Abstract

Any type of economic or political crisis affects not only the country but also its neighbors and partners which have any kind of relation. From this point of view, it is obvious to claim that Turkey suffered economically from all types of crises and wars that Iraq had in near history. Countries need to analyze their foreign trade performance and develop export strategies as companies do for getting success in the competitive business environment. Forecasting techniques are useful tools for strategic planning. It is possible to benefit from a forecast of any future event or an estimation of any historical event in order to create strategies for countries. Building a bridge from past by the help of estimation may be useful for strategic planners to shape the future. An economic loss can be measured by many different parameters to find out the total sustained loss. In this study it is aimed to calculate the economic loss due to the crises of Iraq at the point of export, after the major changes in Turkish economy in 1980. Various forecasting models as Exponential Smoothing, Winters’ Additive and Winters’ Multiplicative, and SARIMA models were implemented. Then all models were compared to find the best and the fully estimation was proposed after selecting the best model. Estimation was performed from 1988 the break-down year of Iraq-Turkey relations when Turkish export was affected, till the embargo of Iraq was terminated by United Nations in 2003. Finally, estimated values were subtracted from the realized export data in order to find out the loss of Turkey during this period.

Introduction

In the last fifty years Iraq has been one of the most adversely affected countries in the Middle East from political and economic difficulties. All problems occurred in this period, including several wars causing many confusions based on religion, ethnicity and tribes which become obstacles for sustainable development of the country. Although Iraq tries to build itself from scratch nowadays and wants to integrate in the world by the help of rich resources, political problems and terror are still crucial problems of the country (Özmen et.al, 2013).

Iraq is the second largest export market of Turkey and Turkish construction companies have a proactive role in the reconstruction of Iraq. Moreover both countries have mutually beneficial cooperation on energy for delivering Iraq's rich oil and natural gas resources to world markets. Before the first Gulf War in 1990, annual bilateral trade volume between Turkey and Iraq was about $ 5.5 billion. However, UN Security Council's economic sanctions against Iraq due to the invasion of Kuwait in 1990 have led to minimization of the economic and commercial relations between the
The population of Iraq is approximately 31 million and its area is 438,317 sq. km. The country consists of several different religions and nationalities like other Middle Eastern countries. Iraq differs from other Middle Eastern countries because of its richness of natural sources such as oil, natural gas, phosphates and more (Ministry of Foreign Affairs – Romania, 2014). It is not possible to mention that this richness brings any kind of welfare to Iraqi people. At the beginning of the 20th century, Iraq, Britain occupied the former part of Ottoman Empire. After gaining independence in 1932, the country was governed by several dictators. The last dictator Saddam Hussein was taken down by a combined force under the supervision of USA. Nowadays, economic development increases the welfare of the society, although corruption, political and security problems are still major problems (Central Intelligence Agency – USA, 2014).

In the general view of the Turkish economy since the establishment of the Republic until 1980, implementation of continuous foreign trade policy is not possible to observe. Liberal foreign trade policy was experienced twice in this period first between the years 1923-1928 due to the Treaty of Lausanne and second between the years 1950-1954 as a result of a change in economic policy. Statist economic policies were generally performed out of these two time limits (Hepaktan, 2006). As a result of the worldwide oil crises and the crisis of balance payments of Turkey in the 1970s, comprehensive stabilization program was implemented on the 24th of January in 1980. Through this program, Turkey had implemented an export-oriented growth strategy instead of an import substitution development strategy. Thus the analyses of Turkey’s international trade became significant in the post-1980 period (Cambazoglu and Karaalp, 2012). Nowadays; as seen on data obtained from Turkish Statistical Institute, one of Turkey’s most structural economic problem is current account deficit as a result of bad structured liberal foreign trade policy and poor infrastructure (Table 1).

Increasing interdependence between Turkey and Iraq is based on energy, economic and trade relations. A stabilized Iraq means considerable business opportunities for Turkish companies with a demand for goods, services and materials. Turkish companies that form the largest commercial investors in Iraq, excluding the oil sector, generally provide manufactured goods, furniture, handcrafts, special-purpose products and associated consumables (Turunc, 2011). Although geographical proximity between Iraq and Turkey can be a major advantage for international trade, one of the biggest problems is the lack of transportation infrastructure between the two countries and one customs which functions with limited capacity. The re-organizing activities of Iraqi custom and inspection systems can create better business environments for Turkish companies at competition with other countries’ companies (Ozmen, 2012).

