

## The net profitability of airline alliances using referential dollars

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***Abstract.** This study revises a previous research in which we analysed the net profitability of airline alliances but did not control for the impact of inflation on such profitability. Using the same methodology, 15 international airlines as subjects and their net financial results for a period of 11 years as primary research variables, we now compared the performance of airlines before and after joining their respective alliances using referential dollars (i.e., constant dollars with 2010 as base year) instead of nominal dollars. The results showed a similar deterioration in short-term net profits after joining an alliance as the previous study did, and a similar behaviour of statistics tests. Thus, the conclusion then achieved still stand after this revision.*

### Introduction

In 2010, we presented some first data on the profitability of airlines after they joined an alliance. The data covered average profitability during a ‘short-term period’ of 3 years and a ‘medium-term period’ of 5 years immediately before airlines joined their alliances. Both periods were compared against the average profitability 5 years after airlines joined an alliance. Our results showed deterioration in net profits after joining an alliance, although this trend was only significant when comparing performance for the short-term period (Pérezgonzález & Lin, 2010).

Unfortunately, in that study we made the mistake of not accounting for the impact of inflation on the reported profitability. This mistake had the potential of being important because each variable captured net profitability for the years before and after joining an alliance, not for natural years. Without accounting for inflation, computation of economic performance was being less accurate than actual performance was.

Nonetheless, we envisage that any threat was rather against the conclusions of that study. That is, the further back in time, the greater the inflation correction needed to be made, which would increase the actual differences between before and after periods. Thus, we expected that the use of referential values (Pérezgonzález, 2011) instead of nominal values may actually come up with more significant results in the direction of the previous study’s conclusions.

Therefore, the primary focus of this study here was to revise our previous study (Pérezgonzález and Lin, 2010) in which we did not account for the impact of inflation on the economic variables of our research. The overall study still explored the benefits or otherwise of joining global strategic alliance groups and, more specifically, aimed to provide empirical evidence of the effects of joining an alliance on the net results of airline members in recent times.

### Methodology

The methodology replicates that used in 2010 (Pérezgonzález and Lin, 2010), except that we have transformed the nominal dollar value of the economic variables in that

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study into referential dollar values (i.e., constant dollars, using 2010 as base year – Pérezgonzález, 2011).

The primary data for this research were the yearly net results per airline. We estimated that 11 consecutive years of data reporting, including the five years prior to joining an alliance, the year of joining the alliance, and the five years after joining the alliance would suffice the research purpose.

The database for this research thus consisted of 15 airlines as subjects and 11 variables as main research data. From these 11 variables we computed three averages: an average for the 5 years after airlines joined their alliance, an average for the 3 years before the airlines joined their alliance, and an average for the 5 years before the airlines joined their alliance.

Before proceeding with any data analysis, we screened the research variables to check whether they were suitable for using parametric tests or not. We found that 6 out of the initial 11 variables had significantly non-normal skewness, and 4 of these also had significantly non-normal kurtosis. As per the three average variables, two had significantly non-normal skewness, and one also had significantly non-normal kurtosis. In view of these results, we considered more appropriate to use non-parametric statistical tests for our data analyses than parametric ones. We settled for a rather lenient significance level of 0.10 in order to compensate for a larger Type II error due to our small sample size (which tends to have larger standard errors than large samples) and the use of non-parametric tests.

## Results

Wilcoxon signed rank test for paired samples showed a negative significant difference between the short-term period before and after airlines joined their alliance ( $Z = -2.499$ ,  $p = 0.012$ ). Short-term net results after joining an alliance<sup>12</sup> have been significantly worse than net results before joining the alliance.

<b>Illustration 1. Referential and nominal net results for the overall sample</b>		
Net results	rUSD	USD
	Mean (S.D.)	Mean (S.D.)
Medium-term, Pre 5 years	285,133 (397,029)	210,604 (287,532)
Short-term, Pre 3 years	441,133 (420,897)	323,562 (314,790)
Short-term, Post 5 years	-157,861 (816,512)	-140,666 (694,593)
*Statistical tests carried out on rUSD.		

