The Impact of Macroeconomic Variables on Airline Profitability in US

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Abstract: The purpose of this study is to measure the predictive power of macroeconomics variables in forecasting airlines profitability in a competitive market situation. The main motivation of this study is to draw a picture of airlines who work under the macroeconomic turbulence, for domestic airlines (Iranian airlines). Domestic airlines that gradually will face more dangerous risks because of Privatization, Organizing Subsidies and joining to WTO. To do this we have used three following variable as predictor of airlines profitability: energy price (oil price), social welfare (per capita GDP) and exchange rate (dollar Index). We have collected 94 US airlines for the year’s between 1990 to 2014. The selected modal for this research is a multiple regression with bootstrapping. Result’s showed that the model was able to predict airline profitability and 28 percent of profitability variation is account for linear combination of three variables.

Introduction

Attendance in a competitive economic environment with powerful rivals multiplies the necessity of paying attention to Economic, political and social variables in a way that the supportive mechanism has been declined. Airline Companies are not familiar with Phenomenon such as currency fluctuations, customers' purchase power and oil shock because of government supportive umbrella and lack of foreign competitions. As airline industry is one of the most significant industries in country strategically, so it needs more Considerations in order to empower companies and also investing on that. Regarding to General policy side in Economy to private enterprises, subside directing and WTO membership, it is presented in this research a view of airline companies situations in economy by free market Accountment and surveyed effects of Macroeconomic economic variables on profitability of these companies. The variables in current research are energy price (oil price), people welfare level (GDP per capita) and currency rate (Dollar index). Oil price in a form of fuel cost decrease or increase has impacts on profitability for airline companies. Income level can be effective on utilizing airway travels. The exchange rate is proportional to the amount of exchange revenue will be effective variable.

Literature Review

Airline companies usually have less margin profit and are too sensitive to outward and inward elements (Kamari, 2012). There are different elements which are effective on profitability such as business model, services quality, technology, pricing, customers' faithfulness, strategic management, Government Policy and Fuel price hedging. Reviewing former literatures showed that since many outward and inward elements are affective on profitability, managers must figure out these elements appropriately (Miranda, 2015).

Two Prevulent models for business in airline industry are: Network model (full services) and low-cost model (Discount). Companies add local and international paths in a network model make diverse divisions (business, Economic & first class) and present different services in high quality. Pater (2011) studied relation between airline companies profitability and business model and showed that companies have long term margin profit than low-cost model (Miranda, 2015). YaylaKulluandIonsitpong (2013) confirmed positive Correlation between profitability and quality of services and concluded that the more quality increased, the more customers' satisfaction, faithfulness and profitability and stock shares they have. Bargasanzan and Lange (2013) announced that airlines companies use facilities like tracked vehicle to move airplane from terminal to overhaul place in order to decline costs.

Raynor (2011) announced that profitability of Southwest Company was because of utilizing airway transportation by optimal fuel, appropriate business model and operations efficiency. Airplane makers figure out the challenge of fuel consuming among airline companies and make new airplanes which has optimal fuel consuming. Boeing Company is the largest air plane company in U.S.A. New production designing (Dream liners 787) is introduced based on aerodynamic situation, optimizing quality of materials and also optimal engine according to fuel consuming. (Miranda, 2013).

Customers are smart about fly ticket costs and price has deep impact on selecting Airline Company. The complexity of prices in business model of network in 1990 caused passengers to choose low-cost business model (Miranda, 2015).
Low-cost model companies have been growing since mid-2012 and like to compete seriously via being effective on shopping manner (Westermann 2012). The main challenge for this kind of model is attracting customers who are affected by brand faithfulness. Toitandt concluded that the impact of price on customers' manner is less rather than brand faithfulness.

