

INVESTING IN ASIAN STOCK MARKETS, 1993 - 2010;
AN ANALYSIS OF PERFORMANCE IN PERIODS OF EXTREME
VOLATILITY, RISK ATTRIBUTION AND PORTFOLIO
OPTIMIZATION

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Executive Summary

The Asian stock markets are emerging, which make them interesting to foreign investors who may see a potential future in these markets. We assume the position of an investor reporting results in US Dollars and analyze the results from investing in ten Asian stock markets (represented by their MSCI country indices). We are particularly analyzing the ten selected Asian stock markets during periods of extreme volatility and during the period 1993 - 2010. The periods of market turmoil are the Asian Financial Crisis (1997 – 1998), the Dot-Com Bubble Crash and September 11 (2000 – 2002) and the Great Financial Crisis (2007 – 2009). Emerging markets have proved to yield higher returns and have higher risk than developed countries in the past. With higher volatility connected to country-specific risk, the inclusion of emerging markets in a portfolio may still have a positive effect on the investment.

The first part of the analysis makes a comparison of developed and Asian countries concerning return and risk, emphasizing betas, Sharpe ratios and correlations, during each selected period of extreme volatility. From 1993 – 2010 the general picture of the Asian countries is that there is a large amount of country-specific risk, using a world index as a benchmark. The Asian markets generally have higher risk and lower average returns than the developed countries from 1993 – 2010 and eight out of ten Asian countries have betas above the market beta. There are only three Asian countries that have marginally performed better than the risk free rate during this period, in all other selected periods the Asian countries have underperformed compared to the risk free rate concerning Sharpe ratios.

During the Dot-Com Bubble Crash and the September 11 effect, most of the Asian countries have higher risk than the developed countries, but the negative returns are approximately equal to the average among the developed countries. As during the Asian Financial Crisis, the Asian countries have higher amounts of country-specific risk than the developed countries on average.

Most of the Asian countries have higher risk than the developed countries, but the negative returns are somewhat lower among the Asian countries compared to the developed countries. Yet, the Great Financial Crisis has made the Asian countries more equal to the developed countries concerning return and risk. What is worth noticing is that the amount of systematic risk has increased dramatically among the Asian countries and is approaching the systematic risk level of the developed countries. The GFC led to all countries

underperforming compared to the risk free rate, as well. The average Sharpe ratio improves for the Asian countries during the GFC, compared to the developed countries.

During periods of extreme volatility, the currencies of smaller markets tend to depreciate relative to the currencies of larger markets. During these periods, investors seem to invest in large markets with more stable currencies, which contributes to further depreciation of the smaller markets' currencies. For a USD-investor there is significant currency risk by investing internationally, especially in smaller markets, or markets that are considered emerging.

The Great Financial Crisis, the most recent period of high volatility, is the period with highest correlation between Asia and the developed countries. This may suggest that Asia is becoming more equal to the developed world, in other words, the Asian stock markets are becoming more integrated with the developed markets.

There is a connection between a country's risk and the risk of the dominating sector in that country. This might mean that high risk in an Asian country is not exclusively due to country-specific factors, but is affected by a worldwide downfall in a specific sector's return. This combination of events contributes to high standard deviations in the Asian countries. Our findings suggest that the systematic risk in several Asian countries has been affected by periods of extreme volatility, within different sectors. The regression model applied in this section shows that there are significant differences in the systematic risk of a country during the period from 1994 – 2010 and during the selected periods of market turmoil, within different sectors.

We finally constructed three optimal portfolios (defined as the minimum variance portfolios) from 2003 – 2010. We found that in an optimal portfolio based on data from 1993 – 2003, with restrictions on short-sales, and a moderate required return, only one Asian country is being included in the portfolio. This country was India, with a portfolio weight of about 0.09.

Preface

This thesis is a partial fulfillment of the master's degree in business administration at the Norwegian University of Life Sciences (UMB).

Through our work with this thesis, we have learned a lot about the Asian economies and the Asian stock markets. We have acquired a better understanding of the risk and return relationship in international stock markets and the development in both western and Asian markets during the period 1993 – 2010. We have also gained insight into what sectors influence the Asian stock markets during periods of extreme volatility. Portfolios consisting of both western and Asian indices have been constructed and have allowed us to see the performance of an internationally diversified portfolio in the time period 2003 – 2010. Working with this thesis has been both challenging and informative and has been rewarding in terms of gained knowledge of international stock markets.

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Index

1. Introduction	1
2. Basic Facts on the Asian Economies	3
2.1 Asian Economies: A Brief Survey	3
2.2 Asian Stock Exchanges: A Brief Survey	14
2.3 Hypotheses Regarding the Asian Markets	20
3. Literature on International Investments	21
3.1 International Diversification: Potential Benefits and Potential Problems	21
3.2 USD versus Local Currency	22
3.3 Home Bias: Failure to Exploit Benefits of International Diversification	22
3.4 Market Correlation in Bear Markets	24
4. Literature on Periods of Extreme Volatility	27
4.1 The Asian Financial Crisis	28
4.2 Dot-com Bubble Crash and September 11	28
4.3 Subprime Mortgage Crisis and the Great Financial Crisis	30
5. Data and Methodology for Analysis of Return and Risk	31
5.1 MSCI Index Methodology	32
5.2 Classification of Markets	34
5.3 The Sharpe Ratio and the Problem of Negative Excess Returns	35
5.4 Portfolio Optimization Methodology	36
6. Analysis of Asian Stock Market Returns during Periods of Extreme Volatility	38
6.1 Comparison of Developed Countries and Asian Countries: Return, Risk and Betas	38
6.2 Sharpe Ratio: Performance of the Indices in the Selected Periods	48
6.3 Comparison of Return and Risk; USD versus Local Currency	49
6.4 Correlations between Asian Countries' Return and Developed Countries' Return	52
7. Influential Sectors in the Asian Stock Markets	58
7.1 Sector Risk and Return during Periods of Extreme Volatility	59
7.2 Sector Influence on Asian Countries' Systematic Risk	60
8. Internationally Diversified Portfolios; Asian Countries in a Portfolio from 2003 – 2010	65
8.1 Portfolio 1's Performance from 2003 – 2010: With Short-Sales Restrictions	68
8.2 Portfolio 2's Performance from 2003 – 2010: Without Short-Sales Restrictions	68
8.3 Naïve Diversified Portfolios from 2003 – 2010	68
9. Discussion and Major Conclusions	71
10. References	76
11. Appendix	84

1. Introduction

The Asian stock markets are considered up and coming. Investing funds in these markets might therefore be interesting and rewarding for a foreign investor who wants to diversify internationally. In this thesis, we assume the position of an investor reporting results in US Dollars (USD). We analyze the potential of investing in Asian stock markets and the effects of diversification and being an investor who takes initiative concerning investments in Asian markets.

We analyze ten Asian stock markets based on the Morgan Stanley Capital International (MSCI Barra) equity indices universe. As an introduction to the analysis, facts about Asian economies and stock markets will be presented. This thesis will not include the Islamic stock exchanges in the Asian countries. Among the ten Asian markets, two are considered developed and eight are considered emerging. The developed markets that form the MSCI World Index will also be analyzed for comparison to the Asian markets. The World Index will be used as benchmark throughout this thesis. The analysis will be based on monthly returns for the stock markets in USD during the period 1993 – 2010. During this period, there are three sub-periods that will be emphasized; the Asian Financial Crisis (1997 – 1998), the Dot-Com Bubble Crash and September 11 (2000 – 2002) and the Great Financial Crisis (2007 – 2009). The reason for carrying out this analysis is that we want to present and interpret the performance of the Asian countries during periods of extreme volatility. Annual average returns, systematic risk, country-specific risk, betas and Sharpe ratios are measures that will be brought into focus during these periods. Currency effects will be considered by separating returns and standard deviations calculated in USD from returns and standard deviations calculated in the local currencies. Correlations between the Asian markets and the World Index will also be considered.

We continue our analysis with investigating which sectors have been important concerning the risk and return in the Asian countries, during the selected periods of extreme volatility. The performance of each sector, concerning average returns and standard deviations, will be investigated and compared to the performance of the Asian countries through the corresponding periods of time. To be able to attribute risk to specific sectors in each Asian country we will apply a regression analysis to see if the beta for a country is significantly different during periods of market turmoil than during the period 1994 – 2010, within each sector. We want to carry out this investigation because we want to see which

sectors in each Asian country have been influential on the countries' risk during periods of extreme volatility

As a final part of the analysis, portfolios consisting of both western and Asian countries will be constructed. This is being done to point out how the portfolio of a USD-investor who diversifies internationally would perform from 2003 – 2010. The portfolios will be based on historical data from 1993 – 2003 and are both optimized (based on minimum variance) and diversified naïve. Another reason for constructing these portfolios is that we want to find the size of the portfolio shares the different Asian countries will get, given different required returns with and without restrictions on short-sales.

2. Basic Facts on the Asian Economies

2.1 Asian Economies: A Brief Survey

Asia's business life is imprinted by large contrasts. Several Asian countries are among the world's ten poorest countries, while other Asian countries are among the richest in the world. The most developed countries in Asia are located in the East and the Southeast region. This region contains countries, which since the 1960s have had the most rapid economic growth in the world. Taiwan, South Korea, Hong Kong and Singapore have doubled their GDP approximately every eighth year since 1960, and are by some, considered fully developed.

At the end of the Second World War Asia's influence on the world economy was marginal. The first decades of the postwar period, Asia seemed to be stuck in an undeveloped stage, without much hope to make things better. The different Asian countries would have to actuate necessary reforms to improve their economic situation and begin a positive development.

The last decades, Asia has been in a rapid economic and political transformation. It has presented itself as the world's most powerful growth region (Filseth¹, 2009).

The economic situation of each Asian country will be presented below, along with their most central stock exchanges, with emphasis on dominating sectors and significant companies (selection of countries based on MSCI Barra's All Country Asia Ex Japan Index).

China

China has had one of the world's highest growth rates, since the country in 1978 decided to modernize the old centrally planned economy. From 1978 to 2003, China's GDP (in comparable prices), has been sextupled. In the same period, the GDP per capita has on average grown by 8.2 % per year. China has, with its size and rapid growth, become an economic factor of power in the world. At the same time, the country is considered to be among the emerging countries. Even though the growth rate has been high, the Chinese economy still shows signs of structural problems with an imbalanced development, large regional differences, supply problems, inflation pressure, corruption, weak legal protection, camaraderie and closed political processes.

After the establishment of the People's Republic of China, in 1949, the country led a centrally planned economy, based on the Soviet model. During the "Great Leap Forward"

(1958 - 1960) and the Cultural Revolution (1966 - 1976) China experienced serious setbacks. In 1978 market economic reforms were introduced. At the same time, the strict political control, led by the Communist Party, was maintained. The reforms involved modernizing within agriculture, manufacturing industry, science and defense. Up until 1990, certain industries, within certain economic zones and selected cities were gradually opened for foreign direct investments. The first four coastal special economic zones were established in strategic locations; Shenzhen on the border to Hong Kong, Zhuhai on the border to Macao, Shantou with cultural connections to Chinese people living in the South-east Asia and Xiamen with cultural connections across the strait from Taiwan. The reform measures immediately led to rapid economic growth for some years, until the end of the 1980s. After the year 1992, the rapid growth picked up again after new in-depth reform measures were carried out, like the authorization of privately owned companies. The goal was to establish a strong private sector under macroeconomic control, but where the political and social development still would be under the control of the Communist Party, with the label “socialistic market economy”.

The government of China has directed a lot of its investments towards establishing infrastructure and buildings in other areas in China than the three regional economic power bases (the Pearl River Delta, the Chang Jiang Delta and the Bohai Sea). This is being done to try to channel growth from the coastal areas to the middle and western regions in the country.

The most noticeable developmental factors in the Chinese economy since 1978 have been the growth and development in the service sector. From being given the lowest priority, the development of the commodity trade, the banking, insurance and financial industries and the hotel and restaurant industries, has been an important factor in the development of China as a modern country. The service sector is still developing to adjust to the international standards and quality measures.

China is traditionally an agricultural country and in 2003 the agricultural sector accounted for 15 % of the country's GDP. The total cultivated area includes approximately 16 % of China's total area, while exploitable meadow and grazing land includes 33 %.

China has grown to be the world's superior fishing nation with a total catch of 47 million tons of marine products in 2003. This equals approximately $\frac{1}{3}$ of the world's total take. China is also one of the world's largest producers of mineral resources. China alone stands for 42 % of the world's coal production (2004). When it comes to energy, China has become a very important participant in the world's energy market. In 2003 China (including

Hong Kong) accounted for 13.5 % of the world's energy production and 12 % of its consumption. China is however not self-supported with energy and is dependent on the import of oil.

The manufacturing sector has developed a lot since the reform started in 1978. Today China is among the leading countries of production in the world when it comes to many different products, especially the labor intense products. As an example, China produces more than half of the world's toys, bicycles and footwear (Næverdal¹, 2009).

Prior to 1978 China was a minor participant in the world trade, but after 1978 the country has developed into becoming a very important global participant, and is today one of the leading trading nations. Asian countries account for half of China's exports and are the source of $\frac{2}{3}$ of the imports (Redaksjonen¹, 2009).

During the reform the infrastructure was highly developed. Still, the infrastructure in China has to be considered as underdeveloped, and it therefore acts as an obstacle in the further economic development. The biggest weaknesses lie in the energy network, transport and telecommunications (Redaksjonen², 2009). Still, as of 2008 China's GDP amounted to approximately USD 7 909 billion, being the second largest economy in the world (World Bank¹, 2008).

Hong Kong

During the Second World War Hong Kong was occupied by Japan after being a British colony since 1898. When the Second World War was over, Hong Kong was once again a British colony. The Second World War impaired the significance that Hong Kong had as a base for the British fleet. That the communists won the Chinese Civil War in 1949 led to a dramatic decrease in the profitable trade that Hong Kong had with China. As a replacement for this loss, Hong Kong industrialized heavily with export products that came to be known worldwide. On the first of July 1997, the transfer of sovereignty of Hong Kong, from the United Kingdom to the People's Republic of China, took place. China takes care of Hong Kong's foreign policy and defense and has the last saying in all important matters. Hong Kong still has its own foreign trade and its own currency, the Hong Kong Dollar, which is fully convertible and fixed against the USD. Hong Kong has the right, regulated by contract, to keep its own capitalistic system and social order with all its rights until year 2047.

Hong Kong's government and business life have been searching for closer integration with South China ever since the millennium. The Guangdong province and the Pearl River Delta are important markets for Hong Kong's service based economy. The strong economic growth in China, combined with China's WTO-membership in 2003 has given Hong Kong new opportunities. Despite competition from Guangzhou and Shenzhen, Hong Kong seems, with its first class infrastructure, well functioning administration and impartial legal system, to be able to do well in the future as a leading economy in Southern China.

Both the Hong Kong airport and the harbor have played important roles for Hong Kong, since it has been crucial for Hong Kong to be able to offer first class service when it comes to air traffic and shipping, especially when the competition from other regions, like Shanghai and Singapore, are increasing. Many foreign companies choose Hong Kong before other regions to invest because Hong Kong has a reputation of being one of the least corrupt places in this part of the world. Only beaten by China, Hong Kong has been the largest receiver of foreign direct investments (FDI) in Asia, for many years. In 2007 the FDI's amounted to USD 59.9 billion, which was more than Singapore, Thailand and India received combined.

Hong Kong was hit hard by the Global Financial Crisis (GFC) and the economy went into recession in November 2008. In the first quarter of 2009 the GDP shrunk with 7.8 % compared to the same quarter in 2007. The GFC seems to have hit Hong Kong harder than the Asian Financial Crisis in 1997 (Filseth², 2009).

From the 1950s to the 1970s the dominating sector in Hong Kong was the manufacturing sector, while from the 1980s until 1997 the dominating sector was the financial sector. The sector that has been dominating in Hong Kong after 1997 is the service sector. This has been led by two subsectors, the business and financial services sectors which together account for half of all economic activity. In 2008 Hong Kong had a GDP of US\$307 billion (World Bank¹, 2008).

India

India is among the largest economic powers in the world, at the same time it is also among the world's poorest countries (GDB per capita). India has had a solid economic growth since the end of the 1990s and during 2005 India was rated as the world's tenth largest economy. The reasons for the economic growth is significant growth in the production industry, a large advance in the IT sector, quite liberal economic policy and a large increase in foreign

investments. Agriculture is still the most important sector in India (employs approximately 60 % of the population) and the Indian society is marked by huge differences in wealth. During the 1990s a radical reform process directing the economy towards market economy was started. Adaption to foreign investments and increased export of Indian commodities was central in this process. The reform process is being supported by the World Bank. In 2009 approximately 28 % of India's 1 147 million citizens live below the poverty level.

The most dominating sector is as mentioned agriculture. Fishing is a sector in India that has shown significant growth and has theoretically huge expansion opportunities. The mining industry in India is significant, but the two most important commercial energy sources for India are oil and coal. The manufacturing industry employs approximately 13 % of India's labor force and contributes approximately to 29 % of India's GDP and the largest subsector is the cotton industry. The reform process has given the manufacturing industry a lot better conditions and has contributed to modernizing this sector.

The state of India has since the 1990s organized their set of rules to promote imports and exports of commodities and in 1991 India and China resumed their business connection. India is a significant exporter of polished diamonds and diamonds and other precious stones are India's most important export article. Other important export articles are cotton textiles, machines and transport equipment along with leather and the export of software services and employees with software expertise. India's imports are dominated by oil and oil products. The US, Japan and Great Britain are India's most important business partners (Redaksjonen³, 2009).

As of 2008 India's GDP amounted to approximately USD 3 359 billion, being the fourth largest economy in the world (World Bank¹, 2008).

Indonesia

During the 20th century production of tin, timber, oil and rubber made up a fundamental part of the economy. However, the subsistence agriculture has been the principal occupation of many Indonesians. Indonesia is very rich in resources such as oil, coal and other industrial raw materials, but the industry development has been slow. Following the crisis 1964 - 1966 the new president Suharto introduced the "New Order" to stabilize the economy. Further economic planning was introduced, which included fiscal and credit restraints, liberalized foreign investment laws and rescheduling of internal debts (Encyclopedia of the nations¹, 2010).

During Suharto's thirty year reign the GDP per capita grew from USD 70 to over USD 1 000 by 1996 (World Bank², 2008).

In line with the OPEC agreements Indonesia had to reduce its production of oil, which at that time was the chief export of the country. Together with the worldwide recession in the early 80s this restrained the government's resources. In order to reverse Indonesia's worsening economy, new policies which encouraged foreign investment were designed. Some of the actions being made were specific structural reforms, major banking deregulations, privatization of the Jakarta Stock Exchange and increasing participation of the private sector debts (Encyclopedia of the nations¹, 2010).

The Asian Financial Crisis struck Indonesia in 1997 and within a year as many as 75 – 80 % of all businesses in Indonesia were technically bankrupt. Bail-out packages were arranged with standby agreements and loans from the International Monetary Fund, the United States, the World Bank and the Asian Development Bank. The crisis increased Indonesia's debt from 25 – 27 % of GDP in 1997 to 102 % of GDP in 1999.

Today Indonesia has the largest economy in Southeast Asia and is a member of the G20 major economies (HM Treasury, 2009). It is one of the emerging markets of the world and as of 2008 it had a GDP of USD 907 billion (World Bank¹, 2008). The main export goods are textiles, oil, gas, rubber, electrical appliances and plywood. The labor force is divided into agriculture (42.1 %), industry (18.6 %) and services (39.3 %) (CIA¹, 2010).

Korea

When Korea was divided, the southern part of the country was mainly an agricultural area. Most of the industry was in the northern part, along with the main part of the country's significant minerals to be found. Until the mid 1960s, the standard of living was higher in North Korea than in South Korea. Since the 1960s, South Korea has secured a fast economic development. They have established a flourishing export industry, with focus on consumer electronics, semiconductors, cars, steel and petrochemical products, partly funded by investments and loans from Japan. The economy in South Korea is a market economy with a high level of governmental control. With a constant high economic growth rate since the 1960s, South Korea entered a period, in the early 1990s, with a lower rate of growth. Increasing salaries from 1988 - 1993 led to a decrease in South Korea's competitive power. They were also hit hard by the Asian Financial Crisis in 1997, and the unemployment rate reached 8 %. Daewoo Motors were in year 2000 hit by the largest bankruptcy in the history of

South Korea, with a total debt of USD 70 billion. After the millennium the economic growth rate was high again and already in 2001 the unemployment rate was reduced to 3 %, which lasted the following years.

Agriculture was the dominating sector, and employed as late as in 1966 56 % of the workforce in South Korea. In 2002 the primary industries (agriculture, fishing and forestry) only accounted for 10 % of the employment and as little as 4 % of the GDP. The main pillar in the economy is the highly export orientated manufacturing industry. The value of the commodity export accounted for 37.7 % of the GDP in 2002 (equivalent number for the US and Japan are approximately 10 %). The manufacturing industry accounted for 28 % of South Korea's employment and 40.9 % of the GDP in 2002. The car industry is significant in South Korea, with Hyundai in the lead. More and more of the production base is being moved to other countries, not only to China, but also to other low cost countries in Asia, as well as to Europe and America.

