2011 3rd International Conference on Information and Financial Engineering
IPEDR vol.12 (2011) © (2011) IACSIT Press, Singapore

Evaluation of Consumers' Welfare Costs due to rise of Energy Carriers Prices (subject of study: Iran)

Azadeh nikban [1], Hamid Nakhaie [2]

[1]Mahan Center, Islamic Azad University, Mahan, Kerman, Iran

[2] Mahan Center, Islamic Azad University, Mahan, Kerman, Iran

Abstract. In this research, in order to survey the effects of energy carriers' prices variation in the economy of Iran, Evaluation of consumers' welfare variation resulted from rise in (energy carriers') prices has been addressed using two indexes: Equivalent Variation (**EV**) and Compensating Variation (**CV**) during 1973-1998. In order to study welfare costs, first demand functions for kinds of energy carriers had been assessed. The selected model used for assessing demand equations was **AIDS** (Almost Ideal Demand System).
Applied data include price of energy carriers and it's extend of consume share is for period from 1973 to 2008.
Model results shows that increase in prices according to government offer result for %16.5 of decrease in utility level of consumers in society and to compensate income of society consumers and to achieve their initial utility level, sum of RIs.510,000 should be paid.

Keywords: Evaluation, Consumers, Costs due, rise of Energy, Carriers Prices

1. Introduction

Power consumption is one of the most important componemts of total energy consumption in Iran. Thus optimization of consumption is a necessity in this part, because the stable economic development and movement forward to industrialization need the effective and economic ultilization from energy carees, specially power energy.

The study of power demand is very important due to the shortage of power station equipments needed to generate power. By this, we carefully recognize behavioral structure of power consumption specially in districts and regionally power has a critical role in advanced and modern economics. It is considred as an important and key part in economic development program in many countries.

Power price is one of the effective factors for power demand that has a reverse relationship with consumption based on consumer behavior theary. By contrast, in Iran tariff rate inceases with consumption rate, because Government pays subside for power consumption. Bat It is very important that low-consumption indvidvals are those who consume in the time of load peak and as a result the marginal cost of per kilowatt is high in the power mains. By contrast, the persons who have high consumption, usually consume all day long and because of this, they consume power also in the hours of day that consumption is low and so their marginal cost is lower in power mains. Thus in many countries power price decreases with consumption increase. But in Iran, it is inverse, because the power price is sub sidial.

Importance and necessity of design implementation because of increasing growth power demand as an effective and uncontaminated energy in society's economic development and growth, researchers, scientists and policy- makers need futurism in this context. Establishment of small and big factories, residential and nonresidential buildings and recreative places needs electricity power. In general, development is along with energy application and specially electicity.

This important case has been studied over past decades, so the related researchers have intended to detect the functional relationship of power with societies' economic variables and tried to predict its demand. They have practically given the results of estimates the related responsibles. In all these studies, the main goal of power demand study is the evolution of income and price sensitivities for future planning and the prediction of its consumption value in future. Development planning of power generation capacities in country needs futurism and the long term prediction of power demand. Electricity as an economic sub- branch of country compared to the other branches, has two important characteristics the distinguish it from the other parts. One characteristic is that necessary investments to increase new capacities of generation, transfer and distribution of power is very considerable the other is that the necessary time to provide these capacities is relatively long and this needs long – term and medium – range predictions about power demand.

2. Goals of research

The importance of power industry as a basic and infrastructure industry has been growing in recent years. This problem is very important in out country.

Especially that our country is in economic development and growth conditions and undoubtedly to supply of electric energy in dimensions needed is very important. Given to importance and the role of power (electicity)as one of the most important necessary components in generation, determining.

Effectiveness demand in variens parts for electricity is very important. Regarding to above mentioned, this research aimes at study and analysis as follows:

- study of price and income shocks effect on power demand function
- Access to the relationship between power demand and its price.
- Access to the relationship between power demand and national income.

3. Hypothesis

Price shocks have an inverse relationship whit power demand.

Price shocks have a direct relationship with power demand.

Income elasticity of power consumption is positive and is less in short time than long term.

Price elasticity of power consumption is negative and its absolute value is less in short time than longterm.

4. Research questions

- What is the relationship between power demand in Iran and gross domestic product?
- What is the relationship between power demand in Iran and consumed cost of power.
- What is the relationship between income price elasticities of power in long term and short time
- What is the difference between the demand function of power in different provinces?

5. Research method

The kind of study is application and we use analytic- descriptive and econometric methods.

We have collected the necessary statistics to provide

This thesis from following references:

1- energy balance sheet
2- Iran's statistics center
3- News site of energy department
4- Balance sheet of Iran central bank
5- Regional power corporations
6- President strategic control and planning vice – president

In this study , we will analysis power demand function in Iran using econometric methods and combination data in 1371-1386 (1992-2007) .

The software used in Eviews version 5 by which power demand model is estimated.

6. conclusion

Given to the results of fitted model, we can conclude about the initial assumptions as follows:

a) The first hypothesis of research: It has been ascertainey that price shockes have a reverse relation thip with power demand, because the estimated price elasticity equals to – 0.043 that shows a reverse relationship between power demand and its price. As we know in the form of log, estimated coefficients show elasticities, of course this is a kind of restriction, because it assumes the elasticities constant. According to obtained results from the estimated model, the price elasticity of power demand in our country is negligible and equals to-0.043.

$$\frac{d(D)/D}{d(p)/p} = \frac{d \log (D)}{d \log (P)} = -0.043$$

b) the second hypothesis: It has been ascertaind that income shocks have a direct relationship whit power demand, because the estimated income elasticity equals to 0.088.

