact Effectiveness belongs to Employee Contributions to the Health Insurance, about 8% of its potential. Health User-fees are the worst: they have an increasing effect on inequality, but compared to Semi-Cash Transfers (Food) and Sales Taxes, which also increase inequality, they have relatively more potential to reduce it.

[Table 7 about here]

With regard to Spending Effectiveness (Table 8), and focusing on the Final Income column, Social Assistance (with about 40%) and Income Tax (with about 35%) are the two most effective

interventions. Employee Contributions to the Health Insurance are worst, with almost zero effectiveness. That means that with a very small fraction of Employee Contributions to the Health Insurance, one can achieve the same level of reduction in inequality as is currently produced by these contributions. This outcome is expected given the small size of the Marginal Contribution of this intervention (see Table 5).

[Table 8 about here]

Table 9 presents FI-FGP effectiveness indicators. As was mentioned earlier, we should not compare Taxes and Transfers because taxes can only increase poverty while transfers can only reduce it. All taxes are highly efficient in raising revenue without significantly increasing poverty, while direct transfers are not very efficient in reducing poverty. Among transfers, Social Assistance has the highest effectiveness (about 21% with respect to Consumable Income) and Semi-Cash Transfers have the lowest (about 4% with respect to Consumable Income). The Targeted Subsidy Program's poverty reduction effectiveness is about 15%. One may question these results for TSP given the high marginal contribution of this program to reducing poverty, as established in the previous sections. But the explanation is in the properties of TSP. The TSP's cash transfers are made to all Iranians (i.e. poor and non-poor equally), so the total cash transfer is very large, but not specifically targeted toward the poor. As a result, its poverty effectiveness diminishes substantially. Poverty would be reduced significantly if the Targeted Subsidy Program were allocated more toward low-income households. We explore this idea further in the next subsection. Finally, it is worth noting that the fiscal system as a whole is not very effective in reducing poverty. With respect to Disposable Income and Consumable Income, the fiscal system only realizes about 28% and 39% of its potential, respectively.

[Table 9 about here]

IV.C. Alternative Scenarios for Implementation of the “Targeted Subsidy Program”

Since the TSP makes the largest marginal contribution to the reduction of inequality and poverty, it is important to analyze it further. This cash transfer program (in the survey year used in this paper) offers an identical amount to every Iranian regardless of income (baseline scenario). However, the Iranian government has recently implemented a “second phase” of the energy subsidies reform, eliminating eligibility for receiving benefits for the top two deciles. What if this new policy had been in place from the beginning? We consider that (i.e. the “second phase” policy) as well as two alternative policy scenarios with fiscally neutral effects as compared to the second phase policy, asking how much larger the marginal contribution of TSP would be in reducing inequality and poverty.³⁸ In the first scenario, we remove the subsidy for the top 40%, but increase transfers to the bottom 60% by about 30%. In the second scenario, we again eliminate transfers for the top 40%, but increase the cash transfer to those at the bottom 30% by about 60%. Finally, to see what would have happened if the energy subsidies had not been replaced with a cash subsidy, we also produce a “no reform” scenario.³⁹

Panel A in Table 10 shows how the Targeted Subsidy Program’s marginal contribution to reducing inequality changes in different scenarios. In the “no reform” case, the consumption subsidy has a relatively small effect on inequality when it is compared to the baseline case in which all households receive a cash transfer. As expected, in all scenarios in which households receive cash transfer, as the transfer to the top income groups are removed and the transfer to the low-income group is increased, inequality decreases significantly. Focusing only on Final Income, the marginal contribution of TSP to reducing inequality is about 0.0559, 0.0742, and 0.0816 Gini

³⁸ These microsimulations follow the “arithmetical approach” that ignores the behavioral responses. For more information about this type of simulation see Bourguignon and Spadaro (2006).

³⁹ We focus only on energy goods and do not simulate bread subsidies because they are relatively small, and part of bread consumption by households was not subsidized even before the reform.

points in the second phase and the two alternative scenarios, respectively. To put this in context, note that in the baseline case the marginal contribution of TSP to the Gini of Final Income is about 0.0465. Therefore, from the inequality perspective, there is not a big difference between the Baseline scenario and the second phase, but the two alternative scenarios produce significantly more reduction in inequality.

[Table 10 about here]

Panel B in Table 10 performs a similar analysis under each scenario using the poverty headcount ratio for the change in poverty. The baseline and the second phase are not different, given that the top 20% would not become poor if they lose this subsidy. As baseline case shows, cash transfers play a relatively significant role in reducing poverty compared to allocating consumption subsidies, as demonstrated in the “no reform” case. With respect to Consumable Income, scenarios one and two improve the marginal contribution of this subsidy program from 11.90 percentage points in the baseline to 14.69 percentage points and 16.79 percentage points respectively. The poverty headcount ratio decreases from about 11% in the second phase case to about 6% in scenario two; that is a significant reduction in poverty for a fiscally neutral policy alternative.

The poverty-reducing effect of an additional cash transfer to low income deciles is significant. To get at that effect, we analyze how different policy scenarios change the poverty headcount index of urban versus rural areas. Panels A and B of Table 11 present these results. These two panels demonstrate that TSP substantially benefits rural areas. In the baseline case and the second phase, the TSP reduces the poverty headcount ratio (for the Consumable Income) in rural areas by about 22 percentage points as opposed to only 8 percentage points in urban areas. Removing the cash transfers from the top deciles and allocating it to the bottom deciles (in scenarios one and

two) causes the marginal contribution of TSP to reducing poverty in rural areas to increase. In the rural areas, the marginal contribution of the TSP to the poverty headcount index increases from about 21.88 percentage points in the baseline case to about 28.03 and 32.96 percentage points in scenarios one and two respectively. In the urban areas, the TSP's marginal contribution increases from about 7.82 percentage points to only 9.23 and 10.17 percentage points in these two scenarios.

[Table 11 about here]

Table 12 presents the effectiveness of TSP under different scenarios, taking the values reported for the Baseline scenario from the previous tables for comparison purposes. We see that the Baseline scenario displays a significant improvement over the “no reform” case. Moreover, with regard to all measures of effectiveness, eliminating the subsidy from the top deciles and allocating it to the low-income groups improves the performance of the TSP significantly. In fact, scenario two, which has the most focused approach to allocating the subsidy to low-income households, almost doubles the effectiveness of the Baseline scenario in reducing inequality. Still, the FI-FGP effectiveness indicator reveals that even this scenario has significant room for improvement, because it only reaches about 22% of its potential.

[Table 12 about here]

Finally, we look at the winners and losers in different scenarios comparing the TSP to the case of a consumption subsidy. We discuss this in depth in the Appendix B of the paper. Although we find that most families benefit from the subsidy reform, the gain for poorest families from TSP is about ten times more than the richest ones. This empirical evidence explains a unique property of the energy subsidy reform in Iran: i.e. its conflict-free implementation, as pointed out first by Salehi-Isfahani et al. (2015).