In 2004, the work with the infrastructure for three free economic zones for foreign investors began. The free economic zones are aiming to make South Korea an economic intersection in Asia.

Japan and the US are the two most important targets for the South Korean exports, along with Hong Kong, Singapore and Germany. China has become increasingly important after 1992, when the diplomatic connections between the two countries were re-established. Japan and the US are the two most important countries for the South Korean imports as well (Redaksjonen⁴, 2009).

As of 2008 South Korea's GDP amounted to approximately USD 1 344 billion, being the thirteenth largest economy in the world (World Bank¹, 2008). MSCI Barra has classified Korea as one of two countries that is currently under review for a potential reclassification to being considered as a developed market (MSCI Barra¹, 2010).

Malaysia

Malaysia has a growing and relatively open market economy. In 1955 Malaysia introduced the First Malayan Five Year Plan. The colonial British government had used all available resources to fight the Malayan communist insurgency and there was a need for resources to develop agriculture and infrastructure. These plans were used to intervene in the economy and redistribute wealth and investment in infrastructure projects and rural improvement. Until the

1970s Malayan economy was largely based on mining and plantation activities, the largest export products were tin and rubber. During the 1970s Malaysia committed itself to convert to manufacturing instead of mining and agriculture and thereby following in the footsteps of the Asian Tigers (Hong Kong, Singapore, South Korea and Taiwan). The country's economy flourished and Malaysia added more products to its export list, such as petroleum, natural gas, tropical hardwoods, palm oil and manufactured items (Encyclopedia of the nations², 2010). This diversification made Malaysia less dependent on overseas commodity markets. The Malaysian economy took a hit in the 1981 - 1982 worldwide recessions. The commodity prices fell and the economic growth slowed down. The government stimulated the economy through spending on heavy industry which led to an increase in foreign debt. Malaysia's period of high growth was again halted in 1985 - 1986 when the palm oil and oil prices were halved. After this period the economic growth continued with an average annual growth of 8 - 9 %. After 13 years of uninterrupted growth the Asian Financial Crisis put a stop to this and Malaysia's GDP was -7.4 % in 1998 items (Encyclopedia of the nations², 2010). The government's response to the crisis was to launch a massive recovery program which included two fiscal stimulus packages and the establishment of three special purpose agencies. Malayan banks were also merged into 10 anchor banks and the domestic brokerages were merged into 15 universal brokers in order to compete with international counterparts. Since the crisis the Malaysian economy has continued to recover apart from a setback due to the aftermath of the terrorist attacks on the United States September 11, 2001.

As of December 2008 Malaysia has a GDP of USD 384 billion which makes it the 28th largest economy in the world (World Bank¹, 2008).

The Philippines

After the Second World War the Philippines were believed to become an economical power in Asia. The country was an ally of the United States, it had a good workforce and natural resources. The future looked bright and in the 1960s the Philippine income per capita were double that of Thailand. However, the economical growth that was predicted never really happened, and today Thailand has almost twice the income per capita compared to the Philippines. One of the reasons for this was the corrupt regime of Ferdinand Marcos, he was president of the Philippines from 1965 to 1986. During his regime the economy grew at a significantly slower rate and the economy was destabilized. Marcos embezzled and misappropriated vast amounts of national wealth and he led his country into poverty. Another reason for the failed economy is the fact that the Philippines were under Spanish rule for

several hundred years followed by a 50 year spell of American occupation. This created enormous estates controlled by a few families and this has restricted the economic growth. In order to secure long term economic growth, new reforms and economic liberalization is vital. The families controlling the land have so much power both politically and economically and therefore major changes are unlikely to happen (Economywatch¹, 2009).

According to the World Bank the Philippines are the 36th largest economy in the world with a GDP of USD 317 billion which makes it the 4th largest economy in South East Asia (World Bank¹, 2008). The main export articles include transport equipment, garments, semiconductors and electronic products, petroleum products, coconut oil, copper products and fruits. The Philippines biggest trading partners are China, Hong Kong, Thailand, Japan, Saudi Arabia, Singapore, South Korea, Malaysia and the United States. As of 2008 the country's labor force was 36.8 million.

Singapore

Heavy economic growth through many years has contributed to the fact that Singapore's GDP per capita has reached the same level as other highly developed countries. The government in Singapore actuated programs of development aimed at specific industries, which led to the heavy economic growth in the country. The primary goal for Singapore in 1965, when Singapore was forced out of the union with Malaysia, was to create places of employment. Foreign investors were called to Singapore to help build up the country's industry. After the target of full employment was reached in the beginning of the 1970s, the economic focus in Singapore shifted to the development of more technological advanced manufacturing industry. The development of the service industry (trade, finance, communications and tourism) has been given a lot of focus since the beginning of the 1990s. Singapore wanted the service industry, alongside the manufacturing industry, to be what led the country's economic development into the future. Today, Singapore is considered as the leading financial centre in Southeast Asia. A reason for this is that the country was quite early with developing the service industry and employing modern information technology. Tourism has become more and more significant, and in 2004 Singapore was visited by 8.3 million tourists, which gave an income of USD 5 billion (Næverdal², 2009).

Singapore is a leading nation in Southeast Asia when it comes to production of cement and building materials, plywood, chemicals and plastic goods, machines, ships and steel constructions such as oil rigs (Redaksjonen⁵, 2009).

The economy of Singapore is highly export orientated; there is a significant import of raw materials, which get re-exported as finished product. In 2004, the value of re-exports accounted for 45 % of Singapore's total exports. Their most important trading partners are Malaysia, China and the US (Redaksjonen⁶, 2009).

As of 2008 Singapore's GDP amounted to approximately USD 239 billion, being the 48th largest economy in the world (World Bank¹, 2008).

Taiwan

After World War II the Taiwan economy was deteriorating, the situation did not improve until the removal of the ROC government to Taiwan in 1949. The monetary situation was stabilized with currency and tax reforms and the rehabilitation of the economy was facilitated with personnel and capital equipment from the mainland. Successive four-year plans were introduced, they were first supplemented by the US and they resulted in substantial economic progress. From 1951 - 1960 the stress was on agricultural development and establishing labor-intensive industries. From 1961 - 1970 the emphasis was on developing industrial products for export, Taiwan registered its first positive trade balance in 1963. Between 1971 and 1980 capital intensive industries were developed, such as machine tools, steel, and motor vehicle assembly. These industries received heavy support to improve the infrastructure. The 1980s saw the development of high-technology industries. During this period the share of high-technology manufacturers increased from 20 % to 29 % of total manufacturers, making Taiwan the 7th largest producer of computer hardware worldwide. Growth accelerated in the 1990s and capital-rich investments increased, especially after the first democratic elections in 1996. The burst of the dot-com bubble in 2000, the global slowdown in 2001 and the aftermath of the 2001 terrorist attacks on the United States affected the economy. Taiwan registered its first decline in real GDP, -2.2 % in 2001. Recovery started in late 2001 and Taiwan's real economic growth was again positive in 2002 (Encyclopedia of the nations³, 2010).

Taiwan has a dynamic capitalist economy, large firms and state-owned banks have been privatized and the government guidance is decreasing. In 2008 Taiwan's GDP was USD 722 billion. The country's biggest export goods are machinery and electronics, this accounted for 70 % of Taiwan's total GDP growth. Taiwan runs a big trade surplus and has the world's fourth largest foreign reserves (CIA², 2010). Taiwan is currently one of two countries who are

under review for a potential reclassification to Developed Markets, MSCI will communicate its final conclusions in June 2010 (MSCI Barra¹, 2010).

Thailand

Thailand achieved an annually economic growth from 1989 to 1996 of approximately 9 % and saw its economy triple from 1986 to 1996. The country was hit hard by the Asian Financial Crisis in 1997 and the real GDP declined 1.4 %. In 1998 it got even worse and the real GDP declined 10.5 %. At this time the Bank of Thailand found it hard to defend the Baht's value against speculation against it. The bank spent almost USD 30 billion in foreign exchange reserves in doing so, but on the second of July 1997 the bank abandoned the peg and let the currency float. The value of the Baht decreased heavily, from 25 Bahts to 1 USD to a low of 53 Bahts to 1 US dollar in January 1998. This left almost every business in Thailand technically bankrupt and the International Monetary Fund (IMF) quickly arranged a USD 17.2 billion bailout package. As a result of this the economy grew moderately in 1999 and 2000 before it slowed down again in 2001 because of the global slowdown and the terrorist attacks on the United States. However, according to the IMF, in 2001 the economy had been restored to its pre-crisis level (Encyclopedia of the nations⁴, 2010).

Thailand has an emerging economy and is heavily dependent on export. In 2008 Thailand had a GDP of USD 545 billion which makes it the 23rd largest economy in the world. In 2006 industry contributed 45 % of GDP, but industry employed only 23 % of the total workforce. Thailand is the largest rice exporter in the world; other exporting goods include rubber, footwear, jewelry, textiles, fishery products, automobiles and electrical appliances. Exports accounts for more than two thirds of the country's GDP (World Bank¹, 2008).

Country	Main Industries	Largest Company	Population	GDP
China	Consumer goods/Industrials	PetroChina	1 330 million	7 909 261
Hong Kong	Financial Services	Industrial and Commercial Bank of China	7 million	306 721
India	Agriculture/Oil & Gas/Industrials	ICICI Bank Ltd.	1 147 million	3 358 871
Indonesia	Oil & Gas/Industrials/Technology	PT Telekomunikasi Indonesia	238 million	907 955
Korea	Technology/Industrials/Agriculture	Samsung Electronics	48 million	1 344 360
Malaysia	Consumer goods/Oil & Gas/Industrials	Sime Darby Berhad	25 million	384 002
Philippines	Oil & Gas/Industrials/Consumer goods	Bank of the Philippine Islands	96 million	317 352
Singapore	Financial Services/Industrials	SingTel	5 million	238 685
Taiwan	Industrials/Technology	Taiwan Semiconductor Manufacturing	23 million	736 100
Thailand	Consumer goods	IRPC Public Company Ltd.	65 million	544 913

Table 1: Basic facts on Asian Economies (USD, PPP adjusted)

2.2 Asian Stock Exchanges: A Brief Survey

China

The Shanghai Stock Exchange (Sse) was founded on November 26, 1990 and is now “the most preeminent stock exchange in mainland China in terms of number of listed companies, number of shares listed, total market value, tradable market value, securities turnover in value, stock turnover in value and the T-bond turnover value” (sse, 2010).

The SSE is not entirely open to foreign investors, this is because of the tight capital control exercised by the Chinese authorities. There are A and B stocks and the B stocks have for a long time been the only stocks available for foreign investors, but the Chinese authorities are planning to allow foreigners to take stakes in their publicly listed firms (China Briefing, 2008).

Among the 10 largest stocks on the SSE there are 4 banks, other dominating sectors are insurance and petroleum. The largest company on the SSE is PetroChina. It is the largest oil and gas producer and distributor in China and one of the world’s largest oil companies (PetroChina, 2008).

The Shenzhen Stock Exchange (Szse) was created in 1990 and has become a great market of competitive edges in China (Shenzhen Stock Exchange¹, 2009). The largest company on the SZSE is China Vanke which is China’s biggest residential property developer with a market capitalization of USD 9.68 billion in January 2010 (Shenzhen Stock Exchange², 2009). China Vanke was the second listed company on the Shenzhen Stock Exchange following the Shenzhen Development Bank (China Vanke, 2007). Big industrial companies that operate in metals and non-metals are a dominating sector on the SZSE (Shenzhen Stock Exchange², 2009).

At the end of 2008 the Shanghai Stock Exchange and the Shenzhen Stock Exchange had more than 1 500 listed companies combined and a total market capitalization of USD 2.66 trillion.

Hong Kong

Hong Kong’s Financial Secretary announced in 1999 a comprehensive market reform of the stock and futures market. The Stock Exchange of Hong Kong Limited (SEHK), Hong Kong Futures Exchange Limited (HKFE) demutualised and together with Hong Kong Securities Clearing Company Limited (HKSCC), merged under a single holding company, that was

named Hong Kong Stock Exchange (HKEx). This reform was designed to increase competitiveness and meet the challenges of an increasingly globalised market (HKEx, 2009).

The largest listed company on the HKEx is Industrial and Commercial Bank of China (ICBC). ICBC had 385 609 employees and 16 386 domestic and overseas branches providing financial products and services to 3.1 million corporate and 190 million personal clients by the end of 2008. ICBC had, in 2008, established 21 business institutions and 134 branches in 15 countries and regions outside China, as well as the agency relations with 1 358 overseas banks in 122 countries and regions (Icbc, 2009). ICBC has a market capitalization of USD 268 982 billion, the largest among all the banks in the world and USD 70 billion more than the second bank in the ranking as of December 2009. It has also moved up to the fourth place in the worldwide ranking of publicly traded companies in terms of market capitalization (Icbc, 2010).

The dominating sector on the HKEx is banking, with companies like the Industrial & Commercial Bank of China Ltd., HSBC Holdings and Bank of China as listed companies. The telecommunications sector, the oil sector and the energy sector are also important ingredients on the HKEx (HKEx, 2010).

India

There are many exchanges in India, but there are two exchanges that account for most of the trading in shares in India. These two are the Bombay Stock Exchange (BSE) and the National Stock Exchange of India (NSE).

The BSE is the oldest stock exchange in Asia with its 133 years of existence. As of 2009, BSE has the largest number of listed companies (4 700) and is ranked as number 5 in the world when it comes to number of transactions (Bse¹, 2009). The largest listed company on the BSE is ICICI Bank Ltd. ICICI Bank is India's second largest bank with total assets of USD 76 billion in September 2009. The bank is present in 18 countries and has a network of 1 590 branches. ICICI Bank offers a wide range of banking products and financial services to both corporate and retail customers (ICICI, 2009). Banking is the most dominating sector on the BSE, with companies like ICICI Bank, Housing Development Finance Corporation (HDFC) and HDFC Bank Ltd. (Bse², 2009).

The National Stock Exchange of India (NSE) is India's largest Stock Exchange and the world's third largest Stock Exchange in terms of transactions (Nasscom, 2006). The NSE is

gaining on the BSE on becoming the biggest stock exchange in India in terms of market capitalization. The largest listed company on the NSE is Reliance Industries LTD and it is also India's largest private sector enterprise, with businesses in the energy and materials value chain. Reliance Industries' activities consists of exploration and production of oil and gas, petroleum refining and marketing, petrochemicals (polyester, fibre intermediates, plastics and chemicals), textiles, retail and special economic zones. Reliance has global leadership in its business being the largest fibre and polyester yarn producer in the world (RIL, 2009). The electricity sector together with the manufacturing and banking sectors are quite dominating on the NSE (Nse, 2009).

Indonesia

Jakarta Stock Exchange (JSX) was privatized in 1992 and the functions of the *Badan Pengawas Pasar Modal* (BAPEPAM) changed to become the Capital Market Supervisory Agency (BAPEPAM-LK). In 1995 JSX introduced the computerized Jakarta Automatic Trading System (JATS). Surabaya Stock Exchange was merged into JSX in 2007 and as a result of this the name was changed to Indonesia Stock Exchange (IDX) (Idx, 2007).

Dominating sectors on Indonesia Stock Exchange include banking, telecommunication and big multi-industry companies. PT Telekomunikasi Indonesia (TLKM) is the largest company listed on Indonesia Stock Exchange with market capitalization of Rp 190.5 trillion or about USD 20.2 billion (Ardi, 2009).

In December 2008 52.5 % of Telekom's stocks was owned by the government and 47.5 % was publicly owned. Telekom's market capitalization was 12.9 % of the Indonesia Stock Exchange capitalization. PT Telekomunikasi Indonesia (Telekom) is the largest communication and information company in Indonesia, it started providing services in 1856 and has been through many transformations since then (Telkom, 2009).

As of December 3, 2009, 36 companies have market capitalization over USD 1 billion and these companies make up 81 % of the total capitalization of companies listed on IDX (Ardi, 2009).

Korea

The Korea Stock Exchange (KSE) was established in 1956 and is located in Busan in South Korea. In 2005 the Korea Exchange (KRX) was established which integrated the KSE, KOFEX and the KOSDAQ Stock Market. The first foreign company on the KRX was listed

in 2007 and the number of listed companies in December 2009 was 648. The total KRX market capitalization was in 2009 about USD 835 billion (Krx, 2009).

The largest company listed on the KRX is Samsung Electronics. This is a company based in South Korea and has grown to become one of the leading electronic companies in the world. Samsung specializes in media and digital appliances, semiconductors, system integration and memory (Samsung¹, 2009). The total stockholders' equity in 2007 was approximately USD 110 billion (Samsung², 2009).

The most dominating sector on the KRX is the IT sector, with the semiconductor and the banking sector as the second and third most dominating sector on the KRX (Krx, 2009).

Malaysia

The Stock Exchange of Malaysia was established in 1964. A year later the name was changed to the Stock Exchange of Malaysia and Singapore because of the secession of Singapore from Malaysia. Because of the currency interchangeability between the two countries the Stock exchange was divided into the Kuala Lumpur Stock Exchange Berhad and the Stock Exchange of Singapore. In 2004 the name was again changed, and the stock exchange is now known as Bursa Malaysia. At the same time as the name was changed a demutualization was exercised and the purpose of this was to enhance the competitive position in order to respond to global trends (Bm¹, 2008).

Bursa Malaysia is one of the largest stock exchanges in Asia with nearly 1 000 listed companies. The companies are either listed on Bursa Malaysia Securities Berhad Main Market or ACE Market (Mesdaq, which provide lower listing requirements) (Bm², 2008).

Sime Darby Berhad is currently the largest stock on the MYX, the second largest stock is Malayan Banking followed by CIMB Group, Public Bank and Tenaga Nasional Bhd. Three of these companies are large banks while Tenaga Nasional Bhd is the largest power company in Southeast Asia. Sime Darby Berhad is Malaysia's leading multinational conglomerate involved in different sectors such as property, industry, energy & utilities, plantation and motors. The company has operations in 20 countries and employs over 100 000 people worldwide (Sd, 2007).

The Philippines

On December 23, 1992 the Manila Stock Exchange (MSE) and the Makati Stock Exchange (MkSE) were unified to become the Philippine Stock Exchange. PSE maintains two trading

floors, one in Makati City and one in Pasig City. PSE still maintains a “one price, one market” exchange through the MakTrade System (Pse¹, 2009). The PSE is known for its short trading hours, trading takes place from 9:30 am to 12:10 pm, this is one of the shortest trading hours of all the stock exchanges in Asia (Parsani¹, 2009).

As of December 29, 2009 there were 253 listed companies and the total market capitalization was USD 131.5 billion (Pse², 2009).

The PSE is dominated by the financial sector and the largest company is Bank of the Philippine Islands, which is the oldest and the largest bank in the Philippines. BPI has almost 12 000 employees servicing over 3 million depositors and in 2009 the market capitalization was USD 2.63 billion (BPI, 2009).

Singapore

The Singapore Exchange Limited (SGX) is Asia-Pacific’s first demutualised and integrated securities and derivatives exchange. SGX was established in 1999, following the merger of two well respected financial institutions, namely the Singapore International Monetary Exchange (SIMEX) and the Stock Exchange of Singapore (SES). SGX is today the home of Singapore’s leading listed companies and is also the forefront of exchanges globally in attracting international issuers. SGX is also emerging as Asia’s offshore risk management centre for international derivatives (Sgx¹, 2009).

The largest listed company on the SGX is SingTel. SingTel is Asia’s leading communications group, the company provides a diverse range of communication services and solutions. SingTel’s services include mobile, data, Internet, info-communications technology, satellite and pay TV. They employ more than 23 000 people worldwide, and had a turnover of USD 10.4 billion for the year ended on 31 March 2009. SingTel has 130 years of operating experience and has played an integral part in developing Singapore as a major communication hub in Southeast Asia (Singtel, 2009).

The Singapore Stock Exchange had 768 listed companies with a combined market capitalization of \$385 billion in January 2009. 313 of these companies were foreign (Parsani², 2009). The most dominating sector on the SGX is banking. The three largest companies listed within this sector are DBS Group Holdings Ltd., United Overseas Bank Ltd. and Oversea-Chinese Bank Ltd (Sgx², 2009).

Taiwan

The Taiwan index consists of two exchanges, namely The Taiwan Stock Exchange (TSEC) and the Gre Tai Securities Market (GTSM).

The Taiwan Stock Exchange (Tsec), located in Taipei, was established in 1961 and began operating as a stock exchange in 1962. The number of listed companies has grown a lot since 1962 and by December 2009 the number had become more than 741. The Taiwan government reported that the total market capitalization of these companies were around USD 390 billion by the middle of 2004 (Economywatch², 2009).