Airplane companies are type of industry which have been governed severely and mostly belong to Governments (Grosso, 2012). Carter Former U.S president removed expensive obstacle for entering to air plane industry and revoked imperative pricing (Avent-halt, 2012). Avent-halt also referred to providing competition in air way transportation industry, creating new market and declining rate through this law. The other consequence of this was optimizing quality of services. U.S other policy was open Sky Policy which has positive impact on airplane industry and let foreign companies whom are able to provide easy and efficient flight for passengers, fly without government intervention (U.S Federal department, 2011). Open sky policy had positive impacts on cooperated countries. The average revenue of cities which international airports were launched in America was increased to 720 Million$ by this policy (Miranda, 2015).

Despite law-revising and open sky policy, it is seen that many countries intend to have some restrictions (Grosso, 2012). According to the research was conducted in 2014 with support from the Boeing Company, it is showed that 63% air traffic was increased, 24.1 million occupations were made and 450 Billion $ economic revenue was created in process of open sky policy (InterVISTAS, 2014).

Hedging fuel is a kind of strategy in which some companies use future fuel contracts and stable rate in order to decline fuel costs. In spite of that this strategy is not without risk (Triana, 2011). Sotoest Company is one pioneer company in hedging fuel that succeeded to augment its profit in 2008 regarding oil price growth to 150$. But this powerful strategy turned to be a weakness at the end of 2008 when oil price reduced to 30$ and caused lots of damages and losses (Miranda, 2015).

Energy price is one of main actors in economy and plays inevitable role on profitability of companies. Perry Sadorsky (2008) researched about the impact of energy pricing on small and large companies. It is referred to two main discussions about the effect of energy pricing on efficiency and profitability in that. The first issue claimed that oil price fluctuation has less impact on large companies because of scale advantage, but the second issue emphasized on adaption ability of small companies and minimum resistance against large companies. Huang et al. (1996) showed in a search that unexpected fluctuation of future oil pricing contract will effect on share price. Miranda (2015) studied about oil price impacts and terrorism on profitability of airline companies. He believed that there is a meaningful relation between oil price, terrorism and profitability. Anyway, oil price fluctuation is very significant variable that can reveal image of its institutes’ profitability.

Variant researches have been done about relation between airway travels and revenue scale. Fridstrom (1998) surveyed on different elements of using airplane via linear regression model. One of his variables was per capita income which confirmed the existence of direct relation.

The recent research results are compatible with Njegovans research (2005) in England. He showed that using airway travels are part of English people's stable costs in a way that the more income they have, the more airway travels they use.

Exchange rate fluctuations effects on airway companies directly and indirectly. Currency properties scale affects directly and impact of currency rate affects indirectly on using air way travels. Smith mangoli (2010) surveyed on effects of rate risk management on Airline Company's profitability in Kenya which included 26 companies. It showed that management of currency rate declines profitability.

Methodology

It is used a quantitative method in order to study potential relation between airline companies profitability and oil price, currency rate and GDP which is a scientific method based on facts and experimental data. Statistical Society of this research includes financial data, related to all airplane companies mainly in U.S.A which would be distributed by that country. These companies consist of all local and international airplane companies data is distributed by RITA transportation association of U.S Government. Its time domain is connected from 1990 to 2014. Data profitability was obtained via Million dollar unit and also the total profit of each company was obtained per gallon for consumed fuel to skip from some elements such as change in number of companies in statistic. Therefore regression formula is presented as below and the aim is clarifying coefficient (Beta) and meaningfulness level

\[ p = \beta_0 \text{Oilp} + \beta_2 \text{PGDP} + \beta_3 \text{DX} + \epsilon \]

Where Oilp is oil price and PGDP is per capita of GDP and \( \beta_3 \) DX is dollar index

Boot steping

Multiple regressions were done by using Boot steping. Boot steping is a new statistical method where main samples can be increased by resubstitution of samples. This method will be powerful method if statistical distribution of sample is unknown or there are few samples. Linear regression was done via producing 1000 data.
Descriptive statistics and data filtering