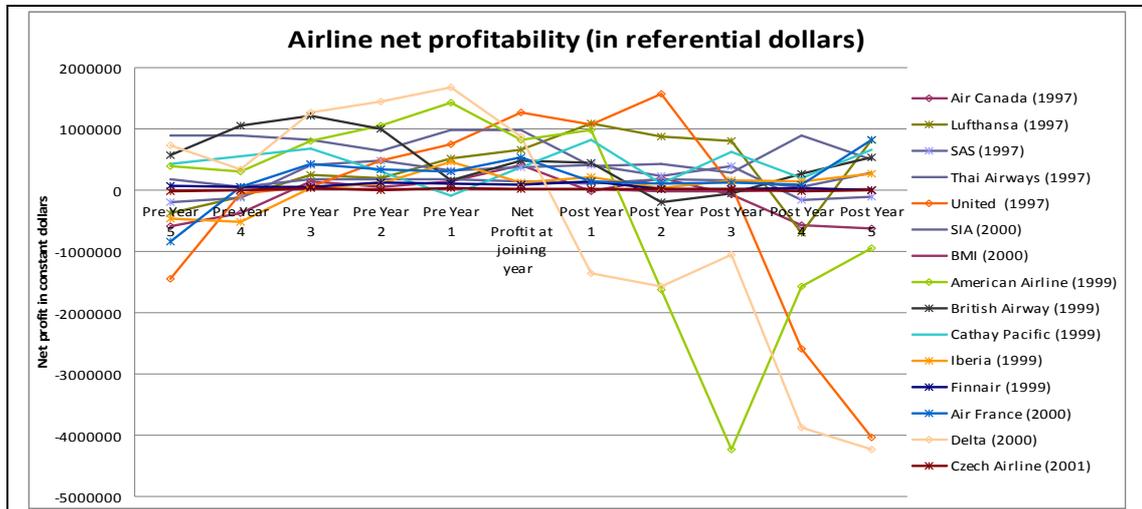
Kruskal-Wallis H tests for several independent samples only showed a significant difference in net results after joining an alliance among airlines grouped according to geographic domicile ( $\chi^2_{(df 2)} = 9.075$ ,  $p = 0.01$ ). Further Mann-Whitney U tests for two independent samples showed that the main differences between these groups were found between American and European airlines ( $U = 0.0$ ,  $p = 0.007$ ), and between American and Asian airlines ( $U = 0.0$ ,  $p = 0.034$ ).

Illustration 2 is a graphic representation of net profit per year per airline. Indeed, the three American airlines in the sample seem to account for the most negative results after

<sup>12</sup> Short-term results refer to the 3 years prior to joining an alliance and the 5 years after joining the alliance. The latter is so in order to account for performance in 2001 and 2002, i.e. after September 11<sup>th</sup> 2001. Medium-term results refer to the 5 years prior to joining the alliance but, as there are no medium-term results after joining the alliance, the 5 years after joining the alliance was used, instead.

joining an alliance. The distinctive negative results by American Airlines and United Airlines coincided with the years 2001 and 2002, while the distinctive negative results for Delta coincided with the years 2001, 2002, 2004 and 2005. When American airlines were controlled for in the sample, a Wilcoxon signed rank test for paired samples showed no significant difference in net results before and after joining an alliance.

**Illustration 2. Graph of net results per airline along 11 years, distributed around the joining year**



## Discussion and conclusions

Our research replicated the results found in our previous study (Pérezgonzález and Lin, 2010), and the conclusions made then still stand once nominal dollars have been transformed into referential dollars (Pérezgonzález, 2011). Namely, the short-term net profit reported by airlines has not increased after joining an alliance, but rather seems to have gone in the opposite direction and has deteriorated significantly.

However, such interpretation needs to be taken with caution. Overall, it seems that American airlines are the ones which account for most of the negative performance in the sample. The events of September 11<sup>th</sup> 2001 may be there to account for the drop in performance, at least partly. Yet we do not have evidence to test the real role that September 11<sup>th</sup> played on the performance reported by airlines, nor a way to ascertain whether the same events did not affect European or Asian airlines in the same manner than they affected American airlines. In any case, it appears that pertaining to an alliance has not helped buffer the potential negative effects of these events on, at least, American airlines' performance.

