

An Analysis of the Gasoline Demand Based On Income Rates in the Different Economical Sections of the Country

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Abstract: Estimation of price and income elasticities of gasoline demand in short-term and long-term can provide useful information to the policy makers. Gasoline fuel is more considered for security supply and environmental aspects. The aim of this study is estimating of income elasticity of Gasoline demand among economic sectors of Iran (e.g. agriculture, services, industry and mining) during the period 1367-1391. Therefore, demand function of gasoline was stipulated in the framework of panel Autoregressive Distributed Lags (PARDL) and income and price elasticities (short-run and long-run) were estimated by pool mean group (PMG) estimator. Long-run income and price elasticities were estimated 2.14 and -1.12, respectively. Therefore, gasoline is a Luxury and elastic good for sectors in long-run. In contrast, short-term income elasticity of gasoline demand for the entire sectors (on average) was negative and meaningless, but only for the services sector is significant at the 10% level. The short-run price elasticity of gasoline demand was estimated -0.13 percent that is statistically significant at the one percent level. The main policy implications of this study are discussed.

Keywords: Gasoline Demand, Income Elasticity, Price Elasticity, Economic Sectors, Panel ARDL.

Introduction

The energy plays a key role in all countries economic development and growth potentially and any demands for the related process will make its importance in this pavement. Energy is considered as one of the most important productive factors in many various manufacturing resources. One of the most important hydrocarbonate fuels is the petroleum having many various deviations. The benzene is one of the most important deviations of the petroleum being considered as the most strategic productions playing a key role in the transportation section efficiently. This important production carries the energy in compare to other productions regarding to the manufacturing aspect. The application of the related production has been increasingly increased during the recent years due to the increase of the automobiles and the low level of the technology in this pavement; importantly the subsidiary price of the country has caused the demand of the benzene to get increased in this regard (Khazadi, 2008). About 98% of the country consumed benzene is wasted in the transportation section and this shows the sophisticated role of the benzene in this case (Mehrghan & Ghorbani, 2009). In addition to the transportation section, today the most considerable section of the energy is spent for the agricultural activities being considered as the main fundamental productive structure in this pavement (Soheili, 2007). The recognition of the energy demand regarding to the main economical sections has

