# Export constraint and domestic fiscal reform: Lessons from 2011 subsidy reform in Iran☆

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## ARTICLE INFO

## ABSTRACT

This paper uses the 1987–2011 Household Budget Surveys from the Statistical Center of Iran consisting of 293,953 observations, coupled with the price data from the Central Bank of Iran, to estimate the structure of demand for goods and services in urban areas of Iran. The estimation procedure assumes a Quadratic Almost Ideal Demand System (QUAIDS) introduced by Banks et al. (1997). It then uses the estimated demand system to study the implications of the removal of the massive subsidies on energy and basic foodstuff that were in place in Iran at the end of 2010. It examines the changes in the economy's consumption patterns, income distribution, private and social welfare, and the environment. The paper's key contribution is to recognize and study how the results of this domestic reform depended on international trade barriers faced by the country. It shows how a seemingly welfare improving policy in the absence of export restrictions turned out to be quite the opposite—at least for the current generations of Iranians.

## 1. Introduction

Economists are, as a rule, against government policies that intervene with the working of competitive price systems. When it comes to redistributive policies, however, some degree of price distortion often becomes necessary. Barring specific preference structures that imply uniform commodity taxes,[1] which are almost always rejected by the data, relative consumer prices of goods differ from relative marginal costs. The exact nature and the rules that govern this differentiation are extensively studied in the literature on optimal taxation. The need for distortionary taxation arises because governments have to raise revenues for financing of their projects,

redistributive and otherwise, but lack revenue sources that can be tapped without creating distortions.

To a great extent, energy exporting countries appear to be able to skirt around this revenue raising problem. They have a huge source of revenue in terms of an existing asset to finance their projects and need not resort to distortionary taxation for this purpose—at least not to the extent that other countries do.[2] Yet these countries have managed to distort their prices in another fashion. Typically, they sell energy products at extremely low prices to their citizens with the idea that their poor cannot afford world-market prices. Additionally, at times, they also sell foodstuff at subsidized prices.

One country, which has recently tried to break away from this trend and end its price subsidies is Iran. This paper studies the implications of this reform for the Iranian economy with respect to consumption patterns, income distribution, private and social welfare, and the environment. One key contribution of the paper is to recognize and examine how the results of this domestic reform ended up to depend on international trade barriers. In the case of

[1] In the presence of an optimal general income tax, this requires weak-separability between labor and consumption goods; and in its absence, weak separability plus linear Engel curves.

[2] Of course, other interesting economic questions arise in this context including the questions of the optimal extraction, refining, and investment of the generated revenues versus consumption. Nevertheless one can safely argue that they do not have the same problems as other countries in terms of raising public revenues.

Iran, the problem has been the severe international sanctions on its oil exports.[3] However, the message that trade barriers can have far reaching consequences for domestic reform is quite a general one. The paper shows how a seemingly welfare improving policy in the absence of export restrictions turned out to be quite the opposite—at least for the current generations of Iranians.

A second and related contribution of the paper, reported in Section 2, is to estimate the demand structure for goods in Iran that underlies the reported welfare calculations. To study this issue, the paper uses the 1987–2011 Household Budget Surveys from the Statistical Center of Iran, coupled with the price data from the Central Bank of Iran, to estimate the structure of demand for goods and services in urban areas of Iran. Lack of price data for rural areas has forced us to exclude these areas from our estimation procedure.[4] The pooled sample consists of 293,953 urban households with a wide range of income variations and other socio-economic characteristics. Price variations, on the other hand, are far more limited because price controls have led to no variations across geographic regions (at least according to the official data). Nevertheless, given the quarterly nature of the data and its availability over many years, we are able to count on 100 price observation.[5]

In light of the subsidy reform emphasis on energy, and some food items, the paper reconfigures the broad categories of expenditures one finds in the Household Budget Surveys. The data contain detailed information on various expenditure items, with uniquely assigned codes, that makes this possible. We thus aggregate consumption expenditures into seven broad categories: (i) energy, (ii) subsidized food, (iii) nonsubsidized food, (iv) energy-consuming goods, (v) non-energy consumer goods, (vi) services, and (vii) housing. Given this reconfiguration, we also have to build a price index for each category. We do so using the detailed monthly price indices of the Central bank of Iran.[6]

We use Banks, Blundell, and Lewbel's (1997) Quadratic Almost Ideal Demand System (QUAIDS) for our estimation procedure. Demand functions derived from the commonly specified utility functions, e.g. CES, impose severe a priori restrictions on demand estimates that are unsupported by the data. The most popular demand system satisfying the axioms of choice in consumer theory without imposing restrictions such as homotheticity is Deaton and Muellbauer's (1980) Almost Ideal Demand System (AIDS).[7] Another advantage of this system is that it allows the estimation of the

parameters of an underlying indirect utility function behind the demand system. This is extremely useful in calculating the welfare changes of government's fiscal policies. Nevertheless the AID system has a drawback. It implies, rather implausibly, that all goods have Engel curves that vary *linearly* with the log of expenditures. Empirical Engel curves, on the other hand, often indicate relationships that are nonlinear. QUAIDS generalizes the AID system in that it is also based on the optimization of an underlying indirect utility function but one that allows for nonlinear Engel curves (having AIDS as a special case). We chose QUAIDS because initial nonparametric analyses of consumer expenditures in our data suggest that the Engel curves for many of the goods categories are nonlinear in the logarithmic of expenditures.

