

An Evaluation of Airline β Values and their Application in Calculating the Cost of Equity Capital

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Abstract

This paper focuses on the calculation of the cost of equity capital in a sample of airlines, in comparison to industry-calculated values. The approach usually taken is to apply CAPM to airline stock prices and market indices. The research shows that the calculated β values are sensitive to the precise methodology and calculations used. Further, the low regression model fits indicate CAPM may not be the most suitable model for β value calculations. The emerging β values are lower than expected, and possible causes of this are discussed.

Keywords: CAPM, Airline β ,

1. Introduction

As airline deregulation continues, an increasing number of airline shares are traded on stock markets and many government-owned carriers are planning privatisation. Furthermore, government backed flag carriers are no longer guaranteed financial

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support in all circumstances and airlines are expected to be profitable self-sustaining business entities. There is thus considerable interest in comparisons of airline equity returns and cost of equity capital. The latter is also required for calculating the weighted average cost of capital (WACC), widely used as the discount rate in investment appraisal, and more recently in such measures as Economic Value Added (EVA)¹ and Cash Value Added (CVA)².

This paper focuses on the task of estimating the cost of equity capital, considered to be more difficult to calculate than the cost of debt. The approach usually taken is to apply the Capital Asset Pricing Model (CAPM) by examining the relationship between airline share returns and the returns to the market, relative to a risk-free rate. Major stock market indices such as S&P500 are taken as a proxy for the market, and long-term government bonds as the risk-free rate. The covariance relationship, represented by the β value, is a measure of the riskiness of the security relative to the market, with numbers greater than unity implying a security is more risky than the overall market.

Through the β values generated by regression analyses using data from a selection of international airlines, this paper discusses the problems associated with using the CAPM method in the estimation of the cost of equity capital. Under different

¹ Economic Value Added (EVA) is computed by taking the spread between the rate of return on capital and the cost of capital and multiplying it by the economic book value of the company. Economic book value is the company's net assets adjusted by excluding marketable securities and construction in progress, and including the present value of non-capitalised leases. (Stewart 1991)

² Cash Value Added (CVA) is similar to EVA as an economic profit measure. It deducts all costs from revenue, including asset replacement costs and a capital charge. (British Airways 2001)

assumptions, β values are calculated and compared. These calculated values are also compared to a selection of β values made available by Bloomberg, Barra and Datastream.

2. Brief Overview of CAPM

The Capital Asset Pricing Model (CAPM) is a model of the trade-off between risk and return by relating the risk and expected returns of listed companies and the market (Sharpe, 1964). CAPM provides a benchmark rate of return for the purposes of evaluation (EVA, CVA, project appraisal) as well as giving an indication of expected rate of return for comparable unlisted companies.

Finance theory asserts that shareholders will be compensated for assuming higher risks by receiving higher expected returns. However, the distinction should be made between systematic risk, which is market risk attributable to factors common to all companies (eg. impact of September 11th on all airlines), and unsystematic risk, which is unique risk specific to the company or a small group of companies (eg. US Airways' bankruptcy announcement; MyTravel's accounting problems announcement). CAPM models the expected return related to the systematic risk. According to portfolio theory, unsystematic risk can be diversified away through portfolio selection, and thus no reward is received for assuming this risk.

The covariance between the company's return and the market's return is the company's β value, and is a measure of the systematic risk of the company. From the β value, CAPM can be used in the calculation of the equilibrium expected return of a company. The equilibrium expected return of a company, R_e , is the sum of the

prevailing risk-free rate, R_f , and a “risk premium” dependant on the β value and the market risk premium ($R_m - R_f$). This can be expressed as follows:

$$R_e = R_f + \beta(R_m - R_f) \quad (1)$$

In order to estimate β , the following regression equation is used:

$$R_e - R_f = a + b_e(R_m - R_f) \quad (2)$$

where

R_e = the return on equity e ,

R_f = the risk-free return,

a = constant,

R_m = the return on the overall stock market,

b_e = the equity β .

Although the calculation of β involves a covariance relationship between company return and market return, the exact methodology of estimating β is not explicitly indicated for published values, nor is it apparently unique. In application, different sources seem to make different assumptions on the methodology, with different β values emerging.

Discrepancies in assumptions arise in a number of areas. With respect to the return on equity, factors such as dividends, taxes and liquidity may be included in “extended” models. Other discussion arises around the inclusion of the risk-free rate in the

regression. These seem to be primarily difference of opinion, as well as understanding whether additional data provides significantly different results. This is, however, not pursued in this paper.