V. Conclusion

This paper analyzes the effect of different components of the fiscal system in Iran on reducing inequality and poverty. Using the marginal contribution approach, we show that direct transfers in general, and the Targeted Subsidy Program in particular, play the most significant role in creating a more equal distribution of income and reducing poverty in Iran. The system as a whole reduces the inequality of income distribution by about 20% (comparing Market Income to Final Income) and the poverty head count ratio by about 50% (comparing Market Income to Consumable Income). The Targeted Subsidy Program alone reduces the inequality and poverty of Consumable Income by about 0.0552 Gini points and 12 percentage points respectively. The main reduction in poverty comes from the rural areas: this program reduces the poverty headcount ratio from about 44% to 23%. The urban areas only experience a moderate 8 percentage point reduction in poverty (i.e. from 13% to 5%) due to this program.

We find mixed results for how effective taxes and transfers are in reducing inequality and poverty compared to their potential. Taxes are very effective in raising revenue without increasing poverty and are moderately effective in reducing inequality. On the other hand, transfers exhibit a similar, moderate effectiveness in reducing inequality to that of taxes, but they are not focused on poor households, and realize less than 17% of their potential power to reduce poverty.

We evaluate different policy scenarios about how to proceed with the current Targeted Subsidy Program in Iran. We find that if the Iranian government's current plan to eliminate the cash transfer of top deciles were extended from the top 20% to the top 40%, and were combined with a moderate increase in the cash transfer to the bottom deciles, the additional reduction in poverty and inequality would be considerable. If the cash transfer of the top 40% is eliminated and the cash transfer to the bottom 60% is increased by only 30%, inequality and poverty would be reduced by an additional 8.5% and 26.4%, respectively (compared to the current Gini and poverty

headcount ratio of Consumable Income). This poverty reduction effect would not be the same for rural versus urban areas. An extra 30% going to the bottom 60% of the income distribution would reduce the poverty headcount ratio of Consumable Income to 16.7% (from 22.8%) in the rural areas. In urban areas, the reduction in the poverty head count ratio would be only 1.4 percentage points (i.e. 4.2% from 5.6% now). The power of the Targeted Subsidy Program in reducing inequality and poverty stems from the ability of the program to reach the bottom deciles of the income distribution in rural areas of Iran. Therefore, the main policy recommendation of this paper is to not just remove the cash transfers from the top 20% (as it was implemented recently in Iran), but to extend it to the top 40% and to allocate part of the resulting extra funds to the bottom deciles, especially in the rural areas.

VI. References

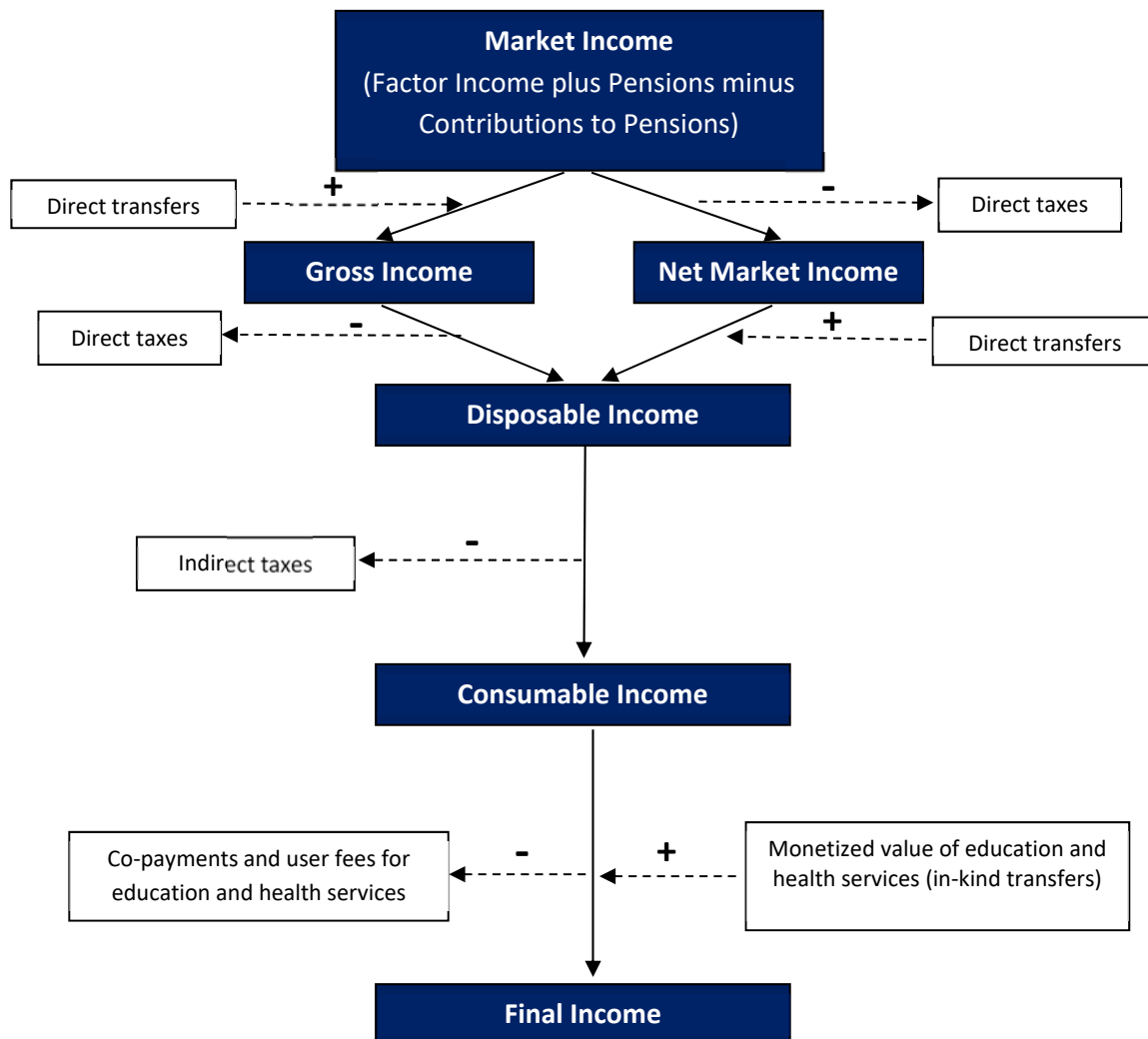
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Figure 1: A framework to define income concepts and combine fiscal interventions.



Source: Lustig (forthcoming) with some adaptation.

Note: Core Income Concepts in dark blue background, Fiscal Interventions in white background.