The largest listed company on the TSEC is Taiwan Semiconductor Manufacturing. The company was established in 1987 and is the world's largest dedicated semiconductor foundry. As both the founder and leader of this industry, Taiwan Semiconductor Manufacturing offers advanced wafer production processes and unparalleled manufacturing industry (Tsmc, 2009).

The three most dominating sectors on the Taiwan Stock Exchange is the semiconductor, financial and communications sector (Twse, 2009).

The Gre Tai Securities Market (Gtsm) was registered on September 26, 1994 and was formally established in November the same year to take over the business of over-the-counter trading from the Taipei Securities Dealer's Association (TSDA). Their over-the-counter market, like the stock exchange, is a part of the market for circulation of securities. The Taiwan Securities Association, Taiwan Stock Exchange and Taiwan Depository & Clearing Corp. donated the initial fund of the GTSM, which amounted to approximately US\$11.5 million. Today the fund stands at approximately USD 82 million (Otc, 2010).

Thailand

The Bangkok Stock Exchange Co., Ltd. (BSE) was established in 1962 by a private group who established an organized stock exchange as a limited partnership. The BSE ceased its operations in the early 1970s because of a lack of official government support and a limited investor understanding of the equity market. The government of Thailand acquired the services of Professor Sidney M. Robbins from Columbia University to help establish a functioning Thai capital market. In 1975 the Securities Exchange of Thailand started trading and in 1991 the name was formally changed to the Stock Exchange of Thailand (SET) (Parsani³, 2009). The Thailand index that MSCI Barra constructs, also consists of the Market

for Alternative Investment (MAI) in Thailand. This is a market where small and medium sized enterprises can be listed. The MAI is being supervised by the SET (Set¹, 2009).

The largest listed company on the SET is IRPC Public Company Limited, formerly Thai Petrochemical Industry Public Company Limited. The company started as a producer of plastic in 1982 and gradually expanded to become a fully integrated petrochemical complex (Irpc, 2008).

There are two dominating sectors on the SET, these two are the resources- and the service sectors, with banking in a third place (Set², 2009).

2.3 Hypotheses Regarding the Asian Markets

We want to present some working hypotheses that will be investigated through the analyses in this thesis and they will be either confirmed or rejected through the conclusions section at the end of the thesis. These hypotheses have been the basis for our investigation, but they are not exclusively the reason for going through with our analysis. However, they have been developed and refined throughout the process.

Hypothesis 1: Asian markets have performed worse than western developed markets during selected periods of extreme volatility.

We believe that since eight out of ten of our selected Asian countries are considered to be emerging, the Asian markets have performed worse than developed countries during selected periods of extreme volatility from 1993 – 2010.

Hypothesis 2: Specific sectors in Asian markets have significantly influenced the systematic risk during periods of extreme volatility.

We want to find out if certain sectors in the Asian countries contribute significantly to increasing or decreasing the systematic risk through periods of market turmoil.

Hypothesis 3: Optimal portfolios from 2003 – 2010 will consist of Asian countries.

We have decided to include this hypothesis because we do not know if Asian countries have performed well enough to be part of an optimal portfolio (defined as minimum variance) consisting of both western and Asian countries.

3. Literature on International Investments

International stock markets have become more globalized and integrated over the years and formal financial impediments between countries have been reduced. This has given rise to several opportunities for international risk diversification. This section will present previous studies and their findings and theories concerning international investments.

3.1 International Diversification: Potential Benefits and Potential Problems

International diversification represents both potential benefits and potential problems. There are two problems in particular, namely country-specific risk and exchange rate risk.

Several countries have social issues, economic problems and political instability which enhance the risk of investing in these countries. Country-specific risk is connected to these three factors in the country where funds have been invested. It is more difficult, as well as more costly, to carry out a thorough and correct market analysis, considering expected returns and risks, in emerging markets, than in developed and more transparent markets. Generally, developed and large markets are more transparent than emerging markets and information are also considered more reliable. PRS Group Inc. (Political Risk Services) is a company that provides different methodologies as to which countries in the world are the most and least risky to invest in. The guide most widely used is the International Country Risk Guide (ICRG), where countries are ranked on a scale from 0 to 100 on the basis of three main factors and 22 variables in total. The three factors are Political Risk (government stability, corruption, ethnic tensions etc.), Financial Risk (exchange rate stability, foreign debt (% of GDP) etc.), and Economic Risk (GDP per capita, annual inflation rate etc.). As a result of a country's score in the ICRG an investor can more easily decide where he/she wants to invest their money, with regards to country-specific risk (Bodie et al., 2008).

The exchange rate is the price of a foreign currency, or the price of a currency in a country measured against other countries' currencies. Exchange rate risk is the uncertain return on an investment, on the basis of fluctuations in the exchange rate of the country where funds have been invested, compared to the investor's own currency. Currency exchange risk alone might amount to a significant part of the total risk of the investments on the stocks invested in, in a foreign country. Still, in the context of international portfolios, exchange rate risk may be partly diversifiable, especially if the investor is passive and holds a well-diversified portfolio, the need to hedge 100 % of your currency position may not be necessary. In any case, investors have the opportunity to hedge their exposure to exchange

rate risk, by using forward or future contracts for delivery or acceptance of one currency for another at a stipulated exchange rate (Bodie et al., 2008).

3.2 USD versus Local Currency

The MSCI Country Indices are calculated both in local currency and in USD. A local currency calculation excludes the impact of currency fluctuations, while a USD calculation incorporates it. There is only one difference in the formulas between local currency and USD indices, and that is that the same exchange rate is used in the denominator and numerator for local currency, which means that there is no impact of currency fluctuations in the performance. The local currency calculation therefore represents the price appreciation or depreciation of securities only, whereas the USD calculation also accounts for the local currency performance relative to the USD (MSCI Barra², 2010).

3.3 Home Bias: Failure to Exploit Benefits of International Diversification

Investors consistently fail to exploit the benefits of international diversification. Despite the well known potential benefits of international diversification investors continue to concentrate their investments in equities of their home country (Strong and Xu, 2003). A certain degree of the home bias can be explained by investor consumption in the home country. That is, goods and services produced in the home country. These prices may to a certain extent be correlated with stock prices of companies from the home country (Bodie et al., 2008).

A way of measuring home bias is to look at the excess weight of the home country relative to its weight in an efficient portfolio. A portfolio weighted by market capitalization would be the most efficient portfolio for all investors, given that a world CAPM is prevailing. However, there is no evidence that a world portfolio is efficient (Bodie et al., 2008).

There have been various attempts at explaining the equity home bias puzzle. French and Poterba (1991) suggested that explanations can be divided into two categories, explanations focusing on institutional factors and explanations focusing on investor behavior. The category of institutional factors included restrictions on international capital flows, transactions costs and withholding of taxes. In 1995 Tesar and Werner pointed out that transaction costs cannot explain the equity home bias because of the large volume of cross-border capital flows and the rather high turnover rate on foreign compared to domestic equity investments. Warnock (2001) did not agree with Tesar and Werner suggesting that foreign turnover rates were inaccurate and in fact comparable to domestic turnover rates. Warnock did however agree to the findings that transaction costs cannot explain the equity home bias.

Eldor, Pines and Schwartz (1988), Stockman and Dellas (1989) and Tesar (1993) show that there is a hedging motive to invest in domestic equities due to the price uncertainty of non-traded goods. Zhou (1998) showed that agents with differential information on average, tilt their portfolio towards stocks that they have more information about. As a result they obtain reduced conditional variances of the stock returns. The question is whether the information asymmetries are large enough to prevent intermediaries from exploiting the benefits of international diversification (Strong and Xu, 2003).

Many authors have also considered investor behavior as an explanation for the equity home bias. French and Poterba (1991) suggest that investors are generally more optimistic about their domestic markets and historical data are unlikely to contradict the investors' attitude. This means that forecasts for expected returns will give huge confidence intervals. Their results show that domestic investors, in this case US investors, expect higher annual returns than British and Japanese investors expect on US equities. Both Shiller, Kon-Ya and Tsutsui (1996) and Kilka and Werner (1999) showed that investors feel more competent about their domestic stocks, which translates into more optimism about their domestic stock market. Strong and Xu (2003) supported earlier research by concluding that there is a bias toward domestic equities and a relative bias against foreign equities.

Amadi (2004) demonstrates that there has been a reduction in equity home bias and he further examines if any developments or theoretical explanations such as globalization, free trade, the internet and the rise of emerging markets and mutual fund investment have had any effects on the increasing international diversification. The results in Amadi's study showed that investors are more likely to invest in foreign markets when their domestic market is underperforming compared to the world market. The per cent share of foreign firms listed in the domestic market seems to have an insignificant effect on the overall foreign diversification. Further, Amadi showed that free trade did not affect foreign diversification while the per cent of internet users did have a significant effect on diversification. The percentage share of emerging markets in world capitalization did according to Amadi's result play an important role in determining equity home bias. The percentage share of mutual fund capitalization did also turn out to be highly significant. A lot of the mutual funds contain a certain share of foreign equity. As agents invest in mutual funds their foreign diversification will indirectly increase through the composition of these funds (Amadi, 2004).

3.4 Market Correlation in Bear Markets

When there is a general decline in the stock market over a period of time it is said to be a bear market. It is connected to the transition from high investor optimism to widespread investor pessimism. There are some studies that suggest that the correlation in country portfolio returns increases during periods of extreme volatility in stock markets. If this is the case, then the benefits from diversification would be lost, at a time when they are needed the most. A study by Roll (1988) of the crash of October 1987 showed that in this period, all 23 country indexes that were part of the study declined. The beta of a country index on the world index (estimated before the crash of October 1987) was the best predictor of that index's response to the crash. This finding suggests that there is a common factor underlying the movement of stocks around the world and that a macroeconomic shock, like the crash of October 1987, would affect all countries and diversification can only moderate country-specific events. The capital asset pricing model (CAPM) suggests using a stock's beta against the world portfolio, therefore the diversification benefits shown by the world CAPM model seem to be realistic (Bodie et al., 2008).

The removal of impediments to international investments, as well as the growing economic, political and financial integration affects the connections between international markets. This could lead to an increase in the correlation of financial markets, which could restrain the positive effects of international diversification. Longin et al. (1995) studied the correlation of monthly excess returns for seven major countries over the period 1960-1990. They found that the international correlation and covariance matrices were unstable over time and that correlation rose in periods when the conditional volatility of markets is large. However, their hypothesis of a constant conditional correlation was rejected (Longin et al., 1995).

The connection between correlation and risk of the returns in the stock market in the US and the markets in France, Germany, Switzerland, Japan and Great Britain were investigated by Solnik et al. (1996). They used monthly data in the period from 1958 to 1995 and enlightened two questions in particular; has the increasing market integration and capital flow contributed to higher correlation in the last thirty years? And is there a higher correlation in periods of high market volatility? Their study showed that the correlation between the US and the other markets varied over time and between markets, and were far from correlated. The connection between correlation and risk showed that movements in the risk (standard deviations) of the markets were not fully coordinated. In the presence of high market volatility the correlation between the markets also seem to be high. There were several cases when the

US market showed high volatility, the other markets were highly volatile as well. Solnik et al. therefore concluded that market volatility is “catching” (Solnik et al., 1996).

If the degree of correlation between international stock markets became higher during periods of increased market volatility was also investigated by Jochum (2001). The data used were daily returns in Germany, Switzerland, Japan, the US and Great Britain in the period of 1973 to 1996. Two questions were answered, the first; does changes in foreign countries stock markets explain changes in a single country’s stock market in periods of high volatility? And is the covariance matrix between the international stock markets being influenced by the fact that a market moves from low to medium or high market volatility? Jochum found that with the exception of a short period in 1978, the markets were always positively correlated. In periods of high market volatility there were higher average correlations between markets than in periods with medium or low market volatility. During the stock market crash of 1987 all the markets had a high degree of volatility and after the crash the average correlation between the markets had increased. This is consistent with the findings that Lau and McInish (1993) found in their study. In periods of high market volatility, foreign markets influence changes in a single country more. At the same time, higher degree of market volatility leads to higher correlation between markets (Jochum, 2001).

Hui (2005) investigated the potential benefits of international diversification in the markets; New Zealand, the US, Australia, Singapore, Japan, Hong Kong, South Korea, Taiwan and the Philippines. The data used were weekly returns from 1990 to 2001, with the purpose of defining the US’ correlation with the Asian and Oceanic markets, and to find out if the Asian Financial Crisis has influenced the correlation. Hui’s analysis showed that the correlation between Hong Kong and Singapore were highest and that the Asian Financial Crisis did not have a significant impact on the markets’ correlation. The difference that the crisis made was that Japan correlated with the US prior to the crisis and correlated with South Korea after the crisis. Also, South Korea moved independently prior to the crisis while the US started to move independently after the crisis (Hui, 2005).

Syriopoulos (2007) investigated whether the establishment of the European Monetary Union (EMU) had influenced the connections between emerging and developed stock markets. The data were from the emerging markets of Poland, Hungary, Slovakia and the Czech Republic and the developed markets of the US and Germany in the period of 1997 to 2003. The correlation between the emerging markets and the developed markets were low or

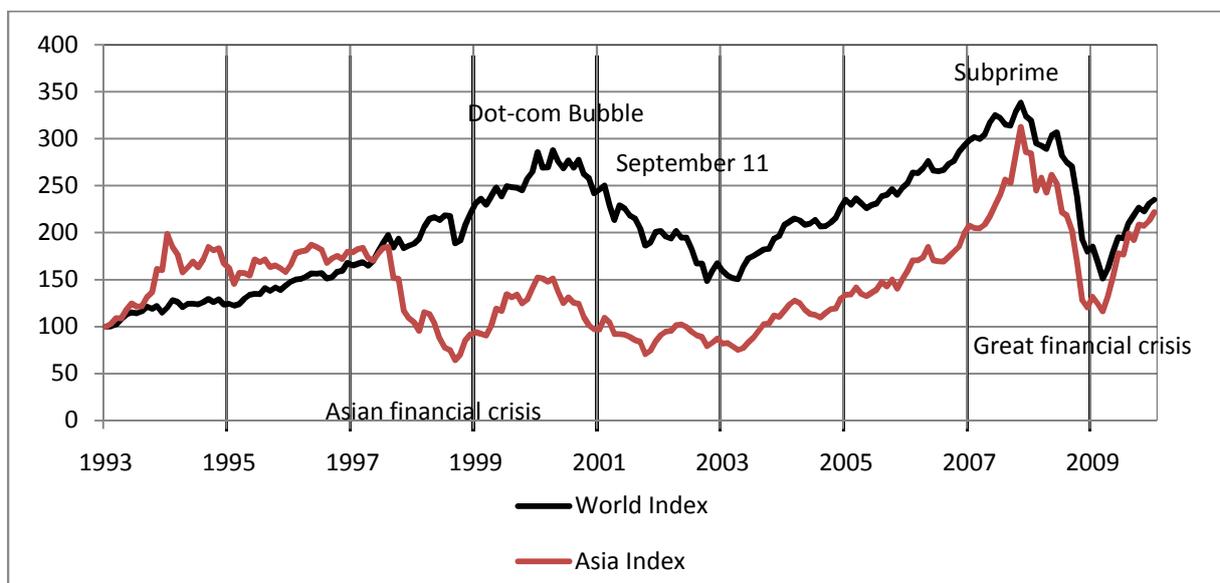
negative in the period before the EMU was established. In the period after the establishment of the EMU the correlations between the markets seem to be generally more correlated. The negative correlations turned positive except for Slovakia which still correlated negatively with the developed markets (Syriopoulos, 2007).

The studies that deal with correlation and volatility show that the integration between international stock markets has increased. This is being reflected through higher correlations between the stock markets. The findings also show that markets correlate more during periods of increased market volatility.

4. Literature on Periods of Extreme Volatility

There have been several periods of extreme volatility, or financial crises, from 1993 to 2010 in the world economy. This section will highlight these periods, the reasons for why they occurred and how the financial markets worldwide were affected. The periods we have included in this section are marked in graph 1, these are the Asian Financial Crisis (1997 - 1998), the Dot-com Bubble Crash and the terror attacks of September 11 (2000 - 2002) and Subprime Mortgage Crisis and the Great Financial Crisis (2007 - 2010).

When prices differ greatly from fundamental values, bubbles and crashes occur. The wealth that these events create, redistribute and destroy is often enormous. Bubbles and crashes are therefore quite scary when prices change quickly. Bubbles occur when prices rise to substantially higher levels than the fundamental values. They often start when buyers become overly optimistic about fundamental values, because they get too excited about new technology and potential growth, that they don't see when prices already reflect information about these potentials. Crashes occur when the prices fall very quickly. Crashes occur in different circumstances, but they often follow bubbles. When bubbles and/or crashes affect many instruments at the same time they are called broad-based events. The crises we will discuss in this section are broad-based events (Harris, 2003).



Graph 1: MSCI World Index and AC Asia ex Japan Index, development (%) from 1993-2010

4.1 The Asian Financial Crisis

The Asian financial crisis involved several issues; the dramatic fall of currencies and equities in South Korea, Thailand, Indonesia and other Asian countries due to a shortage of foreign exchange. The inadequate development of financial sectors and mechanisms for allocating capital in the Asian markets, and the effect the crisis had on the United States and the rest of the world (Nanto, 1998).

The crisis started in May 1997 with the news of Japan's possible raising of interest rates in order to defend the Yen. Even though it did not materialize, investors' perceptions shifted and many investors began to sell off Southeast Asian currencies. After this, two rounds of currency depreciations followed. First, there was a sudden drop in value of the Thai Baht, Philippine Peso, Indonesian Rupiah, and Malaysian Ringgit. When these currencies stabilized, a new round of downward pressures hit the Hong Kong Dollar, Taiwan Dollar, South Korean Won and Singaporean Dollar. In order to counter the weaknesses in the currencies governments sold foreign exchange reserves and raised the interest rates. In addition to slowing the economic growth, it revealed severe problems in the banking sectors of Asian economies. South Korea, Indonesia and Thailand were hit hardest by the crisis and the International Monetary Fund arranged a USD 40 billion package to stabilize their currencies (Nanto, 1998).

Because financial markets are interlinked, what happened in Asia also affected the United States and the rest of the world. Americans were major investors in Asia at that time, both in investments in financial instruments and subsidiaries of American companies. The crisis affected the US imports and exports, the Asian countries imported less, exported more and the American trade deficit rose. The rest of the world were also affected because the economic turmoil caused bankruptcies and revealed weak Asian financial institutions (Nanto, 1998).

According to data (graph 1) from MSCI, the World Index increased from a level of 180 in May 1997 to 188 in August 1998, which is growth of about 4.5 %. MSCI's Asia index dropped from a level of 178 to 64 in the same period, which is a decline of about 64 %.

4.2 Dot-com Bubble Crash and September 11

The economic downfall in the period of 2000 - 2002 can mainly be explained by two specific events. It began with the burst of the dot-com bubble and was followed by the terrorist attacks in the US on September 11, 2001.

The dot-com bubble was a phenomenon in the end of the 1990s which referred to commercial Internet ventures that carried the “.com” suffix in its URL. The Internet became more user-friendly and its public use expanded rapidly, which helped inflate the bubble more quickly. Costs were, wrongly, judged to be low when conducting business online and new businesses began popping up to take advantage of this. Among businesses that were started in the beginning of the dot-com bubble were for example Amazon and eBay. There were certain characteristics that these companies had; they had quick access to venture capital funds, the managers were young and willing to take risks, they spent a lot of money on office spaces and other perks, they conducted expensive marketing campaigns and the original investors made a huge amount of money when the companies were taken public on the stock market (IPO’s, usually NASDAQ). Once the companies were on the stock market, individuals invested heavily in them, which artificially inflated the stock prices, even though many of the companies didn’t make any money. On March 10, 2000, the NASDAQ index of leading technology reached its peak at 5 048.62 points. A year earlier the same index was around 2 500 points, about half of its peak. In the spring of 2005, the NASDAQ index was below 2 000 points. The Internet sector earned over 1 000 % returns on its public equity in the period from early 1998 to February 2000. By this date, the Internet sector equaled 6 % of the market capitalization of all US public companies and 20 % of all publicly traded equity volume. By the end of 2000, when the bubble burst, these returns had completely disappeared (Ofek et.al, 2003).

On September 11, 2001, the World Trade Center and the Pentagon were attacked by the terrorist organization Al-Qaeda. Airplanes were flown directly into the buildings, which resulted in the death of 2 973 people. The economic outlook at that time was already dismal because of the dot-com bubble. Because of the huge downfall of the NASDAQ index, trillions of dollars of value were already erased and company earnings were heading down. After September 11, the economy continued its way down and profits in several different industries declined. This effect was enhanced when the “war on terror” was introduced by George W. Bush and military forces moved into Afghanistan and later on into Iraq (Farrel, 2006).

Both the Dot-Com Bubble Crash and September 11 contributed to the decline in the financial markets from 2000 - 2002. According to data from graph 1 the MSCI World Index dropped from 288 in March 2000 to 148 in September 2002, which was a decline of about 48.6 %.

