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The welfare effects of economic sanctions on final consumers of goods and services in Iran

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ABSTRACT

In this study, using AIDS (Almost Ideal Demand System), we estimated direct and indirect welfare effects of economic sanctions on final consumers of (durable, semi-durable and non-durable) goods and services in Iran during 1981-2012 period. We also analyzed changes in consumer behavior due to sanctions. In order to analyze welfare effects, welfare criteria of Equivalent Variation (EV) and Compensating Variation (CV) were employed, and for testing behavior change, Marshall and Hicks criteria of elasticities were used. The results showed that: 1) the welfare effect rises when sanctions are removed (direct welfare effect). 2) As price of goods and services increases, welfare costs of final consumers and government get higher upon sanctions as compared to when they are removed (indirect welfare effect). 3) Sanctions created a structural failure in behavior pattern of final consumers of goods and services, so that influenced by sanctions, income, price and substitution elasticities of goods and services changed (change of consumers' behavior pattern).
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Introduction

Although in dissimilar ways, economic sanctions can typically lead to increased transaction costs within the economy which in turn may have adverse effects on benefits of economic agents and thus the welfare of society. In fact, one of the main economic goals of all countries, irrespective of their different economic

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systems, is increase in social welfare level and one main component of people's welfare is the consumption amount of goods and services. Economic sanctions through increasing trade costs may have a threefold influence on consumers:
1. Sanctions can directly reduce consumer's welfare level (sanctions' direct welfare effect).
2. Sanctions can increase welfare costs of implementing economic policies (such as price raising) for the government and consumers (sanctions' indirect welfare effect).
3. Consumers change their behavior pattern in response to changes in income and price of goods and services in order to minimize the adverse welfare effects of sanctions (behavior pattern change because of sanctions).
For countries under economic sanctions – such as Iran which in recent years has been under international sanctions of UN Security Council, European Union and USA, simultaneously -, identification and analysis of these three issues is very important for economic policy makers in order for taking right policy to reduce the adverse consequences of sanctions on the family welfare. Accordingly, this study attempts to analyze direct and indirect welfare effects of sanctions and also changes in behavior pattern of consumers in Iran due to sanctions. In this regard, annual data for 1981-2012 period and Almost Ideal Demand system (AIDS) are used.
In the second section of this study, the research literature is discussed. The third section deals with the theoretical foundations and the model. In the fourth section, unit root test is carried out. In the fifth section, the model, the criteria of Equivalent Variations (EV) and Compensating Variations (CV) are calculated for sanction removal policies and also raising the price of consumer goods and services in sanction situation and sanction free situation and then elasticities are calculated for both situations in order to analyze changes in the behavior pattern of consumers. The conclusion is presented in the sixth section.

Review of experimental studies

There has been done no considerable experimental research on the welfare effects of Iran's economic sanctions; however, many studies have been done about other effects of Iran's economic sanctions. Here, we will outline most important studies classified into two categories: those published in Iran and those published outside Iran.
(Costa & Vilalta, 2004) analyzed effects of the US commercial and financial sanctions against Iran in a statistical estimation. This study tried to estimate sanctions' direct costs in three categories of foreign loan, financial support of oil projects and sanctions' financial costs. These costs were estimated to be 2.1 to 3.6 percent of Iran's GPD and so 23.5 to 40.5 dollars for each Iranian in year 2000.
(Ezzati, 2016) investigated the effects of US sanctions against Iran on costs of military goods import in a statistical estimation. They also compared Iran with some countries in the region. This study showed that Iran's military importation increased during 2003 to 2005 years but it decreased in long terms during 1993 to 2005 period.

(Farahani & Shabani, 2013) estimated the effects of sanctions on Tehran stock market assets and relations with regional markets over the period 1998-2009 by using GARCH method. The results indicated that sanctions had negative effects on Tehran stock market output and increased the investment risk of the region's stock markets.

