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Turkey's Energy Demand

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Abstract: The present study aims to forecast the primary energy demand in Turkey for the period 2007-2015 using the Box-Jenkins methodology. The annual data for the period 1970-2006 provided by the Ministry of Energy and Natural Resources were used in the study. Considering the results of unit root test, energy demand series is stationary at first difference. Later among alternative models it is found that the most appropriate model is ARIMA (3,1,3) for energy demand series. According to this model, estimation findings show that the energy demand would continue its increasing trend also in the forecast period. It is expected that the primary energy demand will reach 119.472 TOE in 2015 with an approximately 22 percent increase compared to 2006. Therefore energy policies should be designed for increasing demand in Turkey.

Key words: Energy demand forecasting, Turkey's energy demand, box-Jenkins methodology and primary energy demand

INTRODUCTION

The ultimate objective of economic policies is to maintain an increase in the level of social welfare. It is necessary to increase production by using the resources effectively and efficiently in order to achieve an increase in social welfare. For this reason, it can be seen that the technology factor which has been internalized into new growth models is in a rapid development. The developments in technology also contribute to the increase in the demand for energy. In fact, the use of new technologies in the production process with the Industrial Revolution, which took place in the late 18^{th} century and the beginning of the 19^{th} century, brought along an increase in energy consumption both on country basis and on a global scale. However, together with industrialization, factors such as population and urbanization have also played a significant role as explanatory variables for the increase in energy consumption. The future values of energy demand, which exhibits a dynamic structure depending on the factors mentioned above, are of great importance in terms of the policies that are to be implemented today, because the energy resources that are used the most in our day have an unbalanced distribution among the regions and the reserves have been decreasing steadily. The limitations mentioned above force the countries to already shape their energy policies by taking into consideration the forecasts made for sustainable growth. The present study aims to forecast the energy demand in Turkey for the period 2007-2015 through the Box-Jenkins methodology based on the annual data provided for the period 1970-2006. Turkey is not listed among the countries that are considered to be rich in terms of fossil fuels such as petrol, natural gas and coal. For this reason, correct energy demand forecasts carry a significant value in designing the policies to be implemented in the country.

Energy Demand in Turkey and in the World: In order to meet the energy demand, countries on the one hand continue their search for new energy resources and on the other hand, they focus on projects which will provide more effective and efficient use of existing resources (DPT, 1996). The reason for this search is that energy consumption shows a tendency to increase rapidly depending on factors such as industrialization, population and urbanization throughout the world. In fact, as it can be shown in Fig. 1, the global energy consumption, which was 283.3 quadrillion Btu (British Thermal Unit (Btu), the amount of energy needed to heat one pound (453.6 g) of water from 63º F to 64º F.) in 1980, reached 472.5 quadrillion Btu in 2006 with an increase of approximately 66.8 percent. It is also predicted that this value will reach 678.3 quadrillion Btu in 2030 (EIA, 2006).

The demand for energy, which shows a tendency to continuously increase over time, is currently met through fossil fuels such as petrol, natural gas and coal and nuclear and renewable energy resources. It is forecasted that petrol, natural gas and coal, which are the most consumed of these resources, will maintain their importance also in the future. However, the decrease in the reserves of the mentioned resources as the result of the increase in consumption at the same time leads the consumers towards alternative energy resources. This

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situation can apparently be shown in Fig. 2, where the developments in the global energy consumption according to resources are presented, and it attracts attention that renewable energy resources such as sunlight, wind, water and geothermal resources will become more important in the future (EIA, 2006).

Energy consumption in Turkey also shows a tendency to increase rapidly in parallel with the developments throughout the world. The changes that occurred in socio-economic balances especially after 1980 have a significant contribution to this tendency. Consequently, during the 4th Plan period comprising the years 1978-1983, the primary energy consumption could not exceed 2.1 percent due to the economic, political and social instabilities that occurred in the 1970s. In the second half of the 1980s, the continuing urbanization process together with the recovery observed in the economy caused a rise in the annual average rate of increase of energy consumption to 6 percent. This rate decreased to an average of 4.3 percent in the 1990s when the negative effects of the economic crises were clearly felt. An annual average increase of 6.1 was targeted during the 8th Plan period in parallel with the economic growth rate that was aimed to be achieved. The targeted number was achieved to a certain extent in the period after 2003, where economy gained stability and the effects of the 2001 crisis subsided (DPT, 2006).

