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Price and Income Elasticities of Gasoline Demand in Iran: Using Static, ECM, and Dynamic Models in Short, Intermediate, and Long Run

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Abstract

Price and income elasticities of gasoline demand show whether the price policy, pursued by the Iranian government, can decrease the high gasoline consumption sufficiently or not. Since the two oil price shocks in 1970 and 1973, interest in the study of oil products demand has increased considerably, especially on gasoline. High gasoline consumption is a serious crisis in Iran, posing economically, politically, and environmentally threats. In this study, the elasticities are estimated over three intervals, short run, intermediate run, and long run in Iran during 1976-2010, by putting the estimates of Error Correction Model (ECM), static model, and dynamic model in an increasing order, respectively. The short run, intermediate run, and long run price elasticities are −0.1538, −0.1618, and −0.3612 and the corresponding income elasticities are 0.2273 - 0.3581, 0.4636, and 0.7284, respectively. Not only do these elasticities imply that the gasoline demand is price and income inelastic but also the adjustment velocity, estimated by ECM, is a low point at −0.1942. Based on the estimations, the gasoline demand responds to the changes of price and income slightly and slowly. Therefore, policy makers should develop more strategies to reduce gasoline consumption, for example, substitute goods, public transportation systems, and environmental standards settings.

Keywords

Gasoline Demand, Price Elasticity, Income Elasticity, Static Model, ECM, Dynamic Model

1. Introduction

Since the two oil price shocks in 1970 and 1973, interest in the study of oil products demand has increased considerably, especially on gasoline [1] [2]. These studies assessed the economical, environmental, and political impacts by evaluating the key elements of gasoline demand. Despite deeply concerning of oil producing countries with the international oil products demand, they pay little attention to the domestic demand of the products [3]. For example, gasoline consumption is a serious crisis in Iran which increased considerably until 2006 [4], causing great threats. The consumption of gasoline, as a subsidized good, is very high in Iran because of the low price which is determined by the government [5].

High gasoline consumption is a serious crisis in Iran, posing economically, politically, and environmentally threats [6]. The gasoline consumption has outnumbered the production level leading to import gasoline. Not only the decreasing balance of payments, economically, but also increasing energy dependency, politically, has threatened the country. As a negative externality, it has resulted in environmental pollution, reducing social welfare [5]. These threats have raised the concerns with the high gasoline consumption.

Due to the great threats, policy makers have planned some strategies to turn down the consumption. For example, Iranian government has forced up the gasoline price noticeably by removing the subsidy in 2007 [6]. The policy can reduce the consumption but it is not clear whether it is effective enough in the reduction or ineffective.

The main objective of this paper is to evaluate the price and income elasticities of gasoline demand in Iran. It shows whether the price policy, pursued by the Iranian government, can decrease the gasoline consumption sufficiently or not. If the gasoline consumption responds insufficiently to the price policy, the governors should choose other alternatives. So estimating price and income elasticities of gasoline demand paves the way to make the right decision.

2. Literature Review

There is a large number of studies on gasoline demand with different methods. **Table 1** displays different studies and surveys on price and income elasticities of gasoline demand. In three different decades, Dahl (2012), Dahl and Sterner (1991), and Espey (1998) have categorized the important studies, according to the models and estimates [7]-[9]. So a review of the surveys improves an outlook on the subject, before dealing with studies in details.

Table 1. Previous studies and surveys on price and income elasticities of gasoline demand.

