An Empirical Study for Investigation of the Effects of Strategic Alliances in the Civil Aviation Sector: THY (Turkish Airlines) Case

Kenan İLARSLAN

Assistant Proffesor Dr., Afyon Kocatepe University, Bolvadin School of Applied Science,

ilarslan@aku.edu.tr

Serap N. VURUR

Assistant Proffesor Dr., Afyon Kocatepe University, Bolvadin School of Applied Science,

serapvurur@aku.edu.tr

Fatih BIYIKLI

Research Assistant, Afyon Kocatepe University, Bolvadin School of Applied Sciences

fbiyikli@aku.edu.tr

Abstract

Nowadays companies have to be reorganized in order to adopt changing environmental conditions and try to take advantage of opportunities arises while avoiding the emerging threats. One of the aforementioned reorganization effort is the strategic alliences between firms. The low rate of full capacity, high costs and high tax rates pushed airline companies for forging partnerships and as a result of this huge strategic alliances occured as like Star Alliance, One World and SkyTeam. These partnerships has built code sharing, frequent flier programme and similar collaborations helped the existing capacity usage to the maximum level. So that this provided crutial cost advantages to the companies. In this paper it is aimed to find out whether Turkish Airlines participation to the Star Alliance with signing engagement letter in 2006 has made structural change in firms profitability and within this frame the current ratio and asset turnover rate of Turkish Airlines between 1992-2013 is modelled on return on equity. Performed strategic alliance being examined by Chow test methodology and it is found that this alliance has resulted a structural change on firm's return on equity.

Keywords: Civil Aviation, Airline Alliances, Profitability, Chow Test

1. Introduction

Technological improvements are one of the most important element which shapes todays modern life. As a result of these improvements new products, jobs and sectors emerged. Aviation sector is the one may be the most important one among others in this modern life where time, process, and safety became important. World Civil Aviation started with 12 seconds flight which is made by Wright brothers in 1903 is now reached three billion passangers, 25.000 aircraft and became massive sector as its economic activity accounts for %3, 5 of the world GNP (IATA, 2013).

Current technological improvements, shifting of competition from national to international level with globalisation, removal of economical boundaries in the worldwide, liberalisation, increasing and differentiating the customer demands have been effecting the businesses from different aspects. Companies now have to be reorganized in order to adapt changing environmental conditions and try to take advantage of opportunities arises while avoiding the emerging threats. One of the aforementioned reorganization effort is the strategic alliences between firms. Strategic Alliance can be described as the collaboration of the two or more companies for a certain aim (in order to decrease cost, get free access to the market etc.) exchanging and sharing resources, using and/or improving products, services or technologies mutually.

Emergance of the strategic alliance dates back to the late 1980's. The low rate of aircraft occupancy, high costs and high tax rates pushed airline companies for forging partnerships and as a result of this huge strategic alliances occured as like Star Alliance, One World and SkyTeam. These partnerships has built code sharing, frequent flyer programme and similar

collaborations helped the existing capacity usage to the maximum level. So that this provided crutial cost advantages to the companies. In this context we can say that the purpose of strategic alliances in aviation industry is to increase competitiveness of the member firms and simultaneously provide higher yields to the members (Rajasekar & Fouts, 2009: 94). This paper divided into six parts. In the second part information is given in theoretical frame, in the third part aviation sector's improvement in Turkey and World is given, in the fourth part literature review i conducted, in the fifth part methodology and anaylsis results are explained. In the sixth and the last part conclusion and suggestions are given and general evaluation is made.

2. Conceptual Framework

With liberalisation of economies world nearly became a small village, neverthless particularly since 1990 rising of technological improvements with head spinning speed resulted globalisation of firms and give them a chance to make operation all over the world but both international and economic or political relations influenced the trade agreements and quates naturally so that making operation in foreign countries became more difficult. In this point strategic alliances help firms, provide mutual trade advantages and play critical role in expanding their operations to the different countries and continents.