(Faraji, 2014) explored the effectiveness of the fourth round of US sanctions against Iran in 2010. The study showed that sanctions imposed much pressure on Iran's economy, but not enough to stop Iran's nuclear program.

(Faraji, 2014) in a study named "Iran-US strategic competition in sanction game: Energy, Military control and regime change" which is a part of a long term study belonging to "Center for Strategic and International Studies", analyzed the role of India, Japan, Korea, Russia, China, Turkey and Persian Gulf countries in sanctions and discussed the effects of sanctions on oil sector and gas importation alongside Iran's efforts to become self-sufficient and act against sanctions.

Farahani and Shabani (2013) studied the effects of sanctions on Iran's tourism. They analyzed 2003 to 2012 data via descriptive statistics method. In this study, Iran's national, local, household and global tourism data were employed. The main result of this study was that sanctions didn't hinder tourism growth. Data showed that even growth rate increased in some fields.

Pour International Institute (2013) studied the effects of Iran's sanctions on health and sanitation sector through a field study method asking questions of four groups of pharmacy owners, managers of drug producing companies, drug import companies, drug distribution companies and also 13 Aban drug store. The results showed that sanctions had a terrible effect on Iranian health by reducing access to medicine drugs.

(Hill et al., 2007) with analyzing the effects of oil shocks on government expenditures and government revenues nexus shoed an application for Iran's economic sanctions. This paper find that Iran's economic sanctions have been negative effects on government expenditures

Cordesman updated the above-mentioned study in 2013 and 2014 by adding more statistical data and a more extensive analysis. This report mentioned that change in governors' outlook on sanctions and turning to talk was the result of increasing pressure of sanctions and internal concerns.

(Hill et al., 2007) in a documentary study based on data from various written resources tried to estimate the anti-humanitarian effects of economic sanctions on Iran and Syria. He concluded that sanctions had many anti-humanitarian effects on both countries.

Ezzati and Salmani (2014) analyzed direct and indirect effects of economic sanctions on Iran's economic growth focusing on the external sector of the economy during 1976 to 2012 period. In this study, based on endogenous economic growth models and 2SLS regression method it was shown that sanctions had no significant direct effect on Iran's economic growth, but they had some indirect effects on economic growth through limiting total imports, imports of capital goods, intermediate goods and primary goods and also exports.

According to the above-mentioned studies, we may conclude that although there are numerous studies that have examined the effects of economic sanctions on

economic components, there has been done no investigation on the welfare effect of economic sanctions in Iran, yet. Accordingly, this paper may come to new and innovative results in theoretical and practical aspects, and in terms of internal and external dimensions.

Theoretical aspects and introducing the model

Almost Ideal Demand System

Deaton and Muellbur's AIDS is the development of Working (1943) works on Engle curve. This model fulfills the principles of choice theory and the theory of consumer behavior; free from LES (Linear Expenditure System) limiting assumptions such as linearity of Engle curve, it can estimate consumer's demand. Also, its estimation doesn't require any nonlinear method; in this model, homogeneity and symmetry constraints may be tested via linear restrictions on parameters (Ghorashy and Sadroleshraghi, 2005; 136) AIDS is based on price-independent logarithmic function of generalized cost. This cost function explains the minimum cost for reaching to a certain level of utility in given prices.

Introducing the model

The effect of economic sanctions on the welfare of final consumers of goods and services in the country based on the AIDS is modeled as follows:

$$W_{it} = \alpha_i + \sum_{j=1}^{n} \theta_j \, san_{jt} + \tau_{i1} Ln(d_t) + \tau_{i2} Ln(sd_t) + \tau_{i3} Ln(Ps_t) + \tau_{i4} Ln(Pnd_t) + \beta_i Ln\left(\frac{M_t}{P_t^*}\right) + \sum_{j=1}^{n} \tau_{i1} \, san_{jt} * Ln(pd_t) + \sum_{j=1}^{n} \tau_{i2} \, san_{jt} * Ln(Psd_t) + \sum_{j=1}^{n} \tau_{i3} \, san_{jt} * Ln(Ps_t) + \sum_{j=1}^{n} \tau_{i3} \, san_{jt} * Ln(Pnd_t) + \sum_{j=1}^{n} \beta_i \, san_{jt} * Ln\left(\frac{M_t}{P_t^*}\right) + v_{it}$$

