THE DETERMINANTS OF SYSTEMATIC RISK EXPOSURES OF AIRLINE INDUSTRY

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Abstrak

Sejak kebelakangan ini, industri penerbangan telah terdedah kepada risiko sistematik yang amat tinggi. Prestasi syarikat-syarikat penerbangan yang tersenarai di bursa saham boleh dipengaruhi oleh risiko sistematik, menyebabkan kemeruapan harga saham yang tinggi, dan mungkin membawa kepada sumber modal ekuiti yang tidak stabil. Syarikat-syarikat penerbangan perlu bersaing untuk mendapatkan sumber modal ekuiti di pasaran, maka adalah penting untuk syarikat-syarikat ini memahami faktor-faktor yang menyumbang kepada pendedahan risiko sistematik yang berkaitan dengan ciri-ciri syarikat. Kajian ini bertujuan untuk meneroka faktor-faktor yang menentukan pendedahan risiko sistematik syarikat penerbangan dan membandingkan samada faktor-faktor ini adalah berbeza bagi syarikat-syarikat penerbangan di Amerika Utara, Eropah dan Asia.

Penyelidikan kajian ini merangkumi sampel penuh yang mengandungi 54 syarikat penerbangan berasal dari rantau Amerika Utara, Eropah, Asia, Amerika Selatan, Timur Tengah, Afrika dan Oceania. Memandangkan kepentingan syarikat-syarikat penerbangan dari rantau Amerika Utara, Eropah dan Asia dari segi ekonomi, kajian ini juga membandingkan penentu risiko sistematik bagi syarikat-syarikat penerbangan di ketiga-tiga rantau tersebut. 11 syarikat penerbangan di Amerika Utara, 12 syarikat penerbangan Eropah dan 18 Asia syarikat penerbangan diambil daripada sampel penuh dan dibahagikan kepada tiga subsamples masing-masing terdiri daripada syarikat penerbangan yang berasal dari rantau yang sama untuk membolehkan perbandingan penentu risiko sistematik. Data empirikal yang digunakan dalam kajian ini termasuk maklumat dari penyata kewangan dan pasaran saham. Untuk mendapatkan sampel yang konsisten, harga saham yang dipakai adalah dari Januari 1990 hingga Disember 2010. Satu model penentuan harga aset 5-faktor telah digunakan

untuk menganggar nilai beta sebagai pengukur risiko sistematik dan faktor-faktor yang menentukan risiko sistematik ini dikaji dengan analisis regresi panel. Data panel yang digunakan untuk model penentu adalah dari tahun 1993 hingga 2010.

Hasil kajian menunjukkan hubungan positif antara keuntungan, “leverage” kewangan dan “leverage” operasi dengan risiko sistematik. Analisis regresi panel atas subsampel yang mengandungi syarikat-syarikat penerbangan dari rantau Amerika Utara mendapati bahawa “leverage” operasi berhubungan positif dengan pendedahan risiko sistematik. Bagi syarikat penerbangan Eropah, keuntungan merupakan satu-satunya factor yang mempunyai hubungan positif dan signifikan dengan risiko sistematik. Bagi syarikat-syarikat penerbangan Asia “leverage” kewangan, “leverage” operasi, dan keuntungan adalah penting dan dikaitkan secara positif dengan risiko sistematik.

The Determinants of Systematic Risk Exposure of Airline Industry

Abstract

In recent years, the airline industry has become exposed to high systematic risk. The bottom lines of listed airline companies can be vulnerable and influenced by external shocks, causing high volatility in share price, and might lead to unstable source of equity capital. As firms compete for sources of equity capital available at the markets, it is the interest of firms' management to have better understanding on how factors related to firm characteristic affects the systematic risk exposure of companies. This study aims to explore the potential factors affecting airlines systematic risk exposure and compare systematic risk determinants for airline companies across North America, Europe and Asia.

The analysis of this study consist of a full sample which includes 54 listed airline companies from North America, Europe, Asia, South America, Middle East, Africa and Oceania. In view of economic importance of airlines from North America, Europe and Asia, this study also look into whether the systematic risk determinants for airline companies varies across these three regions.11 North America airlines, 12 Europe airlines and 18 Asia airlines are extracted from the full sample and subdivided into three subsamples each consists of airlines origin from same regions to enable comparison of systematic risk determinants across regions. The empirical data include information in both financial statements and stock market. To make the sample consistent, the latest consistent sample of stock prices is from January 1990 to December 2010. A 5-factor asset pricing model is used to estimate the company beta which is the indicator for systematic risk, and the factors determining the systematic risk is investigated using panel regression. The annul betas are generated using 3-year rolling regression. So, the actual panel data used for the determinant model is 1993-2010.

The results reveal positive relationship between world airlines' profitability, financial leverage and operating leverage with systematic risk exposure. The panel regression analysis of subsamples found that North America airlines systematic risk exposure is positively related with operating leverage. As for European airlines, only profitability is positive and significant related to systematic risk. For Asia airlines, financial leverage, operating leverage and profitability are significant and positively associated with the systematic risk.