its own importance particularly in the industrial section because this is considered as one of the most recognized economic development indexes of all countries regarding to increase the national net production; for the reason, due to the economic growth and development and the industrialization, the degree of the energy demand is also increased (Sadrzadeh Moghaddam et al., 2013). The petroleum productions are affected by many various variables such as the economic variables of the economic growth and the prices level. The economic growth has affected on the economy regarding to both ask and demand leading to increase the productive and consumptive capacities in this pavement. The increase of the economy capacity of the country has been constructed by the manufacturing and service-based units bringing new requirements for these petroleum productions potentially. On the other hand, by the increase of the capita and other consumption patterns, the family consumption has been also increased in this case (Bahreini, 1997). On the other hand, due to the considerable increase of the energy prices, the investigation of the determinant factors of the energy capita is intensely required to be evaluated in order to determine the degree of the consumption rates in this pavement due to the energy economy literature. Some of these experimental models have shown that the energy capita consumption is intensely followed up by the U reverse coordination (Destais et al., 2009). In other words, by increasing the capita income, the intensity of applying the energy will be also increased over time but through passing the capita income of a specified threshold, the intensity of using the related energy will be fixed getting to be reduced in this case. In some studies, the income rate of the energy consumption is also following a similar behavior (for example, the studies of Destais et al (2009). Probably, in low level income rates, the energy consumption is considered as a basic limitation for the economic growth in this pavement but by increasing the capita income, the reduction of the energy rate will reduce the intensity of using energy into the transportation system and other environmental challenges potentially (Destais et al., 2007). The price rate and the income of the gasoline demand show whether the price policy of the government and income changes of the country different economical sections has increased or decreased the degree of the gasoline consumption? According to two great shocks of the oil price in 1970 and 1973 in Iran, the interest of studying and evaluating the oil productions has been also increased considerably. The highest consumption of the gasoline, a serious threat of the economy, politics and the friendly environment has been also considered in this pavement (Taghavaee & Hajiani, 2014). An important consideration of estimating the energy carriers' demand is subjected to the distinction between the short and long term effects and for the reason, the solidarity or the lack of solidarity of the recent investment (gasoline used vehicles) are the main factors in this process efficiently. In short term process the recent investment of the consumer is considered as fixed rate and hence in the short term demand after the necessary changes of the effective factors of the demand, the selection of the efficacy rate of the stock should be established based on the related automobiles but in long term process the investment stock is very variables and it should be completely different than the short term cases (Ghaderi & Mirjalili, 2005). Thus, due to the importance of the gasoline demand regarding to the growth and economic development of the country and the increase of the gasoline demand in the different sections of the country's economy and on the other hand the distinction between the short term and long term demands of the energy demand estimation, the main question of the study is whether the sensitivity of the gasoline demand is really felt between the changes of the short and long term processes of the country regarding to the industry and mining and agricultural sections of Iran during 1988 to 2012? Taghavi and Hajian (2014) in a study carried out the price demand and gasoline demand income in Iran. In this study, the period of the study is referred to 1970 to 2010. In this study, error correction method (ECM), static and dynamic models have been applied in order to estimate the related model. The results of the study represented that the short and long term price demands are -0.1583, 0.1618 and -0.3612 and the income demand is 0.2732, -0.3581 and 0.4636, respectively. Lin and Zeng (2013) stated that the mean price demand is established between -0.497 and -0.196 and the mean income demand is established between 1.01 and 1.05. Rao and Rao (2009) in a study titling the mass-coordination and gasoline demand concluded that the demand is out of demand rather than income and price. Pesaran and Smith (1995) in his study to determine the effective factors of the energy demand in Greece concluded that the gasoline demand is out of demand than the price and income regarding to the short and long term. Cheung and Thompson (2004) used the self-representation of the error method (VECM) and the Joe Haonson pile-up technique in order to estimate the gasoline demands in China. The results represented that the price and income demands of the gasoline in long term is -0.56 and 0.97, and the short term is -0.19 and 1.64, respectively. Ramanathan (1999) has applied ECM model for estimating the energy demands in India and represented that the enlargement of the income demand in short and long terms is 1.12 and 2.68, respectively while the price demands are small in short and long terms (-0.21 and -0.32, respectively). Sadrzadeh Moghaddam et al (2013) in a study carried out the estimation of the energy and price demands regarding to the industrial section. Abdoli and Mohammadi Khiareh (2011) in a study carried out the effective factors on the gasoline consumption in Tehran. The results showed that the variables of the capita income, capita consumption of the gasoline and the real price of the gasoline are coming from the first class and all variables have long term relationship together. The price and income demands of the gasoline are estimated in long term -0.17 and 1.28,

respectively; based on the ECM model the gasoline price demand in short term is -0.11 and the long term estimation is estimated as 0.78 in this case.

Materials and Methods

In the recent years, the intensity of consuming the gasoline in Iran is considerably increasing particularly in megacities; for the reason, this is the main factor for making the air contamination and environmental pollution in these cities; of course this will endanger people's health destroying the national economy in this case. This main factor should be subjected to the low quality of the gasoline and the destructive transportation system of the country making all these air pollutions in this pavement. Hence, the most important approaches for preventing the air pollutions should be mainly subjected to make the destructive transportation out of the related system efficiently and then the price of the gasoline should be reduced potentially in order to prevent any air pollutions as the main approaches for the recent years (Abdoli & Mohammadi Khiareh, 2011). On the other hand, modeling of coordination for the gasoline demand may seem to be very simple. In the lesson books of the economy, the necessary variables have been defined for estimating the commodities demand. These variables include the income, price of commodity and the supplementary or substitutive commodities price. The application of this modeling for these commodities such as the gasoline may bring some other problems in this pavement. The related problem is that the gasoline demand is a derivative demand; in other words, people do not need the gasoline directly but they tend to have better transportation system that this makes the gasoline demand. If the degree of the fuel efficacy is stable over time, this problem will be removed automatically but the increase of the fuel efficacy over time will also make the transportation system per the gasoline increase. Another problem is that the increase of the fuel efficacy is considerably affected by the gasoline price. Due to the mentioned issues, there is established high correlation between the price of the fuel and the efficacy (Abdoli & Mohammadi Khiareh, 2011). The applied experimental models for the energy demand are mainly extracted from Marshal Demand Theory. In the main model the represented variables include the price and real income (Abdoli & Mohammadi Khiareh, 2011). In other words,