Fig. 3 shows that energy consumption shows an increasing trend depending on factors such as population, urbanization and industrialization. The graph also draws attention to the fact that although certain breaks were observed in the periods when economic crises occurred and their effects continued, the general tendency of energy consumption to increase did not change. The Ministry of Energy and Natural Resources forecasts that the energy demand will reach approximately 170 million TOE (Tons of Oil Equivalent), with an increase of approximately 60 percent in case the present situation regarding energy production and consumption continues (Fig. 4).

In Turkey, there are several forecasting studies regarding the future energy consumption conducted by using different methods and taking different periods into consideration. In these studies, although it was forecasted that the energy demand would increase in time and reach significant levels, it is observed that the results of the forecasts were generally different from each other.

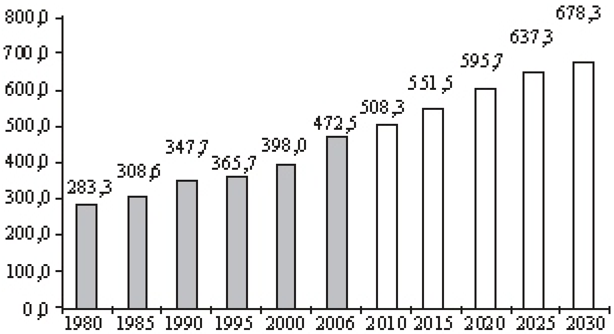

Fig. 1: World marketed energy consumption, 1980-2030

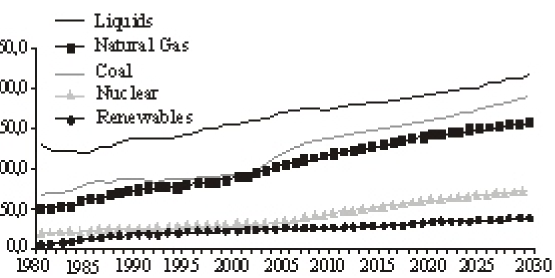

Fig. 2: World marketed energy use by fuel type, 1980-2030

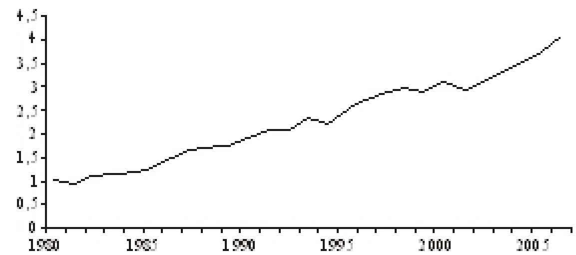

Fig. 3: Energy consumption in Turkey (quadrillion btu)

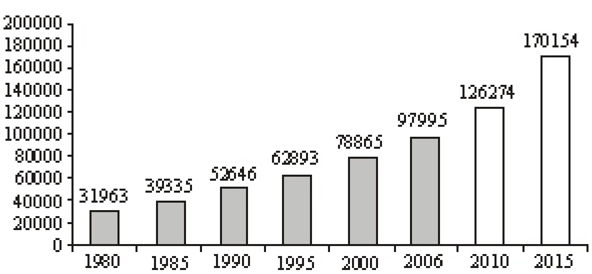

Fig. 4: Primary energy consumption in Turkey (TOE)