Study/Survey	Country	Model	Price SR[a]	Price LR[a]	Income SR	Income LR
Ahmadian et al. (2007)	Iran	Structural time series	−0.19	−0.74	0.32	1.25
Akinboade et al. (2008)	South Africa	ARDL	−0.47		0.36	
Baranzini (2013)	Switzerland	Cointegrating equation and ECM	−0.33	−0.09	0.67	0.02
Dahl (2012)	Survey: classification of various countries elasticities		−0.22[b]		0.96[b]	
Dahl and Sterner (1991)	Survey: classification of various studies models		−0.26[b]	−0.86[b]	0.48[b]	1.21[b]
Eltony and Al-Mutairi (1995)	Kuwait	Cointegrating equation and ECM	−0.37	−0.46	0.47	0.92
Espey (1998)	Survey: classification of various countries elasticities		−0.26[b]	−0.58[b]	0.47[b]	0.88[b]
Ramanathan (1999)	India	Cointegrating equation and ECM	−0.21	−0.32	1.18	2.68
Sene (2012)	Senegal	Log linear	−0.12	−0.30	0.45	1.13
Wadud et al. (2009)	USA	Cointegration	−0.08[b]	−0.11[b]	0.49[b]	0.58[b]

[a]Short-Run (SR) and Long-Run (LR); [b]Averagely.

Dahl and Sterner (1991) have reviewed 97 studies on gasoline demand, the most recent one published in 1988. Despite using different estimation methods, all of the studies have estimated real price and real income as explanatory variables. Due to the vastly various models in the studies, they broke the models into ten "distinct groups" which show nearly unique results. They claim that gasoline demand is mostly inelastic with respect to price and income. Moreover, they argue that correlating the first model with the second models of the ten groups resulted in intermediate run elasticities [8]. There are more recent reviews like this survey.

Espey (1998) has surveyed 101 studies on gasoline demand, made within 1966-1997 with data period from 1929 to 1993. According to the survey, functional forms and countries are very different but all of them use real price and real income as explanatory variables. Due to the vast range of elasticities in the previous studies, he classified the short run and long run estimates into several groups [9]. Likewise, Dahl (2012) has classified the gasoline demand price and income elasticities of the previous studies with static models into many groups [7]. Overall, the most frequent elasticities imply that gasoline demand is maily inelastic with respect to price and income both in Espey (1998) and in Dahl (2012) [7] [9]. Meta-analyses, like Dahl (2012), Dahl and Sterner (1991), and Espey (1998), deal with the issue as a whole [7]-[9].

There are many surveys which cover the literature generally but reviewing some studies expresses a more detailed attitude of developed countries. Baranzini and Weber (2013) have estimated the price and income elasticities of gasoline demand in Switzerland, employing cointegrating equation and Error Correction Model (ECM). They showed that it is inelastic with respect to both price and income, over the short run and long run. The adjustment velocity is low, at −0.27, meaning a slow rate of adjustment to the long run equilibrium [10]. Wadud *et al.* (2009) have obtained the elasticities in USA with cointegration technique. They are inelastic too, just like the last study [11].

Sene (2012), Akinboade *et al.* (2008), and Ramanathan (1999) concentrated on some developing countries [5] [12] [13]. Sene (2012) has estimated short run and long run price and income elasticities in Senegal, using log linear model. He found that the gasoline demand is inelastic because oil products do not have close substitutes [12]. Akinboade *et al.* (2008) estimated price and income elasticities of gasoline demand with Autoregressive Distributed Lag Model (ARDL) in South Africa. They showed that the gasoline demand is inelastic in the countries [14]. Ramanathan (1999) has employed cointegrating equation and Error Correction Model (ECM) to estimate the elasticities of gasoline demand in India through two intervals, short run and long run, as well as the adjustment velocity. Although the estimated gasoline demand is income elastic, it is price inelastic in both the spans. The adjustment velocity is low, at 28%, around that of Baranzini and Weber (2013) [10] [13]. Eltony and Al-Mutairi (1995) have argued that gasoline demand is price and income inelastic in Kuwait, as a developing and oil producing country [15].

Some studies focus on oil producing countries like Iran which is in gasoline consumption crisis [6]. Ahmadian *et al.* (2007) have claimed that the gasoline consumption is evidently high in Iran, caused by the low price of gasoline, which reduces the social welfare [5].