$$G_t = f(p_t, y_t)$$

The related equation is to investigate the energy demand. Due to the gasoline demand function for the different economical sections of Iran in this study, the gasoline consumption variables and the added value of every economical section will be applied in this section. In this study, the investigation of the gasoline demand income for the different economical sections of Iran is carried out during 1988 and 2012 efficiently. The considered experimental model is used based on the Lin and Zeng study in 2013 and all the panel data have been efficiently applied in this case. Due to the study of Lin and Zeng (2013), the general representation of the study is carried out as following:

$$\ln G_{it} = \alpha + \beta_1 \ln p_{it} + \beta_2 \ln VA_{it} + \sum_{k=1}^K \beta_k + 2X_{kit} + \epsilon_{it}$$

It should be mentioned that, the self-regression method along with developed interruptions (ARDL) into the panel data (Panel ARDL) framework used in order to estimate the model and the coefficients in this study. In this study, a middle process of Pesaran et al (1998) is used to obtain the saturated group mean calling PMG in this case.

Data gathering method

In order to gather the theoretical discussion (theoretical basics and research background), the library-based method including all books and papers from ISI website and other formal websites have been used. The main reference of gathering all these data is subjected to the Iranian central bank and other different lists for the energy affairs.

Data analysis method

The mathematical models and the economy-measuring tools have been applied to analyze the related data in this study. In this case, Levin tests, Lin and Chu (LLC) and Im, Pesaran and Shin (IPS) are also applied in order to analyze the related data.

Results

Table 1. Results of price and income demands for the gasoline based on Panel Ista estimators for three Iranian economy sections.

Estimators	Income demand		Price demand	
	Coefficient	Probability value (PV)	Coefficient	Probability value (PV)
Minimum ordinary squares (OLS) of panel with special stable effects	0.620***	0.008	-0.599***	0.0007
Minimum ordinary squares (OLS) of panel with accidental stable effects	3.248***	0.000	-2.039***	0.002
Minimum ordinary squares (GLS) of panel with recovered stable effects	3.310***	0.000	-1.895***	0.000

Table 1 shows the results of price and income demands for the gasoline based on Panel Ista estimators for three Iranian economy sections. As it shown, the sign of all coefficients are established based on the theoretical expectations confirming together. According to the results when a one percent is increased, the other sections of the economy will be increased as 0.62%, 3.24% and 3.31% in this regard. Also, a one percent increase of the real price of the gasoline demand will lead to decrease of -0.59, -2.30 and -1.89 percent in this case.

Table 2. Results of Dynamic Model Estimation (ARDL, 1, 1, 1) Through PMG.

	Variables	Coefficients	Z statistics	Probability value (PV)
Short term demands	Ln AV	2.148***	4.44	0.000
	Ln Pg	-1.120**	-2.25	0.024
Middle demands	ΔLn AV	-0.316	-0.58	0.565
	ΔLn Pg	-0.134***	-2.69	0.007
Short term	ECM (error-correction coefficient)	-0.158	-0.84	-0.339

Table 2 shows the results of ARDL dynamic pattern estimation for the research variables through the PMG estimator. The PMG estimator is subjected to the slope coefficients (price and income demands of the study) and the width from the source between the related groups regarding to the different economical sections in short term but the long term is considered as the equal case in this study.

Table 3. Results of Hussmann test to determine the estimators' efficacy.

Statistics of Hussmann	Statistics of Z	Probability value (PV)
2.44	-	0.2955

According to the obtained results of PMG estimator table 2 in long term, when a one percent increased of the added value or income is seen in economical sections, the demand of the gasoline will be also increased by 2.14% in this case and this is for the increase of the recent automobiles and other machineries and transportation systems. In long term, the price of the gasoline and its increase are really sensitive to the different economical sections because the demand of the gasoline is getting higher than one (-1.12) in long term. Hence, the price policies have better efficacy over the long term. For three sections of the economy, the income demand of the gasoline is considered as negative (-0.316) and it is not significant statistically.

Table 4. Results of short term demands and the equation of error-correction based on the economical section through PMG.