In this model, Ln represents natural logarithm, Wit is the share of ith commodity group, (durable, nondurable and semi durable goods and services) at time t of the total costs of the final consumer goods and services used by households in the country, Pdt is the price index of durable final consumer goods at time t, Psd_t is the price index o semi-durable final consumer goods at time t, Pst is the price index of final consumer services at time t, Pndt is the price index of non-durable final consumer goods at time t, Mt is the total cost paid by the country's households in final consumption of goods and services at time t and Pt is the stone price index for the final consumption costs of the country's households at time t. Also, Sanjt vector represents the dummy variable for sanction number j which takes on value 1 for the year of number j sanction and subsequent years and 0 for the years before that sanction. Also, Vit represents the residual of equation number i in the research model. Sanctions include sanctions on 1987, 1996, 2001, 2003, 2004, 2006, 2007, 2008, 2009, 2010, 2011, and 2012. Also, the study period includes 1971-2012 years.

In spite of the fact that none of endogenous values appear on the right side of AIDS equations, this equation is not separate and unrelated because error terms are related to each other. This is because the dependent variables must satisfy the budget constraint (In other words, the sum of goods in funding in AIDS model should be equal to 1). In this situation, OLS and 2SLS couldn't manage to estimate model parameters (Mahdzan & Victorian, 2013). The seemingly unrelated regression equations make it possible for the coefficient of variables in equations and coefficient variance to change and for the disturbance terms in the equations to have contemporaneous correlation with each other. The assumption that there is correlation between disturbance terms enables the model to incorporate some additional information not included in estimating equations via the method of least squares (OLS). (Kwiatkowski, 1992) provided more efficient estimations for SUR model. For estimating variance-covariance matrix of residual terms, the method of least squares is used and then for estimating equations, the generalized least square method is employed. Since the resulting variance-covariance matrix is single, one of the equations must be omitted and the equation parameters should be calculated using other parameters of the estimated equations. Barten (1969) provided an iterated SUR method (ISUR) that leads to consistent results after omitting an equation.

Unit Root Test

In order to avoid the problem of spurious regression, before performing time series analysis, we should ensure that the series is stationary. Here, KPSS test is used for analyzing unit root. In this test, null hypothesis states that the unit root is stationary. According to table 1, KPSS statistic value for all model variables is smaller than critical values at 5% and 1% significance levels, so the null hypothesis of stationary time series for all variables will be accepted.

Table 1. Results of KPSS unit root test in intercept and trend mode

Variable	$w_{d(t)}$	$w_{sd(t)}$	$w_{nd(t)}$	$w_{s(t)}$	$Ln(d_t)$	$Ln(sd_t)$	$Ln(nd_t)$	$Ln(s_t)$	$Ln(M_t/P_t^*)$
kpss Computational statistic	/0955 0	/1364 0	/1354 0	/1437 0	/1108 0	0/1185	0/1355	/1371 0	/1323 0

KPSS statistic critical value corresponding to degree of freedom and number of observations of variables of this study in intercept and trend test mode at 1, 5 and 10 percent significance levels are0.2160, 0.1460 and 0.1190, respectively.
Source: experimental findings of the research

AIDS estimation

For estimating the AIDS model and parameters, at first equations of the four groups were estimated via OLS method in a non-constrained way and then homogeneity constraint test was performed based on $\sum_j \tau_{ij} = 0$ condition using the Wald test for each of equations; the results are shown in Table 2. They indicate that homogeneity in the first equation may not be rejected at 5% level of significance, but this condition may be rejected at the same significance level

regarding the second, third and fourth equations. It should be noted that when homogeneity is the case within more than half of demand system equations, it can be generalized to all the system (Moret, 2014).