3. Models

The elasticities are estimated over three intervals, short run, intermediate run, and long run in Iran during 1976-2010, putting the estimates of Error Correction Model (ECM), static model, and dynamic model in an increasing order, respectively. Cointegration technique is used for estimation of the static model and then Error Correction Model (ECM) is employed to estimate the "adjustment velocity" [16]. After the dynamic model estimation, the results of the three models are compared with each other in order to derive the elasticities over the three intervals [8].

3.1. Static Model

According to the previous studies, a static model [8], also referred to as "log linear model" [10], with cointegration technique [13] is employed to measure the price and income elasticities of gasoline demand which is as follows:

$$\mathrm{Ln}G_t = \alpha_0 + \alpha_1 \mathrm{Ln}P_t + \alpha_2 \mathrm{Ln}Y_t + u_t \tag{1}$$

where Ln is the natural logarithm, G is the gasoline demand, P is the real gasoline price, Y is the income, u is the residual term with usual classical characteristics $u_t \sim NID\left(0, \sigma_u\right)$ [17], and t is year. Furthermore, α_0 is in-

tercept, α_1 is the long run price elasticity, and α_2 is the long run income elasticity.

On the basis of Engel-Granger (1987) approach, a cointegrating regression signalizes a long run relationship among variables. Providing that all variables of a regression have the same integration degree of ρ, it will be a cointegrating regression if the residual series have a less integration degree than ρ [18]. In this case, parameter α_1 in Equation (1) is interpreted as the price elasticity of gasoline demand and α_2 the income elasticity [16].

3.2. Error Correction Model (ECM)

Error Correction Model (ECM) is used for the estimation of short run elasticities of gasoline demand [13] [16] which is as follows:

$$\Delta \mathrm{Ln}G_t = \beta_0 + \beta_1 \Delta \mathrm{Ln}P_t + \beta_2 \Delta \mathrm{Ln}Y_t + \beta_3 \hat{u}_{t-1} + e_t \tag{2}$$

where Δ is one degree differentiation, $\hat{u}$ is the estimated residuals in the cointegrating regression, e is the residual term, β_0 is intercept, and the remaining symbols were explained in the previous model. The variables with one degree of integration are stationary by differentiating once. Hence, the regression shows the short run relationship among the variables as parameter β_1 is the gasoline price elasticity of gasoline demand and β_2 is the income elasticity. Also, the coefficient β_3 is the adjustment velocity [16].

3.3. Dynamic Model

A dynamic model, referred to as "the partial adjustment model" and "the lagged endogenous model" [8], is employed to verify the results of the static model. In this way, the elasticities of gasoline demand are estimated over the three intervals. The dynamic model is as follows:

$$\mathrm{Ln}G_t = \theta_0 + \theta_1 \mathrm{Ln}P_t + \theta_2 \mathrm{Ln}Y_t + \theta_3 \mathrm{Ln}G_{t-1} + \varepsilon_t \tag{3}$$

where G_{t-1} is the lagged gasoline demand, ε is the residual term, θ_0 is intercept, θ_1 is the short run price elasticity, θ_2 is the short run income elasticity, and θ_3 is the lagged gasoline demand coefficient. In this model, the long run price and income elasticities are equal to $\dfrac{\theta_1}{1-\theta_3}$ and $\dfrac{\theta_2}{1-\theta_3}$, respectively [3] [12].

3.4. Correlating the Estimations

Putting the estimates of Error Correction Model (ECM), static model, and dynamic models in an increasing order, price and income elasticities of gasoline demand are estimated over three intervals, short run, intermediate run, and long run in Iran during 1976-2010, respectively. The elasticities, estimated by the static model, will be interpreted as the intermediate elasticities, if they wax and wane between the short run and long run elasticities, estimated by the dynamic model [8].

