



Identify Factors Affecting the Imports of Consumption Goods, with an Emphasis on Income Inequality (1969-2010)

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ABSTRACT: In the current structure of world economy, import plays an important role in the economic development strategy. This is one of the effective factors on economic growth on the one hand and it is an important item of the country's balance of payments on the other hand. Thus a change that occurs in the import of country would affect on the country's development process. So Suitable policies are important for imports, But choosing the correct strategy for import depends on consider of factors affecting it. So, one of the major issues in the field of import of goods is identify of factors affecting on imports. Therefore, the purpose of this paper is identify factors affecting the imports of consumption goods during the period 1969-2010 in Iran. This study assessed the effects of factors such as gross domestic product, relative price, income inequality and total factor productivity on Iranian imports of consumption goods. Based on the findings, there was a positive relationship between the gross domestic product and income inequality with imports of consumption goods. In addition, relationship between the relative price and total factors productivity with imports of consumption goods are negative and significant.

Key Words: total factors productivity, income inequality, relative price, Johanson co-integration, consumption goods import demand

JEL: F13, H23, O24

Introduction

Including the factors that have significant impact on the economic growth of developing countries and have attracted the attention of many economists, reliance on foreign trade. In general, in the process of economic growth in developing countries, foreign trade plays a vital role because these countries are highly dependent on export revenues and foreign exchange for imports. The lack of consideration to this important sector lead to incorrect results obtained in the research related to economic growth in these countries. Therefore Positioning and the constructive role of foreign trade has the particular importance in the economic activities in developing countries, including Iran.

In Iran, the foreign trade sector underdeveloped according to the needs of time and consequently, has emerged various problems, because of like Easy access to sources of foreign exchange from export of crude oil, Crude oil export monopoly of government and doing the bulk of foreign trade by the government and its affiliated monopolies. Incidence of this problems and possible intensification of them because the decrease of foreign exchange earnings from oil exports, has been caused that increase attention of authorities and policy makers to the foreign trade sector [13].

Thus this study try to identify the factor affecting on demand of imported consumption goods of Iran. Therefore, we investigate the relationship between imports of consumption goods, GDP, total factor productivity (TFP), relative price and income inequality during the 1969 to 2010 period. The remainder of the

paper is as follows: The theoretical model for imports is developed in section 2. Section 3 includes the empirical analysis and discussion. Finally in section 4 conclusions are presented.

Methodology

Katsimi and Moutos (2011), Malley and Moutos (2002) and Flam and Helpman(1987) Consider an open economy where two goods (homogeneous non-traded good (X) and a vertically-differentiated product (Y)) is produced and consumed and trade with other countries.

Assumptions related to the firm

Good X (the non-traded good) is a homogeneous good produced under perfect competition conditions in the domestic country with the use of labor services (L). It is conceived of L as being the simple aggregate of effective labor services provided by perfectly substitutable workers with each of them possessing different units of effective labor. The skilled and unskilled workers refers to changes in inequality that due to changes in the relative wage of skilled workers [2].

It is assumed that firms pay the same wage rate per effective unit of labor. Thus the distribution of talent across firms does not affect unit production costs. For simplicity, it is assumed that each unit of L produces one unit of the homogeneous good under linear technology, so:

$$X = L \quad (1)$$

Using labor as the counting unit, the price of the homogeneous, non-traded good is considered such $P_X = 1$. It is assumed that all prices in the domestic economy and in the other countries are expressed in a common currency (the exchange rate is fixed).

The vertically-differentiated good (Y) is produced by perfect competition firms in both the domestic country and the other countries. In addition, quality is measured by an index $Q > 0$, and that there is complete information about the quality level in all varieties produced at home and abroad. Moreover, for simplicity, it is assumed that there is only one variety produced by domestic firms, q , and only one variety produced by other countries firms, q^* . It is further assumed that, in both the domestic country and the other countries, average costs depend on quality, and that each (physical) unit of a given quality is produced at constant cost.

It is assumed that the domestic country has comparative advantage in the product of the high quality variety of the differentiated good. This represent that the least cost producers of the variety with quality q are domestic producers (that is, $AC(q) < AC^*(q)$), whereas the least cost producers for variety q^* are other countries producers (i.e., $AC(q^*) > AC^*(q^*)$). For simplicity, it is set $P(q) = AC^*(q^*) = \gamma^* q^*$, and $P(q) = AC(q) = \gamma q$.