The existence of homogeneity constraint suggests that if all prices and incomes change equally, the optimal allocation of consumers do not change at all and they have no money illusion in their consumption of goods and are only concerned with real prices and income. Homogeneity hypothesis can be rejected due to the use of indexes such as acetone price index instead of actual price index and also the influence of other variables on the model (Moret, 2014).

Table 2. Almost Ideal Demand System homogeneity hypothesis testing using the Wald test

Equation	Statistic x^2	Test probability	Result
First equation (durable goods)	3/2180	0/0728	The absence of money illusion
Second equation (semi durable goods)	9/0486	0/0026	money illusion
Third equation (Services)	36/2343	0/0000	money illusion
Fourth equation (nondurable goods)	25/9905	0/0000	money illusion

Source: experimental findings of research

Another constraint that can be tested in this system in order to understand the behavior of consumers and if approved can be incorporated in system is the symmetry constraint. Using the Wald test, this constraint may be verified. The symmetry test could be done using the equation τ_ij = τ_ji. As for the symmetry constraint, it is not possible to test the constraint for individual equations, but this constraint should rather be assessed regarding the whole system. The results for symmetry constraint are given in Table 3.

Table 3. Almost Ideal Demand System symmetry hypothesis testing using the Wald test

symmetry Relation	statistic x^2 related to equation	Test probability
All groups at the same time	31/2755	0/0000

Source: experimental findings of research

As shown in table 3, this system is not symmetric. It suggests that price coefficient of jth commodity in the equation concerning the share of ith commodity is not equal to price coefficient of ith commodity in equation related to the share of jth commodity. In fact, the symmetry constraint indicates that the amount of change in demand for a certain commodity per one unit change in price of other goods after income compensation is equal to the amount of change in other goods demand per one unit change in the price of that specified commodity.

Table 4. Estimating model coefficients

Equation	Durable goods	Semi durable goods	Services

Variable	Coefficient	Standard deviation	Coefficient	Standard deviation	Coefficient	Standard deviation
Intercept	0/5684 **	0/2288	0/5242 *	0/1295	-2/5276 *	0/3487
US11					-0/0407 *	0/0114
LPD	-0/1111 *	0/0194	-0/0478 *	0/0099	0/0617 **	0/0268
US96*LPD					0/1057 *	0/0315
US04*LPD					-0/1857 *	0/0591
US08*LPD	-0/0045 *	0/0014				
LPSD	0/1389 *	0/0262	0/0137	0/0125	0/0041	0/0331
US96*LPSD	-0/1246 *	0/0306				
LPS	0/1351 *	0/0251	0/1494 *	0/0187	-0/1357 *	0/0434
US96*LPS			-0/1216 *	0/0221	-0/1098 *	0/0342
US10*LPS			-0/0008	0/0007	-0/0029	0/0021
US11*LPS	-0/0029 **	0/0013				
LPND	-0/1891 *	0/0488	-0/1263 *	0/0295	0/2883 *	0/0707
US96*LPND	0/1264 *	0/0322	0/0967 *	0/0227		
US04*LPND					0/1761 *	0/0589
LMP	-0/0419 **	0/0182	-0/0328 *	0/0102	0/2235 *	0/0276
US96*LMP			0/0032 **	0/0017		
US04*LMP	0/0024 *	0/0007	0/0021 *	0/0004		
coefficient of determination	0/9397		0/8939		0/9693	
Adjusted coefficient of determination	0/9109		0/8434		0/9524	
D-W	2/3562		2/3272		1/9531	

Note: *, ** and ***indicate significance at 1, 5 and 10 percent, respectively.