Strategic airline alliance can be described as: the long term partnership of two or more firms for specific and common purpose such as decreasing overall costs, providing market access etc. (Iatrou & Alamdari, 2005:2). Partners in strategic alliance may assign product, distribution channel, production capacity, Project funding, knowledge, expertise, basic material or intellectual property. Another defination of strategic alliance is the partnership of two or more firms aiming to create synergy by forging alliance through which they hope, they will have more benefit than their individual effort while keeping their independence. Generally slight difference between alliance and acquisation or merger lies right here. In aquisation one firm purchase the other and purchased firm loses its independence and becomes one of the brand of parent company. For example; giant technology firm "Apple" bought famous headphone brand "Beats" by paying 3.2 billion dollars at the beginnign of 2014. In this situation, Beats will be under Apples management thereafter. Similarly mergers in the same way as well. Merger is building wholly new brand by two or more firms while losing their previous forms. For example; in the mid 2000's in Turkey, phone operator brands "Aycell" and "Aria" merged and created the new brand which is called "Avea". In this situation Aycell and Aria are no longer exist but now they have new combined brand "Avea". In either situations firms lost their their independence and involved in different form of business. In contrast in strategic airline alliances firms do not lose their independence.

Even though the strategic alliances provide great advantages to the firms, acccording to Doorley's (1993) study % 60 of alliances splitted within 4 years or less. Similarly Spark's (1999) emphasize on his study % 61 of alliances ended unsuccessfully or alliance performed below expectations. In spite of these datas, between 1990-2000 in where strategic alliances became common, the value of strategic alliances increased from 153 billion dollars to 1 quadrillion dollar (OECD, 2011).

2.1 Reasons of Strategic Alliances in Aviation Sector

Most of the airline companies want to serve beyond their current markets and extent their networks. However limitations and restirictions to reach foreign markets pushed companies to forge strategic alliances (Iatrou & Alamdari, 2005:3). Four strategic factor plays important role in creation of alliance (Gudmundsson & Rhoades, 2001: 210). Among these first and traditionally most popular one is the opportunity to enter into restricted international markets. Through alliances firms can operate in international markets without being challenged by limitations and restrictions. The second factor is the desire of creating flawless international network. According to previous researches, customers prefer the airline which has bigger network in comparision to others. Because they can reduce the travel duration, increase the number of online links, and join better frequent flyer programme by choosing bigger networked firm (Tretheway & Oum, 1993). Third factor is to reduce costs. Cost reduction can be done by joint activities (joint purchase, ground handling etc.). In other words they can utilize from economies of scale through shared flight, fuel or engineering services (Amoah & Debrah, 2011: 42). Fourth and the last factor is the desire of the firms to keep their existance in the regions where their individual operations are unprofitable (Lynch et al., 1998).

2.2 Type of Strategic Alliances in Aviation Industry

Strategic alliances have different types as like, technology transfer and improvement, joint research and development effort, licencing, franchising, marketing agreements and joint ventures (Lee, Cho, Cheong & Kim, 2013: 30). As airline companies come along because of different factors, the alliance types are diversified too. Increasing the income and customer benefits and reducing costs lie behind the appearence of different alliance types. Within the alliance types in Table 1 most common airline alliances are code sharing, blockspace and franchising and/or feding agreements while the least commons are sharing or adopting computer reservation systems and management conracts (Gudmundsson & Rhoades, 2001).

Table 1. Types and Definations of Airline Alliances

Type	Defination
Code Share	One carrier offers service under another carriers' flight designator
BlockSpace	One carrier allocates to another seat to sell on its flight
Revenue Sharing	Two or more carrier share revenues generated by joint activity
Wet Lease	One carrier rents the aircraft/personel of another
Franchising	One carrier rents the brand name of another fort he purpose of offering flight service but supplies its own aircraft/staff
Computer Reservation System	One carrier shares and /or adopts internal reservation system of another
Insurance Parts/Pooling	Two or more carriers agree to joint purchase
Joint Service	Two carriers offer combined flight service
Management Contracts	One carrier contracts with another carrier to manage some aspect of its operations
Baggage Handling/Maintenace/facilities Sharing	One carrier contracts with another to provide services/personnel/facilities at specified sites
Joint Marketing	Two or more carriers combine efforts to market joint services/activities
Equity Swap/Governance	Two or more carriers swap stock and/or create joint governance structure

Source: (Gudmundsson and Rhoades, 2001:210)

3. General Overview of Civil Aviation Sector

International air transportation has grown with two digit numbers until petrolium crise in 1973. Technical improvements were the key factors fort his growth. These improvements while providing high speed, bigger dimension and reduced costs at the same time caused less flight prices naturally.