4. Data

In this study, dataset includes annual time series data from 1976 to 2010. It is derived from the economic time series database of the Economic Research and Policy Department of Iran[1] (see **Appendix 1**) [4]. Only nominal gasoline price is from the National Iranian Oil Refining and Distribution Company[2] (see **Appendix 2**) [19] which is divided by consumer price index (2004 = 100) so that the inflation is captured. The explanatory variable is per capita gasoline consumption and the dependent variables are real gasoline price and real per capita GDP. The real per capita GDP, as a proxy for income, is GDP at current prices in Rials of Iran, divided by the consumer price index and total population. The per capita gasoline consumption, as a proxy for gasoline demand, is gasoline consumption divided by the total population. It is measured in thousand barrels per day in the database but it is converted to liters per day[3] because the nominal gasoline price is the value of per liter in Rials of Iran.

Figure 1 reveals some information about how many liters of gasoline are consumed each day in Iran within

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[1]A department in the Central Bank of the Islamic Republic of Iran. Available from: http://tsd.cbi.ir/
[2]It is in Persian, translated by us. Available from: http://niordc.ir/uploads/fasle11.pdf
[3]On the basis of the International System of Units (IS) a barrel equals 158.98729 liters [20].
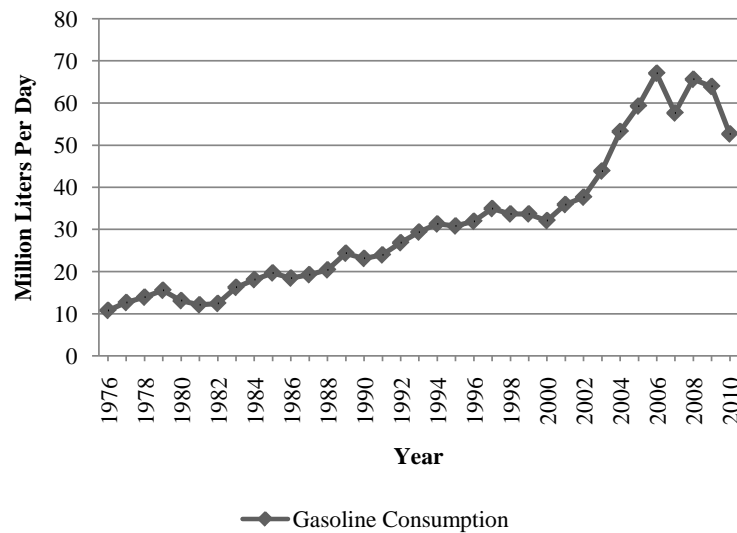
Figure 1. Gasoline consumption in million liters per day in Iran during 1976-2010 [4].

more than three decades, from 1976 to 2010 (see **Appendix 3**) [4].

Based on the graph, the gasoline consumption moved upward during 1976-2006. Until 2002, it surged up markedly, reaching well below 40 million, quadrupling the figure in the first year. Since then, the rate of increasing accelerated within the next four years, as the gasoline consumption topped just below 70 million in 2006.

The gasoline consumption rose and fell erratically within the last four years of the span. It collapsed abruptly from in 2007 which comprised about 60 million. Although it recovered to around 65 million in 2008, it took a nosedive in the last two years which accounted for slightly over 50 million in 2010.

In summary, the gasoline consumption in Iran represents an increasing pattern from 1976 to 2010, with some fluctuations in the last four years.

Since the government paid a massive subsidy for gasoline (reaching 10.2 billion US$ in 2006), its price was low, leading to the high consumption. The high cost of subsidy payment caused the government to formulate some strategies to reduce the consumption, for example, making price policy, setting a higher environmental standard for cars, supplying an alternative fuel (CNG), and gasoline rationing [6]. These led the consumption to fall marginally within 2007-2010, except for 2008.

5. Results

Using the Augmented Dickey Fuller (ADF) unit root test, the variables are checked for stationary properties and cointegration relationship. Using Ordinary Least Squares (OLS), the cointegrating equation is regressed to estimate the price and income elasticities. Then the short run and long run elasticities are estimated by the ECM and dynamic model. The static model estimations are interpreted as the intermediate run elasticities because they are between the short run and the long run elasticities. The econometric software package Eviews version 7 and Microsoft Office Excel version 2007 are applied for the estimation.