4.3 Subprime Mortgage Crisis and the Great Financial Crisis

A big rise in mortgage delinquencies and foreclosures in the US triggered the subprime mortgage crisis, which is an ongoing real estate- and financial crisis. It affected banks and financial markets all over the world. The crisis became apparent in 2007, and has exposed severe weaknesses in the global financial system and in financial industry regulation, but its roots go all the way back to the closing years of the 20th century. The type of US mortgages issued in recent years to subprime borrowers, approximately 80 %, were adjustable-rate mortgages (ARM). This is a loan where the interest rate on the note is adjusted periodically, based on several different indices. When the US house prices reached its peak in mid-2006, and started to decline a lot, the refinancing became a lot more difficult. Mortgage delinquencies rose as the ARMs began to reset at higher rates. Many financial firms held securities that were backed with subprime mortgages, which lost most of their value. This resulted in a huge decline in the capital of many US government supported enterprises and also many banks, which led to tightening credit all over the world (Bernanke, 2009).

The Great Financial Crisis has been described as the worst financial crisis since the 1930s, when the Great Depression took place (Pendery, 2009). The crisis has contributed to declines in consumer wealth estimated in the trillions of USD, the failure of key businesses, the failure of substantial financial commitments incurred by governments and a clear drop in economic activity (Baily et al. 2009). Different solutions are under consideration or have already been implemented, both regulatory solutions and market-based solutions (Obama, 2009).

After the Subprime Mortgage Crisis became apparent in 2007, questions regarding the solvency of banks, declines in credit availability and reduced investor confidence had an impact on the stock markets, where securities decreased largely in value during late 2008 and early 2009. Economies all over the world slowed down, as credit was less available and international trade declined during this period (IMF, 2009). Some argued that investors and credit rating agencies failed to price the risk involved with mortgage-related financial products accurately, and that regulatory practices did not match the 21st century financial markets (Bush, 2008). Central Banks and governments responded with monetary policy expansion, institutional bailouts and fiscal stimulus. Still, there is a lot of risk remaining for the world economy over the next couple of years (Roubini, 2009).

The MSCI World Index dropped from a level of 338 in October 2007 to 151 in February 2009, which is a decline of about 55 % (graph 1).

5. Data and Methodology for Analysis of Return and Risk

The data used in this thesis have been collected from Morgan Stanley Capital International and is from the time lag 1993 – 2010. The data has been downloaded as monthly market prices (both in USD and in local currencies) and processed using Microsoft Excel. Concerning the calculation of Sharpe ratios, these calculations have been based on excess returns, which require the use of a risk free rate. This risk free rate has been collected from the Federal Reserve Bank of St. Louis.

The basis for the analysis is the logarithmic monthly returns (R_t) calculated by $\ln(P_t/P_{t-1})$ from January 1993 to December 2009, a total of 204 observations. All the data are collected from MSCI Barra's internet pages. The Single-index model is a single-factor model where returns are the sum of expected and unexpected components. Also, there is a common macroeconomic factor that affects stocks and a beta coefficient that measures the sensitivity of the stocks to changes in the market. By using the Single-index model the markets' risk and return will be shown in comparison to a benchmark. Unique risk will come out as country-specific risk which cannot be explained by benchmark (or macroeconomic factors), but by the country's own social, political and economic factors. The Single-index model on regression form can be shown as;

$$R_{it} = \alpha_i + \beta_i RM_t + \varepsilon_{it}$$

This market model shows the return of a country's index. Based on this model one can estimate the risk. Beta (β_i) is the country's sensitivity towards benchmark. RM is the market risk. The unexpected component (ε_i) indicates the country-specific risk (unique risk) that can't be explained by benchmark or macroeconomic factors. The estimation of systematic risk, country-specific risk and beta for the different countries is being done by using the returns in a country and compare it against a benchmark, through a regression, for every month between January 1993 and December 2009. The total risk is the sum of systematic risk and country-specific risk and is given by;

$$\sigma_i^2 = \beta_i^2 \sigma_M^2 + \sigma^2 \varepsilon_i$$

The average monthly returns and risk have been annualized.

5.1 MSCI Index Methodology

MSCI Barra has constructed the most widely used international equity indices for institutional investors for over 35 years. The MSCI global equity indices have evolved over time to continue to correctly reflect the international investable opportunity set of equities, while addressing the changing and expanding investment interest of investors who invest across borders. Because of this, the MSCI indices have maintained their leading position in their market. MSCI Barra's global equity indices contribute to the international investment process by serving as relevant and accurate performance benchmarks, the basis for asset allocation and portfolio construction across geographic markets, size segments, style segments and sectors, effective research tools and as the basis for investments vehicles. The Global Investable Market Indices are intended to provide exhaustive coverage of the investable opportunity set with non-overlapping style and size segmentation as well as an innovative maintenance methodology that gives a superior balance between index stability and reflecting changes in the opportunity set in a timely way. They should also provide size segmentation designed to achieve an effective balance between the objectives of country diversification and global size integrity (MSCI Barra³, 2010).

When MSCI Barra constructs their Global Investable Market Indices they follow six steps. These steps are (1) defining the Equity Universe, (2) determining the Market Investable Equity Universe for each market, (3) determining market capitalization size segments for each market, (4) applying Index Continuity Rules for the Standard Index, (5) creating style segments within each size segment within each market and (6) classifying securities under the Global Industry Classification Standard (GICS). After completing the six steps each eligible security in each segment in each country is assigned to a single index which then forms a country's index, for example the index of Thailand (MSCI Barra³, 2010).

The markets in Asia that will be analyzed in this thesis are both emerging and developed. The MSCI Index that will be employed for Asia is the MSCI AC (All Country) Asia ex Japan Index. This index consists of ten Asian countries, eight emerging and two developed. The index that will be used as a benchmark for the Asian countries is the MSCI World Index. These two indices are weighted as shown in table 2:

MSCI World Index		AC Asia ex Japan	
Country	Weight	Country	Weight
Australia Total	3,99 %	China Total	26,39 %
Austria Total	0,14 %	Hong Kong Total	10,98 %
Belgium Total	0,45 %	India Total	11,22 %
Canada Total	5,01 %	Indonesia Total	2,91 %
Denmark Total	0,43 %	Korea Total	18,92 %
Finland Total	0,55 %	Malaysia Total	4,16 %
France Total	4,92 %	Philippines Total	0,62 %
Germany Total	3,52 %	Singapore Total	6,75 %
Greece Total	0,21 %	Taiwan Total	16,06 %
Hong Kong Total	1,10 %	Thailand Total	1,99 %
Ireland Total	0,12 %	Grand Total	100,00 %
Italy Total	1,50 %		
Japan Total	10,26 %		
Netherlands Total	1,22 %		
New Zealand Total	0,05 %		
Norway Total	0,34 %		
Portugal Total	0,13 %		
Singapore Total	0,68 %		
Spain Total	1,86 %		
Sweden Total	1,28 %		
Switzerland Total	3,62 %		
United Kingdom Total	9,62 %		
United States Total	49,02 %		
Grand Total	100,00 %		

Table 2: Weights of the MSCI World Index and the AC Asia ex Japan Index (MSCI Barra⁵, 2010)

Table 3 provides a list of emerging and developed Asian countries, their stock exchanges and classification that MSCI Barra uses as the basis of the construction of the MSCI Global Investable Market Indices.

Country / Index	Exchange	Classification
China	Shenzen Stock Exchange and Shanghai Stock Exchange	Emerging
Hong Kong	Stock Exchange of Hong Kong	Developed
India	National Stock Exchange and Bombay Stock Exchange	Emerging
Indonesia	Jakarta Stock Exchange	Emerging
Korea	Korea Exchange	Emerging
Malaysia	Bursa Malaysia	Emerging
Philippines	Philippine Stock Exchange	Emerging
Singapore	Singapore Exchange	Developed
Taiwan	Taiwan Stock Exchange and GreTai Securities Market	Emerging
Thailand	Stock Exchange of Thailand and Market for Alternative Investment	Emerging

Table 3: Emerging and developed Asian markets (MSCI Barra³, 2010)

5.2 Classification of Markets

According to MSCI, the classification of markets is a key input in the process of constructing an index. This is because it drives the composition of the investment opportunity sets to be represented. By giving a balance between a country's economic development and its market accessibility while preserving index stability, MSCI Barra wants to reflect the views and practices of the international investment community. The framework that MSCI uses (the MSCI Market Classification Framework) consists of three criteria, namely economic development, market accessibility as well as size and liquidity (table 4). To be classified as a developed market or an emerging market, a country has to meet the requirements of all three criteria (MSCI Barra⁴, 2009).

Criteria	Frontier	Emerging	Developed
A Economic Development			
A.1 Sustainability of economic development	No requirement	No requirement	Country GNI per capita 25% above the World Bank high income threshold* for 3 consecutive years
B Size and Liquidity Requirements			
B.1 Number of companies meeting the following Standard Index criteria Company size (full market cap) ** Security size (float market cap) ** Security liquidity	2 USD 280 mm USD 14.5 mm 2.5% ATVR	3 USD 560 mm USD 280 mm 15% ATVR	5 USD 1120 mm USD 560 mm 20% ATVR
C Market Accessibility Criteria			
C.1 Openness to foreign ownership	At least some	Significant	Very high
C.2 Ease of capital inflows / outflows	At least partial	Significant	Very high
C.3 Efficiency of the operational framework	Modest	Good and tested	Very high
C.4 Stability of the institutional framework	Modest	Modest	Very high

* High income threshold for 2007: GNI per capita of USD 11,456 (World Bank, Atlas method)

** Minimum in use for the May 2009 Semi-Annual Index Reviews, updated on a semi-annual basis

Table 4: Criteria

To ensure that all countries included in the MSCI Indices remain reflective of the evolution of the different markets, MSCI Barra regularly reviews the market classification of each country. Every June, MSCI Barra presents its conclusions from its review to the investment community through its Annual Market Classification Review (MSCI Barra⁴, 2009).

As for the developed markets that will be employed, as a benchmark for the Asian markets, the MSCI World Index will be used. This Index consists of 23 countries (see appendix, table A1) that all fulfill MSCI's criteria to be defined as a developed market.

5.3 The Sharpe Ratio and the Problem of Negative Excess Returns

To calculate a Sharpe ratio for an Index one has to use excess returns to be able to compare performance among indices, but also to compare an index's performance against a risk free alternative. In this thesis we will only calculate Sharpe ratios based on excess returns in USD. This means that the Sharpe ratios will not consider the currency risk of an investment.

When evaluating the performance of an index, one has to consider both return and risk and the Sharpe ratio shows the "reward-to-volatility". The Sharpe ratio is calculated by dividing the excess return ($R_p - R_f$) of an asset by its standard deviation (σ_p) of return. The excess return is the difference between the actual rate of return on a risky asset and the risk-free rate. The Sharpe ratio is a measure that takes into account, both the return and the risk of an investment at the same time. The higher the Sharpe ratio, the better an index has performed (Israelsen, 2003).

In this thesis we are facing quite a lot of negative excess returns, since we are analyzing periods of extreme volatility. There is a solution to the problem of calculating Sharpe ratio's when dealing with negative excess return. This involves a modified Sharpe ratio. The “normal” Sharpe ratio and the modified Sharpe ratio are shown below:

$$\text{“Normal” Sharpe ratio: } \frac{(Rp - Rf)}{(\sigma p)}$$

$$\text{Modified Sharpe ratio: } \frac{(Rp - Rf)}{(\sigma p)^{\left(\frac{Rp - Rf}{abs(Rp - Rf)}\right)}}$$

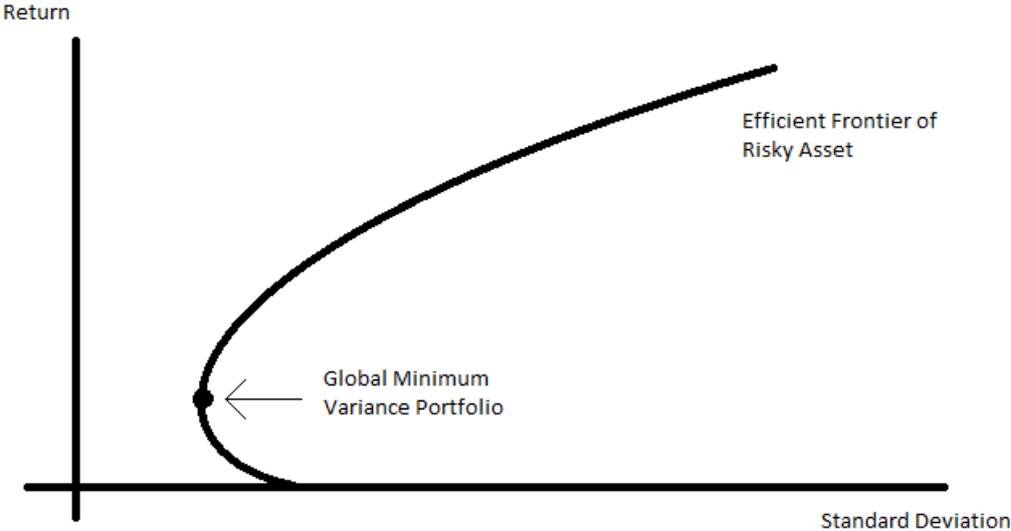
In the modified formula there has been added an exponent to the denominator. This exponent is the excess return divided by the absolute value of the excess return. The modified formula helps improving the problems that occur when dealing with negative excess returns. If the average excess returns are negative and *equal* between two indices, the index with the higher volatility receives the higher “normal” Sharpe ratio which is why one should use the modified Sharpe ratio instead of the “normal” Sharpe ratio when dealing with negative excess returns (Israelsen, 2003). In the data in this thesis there are no indices with equal negative excess returns, but the modified Sharpe ratio will be used, so that the negative excess returns will be accounted for, and the results will be reliable.

5.4 Portfolio Optimization Methodology

In section 8 an optimal portfolio consisting of both western countries and Asian countries will be constructed. A portfolio optimizer will be used to achieve this. This is an Excel-based Markowitz optimizer, based on matrix-algebra, and calculates minimal variance for a required return.

$$\begin{aligned} \sigma_p^2 &= \sum_{i=1}^n \sum_{j=1}^n w_i w_j \sigma_{ij} \\ &= \sum_{i=1}^n \sum_{j=1}^n w_i w_j \rho_{i,j} \sigma_i \sigma_j \end{aligned}$$

To make the optimizer calculate the optimal portfolio, the returns of the indices have to be added for a given period of time, and the solver function in Excel calculates the optimal portfolio based on the required return added by the user. The options in the solver function in Excel can put restrictions on short-sales or allow for short-sales. The optimizer calculates the standard deviation of the optimal portfolio and the variance-covariance matrix for all indices and combination of indices.



Graph 2: The efficient portfolio set

In this thesis, portfolios with restrictions on short-sales (Portfolio 1) and no restrictions on short-sales (Portfolio 2), will be constructed. Three naïve diversified portfolios will also be constructed in each period of extreme volatility.

6. Analysis of Asian Stock Market Returns during Periods of Extreme Volatility

This section will compare the developed countries and Asian countries with regard to average annual returns, risk (both country-specific and systematic), betas, Sharpe ratios and correlations. We will consider these factors according to the selected periods of extreme volatility as well as for the whole period.

6.1 Comparison of Developed Countries and Asian Countries: Return, Risk and Betas

6.1.1 The Whole Period (1993-2010)

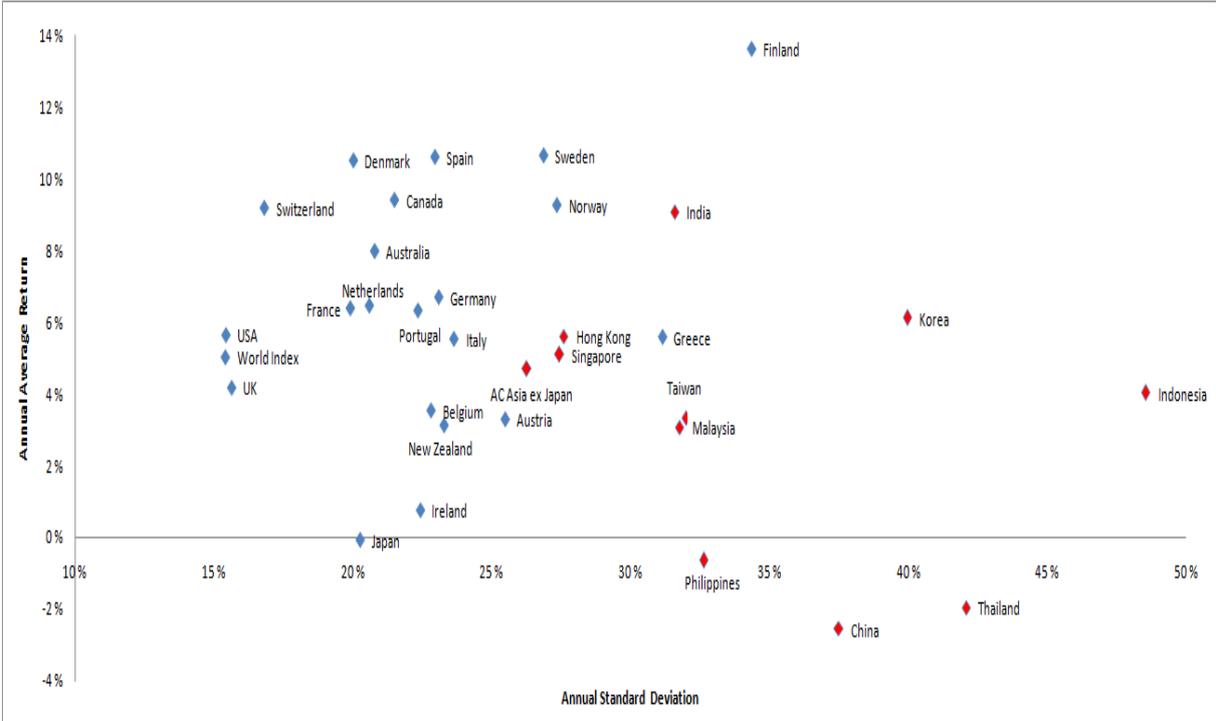


Figure 1: Average return and risk for all markets from 1993 - 2010 (USD)

Figure 1 shows the average return and standard deviation for all of the markets and for the world in the period from 1993 to 2010. As one can see, the Asian markets are placed mostly to the Southeast in the figure, which means that they have higher risk than the developed countries and mostly lower average returns. The two largest markets, the US and the United Kingdom, had the lowest total risks, with respectively 15.4 % and 15.6 %. The World Index had an annual average return of 5 % and total risk of 15.4 % while the Asia Index had an annual average return of 4.7 % and total risk of 26.3 %.

Finland had the largest annual average return (13.6 %), but also a high total risk (34.3 %). Apart from Finland, the eight markets with highest total risk in the period are Asian. These eight markets are the markets that are considered to be emerging markets by MSCI Barra. Among the twelve most risky countries, ten are Asian, including Hong Kong and Singapore, which are considered as developed markets by MSCI Barra. There are four markets that have negative returns in this period. All of them are Asian markets, but Japan is considered as a non-Asian market in this thesis. Indonesia is the market that deviates the most with a total risk of 48.5 % and a return of 4 % in the far east of the figure. A risk averse investor would want to invest in the north-western corner of the figure, with the lowest possible risk given an expected return or a highest possible return, given the level of risk, this means that Switzerland would be a good alternative.

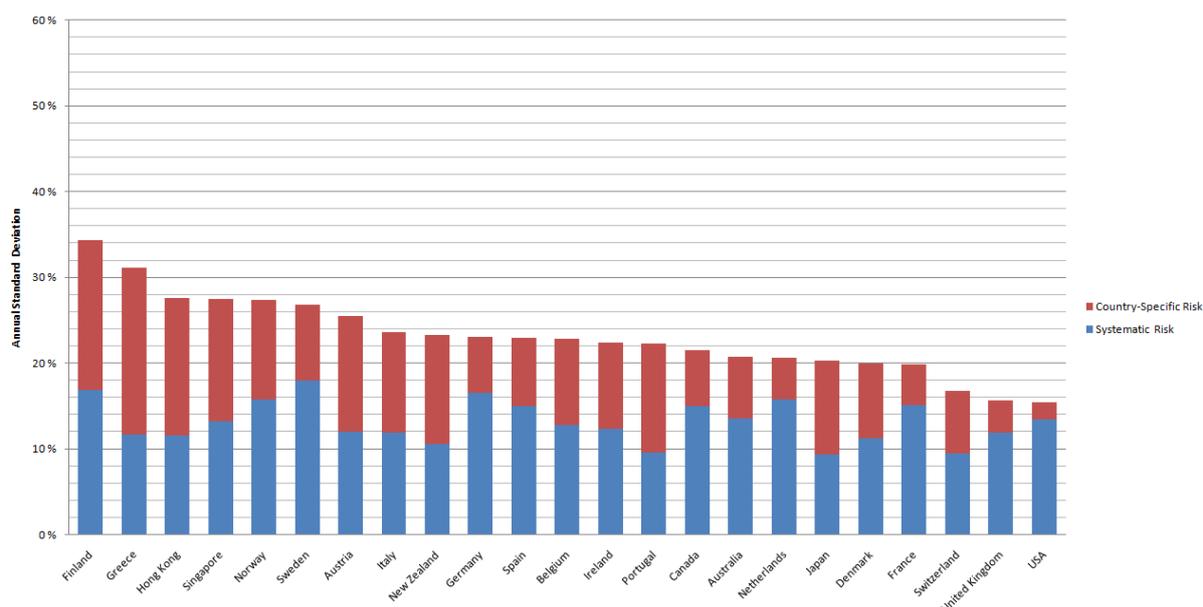


Figure 2: Total, Country-specific and Systematic risk for the developed countries from 1993 - 2010 (USD)

Figure 2 shows the selection of developed country's total risk, divided into country-specific and systematic risk. Finland and Greece stand out with a higher total risk than all the other countries, of respectively 34.3 % and 31.1 %. The amount of country-specific risk is high in both Finland and Greece. The portion of country-specific risk in Finland and Greece amounts to respectively 51 % and 62.7 %. The two Asian countries among the developed countries have quite high risk. Hong Kong has 27.6 % total risk and Singapore has 27.4 % total risk, which make them the 3rd and 4th most risky developed countries. The United Kingdom and the US are the countries with the lowest total risk, this is due to low country-specific risk in both countries, respectively 23.7 % and 12.5 %.