Rise of households real income and increase in the time that they are willingness to spend for holiday also increased the demand on air transportation. Aviation sector is the most critical factor in globalised economy of the world. This year aviation industry celebrating 100. Anniversary of commercial aviation (Aeronautics) and aviation industry passed 3 billion passengers for the first time in 2013 (IATA, 2013). International organizations and giant aircraft producers expect that existance growth will continue until 2030's. Accordingly in world civil aviation in 1990, 1.2 billion passenger and in 2010, 2.7 billion passenger carried and it is expected that in 2030 this number will rise up to 5.9 billion passenger. Also the number of aircraft was 17.307 in 1990 while 23.844 in 2010 and is expected to reach 45.273 in 2030. Sector accommadated (hired) 21 million and 56, 6 million people in 1990 and 2010 respectively while it is predicted to reach 82, 2 million in 2030 (ATAG, 2012: 41). The first modern strategic alliance is made betweeen Florida Air and British Island in 1986 (Oum and Yu, 1998). However strategic alliances became widespread in mid 1990's. Three biggest airline alliances are Star alliance, One world and Skyteam. These alliances are still operating and found in 1997, 1999 and 2000. Comperative information about these airline alliances can be seen in Table 2.

Table 2. Global Airline Alliances

	Star Alliance	oneworld	SkyTeam
Date of Establishment	1997	1999	2000
Number of Member Airlines	26	15	20
Number of Yearly Passenger	637.62 m	506, 98 m	588 m
Destination Countries	193	151	178
Fleet Size	4.338	3.324	4.467
Number of Daily Flight	18.000	14.011	15.723
Number of Employee	439.232	391.968	459.781
Headquarters	Frankfurt, Germany	New York, USA	Amsterdam, Netherlands

Source: Table Created by collecting datas from official websites of Alliances (22.06.2014)

Although the first aviation efforts began in 1912 in Turkey, institutionalization could be achieved in 1925 by establishment of "Turkish Aeronautical Association". First civil air transportation was initiated by establishment of " State Airline Adminisration" which then transformed so called Turkish Airlines. In 1933 and in 1954 "General Directorate of State Airports Authority" and "General Directorate of Civil Aviation" was established respectively due to the response to the need of regulatory and inspectory authorities in the sector through which important steps taken for the procurement of infrastructure, facilities and equipments. Civil aviation sector which developed by the announcement of civil aviation law in 1983 was able to increase service quality, and reliability through enchanced airports. Turkey was the side of "International Civil Aviation Agreement-Chicago Contract" in 1945 which is the root of international civil aviation at the same time Turkey was one of the founder members of "International Civil Aviation Organization (ICAO)". Morever Turkey Became founder member of "European Civil Aviation Conference (ECAC)".

Civil aviation activities which are milestones of economic and social developments of countries, despite the wars and economic crises etc have shown increasing trend around %4-%5 annual growth on average in 1980's. After 1990s new companies entered into market and that created intense competition among rivals ın this context in 2003 liberalisation decision was the breakthrough for Turkish civil aviatioın sector. According to the datas of civil aviation authorities, by the end of 2012 there were 15 airline companies (including 3 cargo), with 370 aircraft and 55 air taxi 44 general aviation, 17 baloon and 39 agricultural spraying firms with 786 air vehicle exist in Turkey. Furthermore the number of bileteral air transportation agreements which allows Turkey for international operations, reached 143 from 122 after the announcement of 24 new agreements in 2012. With these agreements Turkey has been the fastest developed country in terms of number of flight network. After adopting regional aviation policy in 2003 sector has shown rapid growth. In this frame Turkey's datas related with aircraft, passenger and Cargo traffic are given in Table 3.