Table 1: Iranian government revenues and expenditures (1390 Iranian calendar, equivalent to 2011-12).**Panel A. Government revenues**

Categories	% of total revenue	% of GDP	Included in analysis
Total Revenues	100%	27.00%	
Tax revenues	24.07%	6.50%	
Direct taxes, of which:	14.21%	3.84%	
Personal Income Tax	3.14%	0.85%	Yes
Corporate Income Tax	10.26%	2.77%	No
Wealth Tax	0.81%	0.22%	No
Indirect Taxes	9.86%	2.66%	Yes
Non-tax revenues	75.93%	20.50%	
Sales of natural resources, capital, and financial assets	55.23%	14.91%	No
Other Revenues	20.70%	5.59%	No

Panel B. Government expenditures

Categories	% of total expenditure	% of GDP	Included in analysis
Total expenditure	100%	27.00%	
Social spending	50.68%	13.69%	
Targeted Subsidy Program	10.91%	2.95%	Yes
Social protection	11.84%	3.20%	
Social assistance, of which:	3.85%	1.04%	
Assistance to the Low-Income Families and Orphans	1.59%	0.43%	Yes
Assistance to the Families of Martyrs and wounded soldiers.	2.23%	0.60%	Yes
Other	0.03%	0.01%	Yes
Social security, of which:	7.99%	2.16%	
Retirement Pensions: Civilians	4.49%	1.21%	Yes
Retirement Pensions: Armed Forces	3.50%	0.95%	Yes
Education, of which:	16.58%	4.48%	
12-K (Primary and Secondary)	7.79%	2.10%	Yes
Adult Literacy	0.14%	0.04%	No
Tertiary	7.89%	2.13%	Yes
Other	0.76%	0.20%	No
Health	9.24%	2.50%	Yes
Housing (urban and rural)	2.12%	0.57%	No
Other expenditures	49.32%	13.32%	No

Source: Own calculations using Adlband (2011) and SCI (2015).

Note: The total revenues and expenditures are equal to each other and equal to 1,697,255 billion Rials (about 163.76 billion dollars). The GDP of Iran for this period is 6,285,255 billion Rials (about 606.45 billion dollars).

Table 2. Distribution of individuals and households according to socio-economic group

In Daily US 2005 PPP	Socio-Economic Group	Number of individuals (% share)	Number of households (% share)	Average size of household
0 to 1.25	Ultra Poor	2,875,462 (3.62%)	729,004 (3.45%)	3.9
1.25 to 2.5	Extreme Poor	5,284,959 (6.65%)	1,305,675 (6.17%)	4.0
2.5 to 4	Moderate Poor	8,586,729 (10.80%)	1,930,893 (9.13%)	4.4
4 to 10	Vulnerable	32,281,101 (40.60%)	7,810,339 (36.91%)	4.1
10 to 50	Middle Class	29,755,312 (37.42%)	9,026,572 (42.66%)	3.3
50 or more	High Income Class	728,130 (0.92%)	356,549 (1.69%)	2.0
Total		79,511,694	21,159,033	3.8

Source: Own calculations using the Iranian household survey (1390 Iranian calendar, equivalent to 2011-12).

Note: The total population slightly exceeds the actual population for this year due to the application of survey weights. Socio-Economic group is determined according to the "Market Income". PPP stands for Purchasing Power Parity. In calculating PPP values, we use the 2005 round of ICP (International Comparison Program) as reported in the World Development Indicators (WDI) published by the World Bank. To change monetary values from the year of survey to 2005, we use the CPI index from the WDI.

Table 3. Inequality indices for the main income concepts

Index	Market Income (MI)	Net MI	Gross MI	Disposable Income	Consumable Income	Final Income
Gini	0.4286	0.4268	0.3715	0.3686	0.3712	0.3432
Absolute Gini	11157234	10769107	11217766	10833725	10562329	10577442
S-Gini v=1.25	0.1913	0.1899	0.1615	0.1596	0.1612	0.1495
S-Gini v=1.5	0.3087	0.3064	0.2603	0.2572	0.2597	0.2418
S-Gini v=2.5	0.5350	0.5309	0.4502	0.4449	0.4489	0.4237
S-Gini v=3	0.5926	0.5881	0.4984	0.4926	0.4971	0.4715
Theil	0.3314	0.3299	0.2505	0.2478	0.2514	0.2122
90/10	8.47	8.26	5.48	5.35	5.45	4.67

Source: Own calculations using the Iranian household survey (1390 Iranian calendar, equivalent to 2011-12).

Table 4. Poverty indices for the main income concepts

Index (Poverty line in daily US 2005 PPP)		Market Income (MI)	Net MI	Gross MI	Disposable Income	Consumable Income
1.25	Headcount	0.0362	0.0367	0.0026	0.0027	0.0034
	Poverty Gap	0.0136	0.0139	0.0009	0.0009	0.0014
	Squared Poverty Gap	0.0074	0.0076	0.0005	0.0005	0.0009
2.5	Headcount	0.1026	0.1045	0.0204	0.0212	0.0259
	Poverty Gap	0.0399	0.0405	0.0048	0.0050	0.0065
	Squared Poverty Gap	0.0225	0.0229	0.0021	0.0021	0.0029
4	Headcount	0.2106	0.2156	0.0915	0.0939	0.1057
	Poverty Gap	0.0829	0.0847	0.0224	0.0228	0.0269
	Squared Poverty Gap	0.0467	0.0475	0.0087	0.0089	0.0109

Source: Own calculations using the Iranian household survey (1390 Iranian calendar, equivalent to 2011-12).

Note: PPP stands for Purchasing Power Parity. In calculating PPP values, we use the 2005 round of ICP (International Comparison Program) as reported in the World Development Indicators (WDI) published by the World Bank. To change monetary values from the year of survey to 2005, we use the CPI index from the WDI.

Table 5. Marginal contribution of taxes and transfers to inequality

Fiscal Intervention		Progressivity (Kakwani Index)	Marginal contribution to the Gini index of:		
			Disposable Income (0.3686)	Consumable Income (0.3712)	Final Income (0.3432)
Direct Taxes and Contributions	Income Tax	0.2274	0.0018	0.0018	0.0019
	Employee contributions to the health insurance	0.0002	0.0003	0.0002	0.0004
	Employer contributions to the health insurance	0.0455	0.0008	0.0007	0.0009
	Total Direct Taxes and Contributions	0.0855	0.0029	0.0028	0.0032
Direct Transfers	Targeted Subsidy Program	0.4164	0.0527	0.0552	0.0465
	Social Assistance	0.8205	0.0043	0.0045	0.0040
	Semi-cash Transfers (Food)	0.3018	<0.0000	<0.0000	<0.0000
	Total Direct Transfers	0.4384	0.0583	0.0611	0.0516
Indirect Taxes (Sales Taxes)		-0.1363	-	-0.0026	-0.0025
In-kind Transfers	Education Transfers	0.3485	-	-	0.0226
	Education User-fees	0.0682	-	-	0.0018
	Health Transfers	0.4171	-	-	0.0177
	Health User-fees	0.1611	-	-	-0.0075
	Total In-kind Transfers	0.5886	-	-	0.0290

Source: Own calculations using the Iranian household survey (1390 Iranian calendar, equivalent to 2011-12).

Note: The Kakwani index is calculated with respect to the "Market Income".