The estimation of a demand system is an essential undertaking for the study of the effects, and the design, of government policies. Such an undertaking has never been done for Iran. Yet policy makers in Iran, and other major oil producing countries, are currently grappling with the daunting question of developing a tax-based source of government revenue. For many of these countries, oil revenues constitute their main, if not the sole, source of public funds which will sooner or later be exhausted. It is in this light, that we consider the estimation of the demand system for goods in Iran to be one original and general contribution of our study. Section 3 of the paper contains this material.

More specifically, however, this paper aims to shed light on the welfare implications of the recent elimination of price subsidies on energy and basic foodstuff in Iran and replacing them with cash subsidies.[8] The estimate of the underlying indirect utility function allows us to compute exact welfare measures for *non-marginal* tax/subsidy reforms. This is in contrast to the prevalent use of Ahmad and Stern (1984) approach in the literature for examining marginal commodity tax reforms.[9] In particular, our finding will shed light on the questions of the efficiency and equity gains in switching from price to cash subsidies, the incidence of the reform on different income groups (who gained, who lost, and by how much), and the environmental benefits that come with a reform that cuts energy consumption.

Most interestingly, we will argue that the customary way one goes about the welfare implications of fiscal reforms will give a very distorted picture of what happened in Iran. The reason is that textbook applications of price reforms are predicated upon an implicit assumption that may not always hold. Specifically, one typically assumes that by, say, raising domestic prices and thus cutting domestic consumption of certain goods, one is able to sell the excess on international markets. Now while this is generally true, it was not the case for Iran which was facing severe sanctions at the time of the reform. To study the importance of ignoring this (and similar type of) restriction, we examine the welfare implications of the reform under two scenarios. In one, which is what the policy makers expected to occur when they introduced the reform, there is no export constraint. The reduction in the domestic consumption of energy would be sold overseas at the international market prices. We use this scenario as our hypothetical benchmark for the "expected changes," and report the welfare changes that were hoped for in Section 4 of the paper.

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[3] There is also the constraints OPEC imposes through its changing production quotas to limit supply and keep prices high.

[4] This restricts our ability to arrive at reliable macro numbers for the economy as a whole. However, when needed, we provide a "rough estimate" for the economy-wide numbers by assuming that aggregate changes in urban areas apply to rural areas as well.

[5] In an earlier attempt, Gahvari and Taheripour (2011) also used Household Budget Surveys data to estimate the consumers' demands in Iran. However, their data covered the period of 1998 to 2001 only for a total of 16 seasons. This limitation on price variations, i.e., availability of only sixteen data points, severely limited the reliability of their price elasticity estimates. Equally important, Gahvari and Taheripour (2011) did not consider the implications of trade barriers for their results. This issue is at the heart of the present study. Nor did they look at the environmental benefits of the reform.

[6] By contrast, Gahvari and Taheripour (2011) used the data's broad categories of: (i) grains/bread/cake, (ii) other food products, (iii) clothing, (iv) housing (rent and imputed rent), (v) utilities (water, electricity, natural gas, phone, etc.), (vi) household items and furnishing, (vii) health, (viii) transportation (including fuel used outside the house), (ix) education, recreation, personal hygiene, (x) durable goods including automobiles (expenditures as opposed to imputed services), and (xi) other non-durable goods and services. This categorization is somewhat problematic for studying the effects of removing price subsidies. Energy appears in a number of these categories particularly utilities and transportation. Similarly, items (i) and (ii) include both subsidized and nonsubsidized food.

[7] Amongst other commonly used specifications, log-linear models do not satisfy theory exactly, linear expenditure system is overly restrictive, and flexible functional forms lead to representations of utility functions only approximately.

[8] The policy is commonly referred to as "targeting subsidies". This may have been the initial intention of the government; but is a misnomer. The policy that was instituted was neither targeted nor self-targeted. Instead, it was a uniform monthly cash rebate to every person in a household (of about $44.5 using the official rate of exchange of the time).

[9] The advantage of Ahmad and Stern (1984) first-order approximation approach is that it requires less information. However, the estimation of the indirect utility function gives us the required information. Consequently, we do not need to resort to any approximation.