Chapter One

INTRODUCTION

1.0 Chapter Overview

This chapter introduces the research outline of the study. It begins with highlighting the motivation of the study and the problem statement followed by research objectives and research question. Definition of key terms of certain variables will also be included to assist in understanding. This chapter also presents the scope of the study which is airline industry and a subsection that give an overview of airline industry in North America, Europe and Asia. It ends with the significance of the study and will give a brief overview of the remaining chapters in the thesis.

1.1 Motivation

Within the last few decades the airline industry has become exposed to frequent high external shocks. Among these shocks are: terrorist attacks of September 11th 2001, the outbreak of diseases such as SARS and H1N1 infections, recession origin from bursting of dot-com bubbles, Asia financial crisis and the recent subprime mortgage crisis, the earthquake and tsunami that hit Japan in March 2011 and the unpredictable raise and fall in oil price. The bottom lines of listed airline companies can be vulnerable and influenced by these external shocks, causing high volatility in share price, and might lead to unstable source of equity capital. The horrible event of 2001 have causes the world airline industry to record net losses of USD 13 billion and it took six years for the industry to turn around and recorded a total net profit of USD 14.7 billion (The Economist, 2011).

In the USA alone, the succession of troubles described above have caused four US network carriers namely Northwest, United US Airways, Delta Airlines and United Airlines to file for Chapter 11 bankruptcy protection in the last decade. American Airlines is the only US network carrier that so far never files for Chapter 11 bankruptcy but its share price has twice plunge by more than 90% within the last ten years. The first free fall occurred during period between 2001 and 2003 cause by terrorist attack and recession and the second episode happened between 2007 and 2009 due to subprime mortgage crisis.

In finance, there are two form of uncertainty that cause variation in stock price. First, there is the uncertainty that comes from condition in macro environment such as those external shocks that buffeted airlines in the last couple of years. This kind of uncertainty which firms have no control on it is called systematic risk. The second form of uncertainty is unsystematic risk, which can be defined as a stock's volatility caused by firm-specific events. A supply chain disruption that affects a single company or only a few closely related companies represents a source of firm-specific risk.

Unsystematic risk caused by firm specific events can be eliminated by holding a fully diversified portfolio that consists of stocks that uncorrelated among each other. If an investor holds such portfolio of uncorrelated stocks, volatility in stock price caused by firm specific events such as the loss of key personal or major supply chain disruptions are likely to offset one another. Therefore, unsystematic risk is not important in asset's risk pricing. On the other hand, the market-related systematic risk exposure is unavoidable as it is caused by market events and cannot be diversified away even by holding a large portfolio of different stocks. Investors will always concern how these market events will affect their stock returns. Thus, systematic risk plays a center role in risk pricing.

Even though systematic risk is caused by external shocks that firm have no control, however, managerial decisions on finance, operations and investments can change the degree of systematic risk exposure (Lee and Jang, 2007). Managerial decisions affect financial performances, which in turn affect exposure to systematic risk. During an economic recession the airline can choose strategies that manage the extent to which economic slowdown has on its operating profits even though the airline cannot prevent the economic downturn itself. For example, plane leasing rather than ownership can shift toward a lower operating leverage. Therefore, for airlines executives, understanding determinants of the firm's systematic risk would enable them to formulate strategies and setting policies that can mitigate the risk exposure, further enhance firm value, and maximizing the returns of firms and shareholders.

Despite the fact that systematic risk affect stock price and cost of equity capital, over the years researchers have not paid much attentions to the airline industry's systematic risk exposure. In order for management to manage their company successfully, it is important to know how managerial decisions such as those on finance, operation and investment affect the systematic risk exposure of airline companies. Under the current challenging yet competitive business environments, identifying the factors contribute to systematic risk exposure; especially those related to firm characteristic is urgently needed.

1.2 Problem Statement

In today's highly competitive business environment, more than ever, airlines' managers need to make strategic decisions that can create competitive advantage, steering their companies into sustainable growth path and enhance the value of their respective firms. The strategic decisions especially those on finance, operation and investment cannot be properly made without

considering the risk involved. Previous studies have found that managerial decision affect financial performances, which in turn affect exposure to systematic risk. As virtually all firms fighting for equity capital available at the markets, it is the interest of firms' management to have better understanding on how factors related to firm characteristic affects the systematic risk exposure of companies.

Many studies have investigated how factors related to firm characteristic contribute to systematic risk exposure of airline companies. In most studies, these factors are proxies by firm specific variables related to managerial decision such as capital structure, leverage ratio and so on. However, most of the research had been focuses on US airlines. Over the past few years, important changes in both operations and capital markets for the US airline industry have occurred. In the study conducted by Lee and Jang (2007), the average return on assets (ROA) for the sampled US airline companies was -0.28 percent. In contrast, this study included more recent data up to year 2010 reported a mean ROA ratio of -12.43 percent for North America airlines. Beta determinants may change as operation and capital market conditions change (Levy & Sarnat, 1984).