5.1. Unit Root Test

Table 2 shows the results of the ADF tests with intercept. The estimates do not reject the null hypothesis of nonstationarity at 1% significance level but all the variables are stationary after differentiating once[4]. So they are integrated of the same degree, representing the evidence of cointegration.

5.2. Static Model

Table 3 displays the coefficients and the t-statistics of the static model which is a cointegrating regression as a

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[4]Whether including a deterministic trend and intercept or not, the results are the same.

Table 2. Augmented Dickey Fuller (ADF) test statistics for levels and first differentiations of the variables, including intercept[a], from 1976 to 2010.

Variables	Levels	First differences
Ln G	−1.1233	−4.6579[b]
Ln P	−1.6676	−4.5200[b]
Ln GDP	−0.6434	−4.0625[b]

[a]The results are the same, whether including intercept and trend or not; [b]Significant at 1% level.

Table 3. Results of the static model.

Variables	Coefficient	t-statistic	Prob.
Ln P	−0.1618	−3.2406	0.0029
Ln GDP	0.4636	3.1758	0.0034
Constant	−5.7784	−3.2878	0.0026
AR(1)	0.7855	8.2553	0.0000
Jarque Bera statistic	0.8680		
Durbin Watson statistic	2.0205		
Breusch Godfrey serial correlation LM test (F statistic), including two lags[a]	0.1352		
Breusch-Pagan-Godfrey heteroskedasticity test (F statistic)	2.5071		
Unit root test statistic of the residual (ADF)	−5.6940		
R squared	0.9292		
Adjusted R squared	0.9221		
F statistic	131.3557		
Ln P	−0.1618		

[a]The results will be the same, if it includes more lags.

long run relationship.

Based on the estimates, the elasticities are low. The price and income elasticities of gasoline demand are −0.1618 and 0.4636 (statistically significant at 1% level). Not only are the coefficients signs consistent with the economic theories but also the different econometric tests on the residual series confirming the results. They show that the residual satisfies the classical assumptions with Jarque-Bera statistic, Breusch Godfrey serial correlation LM test, and Breusch-Pagan-Godfrey heteroskedasticity test, nevertheless, autocorrelation problem will exist if the regression excludes AR(1). Moreover, the residual is stationary in level, proving the long run relationship. The coefficients of determination and F statistic impress the great accuracy of the regression.

So the model implies reliably that the gasoline demand is inelastic with respect to price and income. Also, lagged residual is used in ECM to estimate the adjustment velocity.

5.3. Error Correction Model

Table 4 presents the short run relationship among the variables and the adjustment velocity, using ECM.

In accordance with the table, the elasticities are even lower than those of the static model and the adjustment speed is relatively slow. The short run price and income elasticities of gasoline demand are −0.1538 and 0.2273. The coefficient of the lagged residuals is −0.1942 which is interpreted as the adjustment velocity. Just like the static model, the coefficients signs are in alignment with the economic theory and the residual of the regression satisfies the classical assumptions. As the coefficients of determination and F statistic are high, the regression is perfectly fit.

Overall, the model represents an inelastic gasoline demand in the short run with low adjustment speed.

5.4. Dynamic Model

Table 5 illustrates the coefficients and the t-statistics of the dynamic model.

Table 4. Results of the Error Correction Model (ECM).

Variables	Coefficient	t-statistic	Prob.
$\Delta \ln P$	−0.1538	−3.1718	0.0036
$\Delta \ln GDP$	0.2273	1.5232	0.1385
$\hat{u}_{t-1}$	−0.1942	−1.0363	0.3086
Constant	0.0203	1.2744	0.2126
Jarque Bera statistic	0.2781		
Durbin Watson statistic	1.8164		
Breusch Godfrey serial correlation LM test (F statistic), including two lags[a]	0.6268		
Breusch-Pagan-Godfrey heteroskedasticity test (F statistic)	0.5113		
R squared	0.3238		
Adjusted R squared	0.2539		
F statistic	4.6304		
$\Delta \ln P$	−0.1538		
$\Delta \ln GDP$	0.2273		

[a]The results will be the same, if it includes more lags.