Table 1. Turkey’s Foreign Trade Amounts

<table>
<thead>
<tr>
<th>Year</th>
<th>Export USD</th>
<th>Import USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>102,142,612,603</td>
<td>140,928,421,211</td>
</tr>
<tr>
<td>2010</td>
<td>113,883,219,184</td>
<td>185,544,331,852</td>
</tr>
<tr>
<td>2011</td>
<td>134,906,868,830</td>
<td>240,841,676,274</td>
</tr>
<tr>
<td>2012</td>
<td>152,461,736,556</td>
<td>236,545,140,909</td>
</tr>
<tr>
<td>2013</td>
<td>151,868,550,560</td>
<td>251,650,560,072</td>
</tr>
</tbody>
</table>
By analyzing the data obtained from Turkish Statistical Institute, it is observed that the international trade between these two countries has a positive tendency on trade surplus in Turkey (Table 2).

<table>
<thead>
<tr>
<th>Year</th>
<th>Export USD</th>
<th>Import USD</th>
<th>Net Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>5,123,406,267</td>
<td>120,558,160</td>
<td>5,002,848,107</td>
</tr>
<tr>
<td>2010</td>
<td>6,036,362,316</td>
<td>153,475,601</td>
<td>5,882,886,715</td>
</tr>
<tr>
<td>2011</td>
<td>8,310,129,576</td>
<td>86,753,326</td>
<td>8,223,376,240</td>
</tr>
<tr>
<td>2012</td>
<td>10,822,143,970</td>
<td>149,327,537</td>
<td>10,672,816,433</td>
</tr>
<tr>
<td>2013</td>
<td>11,958,852,545</td>
<td>145,526,270</td>
<td>11,813,326,275</td>
</tr>
</tbody>
</table>

After the Iran-Iraq war that ended in 1988, the Iraqi army attacked Kuwait in August 1990 by claiming it as its 19th province. As a result, USA and its 29 allies under supervision of the UN Security Council evicted Iraq from Kuwait (Hafedh et al., 2007). After this first US military action based on forcing the Iraqi army out of Kuwait in 1990, in 2003 the second US military action was to stop Iraq’s suspected “weapons of mass destruction” programs and to dispose of Hussein (Williams and Slusser, 2013). Under Saddam Hussein’s regime by spending most of its national revenue annually on its military for long years, twelve years of worldwide economic sanctions (1991-2003) and all the wars has caused millions of Iraqis to lost their homes and make them to be short of basic needs such as food, electrical power, water services etc. The numerous sanctions against the Saddam regime could not succeed the down of the regime but had crucial adverse effects on Iraqi people. During this period, UN sponsored “Oil for Food Program” organized for providing the basic human necessities to Iraqi people was not meeting expectations because of corruption and mismanagement (Hafedh et al., 2007). Billions of dollars of revenue was lost because of the damages in the oil infrastructure of the country (BBC-Iraq profile, 2014). The effects of both global and regional instability can be negative not just on Iraq but also to neighbor countries especially Turkey (Ogus and Erbil, 2005). It is believed in Turkey that the security and economy were adversely affected than any other country. It is claimed that the Turkish economy suffered losses of between $40 and $65 billion from bilateral trade with its main trading partner before 1990 (Prusher, 2003).

Among all their neighbors, Turkey had the best political and economic relations with Iraq during the 1980s. After the economic change in Turkey beginning from 1980, the bilateral trade between the two countries was increasing with a positive tendency based on twin pipelines carrying Iraqi petroleum to Turkish ports on the Mediterranean and exportation of all type of goods from Turkey (Sayari, 1992). By the end of the Iran-Iraq war in 1988, Iraqi army attacked Kurdish society in Northern Iraq that supported Iran during the war. The cooperation between Saddam Hussein and PKK (Kurdistan Workers' Party) against other Kurdish parties such as Kurdistan Democratic Party and Patriotic Union of Kurdistan, the protection of Kurdish refugees by Turkey, refusal of Turkey the hot pursuit Iraqi-Kurdish militants agreement with Baghdad (Keskin, 2008) and the “water problem” of Euphrates and Tigris rivers between two countries were major political problems in 1988 (Dedeoğlu, 2011). Meanwhile, after the Iran-Iraq war, the general economic situation of Iraq was not good. The foreign debt was over $80 billion by 1988, foreign reserves were drained, development projects were abandoned, more than 20 percent of the labor force of Iraq was working for the army, oil revenue was at minimum level and all valuable things in the country such as large factories in construction materials and mineral extraction, food processing and light manufacturing and agricultural lands were sold in a frenzy of privatization and the revenue was spent for the needs of the army (Parker and Moore, 2007). Thus, based on all these political and economic problems, 1988 was the break-down year of Turkey and Iraq trade relations.