Literature Review: There are several studies on energy demand forecasting in Turkey. Of these studies, Ediger and Akar (2007) forecasted the primary energy demand with respect to types of fuel for the period 2005-2020 by using the ARIMA and the seasonal ARIMA methods. The results obtained in the study showed that the rate of increase in the annual energy demand, which was 4.9 percent in the period 1950-2005, would fall to 3.3 percent in the period 2005-2020. Unler (2008) used the Particle Swarm Optimization (PSO) technique to forecast the energy demand for the period of 2006-2025 based on the data obtained in the period 1979-2005. Ediger and Tatlıdil (2002) forecasted the primary energy demand based on the data from the period 1950-1999 by using the cycle analysis method. The results they obtained in the study showed that the total amount of energy demand would reach 131.44 million TOE in 2010. Akay and Akat (2007) forecasted the future values of industrial and total electricity consumption by using the data concerning the period between 1970 and 2004. The findings that were forecasted by using the GPRM approach showed that the industrial energy consumption would reach 140.37 TWH and the total energy consumption would reach 265.7 TWH in 2015. Toksarı (2009) forecasted the electricity demand for the period 2007-2025 under three scenarios based on different GDP, population and import growth rates by using ant colony optimization (ACO). Hamzaçebi (2007) forecasted the electricity energy consumption for the period 2003-2020 by using “artificial neural networks” (ANN). According to the energy demand analysis model, the findings of the artificial neural networks study showed that the level of consumption would be realized higher than predicted in the housing and agricultural sectors and lower in industry and transportation. Erdoğdu (2007) provided an electricity demand forecast for the period 2005-2014 based on the data from the period 1923-2004 by using cointegration analysis and ARIMA modeling. The results of his study presented that electricity consumption will reach 160.090 GWh in 2015, showing an annual average increase of 3.3 percent. In his study on natural gas demand, an issue which has recently come into prominence in Turkey, Erdoğdu (2009) analyzed the data from the period 1987-2007 using an ARIMA modeling and calculated the values that natural gas consumption would reach in the period 2008-2030. Information regarding the studies conducted on energy demand forecasting in Turkey is shown in Table 1.

MATERIALS AND METHODS

With this study, it is aimed to forecast the primary energy demand in Turkey for the period 2007-2015 using the Box-Jenkins methodology. For this purpose, the annual data for the period 1970-2006 provided by the Ministry of Energy and Natural Resources were used as basis in forecasting the energy demand in the study.

Box-Jenkins Methodology: The Box-Jenkins methodology used in analysis and forecasting is widely regarded to be the most efficient forecasting technique. This methodology fits Autoregressive Integrated Moving Avarege (ARIMA) type models (Baltagi, 2008). ARIMA approach combines two different parts into one equation; they are the Autoregressive process and Moving average process (Bashier and Talal, 2007). The autoregressive process (AR) is one where the current value of the variable (Yt) is a function of its past values plus an error term; as in:

$$Y_t = f\left(Y_{t-1}, Y_{t-2}, \ldots, Y_{t-p}\right) \tag{1}$$

or

$$Y_t = u + \theta_1 Y_{t-1} + \theta_2 Y_{t-2}, \ldots, \theta_p Y_{t-p} \tag{2}$$

where Yt is the variable is being forecasted, p is the number of the past values used and u is the error term and normally distributed. The AR process can be written in lag operator form as:

$$\theta(L)Y_t = \beta + \mu_t \tag{3}$$

Where,

$$\theta(L) = \left(1 - \theta_1 L - \theta_2 L^2 + \ldots + \theta_p L^p\right) \tag{4}$$

A moving average process assumes the current value of the variable Yt as a function of the past values of the error term plus a constant. A moving average of order (q), MA (q) is expressed as:

$$Y_t = f\left(\varepsilon_{t-1}, \varepsilon_{t-2}, \ldots, \varepsilon_{t-q}\right) \tag{5}$$

or

$$Y_t = u + \mu_t + \phi_1 \varepsilon_{t-1} + \phi_2 \varepsilon_{t-2}, \ldots, \phi_q \varepsilon_{t-q} \tag{6}$$

The MA process can be written in lag operator form as:

$$Y_t = u + \phi(L) u_t \tag{7}$$

Where,

$$\theta(L) = \left(1 - \phi_1 L - \phi_2 L^2 + \ldots + \phi_q L^q\right) \tag{8}$$

To create an ARIMA model, one begins by combining the two specifications into one equation with no independent variable, as follows:

Table 1: Selected studies on forecasting energy demand in Turkey

Authors	Methodology	Data	Forecasted Variable	Forecasted Period
Ediger ve Tatlıdil (2002)	Cycle Analysis	1950-1999	Primary Energy Demand	2000-2010
Akay ve Atak (2007)	Grey Prediction with Rolling Mechanism (GPRM)	1970-2004	Industrial and Total Electricity Demand	2006-2015
Ediger ve Akar (2007)	ARIMA, Seasonal ARIMA	1950-2004	Primary Energy Demand by Fuel	2005-2020
Erdoğdu (2007)	Cointegration, ARIMA	1923-2004	Electricity Demand	2005-2014
Hamzaçebi (2007)	Artificial Neural Networks (ANN)	1970-2004	Net Electiricity Energy Demand	2005-2020
Ünler (2008)	Particle Swarm Optimization (PSO)	1979-2005	Energy Demand	2006-2025
Erdoğdu (2009)	ARIMA	1987-2007	Natural Gas Demand	2008-2030
Toksarı (2009)	Ant Colony Optimization (ACO)	1979-2006	Net Electiricity Energy Demand	2007-2025

Table 2: Correlogram of original energy demand

Autocorrelation	Partial Correlation		AC	PA	CQ-Stat	Prob.
. |*******|	. |*******|	1	0.898	0.898	32.306	0.000
. |****** |	. | . |	2	0.813	0.039	59.588	0.000
. |****** |	. | . |	3	0.732	-0.023	82.347	0.000
. |***** |	. | . |	4	0.656	-0.018	101.17	0.000
. |**** |	. | . |	5	0.589	0.006	116.81	0.000
. |**** |	. | . |	6	0.529	-0.000	129.82	0.000
. |*** |	.*| . |	7	0.451	-0.118	139.62	0.000
. |*** |	. | . |	8	0.388	0.008	147.10	0.000
. |**. |	.*| . |	9	0.315	-0.080	152.22	0.000
. |**. |	.*| . |	10	0.235	-0.099	155.19	0.000
. |* . |	.*| . |	11	0.158	-0.059	156.58	0.000
. |* . |	. | . |	12	0.087	-0.036	157.02	0.000
. | . |	. | . |	13	0.029	0.012	157.08	0.000
. | . |	.*| . |	14	-0.037	-0.108	157.16	0.000
.*| . |	. | . |	15	-0.097	-0.031	157.78	0.000
.*| . |	. | . |	16	-0.153	-0.034	159.40	0.000
.**| . |	. | . |	17	-0.206	-0.043	162.45	0.000
.**| . |	. | . |	18	-0.250	-0.022	167.18	0.000
.**| . |	. | . |	19	-0.289	-0.039	173.88	0.000
***| . |	. | . |	20	-0.325	-0.026	182.87	0.000

$$Y_t = u + \theta_1 Y_{t-1} + \theta_2 Y_{t-2}, \ldots, \theta_p Y_{t-p} \quad u_t + \phi_1 \varepsilon_{t-1} + \phi_2 \varepsilon_{t-2}, \ldots, \phi_q \varepsilon_{t-q} \tag{9}$$

Where θ and ϕ are the coefficients of the ARIMA respectively. In lag operator form the ARIMA model can be as follows:

$$\theta(L) Y_t = u + \phi(L) u_t \tag{10}$$

There are three basic steps to the development of an ARIMA model (Kennedy, 2003):

- Identification / model selection: The values of p, d, and q must be determined. The principle of parsimony is adopted; most stationary time series can be modeled using very low values of p and q.
- Estimation: The θ and ϕ parameters must be estimated, usually by employing a least squares approximation to the maximum likelihood estimator.
- Diagnostic checking: The estimated model must be checked for its adequacy and revised if necessary, implying that this entire process may have to be repeated until a satisfactory model is found.

RESULTS

In order to perform forecasting by using the Box-Jenkins methodology, first, the stationarity of the series was tested by using the autocorrelation function (ACF) and the Augmented Dickey-Fuller (ADF) tests.

According to the correlogram of the original series shown in Table 2, the autocorrelation and partial autocorrelation values fall outside the confidence limit of 95% with a certain level of lag. This shows that energy demand has a unit root at the level. That the calculated ADF test statistics are larger than the absolute value of the MacKinnon critical values at the 1%, 5% and 10% significance levels supports this result (Table 3).