Lastly, the frequency and period required for the calculation of β may also differ across estimation methods, with methods preferring monthly frequencies more common than those using daily frequencies. These differences will be examined in the estimation of the β values.

3. Sample Airlines

A sample of airlines was chosen attempting to ensure the sample was both internationally representative and representative of airlines of varying stage lengths (both long haul and short haul carriers). The calculation of β values requires stock market data, limiting sample airlines to listed companies and eliminating airlines such as Virgin Atlantic and South African Airways. Availability of data further limited the selection, eliminating Sabena and China Airlines from the original sample.

The final sample of airlines was: Austrian Airlines, British Airways, Cathay Pacific, Finnair, Lufthansa, Qantas, SAS, Singapore Airlines, Southwest Airlines and Varig. This sample covered Europe, North America, Latin America, Asia and Australia, but did not include an African representative. Summary data on the sample is shown in Table 1.

4. Industry Sources

The β values are very readily available from a number of companies who calculate β values for most listed companies worldwide. Widely recognised sources are Datastream, Bloomberg and Barra, which provide regularly recalculated and updated β values. The β values and R^2 values (for January 2002) from these sources are listed in Table 2. A comparison of β values is depicted in figure 1.

The most striking feature of the comparison is the range of values. Some airlines have a very narrow range of values, (e.g. Lufthansa, Qantas) while others have a much wider range, (e.g. SAS, British Airways). Clearly, Datastream, Bloomberg and Barra have used different methodologies with different assumptions, resulting in the estimation of different β values. Closer analysis of the model fit, as represented by the R^2 , reveals (on the whole) better model fits by Datastream than by Bloomberg (R^2 unavailable for Barra).

Most importantly, the above research indicates that (a) different methodologies for the estimation of β do exist and are widely used; and (b) these different methods have different resulting β values, with different degrees of model fit. The following sections examine the implications of different models using the sample airlines proposed earlier.

5. Data for Sample Airlines

The CAPM model requires specific information for the estimation of β : the share prices and dividends for calculation of equity returns; market index values for

calculation of market returns; and bond returns. The airlines, primary exchange of listing and market indices of leading industrial companies are shown in table 3.

All market data used in the estimations of the β -values were obtained from Datastream. For monthly frequency, the estimation of β requires 60 data points, requiring data going back at least 5 years (Stewart, 1991). For daily frequency, at least a year of data is conventionally included. The following data was used:

- Monthly share prices for each airline from January 1996 to January 2002.
- Daily share prices for each airline from January 2001 to January 2002.
- Monthly market index for each index from January 1996 to January 2002.
- Daily market index for each index from January 2001 to January 2002.
- Monthly dividend yields for each airline from January 1996 to January 2002.
- Daily dividend yields for each airline from January 2001 to January 2002.
- Monthly dividend payout for each airline from January 1996 to January 2002.
- Monthly 10-year benchmark bond yields for the country of primary listing, from January 1996 to January 2002.
- Daily 10-year benchmark bond yields for the country of primary listing, from January 2001 to January 2002.

6. Methodology

Four different methodologies have been used in this analysis, each based on a different set of underlying assumptions. These are discussed below.

6.1. Method 1

The following assumptions have been made.

- 1) The return on equity is calculated on a monthly basis. It is the sum of the annual change in share price and the annual dividend yield.

$$equity\ return_i = \frac{p_i - p_{i-12}}{p_{i-12}} + dy_i \quad (3)$$

where p_i = share price in month i ,

dy_i = dividend yield in month i ,

- 2) The market return is calculated on a monthly basis. It is calculated as the annual change in market index, as follows:

$$market\ return_i = \frac{m_i - m_{i-12}}{m_{i-12}} \quad (4)$$

where m_i = market index in month i ,

- 3) The risk free rate is approximated by the 10-year government bond yield, where available.

6.2. Method 2

The following assumptions have been made.

- 1) The return on equity is calculated on a monthly basis. It is the sum of the monthly change in share price and the annual dividend yield averaged over the year.

$$equity\ return_i = \frac{p_i - p_{i-1}}{p_{i-1}} + \frac{dy_i}{12} \quad (5)$$

where p_i = share price in month i ,

dy_i = dividend yield in month i ,

- 2) The market return is calculated on a monthly basis. It is calculated as the monthly change in market index.

$$market\ return_i = \frac{m_i - m_{i-1}}{m_{i-1}} \quad (6)$$

where m_i = market index in month i ,

- 3) The risk free rate is approximated by the 10-year government bond yield, where available. Similar to the dividend yield, the bond yield was averaged over the year.