Table 3. Statistics related with Aircraft, passenger and Cargo traffic of Turkey (2002-2013)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013Unascertained
Passenger traffic(direct transfer included)	33.783.892	34.443.655	45.057.371	56.119.472	62.271.876	70.715.263	79.887.380	86.001.343	103.536.513	118.292.000	131.029.516	150.186.231
Passenger Traffic	33.783.892	34.443.655	45.057.371	55.572.426	61.655.659	70.296.532	79.438.289	85.508.508	102.800.392	117.620.469	130.351.620	149.531.729
- Domestic	8.729.279	9.147.439	14.460.864	20.529.469	28.774.857	31.949.341	35.832.776	41.226.959	50.575.426	58.258.324	64.721.316	76.138.315
- International	25.054.613	25.296.216	30.596.507	35.042.957	32.880.802	38.347.191	43.605.513	44.281.549	52.224.966	59.362.145	65.630.304	73.393.414
Direct Transfer Passenger				547.046	616.217	418.731	449.091	492.835	736.121	671.531	677.896	654.502
All Flights(included overflight)	532.531	529.205	640.549	757.983	852.175	935.567	1.010.937	1.066.053	1.213.125	1.335.185	1.376.486	1.503.015
Flight Traffic	376.579	374.987	449.493	551.980	627.401	688.468	741.765	788.469	919.411	1.042.369	1.093.047	1.221.346
- Domestic	157.953	156.582	196.207	265.113	341.262	365.177	385.764	419.422	497.862	579.488	600.818	680.525
- International	218.626	218.405	253.286	286.867	286.139	323.291	356.001	369.047	421.549	462.881	492.229	540.821
Overflight Flight Traffic	155.952	154.218	191.056	206.003	224.774	247.099	269.172	277.584	293.714	292.816	283.439	281.669
Cargo Traffic(Tonnes) (Cargo+Post+ Baggage)	896.865	964.080	1.164.349	1.304.241	1.360.550	1.546.184	1.644.014	1.726.345	2.021.076	2.249.473	2.249.133	2.574.893
- Domestic	181.262	188.979	262.790	324.597	389.206	414.294	424.555	484.833	554.710	617.835	633.076	737.843
- International	715.603	775.101	901.559	979.644	971.344	1.131.890	1.219.459	1.241.512	1.466.366	1.631.639	1.616.057	1.837.050

Source: www.dhmi.gov.tr

In the light of these datas passenger traffic (including direct transfer) increased by %344, 55 drom 2002 to 2013 and considering the same period, increase in domestic passenger traffic was %772, 22 while international passenger traffic was %192, 93. Flight traffic in domestic flights rose by %330, 84 while flight traffic in international flights rose by %147, 37 between 2002-2013 period the rise in Cargo traffic in the same period was %187, 10.

Airline companies have turned towards strategic alliances and bileteral agreements in order to reduce costs and improve themselves in industrial aspect. In this frame Turkish Airlines first alliance trial was forging its frequent flyer programme with qualiflyer group in the lead of Swiss Air in 1988 but Turkish Airlines left the alliance as it did not make expected outcomes. The second alliance trial of Turkish Airlines was the Star Alliance membership in the lead of Lufthansa of which Turkish Airlines became full member by joining to alliance on 1 April 2008. Star Alliance member Turkish Airlines now have flights to 243 destination in 105 countries with 202 international and 41 domestic destination. With this network Turkish Airlines is on the fouth place among the list of airlines which have the biggest network in the world. According to Skytrax's rewards in 2013 Turkish airlines choosen the best airline in Europe third times in a row and ninth best in entire world. (www.staralliance.com/en/about/airlines/turkish_airlines/ access: 20.05.2014).