Table 3: Results of ADF unit root test

		t-Statistic	Prob.
Augmented Dickey-Fuller test statistic		-0.792782	0.9570
Test critical values	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

The correlogram obtained for the first difference of the series, which was found to be stationary at the level, is shown in Table 4. It can be seen in the Table 4 that as the autocorrelation and partial autocorrelation values fall within the confidence limits of 95%, the energy demand series satisfies the stationarity condition at its first difference.

Following the stationarity test, the most appropriate ARIMA model for forecasting through the Box-Jenkins methodology was identified as ARIMA (3,1,3) by using the correlogram obtained for the first difference of the series and Akaike and Schwarz criteria. The forecasted model is given in Table 5.

Statistical analyses were performed on the error terms in order to test the relevance of the forecasted model parameters. For this, first the correlogram of the residuals of the series was examined (Table 6).

That the ACF and PACF of the residuals are within the confidence limits of 95% shows that no autocorrelation exists. At the same time, autocorrelation was tested also by using the Breusch-Godfrey LM test. The results were examined up to 10 lags and it was seen that there was not any autocorrelation, as the probability value was found to be bigger than 0.05 (Table 7).

After testing the relevance of the model, the trend that the primary energy demand will show in the period of 2007-2015 was forecasted. The results of the forecasted trend which is shown in Fig. 5 point out that the energy demand, which was 97.995 TOE in 2006, will reach 119.472 TOE in 2015 by increasing at a rate of 22%.

Table 4: Correlogram of first differences of energy demand

<table>
<tr><th>Autocorrelation</th><th>Partial Correlation</th><th></th><th>AC</th><th>PA</th><th>CQ-Stat</th><th>Prob.</th></tr>
<tr><td>. *| . |</td><td>. *| . |</td><td>1</td><td>-0.073</td><td>-0.073</td><td>0.2107</td><td>0.646</td></tr>
<tr><td>. | . |</td><td>. | . |</td><td>2</td><td>0.040</td><td>0.035</td><td>0.2750</td><td>0.872</td></tr>
<tr><td>. |* . |</td><td>. |* . |</td><td>3</td><td>0.140</td><td>0.147</td><td>1.0933</td><td>0.779</td></tr>
<tr><td>. | . |</td><td>. | . |</td><td>4</td><td>-0.020</td><td>0.000</td><td>1.1097</td><td>0.893</td></tr>
<tr><td>.**| . |</td><td>.**| . |</td><td>5</td><td>-0.264</td><td>-0.286</td><td>4.1881</td><td>0.523</td></tr>
<tr><td>. | . |</td><td>. *| . |</td><td>6</td><td>-0.012</td><td>-0.081</td><td>4.1942</td><td>0.650</td></tr>
<tr><td>. |* . |</td><td>. |* . |</td><td>7</td><td>0.092</td><td>0.140</td><td>4.5920</td><td>0.710</td></tr>
<tr><td>. | . |</td><td>. |* . |</td><td>8</td><td>-0.016</td><td>0.109</td><td>4.6047</td><td>0.799</td></tr>
<tr><td>. | . |</td><td>. | . |</td><td>9</td><td>0.060</td><td>0.054</td><td>4.7877</td><td>0.852</td></tr>
<tr><td>. |* . |</td><td>. |* . |</td><td>10</td><td>0.180</td><td>0.072</td><td>6.4996</td><td>0.772</td></tr>
<tr><td>. |* . |</td><td>. |* . |</td><td>11</td><td>0.118</td><td>0.116</td><td>7.2613</td><td>0.778</td></tr>
<tr><td>.**| . |</td><td>.**| . |</td><td>12</td><td>-0.215</td><td>-0.206</td><td>9.9065</td><td>0.624</td></tr>
<tr><td>. |* . |</td><td>. | . |</td><td>13</td><td>0.104</td><td>0.028</td><td>10.544</td><td>0.649</td></tr>
<tr><td>. *| . |</td><td>. | . |</td><td>14</td><td>-0.077</td><td>-0.037</td><td>10.917</td><td>0.693</td></tr>
<tr><td>. | . |</td><td>. |* . |</td><td>15</td><td>-0.057</td><td>0.083</td><td>11.126</td><td>0.744</td></tr>
<tr><td>. | . |</td><td>. | . |</td><td>16</td><td>-0.022</td><td>0.023</td><td>11.160</td><td>0.800</td></tr>
<tr><td>. | . |</td><td>. *| . |</td><td>17</td><td>-0.032</td><td>-0.172</td><td>11.232</td><td>0.844</td></tr>
<tr><td>. | . |</td><td>. *| . |</td><td>18</td><td>-0.016</td><td>-0.067</td><td>11.252</td><td>0.883</td></tr>
<tr><td>. | . |</td><td>. | . |</td><td>19</td><td>0.028</td><td>0.039</td><td>11.317</td><td>0.913</td></tr>
<tr><td>. |* . |</td><td>. |**. |</td><td>20</td><td>0.158</td><td>0.226</td><td>13.455</td><td>0.857</td></tr>
</table>