Sections	Variables	Coefficients	Z statistics	Probability value (PV)
Services	$\Delta \text{Ln AV}$	-0.473*	-1.78	0.076
	$\Delta \text{Ln Pg}$	-0.0967***	-3.50	0.000
	Width from source (α)	0.596**	2.09	0.037
	ECM	0.129**	2.18	0.030
Mining and industry	$\Delta \text{Ln AV}$	0.704	0.69	0.493
	$\Delta \text{Ln Pg}$	-0.0734	-0.37	0.709
	Width from source (α)	-0.838	-1.08	0.279
	ECM	-0.0930	-0.98	0.327
Agriculture	$\Delta \text{Ln AV}$	-1.181	-0.68	0.497
	$\Delta \text{Ln Pg}$	-0.233	-0.49	0.623
	Width from source (α)	-3.591*	-1.92	0.055
	ECM	-0.511***	-2.63	0.008

According to the reported results in table 4, the income demand of the short term regarding to the services and agricultural sections are -0.47 and -1.18, respectively that these are significant statistically only in the service section. Hence, in short term a one percent increase of the added value including the services and transportation systems will reduce about -0.47% of the gasoline demand in this regard. The negative of the income demand in short term is that the recent stock of the investment is subjected to the transportation system as the main stable variable.

Discussion and Conclusion

As it was shown, the minimum demand is subjected to the fixed effects (FE) and according to the gasoline, this process is considered as the main necessary commodity regarding to the consumptive commodities and the main price of the gasoline should be established between zero and one. Regarding to the rest of the cases (other estimators), the gasoline is considered as the main luxury commodity being higher than one and having demand price higher than one.

As it was shown, the process is subjected to the long term regarding to the sign of the coefficients (demands) according to the economical theoretical basics and these have negative and positive price and income demands statistically. According to the results of the long term process for the Iranian economical sections, the gasoline is considered as the main luxury commodity regarding to its price. In contrast, the related process regarding to the short term is considered as the negative sign and only the price is significant statistically. The error correction coefficient sign is theoretical (negative) but it is not significant statistically. According to the reported results of table 2, all signs of the demands over the long term are subjected to the theoretical basics but only the price is significant statistically and it will have negative sign in short term regarding to its price and income demands. But these will also come along with positive signs but none of them are significant statistically. The preliminary understanding of the reported results through the estimators represent the fact that the PMG estimator can give accurate and authentic results that these can be also applied in order to extract the statistical correct results in this study.

According to the energy economy literature, this coefficient should be small than one being close to the zero and positive but it is not significant because in short term the recent automobiles and other transportation systems are fairly stable in this pavement. Thus, due to the derivation of the gasoline demand, it is expected that the income increase regarding to the short term does not change and the income demand is not getting significant in short term. The negative income demand is for that the government should pay attention to some plans and other restricted plans of the traffic and fuel card in order to reduce the demand of the gasoline in this pavement. Also, due to the results, the price demand of the gasoline regarding to the short term is obtained -0.13% for three sections and it is significant statistically in one percent level. As it shown, the PMG estimator is able to estimate the price and income demands of the gasoline in three sections and the error-correction coefficients.

Hence, in short term the increase of the added value of the income section regarding to the gasoline demand cannot be changed or reduced due to the implementation of some plans such as the restriction traffic for automobiles and the fuel card. The short term demand of the gasoline regarding to the mining and industrial section is obtained 0.70

but it is not significant statistically. Also, all price demands of the gasoline price are negative in short term and it is significant only in service section statistically (-0.096). It should be mentioned that the short term price demands are low and in other words they are out of demand. Generally, two factors of availability to the substitutive commodities and the number of applied cases are the main effective factors for the price demand of a commodity. Regarding to the gasoline, there has been established many various applications having low price in short term. In addition, the subsidiary of the gasoline sale price and making low price are the main factors for the demand price. Also in long term the changes effects include two main factors: the direct and indirect factors. The direct effects are taken place when the income increase of the gasoline increased (in other words, the higher income is coming along with the economy and other recreational travelling) and the indirect effects are subjected to the long term when the income of families are also increased in this pavement. In other words, when the income of the families is increased, the fuel consumption will be also increased in this case.

Conflict of interest

The authors declare no conflict of interest

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