Assumptions related to the households

All households are assumed to have identical preferences, and to be endowed with one unit of labor, which they offer in elastically. There are, however, differences in skill between households, which are reflected in differences in the endowment of each household's effective labor supply. This is in turn reflected in an unequal distribution of income across households. Following Rosen(1974) and Flam and Helpman(1987) it is assume that the homogeneous good is divisible, whereas the quality-differentiated product is indivisible and households can consume only one unit of it [5]. For simplicity, it is considered the utility function of household i as:

$$U_i = Q_i X_i \quad (2)$$

Where Q_i and X_i stand for the quality(either q or q^*) of the differentiated product and the quantity of the homogeneous good (respectively) consumed by household i .

Let e_i stand for the endowment of effective labor units owned by household i . Since the wage rate per effective unit of labor is unity, e_i stands also for household income. Assume that there is a continuum of households, ($i \in [0,1]$) with Pareto distributed incomes. The Pareto distribution is defined over the interval $e \geq b$, and its CDF is:

$$F(e) = 1 - (b/e)^a \quad (3)$$

Where $a > 1$: Parameter b stands for the lowest income (ability) in the population, and parameter a defines the shape of the distribution (if values of a increases, equality also increases).

The mean of the Pareto distribution is equal to:

$$\mu = \frac{ab}{a-1} \tag{4}$$

The budget constraint of a household depends on whether it consumes the domestic or the foreign variety of the differentiated product. The budget constraint of a household which buys the domestically-produced variety is,

$$e_i(1-t) = X_i + \gamma q \tag{5}$$

Whereas the budget constraint of a household buying the imported variety is,

$$e_i = X_i + \gamma^* q^* \tag{6}$$

Where t is income tax rate. The utility maximizing demand for the homogeneous good if the household chooses to consume the domestically-produced variety is,

$$X_i^D = e_i - \gamma q \tag{7}$$

Whereas if the household chooses to consume the other countries-produced variety the demand for X

$$X_i^F = e_i - \gamma^* q^* \tag{8}$$

In deriving the above it have assumed that for all households income is high enough to generate positive demands for both goods. The resulting indirect utility functions in the two cases are then,

$$V_i^D = (e_i - \gamma q)q \tag{9}$$

$$V_i^F = (e_i - \gamma^* q^*)q^* \tag{10}$$

Household i will buy a foreign produced variety if $V_i^D < V_i^F$.

It should be noted that : $\partial(V_i^F - V_i^D) / \partial e_i > 0$ (11)

This implies that only households with large incomes will be willing to buy the high-quality variety which is domestically produced, whereas low-income households will find it optimal to consume the low-quality variety which is imported from the other countries.

Let λ implies the income of a household that is indifferent between consuming the domestically produced variety and the foreign variety, i.e., for this household it holds that

$$V^D = (\lambda - \gamma q)q = (\lambda - \gamma^* q^*)q^* = V^F \tag{12}$$

It term λ the dividing level of income (ability). Solving for λ it is found that:

$$\lambda = \frac{\gamma q^2 - \gamma^* (q^*)^2}{q - q^*} \tag{13}$$

Equation (13) shows that the value of λ is independent of both parameters (a and b) describing the distribution of income. The Pareto distribution denote that the proportion of households with incomes smaller or equal to λ (that is, households of consumer the foreign product), is equal $1 - [(b/\lambda)^a]$. Thus, the real volume of total imports is:

$$M = 1 - [(b/\lambda)^a] \gamma^* q^* \tag{14}$$

Given our interest in the effect of mean preserving changes in income inequality, and the independence of λ from changes in a and b, we can use equation (14) to find the effect of changes in a while adjusting b (the lowest income in the population) so as to keep average income (= $ba/(a-1)$) constant.