4. Literature Review

There are number of academic studies exist which examine the effect of strategic alliances in different sectors. Within those studies (Rothaermel, 2001; Gottinger & Umali, 2008) in medical sector, (Clement et al., 1997) in health sector, (Ngugi vd, 2012) in banking sector, Bae & Gargiulo (2004) in telecommunication sector and (Isoraite, 2009) in computer and software sector can be given as example among many others

In Oum and Zhang (2001)'s study, alliances which are created by 22 international airline companies between 1986 and 1995 are evaluated with panel data methodology and it is found that issues such as productivity, profitability and price are

all dependent on the size of alliance that they are involved. In the study, it is found that the large sized alliances have signicant and positive effect on firms profitability, productivity and price while it is determined that small sized alliances have no signicant effect on aforementioned factors.

According to the study of Morrrish and Hamilton in 2002, it is observed that participation of airline firms in strategic alliance has made positive effect on productivity and occupancy ratio while there is no increase found on firms profitability.

Oum ie (2004) examined the effect of strategic alliances on firm performance through the productivity and profitability aspect with panel data methodology. In analyze, 10 years of financial and operational datas of the 22 international airline companies are used and after examination of these datas it is found that altough the alliances increased the productivity of firms, there is no significant and positive effect found on firms profitability.

Iatrou & Alamdari (2005) performed questionnaire to 28 airline firms in order to determine the effect of strategic alliances on firm performance. Each participant answered the survey and determined that strategic alliance made increase on income, occupancy rate, an passenger traffic.

Fillon & Colonques (2007) found that strategic alliances haven't created positive effect on firms profitabiility through two-phased game theory methodology.

O'Neal i.e (2007) tried to measure the effect of Delta airways participation to Skyteam through optimization technique. After Examination it is found that this alliance created 50 million dollars increase in the operational income of Delta Airways.

Perezgonzalez & Lin (2010) analyzed the effects of alliances in avioation sector on firms net profitability. In this study, 15 airline firms' 11 years of financial datas are examined by non-parametric statistical tests. According to the analyze result there is no increase found in firms short term net profitability after joining to alliance. Similar study has been conducted by Perezgonzalez (2011), this time 21 airlines firms' 11 years of financial and operational datas are being examined and again it is found that strategic alliances in aviation sector, haven't created increase on firms profitability.

5. Methodology

5.1 Purpose

Civil aviation sector is the one of the most dynamic sector in the world. Increase in the quality and quantity of competition in todays world, removal of economic boundries in the worldwide, and liberalisation of ecanomies and such other factors have been influencing companies. In order to take a stand against these macro factors, companies went into long term strategic alliances under the name of external growth. Concordantly, Turkish Airlines and Star Alliance signed engagement letter on 9 December 2006 for the purpose of joining to alliance. In this work it is aimed to find out whether europes fastest growing airline which is so called Turkish Airlines participation to Star Alliance has made any structural change on firms profitability or not.

5.2 Data

Within the scope of analyze, datas collected through the financial statements and annual reports of Turkish Airlines between 1993-2013 period. Aforesaid statements and reports collected from Turkish Airlines offical website and requested and received by post from İstanbul Stock Exchange. In the study dependent variable is return on equity (ROE= Net Profit/Equity) and independent variables are current ratio (CR= Current Asset/ Short term Liabilities) and Asset Turnover Ratio (AT= Net Sales/Total assets). Excel 2010 and EViews8 SV programmes are used in calculations.

5.3 Method

There might be a structural change found within the relationship between dependent and independent variables when a regression model used which includes time series. It can be understood from structural change that parameter values aren't remaining constant during the period in the model. Structural change can be emerged from external factors such as petroleum embargos of OPEC in 1973 and 1979, gulf war in 1990-91 or radical policy change from fixed exchange rate system to flexible exchange rate system in 1973 (Gujarati, 2004: 273). In other words coefficients in the model can be different before and after the vital macroeconomic changes. In such situations the change in coefficients of regression is described as a structural break (Verbeek, 2008: 66). In the application of time series subsample typically described based on specific time. Chow test can be used in finding whether there is any significant statistical change on data series around

a certain time. In chow test sample divided into two or more groups, model is estimated separately for each period and then model estimated for entire period by bringing datas together. Accordingly three possible regression equation can be shown as follows.