Source: Research experimental findings

According to Wald test results, homogeneity and symmetry constraints aren't true in this system, so equations will be estimated without including these conditions. Budget constraint ($\sum w_i = 1$) in AIDS system based on additivity constraint must be imposed on the model. For using budget constraint in equation system, we eliminate the fourth equation that deals with the group of non-durable goods and its coefficients will be calculated according to the additivity constraint. By using this constraint, the number of equations in the equation system 25 decreases to three. Now, this three-equation system is estimated by using Iteration SURE (Table 4). It should be noted that all sanction variables that are defined as dummy variable have been entered into the model via forward stepwise method; those that were statistically significant (or were required in the model by the Wald test) are kept in the model and others are removed.

Here, on the basis of Table 4 estimates, the system can get rewritten into two states of sanctions and removal of sanctions in year 2012 time point. In fact, in

sanction state, dummy variables of all the sanctions of table 4 are 1 and in the state of sanction removal they are 0 (Table 5).

Table 5. The research model coefficients in terms of sanctions and the removal of sanctions on the time point 2012

Conditions	Variable	intercept	Lpd	lpsd	Lps	lpnd	Lpm
Sanctions	Sd	0/5684	-0/1157	0/0143	0/1321	-0/0627	-0/0395
	Ssd	0/5242	-0/0478	0/0137	0/0270	-0/0296	-0/0275
	Ss	-2/5683	-0/0183	0/0041	-0/2483	0/4644	0/2235
	Snd	2/4758	0/1818	-0/0321	0/0891	-0/3721	-0/1564
Without sanctions	Sd	0/5684	-0/1111	0/1389	0/1351	-0/1891	-0/0419
	Ssd	0/5242	-0/0478	0/0137	0/1494	-0/1263	-0/0328
	Ss	-2/5276	0/0617	0/0041	-0/1357	0/2883	0/2235
	Snd	2/4351	0/0972	-0/1567	-0/1488	0/0270	-0/1488

Note: Due to limitations, the coefficients of non-durable goods equation are calculated based on the coefficients of the other equations.

Source: experimental findings of research

Investigating direct welfare effects of sanctions

For investigating direct welfare effect of sanctions, reduction ad absurdum technique was adopted. This was done via answering to this question that how much is the welfare effect of sanction removal policies (without any price change policy)? To answer this question, the general price level of durable, semi-durable and non-durable goods and services was taken equal to their values in 2012 and EV and CV criteria were calculated based on turning policy from sanctions to removing all of them (Table 6). Considering that in this study, constant prices in year 2004 are used, welfare indexes per each person in year 2012 are calculated corresponding to the actual price of year 2004 which for the tangibility of figures, along with the price index of consumer goods and services is converted to current prices and then divided by 12 in order to give monthly welfare index according to current price of the year 2012.

Table 6. Sanction removal welfare index for the year 2012 per each person (statistics are in ten thousand Rials)

Annual fixed price for 2004		CPI for the year 2012	The annual current price		The current monthly price	
C.V	E.V	(base yare 2004)	C.V	E.V	C.V	E.V
-41/86	-43/29	364/24	-152/48	-157/68	-12/71	-13/14

Source experimental findings of research

Based on the CV criteria from table 6, if sanctions had been removed in 2014, the government could have taken 12.71 thousand Tomans per month from each final consumer of goods and services so as to reduce its utility level to the utility level of the sanction period. However, based on EV criterion, if in 2012, 13.14 thousand Tomans had been paid monthly to each final consumer of goods and services, he would have been in that welfare level as if sanctions had never occurred. Thus, according to EV and CV criteria, the welfare level of the final consumers of goods and services are higher when sanctions are removed as compared to the sanction period and This is the reason why consumers are

willing to pay a sum to get rid of sanctions; otherwise, if sanctions are persistent, an amount of money should be paid to consumers in order that their welfare level might not be reduced.

Investigating sanctions' indirect welfare effects

In this study, sanctions' indirect welfare effect is defined as how much the existence of sanctions has changed welfare effects of economic policies for final consumers. In this paper, the policy of removing subsidies has been case studied. In this regard, welfare indexes of goods and services price raise per capita for 2012 are calculated by equations 21 and 24, and table 5 results in case of sanctions and also when they are removed; the results is explained in Table 7.