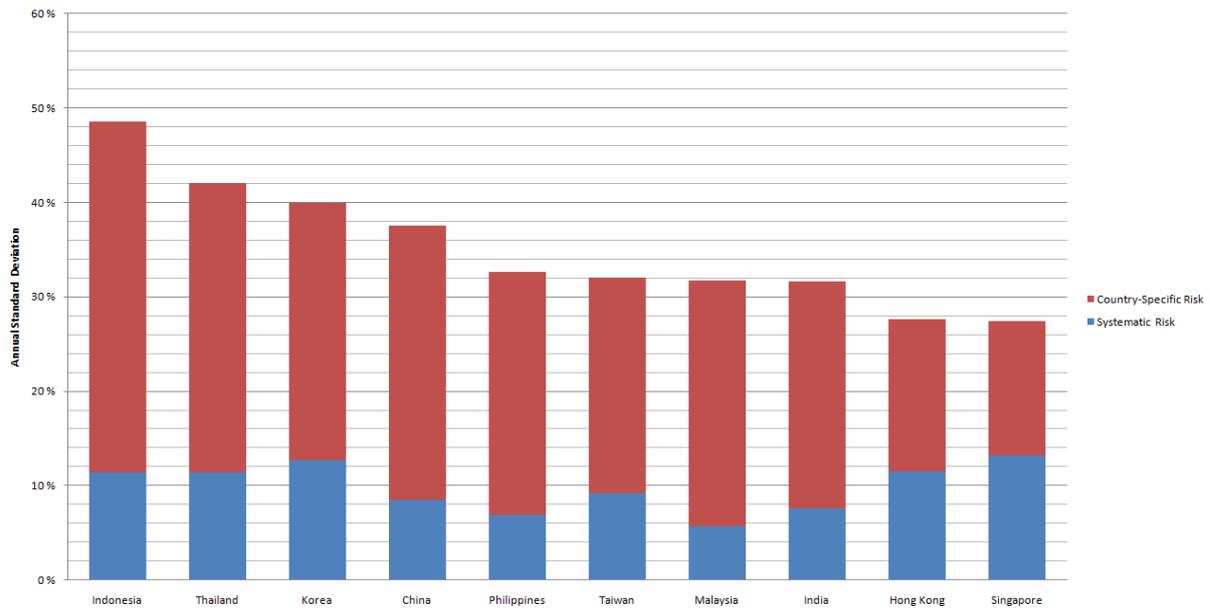


Figure 3: Total, Country-specific and Systematic risk for the Asian countries from 1993 - 2010 (USD)

Figure 3 shows that the total risk is generally much higher for the Asian countries compared to the developed countries. This is due to a lot higher country-specific risk in Asia. That the developed countries have higher amounts of systematic risk than the Asian countries points to the fact that the developed countries are more integrated since the World Index only comprise of developed countries. Indonesia has the highest total risk of 48.5 %, where the country-specific portion of the total risk amounts to 76.4 %. Country-specific risk in Malaysia comprises 82 % of total risk in the country, which is the largest portion among the Asian countries.

Beta for a country is the country's responsiveness to movements in the market. The market in this thesis is the MSCI World Index. This means that beta is the measure of the systematic risk of a country. It is the tendency of a country's returns to respond to swings in the World Index. Beta of countries seems to move towards 1 over time. An explanation for this is that a country in a phase of development may be more unconventional than a developed country in many ways, from technology to political governance. As it develops, however, a country often expands its operations. As the country becomes more conventional and diversified, it starts to resemble the rest of the developed world even more. Thus its beta will tend to change in the direction of 1. Finland has a beta of 1.56 in this period, which means that if the World Index has a positive return of 1 %, Finland will have a positive return of 1.56 % and vice versa (see appendix, table A2). The Asian countries are quite spread out during the period of 1993 – 2010. However, Indonesia, Korea and Thailand are among the top four

countries with large betas. Malaysia, on the other hand has the second smallest beta, which means that a change in the World Index does not affect Malaysia as much as other countries with larger betas. The US, which is a country of great significance, and comprises a significant part of the World Index, has a beta of 0.94, which is quite close to 1.

6.1.2 The Asian Financial Crisis (May 1997 – August 1998)

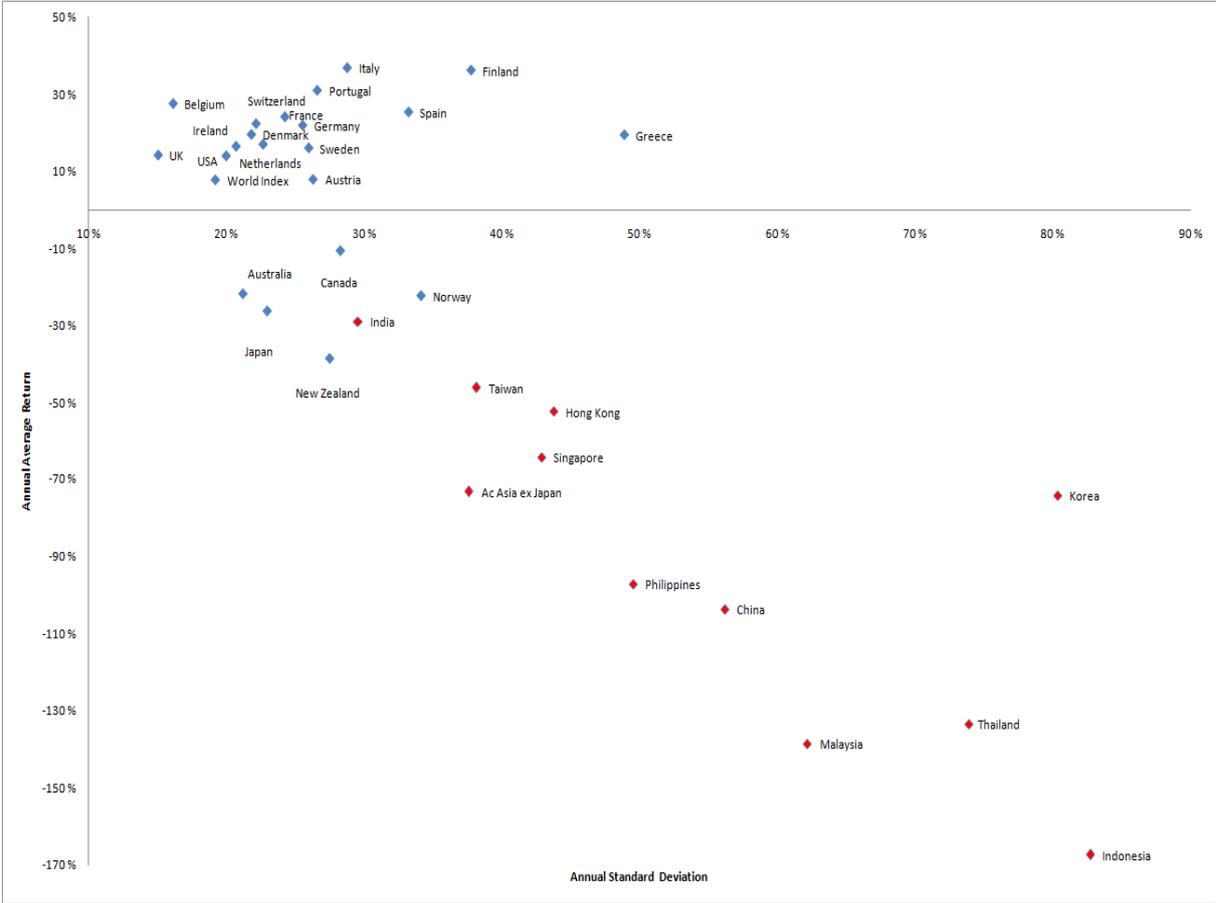


Figure 4: Average return and risk for all markets during the Asian Financial Crisis (USD)

During the Asian Financial Crisis all the Asian markets underperformed, with high standard deviations and extensive negative returns. The markets that were hit hardest by this crisis were Indonesia, Malaysia and Thailand, with negative returns of respectively – 167.4 %, - 138.6 % and – 133.5 %. Hong Kong and Singapore, despite being developed markets, have been hit hard by the Asian Financial Crisis as well. Japan, which is considered among the “western” developed countries, is the Asian country that performs the least poor, with risk of 23 % and a return of – 26.3 %. Since this is an Asian financial crisis, the developed countries were not much affected by it. This can be seen from the figure, which shows that 18 out of 23 developed countries have positive average annual returns. The developed country that has the lowest negative return is New Zealand. This return is actually lower than India’s, which is an

Asian country that is also considered being emerging. The World Index has a return of 7.7 % and an annual standard deviation of 19.2 %.

The total, country-specific, and systematic risk for the developed countries during the Asian Financial Crisis are very similar to the whole period (1993 - 2010), with Greece, Hong Kong, Singapore, Finland and Norway as the countries with the highest total risk.

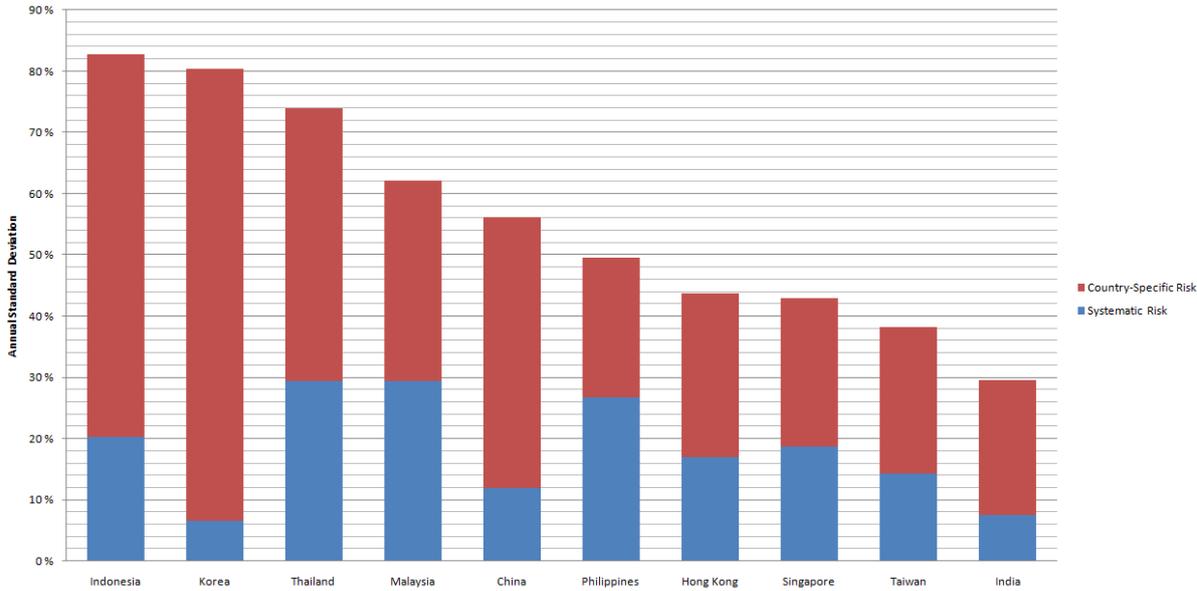


Figure 5: Total, Country-specific and Systematic risk for the Asian countries during the Asian Financial Crisis (USD)

As one can see from figure 5 the Asian country with highest total risk is Indonesia, with an annual standard deviation of 82.7 %. Indonesia’s high total risk is much due to a high amount of country-specific risk (75.5 %). Korea is the country in Asia with the highest amount of country-specific risk (91.8 %), which also contributes to making Korea the Asian country with the second highest total risk. All the Asian countries have higher total risk during the Asian Financial Crisis compared to the whole period, but India stands out during this crisis. This is because India actually has a lower total risk in this period than during the whole period covered in this thesis (29.6 % vs. 31.6 %).

The Asian countries dominate the top of the list concerning betas. Seven out of the ten countries with the largest betas are Asian, which is logical due to the fact that this crisis mostly concerned Asian countries. There are in theory no upper or lower bound for the size of betas, but the betas of Thailand, Malaysia, Indonesia and the Philippines are quite high,

ranging from 2.44 to 1.90. India is the Asian country that sticks out during the Asian Financial crisis, with a beta as low as 0.78 (see appendix, table A3).

6.1.3 Dot-Com Bubble Crash and September 11 (March 2000 – September 2002)

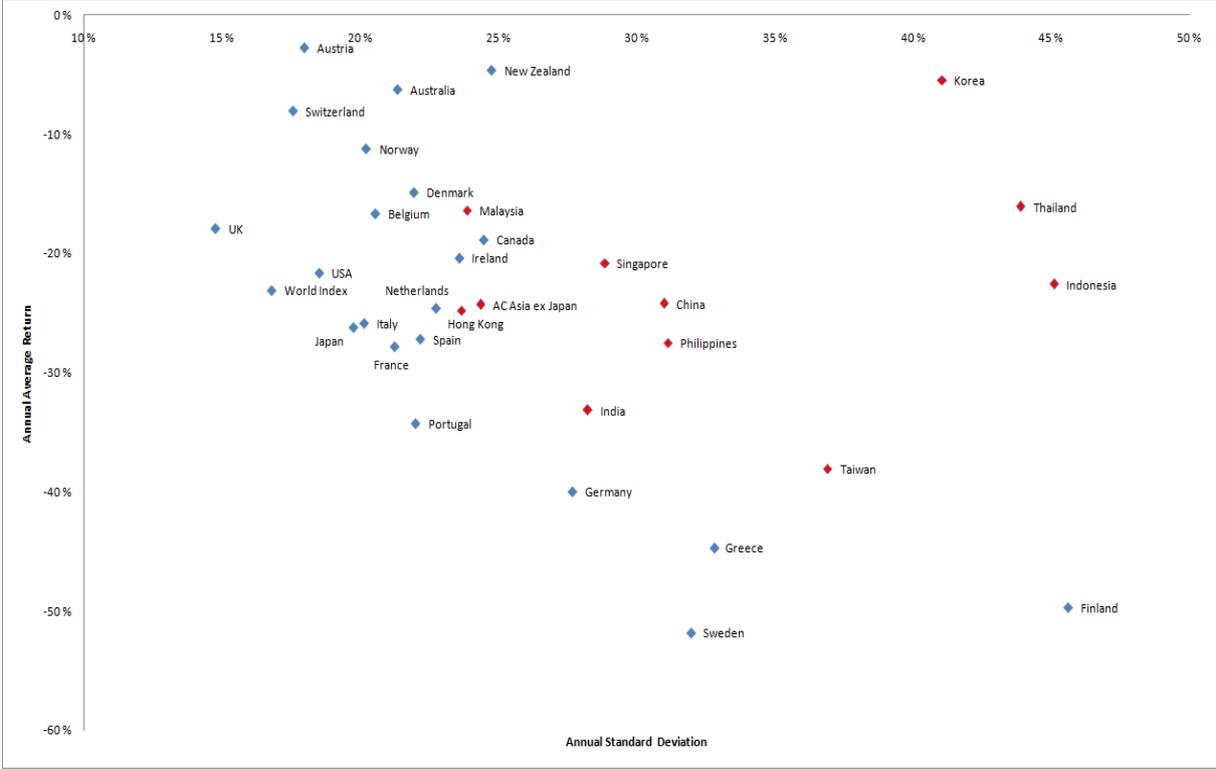


Figure 6: Average return and risk for all markets during the Dot-Com Bubble Crash and September 11 (USD)

The Dot-Com Bubble Crash and September 11 hit the financial markets all over the world hard, and all markets have negative returns. There are four developed countries that stand out when it comes to high negative returns, these are Sweden, Finland, Greece and Germany, with returns of respectively – 51.8 %, - 49.7 %, - 44.7 % and - 40 %. Most of the Asian countries are placed in the eastern part of the figure (figure 6), which means that they have quite high risk and negative returns approximately equal to the average. Among the Asian countries there are three countries with quite a lot higher risk than the other countries in Asia, these three are Indonesia (45.1 %), Thailand (43.9 %) and Korea (41 %). The developed countries are assembled mostly in the middle part of the figure, and the World Index has a return of – 23.1 % and an annual standard deviation of 16.8 %.

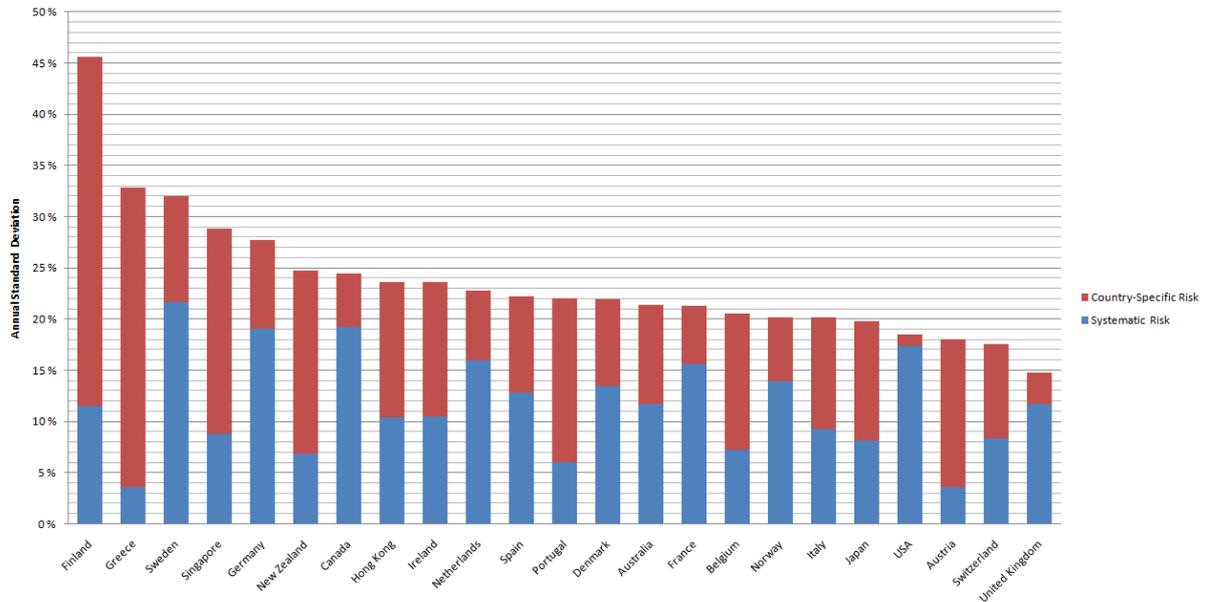


Figure 7: Total, Country-specific and Systematic risk for the developed countries during the Dot-Com Bubble Crash and September 11 (USD)

Figure 7 shows that Finland has the highest total risk (45.6 %) of all countries, both developed and Asian. Greece has an amount of country-specific risk as high as 89 %.The US and the United Kingdom are once again the two countries that have the lowest amount of country-specific risk of respectively 6.5 % and 20.7 %.