$$Y_t = \lambda_1 + \lambda_2 X_t + \lambda_3 X_t + u_{1t} \quad (1)$$

Sub Period 1

$$Y_t = \gamma_1 + \gamma_2 X_t + \gamma_3 X_t + u_{2t} \quad (2)$$

Sub Period 2

$$Y_t = \alpha_1 + \alpha_2 X_t + \alpha_3 X_t + u_t \quad (3)$$

Entire Period

Regression(3) assumes coefficient of slope remains same and constant during the period in which case there is no structural change. Consequently $\alpha_1 = \lambda_1 = \gamma_1$, $\alpha_2 = \lambda_2 = \gamma_2$ and $\alpha_3 = \lambda_3 = \gamma_3$

Assumptions of this test are as follows.

1-) $u_{1t} \sim N(0,\sigma^2)$ ve $u_{2t} \sim N(0,\sigma^2)$. Namely regressions in subperiod's error terms distributes constantly with the same varience.

2-) Error terms u_{1t} and u_{2t} distribute independently (Gujarati, 2004: 274-276).

F test can be calculated as follows in order to decide whether structural change exist or not after assumptions provided.

$$F = \frac{(RSS_R - RSS_{UR})/k}{(RSS_{UR})/(n_1 + n_2 - 2k)} \sim F_{[k,(n_1 + n_2 - 2k)]}$$

Here: RSS_R represents residual sum of squares of restricted model, RSS_{UR} represents residual sum of squares of unrestricted model, k represents number of parameters and n represents number of observation. While RSS_R is the residual sum of squares of regression (3), RSS_{UR} is the residual sum of squares of regression 1 and regression 2. Nominately $RSS_{UR} = RSS_1 + RSS_2$. Chow tests null hypothesis claims no structural change (H_0) and alternative hypothesis (H_1) claims the existance of structural change. If $F > F_{[k,(n_1+n_2-2k)]}$ H_1 existance of structural change but if $F < F_{[k,(n_1+n_2-2k)]}$ H_0 or no structural change will be accepted (Güriş et al., 2011: 420).

5.4 Analyse and Findings

Return on equity, current ratio, and asset turnover rate are shown in Appendix 1 between 1993-2013. As it is mentioned before, alliance talks between Turkish Airlines and Star Alliance initiated in 2006. Average return on equity of Turkish Airlines between 1993-2005 period is -%11, 59 while this average increased to %14, 94 between 2006-2013. Consequently it is obviously seen that return on equity of Turkish Airlines rose after joining to alliance.

In analyse where current ratio and asset turnover rate modelled on return on equity, estimation made considering the effect of Turkish Airlines participation to Star Alliance. Strategic Alliances may change the structure of relationship among variables. Structural change will cause a break on regression line. Because of this break, if model is estimated without considering the break, the functional shape of the model will be determined inaccurate and thereby there will be description mistake made. As a result of strategic alliance in the model, whether structural change exist or not can be examined with the Chow test (Sarıtaş and Uyar, 2012:80). 2006 is the year in which Turkish Airlines and Star Alliance started negotiations and signed engagement letter, thereby it is considered the refraction period in this research. In this frame calculated regressions for sub and entire periods are described in Table 4.

Table 4. Calculated regression model considering sub and entire periods

Dependent Variables: ROE	Coefficient	Standard Deviation	t-statistics	p-value
1993-2005 (T = 13)				
(Constant)	-0, 3418	0, 1312	-2, 6052	0, 0263*
CR	0, 9978	0, 1275	7, 8201	0, 0000*
AT	-0, 5200	0, 0827	-6, 2880	0, 0000*
$R^2 = 0,8687$				
$RSS_1 = 0,2621$				
D-W statistic = 1, 8217				
2006-2013 (T = 8)				
(Constant)	-0, 0362	0, 6019	-0, 0602	0, 9543
CR	0, 1012	0, 1066	0, 9493	0, 3860
AT	0, 0966	0, 7918	0, 1221	0, 9075
$R^2 = 0, 1874$				
$RSS_2 = 0,0707$				
D-W statistic = 2, 0029				
1993-2013 (T = 21)				
(Constant)	-0, 1733	0, 1447	-1, 1969	0, 2469
CR	0, 5759	0, 1240	4, 6428	0, 0002*
AT	-0.3521	0, 0820	-4, 2936	0, 0004*
$R^2 = 0, 6213$				
RSSR = 0, 9219				
D-W Statistic = 1, 1732				