Table 6. Marginal contribution of taxes and transfers to poverty

Fiscal Intervention		Marginal contribution to the \$4 PPP poverty headcount index of:	
		Disposable Income (0.0939)	Consumable Income (0.1057)
Direct Taxes and Contributions	Income Tax	-0.0004	-0.0005
	Employee contributions to the health insurance	-0.0013	-0.0002
	Employer contributions to the health insurance	-0.0008	-0.0007
	Total Direct Taxes and Contributions	-0.0024	-0.0021
Direct Transfers	Targeted Subsidy Program	0.1131	0.1190
	Social Assistance	0.0104	0.0111
	Semi-cash Transfers (Food)	0.0001	0.0002
	Total Direct Transfers	0.1217	0.1277
Indirect Taxes (Sales Taxes)		-	-0.0118

Source: Own calculations using the Iranian household survey (1390 Iranian calendar, equivalent to 2011-12).

Note: PPP stands for Purchasing Power Parity. In calculating PPP values, we use the 2005 round of ICP (International Comparison Program) as reported in the World Development Indicators (WDI) published by the World Bank. To change monetary values from the year of survey to 2005, we use the CPI index from the WDI.

Table 7. Impact Effectiveness indicators for taxes and transfers in Iran

Fiscal Intervention		Impact Effectiveness with respect to:		
		Disposable Income	Consumable Income	Final Income
Direct Taxes and Contributions	Income Tax	0.3239	0.3532	0.3844
	Employee contributions to the health insurance	0.0515	0.0382	0.0829
	Employer contributions to the health insurance	0.1288	0.1319	0.1595
	Total Direct Taxes and Contributions	0.1847	0.1758	0.2087
Direct Transfers	Targeted Subsidy Program	0.3924	0.3962	0.3841
	Social Assistance	0.4239	0.4202	0.4303
	Semi-cash Transfers (Food)	-0.0362	-0.0391	-0.0437
	Total Direct Transfers	0.4183	0.4211	0.4053
Indirect Taxes (Sales Taxes)		-	-0.1370	-0.1391
In-kind Transfers	Education Transfers	-	-	0.2322
	Education User-fees	-	-	0.1563
	Health Transfers	-	-	0.3298
	Health User-fees	-	-	-0.2455

Source: Own calculations using the Iranian household survey (1390 Iranian calendar, equivalent to 2011-12).

Table 8. Spending Effectiveness indicators for taxes and transfers in Iran

Fiscal Intervention		Spending Effectiveness with respect to:		
		Disposable Income	Consumable Income	Final Income
Direct Taxes and Contributions	Income Tax	0.3190	0.3101	0.3511
	Employee contributions to the health insurance	≅0	≅0	≅0
	Employer contributions to the health insurance	0.1237	0.1145	0.1360
	Total Direct Taxes and Contributions	0.1645	0.1595	0.1887
Direct Transfers	Targeted Subsidy Program	0.2847	0.2871	0.2651
	Social Assistance	0.4022	0.4066	0.3999
	Semi-cash Transfers (Food)	N/A	N/A	N/A
	Total Direct Transfers	0.2942	0.2971	0.2753
Indirect Taxes (Sales Taxes)		-	N/A	N/A
In-kind Transfers	Education Transfers	-	-	0.1750
	Education User-fees	-	-	0.1513
	Health Transfers	-	-	0.2700
	Health User-fees	-	-	N/A

Source: Own calculations using the Iranian household survey (1390 Iranian calendar, equivalent to 2011-12).

Note: Fiscal interventions with an N/A are the ones with a negative marginal contribution, so it is mathematically impossible to calculate the spending effectiveness for them.

Table 9. FI-FGP effectiveness indicators for taxes and transfers in Iran

Fiscal Intervention		\$4PPP FI-FGP Effectiveness with respect to:	
		Disposable Income	Consumable Income
Direct Taxes and Contributions	Income Tax	0.9984	0.9964
	Employee contributions to the health insurance	0.9879	0.9837
	Employer contributions to the health insurance	0.9964	0.9955
	Total Direct Taxes and Contributions	0.9945	0.9923
Direct Transfers	Targeted Subsidy Program	0.1340	0.1492
	Social Assistance	0.1826	0.2069
	Semi-cash Transfers (Food)	0.0344	0.0387
	Total Direct Transfers	0.1464	0.1619
Indirect Taxes (Sales Taxes)		-	0.9567
Total System		0.2811	0.3886

Source: Own calculations using the Iranian household survey (1390 Iranian calendar, equivalent to 2011-12).

Note: PPP stands for Purchasing Power Parity. In calculating PPP values, we use the 2005 round of ICP (International Comparison Program) as reported in the World Development Indicators (WDI) published by the World Bank. To change monetary values from the year of survey to 2005, we use the CPI index from the WDI. The FI-FGT effectiveness indicators are bounded between zero and one and the higher the value of an indicator, the better the tax is in not increasing poverty and a transfer is in reducing poverty.

Table 10. Alternative policies for how to manage Targeted Subsidy Program and their effect on inequality and poverty**Panel A. Inequality**

Policy	Marginal contribution to the Gini index of:		
	Disposable Income(DI)	Consumable Income(CI)	Final Income(FI)
Baseline (All income deciles receive the subsidy)	0.0527 (Gini of DI: 0.3686)	0.0552 (Gini of CI: 0.3712)	0.0465 (Gini of FI: 0.3432)
No reform: Individuals receive consumption subsidy	0.0088 (Gini of DI: 0.4126)	0.0095 (Gini of CI: 0.4170)	0.0080 (Gini of FI: 0.3813)
Second phase: No subsidy for top 20%	0.0628 (Gini of DI: 0.3586)	0.0655 (Gini of CI: 0.3609)	0.0559 (Gini of FI: 0.3336)
Policy Simulation 1: No subsidy for top 40% and an extra 30% for bottom 60%	0.0834 (Gini of DI: 0.3379)	0.0868 (Gini of CI: 0.3397)	0.0742 (Gini of FI: 0.3153)
Policy Simulation 2: No subsidy for top 40% and an extra 60% for bottom 30%	0.0916 (Gini of DI: 0.3297)	0.0953 (Gini of CI: 0.3312)	0.0816 (Gini of FI: 0.3080)

Source: Own calculations using the Iranian household survey (1390 Iranian calendar, equivalent to 2011-12).

Panel B. Poverty

Policy	Marginal contribution to the \$4 PPP poverty headcount index (PHI) of:	
	Disposable Income(DI)	Consumable Income(CI)
Baseline (All income deciles receive the subsidy)	0.1131 (PHI of DI: 0.0939)	0.1190 (PHI of CI: 0.1057)
No reform: Individuals receive consumption subsidy	0.0238 (PHI of DI: 0.1832)	0.0254 (PHI of CI: 0.1993)
Second phase: No subsidy for top 20%	0.1131 (PHI of DI: 0.0939)	0.1190 (PHI of CI: 0.1057)
Policy Simulation 1: No subsidy for top 40% and an extra 30% for bottom 60%	0.1387 (PHI of DI: 0.0682)	0.1469 (PHI of CI: 0.0778)
Policy Simulation 2: No subsidy for top 40% and an extra 60% for bottom 30%	0.1578 (PHI of DI: 0.0492)	0.1679 (PHI of CI: 0.0568)

Source: Own calculations using the Iranian household survey (1390 Iranian calendar, equivalent to 2011-12).