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Benefit per gallon (Dollar))</td>
<td>-48</td>
</tr>
<tr>
<td>mean</td>
<td>24</td>
</tr>
<tr>
<td>Median</td>
<td>609</td>
</tr>
<tr>
<td>Sample variance</td>
<td>370,349</td>
</tr>
<tr>
<td>elongation</td>
<td>2.0</td>
</tr>
<tr>
<td>minimum</td>
<td>-1,697</td>
</tr>
<tr>
<td>maximum</td>
<td>1,097</td>
</tr>
<tr>
<td>Total</td>
<td>-1,204</td>
</tr>
<tr>
<td>Number(year)</td>
<td>25</td>
</tr>
</tbody>
</table>

Classic Assumptions

It is necessary to evaluate the assumptions of multi-collinearity, outliers, normality, linearity, homoscedasticity, and independence of residuals.

One of Ordinary Least Squares assumptions estimator is lack of linear correlation among variables. VIF test is used to clarify multicollinearity. If the result of this test is 1, it means there will be no correlation among variables, if the result is more than 10 it will be obligatory to omit one of variables. The result showed that there would be no concern of linear parallel. One of main linear regression assumption is normality of remained sentences (regression by SPSS, 2014). There is a presupposition in all tests related to meaningfulness of coefficients that remained values are normal and if normality with mean is zero, it will be distributed around mean concurrently (soori 2013). Histogram plot in SPSS and Normal probability plot were used to survey remained values normality.

![Normal Probability Plot](image1)

Plot 1. Normal probability plot

![Histogram Plot](image2)

Plot 2. Histogram plot
There may be seen some signs of data abnormality in above plots. It is utilized bootstrap via 1000 data for performing linear regression in order to skip worrying on data abnormality. There are different types of tests for reviewing Heteroskedasticity such as Bartlett, Folded- covariant that Stacker plot in SPSS is used in this research. The result indicated that there was no concern about Heteroskedasticity one of main assumptions in OLS methods is absence of autocorrelation (Soori, 2014).

For testing autocorrelation In This model, we use Durbin-Watson statistic. If it is less than 2 there is not autocorrelation among Error terms if it is more than 2 there isn’t autocorrelation. The result of Durbin-Watson statistic can be seen in table 4 that indicates the absence of autocorrelation.

**Result of linear regression**

According to table 2, the regression result showed that oil price is in contrary relation with profitability of airline companies in U.S.

But relation between dollar index and currency rate it not possible to claim as above. P-value in this case equals 6% that is not acceptable according to certainty of 95% if certainty is decreased to 90 %, rejection of zero hypothesis and acceptance of one hypothesis will be possible. It should be noted that relation between dollar index and companies profitability is negative. P-value for GDP per capita variable equals 2.8% where zero hypotheses is rejected in certainty of 95% and relation between GDP per capita and airline companies profitability is accepted.

Table 6 shows coefficient scale and P-Value for per variables:

<table>
<thead>
<tr>
<th>Model</th>
<th>B</th>
<th>Std. Error</th>
<th>Sig. (2-tailed)</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>298.979</td>
<td>524.489</td>
<td>0.562</td>
<td>-652.829 to 1428.168</td>
</tr>
<tr>
<td>Oil price</td>
<td>-1.328</td>
<td>19.281</td>
<td>0.49</td>
<td>-73.915 to -4.500</td>
</tr>
<tr>
<td>Dollar index</td>
<td>-0.873</td>
<td>16.300</td>
<td>0.060</td>
<td>-66.432 to -5.589</td>
</tr>
<tr>
<td>GDP per capita</td>
<td>0.118</td>
<td>0.061</td>
<td>0.028</td>
<td>0.022 to 0.248</td>
</tr>
</tbody>
</table>

Multiple linear regressions by certainty of 95 percent showed that independent variables i.e. oil price, dollar index, GDP per capita can determine 53% of profitability changes in U.S. Airline companies. Zero hypothesis in this regression means that disability in predicting profitability of airline companies by mentioned independent variables in certainty of 95 % is rejected and contrary hypothesis is accepted.