CV criterion mentioned in table 7 suggests that if at the same time, the price of people's final consumer goods and services get increased by 0.05, 0.10, 0.15, 0.20 and 0.25, in sanction situations of the year 2012, the amounts of 18.82, 37.63, 56.41, 75.17 and 93.91 thousand Tomans should be paid monthly to each final consumer of goods and services in the country in order for them to reach to their utility level before change in prices; however, these amounts are reduced to 18.69, 37.36, 55.99, 74.61 and 93.20 thousand Tomans per month when sanctions are removed.

EV criterion suggests that in order that the price of consumer goods and services might not get increased by 0.05, 0.10, 0.15, 0.20 and 0.25, the households in 2012 are willing to pay amounts of 17.95, 34.28, 49.21, 62.91 and 75.53 thousand Tomans per month in sanction situation and amounts of 17.83, 34.06, 48.90, 62.52 and 75.07 thousand Tomans per month if sanctions are removed. In fact, by these payments, consumers achieve secondary utility that would have been achieved if the price increase policy had been implemented. A comparison between EV and CV values in case of price policy implementation in sanction and sanction-free situations indicates that in sanction situation, implementing price policies for final goods and services has higher final costs for both government and consumers of goods and services as compared to when sanctions are removed. In fact, according to CV criterion, by an increase in goods and services price, consumers' welfare is reduced more in sanction situation than in sanction-removed situation so that government must pay higher amounts in sanction situation; alternatively, according to EV criterion, being aware of this reduced welfare, consumers themselves are willing to pay higher amounts to the government in time of sanction in order to stop government price raise policy.

Table 7. Welfare indexes of goods and services price raise in 2012 for each person with sanctions and without sanctions (numbers in thousand Tomans) 2109

Cinditions	Price raise policy(percent)	2004 annual fixed price		Year 2012 CPI (base year 2004)	Annual to current price		Monthly to current price	
		C.V	E.V		C.V	E.V	C.V	E.V
sanctions	1/05	62/01	59/13	364/24	225/88	215/37	18/82	17/95
	1/10	123/96	112/94	364/24	451/50	411/38	37/63	34/28

	1/15	185/84	162/13	364/24	676/89	590/54	56/41	49/21
	1/20	247/65	207/27	364/24	902/04	754/94	75/17	62/91
	1/25	309/41	248/83	364/24	1126/97	906/33	93/91	75/53
Without sanctions	1/05	61/58	58/73	364/24	224/30	213/93	18/69	17/83
	1/10	123/07	112/21	364/24	448/27	408/70	37/36	34/06
	1/15	184/48	161/10	364/24	671/94	586/77	55/99	48/90
	1/20	245/81	205/97	364/24	895/31	750/22	74/61	62/52
	1/25	307/05	247/31	364/24	1118/40	900/78	93/20	75/07
Difference	1/05	0/43	0/39	0/00	1/58	1/44	0/13	0/12
	1/10	0/89	0/74	0/00	3/23	2/68	0/27	0/22
	1/15	1/36	1/03	0/00	4/95	3/77	0/41	0/31
	1/20	1/85	1/30	0/00	6/73	4/72	0/56	0/39
	1/25	2/35	1/52	0/00	8/57	5/55	0/71	0/46

Source: experimental findings of research

Investigating changes in final consumer behavior pattern due to sanctions

To examine the question of whether Iran's final consumers of goods and services have changed their behavior pattern in reaction to changes in income and price of goods and services in order to minimize the deadweight loss of welfare caused by sanctions; the Marshall and Hicks elasticities are used based on equations 14, 15, 16, 17, 18 and table 5 coefficients (Table8).