Note: PPP stands for Purchasing Power Parity. In calculating PPP values, we use the 2005 round of ICP (International Comparison Program) as reported in the World Development Indicators (WDI) published by the World Bank. To change monetary values from the year of survey to 2005, we use the CPI index from the WDI.

Table 11. Alternative policies for how to manage Targeted Subsidy Program and their effect on poverty in urban vs. rural areas**Panel A. Urban areas**

Policy	Marginal contribution to the \$4 PPP poverty headcount index (PHI) of:	
	Disposable Income(DI)	Consumable Income(CI)
Baseline (All income deciles receive the subsidy)	0.0720 (PHI of DI: 0.0482)	0.0782 (PHI of CI: 0.0556)
No reform: Individuals receive consumption subsidy	0.0161 (PHI of DI: 0.1041)	0.0173 (PHI of CI: 0.1165)
Second phase: No subsidy for top 20%	0.0720 (PHI of DI: 0.0482)	0.0782 (PHI of CI: 0.0556)
Policy Simulation 1: No subsidy for top 40% and an extra 30% for bottom 60%	0.0846 (PHI of DI: 0.0356)	0.0923 (PHI of CI: 0.0415)
Policy Simulation 2: No subsidy for top 40% and an extra 60% for bottom 30%	0.0926 (PHI of DI: 0.0276)	0.1017 (PHI of CI: 0.0320)

Panel B. Rural areas

Policy	Marginal contribution to the \$4 PPP poverty headcount index (PHI) of:	
	Disposable Income(DI)	Consumable Income(CI)
Baseline (All income deciles receive the subsidy)	0.2134 (PHI of DI: 0.2055)	0.2188 (PHI of CI: 0.2280)
No reform: Individuals receive consumption subsidy	0.0425 (PHI of DI: 0.3764)	0.0454 (PHI of CI: 0.4013)
Second phase: No subsidy for top 20%	0.2134 (PHI of DI: 0.2055)	0.2188 (PHI of CI: 0.2280)
Policy Simulation 1: No subsidy for top 40% and an extra 30% for bottom 60%	0.2710 (PHI of DI: 0.1479)	0.2803 (PHI of CI: 0.1665)
Policy Simulation 2: No subsidy for top 40% and an extra 60% for bottom 30%	0.3170 (PHI of DI: 0.1019)	0.3296 (PHI of CI: 0.1172)

Source: Own calculations using the Iranian household survey (1390 Iranian calendar, equivalent to 2011-12).

Note: PPP stands for Purchasing Power Parity. In calculating PPP values, we use the 2005 round of ICP (International Comparison Program) as reported in the World Development Indicators (WDI) published by the World Bank. To change monetary values from the year of survey to 2005, we use the CPI index from the WDI.

Table 12. Effectiveness of Targeted Subsidy Program in alternative policy scenarios**Panel A. Impact Effectiveness**

Policy	Impact Effectiveness with respect to:		
	Disposable Income	Consumable Income	Final Income
Baseline	0.3924	0.3962	0.3841
No reform	0.1751	0.1802	0.1809
Second phase	0.5248	0.5266	0.5222
Policy Simulation 1	0.7005	0.6973	0.6939
Policy Simulation 2	0.7614	0.7646	0.7613

Panel B. Spending Effectiveness

Policy	Spending Effectiveness with respect to:		
	Disposable Income	Consumable Income	Final Income
Baseline	0.2847	0.2871	0.2651
No reform	0.1485	0.1551	0.1448
Second phase	0.4111	0.4134	0.3875
Policy Simulation 1	0.5747	0.5764	0.5396
Policy Simulation 2	0.6435	0.6453	0.6041

Panel C. FI-FGP Effectiveness

Policy	\$4PPP FI-FGP Effectiveness with respect to:	
	Disposable Income	Consumable Income
Baseline	0.1340	0.1492
No reform	0.1133	0.1270
Second phase	0.1587	0.1766
Policy Simulation 1	0.1799	0.2012
Policy Simulation 2	0.1921	0.2160

Source: Own calculations using the Iranian household survey (1390 Iranian calendar, equivalent to 2011-12).

Note: The description of policy scenarios are as follows. Baseline: all income deciles receive the subsidy; no reform: individuals only receive a consumption subsidy; second phase: No subsidy for top 20%; Policy Simulation 1: No subsidy for top 40% and an extra 30% for bottom 60%; Policy Simulation 2: No subsidy for top 40% and an extra 60% for bottom 30%. PPP stands for Purchasing Power Parity. In calculating PPP values, we use the 2005 round of ICP (International Comparison Program) as reported in the World Development Indicators (WDI) published by the World Bank. To change monetary values from the year of survey to 2005, we use the CPI index from the WDI.