1.2. Methods

Forecasting is naturally used in all of human being’s life. L.T. Simister (1981) stated that “Forecasting is a natural part of human behavior and experience whether we explicitly realize it or not. For all of us are continually implementing plans as we go about our daily living and these plans must necessarily be founded upon views about the future i.e. upon forecasts.” However, forecasting is also has importance from the companies point of view. John R. Sparkes, Stephen F. Witt, (1981) put forth that “at all levels of economic management — from the economy to the company — forecasting is widely accepted as a crucial aspect of policy making.” Ian McCafferty, (1986) stated the importance of forecasting from the managers point of view as “any manager or entrepreneur who aims to survive for a considerable period needs information not only on what is going on now, and what happened several months ago, but also what is likely to happen in the future.”. Moreover, forecasting and strategic planning are related to each other as Naylor (1983) expressed “strategic planners should spend more time underselling the importance of forecasting the future and less time building up false expectations concerning forecasts with techniques which, at best, have a mixed record”. Finally, Albert (1983) emphasized that “Forecasting methods are explicit procedures for translating information about the environment and the company's proposed strategy into statements about future results.”
Accuracy is also important as well as forecasting. Inaccurate forecast has no more meaning than misleading. Moreover, accuracy is accounted by different ways in the literature. Mean absolute percentage error (MAPE) might be considered as one of the common used error measurement proposing type in researches. P. Arumugam, V. Anithakumari (2013) has used MAPE at their research called “Fuzzy Time Series Method for Forecasting Taiwan Export Data”. Furthermore, Pana et. al. (2013) also used MAPE as one of the error measuring parameters when they forecast energy’s environmental impact using a three variable time series models. A. Azadeh, M. Taghipour, S.M. Asadzadeh, M. Abdollahi, (2013), measured error of prediction of electricity consumption with random variations using MAPE. Finally, Benyamin Khoshevisan, ShahinRafiee, MahmoudOmid, HosseinMousazadeh (2013) have used MAPE as one of the error measuring parameters for their research called as “Prediction of potato yield based on energy inputs using multi-layer adaptive neuro-fuzzy inference system”.

Moreover, in this study other most common accuracy measurement parameters in the literature like Root Mean Squared Error (RMSE), Mean Absolute Error (MAE) and Mean Squared Error (MSE) were preferred. Although various types of researches were studied about export forecast by applying different models, any forecasting studies about the effect or loss of any situation like war, embargo etc. on exports could not be found. Only a similar research was done for modeling and forecasting the effects of war on macroeconomic variables of Iran which was performed by neural network model (Sadr and Farahani, 2011).

There are various research studies performed on export forecasting field. Furthermore, various models were applied to perform prediction. On the other hand, there is lack of research in this field which forecasts the effect or loss of any situation like war, embargo…etc. One particular research conducted by Sadr and Farahani 2011 mentions t modeling and forecasting war effects of macroeconomic variables in Iran. In this research, they have used neural network model to predict effects.

Computational models may be used to perform the best forecasts. However, they are mostly used on energy forecasting research studies. Taspinar, Celebi, and Tutkun (2013) used time series models, SARIMAX, and neural networks to find the best model for forecasting. They have performed forecasting for daily gas consumption in Turkey. As a result, they have performed quite precise prediction which included daily residential natural gas consumption, air temperature, average cloud cover, relative humidity, atmospheric pressure and wind speed as input variables. They have shown that SARIMAX model performed well for Sakarya province as a short term local forecasting. On the other hand, cloud cover was found to be very effective on gas consumption. However, Mishra (2012) also selected computational time series methods, altering conditional estimation (ACE) and ARIMA models to perform prediction about natural gas prices.

The methodology of this research is close to the forecasting of export methodologies. For this reason, it can be effective to review what authors have done in the export forecasting field. For example, in order to achieve the goal of forecasting the Fiji’s exports and imports between 2003 and 2020, Narayan, Paresh Kumar Narayan, Seema Prasad, Biman Chand, (2008), have used the ARMAX model. Pakravan and Kalashmi, (2011), have implemented the ARIMA model to predict pistachio exports levels of Iran, U.S. and Turkey. Moreover, Ruakibi and Mutairi, (2013), have implemented neural networks model to forecast air travel demand of Kuwait. AlireiraAlihamidi, MeisamJafari-Eskandari, AzimehMozafari, HamedNozari, (2013), have used neural networks and regression methods comparatively to forecast crude oil exports.