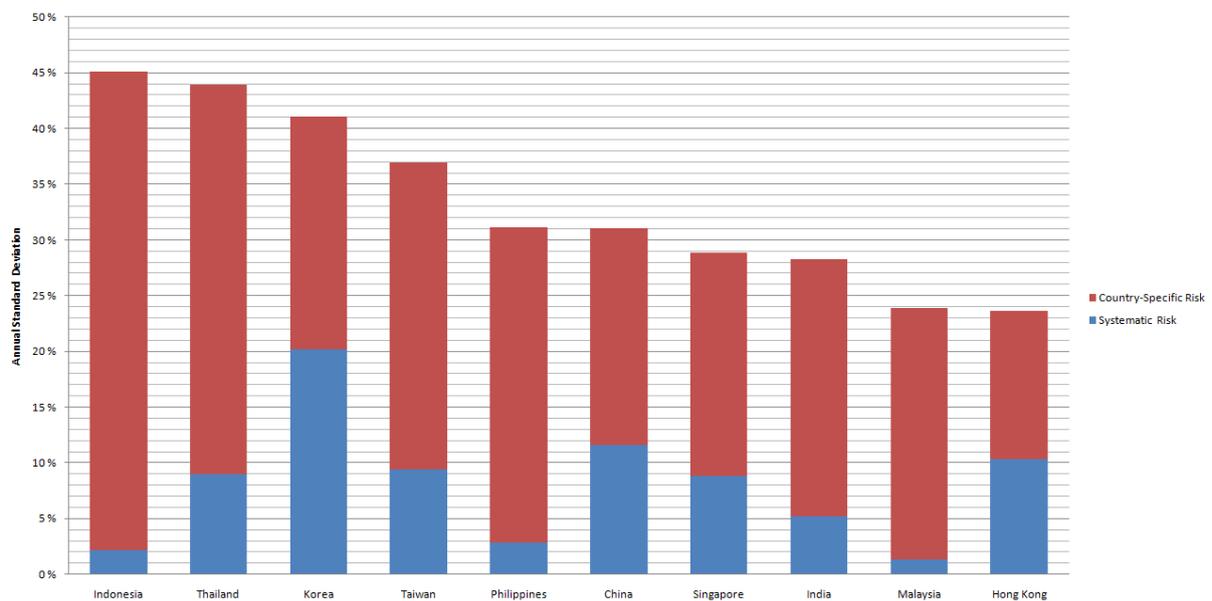


Figure 8: Total, Country-specific and Systematic risk for the Asian countries during the Dot-Com Bubble Crash and September 11 (USD)

Indonesia, Thailand and Korea stand out among the Asian countries when it comes to total risk during the Dot-Com Bubble Crash and September 11. The three countries in Asia that

have the highest country-specific risk during this crisis are Indonesia (95.2 %), Malaysia (94.4 %) and the Philippines (90.9 %).

During the Dot-Com Bubble Crash and September 11, Korea was the country with the largest beta of 1.72. The betas of the Asian countries are spread out during this period, but three of the four countries with the smallest betas are Asian (Indonesia, Philippines and Malaysia). The US has once again a beta quite close to 1 (1.07), Hong Kong and Singapore seem to follow each other quite closely concerning all the different periods including this period (see appendix, table A4).

6.1.4 The Great Financial Crisis (October 2007 – February 2009)



Figure 9: Average return and risk for all markets during the Great Financial Crisis (USD)

As one can see from figure 9 most countries are assembled in the middle of the figure, everyone with returns below - 35 % and annual standard deviations above 21 %. Five out of ten Asian countries are placed to the east in the figure, which means that they have high standard deviations, but about average returns in this period. Although every country performs poorly during the Great Financial Crisis, Malaysia is a bit of a surprise. Malaysia actually has the least negative return of – 35.2. The World Index has a standard deviation of 23.3 % and an annual average return of – 54.9 %.

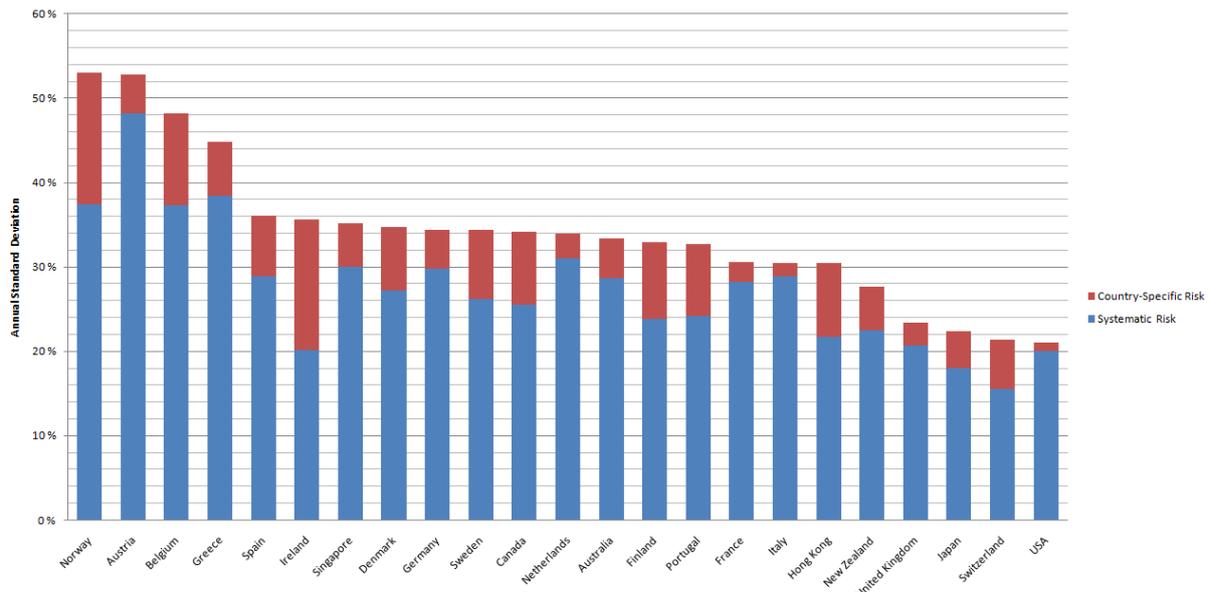


Figure 10: Total, Country-specific and Systematic risk for the developed countries during the Great Financial Crisis (USD)

The general trend during the GFC is that all the developed countries have high systematic risk, which once again supports the fact that the developed countries are quite highly integrated. The two developed countries with the highest amount of systematic risk are the US (95 %) and Italy (95 %).

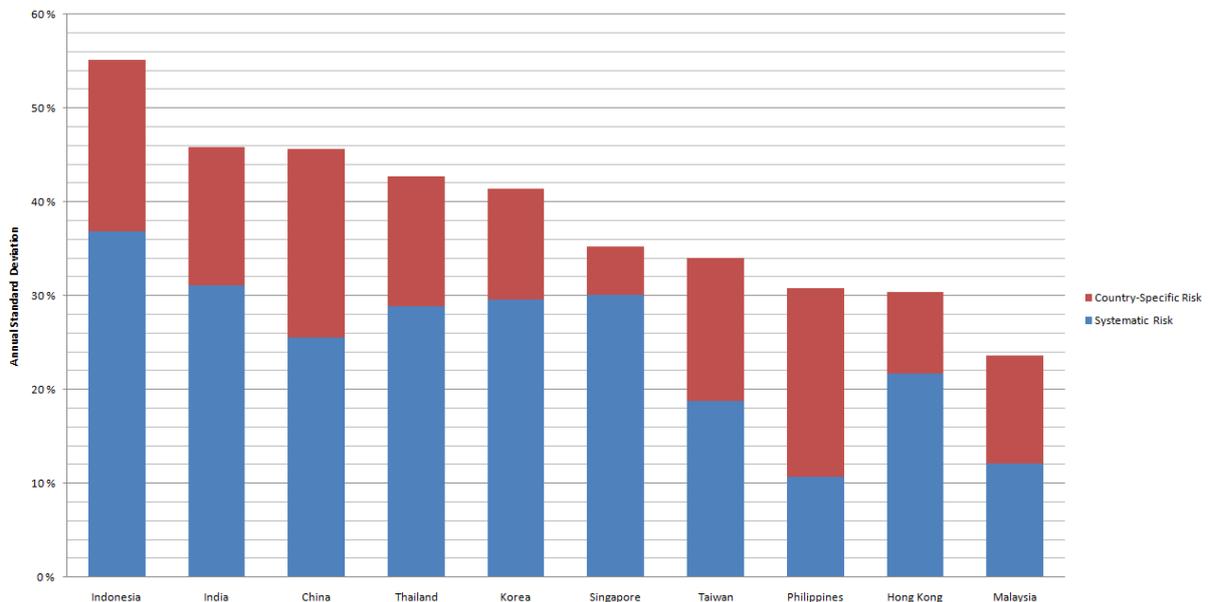


Figure 11: Total, Country-specific and Systematic risk for the Asian countries during the Great Financial Crisis (USD)

The general trend among the Asian countries during the GFC is that all the countries have increased their amount of systematic risk dramatically compared to previous periods. The Asian countries can therefore be said to correlate more with the developed countries during

this period. The two countries with highest total risk are Indonesia (55.2 %) and India (45.9 %). The countries with the highest amount of systematic risk in this period in Asia are Korea (71.6 %) and Hong Kong (71.2 %).

During the Great Financial Crisis all the Asian countries have been grouped either in the top of the beta list or at the bottom of the list. Indonesia is the country with the largest beta (1.94) among the Asian countries, while Malaysia has the smallest Asian beta (0.73). Compared to the other periods in this thesis there are several more countries that have a beta greater than one during the Great Financial Crisis (see appendix, table A5).

6.1.5 A Brief Summary and Major Conclusions on the Comparison of Developed and Asian Countries: Return, Risk and Betas

From 1993 - 2010, the country that sticks out concerning total risk is Indonesia. The general trend among the Asian countries during the whole period is a very large amount of country-specific risk compared to the developed countries. The Asian country with the most country-specific risk during this period is Malaysia. Hong Kong and Singapore are the two Asian countries with the lowest total risk and the smallest amounts of country-specific risk. This is as expected since these two countries are classified as developed by MSCI Barra. The Asian markets generally have higher risk and lower average returns than the developed countries. From 1993 - 2010, eight out of ten Asian countries have betas above the market beta.

Since the Asian Financial Crisis affected mainly the Asian countries it is therefore a more limited period of extreme volatility worldwide than the other selected periods. Indonesia is the country with the highest total risk during the Asian Financial Crisis. The amount of country-specific risk is higher among the Asian countries compared to the developed countries. The country with the highest country-specific risk is Korea and the country with the smallest amount of country-specific risk is the Philippines. All the Asian markets had high standard deviations and extensive negative returns. During this period nine out of ten Asian countries have a beta above the market beta.

Once again, Indonesia is the Asian country with the highest total risk, but Finland is the country with the highest total risk overall during the Dot-Com Bubble Crash and September 11. Most of the Asian countries have higher risk than the developed countries, but the negative returns are approximately equal to the average among the developed countries. The same goes for the Asian Financial Crisis, the Asian countries have higher amounts of country-specific risk than the developed countries on average. The Asian country with the

highest amount of country-specific risk is Indonesia, and the country with the smallest amount is Korea. This period of extreme volatility led to negative returns in all indices selected in this thesis. During this period there were only four Asian countries with a beta above the market beta.

Most of the Asian countries have higher risk than the developed countries, but the negative returns are somewhat lower among the Asian countries than among the developed countries. Yet, the Great Financial Crisis has made the Asian countries more equal to the developed countries concerning return and risk. Malaysia is actually the country with the least negative return and a relatively low total risk. Indonesia is as usual the Asian country that deviates the most with the highest total risk overall. What is worth noticing is that the amount of systematic risk has increased dramatically among the Asian countries and is approaching the systematic risk level of the developed countries. Eight Asian countries have a beta higher than the market beta.

6.2 Sharpe Ratio: Performance of the Indices in the Selected Periods

By looking at the Sharpe ratios for the whole period (1993 – 2010) one can see that there are thirteen negative Sharpe ratios and no Sharpe ratios over 0.3 (see appendix, table A6). Annual average risk free rate for this period is 5.2 %. Based on excess returns and Sharpe ratios, there are eighteen markets that beat the risk free rate. There are two markets that have performed equal to the risk free rate during this period, these markets are Singapore and the World Index. The two best performing markets are Denmark and Finland with Sharpe ratios of respectively 0.27 and 0.25. The three worst performing markets are Asian, namely the Philippines, China and Thailand. Among the eight worst performing markets, six markets are Asian (seven if you consider Japan) and they are all considered emerging by MSCI Barra. The average Sharpe ratio for the Asian countries during this period was 0.007 and for the developed countries it was 0.092. This implies that the developed countries have performed better than the Asian countries from 1993 – 2010.

During the Asian Financial Crisis all the Asian markets performed badly based on Sharpe ratios. All developed countries, except Canada, Australia, Japan, Norway and New Zealand, had positive Sharpe ratios. The positive Sharpe ratios of the developed countries in this period were also steeper compared to the whole period. It does not come as a surprise that the Asian countries performed worse than the developed countries, since this was an Asian financial crisis, which did not affect the whole world in the same way. The average annual

risk free rate during this period was 5.9 % and the average Asian Sharpe ratio was -0.6 while the average Sharpe ratio for the developed countries was 0.463.

The Dot-Com Bubble Crash and September 11 led to all markets underperforming compared to the risk free rate. All markets have negative Sharpe ratios. When we are looking at the Sharpe ratios for this period there is no particular pattern evolving when it comes to the Asian countries. The average annual risk free rate during this period was 5.2 %. The average Sharpe ratio for the Asian countries and the developed countries were respectively -0.093 and -0.074.

The Great Financial Crisis hit all markets hard, leading to an overall underperformance compared to the risk free rate. There is no particular pattern evolving when it comes to the Asian countries in this period either. The exception is Malaysia, which actually is the best performing country overall during this period, with a Sharpe ratio of -0.092. The average annual risk free rate during this period was 3.7 % and the average Sharpe ratio for the Asian countries was -0.245 and for the developed countries it was -0.264.

6.3 Comparison of Return and Risk; USD versus Local Currency

This section will compare both risk and return in local currency and USD to be able to take into account the currency risk that is present when investing internationally (seen from a USD-investor's point of view). Table A7 (see appendix) shows the USD gain/loss and the currency risk for all countries during each period. The loss/gain is calculated by subtracting the return in local currency from the return in USD, the same has been done with the standard deviation.

Table 5 shows the loss/gain in USD and the currency risk for the whole period for the countries with the highest currency fluctuations against the USD. The USD has appreciated against all of these countries' currencies. Among these ten countries, the seven countries with the largest currency loss against the USD are Asian, with Indonesia as the country on top, with a loss of 8.9 % and a currency risk of 11.6 %. The return would have been reduced by 69 % for the USD-investor if the investment in Indonesia had been realized by the end of this period, due to USD appreciation. Indonesia has a USD standard deviation of 48.5 %, where 11.6 % of this represents the currency risk against the USD. During the whole period, a USD-investor would not experience a positive currency gain in any Asian countries, except for Singapore. In Singapore a USD-investor would have had a currency gain of 0.9 % during the whole period.

1993 - 2010	USD	Currency
Country	Loss/Gain	Risk
Indonesia	-8,90 %	11,56 %
Philippines	-3,86 %	3,66 %
India	-2,42 %	2,37 %
Korea	-2,31 %	7,58 %
Thailand	-1,60 %	3,26 %
Malaysia	-1,58 %	2,95 %
Taiwan	-1,36 %	2,21 %
Greece	-0,57 %	1,11 %
Spain	-0,07 %	1,53 %
Sweden	-0,07 %	2,79 %

Table 5: Effects from exchange rate fluctuations for the whole period (1993 – 2010), bottom ten countries (USD)

Asia Crisis	USD	Currency	Dot-Com + 9.11	USD	Currency	GFC	USD	Currency
Country	Loss/Gain	Risk	Country	Loss/Gain	Risk	Country	Loss/Gain	Risk
Indonesia	-114,60 %	15,44 %	Philippines	-9,53 %	3,75 %	Korea	-36,44 %	12,78 %
Malaysia	-38,35 %	11,02 %	Indonesia	-7,42 %	12,77 %	New Zealand	-29,03 %	6,92 %
Philippines	-38,06 %	8,45 %	Taiwan	-4,98 %	1,30 %	United Kingdom	-25,22 %	3,08 %
Thailand	-35,43 %	-1,06 %	Thailand	-4,90 %	5,34 %	Sweden	-23,28 %	8,16 %
Korea	-31,11 %	21,72 %	Australia	-4,74 %	8,40 %	Australia	-23,00 %	15,99 %
New Zealand	-25,19 %	2,51 %	India	-3,99 %	0,63 %	Indonesia	-19,06 %	14,19 %
Australia	-23,39 %	3,11 %	Japan	-3,98 %	3,98 %	Norway	-18,54 %	11,54 %
Taiwan	-17,34 %	5,17 %	Canada	-3,45 %	3,35 %	India	-17,61 %	5,51 %
Singapore	-15,40 %	6,02 %	Korea	-3,17 %	3,09 %	Canada	-17,25 %	11,37 %
India	-13,00 %	2,13 %	Sweden	-2,17 %	2,52 %	Ireland	-7,98 %	4,06 %

Table 6: Effects from exchange rate fluctuations, bottom ten countries for the selected periods of crises (USD)

During the Asian Financial Crisis the Asian countries suffered large negative returns. This was enhanced by depreciation against the USD as well, which resulted in even larger losses for a USD-investor. The Indonesian currency depreciated the most against the USD, by 114.6 %, which means that a USD-investor would suffer a currency loss of 114.6 % on the return by investing in Indonesia. No Asian countries would represent a currency gain for a USD-investor during the Asian Financial Crisis.

The Dot-Com Bubble Crash and September 11 do not represent any gains for a USD-investor in any Asian countries. Among the overall ten “worst” countries for a USD-investor to invest in, six are Asian. The remaining four Asian countries do not represent a gain either (see appendix, table A7). If one would invest in the Philippines during this period, the return would be reduced by 53 % because of currency fluctuation, if the investment would be realized at the end of this period.

As one can see from table 6 the number of Asian countries represented among the worst performing countries concerning currency, during the Great Financial Crisis, is lower than previous periods. This shows that the USD has been strong compared to currencies in the rest of the world during this period. The Japanese Yen is the only currency worth mentioning, that has appreciated against the USD during the Great Financial Crisis.

6.3.1 A Brief Summary and Major Conclusions on the Performance of the Indices and USD versus Local Currency

Based on the average Sharpe ratios for the Asian countries and the developed countries, the developed countries have performed better in the period from 1993 – 2010. Among the eight worst performing markets, six markets are Asian and they are all emerging markets. There are only three Asian countries that have marginally performed better than the risk free rate during this period, in all other selected periods the Asian countries have underperformed compared to the risk free rate.

As expected, all the Asian countries performed worse than the developed countries during the Asian Financial Crisis (except for India, which actually performed better than New Zealand).

Both developed countries and Asian countries underperformed compared to the risk free rate during the Dot-Com Bubble Crash and September 11. It is worth noticing that Indonesia is the Asian country that is among the worst performing countries, based on Sharpe ratios, during all three periods of extreme volatility and for the whole period.

The GFC led to all countries underperforming compared to the risk free rate, as well. Malaysia is the best performing country overall during this period. The average Sharpe is better for the Asian countries during the GFC, than for the developed countries.

When looking at USD versus local currency from 1993 – 2010, the seven largest currency losses for a USD-investor are in Asian countries, with the Indonesian Rupiah as the worst performing currency against the USD. The Indonesian Rupiah is constantly among the worst performing currencies during all selected periods. The Indonesian currency risk therefore explains some of the bad Indonesian performance and contributes to the country's large total risk.

A USD-investor would lose money on investments made in all the selected Asian countries during the Asian Financial Crisis based on currency depreciation against the USD. The same applies for the Dot-Com Bubble Crash and September 11.

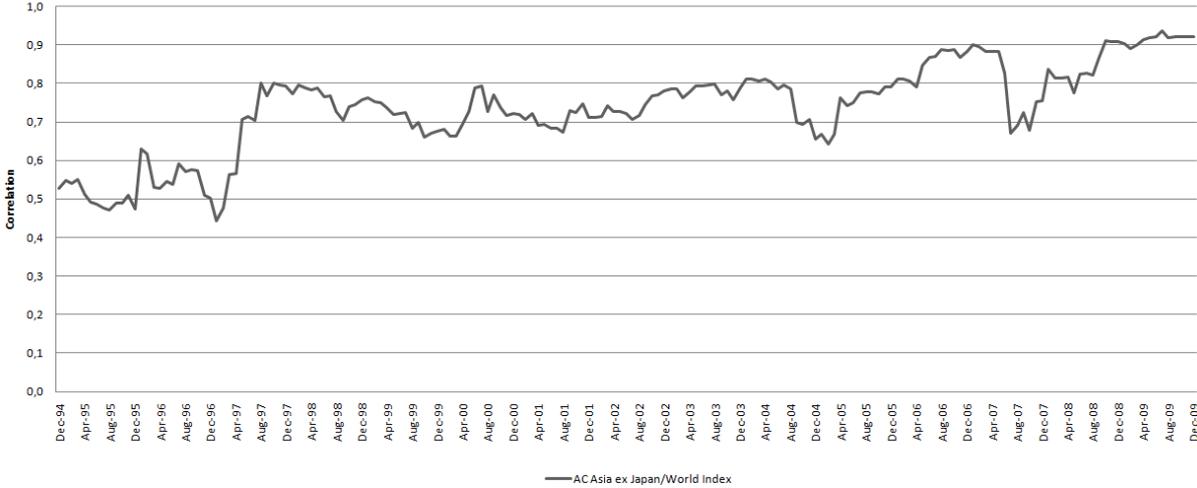
For the GFC the Asian countries' currencies are not the only ones performing badly against the USD, this is made evident by only three Asian countries among the ten worst performing currencies against the USD.