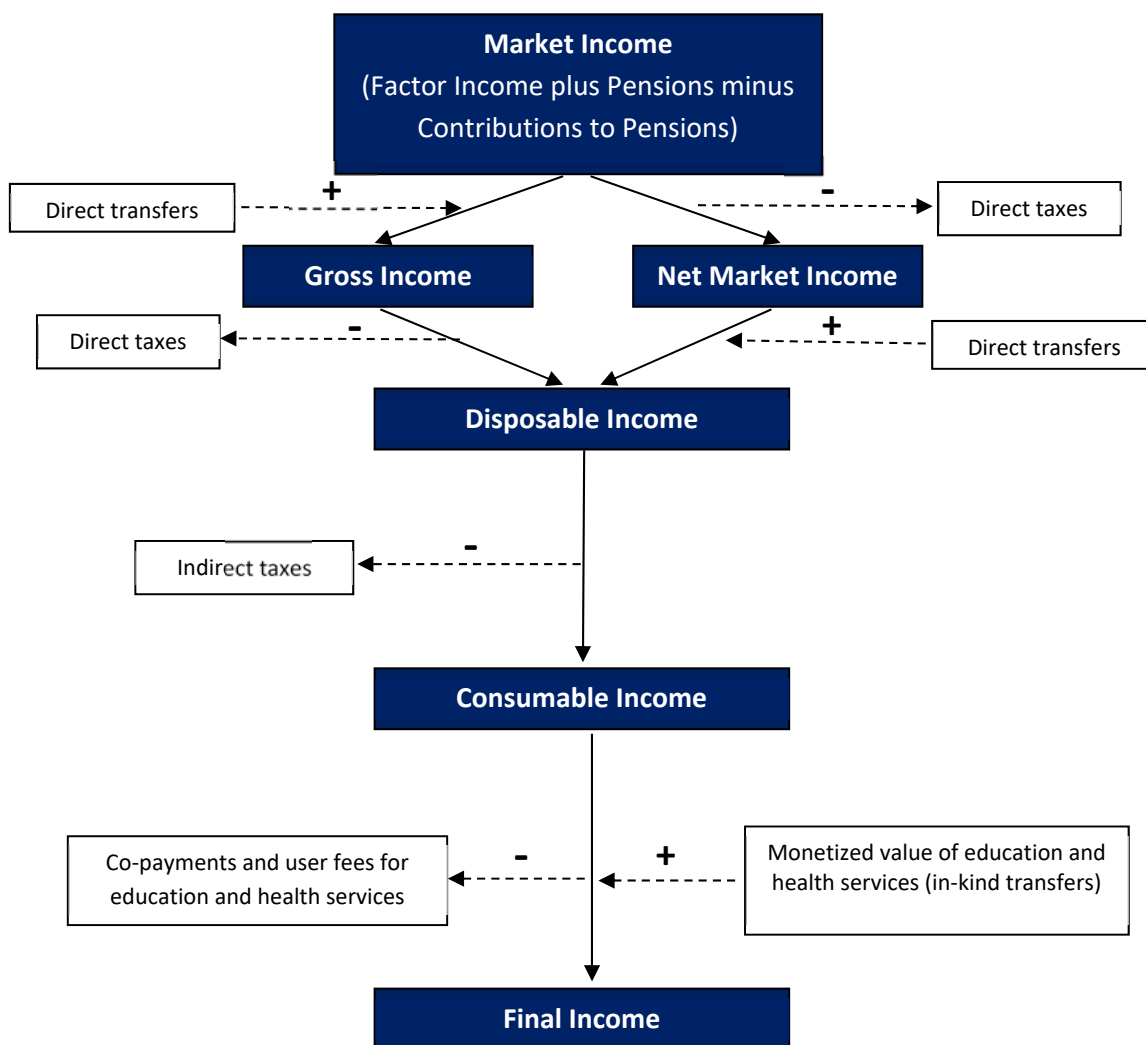
Appendix A: Methodological Appendix

A1. Construction of Income Concepts

The first step in fiscal incidence analysis is to construct the basic income concepts. Figure A1 is the same as Figure 1 in the main text and presents the income concepts used in this paper. Table A1 describes the components included in these income concepts in the case of Iran. We begin with Market Income.⁴⁰ We then subtract direct taxes and add cash transfers to obtain Disposable Income. Next, we subtract indirect taxes to generate Consumable Income. (Because consumption subsidies were replaced by the TSP, there are no consumption subsidies). Finally, we add the monetized value at average government cost of In-kind Transfers (i.e. health and education), net of user fees, to obtain Final Income. Table A2 describes the main assumptions used to allocate taxes and transfers at the household level, and is based on the standardized table developed by the Commitment to Equity Institute at Tulane University. This standardization makes the current paper comparable to 23 completed and 14 in-progress incidence analysis projects; their results are part of the CEQ Institute Data Center on Fiscal Redistribution.

⁴⁰The survey actually includes pre-tax income for employees. For the self-employed, market income is generated by subtracting Business Costs from Sales since there are questions for both items in the survey.

Figure A1: A framework to define income concepts and combine fiscal interventions.



Source: Lustig (forthcoming) with some adaptation.

Note: Core Income Concepts in dark blue background, Fiscal Interventions in white background.

Table A1. Description of Market Income and other income components

Main Categories	Sub Categories	Description
Market Income	Factor Income	All monetary and non-monetary income received as an employee or self-employed individual excluding any subsidy or social assistance and including imputed rent for home owners. All components are directly observed in the survey.
	Contributory Pensions	All pensions received through the retirement programs. The relevant information is observed directly in the survey.
	Employee contributions to the Social Security Insurance	The deductions from employees' paychecks that is paid for the social security insurance (i.e. pension) of an employee. The relevant information is observed directly in the survey.
	Employer contributions to the Social Security Insurance	The employers' payment toward the social security insurance (i.e. pension) of employees. Since this is a mandatory payment and we assume it results in lower payments to employees, we include it as a type of deduction. The relevant information is observed directly in the survey.
Direct Taxes and Contributions	Income Tax	Income tax for self-employed individuals (observed directly in the survey) and payroll tax for employees (imputed using the data about gross and net income as well as contributions to pensions).
	Employee contributions to the health insurance	The deductions from employees' paychecks that is paid toward the health insurance. The relevant information is observed directly in the survey.
	Employer contributions to the health insurance	The employers' payment toward the health insurance of employees. Since this is a mandatory payment and we assume it results in lower payments to employees, we include it as a type of deduction. The relevant information is observed directly in the survey.
Direct Transfers	Targeted Subsidy Program	The direct cash transfer program that is established by the government following the energy subsidy reform in Iran. The relevant information is observed directly in the survey.
	Social Assistance	Includes all cash transfers to low income individuals through public organizations. The relevant information is observed directly in the survey.
	Semi-cash Transfers (Food)	Include the monetary value of all edible items that a household receives for free. The values are imputed assuming all edible goods

		that are obtained “free but not from other households” are provided by the different public agencies.
Indirect Taxes	-	Sales taxes. Imputed using the 3% statutory rate (which is applicable to most of goods) and the information available in the survey about the consumption expenditure of each household)
In-kind Transfers	Education	Includes a nominal subsidy for each student in a household depending on the grade minus any user fees (the latter is observed directly in the survey)
	Health	Includes a nominal subsidy for each individual in a household with health costs minus these costs (the latter is observed directly in the survey)

Table A2. Key assumptions for fiscal incidence analysis in Iran.

Assumption type	Iran (2011-12)
<i>Use of input-output matrix for indirect taxes and subsidies</i>	
Indirect taxes calculated with an input-output matrix?	No
Indirect subsidies calculated with an input-output matrix?	No
<i>Take-up assumptions</i>	
Take-up of direct transfers—as reported in the survey?	Yes
Take-up of in-kind transfers—as reported by use?	Yes
<i>Social security contributions, taxes, and subsidies (shifting assumptions)</i>	
Social security contributions: only those paid by employee or both those paid by employee and employer are assumed to be borne by employee?	Both borne by employees
Direct taxes: burden of direct personal income taxes assumed to be borne entirely by the recipient of income?	Yes
Indirect taxes: burden assumed to be borne entirely by the consumer?	Yes
Indirect subsidies: benefit assumed to be received entirely by the consumer?	n.a.
<i>Tax evasion assumptions</i>	
Direct taxes	Informal employees assumed to pay no personal income tax
Indirect taxes	Zero evasion is assumed: The most common sales tax rate (3%) is applied to all taxable goods consumed by a household
<i>Scaling-up or scaling-down assumptions</i>	
In-kind education and health services scaled up or down?	Scaled down
Other taxes, transfers, and subsidies individually (such as taxes on tobacco) or as a category (such as total indirect taxes) scaled up or down?	Scaled down
<i>Treatment of administrative costs and capital expenditures</i>	
Cash and near-cash transfers include administrative costs?	No
Education and health include administrative costs?	No
Education and health include capital expenditures?	No

Note: n.a. = not applicable.