For the usage of time series models as seasonal exponential smoothing, winters’ additive, and winters’ multiplicative, and SARIMA, there is a research performed by Mustafa Akkurt, Omer F. Demirel, and SelimZaif, (2010). They have comparatively used various time series methods such as exponential smoothing, winters’ forecasting and Box-Jenkins methods. These methods were compared with each other in terms of the superiority in forecasting performance. The findings revealed that in the yearly data set, double exponential smoothing model outperformed the other alternative forecasting models. On the other hand, in term of monthly data set, SARIMA model provided the better results than the others.

Overall, it was seen in the literature that forecasting was widely performed in the energy field all around the world. For example PasapitchChujai, Nittaya Kerdpprasop, Kittisak Kerdpprasop (2013) used ARIMA and ARMA models to perform time series analysis forelectricity consumption of households. Close to that research, Kumar and Gupta (2010) performed ARIMA model to predict exports of industrial goods from Punjab. One another research was by M.E. Haque, M.F. Imam, M.A. Awal (2006). They also performed ARIMA model to predict shrimp and frozen food export of Bangladesh.

In this research, data was collected from the Turkish National Statistics Foundation (TUIK). However, the data contains export currencies from 1980 up to the last month of 1987, monthly. It may be questions as to why the data starts from 1980. This is mainly because before 1980, Turkey was a closed economy and started to export to the world increasingly after the 1980, January decisions. After that time, data shows that the export of Turkey to Iraq bursts. Seasonality and seasonal trend are observed at the distribution of data till the political problems started in 1988. After this time, export decreased abnormally and can be considered as intervention at export. It was concluded that the political problems that started in 1988 affected Turkish export to Iraq in a negative manner. Those problems were...
mentioned in the previous sections. Therefore, the year 1988 is not considered at all. Using this data, first of all, data structure analysis was performed and seasonality is detected as mentioned above. Then according to structure of data, possible models were selected among time series methods as exponential smoothing, winters’ models, and SARIMA. Best fitting model was selected among those models which give minimum MAPE, RMSE, and MAE. Then test estimation was performed to test if the champion model performs good estimation. MAPE, MAE, and RMSE were considered in the test estimation section. Test estimation is performed using data between January 1980 and December 1986. 1987 is considered for test estimation. After all these processes, best fitting model was used to perform full estimation. Finally, estimated values were subtracted from the real export currencies and as a result, the loss has been estimated.

2. Forecasting Export Loss of Turkey to Iraq between 1988-2003

In this section data structure was analyzed and according to data distribution, appropriate models were estimated. Secondly, the best two models were selected out of four models and they were used for test estimation. Finally, the best model which was qualified at the test estimation will be used to perform full estimation within the period.

2.1. Data Structure

First of all, data distribution was observed in order to be able chose appropriate model for estimation. When data is plotted, it is seen that there is irregular fluctuation so much. Data distribution is shown below on the figure 1;
Although there seems to be very low trend, it was observed that there is irregular fluctuation on data. For instance, normally export is increasing seasonally during the winter as . The entire peak points of data are during the winter months. On the other hand, in January 1982, export value rose up to 1 million dollar. Normally, the next January must be a close value to the previous year but January 1983 seems to be not even close to half million dollar. Furthermore, after January 1983, increase is continuing till the next January and then decreases suddenly. This shows that it is hard to decrease the error in this kind of data distributions. Sudden increase and decreases affect error levels in negative manner. Anyway, models will be applied in order to choose the best fitting model which provides the least error level at RMSE, MAPE, and MAE base.

### 2.2. Analysis and Results

Seasonal exponential smoothing winters’ additive, winters’ multiplicative, simple exponential smoothing, and SARIMA models were applied to find best fitting model for the data. Error levels of each model are stated below.