* sign represents the statistics significance level is significant at %5

The model including entire period can be written as like this according to regression analysis result;

$$ROE = -0,1733 + 0,5759(CR) - 0,3521(AT)$$

Emergence of R2 = 0, 6213 in analysis indicated that approximately %62, 1 of the change on dependent variable – Return on Equity- can be explained by the change on independent variables - Current Ratio and Asset Turnover Rate-. Coefficient concerning current ratio is 0, 5759. So that there is a significant and positive relationship exist between current ratio and return on equity. Hereunder a unit change on current ratio results 0, 5759 unit change on return on equity.

Coefficient concerning asset turnover rate is -0, 3521. So that there is a significant and negative relationship exist between asset turnover rate and return on equity. Hereunder a unit change on asset turnover rate results -0, 3521 unit change on return on equity. Chow test can be applied if variences are equal and under the assumption of series parts of error terms are normally distributed around zero average and independent from each other. Considering sub-periods the equality of variences is tested with F test. To adress this established hypothesis are as follows:

$$H_0 = \sigma_1^2 = \sigma_2^2$$
$$H_1 = \sigma_1^2 \neq \sigma_2^2$$

In this situation F statistic is calculated as; $F = \dfrac{\sigma_1^2}{\sigma_2^2}$

As

$$\sigma_1^2 = \frac{RSS_1}{n_1 - k} = \frac{0{,}2621}{13 - 3} = 0{,}02621$$

$$\sigma_2^2 = \frac{RSS_2}{n_2 - k} = \frac{0{,}0707}{8 - 3} = 0{,}0141$$

$$F = \frac{\sigma_1^2}{\sigma_2^2} = \frac{0{,}02621}{0{,}0141} = 1{,}8588$$

F Tablo value is found 4.74 according to 10 and 5 degree to freedom. Hereunder us F < Ftable H0 hypothesis is acceptable. Nominately as calculated regressions variences of sub-periods accepted equal, chow test is applicable. The other prerequisite of Chow test is the assumption of error terms normal distribution. In this context according to the calculations made considering sub-periods in the frame of J-B test statistics, we can say that error terms are normally distributed. As J-B test statistics p value = 0, 5743 > α= 0, 05 before breaking period, H0 hypothesis is acceptable which states errors regarding the model are normally distributed. Morever as J-B test statistics p value = 0, 8355 > α = 0, 05 after breaking period H0 hypothesis is acceptable which states errors regarding the model are normally distributed. Other prerequisite fort he chow test is independent dispersion of error terms. In order to ensure this, Breusch-Godfrey LM test is mad efor each sub-period and it is found that error terms are distributed independently. Accordingly as LM statistics p value = 0, 8880 > α = 0, 05 before breaking period, H0 hypothesis is acceptable which states that errors are distributed independently. Likewise as LM statistics p value= 0, 97700 > α =0, 05 after breaking period, H0 hypothesis is acceptable which states that errors are distributed independently. After providing aforesaid prerequisations, chow test can be applied. Hereunder chow test results are shown in table 5 which scopes the period between 1993-2013 and consider 2006 as a breaking point.