A.2 Marginal Contribution of Taxes and Transfers

This study relies on the concept of marginal contribution to estimate the contribution of taxes and transfers to reducing inequality and poverty. Theoretically, marginal contribution analysis asks what the distribution of income would have been in the absence of a tax⁴¹ (or transfer), defining the difference between this counterfactual and the actual distribution of income as the marginal contribution of that tax (or transfer). This is shown in the equation below:

$$MC_{T(or B)}^{End\ income} = Index_{End\ income \setminus T(or B)} - Index_{End\ income} ;$$

where $MC_{T(or B)}^{End\ income}$ is the marginal contribution of tax or transfer to the inequality or poverty index of an “end income” concept (such as the disposable income). $Index_{End\ income \setminus T(or B)}$ is the value of that index for the same end income concept but when T (or B) is excluded. Similarly, $Index_{End\ income}$ is the value of that index when T (or B) is included. For example, the marginal contribution of direct taxes to the redistributive effect from market income to disposable income equals the difference between the Gini of disposable income including the direct taxes and the Gini coefficient of disposable income alone. In this paper, we focus on the first order effects of removing a tax or transfer and therefore ignore the behavioral responses. As is clear from the equation above, the order in which other fiscal interventions are added has no effect on the value of the $Index_{End\ income \setminus T(or B)}$.

One important feature of the marginal contribution approach is that it does not rely on the order in which other taxes and transfers (besides the tax or transfer of interest) are incorporated into the calculation. However, there is no guarantee that the sum of the marginal contributions of all components of a fiscal system are equal to the overall redistributive effect. This mathematical constraint has no implication for policy makers. Policy questions are all about changing the

⁴¹Or replacing that tax (or transfer) with another tax (or transfer) that is neutral in reducing inequality (or poverty).

characteristics of a particular tax or transfer, adding a tax or transfer, or eliminating a tax or transfer, and how such changes potentially would affect the redistributive and poverty indicators. Only the marginal contribution approach provides the correct answer to these questions by comparing the fiscal system before and after a tax, transfer, or particular reform.

A.3 Effectiveness of Taxes and Transfers

In order to assess the effectiveness of taxes or transfers, or changes in them, we rely on the notion of “potential effect” and use the indicators proposed in Enami (forthcoming [b]). Mathematically, a given amount of taxes (or transfers) can be collected (allocated) in such a way to maximize the impact on inequality (or poverty) reduction. For example, in the case of the Gini coefficient, the maximum effect is obtained by collecting taxes from the richest individual until his/her income becomes equal to the second richest, then taxing both of them until their income becomes equal to the third richest person, and to continue this process until all of the tax has been collected. This procedure maximizes the reduction in Gini while keeping the size of taxes constant. An “optimal” transfer would follow a similar procedure, but start with the poorest individual and move him/her up in the income distribution. This indicator is defined as follows:

$$\text{Inequality Impact Effectiveness}_{T \text{ (or B)}}^{\text{End income}} = \frac{MC_{T \text{ (or B)}}^{\text{End income}}}{MC_{T \text{ (or B)}}^{\text{End income}^*}} ;$$

where $MC_{T \text{ (or B)}}^{\text{End income}^*}$ is the maximum possible $MC_{T \text{ (or B)}}^{\text{End income}}$ if the same amount of Tax (or Benefit) is levied on (distributed among) individuals optimally. The “end income” in our analysis can refer to one of three income concepts: Disposable Income, Consumable Income, and Final Income (defined in Figure 1). The value of this Inequality Impact Effectiveness indicator lies between -1 and +1 (the higher the indicator, the more effective).

Alternatively, one can keep the change in inequality constant and estimate the minimum size of a tax or a transfer that would be required to achieve the same marginal contribution. This reduction in the size of a tax or transfer is obtained through the same optimal redistribution process described above. This indicator is defined as follows:

$$\text{Inequality Spending Effectiveness}_{T \text{ (or } B)}^{\text{End income}} = \frac{T^* \text{ (or } B^*)}{T \text{ (or } B)};$$

where T^* (or B^*) is the minimum amount of T (or B) that is needed to create the same $MC_{T \text{ (or } B)}^{\text{End income}}$ if the tax or transfer were optimally redistributed. Note that the Spending Effectiveness Indicator is only calculated for taxes and transfers with a positive $MC_{T \text{ (or } B)}^{\text{End income}}$ because it is meaningless to calculate the optimum size of a tax or transfer that increases inequality. As a result, the value of this indicator lies between 0 and 1 (the higher the indicator, the more effective).

We use Impact and Spending Effectiveness Indicators to evaluate the performance of taxes and transfers in reducing inequality. Although we have shown results using the Gini coefficient, the indicators can be calculated with any other inequality measure. While these effectiveness indicators can be calculated for poverty reduction, Higgins and Lustig (2016) show that a fiscal system that reduces inequality and poverty (using conventional poverty measures) also can hurt the poor. Thus, it is important to separate a fiscal system's poverty reducing effect from its poverty increasing effect. Taxes can only hurt the poor while transfers can only benefit them, so it is important to account for both effects when taxes and transfers are bundled. To account for this issue, the following indicators are used to evaluate the effectiveness of taxes and transfers in reducing poverty. The first two are used to analyze a tax (or a group of taxes) or a transfer (or a group of transfers) only, and the third is used to analyze a system composed of at least one tax and one transfer:

$$FI_FGP_T = \frac{T - FI_MC_T^{End\ income}}{T};$$

$$FI_FGP_B = \frac{FGP_MC_B^{End\ income}}{B};$$

$$FI_FGP_{Total\ system} = \left[\left(\frac{B}{T+B} \right) \left(\frac{FGP_MC_B^{End\ income}}{B} \right) \right] + \left[\left(\frac{T}{T+B} \right) \left(\frac{T - FI_MC_T^{End\ income}}{T} \right) \right]$$

$FI_MC_T^{End\ income}$ is the marginal contribution of tax T to the Fiscal Impoverishment (FI) index of the end income of interest and $FGP_MC_B^{End\ income}$ is the marginal contribution of transfer B to the Fiscal Gain to Poor (FGP) index of the end income of interest. The FI indicator measures how much poor individuals become worse off and non-poor become poor as a result of a tax. The FGP indicator measures how much poor individuals are made better off as a result of a transfer. Following Higgins and Lustig (2016), the change in the poverty gap is the index used to calculate the FI-FGP indicators.

All FI_FGT indicators vary between zero and one (the higher the indicator, the better). However, one cannot compare the effectiveness of taxes to transfers because taxes can only increase poverty. So, their effectiveness is calculated with respect to how much they do not increase poverty while raising revenue. On the other hand, transfers can only reduce poverty, so their effectiveness is calculated with respect to their performance in reducing poverty. The total fiscal system, which is the combination of all taxes and transfers, can increase or decrease poverty. Therefore, it should be only compared to alternative fiscal systems that have both taxes and transfers.