This research is but a second empirical step in studying the benefits or otherwise of joining an alliance. Variables of interest for future study are those useful to continue comparing performance before and after joining an alliance, variables such as operational costs, number of passengers transported, etc. New research goals will, thus, explore the effect of alliances on those variables in the coming future.

## References

- PÉREZGONZÁLEZ Jose D (2011).** *Referential currency (r)*. Journal of Knowledge Advancement & Integration, 2011, pp.12-14.
- PÉREZGONZÁLEZ Jose D & Bo LIN (2010).** *The net profitability of airline alliances, an empirical study*. Aviation Education and Research Proceedings, vol. 2010, pp 43-48.

## Comparing the net profitability of airline alliances against that of airlines not in an alliance

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***Abstract.** This study compares the net return of airlines which have joined alliances against a control group of airlines which have not joined any alliance. In particular, the net financial results for a period of 11 consecutive years were extracted for 21 airlines from ICAOData. We compared the alliance and non-alliance groups in their performance before and after joining an alliance (or equivalent measure), as well as in their relative net performance. Results show a significant deterioration of net profits for the alliance group and a significant improvement for the non-alliance group. This group also differed significantly from the alliance group in having a positive relative net performance in the short-term. Thus, results suggest that not being in a strategic alliance has worked out more profitably for the 'independent' airlines than being in one has worked out for the 'allied' ones.*

### Introduction

The airline industry is one of several industries that have adopted the strategic alliance model in their operations. However, few studies have analyzed whether airlines are more profitable in an alliance or out of it. The study by Oum, Park, Kim and Yu (2004) is one of few addressing the question empirically. In assessing the benefits brought by intra-alliance cooperation, they found that airlines did not gain significant performance improvements after joining the alliance. And Pérezgonzález and Lin (2010, 2011) found that airlines in strategy alliances have performed significantly worse after joining their alliances than they were doing before joining them.

However, above studies seem to have analyzed just the one group of airlines in an alliance, without having a clear external referent for assessing whether not being in an alliance would have work better for the airlines. It may always be the case that airlines not in an alliance have actually done worst than those within one.

Therefore, this study further expands Pérezgonzález and Lin's research by comparing the net performance of airline alliances against that of a group of airlines not in an alliance in the same period of time. Any results from this study are, thus, potentially more valid as the study actually has a control group of airlines not in an alliance against which to compare the economic performance of airlines in a strategic alliance.

### Methodology

The main source of data for this research was the financial database compiled by ICAO (ICAOData), as presented in Pérezgonzález and Lin (2010) and used in Pérezgonzález and Lin (2011), to which we add another subsample of 6 airlines not pertaining to an alliance (at least not during the reported period).

The database for this research thus consisted of 21 airlines, and 11 initial variables representing 11 consecutive years of data reporting, including the five years prior to

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joining an alliance, the year of joining the alliance, and the five years after joining the alliance, or equivalent period of time between 1995 and 2005 for airlines not in an alliance.

From those initial variables, we computed five main research variables: the average net profitability for the 5 years after airlines joined their alliance, the average net profitability for the 5 years before airlines joined their alliance, the average net profitability for the 3 years before airlines joined their alliance, medium-term relative net performance (= average net profitability of 5 years after joining alliance - average net profitability of 5 years before joining alliance), and short-term relative net performance (= average net profitability of 5 years after joining alliance - average net profitability of 3 years before joining alliance). Equivalent values were obtained for the control group, using the year 2000 as “joining” year. All nominal values (USD, S) were also transformed into referential values (rUSD, r\$) (i.e., constant values, using 2010 as base year – Pérezgonzález, 2011).

Before proceeding with the analysis of data, we screened the research variables to check whether they were suitable for using parametric tests or not. We found that most variables were significantly non-normal in skewness and kurtosis. These results thus suggested that non-parametric tests were more suitable for our intended data analysis. We used SPSS/PC+ (16.0) for data analysis, and non parametric, two-tailed tests, as our main statistics. We settled for a rather lenient significance level of 0.10 in order to compensate for a larger Type II error due to our small sample size (which tends to have larger standard errors than large samples) and the use of non-parametric tests.