6.3. Method 3

The following assumptions have been made.

- 1) The return on equity is calculated on a monthly basis. It is the monthly return on shares, including dividends, and is calculated as follows:

$$equity\ return_i = \frac{p_i - p_{i-1} + d_i}{p_{i-1}} \quad (7)$$

where p_i = share price in month i ,

d_i = dividend paid in month i ,

- 2) The market return is calculated on a monthly basis. It is calculated as the monthly change in market index.

$$market\ return_i = \frac{m_i - m_{i-1}}{m_{i-1}} \quad (8)$$

where m_i = market index in month i ,

- 3) The risk free rate is approximated by the 10-year government bond yield, where available. The bond yield was averaged over the year.

6.4. Method 4

The following assumptions have been made.

- 1) The return on equity is calculated on a daily basis. It is the sum of the daily change in share price and the adjusted annual dividend yield.

$$equity\ return_j = \frac{p_j - p_{j-1}}{p_{j-1}} + \frac{dy_j}{262} \quad (9)$$

where p_j = share price on day j ,

dy_j = dividend yield on day j

- 2) The market return is calculated on a daily basis. It is calculated as the daily change in market index, as follows:

$$market\ return_j = \frac{m_j - m_{j-1}}{m_{j-1}} \quad (10)$$

where m_j = market index on day j ,

- 3) The risk free rate is approximated by the 10-year government bond yield, where available. Similar to the dividend yield, the bond yield was averaged over the year.

7. Results

Despite the apparent similarities in the methods, the results were quite varied. The estimated β values are tabulated in table 4, together with the R^2 from the regression. Figure 2 shows a graphical depiction of the results.

Finance theory indicates that the airline industry is traditionally more risky than the market as a whole, and consequently it is expected that the β -values of the selected airlines should be greater than 1.00, typically in the range 1.2 – 1.4 (Morrell 1997). However, it is apparent from the above results that not all airlines seem to support this.

7.1. Discussion: Method 1

This method used the annual returns calculated on a monthly basis. The underlying assumptions have resulted in β values which on the whole seem to correspond to prevailing finance theory. Five airlines have β values in the range 0.99 – 2.05, supporting the theory that airlines are at least as risky as the market. One airline had a negative β value, indicating counter-cyclical returns of airlines; three airlines had β values less than 0.2. The remaining airline had a β value just above 0.4. The sample average β value is 0.843, slightly below 1.00.

Model fit, represented by the R^2 value, shows a wide range. Three airlines had high R^2 values above 59%; two airlines display a more moderate fit with R^2 values around 33%. Three airlines had a weak fit of between 3% and 10% and the remaining two airlines had R^2 values of less than 1%.

Overall, the results are reasonably satisfactory. However, while some airlines produced good results with this model – high β values and high R^2 values – there were still many with low (or negative) β values and low model fit, and clearly other models may produce better results.

7.2. Discussion: Method 2

This method was based on the monthly returns and has resulted in very low β values: two of the airlines showed negative β -values, indicating counter-cyclical behaviour of the airlines; seven airlines showed values below 0.4; and the remaining airline had the highest value of the sample at 0.711. The average β value of the sample was exceptionally low at 0.190, far below the expected average above 1.00.

Furthermore, the low R^2 values indicate that the model fit is very poor, and that changes in the market return do not adequately explain changes in the airline return: five airlines have R^2 of less than 1%; the remaining five have R^2 between 1% and 7%. These R^2 values indicate that the market return is a very poor predictor of airline returns.

In summary, this model produced the poorest results – both in terms of low β values, and low model fit.

7.3. Discussion: Method 3

This method was also based on monthly returns and has produced similar results to those of method 2: low β values accompanied by low R^2 values. Again, there are two airlines with negative β values; seven airlines with β values below 0.4; and the remaining airline with the highest value of 0.740. This method displays an equally low average β value of 0.201. The R^2 values are similarly low: five again have R^2 values less than 1% and the remaining five have R^2 values between 1% and 7%.

Both methods 2 and 3 seem to produce counter-intuitive results. The apparent counter-cyclical behaviour of the two airlines together with the low β values of the remaining sample airlines seem to contradict prevailing finance theory.