Appendix B: Winners and Losers of the TSP

As mentioned before, removing energy subsidies has never occurred as peacefully as in Iran. Previous researchers attributed that mainly to the fact that the elimination of energy subsidies was accompanied by the introduction of a cash transfer program (Salehi-Isfahani et al. 2015). How did people in different income groups benefit or lose in this transition? The main constraint in estimating such benefits and losses is that removing energy subsidies results in a significant change in relative prices. Therefore, one would expect that consumers would respond by changing their consumption patterns, a change that is not captured in standard fiscal incidence analyses that do not involve behavioral responses. Moreover, given the existence of other policy reforms as well as new international sanctions against Iran around the time of this energy subsidy reform, it is hard to disentangle the benefits and losses of the subsidy reform by itself.

That being said, it is possible to provide some insight into this question by focusing on the benefits and losses associated with the direct consumption of previously subsidized goods (e.g. water). Specifically, whether the cash transfer was big enough to make up for the extra cost of consuming previously subsidized goods. Because the price of these goods is determined by public officials ahead of time, both before and after the subsidy reform, the effect of other fiscal policies and sanctions are eliminated.

Table B1 shows the percentage of families in each income group that received a cash subsidy which was more than the extra cost of consuming electricity, water, natural gas, various oil-based products used for heating, and various types of auto fuels. Almost all families, with the exception of those belonging to the “High-Income Class,” are winners. However, the average size of the gain is very different for the poorest families compared to the richest ones. On average, a family in the poorest group gains about 10 times more than a family in the richest group. This is mainly due to

the fact that families in the first decile are larger on average; the total amount of cash transfer increases directly with the number of individuals in a family, but the costs of goods such as water or electricity does not increase at the same rate. Moreover, the amount of consumption of the previously subsidized goods is significantly higher in the wealthy families. This suggests that there are merits to the idea of a cash transfer being a main driver behind the peaceful elimination of energy subsidies in Iran. Table B2 repeats this analysis for the other policy scenarios. As expected, the richest group are now the losers, since they do not receive any subsidy, while the gain to the poor households increases as the program becomes more targeted towards them. However, the “middle class” is also affected negatively by removing the cash transfer from the seventh and eighth deciles. On average, a middle-class family would be a “loser” if the government decides to continue with the elimination of TSP from deciles beyond the top two.

Table B1. Winners and losers of the subsidy reform in Iran: Baseline

Socio-Economic Group	Percentage of winning households	Average yearly gain by a household (PPP \$)
Ultra-Poor	95.43%	\$3396.97 [1194.98%]
Extreme Poor	95.25%	\$3535.79 [500.187%]
Moderate Poor	95.20%	\$3378.48 [282.33%]
Vulnerable	95.05%	\$2910.91 [116.30%]
Middle Class	94.12%	\$2075.55 [32.31%]
High Income Class	68.06%	\$408.77 [1.47%]

Source: Own calculations using the Iranian household survey of year (1390 Iranian calendar, equivalent to 2011-12) and prices from AsreBank News Agency (2014).

Note: The numbers in brackets are average size of gain as a percentage of the average Market Income of a household. PPP stands for Purchasing Power Parity. In calculating PPP values, we use the 2005 round of ICP (International Comparison Program) as reported in the World Development Indicators (WDI) published by the World Bank. To change monetary values from the year of survey to 2005, we use the CPI index from the WDI. To determine whether a family is “winner” and the size of its gain/loss, the gain and loss is calculated for one month (since the cost data is only available for one month) and then multiplied by 12. The cost of the reform is determined based on the forgone consumption subsidy of the following goods. For each good the number in parenthesis represents the post-reform/pre-reform price ratio for the unit of consumption of that good and all prices are determined by the public officials: water (262.3/127.1), electricity (45/12.9), natural gas for home consumption (70/13.2), liquid gas for home consumption (540/40), natural gas for car fuel (300/40), furnace fuel oil (200/9.5), regular gas for car fuel (700/400), diesel fuel (350/16.5), kerosene (100/16.5). The socio-economic groups are determined based on the Market Income of households. An Ultra Poor household is the one that the average daily income of individuals in that household is \$0 to \$1.25 PPP (in purchasing power parity of 2005). Similarly, the average income of individuals in the households of other groups are as follows: Extreme Poor: \$1.25 to \$2.5; Moderate Poor: \$2.5 to \$4; Vulnerable: \$4 to \$10; Middle Class: \$10 to \$50; High Income Class: more than \$50.

Table B2. Winners and losers of the subsidy reform in Iran: other scenarios

Socio-Economic Group	Average yearly gain by a household (PPP \$)		
	Second Phase	Policy Simulation 1	Policy Simulation 2
Ultra-Poor	\$3403.50 [1192.37%]	\$4581.83 [1605.19%]	\$5728.65 [2006.96%]
Extreme Poor	\$3548.44 [502.37%]	\$4793.60 [678.65%]	\$6005.44 [850.21%]
Moderate Poor	\$3348.94 [280.26%]	\$4570.64 [382.50%]	\$5759.65 [482.00%]
Vulnerable	\$2937.42 [117.18%]	\$4064.08 [162.12%]	\$3731.42 [148.85%]
Middle Class	\$1136.34 [17.39%]	\$-232.03 [3.55%]	\$-413.27 [6.33]
High Income Class	\$-1462.14 [5.26%]	\$-1462.14 [5.26%]	\$-1462.14 [5.26%]

Source: Own calculations using the Iranian household survey (1390 Iranian calendar, equivalent to 2011-12) and prices from AsreBank News Agency (2014).

Note: The numbers in brackets are average size of gain as a percentage of the average Market Income of a household. The description of policy scenarios are as follows. No reform: individuals only receive a consumption subsidy; second phase: No subsidy for top 20%; Policy Simulation 1: No subsidy for top 40% and an extra 30% for bottom 60%; Policy Simulation 2: No subsidy for top 40% and an extra 60% for bottom 30%. PPP stands for Purchasing Power Parity. In calculating PPP values, we use the 2005 round of ICP (International Comparison Program) as reported in the World Development Indicators (WDI) published by the World Bank. To change monetary values from the year of survey to 2005, we use the CPI index from the WDI. To determine whether a family is “winner” and the size of its gain/loss, the gain and loss is calculated for one month (since the cost data is only available for one month) and then multiplied by 12. The cost of the reform is determined based on the forgone consumption subsidy of the following goods. For each good the number in parenthesis represents the post-reform/pre-reform price ratio for the unit of consumption of that good and all prices are determined by the public officials: water (262.3/127.1), electricity (45/12.9), natural gas for home consumption (70/13.2), liquid gas for home consumption (540/40), natural gas for car fuel (300/40), furnace fuel oil (200/9.5), regular gas for car fuel (700/400), diesel fuel (350/16.5), kerosene (100/16.5). The socio-economic groups are determined based on the Market Income of households. An Ultra Poor household is the one that the average daily income of individuals in that household is \$0 to \$1.25 PPP. Similarly, the average income of individuals in the households of other groups are as follows: Extreme Poor: \$1.25 to \$2.5; Moderate Poor: \$2.5 to \$4; Vulnerable: \$4 to \$10; Middle Class: \$10 to \$50; High Income Class: more than \$50.