#### Table 3. Comparison of best fitting models

<table>
<thead>
<tr>
<th>Name of the model</th>
<th>MAPE %</th>
<th>MAE</th>
<th>RMSE</th>
<th>Level</th>
<th>Trend</th>
<th>Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seasonal Exponential Smoothing</td>
<td>19.4</td>
<td>7,761,288</td>
<td>10,427,133</td>
<td>0.999</td>
<td>-</td>
<td>1.000</td>
</tr>
<tr>
<td>Winters’ Additive</td>
<td>19.5</td>
<td>7,757,880</td>
<td>10,299,329</td>
<td>1.000</td>
<td>0.000</td>
<td>0.001</td>
</tr>
<tr>
<td>Winters’ Multiplicative</td>
<td>23.2</td>
<td>10,372,791</td>
<td>13,667,301</td>
<td>0.829</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td>SARIMA (0, 1, 0) (0, 1, 1)</td>
<td>21.8</td>
<td>10,221,111</td>
<td>13,327,543</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Seasonal exponential smoothing, winters’ additive, winters’ multiplicative, and SARIMA models were computed among each other and winters’ additive model seems to fit better then remaining models. Winters’ additive responded with lower error levels at 1.000 level of alpha (Level), 0.000 level of Gamma (Trend), and 0.001 level of Delta (Season). Finally, it can be concluded that in fitting section, winters’ additive model performed the best fitting and least error among other models. In the next section, test forecast was performed among all models to approve best model.

#### 2.3. Testing estimation

All of the models were tested in the test estimation section to approve the best model for the full forecasting. Testing estimation was performed from January 1987, until December 1987. Here below there are the results of the concerning models.

#### Table 4. Error levels of models attest estimation

<table>
<thead>
<tr>
<th>Name of the model</th>
<th>MAPE</th>
<th>MAE</th>
<th>RMSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seasonal Exponential Smoothing</td>
<td>% 33</td>
<td>11,202,596</td>
<td>12,931,288</td>
</tr>
<tr>
<td>SARIMA (0, 1, 0) (0, 1, 1)</td>
<td>% 38</td>
<td>13,364,262</td>
<td>15,377,376</td>
</tr>
<tr>
<td>Winters’ Additive</td>
<td>% 16</td>
<td>10,637,442</td>
<td>12,270,400</td>
</tr>
<tr>
<td>Winters’ Multiplicative</td>
<td>% 20</td>
<td>14,644,337</td>
<td>16,246,247</td>
</tr>
</tbody>
</table>

Real forecast and estimation values were compared. MAPE, MAE, and RMSE levels of winters’ additive decreased and remained the best model for forecasting. This means that winters’ additive estimates better than all other models that are compared with. Finally, fully forecast was performed using winters’ additive model. Fitting distribution of test estimation is as below on the graph;
It is proved that winters’ Additive Model is the best model among other tested models and full estimation performed using this model. When full estimation is extended from January 1988, till May 2003, sum of values are totally as $56,854,192,063. On the other hand, there are actualized values which has sum of $2,593,554,376. Actualized value is very low because there was no export or very low value which is not written on the web page of TUIK. Finally, when forecasted data was subtracted from the real data, result becomes $54,260,637,687. This number is the export loss of Turkey between 1988 and 2003 to Iraq.

3. Conclusion

In this study the loss of Turkey’s export to Iraq was considered by using official data obtained from TUIK. A similar research can be performed not only through an export view but also a macroeconomic view. By this study, it is proved that political crises such as embargoes and wars also affect neighboring countries and other countries that have any kind of relations with the concerning countries within the problem.

Moreover, this study aimed to calculate the economic loss caused by the crises of Iraq at the point of export, after the major changes in Turkish economy in 1980. Various forecasting models as Exponential Smoothing, Winters’ Additive and Winters’ Multiplicative, and SARIMA models were implemented. Then all models were compared to find the best and fully estimation was proposed after selecting the best model. Estimation was performed from 1988 the break-down year of Iraq-Turkey relations when Turkish export is affected, till the embargo of Iraq has been terminated by United Nations in 2003. Finally, estimated values were subtracted from the realized export data in order to find out the loss of Turkey in this period.

This only portrays loss from the export point of view. The same kind of research might be performed from the macroeconomic view. By this way, it might be possible to show that the embargoes, wars, and that kind of political crisis are not effecting only the country that is inside the situation, but also the country that is neighbor or has any kind of economic relations with the concerning country. This study might be considered as a pioneer in this field. Although it was not easy to find resources and similar previous studies for this study, it is hoped that this study leads other researches in which statistical techniques are also used for analysis and estimation or forecasting of international trade activities for countries’ strategic export management. Furthermore, similar studies can be performed by using Artificial Neural Network and Genetic Algorithm models which help to decrease the error of the concerning estimation and result with better and more accurate results.

Finally, this study is a pioneer in its field and encourages academicians to use forecasting tools for further studies in strategic management field. On the other hand, the approach of the study can be used by bureaucrats of governments for analyzing the loss of export due to any economical or political crisis. Similarly, managers of private companies can get the help of forecasting tools for shaping their future strategies, especially for international trade operations.

References