During periods of extreme volatility, the currencies of smaller markets tend to depreciate more than currencies of larger markets. During these periods investors seem to invest in large markets with more stable currencies, which contributes to further depreciation of the smaller markets' currencies. For a USD-investor there is significant currency risk by investing internationally, especially in smaller markets, or markets that are considered emerging.

6.4 Correlations between Asian Countries' Return and Developed Countries' Return

In this chapter we will look at correlations between AC Asia ex Japan Index and the World Index and correlations between ten Asian countries and the World Index. We will further look at how the correlations have been during the Asian Financial Crisis, the Dot-Com Bubble Crash and September 11 and the Global Financial Crisis. These correlation coefficients may give us some insight, but it is important to stress that the correlations do not represent causality and the results need to be interpreted thoroughly. The calculations will be done in both USD and local currency to be able to see the influence of the currency risk.

6.4.1 The Whole Period (1993 - 2010)



Graph 3: 24 months moving correlation between the returns of the AC Asia ex Japan Index and the World Index from 1993 – 2010 (USD).

As one can see from the graph 3 the 24 months moving correlation ranges from 0.44 (January 1997) to 0.94 (July 2009) during the whole period. The trend over this period shows an increasing correlation between the Asian Index and the World Index. The correlation is relatively high during the whole period and after May 1997 it does not drop below 0.6.

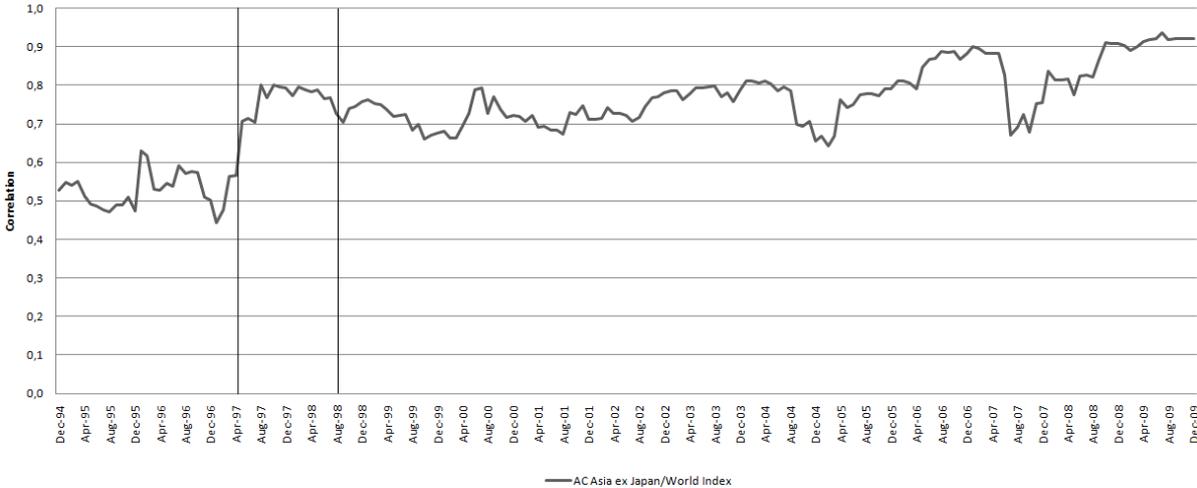
	1993 - 2010	
	USD	Local
Correlation Developed/World Index:	0,76	0,71
Correlation between Developed Countries:	0,62	0,60
Correlation Asia/World Index:	0,53	0,52
Correlation between Asian Countries:	0,52	0,48
AC Asia ex Japan Index/World Index:	0,73	-

Table 7: Correlation coefficients of the returns from 1993 – 2010.

As table 7 shows the average correlation of the developed countries is higher than the average correlation of the Asian countries against the World Index in USD (0.76>0.53). The average correlation between the developed countries is also higher than the average correlation between the Asian countries (0.62>0.52). The developed markets therefore correlate to a greater extent than what the Asian countries do. The difference between correlation in USD and local currency is negligible. The average correlation of the Asian countries is as

mentioned 0.53, which is relatively far from +1 (perfect correlation). Among the Asian countries, Singapore is the country that correlates the most with the World Index (0.69), with Hong Kong in second place (0.65). Malaysia is the country having the lowest correlation coefficient with the World Index (0.42). The AC Asia ex Japan Index is a weighted portfolio of the ten selected Asian countries and has a correlation coefficient against the World Index of 0.73, which is 0.2 higher than the average correlation of the Asian countries against the World Index.

6.4.2 The Asian Financial Crisis

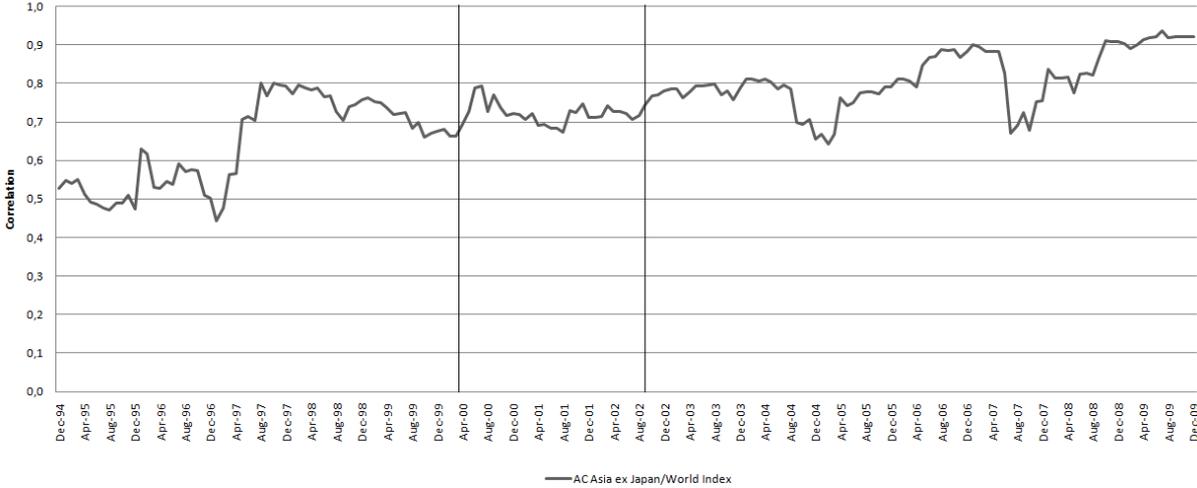


Graph 4: 24 months moving correlation between the returns of the AC Asia ex Japan Index and the World Index during the period 1993 – 2010, Asian Financial Crisis outlined (USD)

As one can see from graph 4 the 24 months moving correlation between the Asia Index and the World Index is above 0.7 and is quite high and stable during the whole crisis.

The currency risk is negligible during this period as well. The developed countries correlate more with the World Index compared to what the Asian countries do (0.80>0.57). The correlation among the developed countries is also higher than the average correlation among the Asian countries (0.68>0.59). It is worth mentioning that the average correlation between the Asian countries and the World Index is higher during the Asian Financial Crisis than during the period 1993 - 2010 (0.68>0.53). The AC Asia ex Japan Index has an average correlation coefficient against the World Index of 0.75 during the Asian Financial Crisis, which is 0.2 higher than the average correlation of the Asian Index against the World Index during the period 1993 – 2010 (see appendix, table A8).

6.4.3 Dot-Com Bubble Crash and September 11

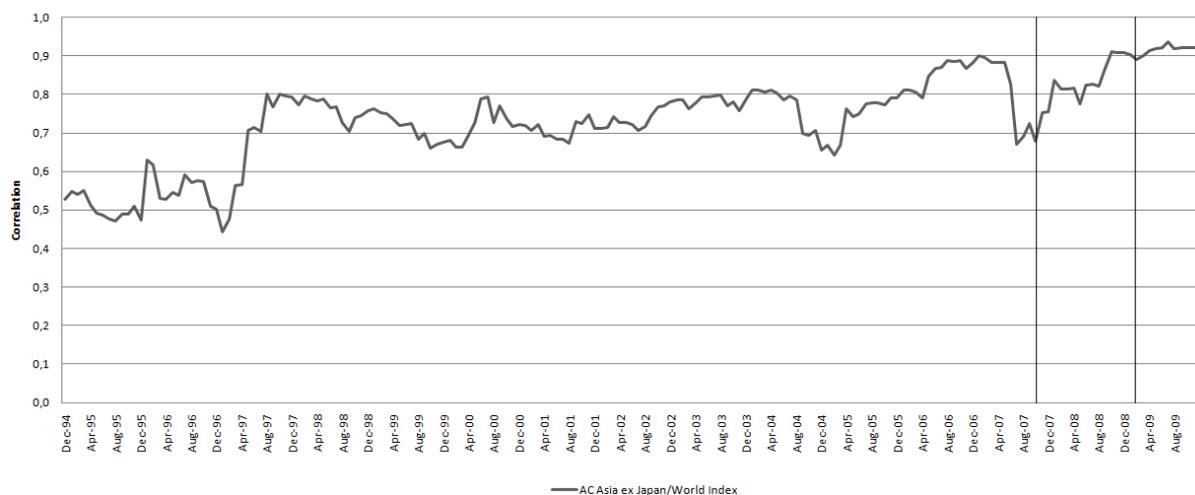


Graph 5: 24 months moving correlation between the returns of the AC Asia ex Japan Index and the World Index during the period 1993 – 2010, the Dot-Com Bubble Crash and September 11 outlined (USD).

The 24 months moving correlation between the Asia Index and the World Index lies between 0.65 and 0.8 during this period. The highest correlation occurs shortly after the beginning of the crisis.

The average correlation between the developed countries is 0.56, while the average correlation between the Asian countries is 0.45. Once again, the correlation between the developed countries turns out to be higher than the correlation between the Asian countries. The average correlation between the Asian countries and the World Index (0.47) is lower than both during the Asian Financial Crisis and during the whole period. The AC Asia ex Japan Index has an average correlation coefficient against the World Index of 0.72. There is practically no currency risk during the Dot-Com Bubble Crash and September 11 (see appendix, table A8).

6.4.4 The Great Financial Crisis



Graph 6: 24 months moving correlation between the returns of the AC Asia ex Japan Index and the World Index during the period 1993 – 2010, the Great Financial Crisis outlined (USD).

The Great Financial Crisis is the selected period with highest average correlation between the Asia Index and the World Index.

The AC Asia ex Japan Index has an average correlation coefficient against the World Index of 0.89 and the average correlation between the Asian countries and the World Index is 0.79. These two correlation coefficients are the largest compared to the same coefficients in the other crises. The average correlation among the developed countries is 0.83 and the average correlation among the Asian countries is 0.74. This is the closest the reciprocal correlation coefficients in Asia and the developed countries have been to one another, with a difference of only 0.09 (see appendix, table A8).

6.4.5 A Brief Summary and Major Conclusions on Correlations between Asian Countries' Return and Developed Countries' Return

All calculations have been done in both USD and local currency to see the influence of the currency risk and we have been able to see that the currency risk for our selected periods has been negligible.

The results found in connection with the Asian Financial Crisis are somewhat unexpected. The correlation between the Asian countries and the World Index is higher during this period than during both the whole period and the Dot-Com Bubble Crash and September 11. We find this unexpected because of other results found in this thesis, which shows that the Asian Financial Crisis mostly affected the Asian countries.

During the Dot-Com Bubble Crash and September 11 the correlation between the Asian countries and the World Index is lower than during all the other periods.

The results for the Great Financial Crisis show that correlation between markets increase during periods of very high systematic risk (market risk). This is consistent with findings of Jochum (2001). Graph 3 shows that the correlation between Asian countries and developed countries is increasing. The Great Financial Crisis is the most recent period of high volatility and is also the period with highest correlation between Asia and the developed countries. This may suggest that Asia is becoming more equal to the developed world, in other words, the stock markets in the world are becoming more integrated.

7. Influential Sectors in the Asian Stock Markets

In this section we will investigate which sectors have been important concerning the risk and return in the Asian countries, during the selected periods of extreme volatility. Due to today's globalization (international diversification, domestic diversification and multinational companies) it is more difficult than ever to attribute a country's risk and return to specific sectors. Section 7.1 will investigate each sector's average return and standard deviation, during each period of market turmoil. The data used for showing each sector's performance are from The Financial Times and the London Stock Exchange (FTSE). These are monthly prices for the worldwide sectors of Oil & Gas, Industrials, Consumer goods, Financials, Technology and Utilities. The prices have been transformed to monthly logarithmic returns, so that standard deviations, average returns and regression analysis could be applied. The sectors we have decided to apply in this section are based on the main sectors reported in table 1 in section 2.1. The FTSE Oil & Gas sector contains oil and gas producers, oil equipment, services and distribution and alternative energy. The Industrials sector consists of construction and materials, aerospace and defense, general industrials, electronics and electrical equipment, industrial engineering, industrial transportation and support services. The Consumer Goods sector contains automobile and parts, food producers, beverages, household goods and home construction, general retailers, leisure goods, personal goods and tobacco. The Financials sector consists of banks, insurance, real estate investment and services and financial services. The Technology sector contains software and computer services, technology hardware and equipment. The Utilities sector consists of electricity, gas, water and multi utilities (FTSE, 2010)

Concerning risk attribution to specific sectors, we will look at the six sectors in each Asian country, and see if the beta for a country is significantly different during a period of extreme volatility than from 1994 – 2010, within each sector. This will be done by regression analysis, where we will report betas, t-statistics, standard error, R^2 and correlations in section 7.2. The goal is to see if the systematic risk of an Asian country, within a particular sector, changes during a period of extreme volatility, compared to the systematic risk within the same sector from 1994 – 2010. The regression applied to be able to obtain this information is the following:

$$r_t^{Country} = \alpha + \beta_1 r_t^{Sector} + \beta_2 * [r_t^{Sector} * CrisisDummy]$$

The dependent variable ($r_t^{Country}$) is a country's return from 1994 – 2010. The first independent variable ($\beta_1 r_t^{Sector}$) reports the beta coefficient of a specific sector's return from 1994 – 2010. The second independent variable ($\beta_2 * [r_t^{Sector} * CrisisDummy]$) reports the beta coefficient of the same sector in a period of extreme volatility. We have been able to produce this beta by multiplying the sector's return with a dummy variable that is valid (1) only during a selected period of extreme volatility, all other times, the dummy variable is zero. If the second beta coefficient is significant, the beta for that country has been different within the specific sector during the period of extreme volatility that is being investigated, than from 1994 – 2010. If the second beta is significant (either positive or negative) this beta will be added to the first beta, and provide an adjusted (sum) beta for that country, within the specific sector, for the selected period of extreme volatility. The adjusted beta will report if the systematic risk for that country has gone up or down within a sector during a period of extreme volatility.

7.1 Sector Risk and Return during Periods of Extreme Volatility

Sector	Asia Crisis		DotCom+9.11		GFC	
	Avg. Return	Std.dev	Avg. Return	Std.dev	Avg. Return	Std.dev
Oil & Gas	-0,82 %	21,35 %	-1,42 %	15,56 %	-32,76 %	36,46 %
Industrials	8,05 %	22,38 %	-15,93 %	17,87 %	-50,62 %	31,21 %
Consumer gds	6,50 %	23,63 %	-13,96 %	21,92 %	-33,01 %	22,10 %
Financials	18,37 %	29,11 %	-6,46 %	16,60 %	-74,10 %	31,86 %
Technology	32,05 %	30,25 %	-55,82 %	31,62 %	-39,47 %	32,69 %
Utilities	11,56 %	12,30 %	-7,36 %	13,03 %	-28,08 %	23,26 %

Table 8: Each sector's performance during each period of extreme volatility, FTSE indices (USD)

Table 8 shows that during the Asian Financial Crisis each sector performed quite well concerning average returns. The sector indices are constructed and based on worldwide data for companies that operate within the different sectors. Since the Asian Financial Crisis mostly concerned the Asian countries, the worldwide sectors were not widely affected by this crisis. The technology sector had the highest average return, but also the highest standard deviation during this crisis. The two Asian countries with the highest standard deviations during the same period are Indonesia and Korea. In Korea the technology sector is one of the most conspicuous sectors in its economy. In Indonesia electrical appliances are very important export goods, which can be included in a technology sector. This might contribute to some of the risk experienced in these two countries during the Asian Financial Crisis, combined with

other important factors. The currency risk in Indonesia is high during every period of extreme volatility, which makes the country stand out concerning total risk.

The Dot-Com Bubble Crash and September 11 resulted in a large decline in the technology sector's average return. This sector also has a lot higher standard deviation than the other sectors during this period. This is a natural consequence, since this crisis was a worldwide crisis that concerned the technology sector. However, all sectors experienced negative average returns. The Asian countries that have technology as a conspicuous sector are Korea, Indonesia and Taiwan. These three countries are also among the four countries with the highest standard deviations during this period (the fourth is Thailand), which shows that a worldwide downfall in the technology sector influences the total risk of the Asian countries that have this sector as a large part of their economy. This suggests that an Asian country with a high standard deviation is not necessarily risky exclusively due to typical country-specific factors such as political systems, military systems and religion. A large dominating sector decline worldwide might contribute just as much to a high standard deviation.

The Great Financial Crisis affected all sectors worldwide. As one can see from table 8 the financial sector was hit the hardest, with an average negative return of 74.1 %. This is the highest negative sector return during all selected periods. Generally, all sectors are experiencing higher standard deviations in this period, and the Oil & Gas sector has the overall highest standard deviation of 36.5 %. The two countries with the highest standard deviations during the GFC are Indonesia and India. In both countries the Oil & Gas sector and the Industrials sector dominate in their economies. These two sectors are among the worst performing sectors during the GFC. Being engaged in two of the worst performing sectors contributes to a high standard deviation.

7.2 Sector Influence on Asian Countries' Systematic Risk

We have decided to only include the significant beta coefficients

$(\beta_2 * [r_t^{Sector} * CrisisDummy])$ in the tables, based on a critical t-value, which is also included in the table. The correlation coefficients are based on a correlation analysis between each sector's return compared to each country's return during each selected period. We will report the findings for each Asian country one by one. The only country that did not have any significantly different betas during any period of extreme volatility was the Philippines, and will therefore not be reported in this section.

CHINA					
Great Financial Crisis	β	t-Stat	Std.Error	R ²	Correlation
Technology	0,20	1,88	0,11	6 %	0,51
Technology * GFCDummy	0,60	2,10	0,29		
Adjusted (sum)	0,80				

Table 9: China's betas during periods of extreme volatility (USD)

As one can see from table 9 the sector that has influenced China's systematic risk significantly is the technology sector, and only during the Great Financial Crisis. China's beta in the technology sector from 1994 – 2010 is 0.2, while China's beta is 0.6 within the technology sector during the GFC. This means that China's systematic risk (beta) in the technology sector has increased to 0.8 as a consequence of the GFC. The correlation between China's return during the GFC and the return of the FTSE-Technology sector during the GFC is 0.51, which can be characterized as medium correlation.

Hong Kong					
Dot-Com+9.11	β	t-Stat	Std.Error	R ²	Correlation
Oil & Gas	0,52	5,21	0,10	13 %	-0,12
Oil & Gas * Dot-ComDummy	-0,69	-2,19	0,31		
Adjusted (sum)	-0,16				
GFC					
Consumer goods	0,23	1,94	0,12	10 %	0,70
Consumer * GFCDummy	0,85	2,89	0,30		
Adjusted (sum)	1,08				
Technology	0,24	3,08	0,08	12 %	0,14
Technology * GFCDummy	0,50	2,50	0,20		
Adjusted (sum)	0,74				
Utilities	0,38	2,59	0,15	12 %	0,42
Utilities * GFCDummy	0,72	2,40	0,30		
Adjusted (sum)	1,11				

Table 10: Hong Kong's betas during periods of extreme volatility (USD)

The numbers reported for Hong Kong are shown in table 10. The sector that has influenced Hong Kong's systematic risk significantly is the oil & gas sector during the Dot-Com Bubble Crash and September 11. Hong Kong's beta in the oil & gas sector from 1994 – 2010 is 0.52, while Hong Kong's beta is -0.69 within the oil & gas sector during the Dot-com and September 11 period. This means that Hong Kong's systematic risk within the oil & gas sector has decreased to -0.16 as a consequence of the Dot-Com Bubble Crash and September 11. The correlation for this sector and Hong Kong's return is -0.12 during this period. There

are three sectors that have increased the systematic risk in Hong Kong during the GFC. These three sectors are the consumer goods sector, the technology sector and the utilities sector. Out of these three, the consumer goods sector has affected Hong Kong's systematic risk the most and also has the highest correlation with Hong Kong's return during the GFC.