## Results

A Wilcoxon signed rank test for paired samples showed significant deterioration in net profitability in the short-term period before and after airlines joined their alliances ( $Z = -2.499$ ,  $p = 0.01$ ) but not so for the medium-term period ( $Z = -1.420$ ,  $p = 0.16$ ). As for the non-alliance group, longitudinal differences showed a significant improvement in net profitability in the short-term period before and after 2000 ( $Z = -2.033$ ,  $p = 0.04$ ) but not necessarily so for the medium-term period ( $Z = -1.195$ ,  $p = 0.23$ ).

We also used a Mann-Whitney test for two independent samples to explore whether the differences in relative net performance between both subsamples were also statistically significant. Results showed that both subsamples differed significantly in their short-term relative performance ( $U = 18.0$ ,  $p = 0.04$ ) but not so in their medium-term relative performance ( $U = 30.0$ ,  $p = 0.51$ ).

**Illustration 1. Net results for airlines both in an alliance and not in an alliance.**

	Airlines in an alliance	Airlines not in alliance
Net results	Mean (S.D.)*	Mean (S.D.)*
Medium-term, Pre 5 years	285,133 (397,029)	6,404 (65,119)
Short-term, Pre 3 years	441,133 (420,897)	-8,052 (82,001)
Short-term, Post 5 years	-157,861 (816,512)	8,572 (35,797)
Medium-term relative performance	-442,994 (1,067,800)	1,303 (74,015)
Short-term relative performance	-598,994 (1,151,040)	16,624 (72,493)

\*Values in thousands of referential USD.

## Discussion and conclusions

This research further expands the results of another (see Pérezgonzález and Lin, 2011) with the particularity that we have now compared the alliances' net performance against the net performance of a control group of airlines not in an alliance during, approximately, the same period of time.

The lack of significant overall impact of alliance membership on airlines' profitability over the years reported by Oum, Park, Kim and Yu (2004), and our own suggestions that the impact on profitability may have been significantly negative, at least, in the recent short-term (Pérezgonzález and Lin, 2010, 2011), is now further supported by the results here presented. Indeed, our results support the interpretation that the group of airlines not in an alliance have been significantly better off in the short term than airlines which were in an alliance. In fact, airlines not in an alliance seem to have made a profit in that time, while airlines in alliances have drawn a loss.

No doubt, these results are but a glimpse of airline alliances' economics. After all, we only found adequate data for a rather small sample of airlines, and the impact of potential mediator and modulating variables have not been controlled for. For example, it may be that the events of September 11<sup>th</sup> 2001 may be there to account for the drop in performance in alliance groups, as suggested elsewhere (Pérezgonzález and Lin, 2010, 2011), but we do not yet have evidence to test the real role that September 11<sup>th</sup> played on such performance nor a way to ascertain why airlines not in an alliance would not have been equally affected.

It is also possible that smaller airlines tend not to be in alliances and, thus, are more flexible to adapt to changing circumstances, although this would certainly contradict one of the reasons to pertain to an alliance in the first place.

All in all, we do not have ready answers whether pertaining to an alliance is beneficial or not, and why that should be so. We only have some data that illustrate that, at least at some time in the recent past, a group of airlines not in an alliance seems to have done economically much better than airlines in alliances in approximately the same period of time.

Again, this research is but a third step in tackling the benefits or otherwise of joining an alliance, from an empirical perspective. Further studies may be needed to explore the performance of airline alliances when taking in to account other performance-related variables, such as operational costs, number of passengers transported, etc.

## References

- OUM HT, J PARK, K KIM & C YU (2004).** *The effect of horizontal alliances on firm productivity and profitability: evidence from the global airline industry.* Journal of Business Research. 57, pp 844-853.
- PÉREZGONZÁLEZ Jose D (2011).** *Referential currency (r).* Journal of Knowledge Advancement & Integration, 2011, pp.12-14.
- PÉREZGONZÁLEZ Jose D & Bo LIN (2010).** *The net profitability of airline alliances, an empirical study.* Aviation Education and Research Proceedings, vol. 2010, pp 43-48.
- PÉREZGONZÁLEZ Jose D & Bo LIN (2011).** *The net profitability of airline alliances using referential dollars.* Aviation Education and Research Proceedings, vol. 2011, pp 63-65.