Furthermore, the systematic risk attributable to the market – as measured by the R^2 value – seems to be a very small part of the airline return, in comparison to the unsystematic attributable directly to the airline itself. In other words, it appears that factors and changes in the overall market return explain only a very small portion of changes in the airline return – there are other airline-specific, unsystematic factors that need to be identified which likely have a more significant effect on airline returns.

7.4. Discussion: Method 4

This method calculated the daily returns. The results agreed more strongly with finance theory: six airlines had β values above 1.00 with a seventh airline at 0.922. One airline had a midrange β value of 0.64 with the remaining two airlines below 0.25. Reassuringly, no negative values emerged. The sample average was the highest

of the methods analysed, at 0.918. After excluding the two lowest values, the average of 1.11 is more in line with expectations.

The model fit is a little weaker than method 1, but still better than methods 2 and 3. Three airlines had R^2 values between 30% and 40%; three airlines had R^2 values between 18% and 29%; three airlines had low R^2 values between 1% and 8% with the remaining airline's model fit is less than 1%.

Although the β values are more supportive of finance theory, the lower R^2 values indicate a poorer model fit.

7.5. Discussion: Summary

From analysis of both industry β values and the regression β values, it is clear that in the sample of selected airlines there is significant sensitivity of the β values to the underlying assumptions used. The values ranged from negative values on one hand, to values greater than 2.00 on the other hand, depending on the model used and the underlying assumptions made. Some airlines in the sample displayed a wider range of values than others.

8. Forward Looking β Values

Since the calculated β values are backward looking measures based on what has happened in the past, they should be adjusted to reflect the prospective risk profile in the future. This requires unlevering the β , which represents the β the firm would have if there was no debt financing (Pike and Neale 1999). This is calculated as follows:

$$\beta_{unlevered} = \frac{\beta_{current}}{1 + (1-t) * \frac{D}{E}_{actual}} \quad (11)$$

where t = corporate tax rate

$\frac{D}{E}_{actual}$ = actual debt equity ratio.

The unlevered β is relevered using a projected or target debt/equity ratio, giving it a prospective β value for the future.

$$\beta_{levered} = \beta_{unlevered} * \left(1 + (1-t) * \frac{D}{E}_{target}\right) \quad (12)$$

The calculated β values were unlevered using the debt/equity ratio from the latest financial statements available. A target debt/equity ratio of 1.00 – 1.5 was chosen for airlines with high existing debt/equity ratio; those with lower ratios were given a lower target debt/equity ratio of 0.5. Singapore was not given a new target ratio due to its low current ratio. Varig had negative equity as a result of large negative retained earnings. Assuming zero retained earnings gave a positive debt/equity ratio and a target ratio set. These ratios are shown in Table 5. The relevered β values for each of the methods is shown in Table 6.

These relevered β values are, on average, lower than the comparable industry β values, since the target debt/equity ratios are projected to be lower than currently. When comparing the industry and relevered β values, it is clear that there is a wide range of values depending on the methodology used. This is shown in figure 3.

With the airlines in descending order of range, Qantas (with a range of 1.77) is more sensitive to the underlying assumptions of the model than Finnair (with a range of 0.55). The range in β values will be accompanied by a range in cost of equity capital values and, consequently, WACC values.

9. Understanding the Lower β Values

The issue still remains as to why the average β values are on the whole much lower than was expected or that has been postulated in finance theory. A question arises as to whether the shares of the airlines are well traded enough to respond sufficiently to changes in the market. It is probable that if the majority of the shares of an airline are not traded actively, the airline returns may not be as sensitive to shocks in the market. This may result in the airline returns being less correlated with the market returns, and lower β values would result.

Figure 4 shows the percentage of shares traded daily. Aside from British Airways, most airlines have less than 1% of shares traded daily, which may be as a result of high proportions of closely held shares. Table 7 shows the majority shareholders who it is believed will not trade their holdings. These shareholders include governments and states, and strategic holdings by other companies.

The correlation between the β values and the trading activity will indicate whether there is a relationship between them. The intuition is that the share prices of the more actively traded shares will tend to respond to market shocks, and consequently should have higher β values. These correlations are shown in figure 5.

There seems to be a good relationship between the β values and the trading activity: for Datastream, Barra and Method 4, there appears to be a fairly strong association of higher β values with the more actively traded shares. Bloomberg, and methods 2 and 3 display a weaker relationship between higher β values and more actively traded shares. Method 1, although producing some good β values, displays an association of higher β values with less actively traded shares. In general though, it appears that there is some correlation between higher β values and more actively traded shares.