Table 5: The estimation results of ARIMA (3,1,3)

	Variable	Coefficient	Std. Error	t-Statistic	Prob.
	C	2313.806	610.8022	3.788143	0.0008
	AR(1)	0.054454	0.821642	0.066274	0.9477
	AR(2)	-0.711956	0.196056	-3.631399	0.0012
	AR(3)	0.367683	0.618149	0.594814	0.5571
	MA(1)	-0.086143	0.835087	-0.103155	0.9186
	MA(2)	0.916011	0.102896	8.902262	0.0000
	MA(3)	-0.090662	0.688625	-0.131657	0.8963
R-squared	0.196216		Mean dependent var	2227.182	
Adjusted R-squared	0.180727		S.D. dependent var	2512.767	
Durbin-Watson stat	1.966128		Akaike info criterion	18.67120	
F-statistic	1.057832		Schwarz criterion	18.98864	
Inverted AR Roots	. 42	-.18+.91i		-.18-.91i	
Inverted MA Roots	. 10	-.01-.96i		-.01+.96i	

Table 6: Residual correlogram of ARIMA (3,1,3)

<table>
<tr><th>Autocorrelation</th><th>Partial Correlation</th><th></th><th>AC</th><th>PA</th><th>CQ-Stat</th><th>Prob.</th></tr>
<tr><td>. | . |</td><td>. | . |</td><td>1</td><td>-0.014</td><td>-0.014</td><td>0.0071</td><td></td></tr>
<tr><td>. | . |</td><td>. | . |</td><td>2</td><td>0.037</td><td>0.037</td><td>0.0589</td><td></td></tr>
<tr><td>. *| . |</td><td>. *| . |</td><td>3</td><td>-0.128</td><td>-0.128</td><td>0.6936</td><td></td></tr>
<tr><td>. | . |</td><td>. | . |</td><td>4</td><td>0.018</td><td>0.014</td><td>0.7069</td><td></td></tr>
<tr><td>. *| . |</td><td>. | . |</td><td>5</td><td>-0.064</td><td>-0.055</td><td>0.8744</td><td></td></tr>
<tr><td>. *| . |</td><td>. *| . |</td><td>6</td><td>-0.158</td><td>-0.181</td><td>1.9477</td><td></td></tr>
<tr><td>. | . |</td><td>. | . |</td><td>7</td><td>0.005</td><td>0.009</td><td>1.9488</td><td>0.163</td></tr>
<tr><td>. | . |</td><td>. | . |</td><td>8</td><td>-0.037</td><td>-0.045</td><td>2.0129</td><td>0.366</td></tr>
<tr><td>. |* . |</td><td>. |* . |</td><td>9</td><td>0.174</td><td>0.135</td><td>3.4623</td><td>0.326</td></tr>
<tr><td>. |* . |</td><td>. |* . |</td><td>10</td><td>0.143</td><td>0.166</td><td>4.4931</td><td>0.343</td></tr>
<tr><td>. |* . |</td><td>. |* . |</td><td>11</td><td>0.097</td><td>0.070</td><td>4.9857</td><td>0.418</td></tr>
<tr><td>.**| . |</td><td>.**| . |</td><td>12</td><td>-0.237</td><td>-0.248</td><td>8.0732</td><td>0.233</td></tr>
<tr><td>. | . |</td><td>. |* . |</td><td>13</td><td>0.056</td><td>0.077</td><td>8.2575</td><td>0.310</td></tr>
<tr><td>. | . |</td><td>. | . |</td><td>14</td><td>0.002</td><td>0.043</td><td>8.2577</td><td>0.409</td></tr>
<tr><td>. | . |</td><td>. | . |</td><td>15</td><td>0.002</td><td>0.005</td><td>8.2580</td><td>0.508</td></tr>
<tr><td>. *| . |</td><td>. | . |</td><td>16</td><td>-0.101</td><td>-0.020</td><td>8.9554</td><td>0.536</td></tr>
</table>