Futhermore, we only encounter two studies that look into systematic risk determinants of Asia airlines - Hung and Liu (2005) whom examined the potential factors affecting Taiwan airlines' systematic risk and Hooy and Lee (2010) who carried out their study in the context of East Asia airlines. Research that uses and compares data across North America, European and Asia airlines are important as the natures of airline business in these regions are vastly different (Damuri and Anas, 2004).

1.3 Research Objectives

This study attempts to accomplish two main objectives as follows:

1. To determine whether firm specific variables namely firm size, liquidity, profitability, financial leverage, operating leverage and growth affects systematic risk of world airlines.
2. To compare systematic risk determinants for airline companies across three different regions.

1.4 Research Question

To achieve the above objectives, the study tries to answer the following research question:

1. What is the relationship between firm size and systematic risk?
2. What is the relationship between liquidity and systematic risk?
3. What is the relationship between profitability and systematic risk?
4. What is the relationship between financial leverage and systematic risk?
5. What is the relationship between operating leverage and systematic risk?
6. What is the relationship between airline companies' growth and systematic risk?
7. Do systematic risk determinants differ across three different regions namely, North America, Europe and Asia?

1.5 Definition of Key Terms

1. Systematic risk represents relative volatility to the market, or the risk of a stock relative to the risk of the market portfolio. (Van Horne,2001).
2. Beta is the measurement for systematic risk and reflects the collective judgment of investors on the extent to which macroeconomic conditions influence firms and depends on marketing policy, production policy, and firm policies and decisions, all of which are affected by corporate financial policy (Ben-Zion & Shalit,1975; Logue & Merville, 1972).

1.6 Scope of the Study

1.6.1 Overview of the Airline Industry

The scope of this study entails the airline industry. This study examines the firm-specific factors affecting systematic risk exposure of publicly traded airline companies.

The airline industry brings customers to almost everywhere in the world, and has played an important and fundamental role in creating a globalized and integrated world economy. During the early development of airline industry, its growth was largely due to introduction of new technologies such as those that enable the development of commercial aircraft in 1950s. Major changes in growth factors took place only after the economic deregulation that started with US airlines in 1978. Since then, management issues such as profitability, competitive strategies and cost saving have taken the center stage in determining airline growth. The deregulation of airline industry has brought enormous benefit to majority of air travelers. After the deregulation, the demand for air travel grows significantly, at the same time average air fares has declined rapidly. Today, the air travel fares for US domestic flight is less than half of 1978 levels (ATAA, 2008). Worldwide, the deregulation of airline industry has allowed many new entrants leading to a fiercely competitive global airline market.

By 2008, there are more than 2000 airline companies around the world which offer flights to over 3700 destinations worldwide (ATAG, 2008). Over the past 30 years, the industry has attained averaged 5% annual growth rate whereby the demand for air travel is mainly driven by economic growth. On global basis, some analysts estimate that world airlines are expected to continue growing at 4–5% annual growth rate for the next 10-15 years; even after taking into consideration relatively pessimistic assumptions regarding global economic growth. The

projected economic growth is expected to cause a doubling of air travel around the globe within the next 15 years.

Yet this buoyant outlook may be hiding some of the gloomy pictures. In the past decades, world airlines have been deeply affected by numerous systematic shocks. The terrorist attacks of September 11th 2001 paralyzed the US airline industry and at the same time the SARS health scare brought down demand in Asia. Then the rise in oil prices in 2008, recession in US cause by subprime mortgage crisis and volcanic eruptions put further stress on world airlines. The effect of this series of shocks is reflected in airlines' financial performance. After the horrible event of 2011, world airlines plunge into net loss and it took six years before they finally recovered and recorded a total profit of $14.7 billion in 2007. Then another shocks arrived. The price of jet fuel surge to over $170 per barrel, more than doubling the previous level; and subsequently the subprime mortgage crisis sent load factors down again.

Currently, the economic impact of global airline industry has been estimated to be $3.5 trillion a year, which is equivalent to about 7.5% of world gross domestic product (ATAG, 2008). Besides the economic importance, there are many other industries such as hospitality and tourism that are closely related to airline industry, making the volatility of airline profits and their subsequent exposure to systematic risk a major concern. Therefore, it is vital to investigate the determinants of the systematic risk in order for airline management minimizing their company risk exposure.

Since the deregulation of US airlines in 1978, many new entrants scrambled into the industry and competition within the industry become intensified. Fundamentally, the competitive strategies and management practices of airline companies have deeply changed by the new level of increased competition. Issues regarding productivity enhancement and cost saving became

major goals of not just US airlines but non-US airlines as well as the pressure for reduce government involvement in airline business spread across the world. In the past, airlines hoped to reduce cost by taking advantage of scale economies either through internal growth and/or mergers. Airlines around the world has been expanding their networks and trying to forge partnerships which gave birth to "global alliances" such as Star Alliance, Oneworld and SkyTeam. These alliances allow airlines to corporate on a higher level on issues such as marketing, branding and code sharing and to serve the consumers better. Ultimately, airlines within these alliances will able to benefit from economies of scale through these partnerships.