An alternative explanation for the lower β values may be as a result of the market becoming more volatile in itself, as a result of the increasing dominance of the IT sector and the Telecommunications sector, seen to be highly volatile sectors. As such, although the airline industry may not have become less volatile, the overall market may have become more volatile. Since the β values measures the *relative* volatility in returns between individual companies and the market, the β values for airlines may indeed have fallen.

10. Calculating the Equity Cost of Capital

The cost of equity capital is calculated using the CAPM model. Long-term government bonds are used as proxies for the risk free rate for each of the markets, while an equity risk premium of 4.5% is used (The Economist, 2002). Government bond yields average approximately 5.1% for all countries excluding Brazil, which has a yield of approximately 13.4%. Various β values will be used for comparative purposes: all industry β values will be used as well as the β values calculated in methods 1 and 4. The results of the calculations are depicted in figure 6, which shows

the minimum, maximum and average cost of equity capital for each airline, arranged in descending order by range.

There is an interesting range of cost of equity: from 6.7% for British Airways to 0.9% for Lufthansa. British Airways has the largest range of cost of equity, as a result of the sensitivity of the estimated β values to the method used. On the other extreme, Lufthansa has a narrow range of cost of equity: the β values for do not appear to be as sensitive to the methodology used.

Varig, although having a fairly narrow range of 3.0%, notably has the highest cost of equity due to the high prevailing interest rates in Brazil. Finnair has the lowest cost of equity as a result of low (and negative) β values rather than as a result of low interest rates. These results should be viewed cautiously.

11. Conclusion

The calculation of the β value of a listed airline is not an exact science. Since an airline's weighted average cost of capital (WACC) is an integral part of the airline business, robust methodology needs to be in place to calculate this hurdle rate. This analysis has addressed the calculation of β values through the CAPM model.

There does not seem to be a specific methodology to use CAPM to estimate the value of β , and the estimated β values appear to be very sensitive to the underlying assumptions of the methods. This could introduce problems in areas such as project appraisal since the cost of equity, and hence WACC, is neither unique nor stable.

The sensitivity to underlying assumptions results in a wide range of values as well as some counter-intuitive results. Further, the models display various degrees of model fit. Annual returns calculated on a monthly basis and daily returns calculated on a daily basis provided results more consistent with finance theory than methods looking at monthly returns calculated on a monthly basis.

The estimated β values do not seem to fall into the expected range of 1.2 – 1.4, but tend to display lower values. There may be a number of reasons for this: the sample airlines included; a positive correlation with trading activity; or as a result of the market itself becoming more volatile. Further investigation into this area is necessary to determine the exact source.

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TABLE 1: SUMMARY SAMPLE DATA

	PASSENGER TRAFFIC (RPK MN)	PAX (MIL)	AVERAGE STAGE LENGTH (KM)
Singapore	71,118	15.0	4,741
Cathay Pacific	47,153	11.9	3,962
British Airways	116,674	36.2	3,223
Qantas	64,149	20.5	3,129
Varig	26,599	10.9	2,440
Finnair	17,534	7.4	2,370
Austrian Airlines	8,799	3.9	2,256
Lufthansa	88,608	41.3	2,146
Southwest Airlines	67,966	63.7	1,067
SAS	22,647	23.2	976

Source: Airline Business September 2001

TABLE 2: INDUSTRY β COMPARISON (JANUARY 2002)

	BARRA		BLOOMBERG		DATASTREAM	
	β	R^2	β	R^2	β	R^2
Singapore	1.209	N/A	1.090	0.39	0.917	0.732
Cathay Pacific	1.033	N/A	0.920	0.30	0.643	0.434
British Airways	1.857	N/A	1.270	0.22	1.599	0.623
Qantas	0.878	N/A	0.940	0.05	0.860	0.275
Varig	0.746	N/A	0.740	0.05	0.301	0.127
Finnair	0.145	N/A	0.470	0.03	0.166	0.239
Austrian Airlines	0.977	N/A	1.270	0.18	1.095	0.625
Southwest Airlines	1.085	N/A	0.420	0.01	0.726	0.395
SAS	1.383	N/A	0.570	0.03	0.581	0.466
Lufthansa	1.185	N/A	1.120	0.46	1.140	0.682
AVERAGE	1.050		0.881		0.803	