There are significant differences between the results obtained in the present study and the official forecasts of the Ministry of Energy and Natural Resources. The Ministry of Energy and Natural Resources forecasts that the increases in the primary energy demand will occur at higher rates. In fact, when we look at the data for 2015 shown in Table 8, the result show that the difference between the two forecasts is 48.331 TOE. However, the forecast results obtained in the study conducted by Ediger and Akar (2007) are significantly similar to the forecast results obtained in the present study.

Table 7: The results of Breusch-Godfrey LM test

F-statistic	0.972950	Prob. F(10,16)	0.501115
Obs*R-squared	12.47819	Prob. Chi-Square(10)	0.254326

Table 8: Comparision of the results with other forecasts

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Forecasted	101.839	102.262	105.542	109.818	110.855	112.058	115.941	118.662	119.472
Ediger ve Akar (2007)	101.544	102.499	102.612	109.050	107.004	110.673	115.713	119.470	121.823
Difference	295	-237	2.930	768	3.851	1.385	228	-808	-2.351
MENR	105.876	111.633	119.026	126.274	133.982	142.861	150.890	160.211	170.154
Difference	-4.037	-9.371	-13.484	-16.456	-23.127	-30.803	-34.949	-41.549	-50.682

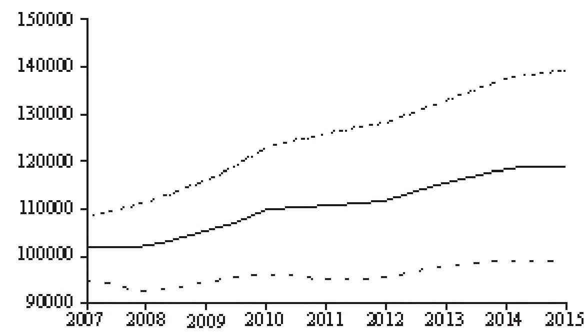

Fig. 5: Primary energy demand projection from 2007 to 2015

CONCLUSION

Energy plays a significant role in achieving economic and social development. The unbalanced distribution of the energy resources among the regions and the decrease of the reserves because of the increase observed in demand make the issue of energy more important. Such limitations lead the countries towards designing policies which will enable effective and efficient use of energy. Because energy consumption shows a tendency to increase rapidly depending on factors such as industrialization, population and urbanization throughout the world. It is forecasted that petrol, natural gas and coal, which are the most consumed of these resources, will maintain their importance in the future. Similarly energy consumption in Turkey also tends to increase rapidly. The Ministry of Energy and Natural Resources forecasts that the energy demand will increase approximately 60 percent in case the present situation continues. While energy demand was 97.995 TOE in 2006, it is estimated that energy demand will reach to 170.154 TOE in 2015. In the present study, the future values of the primary energy demand were forecasted for Turkey based on the annual data for the period 1970-2006 by using the Box-Jenkins methodology. Firstly the autocorrelation function (ACF) and Augmented Dickey-Fuller (ADF) test was used to test stationarity of the energy demand series. Later among alternative models it is found that the most appropriate model is ARIMA (3,1,3) for energy demand series. After identifying the most appropriate ARIMA model for the series which satisfied the stationarity condition at its first difference, a projection was made for the period 2007-2015. The findings obtained in the study showed that the primary energy demand, which was 97.995 TOE in 2006, would reach 119.472 TOE in 2015 by increasing at a rate of 22%. Although these results are below the official forecasts of the Ministry of Energy and Natural Resources, they are similar to the forecasts of Ediger and Akar (2007).

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