1.6.2 The Airline Industry in North America, Europe and Asia

Data from Air Transport Association, ICAO show that since airline deregulation, North America is leading the rest of the world in terms of air traffic, followed by Europe and Asia-Pacific. However, The International Air Transport Association (IATA) has predicted that by 2014 Asia will account for about 30% of the world's air traffic, leading to a projected boom in air travel. By then, China, Hong Kong and Japan will become the top three markets for air travel in Asia. Even through a deepening sovereign debt crisis in Europe will surely affect demand in Asia, many believe that strong domestic demand will partly insulate its airlines. According to Boeing, in the next 20 year, Asia's economy is expected to grow at an average rate of 4.7 percent per year significantly outpace the world's average growth rate. By 2030, Asia's contribution to the world GDP is expected to reach 35 percent; additional 8 percent from current level. The rapid expansion of Asia's economy will create strong demand for air travel within Asia region and also between Asia and other regions of the world.

In the midst of persistence debt crisis, it is easy to forget how vibrant European economies once were. But in spite uncertainty, German's exports remain strong and there are many emerging high growth European countries that driving the region growth. Looking forward, Europe's overall GDP is expected to grow at an annual rate of 2 percent for the next twenty years. More importantly, European Union's is trying to liberalized transportation sector which will benefited airline companies enormously.

Despite eastward shifting of economic power in the last decade, the outlook for North American airline industry remains favorable. Airlines are expected to continue the consolidation process, reducing capacity and improving their financial performance. The short haul demand which refer to traveling within North America is expected to grow at an average rate of 2 percent a year, but with the raise of South America and Asia economies, the long haul traffic is expected to grow at the rate of 4.5 percent annually.

Using data published by Boeing in Current Market Outlook 2011-2030, we constructed Figure 1.1 and Table 1.1 which shows number of fleet and share of fleet across 7 regions in the world in great details. We believe that these data are good proxies for air traffic demand as airlines will have to purchase and modernize their fleets to accommodate the ever increasing demand for air travel. Figure 1.1 shows that in year 2010, North America airlines still have the most number of fleet follow by European airlines and Asia airlines. However by year 2030, Asia airlines will own the most number of airlines, with North America airlines tailing at third place behind European airlines. In term of percentage share of fleet shown in table 1.1, Asia, North America and Europe airlines together will own a total of 78.87% of world fleet in 2030.

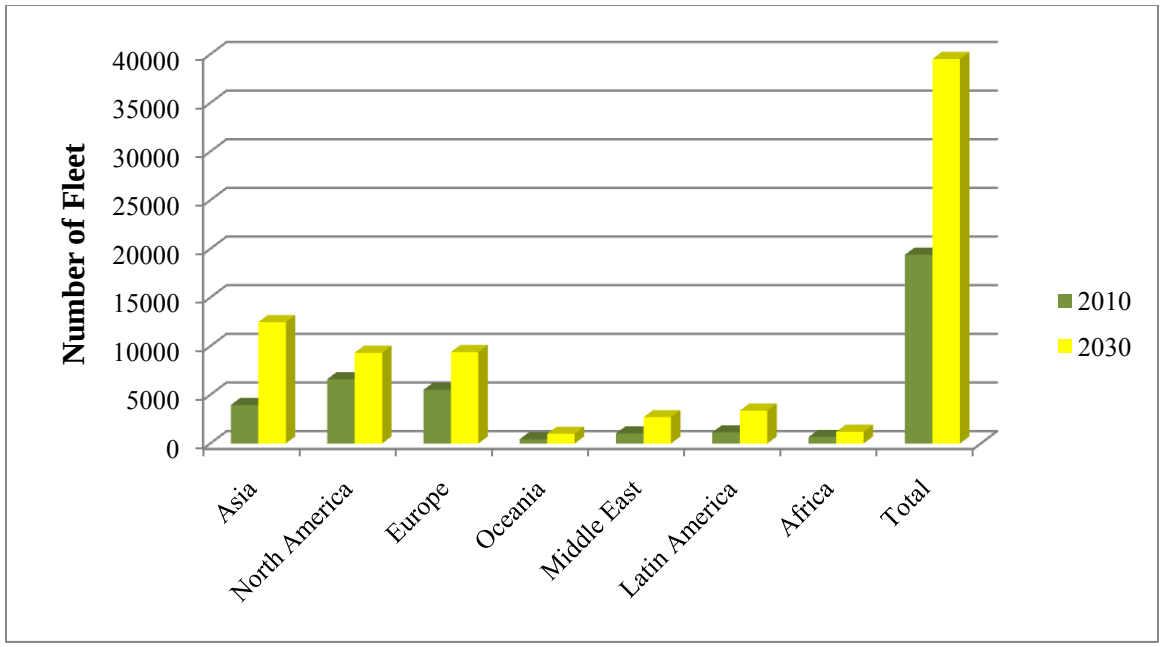

Figure 1.1: **Number of Fleet across Region in Year 2010 and 2030**

Table 1.1
Number of Fleet and Share of Fleet of Airlines across Region

Region	Number of Fleet		Share of Fleet (%)	
	Year			
	2010	2030	2010	2030
Asia	3960	12480	20.40	31.57
North America	6610	9330	34.05	23.60
Europe	5520	9410	28.44	23.80
Oceania	450	1000	2.32	2.53
Middle East	1040	2710	5.36	6.86
Latin America	1150	3390	5.92	8.58
Africa	680	1210	3.50	3.06
Total	19410	39530	100.00	100.00

The data highlight that for the next twenty years, Asia, North America and Europe will remain as three most important economic blocks in the world and airlines from these regions will continue to play important role in supporting these region growth. Therefore, in this study, we specifically focus on airlines in North America, Europe and Asia with the intention of discovering their potentially different systematic risk determinants.