Letting $\bar{\mu}$ imply the given level of average income it is found that:

$$\frac{\partial M}{\partial a} = (M - \gamma^* q^*) \left[\ln \frac{(a-1)\bar{\mu}}{a\lambda} + \frac{1}{a-1} \right] \tag{15}$$

The sign of $\frac{\partial M}{\partial a}$ is ambiguous, since $\left[\ln \frac{(a-1)\bar{\mu}}{a\lambda} + \frac{1}{a-1} \right] < 0$.

In order to understand the reason for this ambiguous effect consider first the result of a rise in a while holding b constant. In this case the rise in a (which implies a reduction in inequality) is associated with a reduction in average income (ability) and in the proportion of households with income greater than λ (i.e. the households buying the domestically produced variety). Consequently, the proportion of households selecting to buy domestically produced goods decreases and imports increase. Given our wish to examine the effects of mean preserving changes in income inequality, an increase in a must be paired with an increase in b in order

to keep μ constant. A-ceteris paribus- increase in the scale parameter b (which implies a rise in the lowest income in the population, as well as a rise in average income) implies that there will be fewer households below any given level of μ , thus decreasing the proportion of households buying the imported variety. Hence, the increase in a , increased imports and increased in b decrease imports.

Econometric Analysis

Empirical Literature Review and Data

Most previous studies on import demand function are considered it as function of real income and relative prices[3,4]. A large body of empirical literature has estimated price and income elasticity of imports and much of it focused on trade. Some of recent papers have tried to find evidence of a long run relationship (co-integration) between the levels of imports, income and relative prices (or the real exchange rate). In abroad of Iran, more studies have done in relationship between inequality and import demand. Katsimi and Moutos (2011) by using US data for the 1948–2007 period, find not only that there is a stable long-run relationship between imports, income, relative prices and inequality, but that the influence of inequality is quantitatively very important as well. Their result appears robust both to changes in the level of aggregation of real imports and across alternative methods of estimating co-integration equations. Adam et al (2008) the empirical importance of changes in inequality on the demand for imports, assessed by examining panel data for 36 developing and developed countries for the 1980-1997 period. They find significant evidence supporting their prediction that inequality has a large influence on the demand for imports. Moreover they find that, in line with the predictions of their theoretical model, this influence is positive for high-income countries and negative for low-income countries[2]. Katsimi and Moutos (2006) find no evidence for the existence of a long run relationship between aggregate imports, income and competitiveness in the US. However, the addition of US income inequality as a determinant of the aggregate demand for imports improves the picture significantly[7]. Another strand of this literature challenges the conventional wisdom by arguing that the standard imports demand function may be misspecified due to the omission of other determinants of a long run imports equation.

But, up to now, no study has done for investigate effect of income inequality on demand for Iran's imported consumption goods. Tashkini and Bastani (2006) [12], Toufighi and Mehrabian (2002), Shahabadi (2005) and Pourmoghim (2000) [10] investigate affecting factors on Iran's import demand function. They consider import demand as dependent of gross domestic product (GDP) and relative price (RP). Their results show that GDP has positive effect and RP has negative effect on Iran's import demand. Abrishami (2001) fail to find evidence for a co-integrating relationship for the 1971-1997 period [1]. Nasrollahi (2004) find evidence for a co-integrating relationship among real imports, real income and relative prices for the 1959-2000.[9]

The main empirical implication of our theoretical model is that inequality may be an important determinant of the demand for imported consumption goods. As a result, omitting the level of inequality may be one reason why most previous studies failed to provide strong evidence of a stable long run imported consumption goods demand function[8]. Our purpose is to enrich the commonly used empirical specification by including a measure of inequality. Specifically, in line with the most recent research in this topic, we use the Johansen (1988, 1991) procedure in order to investigate the existence of a long-run relationship between imported consumption goods, income, relative prices and inequality. We expand on this traditional specification since -unlike our stylized model- international trade is conducted not only in vertically differentiated goods but in horizontally differentiated and homogeneous goods as well.