It shows that there is a direct relationship between power demand and income.

$$\frac{d(D)/D}{d(GDP)/GDP} = \frac{d \log (D)}{d \log (GDP)} = 0.088$$

c) the third hypothesis: It has been ascertained that income elasticity of power consumption in short-time is less than long – term. Because the estimated coefficient for virtual variable (D2) in 1994 (1376) refers to negligible increase of power consumption in mentioned year, that is power price has been increased about 136% and so price elasticity of power consumption is almost negligible in short- time. Also estimated coefficients apply that there are many factors intrudesing population, technology advancement, urbanization development which increase the power consumption to 1/15% It should be mentioned that the demand function of power in the different provinces is almost identical because in the estimated model only latitude-origin coefficient was slightly different and the other coefficients are identical for all provinces. The results obtained from the fitting of demand model show that the absolute value of income and the other coefficients are identical for all provinces. The results obtained from the fitting of demand model show that the absolute value of income and priceelasticity of power demand are 0.088 and 0.043% respectively in long-term. It shows that the power demand results from income policies than price policies.Also this refers to this subject that income and price elasticities of power demand in Iran are very small than the other countries.this is because of to be subside power price in Iran;80 government share from paid costs is more than three times of consumers share.so regarding to research findings this hypothesis that income and price elasticities of power consumption in Iran is similar to the other countries strictly is rejected.according to these findings,we can conclude that the use of electricity is less in fluenced by price and income with current price levels is very higher than its marginal cost for consumers.since to be low the power consumed price isnot an obstacle for its higher consumption,so income elasticity of power consumption is more than its price elasticicty.but low-income is an obstacle to buy the luxurious electrical equipments ,so the sensitivity of power consumption to higher income is more than the sensitivity of power consumption that its price.Given to optimization of power consumption is a requirement ,government attempts to control the price of power.Since consistent economic development and move forwards to industrialization need to efficient utility of components and careers of energy especially electricity energy.The most important of these methods is increase of tariff rate with increase of power consumption.We can conclude that such policies can not result in control and optimization of power demand in country.Also the other important point that is government pays subside for power consumption ,so this policy causes to reduce the power consumption only in non-peak hours,and there is no marked change in reduction of consumption in peak hours.So we will not have big change in marginal cost.As before mentioned, low-consumption individuals are those who consume in the time of load peak,and as a result the marginal cost of per kilowatt is high in the power mains.In the contrast,the consumers who have high consumption,usually consume all day long and because of this they consume power in the hours of day that consumption is low and so theirmarginal cost is lower in power mains. If the subside of energy careers is deleted ,we can expect that the price elasticity of power demand is increased highly;because income and price elasticities are not constant.One of the most important deficiencies of demand function estimate is the estimate in the form of Log,because it assume elasticities constant,but the elasticity isnot constant and it must be calculated as point.As mentioned before,if the current trend in the increase of power

demand continues,annual power consumption in country will increase to 8/6%.Now,if we assume that because of deletion or reduction of subside for power consumption,price elasticity of power consumption reduces to 5/5%,under these conditions we can save about 1/54% in grass domestic product of country.

7. REFERENCES

[1] Anderson, G. and R. Blundell (1983) 'Testing Restrictions in a Flexible Dynamic Demand System: An Application to Consumers' Expenditure in Canada', Review of Economic Studies 50: 397-410.

[2] Arthur Lewbel, Nesting the Aids and Translog Demand Systems, International Economic Review, Vol. 30, No. 2. (May, 1989), pp. 349-356.

[3] Angus Deaton; John Muellbauer, An Almost Ideal Demand System, The American Economic Review, Vol. 70, No. 3. (Jun., 1980), pp. 312-326

[4] Berndt, E.R. and N.E. Savin (1975) 'Estimation and Hypothesis Testing in Singular Equations Systems with Autoregressive Disturbances', Econometrica 43: 931-957.

[5] Eskeland,G. and Foyozioglu,T." Is Demand for Polluting Goods Managable? An Econometrics Study Car Ownership Use in Mexico"., Journal of Development Economics., Vol.53,(1997).

[6] Buse, A. (1994) ' Evaluating the Linearized Almost Ideal Demand System', American Journal of Agricultural Economics 76: 781-793.

[7] Carpentier, A. and H. Guyomard (2001) 'Unconditional Elasticities in Two-Stage Demand Systems: An Approximate Solution', American Journal of Agricultural Economics 81(1): 222-229.

[8] Chambers, M.J. and K.B. Nowman (1997) 'Forecasting with the Almost Ideal Demand System: Evidence from Some Alternative Dynamic Specifications', Applied Economics 29: 935-943.

[9] Chern, W.S., K. Ishibashi, K.Taniguchi and Y. Tokoyama (2002) 'Analysis of Food Consumption Behavior by Japanese Households', Ohio State University, National Agricultural Research Center and Food and Agriculture Organization of the United Nations.

[10] Deaton, A. and J. Muellbauer (1980a) 'An Almost Ideal Demand System', American Economic Review 70(3): 312-316.

[11] Edgerton, E. (1997) 'Weak Separability and the Estimation of Elasticities in Multistage Demand', American Journal of Agricultural Economics 79: 62-79.

[12] Green, R. and J.M. Alston (1990) 'Elasticities in AIDS Models', American Journal of Agricultural Economics 72:442-445.