1.7 Significance of the Study

The significance of this study can be view from three perspectives. From investors perspective this study contribute to risk return relationship. In an investment decision making process, investors will have to consider risk return relationship. By establish relationship between firm specific variables with systematic risk, investors can identify a particular level of systematic risk exposure of airline companies from the publicly available information such as financial statements.

From the firm perspectives, the management can set target for the level of systematic risk exposure and tailor their financial, operating and marketing policies to achieve the target. As the goal of a firm is to maximize its shareholders wealth, naturally firms' management would target maximum return under specific level of risk exposure. Therefore, a thorough understanding of the impact of firm specific variables under management's control on systematic risk is of great importance as it allowed firms to set their policies to achieve lowest possible risk and highest possible returns.

To airline finance decision makers better understanding about systematic risk enable them to consider investors' expectations by taking into consideration the impact of their operation and financial policies on stock return.

1.8 Organization of the Remaining Chapters

The rest of this study is organized as followed: chapter 2 reports a review of the literature in this topic; chapter 3 outlines the research model and the framework of the analysis involved as well as the data employed and their sources. Chapter 4 presents the results and chapter 5 are discussion on the findings. Concluding comments are in the final section.

Chapter Two

Literature Review

2.0 Chapter Overview

This chapter highlights important contributions from previous studies related to the topic of systematic risk determinants. The chapter includes the concept of systematic risk, beta as a measurement of systematic risk, theory and research related to systematic risk determinants in general industry as well as in airline industry. It also covers hypothesis development and end with research framework.

2.1 The Concept of Systematic Risk

In order to have a better understanding, it is useful to first define the concept of systematic risk. Risk represents the "probability distribution of the consequences of each alternative" (March & Simon, 1958, p. 137). In finance, risk is commonly refers to the unexpected variability of returns. The variations in returns are higher whenever there is an increase in uncertainty. There are two factors that cause variation in stock return. First, there is the uncertainty that comes from condition in general economy such as changes in monetary and fiscal policies, business cycle, oil price, and volatility in exchange rate. These macroeconomic factors cannot be predicted with certainty and the stock returns of all companies are affected by these factors. This kind of risk that arises from uncertainty in macroeconomy in called systematic risk. In addition, there is risk that associated with specific company. A sudden departure of key personnel of a company represents a source of firm-specific risk. These factors affect that particular company without affecting other companies in economy. Such risk is call unsystematic risk.

Systematic risk plays a center role in modern financial theory especially in risk pricing. According to modern portfolio theory, investors are expected to be compensated for bearing systematic risk whereas unsystematic risk is unimportant and no compensation will be given to investors for bearing unsystematic risk. In order to illustrate this matter further, let's consider the following example.

Consider a diversification strategy in which an investor could include additional stocks in his portfolio without incurring significant cost,. For example, consider an investor invest half of his portfolio fund in AirAsia's stocks and another half in Singapore airline's stocks. Because firm specific factors that influence both companies are different, it is unlikely that any firm specific factor can cause the stocks of both companies to move in either direction simultaneously. Therefore, diversification effectively reduces volatility of the investor's portfolio. When the investor diversify into many more stocks, the exposure to firm specific factors will spread out even thinner and portfolio volatility will continue to reduce. Eventually, however, even the investor hold every company stock, he cannot avoid risk altogether as all stocks are affected by common macroeconomic aggregates such as business cycle. When the business cycle moves into recession, no one can avoid the exposure to downward risk regardless of the amount of stocks that being held. Thus, portfolio risk reduces as the number of stocks in portfolio increases, but it cannot be reduced to zero. The risk that remains is known as systematic risk. In contrast, unsystematic risk can be eliminated through diversification strategy.

Since unsystematic risk can be reduced through diversification without incurring additional cost, it is logical that investors should not be compensated for bearing it. Thus, investors should only be compensated for the bearing systematic risk that cannot be diversified away.

2.2 Beta as a Measure of Systematic Risk

As mentioned above, all stocks are affected by systematic risk. However, some stocks will be more sensitive than others to macroeconomic shocks. During a slowdown in economy, airline companies might be more responsive to the macroeconomic changes than healthcare companies. Therefore, each firm must be assigned with a sensitivity coefficient to macroeconomic conditions. This sensitivity coefficient for security *i* is denoted as beta, $ß_i$.