Table 5. Results of the dynamic model.

Variables	Coefficient	t-statistic	Prob.
$\ln P$	−0.1776	−4.2945	0.0002
$\ln GDP$	0.3581	3.3025	0.0026
$\ln G_{t-1}$	0.5084	3.7460	0.0008
Constant	−4.2121	−3.1636	0.0037
AR(1)	0.2840		
$\hat{\theta}_1 / 1 - \hat{\theta}_3$	−0.3612		
$\hat{\theta}_2 / 1 - \hat{\theta}_3$	0.7284		
Jarque Bera statistic	0.8288		
Durbin Watson statistic	2.1732		
Breusch Godfrey serial correlation LM test (F statistic), including two lags[a]	1.1950		
Breusch-Pagan-Godfrey heteroskedasticity test (F statistic)	1.0896		
R squared	0.9438		
Adjusted R squared	0.9358		

[a]The results will be the same, if it includes more lags.

On the basis of the table, all the elasticities are low. The long run price and income elasticities of gasoline demand are 0.3612 and 0.7284 and the short run corresponding elasticities are −0.1776 and 0.3581, respectively. The coefficients signs in this model are also accorded with the economic theories and the different econometric tests on the residual series fulfill the classical assumptions, nevertheless, autocorrelation problem will exist unless the regression is autoregressed. The regression fit goodness is evidenced by coefficients of determination and F statistic, as the previous models.

So the gasoline demand is price and income inelastic in the short run and long run.

Arranging the estimations of the three models in an increasing order, the short run, intermediate run and long run elasticities are achieved.

The intermediate run elasticities are estimated by correlating the static to the dynamic models. On one hand, the absolute value of the long run elasticities are more than the short run elasticities, as expected. On the other hand, the estimated elasticities in the static model range between the estimated long run and short run elasticities in the dynamic model. Hence, the static model estimates are interpreted as the intermediate price and income elasticities which are −0.1618 and 0.4636, respectively [8].

Generally, the model implicates that the gasoline demand is inelastic with respect to price and income in the intermediate run.

6. Discussion

Table 6 represents the estimated elasticities through three different intervals, short run, intermediate run, and long run, as well as the adjustment velocity.

Regarding the table, although the short run price elasticity of the dynamic model is, surprisingly, more than that of the intermediate run, the estimates are broadly similar to the previous studies from two perspectives. Firstly, the price elasticities are less than the income elasticities [8]. Secondly, the price elasticities range in the most frequent groups of the classified elasticities by Dahl (2012) and Espey (1998), and the income elasticities in the second most [7] [9].

Not only the elasticities are low but also the adjustment velocity is slow. While all the signs of the elasticities are consistent with the economic theories, they are less than one in absolute value, meaning inelasticity over the three courses. The adjustment velocity is slow, at −0.19, impling 19% of the gasoline consumption adjustment occurs during the first year. So disequilibrium lasts more than five years to reach long run equilibrium.

Consequently, the gasoline demand responds to the price and income changes slightly and slowly, relatively the same result as the previous studies.

7. Conclusions

The gasoline demand responds to price and income changes slightly and slowly in Iran during 1976-2010.

The gasoline demand is price and income inelastic in all the three intervals which characterizes gasoline as a necessary good with no close substitutes. Not only is the response magnitude of the gasoline consumption to price and income small but also the response speed is slow because the adjustment velocity is low. So price policy reduces the gasoline consumption ineffectively with a long delay. Even more, the price policy may be dominated by income rise in Iran as a developing country.

Increasing effect of income growth can overtake the decreasing effect of the price policy. The economy of Iran, on one hand, is expected to grow because developing economies are less than their potential level. The in-

Table 6. Estimated elasticities through the intervals, using the static and dynamic models in brief.