Table 8. AIDS system elasticitiesConditions	With sanctions				Without sanctions			
Elasticity type	Marshall elasticities				Marshall elasticities			
Group	Durable	Semi-durable	Services	Non-Durable	Durable	Semi-durable	Services	Non-Durable
Durable	-2/7981	0/2510	2/1054	-0/9902	-2/7235	2/2323	2/1524	-2/9983
Semi-durable	-0/4093	-0/8423	0/2644	-0/2747	-0/4006	-0/8370	1/4309	-1/1939
Services	-1/5090	-0/8678	-1/8254	0/9061	-1/3150	-0/8678	-1/5524	0/4793
Non-Durable	1/4760	0/5484	0/3716	-1/7306	1/2233	0/2207	-0/2034	-0/7868
Income elasticity	0/3722	0/7379	1/5418	0/6271	0/3339	0/6879	1/5418	0/6454
Elasticity type	Hicks elasticities				Hicks elasticities			
Durable	-2/7746	0/3324	2/5118	-0/5766	-2/7025	2/3122	2/5585	-2/5851
Semi-durable	-1/0382	-0/7587	1/6705	-0/1774	-0/9950	0/4277	1/6985	-1/3810

Services	-0/2174	0/1397	-0/2672	0/2675	-0/2064	0/4418	-0/2600	-0/0389
Non-durable	-0/2128	0/1391	0/7275	-0/7299	-0/2019	0/4362	0/7345	-1/0313

Source: experimental findings of research

As table 8 shows, income self-elasticity of all four groups is negative and as expected, there is a negative relation between demand and price. In state of progressing sanctions, durable goods, non-durable goods and services (semi-durable goods) groups have absolute elasticity value greater (smaller) than 1 indicating that families have high (low) sensitivity to their price and if somehow their prices raise, demand for them will experience higher (lower) percentage of negative changes than just price raise. On the other hand, if sanctions are removed, the absolute value of price self-elasticity of all the investigated groups will be decreased. In this case, the absolute value of price self-elasticity of durable goods and services (semi-durable and non-durable goods) groups will be greater (smaller) than 1; accordingly, in sanction removed state, semi-durable and non-durable goods sensitivity to price raise policies will be lower and by these policies, the percentage of their demand change will be lower.

Also, based on Marshall cross (gross) elasticities, in case of economic sanctions, semi-durable goods are weak complement for durable and non-durable goods and weak substitute for services and durable goods are weak (strong) substitute for semi-durable goods (services) and complement for non-durable goods. Also, non-durable goods are strong (weak) substitute for non-durable goods (semi-durable and services) and also services are strong (weak) gross complement for durable (semi-durable) goods and weak substitute for non-durable goods. These relations will change by removing of sanctions in such a way that durable goods become strong substitute (complement) for semi-durable goods and services (non-durable goods); semi-durable goods become weak (strong) complement for durable (non-durable) goods and strong complement for services; services become strong (weak) complement for durable (semi-durable) goods and weak substitute for non-durable goods; and non-durable goods become strong (weak) substitute for durable (semi-durabe) goods and weak complement for services. Based on price elasticities, regardless of sanctions being at work or not, services are a luxury group for the households and non-durable, semi-durable and durable goods has a price elasticity lower than 1 in order of importance and are considered as essential goods for consumers.

Theoretically and based on Slutsky equation, it may be possible that one or two Hicks-Allen substitute goods be also gross complement to each other; on the other hand, any commodity must have at least one Hicks-Allen type substitute but it is possible that it has not any complement (Pauly et al., 2003). Based on Hicks net elasticities presented at the table 8, in sanction conditions, durable goods are net weak (strong) substitute for semi-durable goods (services) and weak complement for semi-durable goods. Semi-durable goods are strong (weak) complement for durable (non-durable) goods and strong substitute for services. Also, services are weak complement for durable goods and weak substitute for semi-durable and non-durable goods. Furthermore, nun-durable goods are weak

substitute for services; and net non-durable goods are net weak complement for durable goods. However, in conditions of sanctions being removed, durable goods become net strong substitute for semi-durable goods and services, and strong complement for semi-durable goods; semi-durable goods become weak (strong) complement for durable (non-durable) goods and strong substitute for services; and net substitute and complement relations of non-durable goods and services with other goods are the same as sanction state conditions.
Based on theoretical analysis and results presented in table 8, it is obvious that final consumers have changed their behavior pattern in respect to income and the price of consumer goods and services in order to minimize welfare loss caused by sanctions (Zellner, 1962).