Mathematically, beta is given as:

$$ß_i = \frac{Cov(r_i, r_M)}{Var(r_M)}$$

where r_i is the return of the asset

r_M is the return of the market

$Var(r_M)$ is the variance of expected returns of the market, it can be denoted as σ_M^2

$Cov(r_i, r_M)$ is the covariance of expected returns of securities *i* and market

The equation demonstrates that beta measures the extent to which returns on the stock and the market move together. Cyclical firms like airlines will exert higher sensitivity to the market and therefore have higher systematic risk exposure.

Rational investors are thought to be risk averse. Risk aversion means investors are willing to give up some portion of return to achieve risk reduction. If this assumption is true, then we would expect investors to demand a higher return to justify the additional risk accepted by investing in riskier companies. In the next chapter (methodology), we illustrate how beta can be used in a number of asset pricing models to describe the relationship between systematic risk and expected return. For now, we shall just accept the notion that in order to earn higher returns, investors will need to take higher levels of risk. As systematic risk determined the expected

return of stocks and thus its intrinsic value; it is critically important to study the determinants of systematic risk exposure of companies.

Previous study of the determinants of systematic risk can be classified into either macro or micro categories based on their orientation. In the macro category, many studies have look into the relationship between systematic risk and macroeconomic variables such as real GDP growth, inflation rate, money supply, interest rate and the federal deficit (Ben-Zion & Shalit, 1975). In the micro category, earlier work has focused on individual firms' systematic risk exposure as related to their underlying characteristic and activities. This type of study begins with the empirical work of Beaver et al (1970) which studied the relationship of several accounting variables such as profitability ratio, dividend payout ratio, liquidity, leverage, growth and asset size to the firm's systematic risk, and found significant relationship between them. Since then, plenty of research had been carried out in this area. Based on the literature, the potential list of determinants for beta includes firm size, liquidity, profitability, financial leverage, operating leverage and growth.

In this study, we only look into these micro aggregates as potential list of systematic risk determinants in airline industry. The reason is while it is those macro variables such as the real GDP that initially gain the spot light as potential determinant of systematic risk exposure, subsequent empirical studies does not show promising result (Robichek and Cohn, 1974). Ideally, the relationships between the activities and characteristics of a firm and the systematic risk exposure of its common stock should be investigated within the context of a fully developed model. However, no such model exists, and existing asset pricing models such as CAPM do not specify the firm-related determinants of risk. Therefore, to provide some logical basis for specifying variables, this study first introduces a number of potential systematic risk

determinants together with theories that support their inclusion, and then evaluates and critiques these theories during hypothesis development.

2.3 Determinants of Systematic Risk in General Industry

The section discusses the theory and the results of empirical studies related to systematic risk determinants in non-airline industry.

2.3.1 Firm Size

The size of the firm is one of the determinants of systematic risk, where large firms tend to have lower beta. There are several theoretical arguments which may be correlated with one another, can be advanced in support of this assertion.

Marketability: According to Fisher (1959), firms' securities are marketable assets. In particular, large firms' securities are considered less risky as assets are highly liquid and can be easily convert into cash. In essence, investors are concern with risk incurred by holding a firm security; the risk associated with the difficulty of turning the security into cash particularly during the period of high market volatility. If securities markets were "perfect", converting a security into cash would be no problem. However, in reality, selling a security require someone to purchase it. In certain time, the investor might end up suffering huge lost when he or she might have to sell the security at a huge discount to its fair value. Thus marketability can influence the risk perceived by investor.

Due to concern over marketability, it is an interest for investor to estimate the degree of imperfection of the market for a particular security. There are several possible ways to estimate

the degree of imperfection. The trading volume of a particular security and its bid-ask price spread are variables sometimes suggested as measures of marketability.

Probability of Bankruptcy: firms do not grow large overnight; rather they take a period of time to grow into their existing size. Since non-performing firms tends to fail in the first few years of their operation, it is logical to assume that firm's size composes a measure of its past performance. Thus, firm's size may be serve as an indicator of its future performance and, hence, firm's risk. This hypothesis is well supported by various empirical studies. In one of the studies, Queen and Roll (1987) found that firm size provide a good prediction of firm failure. Over a decade, smallest firms have about fifty percent chance of failing, whereas largest firms have a about twenty per cent motility rate over two decades.

Diversification: In order to earn above average return in competitive environment, large firms which have the resources and capabilities tend to diversify into different business sectors. As large firms tend to have better access into financial market and able to raise capital at a lower cost compare to small firm (Titman and Wessels, 1988), it allow them to be well diversify. Firms can reduce risk by simply invest in combinations of businesses which are fairly uncorrelated (correlation coefficient $-1 \leq \rho \leq 1$). Unless the managements choose to diversify into businesses which are perfectly correlated, large firms would tend to have lower variability in returns when compared with firms with smaller size. According to portfolio theory, less variation on firms' returns does not mean lower risk. Covariance of firms' returns with market returns also has to be lower in order to achieve risk reduction. However, from individual investor point of view, so long as firms can diversify their businesses with higher efficiency than individual investor can achieve with his own stock portfolio; large firms can be perceived as less risky.