Our analysis is based on annual data. We consider model of Iran real imported consumption goods (IM) as a function of Iran real gross domestic product(Y), the relative price (RP), income inequality (IN) and total factor productivity (TFP). To calculate TFP, we need to determine the share of capital and labor. Hence, we have estimated the production function with two explanatory variables L and K for the calculation of TFP. To estimate the production function, we need to specify the incidental form of production functions[11]. In this study, we have used the Cobb-Douglas production function. Estimation results indicate that the share of labor(a) and physical capital(B) in GDP is respectively 56 and 44 percent. Thus, total factor productivity is calculated using the following index:

$$Tfp_t = \frac{Y_t}{L^a K^B} \text{ or, } \text{Log}Tfp = \text{Log}Y - B\text{Log}K - a\text{Log}L \quad (18)$$

that (TFP) is total factor productivity, (Y) is gross domestic product, (K) is Inventory of physical capital, (L) is labor, (a) is GDP elasticity to physical capital, (B) is GDP elasticity to labor and (t) is time.

Note that all variables have been used to the logs. We measures inequality, IN with the GINI coefficient, Imported consumption goods, (IM) and real gross domestic product, (Y) have been in 2011 taken from the Federal Reserve Bank of Iran available at Time Series Data Bank (TSD)[14]. In addition, consumer price index(CPI) for Iran and US in order to accounting Iran's relative price, taken from world development indicators (WDI) the covers the longest period (1969-2010).[15]

Estimation and Testing Procedure

First, we test the unit root hypothesis for each of the individual component of the vector stochastic process $\{Z_t\}$; where $Z'_t = (IM_t, Y_t, Rp_t, Gini_t, Tfp_t)$.Standard unit root tests of Dickey and Fuller (1981) fail the unit root null for all the four series under consideration in level. But fail to reject the unit root null for all the four series with 1st difference. Therefore, we proceed by assuming that the process $\{Z_t\}$ consists of I(1) components. Then we move on to multivariate analysis within the Johansen (1998, 1991) co-integration framework. We take the following steps: (i) Since the Johansen procedure is based on the estimation of a VAR(p) model, we first choose the optimal lag-length of the VAR. (ii) In the context of the Vector Error Correction (VEC) representation of VAR(p), we test for co-integration by using the trace and the maximum eigenvalue statistic. (iii) Having determined the co-integration rank, we re-estimate the VEC model with the co-integration rank restriction imposed on the long-run matrix of the model. In this framework, we estimate both the long-run and the short-run dynamics of the system. More specifically, let us assume that the stochastic process $\{Z_t\}$, where $Z'_t = (IM_t Y_t RP_t Gini_t Tfp_t)$ is generated by the following VAR(p) model

$$Z_t = A_0 + \sum_{i=1}^p A_i Z_{t-i} + U_t \tag{19}$$

whose VEC representation takes the form:

$$\Delta Z_t = A_0 + \Pi Z_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Z_{t-i} + U_t \tag{20}$$

with $U_t \sim NI(0, \Omega)$. The process $\{Z_t\}$ is co-integrated if the matrix Π is of reduced rank, that is when $r(\Pi) = r < 5$ in our case. The rank of Π describes the number of the co-integrating vectors in the system. If the matrix Π is of full rank, that is $r(\Pi) = 5$ then the VAR(p) is stable VAR in levels and there are no unit roots in the system. Note that this case contradicts the assumption that each of the four series is I(1). Finally, if $r(\Pi) = 0$ then the number of unit roots in the system is equal to four, and the series are not co-integrated. Let us assume that $r(\Pi) = 1$. In such a case, the long-run matrix Π can be decomposed into

$$\Pi = cb' \tag{21}$$

Where c and b are (5×1) vectors. In such a case, the system (2) becomes

$$\Delta Z_t = A_0 + \begin{bmatrix} c_{11} \\ c_{21} \\ c_{31} \\ c_{41} \\ c_{51} \end{bmatrix} [b_{11} b_{21} b_{31} b_{41} b_{51}] Z_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Z_{t-i} + U_t \tag{22}$$

It can be seen that the vector b contains the long-run parameters of the system, whereas the vector c contains the adjustment coefficients of each of the four variables $IM_t, Y_t, RP_t, Gini_t$ and Tfp_t to the disequilibrium error of the previous period.

The results of unit root test reported in table (1).