Conclusion

In this study, we investigated direct and indirect effects of economic sanctions on the welfare of final consumers of consumer goods and services (durable, semi-durable and non-durable goods and services) in Iran. Moreover, the effect of sanctions on consumers' behavior pattern was tested. In this regard, at first AIDS for society members was estimated based on annual data for 1981-2012 in a non-constrained way; then using Wald test, homogeneity constraint test was carried out for every individual equation and symmetry hypothesis was tested for all equations simultaneously. Results indicated that at 5% level of significance, the homogeneity constraint in the system is accepted only for durable goods equation and it is rejected for the three other equations. Also, symmetry hypothesis is rejected for the whole system. According to these results for the system, the estimation is performed just in a way constrained to additivity (budget constraint) by ISURE method. Then, for investigating direct welfare effects of the sanctions, it was assumed that price of goods and services were constant in year 2012 and sanctions would be removed. Calculating CV criterion for this situation suggested that if sanctions had been removed, 12.71 thousand Tomans should be taken monthly from any consumer to lower consumer utility level to the corresponding level in sanction situation. Also, based on EV criterion, if sanctions were to stay, in year 2012 an amount of 14.13 thousand Tomans must be paid monthly to each consumer in order to achieve the welfare level of sanction free situation. Therefore, by removing sanctions, the welfare level of final consumers of goods and services will improve. In other words, sanctions reduced the welfare level of final consumers. Furthermore, in order to investigate indirect welfare effect of sanctions it was assumed that price of durable, semi durable, non-durable goods and services increased by 0.05, 0.10, 0.15, 0.20, 0.25 time of their amount during 2012. Results of CV criterion calculation indicated that if, in order of price raise, in case of sanctions 18.81, 37.63, 56.41, 75.17, 93.91 thousand Tomans and in case of removing sanctions 18.69, 37.36, 55.99, 74.61, 93.20 thousand Tomans be paid monthly to each final consumer of goods and services in the country, the consumers will reach to the utility level that they would have before applying price raise policy. According to the results of EV criterion, if in the year 2012 the final consumers pay monthly

17.95, 34.28, 49.21, 62.91, 75.53 thousand Tomans in case of sanctions and 17.83, 34.06, 48.90, 62.52 and 75.07 thousand Tomans in case sanctions removed, they will reach to the utility level that they would achieve in case of applying price raise policy. Comparing values of CV and EV criteria in sanction condition and in sanction free condition shows that final consuming goods and services price raise policies have higher welfare costs for both government and consumers in sanction situation than in sanction free situation. Also, by calculating elasticities of demand system in sanction situation and sanction free situation it was shown that behavior pattern of final consumers has changed in reaction to changes in income and price of goods and services influenced by sanctions. This change has been in such a way that Marshall Elasticities results showed that price self-elasticity of all four groups of goods and services in sanction conditions was negative having followed the demand rule. According to these results, in sanction (sanction free) situation, the absolute value of price self-elasticity of non-durable goods and services are greater than 1. Also, according to cost elasticities, services (durable, semi-durable and non-durable goods) are like a luxury (necessary) group of goods for the households. Also, based on Marshall and Hicks cross elasticities, gross and net substitute and complementary relations are different in sanction and sanction-free situations. It may be said that by progressing sanctions, personal behavior pattern (elasticities) has suffered a structural failure. Such a situation could create uncertainty in people's consumption decisions that leads to adverse effects on the economy. Accordingly, removal of sanctions has been very positive.

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