TABLE 3: AIRLINES AND MARKET INDICES

AIRLINE	EXCHANGE OF PRIMARY LISTING	MARKET INDEX
Singapore Airlines	Singapore	Straits Times Index
Cathay Pacific	Hong Kong	Hang Seng
British Airways	London	FTSE 100
Qantas	Australia	Australian All Ordinaries
Varig	Sao Paulo	Bovespa
Finnair	Helsinki	HEX General
Austrian Airlines	Vienna	ATX
Southwest Airlines	New York	S&P 500 Composite
SAS	Stockholm	Affarsvarn Gen
Lufthansa	Frankfurt	DAX 30

TABLE 4: REGRESSION ESTIMATION RESULTS

	METHOD 1		METHOD 2		METHOD 3		METHOD 4	
AIRLINE	β	R^2	β	R^2	β	R^2	β	R^2
Singapore*	1.332	0.870	0.209	0.036	0.216	0.038	1.195	0.401
Cathay Pacific*	0.020	0.599	0.112	0.006	0.111	0.006	0.922	0.321
British Airways	0.422	0.086	0.711	0.062	0.740	0.066	1.510	0.247
Qantas	1.678	0.090	-0.185	0.004	-0.204	0.005	1.113	0.074
Varig*	1.719	0.357	0.269	0.009	0.239	0.007	0.641	0.056
Finnair	-0.076	0.033	0.108	0.027	0.147	0.043	0.049	0.005
Austrian Airlines	2.046	0.335	0.228	0.013	0.338	0.028	1.390	0.184
Southwest Airlines	0.195	0.001	-0.053	0.001	-0.054	0.001	1.107	0.289
SAS	0.102	0.005	0.117	0.007	0.092	0.004	0.241	0.025
Lufthansa	0.993	0.736	0.385	0.069	0.380	0.068	1.011	0.382
AVERAGE	0.843		0.190		0.201		0.918	

* indicates no bond data available

TABLE 5: ACTUAL AND TARGET DEBT/EQUITY RATIOS: 2000/2001

AIRLINE	PRESENT RATIO*	TARGET RATIO
Singapore	0.18	0.18
Cathay Pacific	1.27	1
British Airways	2.02	1.5
Qantas	1.26	1
Varig	-10.88/6.31	3
Finnair	0.55	0.5
Austrian Airlines	3.32	1.5
Southwest Airlines	0.56	0.5
SAS	0.59	0.5
Lufthansa	0.51	0.5

** Source: for 2000/2001 from latest annual reports*

TABLE 6: RELEVATED β VALUES

AIRLINE	METHOD 1	METHOD 2	METHOD 3	METHOD 4
Singapore	1.332	0.209	0.216	1.195
Cathay Pacific	0.018	0.100	0.099	0.823
British Airways	0.359	0.604	0.629	1.283
Qantas	1.578	-0.174	-0.192	1.047
Varig	0.959	0.150	0.133	0.357
Finnair	-0.074	0.106	0.143	0.047
Austrian Airlines	1.276	0.142	0.211	0.867
Southwest Airlines	0.195	-0.053	-0.054	1.110
SAS	0.097	0.111	0.088	0.229
Lufthansa	0.988	0.383	0.379	1.006
<i>Average</i>	<i>0.673</i>	<i>0.158</i>	<i>0.165</i>	<i>0.796</i>

TABLE 7: PERCENTAGE OF CLOSELY HELD SHARES

AIRLINE	SHAREHOLDER	HOLDING
Singapore	Singapore Government <i>(through Temasek Holdings (Private) Limited)</i>	56.8%
Cathay Pacific	John Swire & Sons	45.8%
	CITIC Pacific Limited	25.8%
British Airways	Bank or Nominee, Insurance Companies	81.5%
Qantas	British Airways	25.0%
Varig	State of Brazil	0.7%
	FRB-Par Investimentos Ltda.	87.3%
Finnair	State of Finland	58.4%
Austrian Airlines	Austrian Government <i>(through Austrian Industry Holding OEIAG)</i>	39.7%
	Air France	1.5%
Southwest Airlines	Institutional Ownership	72.4%
SAS	Governments: Danish, Norwegian, Swedish	50.0%
Lufthansa	MGL - Gesellschaft für Luftverkehrswerte <i>(accountable to the Allianz group, the Allianz Finanzbeteiligungs GmbH, Dresner Bank, Bayerische Landesbank)</i>	10.1%



DSPACE

<https://dspace.org/>

An evaluation of airline beta values and their application in calculating the cost of equity capital.

Turner, Sheelah; Morrell, Peter

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<http://hdl.handle.net/1826/924>

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