Table Head	Short run		Intermediate run	Long run
	ECM	Dynamic model		
Price elasticity	−0.1538	−0.1776[a]	−0.1618	−0.3612
Income elasticity	0.2273	0.3581	0.4636	0.7284
Adjustment velocity	−0.1942			

[a]Unexpected absolute value which is more than the intermediate run absolute value

come elasticity of gasoline demand, on the other hand, is more than the price elasticity. Therefore, other alternatives, besides the price policy, should be developed to reduce the negative consequences of gasoline consumption, for example, supplying more environmentally friendly substitutes, more reliable public transportation systems, and setting higher environmental standards for industries, especially for car factories.

As a future study, estimating the elasticities of these factors can guide the governors and policy makers to pursue the most efficient policies.

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Appendices

Year (based on Persian calendar)	Price indices ► Consumer Price Index (CPI) (1383 = 100) ▼	Energy Sector ► Oil ► Consumption of Oil Products ▼	Human resource and Employment ► Population and Employment ▼	National Accounts ► Gross National Product and Income by Economic Sectors (at current prices) ▼
	General Index	Gasoline (thousand barrels per day)	Total Population (thousand persons)	Gross domestic product (at basic price) (billion Rials)
1355	0.7	68	33,709	4391
1356	0.9	79.7	35,025	5111
1357	1	87.7	36,393	4987
1358	1.1	98	37,814	6068
1359	1.3	82.6	39,291	6299
1360	1.6	76.3	40,826	7656
1361	1.9	78.3	42,420	10,078
1362	2.2	102.4	44,077	12,438
1363	2.4	113.9	45,798	13,559
1364	2.6	123.9	47,587	14,423
1365	3.2	116.2	49,445	14,661
1366	4.1	121.3	50,662	17,924
1367	5.3	128.5	51,909	20,200
1368	6.2	153.3	53,187	25,079
1369	6.8	145.6	54,496	34,506
1370	8.2	150.8	55,837	48,428
1371	10.2	169	56,656	64,502
1372	12.5	184.9	57,488	100,124
1373	16.9	197	58,331	131,771
1374	25.2	194	59,187	188,184
1375	31.1	201	60,055	248,972
1376	36.4	220	61,070	291,769
1377	43	212	62,103	328,522
1378	51.7	212	63,152	434,385
1379	58.2	202	64,219	576,493
1380	64.8	226	65,301	664,620
1381	75.1	237	66,300	913,835
1382	86.8	276	67,315	1,124,073
1383	100	335	68,345	1,455,690
1384	110.4	373	69,390	1,854,711.3
1385	123.5	422	70,496	2,260,529.6
1386	146.2	362.7	71,532	2,861,974
1387	183.3	413	72,584	3,378,724.1
1388	203	402.3	73,651	3,562,289.4
1389	228.2	331.4	74,733	4,304,264.3

[a]A department in the Central Bank of the Islamic Republic of Iran [4].

Appendix 2. Gasoline: Current price in Iran [19].

Year	Gasoline: current price
1976	6
1977	8
1978	10
1979	10
1980	30
1981	30
1982	30
1983	30
1984	30
1985	30
1986	30
1987	30
1988	30
1989	30
1990	50
1991	50
1992	50
1993	50
1994	50
1995	100
1996	130
1997	160
1998	200
1999	350
2000	385
2001	450
2002	500
2003	650
2004	800
2005	800
2006	1000
2007	1000
2008	1000
2009	1000
2010	4000

Appendix 3. A.D calendar years versus Persian calendar years.

A.D Calendar	Persian Calendar
1976	1355
1977	1356
1978	1357
1979	1358
1980	1359
1981	1360
1982	1361
1983	1362
1984	1363
1985	1364
1986	1365
1987	1366
1988	1367
1989	1368
1990	1369
1991	1370
1992	1371
1993	1372
1994	1373
1995	1374
1996	1375
1997	1376
1998	1377
1999	1378
2000	1379
2001	1380
2002	1381
2003	1382
2004	1383
2005	1384
2006	1385
2007	1386
2008	1387
2009	1388
2010	1389

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