Table 5: Chow test Results

Chow test: 2006	
Basic Hypothesis: no structural change in 2006	
Sample Period: 1993-2013	
F-statistic = 8, 8474	Prob. F(3, 15) = 0, 0013

According to the result of examined model as "0, 05> Prob. F(3, 15)" basic hypothesis is refused. According to this preliminary protocol signed in 2006, Turkish Airlines participation to Star Alliance caused structural change. Additionally in illustration 1 structural break showed with respect to CUSUM-SQ test.
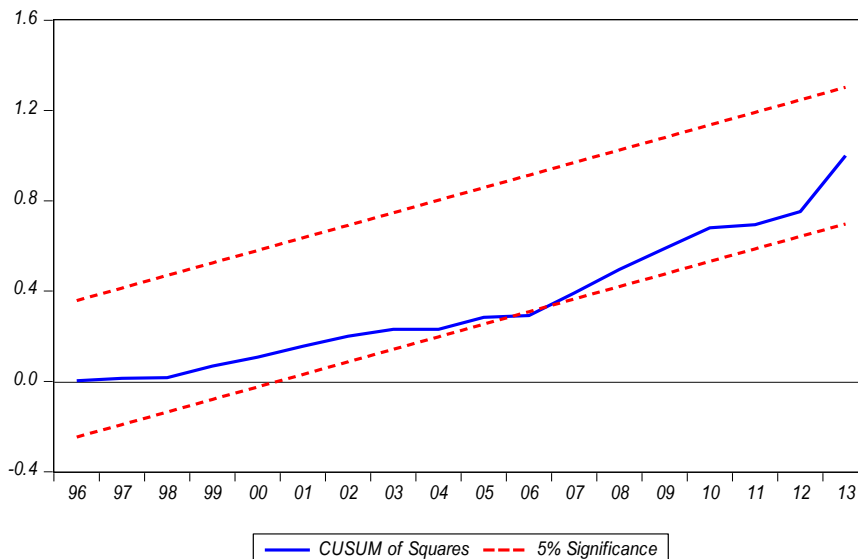
illustration 1. CUSUM-SQ Test graphic

6. Conclusion and Suggestions

Civil aviation sector which is one of the fundamental dynamics of modern life and at the same time is the one of the basic indicator of economic and social development of countries, has been adversly influenced by wars, economic crisis, high oil prices, globalisation of competition and such other macro factors. Airline firms head towards strategic alliances and cooperations in order to reduce costs and improve themselves in industrial content. Furthermore via alliances firms can operate in international markets without being challenged laws and restrictions and this provide firms to create synergy. Turkish Airlines signed strategic alliance contract with Star Alliance because of similar reasons. Chow test was applied with the idea that it may cause a structural break in econometric model in order to measure the effect of Turkish Airlines participation to Star Alliance with pre-protocol signed in 2006. To adress this in this study current ratio and asset turnover rate modelled on return on equity and datas used which are belong to 1993-2013 period. After the application of Chow test, it is found that this alliance caused structural change in the model. In other words this influenced return on equity of Turkish Airlines positively. Because while average return on equity of Turkish Airlines was -%11, 59 between 1993-2005, this rate went up to %14, 94 on average between the period of 2006-2013. Consequently we can say that Turkish Airlines return on equity is increased by joining to Star Alliance.

Chow test provide information about whether there is a break in the model or not but it doesn't provide information about the source of break whether from constant term or coefficient. Thus this can be the research topic of future scientific articles. The other suggestion is, beside financial ratios, operational datas such as occupancy rate, number of passenger carried etc. can be added to the model so that factors effecting return on equity can be viewed through different perspectives.

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Appendix 1. Datas used in Analyse

Years	ROE	CR	AT
1993	-0, 334	0, 560	0, 738
1994	-0, 264	0, 565	1, 111
1995	0, 019	0, 947	1, 333
1996	0, 126	1, 194	1, 572
1997	0, 051	1, 223	1, 799
1998	0, 055	1, 229	1, 831
1999	-1, 060	0, 592	1, 942
2000	-0, 833	0, 790	2, 598
2001	0, 049	1, 865	2, 803
2002	0, 274	1, 885	2, 214
2003	0, 243	1, 197	0, 848
2004	0, 056	0, 930	0, 948
2005	0, 111	0, 689	0, 840
2006	0, 115	0, 798	0, 829
2007	0, 153	1, 305	0, 919
2008	0, 380	1, 599	0, 778
2009	0, 162	1, 436	0, 821
2010	0, 076	1, 374	0, 791
2011	0, 004	1, 031	0, 720
2012	0, 210	0, 860	0, 794
2013	0, 098	0, 201	0, 739