Economies of Scale: Large firms may also choose to pursue economies of scale as strategy to earn above average returns. Economies of scale would enable firms to incur lower unit costs. So long as product price remain the same, firms would able to earn higher profit margin. The above average return can be consider as a buffer against losses, reducing the probability of bankruptcy risk (Ben-Zion and Shalit, 1975).

Large firms may also tend to have low systematic risk due to their better ability to mitigate the impact of social-economic and political changes (Sullivan, 1978). The negative correlation between firm size and systematic risk has been confirmed in a number of empirical studies, including those by Logue and Merville (1972), Breen and Lerner (1973), Lev and Kunitzky (1974), Pate1 and Olsen (1984), Ang et al. (1985), Gu and Kim (1998), Kim et al. (2002) and Kim et al. (2010).

2.3.2 Liquidity

Competing theories exist regarding the relationship between liquidity and systematic risk. Jensen (1984) supports a positive correlation between a firm's liquidity and systematic risk. According to Jensen (1984) high liquidity may increase a firm's agency cost of free cash flow and therefore leads to higher systematic risk. The agency cost of free cash flow is part of modern day management conundrum. In majority of companies, investors do not involve in managing the companies' daily operation. Rather, the role of managing company is being carried out by professional managers. This separation of ownership and control has resulted in a potential conflict of interest which is termed agency problem. (Berle and Means, 1932 as cited in Abdullah, 2004). Overall, agency theory predicts that the separation of owners and managers

potentially will lead to managers of firms taking actions, which might not align with the goal of maximizing shareholders' wealth (Jensen & Meckling, 1976).

Moreover, high liquidity may imply that available resources are invested in marketable securities and are not invested in operating assets that generate high earnings, which could lead to increase risk (Borde 1998). High liquidity levels too can lead to more aggressive investment and therefore to higher risk (Borde et al., 1994). In both study, the ratio of cash and short-term securities investments to total assets (quick ratio) was employed as liquidity indicator. The researches argued that misallocation of resources may arise due to imperfection in managements' compensation plan. In most companies, managers are compensated based on the size of the firm they manage. Indirectly it encourages managers of firms with high liquidity to engage in activities expansion. In the process, capital might be misallocated into area where the firm has little expertise and capability, thus, increases exposure to systematic risk.

In contrast, Logue and Merville (1972) and Moyer and Chartfield (1983), postulating a negative relationship between liquidity and systematic risk. The researches claimed that high liquidity is an indication of low level of short-term liabilities and helps lower systematic risk. In another words, the higher the ratio of liquid assets to total assets, the easier the firm can meet short term cash need and therefore lower risk. The argument seems logical as liquid assets are defined as cash or cash equivalent which can be easily converted into cash, and therefore can be used to meet short term financing needs lowering the risk of insolvency.

An early investigation of the relationship between current ratio and beta by Beaver, Kettler, and Scholes (1970) found a negative relationship between the two. Similar finding was reported by Mear and Firth (1988) and Moyer and Chartfield (1983). However, empirical studies

by Borde (1998), Rosenberg and McKibben (1973) and Pettit and Westerfield (1972) found positive correlation between liquidity ratios and systematic risk.

2.3.3 Profitability

Theoretically, the impact of profitability on systematic risk may be contradicting depending on corporate strategic decision. Borde (1998) postulated that if high profitability (using ROA as measurement) is due to superior operating performance, a negative correlated relationship may exist between profitability and systematic risk. That is, those airlines with high profitability due to excellent management and operating efficiency will have small probability of losses or bankruptcies thus, lower risk. Borde (1998) assertion is in support of Logue and Merville, (1972) hypothesis where high profitability lowers the probability of business failure, thus lowering a firm's systematic risk. Scherrer and Mathison (1996) too argued that the stability of the cash flow from operating real estate, which reduces the systematic risk, is determined by the ability to manage the property profitably. On the other hand, Borde (1998) also postulated that firms that enjoy high operating profit over long period of time and may implement excessive growth strategies and thus exposed to high systematic risk.

Early empirical studies showed inconclusive results. Borde's (1998) reported a negative relationship between return on assets and systematic risk. Logue and Merville (1972) too showed that beta is not only negatively correlated with return on assets but also with another profitability ratio i.e. profit margin. Mear and Firth (1988) and Melicher (1974) regression analysis, however, found beta positively related to profitability.

It is interesting to note that, relationship between profitability and systematic risk may not be consistent over different type of businesses. Borde et al. (1994) found that market returns for

life insurance companies are positively correlated with systematic risk, supporting the hypothesized positive risk-return relationship. But, market returns for property-liability-insurance companies are found to be negatively correlated with systematic risk.

2.3.4 Financial Leverage

Modigliani and Miller (1958) suggested that as the amount of debt in the firm's capital structure increases, risk also increases. Building on MM proposition, Hamada (1972) proposed that it is necessary to make adjustment to firms' beta for those firms that are financially leveraged. His formula is:

$$\beta = (S^*/S)\beta^*$$

Where β = the levered firm's common stock beta,

β^* = the unlevered firm's common stock beta

S = the total market values of the firm's common stock after debt financing.

S^* = the total market values of the firm's common stock before debt financing.