**Conclusion**

As results showed, there is a meaningful relation among three independent variables; oil price, currency rate and GDP per capita with airline companies profitability. It was observed that three independent variables justify 53% of companies’ profitability and 47% of profitability changes are originated by other elements. Regression results showed that rejection of zero hypotheses which is impossibility of predicting company’s profitability by three variables, it would be possible in 95% Confidence Interval.

It was cleared that two variables; oil price and GDP per capita have meaningful relation with airline companies’ profitability but dollar index variable has no meaningful relation in 95% Confidence Interval. It is also possible to confirm meaningful relation in 90% Confidence Interval for per variable.

As it was expected, oil price and airline companies’ profitability has a contrary relation. Whereas an important part of airline companies is fuel cost, cost decline can have positive effects. Therefore, changes in oil price can be considered as a key variable in profitability. This research’s result is somehow as same as Miranda’s in 2015. he evaluated the effect of terrorist attack and fuel price on profitability of airline companies in U.S. where accepted contrary and meaningful relation between profitability and fuel price.

Direct relation between GDP per capita and airline companies profitability is another hypothesis which was confirmed by this research. Many researchers have been done about relation between on airway travelsquantity and range of
revenues. Fridstrom (1998) reviewed the effects of some elements on airway travel quantity by linear regression model. One of his variables was income per capita among people in society which confirmed direct relation.

The result of current research is in accordance with Njegovann research (2005) in England. He showed that using airways travels are fixed cost of English citizen in a way that the more revenue they have, the more use airways travels.

The other variable in this research was currency rate in which its meaningful relation with airline companies' profitability was not accepted in 95% confidence interval but if confidence interval is decreased to 90%, there will be a meaningful relation. Eduardo measured impacts of changes in currency rate on American citizen's travels in 1996 that results indicated in growth in travels after U.S Dollar enrichment.

Special complexities in impacts of currency rate on economic variables probably are a reason for meaningless relation between currency rate and profitability.

**Practical issues of results**

The aim of this research is clarifying the impacts of Maecroeconomic variable on airline companies' profitability that can be a guideline for private investors in a field of finance in airline companies. Private enterprise, moving toward a market via free market mechanism and optimizing quality and quantity of airline companies services signifies the necessity of surveying on economics in era of airway transportation investment. Survival of Local airline companies depends on recognizing necessary factors for activity in a market with powerful rivals, competitive price, subside less fuel and regardless of governmental support.

It is showed that three variable; oil price, GDP per capita and currency rate determine 28% of airline companies' profitability. Therefore, the first usage of this result can be for active airline companies in country. Companies can use three variables in long term planning and determining competitive price and decrease environmental risks. More important usage is investment in airplane industry but by economic supervision predicting economic situation of a country depends on predicting Macroeconomic economic variables and these variables can determine 53% of airline companies' profitability.

According to research oil price is one of determinant elements in airlines companies profitability while Iranian companies use advantage of fuel subsiude and governmental support, companies in developed economy work in a competitive condition without any subsiude. Therefore according to subsiude directing policy and applying Iran as a membership of WTO it is necessary to revise cost structure and optimize airplane transportation by up-to-date technology based on low cost fuel. Such isolation can be very hazardous since Iranian companies are protected in from fatal fluctuation of economy so they are not able to have enough flexibility and coincidence. Because of that new investors should be aware of fuel costs significance.

Welfare Improvement and growth in GDP per capita of national revenue can be apropious factor for airway transportation in Iran. If there are normal conditions, necessary source and potentiality for economic growth, air way transportation will be increased which causes growth in profitability regarding other elements. Thus, investors should consider this positive aspect seriously.

**References**