Table 1. Unit root test

Variable in level	ADF test		Variable in 1st difference	ADF test	
	constant	Constant & Trend		constant	Constant & Trend
LIM	-1/758*	- 1.853	dLM	-4/885***	-4/462**
LY	- 1/069	- 1/254	dLY	- 3/362**	- 3/413**
LRp	- 2/262	- 2/124	dLRp	- 5/918***	- 5/838***
LGini	- 1/325	- 2/129	dLGini	-4/805***	- 7/382***
LTfp	-1/974	-1/895	dLTfp	-3/992***	- 4/159***

Note: * , ** , *** Reject the null of non-stationarity at the 10% , 5% , 1% level

Then we move on to multivariate analysis within the Johansen (1998, 1991) co-integration framework. We take the following steps: (i) Since the Johansen procedure is based on the estimation of a VAR model, At first, we choose the optimal lag length of the VAR[6]. The results of selecting the optimal lag of VAR reported in tables (2).

Table 2. Choosing the Optimal lag of Var model

Lag	LogL	LR	(HQ)	(SC)	(AIC)
0	-48/211	NA	- 3/271	3/176	2/956
1*	154/638	338/084*	- 6/463*	- 5/604*	- 6/924*
2	175/419	28/862	- 5/845	-4/270	- 6/689
3	192/638	19/132	- 5/029	-2/738	- 6/257

* represent lag order chosen by the criterion
 LR is sequential modified LR test statistic
 AIC is Akaike criterion
 SC is Schwartz criterion
 HQ is Hannan-Quinn criterion

The table(2) show that according to Akaike and Schwarz and Hannan-Quinn information criterion the optimal lag of VAR is 1. (ii) Then we test for co-integration by using the trace and the maximum eigenvalue statistic. The statistic results of trace and maximum eigenvalue are given in Tables (3) and (4).

Table 3. The result of consumption goods imports Co integration by using Trace Test

Null Hypothesis	Alternative	genvalue	Trace Statistic	Critical Value 0/95	Result
$r = 0$	$r \geq 1$	0/567	74/978	60/061	fail to reject Null Hypothesis
$r \leq 1$	$r \geq 3$	0/419	43/986	40/174	fail to reject Null Hypothesis
$r \leq 2$	$r \geq 3$	0/313	23/863	24/275	Reject Null Hypothesis
$r \leq 3$	$r \geq 4$	0/231	9/962	12/320	Reject Null Hypothesis
$r \leq 4$	$r = 5$	0/005	0/216	4/129	Reject Null Hypothesis

Trace test indicates 2 co-integrating eqn(s) at the 0.05 level.

Table 4. Import Co-integration Result by using Maximum Eigenvalue Test

H ₀	Alternative	Eigen value	Max-Eigen Statistic	Critical Value 0/95	Result
$r = 0$	$r = 1$	0/567	30/992	30/439	fail to reject Null Hypothesis
$r \leq 1$	$r = 2$	0/419	26/122	24/159	fail to reject Null Hypothesis
$r \leq 2$	$r = 3$	0/313	13/901	17/797	Reject Null Hypothesis
$r \leq 3$	$r = 4$	0/231	9/745	11/224	Reject Null Hypothesis
$r \leq 4$	$r = 5$	0/005	0/216	4/129	Reject Null Hypothesis

Max-eigenvalue test indicates 2 co-integrating eqn(s) at the 0.05 level.

As shown in Tables (3) and (4), according to both Trace and Max-Eigen statistic indicates 2 co-integration at 0/05 level. Thus this result confirms existence of a long-run relationship for imported consumption goods equation (one including imported consumption goods, income, relative price and total factors productivity). Then the long-run relationship between the variables in the model were estimated and normalized vector is selected to first endogenous variable. In the choice of the long run vector model variables, it is necessary to note that the normal vector to first endogenous variable must sign of the coefficients according to economic theory and the vector coefficients to be statistically significant.

Table 5. estimation of co-integration vector of Iran(long run relationship)

Variables	Coefficient	Standard Error	T-Ratio
LM	1	-	-
LY	0/686	0/162	- 4/234
LRp	0/212	0/079	2/683
LGini	-0/253	0/098	-2/581
LTfp	0/368	0/119	-3/092

$$LM = 0/686LY - 0/212LRp + 0/253LGini - 0/368LTfp \quad (19)$$

All reported coefficients are significant. In other words, real income, relative price, Gini coefficient as the estimator of income inequality and the total factors productivity explain demand of imported consumption goods and this variable is well described by its lags, according to the diagnostic criteria such as $R^2=0/93$.