After testing his model empirically, Hamada concluded that if the Miller and Modigliani propositions on corporate tax leverage are correct, then approximately 21 to 24% of common stocks systematic risk can be explained merely by the additional financial risk taken on by the underlying firm which uses debt and preferred stock. Therefore, corporate financial leverage does count considerably for the increases in systematic risk.

However, because the total market values of the firm's common stock before debt financing (S^*) is not directly observable for a levered company, Rubinstein (1973) make several assumptions and developed Hamada model to become:

$$\beta = \beta^* + \beta^*(1-\tau)D/E$$

Where β = the levered firm's common stock beta,

β^* = the unlevered firm's common stock beta,

τ = the corporate income tax rate,

D = the market value of debt, and

E = the market value of common equity.

From the formula, one can see that a leveraged firm's beta is a positive function of the extent of financial leverage in a firm's capital structure. The Rubinstein formula resolves the overall risk into two components - operating risk and financial risk. In the model, β^* measures operating risk and $\beta^*(1-\tau)D/E$ represents the financial risk of common stock. Rubinstein suggested that operating risk reflects the combined effects of the degree of operating leverage, the pure systematic influence of economy-wide events, and the uncertainty associated with the firm's operating efficiency. Firms that engaged in financial leverage magnifies this operating risk and produce financial risk.

Both the value of debt and equity in the Hamada-Rubinstein's models are stock measures and, therefore, are market values. Draws on the earlier works of Hamada and Rubinstein, Bowman (1979) demonstrated that using accounting determined debt measure (debt to equity ratio), the systematic risk of a levered firm is equal to the systematic risk of the same firm without leverage times one plus the leverage ratio (debt-to-equity).

Hamada's model assumes that corporate debt is risk free. However, in reality, it is not. Furthermore, despite Hamada showed that operating risk and financial risk are positively correlated with systematic risk, the model does not show how operating leverage and financial leverage are related to operating risk and financial risk. In order to solve these issues, Mandelker & Rhee (1984) modified Hamada's model to allow risky debt and explicitly introduced measures

of the degree of operating and financial risk into their theoretical model. Empirically tested, Mandelker & Rhee's model showed further support for Hamada's model. The results consistently showed positive regression coefficients for both degree of operating leverage (DOL) and degree of financial leverage (DFL), suggesting that both are positively correlated with the systematic risk of common stock. A major contribution of the Mandelker and Rhee (1984) model compared to Hamada (1972) and Rubinstein (1973) models is that it uses leverage values based on accounting flow numbers rather than market stock numbers.

Without developing theoretical model, Ben-Zion and Shalit (1975) too argued in favor of positive relationship between financial leverage and systematic risk. According to the researches, financial leverage is an important determinant of a firm equity risk as creditor and preferred stock holder has priority over common stock holder on firm's asset in the event of firm liquidation. The higher the debt leverage in the firm's capital structure, the higher is the risk of bankruptcy, and the lower is the valuation of its stock price.

According to Van Horne (2001), the use of financial leverage may create incremental value to the shareholders as the interest payments are tax deductible. Therefore, firms may attempt to maintain an optimal capital structure which minimizes its weighted average cost of capital at the same time maximizes the value of the shareholders. However, debt financing not necessarily always benefits the shareholders. Company's value may fall with the increased financing due to increased financial risk or lower perceived quality of earnings. The fall in value will then causes high volatility in stock price. Thus, high debt leverage exposes shareholders to high systematic risk.

Consistent with theory, empirical findings have unanimously supported this hypothesized positive relationship (Beaver et al., 1970; Hamada, 1972; Ben-Zion & Shalit, 1975; Bowman,

1979; Gahlon & Gentry, 1982; Mandelker & Rhee, 1984; De Jong & Collins, 1985; Amit & Livanat, 1988; Marston & Perry, 1996; Kim et al., 2007 and Lee & Jang, 2007).

2.3.5 Operating Leverage

Traditionally in finance, risk is decomposed into two components - operating risk (often called business risk) and financial risk. Operating risk is usually referring to the uncertainty in firms' operating results, especially operating earnings. Financial risk is associated with the effect on uncertainty of financial policy, especially the debt-equity mix and the fixed interest charge associated with debt.

The early theoretical research on the relationship between operating leverage and systematic risk was started off by Rubinstein (1973). Rubinstein (1973) argued that systematic risk can be decomposed into operating risk and financing risk. Operating risk reflects the combined effects of the degree of operating leverage, the systematic impact of macroeconomic events, and the uncertainty associated with the firm's operating efficiency. Therefore, according to Rubinstein model, there is a linear relationship between systematic risk of levered firm with its degree of operating leverage.

Lev (1974) first develops a theoretical model that postulate a positive relationship between operating leverage and firms' systematic risk exposure. He then tested his model empirically and confirm that there is a positive correlation between operating leverage and systematic risk, even though the explanatory power is rather weak. Lev (1974) defined a firm's operating leverage as the ratio of the fixed to variable operating costs. In other words, high operating leverage means a higher percentage of fixed costs relative to variable costs. In general, when a firm has high operating leverage, it will endure higher earnings volatility with respect to