As are observed in the estimates, the greatest coefficient is 0.68 that related to gross domestic product. Thus, the GDP is one of the determinants of consumption goods imports. Because increasing it, increases imports of consumption goods. In fact, when the real income of the people has increased, imports of consumption goods has also increased directly. The positive and highly significant coefficient for this variable in the demand for imported consumption goods to Iran, expresses which this variable plays an important role to determining the volume of Iran's imports.

After the gross domestic product(Y), the most of effect is relate to total factors productivity(TFP). Coefficient of this variable has obtained 0.36 that is negative and significant. In fact, increase in total factor productivity reduces cost of domestic products in comparison imported goods. It caused to shift in demand from imported goods to domestic product goods. Therefore, the increase in total factor productivity will decrease imported consumption goods.

The coefficient of income inequality is 0.25 positive and significant. It can be stated with increasing income inequality and the deterioration in income distribution, imports of consumption goods will increase. It seems that the main weight of imported consumption goods consumed by the wealthy classes. In other words, This group according to their purchasing power and consumption patterns have tended to use the foreign consumption goods. The result of this part is similar to Katsimi and Motous (2011), Adam et al (2008) and Katsimi and Motous (2006).

In addition, coefficient of relative price has obtained (0.21) negative that is significant. Therefore, increasing the relative price leads to reduction imports of consumption goods. In other words, by increasing the relative price, domestic currency will weaken, and imports of consumption goods are more expensive. Thus the demand for imported goods will decrease.

Finally, we estimate vector error correction models (VECM). The result of VECM reported in table (6). The error correction coefficients of real imports reported in the last columns of Table (6) are negative and significant under both specifications. This indicates that in the presence of disequilibrium the volume of imports gradually adjusts towards its long-run value. The adjustment speed of short run error towards equilibrium and long run errors is equal to 0.05 and in 5% level is significant.

Table 6. The estimate of vector error correction models (VECM)

variable	Coefficient	Standard errors	t-statistic
$\Delta LM(-1)$	0.233	0.167	1.391
$\Delta LY(-1)$	0.783	0.318	2.460
$\Delta LRp(-1)$	-0.059	0.072	-0.821
$\Delta LGini(-1)$	-0.713	1.025	-0.696
$\Delta LTfp(-1)$	-0.808	0.667	-1.211
ECM(-1)	-0.057	0.030	-1.885

ECM(-1) reports coefficients of the residual of the co-integrating equation in the error-correction model of consumption import

Concluding Remarks

The main purpose of this study is identify factors affecting on the imports of consumption goods during the period 1969-2010 period. This study assessed the effects of factors such as gross domestic product, relative price, income inequality and total factor productivity on Iranian imports of consumption goods. Based on the findings, there was a positive relationship between the gross domestic product and income inequality with imports of consumption goods.

In addition, relationship between the relative price and total factors productivity with imports of consumption goods are negative and significant. In fact, increase in total factor productivity reduces cost of domestic products in comparison imported goods. It caused to shift in demand from imported goods to domestic product goods and decreases imports.

According to previous study, if a country has comparative advantage in the production of the high-quality varieties (high-income, high-productivity countries usually do), the rise in inequality will increase the imports demand and this subject is inversely about the low-income countries that have comparative advantage in the production of the low-quality varieties. The results of evaluation show significance of income inequality as a determining factor in demand equations of imported consumption goods. But as was seen in the estimates, it is not correct in the case of Iran. This means that although Iran is a developing country, but the increase in income inequality that has led to increased imports of consumer goods. Therefore, Iran by reducing income gap between its deciles, such as developed country can comparative advantage in producing high quality varieties, so that responded to consumption needs of people. In fact, The increasing role of knowledge components in the production of the country can be a great help to a wide stratum of society whose only their asset is human capital and caused of more balanced distribution of income and increase the competitiveness of the economy and increase the willingness of society stratum to using of domestic high quality varieties.

Finally, It is recommended that policy makers and officials use the youth and skilled labor because use of the young and skilled person, not only reduces the income inequality in society but also increases productivity in different economic sectors and reduces the need to import from other countries

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