From now on, the numbers for each country in this section will be presented in the appendix, table A9. India's systematic risk during the Dot-Com Bubble Crash and September 11 was decreased to 0.3 from 0.93 in the consumer goods sector, while the beta in the utilities sector decreased to -0.23 from 0.82. During the GFC, India's systematic risk increased in three sectors, namely consumer goods, technology and utilities, to respectively 1.55, 0.96 and 1.43 from 0.61, 0.47 and 0.43.

Indonesia's systematic risk during the Asian Financial Crisis increased to 2.22 from 0.82 in the oil & gas sector. During the GFC, Indonesia's systematic risk increased in two sectors, namely the technology sector and the utilities sector, to respectively 1.21 and 1.88 from 0.46 and 0.71.

The sector that has influenced Korea's systematic risk significantly is the utilities sector and only during the Dot-Com Bubble Crash and September 11. Korea's beta in the utilities sector from 1994 – 2010 is 0.78, while Korea's beta is -1.25 within the utilities sector during the GFC. This means that Korea's systematic risk in the utilities sector has decreased to -0.47 as a consequence of the GFC.

In Malaysia, the systematic risk in five out of six sectors was affected as a result of the Asian Financial Crisis. All of these betas were increased. The Malaysian beta in the oil & gas sector increased from 0.42 to 1.47 and the beta in the industrials sector increased from 0.48 to 1.65. Malaysia's beta in the consumer goods-, the financials- and utilities sector increased, respectively, from 0.48 to 1.22, 0.4 to 1.05 and 0.36 to 1.9 during the Asian Financial Crisis. The fact that Malaysia's significant beta differences only took place during the Asian Financial Crisis makes Malaysia somewhat special among the Asian countries. This indicates that Malaysia is mostly affected by Asian factors, which also can be seen from the Sharpe ratios from section 6.2, where Malaysia is the best performing country of both "western" and Asian countries during the GFC, which was a worldwide crisis with no special Asian factors involved.

The sector that has influenced Singapore's systematic risk significantly is the financial sector during the Dot-Com Bubble Crash and September 11. Singapore's beta in this sector from 1994 – 2010 is 0.49, while Singapore's beta is 0.66 within the same sector during the Dot-Com Bubble Crash and September 11. This means that Singapore's systematic risk in the financial sector has increased to 1.15 as a consequence of the Dot-Com Bubble Crash and September 11. The correlation for this sector and Singapore's return is 0.64 during this period. There are five sectors that have increased the systematic risk in Singapore during the GFC. Since Singapore is considered a developed country and the systematic risk in all developed countries increased during the GFC, this does not come as a surprise. The same applies to Hong Kong, and Hong Kong's betas were significantly higher within three sectors during the GFC, as mentioned above. The five sectors in Singapore that significantly affected Singapore's systematic risk during the GFC were the oil & gas sector, the industrials sector, the consumer goods sector, the technology sector and the utilities sector.

For Taiwan there were two periods of extreme volatility that had significant impact on Taiwan's beta, the first was the Dot-Com Bubble Crash and September 11 (the utilities sector) and the second was the GFC (the technology sector). Taiwan's beta in the utilities sector changed from 0.4 to -0.52 during the Dot-Com Bubble Crash and September 11, while the beta in the technology sector changed from 0.29 to 0.8 during the GFC.

Thailand's beta during the Dot-Com Bubble Crash and September 11 decreased to -0.31 from 1.03 in the utilities sector. During the GFC, Thailand's betas increased in two sectors, namely the consumer goods sector and the technology sector, to respectively 1.58 and 0.99 from 0.54 and 0.25.

7.3 A Brief Summary and Major Conclusions on Influential Sectors in the Asian Stock Markets

When looking at table 1 (section 2.1), one can see which sectors are the most dominating sectors in each Asian country. The comparisons made in section 7.1 suggest that there is a connection between a country's risk and the risk of the dominating sector in that country. This might mean that high risk in an Asian country is not exclusively due to country-specific factors, but is affected by a worldwide downfall in a specific sector's return. This combination of events contributes to high standard deviations in the Asian countries. The currency risk is also a factor to consider with regards to high Asian standard deviations.

In section 7.2 we found that in China, the only sector that influenced the systematic risk (increased) was the technology sector, and only during the Great Financial Crisis. Hong Kong's systematic risk was reduced in the Oil & Gas sector during the Dot-Com Bubble Crash and September 11, while Hong Kong's systematic risk increased in the consumer goods, technology and utilities sectors during the GFC. India's systematic risk increased in the consumer goods sector, but decreased in the utilities sector during the Dot-Com Bubble Crash and September 11. In the course of the GFC, India's systematic risk in the consumer goods, technology and utilities sector increased. In the Asian Financial Crisis, Indonesia's systematic risk increased in the Oil & Gas sector, it also increased in the technology and utilities sector during the GFC. Furthermore we found that in Korea, the only sector which influenced the systematic risk (decreased) was the utilities sector, and only during the Dot-Com Bubble Crash and September 11. In Malaysia, all selected sectors, except the technology sector, increased the country's systematic risk during the Asian Financial Crisis. The Philippines' systematic risk was not significantly influenced in any of the sectors in any of the periods of extreme volatility. Singapore's systematic risk was increased in the financial sector during the Dot-Com Bubble Crash and September 11, while the country's systematic risk increased in all sectors, except the financial sector, during the GFC. Taiwan's systematic risk decreased in the utilities sector in the course of the Dot-Com Bubble Crash and September 11. During the GFC, Taiwan's systematic risk in the technology sector increased. Finally, we found that Thailand's systematic risk decreased in the utilities sector, while it increased in the consumer goods and technology sector during the GFC.

8. Internationally Diversified Portfolios; Asian Countries in a Portfolio from 2003 – 2010

To find out which countries, both western and Asian, that make an optimal portfolio, all the returns of the countries in the MSCI World Index have been added to the optimizer, along with all the Asian countries' returns. The countries chosen by the optimizer during the first time period (1993 – 2003) will form the portfolio that will be investable for a USD-investor who wants to diversify internationally, and in at least one Asian country, from 2003 – 2010. A USD-investor realizing the potential of investing in the up and coming Asian markets, might experience positive effects by investing in these markets. The goal is to investigate the performance of the portfolio in the time period of 2003 – 2010, based on the portfolio the optimizer chooses as the optimal portfolio from 1993 – 2003. The reason why we want to investigate the time period we want to investigate is 2003 – 2010 is that these are the most recent years in our thesis, and therefore closest to today's situation. We base the portfolio on return over ten years (1993 – 2003), and test the portfolio for seven years ahead, by pretending to be a USD-investor investing in this portfolio in the end of year 2002.

This thesis is centered on Asian countries' performance during periods of extreme volatility or times of market turmoil. During periods like this, the stock markets underperform compared to the "risk free" alternative. This is a well known fact, however, the aim of this section is to investigate the performance of an optimal portfolio during the most recent years and what this optimal portfolio consisting of western countries and Asian countries will look like, during the time period 2003 – 2010. The only crisis that will affect the optimal portfolio in this time period is the Great Financial Crisis. This is the most recent crisis in the financial markets, and also the most extensive one, it is therefore the crisis that we want to focus our attention on.

In section 8.1 we will present an optimal portfolio with short-sales restrictions. Section 8.2 will present an optimal portfolio with no restrictions on short-sales. Section 8.3 will present naïve diversified portfolios, based on investing a certain percentage in Asian countries. The naïve diversified portfolios are constructed to be able to compare Portfolio 1 and Portfolio 2 to the naïve diversification alternative. The portfolio constructed by the Optimizer in the time period 1993 – 2003, with a moderate annual required return of 5 % and with restrictions on short-sales, was this one:

Portfolio 1, 1993 - 2003, No Short Sales	
Country	Portfolio Share
Australia	0,61 %
Austria	7,30 %
Belgium	4,87 %
Denmark	9,10 %
Japan	1,14 %
Switzerland	15,25 %
United Kingdom	30,76 %
USA	22,31 %
India	8,66 %
Annual Portfolio Standard Deviation	12,55 %
Required Annual Portfolio Return	5,00 %

Table 11: The optimal portfolio from 1993 – 2003, with a required annual return of 5 % (USD)

As one can see from table 11 the only Asian country that was selected in the optimal portfolio (Portfolio 1) was India. Portfolio 1's return in this period was 5 % and an annual standard deviation of 12.55 %. We ran different required returns in the optimizer, and with an annual required return between 9 % and 10 % the Asian countries disappeared from the optimal portfolio. Since the USD-investor wants to invest in at least one Asian country, a suitable annual required return was 5 %. This portfolio consists of nine countries, this is per definition not a well diversified portfolio, but based on historical returns, this is the best performing portfolio in the selected time period.

The portfolio constructed by the Optimizer in the time period 1993 – 2003, with a moderate annual required return of 10 % and without restrictions on short-sales, was this one:

Portfolio 2, 1993 - 2003, Short Sales	
Country	Portfolio Share
Australia	48,19 %
Austria	19,94 %
Belgium	10,45 %
Canada	-27,99 %
Denmark	30,04 %
Finland	3,18 %
France	-2,93 %
Germany	-24,52 %
Greece	-4,90 %
Ireland	-7,95 %
Italy	-4,42 %
Japan	-33,20 %
Netherlands	-2,04 %
New Zealand	-6,91 %
Norway	11,87 %
Portugal	-14,68 %
Spain	-10,01 %
Sweden	18,48 %
Switzerland	19,27 %
United Kingdom	75,41 %
USA	-7,12 %
China	-1,20 %
Hong Kong	5,02 %
India	-3,06 %
Indonesia	-1,66 %
Korea	13,84 %
Malaysia	-5,98 %
Philippines	3,94 %
Singapore	-5,98 %
Taiwan	4,53 %
Thailand	-11,57 %
Annual Portfolio Standard Deviation	10,10 %
Required Annual Portfolio Return	10,00 %

Table 12: The optimal portfolio from 1993 – 2003 (short-sales allowed), with a required annual return of 10 % (USD)

As one can see from table 12 the optimal portfolio (Portfolio 2) consists of a combination of countries from the MSCI World Index and the AC Asia ex Japan Index. Portfolio 2's return in this period was 10 % with an annual standard deviation of 10.1 %. A required return of 10 % is moderate with short-sales allowed. This portfolio consists of 31 countries, this is per definition a well diversified portfolio and based on historical returns, this is the best performing portfolio in the selected time period. In section 8.2 we will investigate this portfolio's performance from 2003 – 2010.

8.1 Portfolio 1's Performance from 2003 – 2010: With Short-Sales Restrictions

Portfolio 1 performed better from 2003 – 2010 than from 1993 – 2003. The portfolio has a higher return (7.8 %) and a higher standard deviation (18.7 %). Portfolio 1 performed the worst during the Great Financial Crisis with an annual return of - 61.7 % and a standard deviation of 26.8 % during the GFC. The portfolio had a positive performance from 2003 up until the Great Financial Crisis, with an annual return of 19.5 % and a standard deviation of 9.9 %. The overall performance of Portfolio 1 from 2003 – 2010 is heavily affected by the GFC, where the portfolio had a large negative return and a high standard deviation.

8.2 Portfolio 2's Performance from 2003 – 2010: Without Short-Sales Restrictions

Portfolio 2 performed worse from 2003 – 2010 than from 1993 – 2003. The portfolio has a lower return of 9.4 % and a higher standard deviation of 16.2 %. Portfolio 2 performed the worst during the Great Financial Crisis with an annual return of - 75.4 % and a standard deviation of 21.7 % during the GFC. The portfolio had a positive performance from 2003 up until the Great Financial Crisis, with an annual return of 22.6 % and a standard deviation of 9 %. This standard deviation is 1.06 % lower than from 1993 – 2003. The overall performance of Portfolio 2 from 2003 – 2010 is, as Portfolio 1, heavily affected by the GFC, where the portfolio had a large negative return and a high standard deviation.

8.3 Naïve Diversified Portfolios from 2003 – 2010

We have constructed three different portfolios based on naïve diversification in the time period of 2003 -2010. The portfolios consist of the countries that constitute the MSCI World Index (except Hong Kong and Singapore) and the Asian countries from the AC Asia ex Japan Index. The western countries have been given the percentage shares of 70 %, 80 % and 90 %. This means that the Asian countries have been given the percentage shares of 30 %, 20 % and 10 %. There are 21 western countries and each country has been given an equal share in the western portion of the portfolio, the same applies to the Asian countries, where the Asian portion of the portfolio has been equally divided among the ten Asian countries. In the portfolio consisting of 90 % western countries and 10 % Asian countries each western country has been given a portfolio share of 4.3 % and each Asian country has been given a portfolio share of 1 %. In the portfolio consisting of 80 % western countries and 20 % Asian countries each western country has been given a portfolio share of 3.8 % and each Asian country has been given a portfolio share of 2 %. In the portfolio consisting of 70 % western countries and

30 % Asian countries each western country has been given a portfolio share of 3.33 % and each Asian country has been given a portfolio share of 3 %.

The differently weighted portfolios have been constructed through 2003 – 2010, from 2003 up until the GFC and through the GFC alone. These portfolios are presented in the table below (table 13) through the different time periods within 2003 – 2010.

Naive Diversified Portfolios						
	2003 - 2010		2003 - GFC		GFC	
	Return	Std.Dev	Return	Std.Dev	Return	Std.Dev
90 % Western / 10 % Asia	8,75 %	21,48 %	22,58 %	11,45 %	-69,37 %	31,48 %
80 % Western / 20 % Asia	9,53 %	21,41 %	23,02 %	11,39 %	-67,82 %	31,44 %
70 % Western / 30 % Asia	10,36 %	21,53 %	23,60 %	11,49 %	-66,70 %	31,65 %

Table 13: Naive diversified portfolios 2003 – 2010 (USD)

As one can see from table 13 the portfolio consisting of 70 % western countries and 30 % Asian countries from 2003 – 2010 is the best performing one in this time period, when applying return to standard deviation ratios. The best performing portfolio from 2003 until the GFC is also the portfolio consisting of 70 % western countries and 30 % Asian countries. During the GFC, the portfolio consisting of 70 % western countries and 30 % Asian countries performed best.

8.4 A Brief Summary and Major Conclusions on Internationally Diversified Portfolios; Asian Countries in a Portfolio from 2003 – 2010

Portfolio 1 consisted of nine countries from 1993 – 2003, and we have shown how this portfolio has performed from 2003 – 2010. It performed better from 2003 – 2010 than from 1993 – 2003. The only Asian country in this portfolio was India with a portfolio share of 8.66 %. With a required return between 9 % and 10 %, India, as the only Asian country with a share in the portfolio, disappeared from the portfolio. Both the US and the United Kingdom have proved to be quite well performing countries from 1993 up until today (see appendix, table A6). These two countries' shares combined amount to over 50 % of the total portfolio.

Portfolio 2, where short-sales were allowed, four of the Asian countries were invested in, while the remaining six were sold short. The countries invested in were Hong Kong, Korea, Philippines and Taiwan. The countries that were sold short were China, India, Indonesia, Malaysia, Singapore and Thailand. Portfolio 2's performance from 2003 – 2010 was quite poor compared to its performance from 1993 – 2003.

Among the naïve diversified portfolios, the portfolios with 70 % western countries and 30 % Asian countries have performed best through all three periods, compared to the other naïve diversified portfolios. The trend among these portfolios is that when increasing the portion of Asian countries the return seems to increase, while the standard deviation first drops, then increases. Although we have not tried all combinations of western and Asian countries in a portfolio (it is not likely that a USD-investor would invest the majority of investable funds in Asian countries) we believe that up until a certain point, the return and standard deviation will increase in proportion to the portion of Asian countries in the portfolio. Beyond this point, the standard deviation will probably continue increasing, but the return will not.

9. Discussion and Major Conclusions

This section will present our three hypotheses, one by one, and within each selected period of extreme volatility. The whole period (1993 – 2010) will be presented first as an overview of how the Asian countries have performed during a more extensive period of time and not exclusively through a period of market turmoil. Further, each selected period of extreme volatility will be presented and conclusions in accordance to each hypothesis will be drawn.

For the whole period (1993 – 2010) we found that the Asian country with the best performance, based on Sharpe ratios, was India. Indonesia was the Asian country with the highest risk during this period, while India, in addition to the best Sharpe ratio, had the highest average return as well. When looking at the systematic and country-specific risk among the Asian countries during the whole period, the Asian countries have higher country-specific risk than the developed countries. The country that had the highest amount of country-specific risk from 1993 – 2010 was Malaysia, with a country-specific risk amounting to almost 82 % of the total risk. In comparison, the developed country with the highest amount of country-specific risk was Greece, with 62 % of the country's total risk. Country-specific risk is connected to a country's social, economic and political issues. A high amount of country-specific risk suggests that there are problems within one or more of these three factors. Given the history of the Asian countries, this finding makes sense. Eight out of the ten Asian countries in this thesis are classified by MSCI Barra as emerging based on their criteria, which once again support our findings. The World Index has an average return of 5 % and a standard deviation of 15.4 % from 1993 – 2010, while the AC Asia ex Japan Index has an average return of 4.7 % and a standard deviation of 26.3 % during the same period. The correlation between the developed countries is also higher than between the Asian countries, which might indicate more interdependence among the developed countries. Through this period, Asian countries have had relatively high currency risk and exchange rate fluctuations would affect a USD-investor negatively, when investing funds in Asian markets.

In the first part of the analyses in this thesis, section 6, we tested whether Asian markets have performed worse than western developed markets during selected periods of extreme volatility.

The Asian Financial Crisis mainly affected the Asian countries and represents therefore a more limited period of extreme volatility worldwide than the other selected periods. This means that when applying the findings from the analysis to hypothesis 1, the

result is quite obvious. During an Asian financial crisis, the Asian countries have underperformed compared to western developed countries, based on average returns and standard deviations. Among the Asian countries, India performed best, based on Sharpe ratios during the Asian Financial Crisis. All the Asian markets had high standard deviations and extensive negative returns. The currency risk was obviously high during the Asian Financial Crisis as well. Since the Asian Financial Crisis is limited to the Asian markets, hypothesis 1 is confirmed through this period.

The Dot-Com Bubble Crash and September 11 were a worldwide financial crisis. The first part of this period (dot-com) originated from companies based in western countries, but affected the financial markets all over the world. The September 11 terror attacks shook markets all over the world. These two periods of extreme volatility followed each other closely in time and can be seen as one period of extreme volatility which led to negative returns in all selected markets. Both Asian and western developed countries had negative returns and high standard deviations. Most of the Asian countries have higher risk than the developed countries, but the returns are approximately equal to the average among the developed countries. As we found from 1993 – 2010, the Asian countries have higher amounts of country-specific risk than the developed countries on average also during this period. The Sharpe ratios for all markets are negative during the Dot-Com Bubble Crash and September 11. All markets have underperformed. The correlation between the developed countries is higher than the correlation between the Asian countries. Since the Dot-Com Bubble originated in the western developed countries and the September 11 attacks had most influence on western countries, this might be an indication of why the correlation between the western developed countries is higher during this period than among the Asian countries. Hypothesis 1 can be confirmed during the Dot-Com Bubble Crash and September 11, since the average return between the Asian and the western developed countries are almost identical (a difference of 0.61 % in favor of the Asian countries), but the standard deviations in Asia are so much higher than in the western developed countries, that the risk-return relationship is better in the developed countries.

The Great Financial Crisis is one of the most severe crises in the financial markets; it hit all markets worldwide hard. The Asian countries have higher risk than the developed countries, but the average negative returns are lower among the Asian countries than among the developed countries (a difference of 10.95 %). The performance of the Asian countries has become even more equal to that of the western countries during the Great Financial Crisis.

Malaysia is actually the country with the least negative return and a relatively low total risk compared to all countries, which contributes to the fact that Malaysia has the best Sharpe ratio during the GFC. The amount of systematic risk has increased dramatically among the Asian countries and is approaching the systematic risk level of the developed countries. This suggests that the interdependence worldwide has become greater during the GFC. The average correlation among both the western developed and the Asian countries has increased greatly in this period as well, with coefficients of respectively 0.83 and 0.74. During the GFC, the Asian countries have higher standard deviations than the western developed countries, but the Asian countries have less negative returns, which mean that hypothesis 1 cannot be confirmed during this period. This conclusion is based on the risk-return relationship, which favors the Asian markets.

The discussion and conclusions show that it is difficult to achieve a positive return during periods of extreme volatility, by investing in international well-diversified indices. This indicates that the returns in the international stock markets seem to follow each other. As a consequence of the globalization and the seemingly correlating returns during periods of extreme volatility, the positive effect of international diversification seems to have been reduced. Mainly, Asian countries have higher risk during periods of extreme volatility, but not lower average returns compared to western developed countries. In our three selected periods of market turmoil, two periods confirm hypothesis 1. This is the Asian Financial Crisis, which of course affects the Asian countries negatively, and can therefore hardly form the basis of a conclusion that Asian markets perform worse than other markets. The Dot-Com Bubble Crash and September 11, which were a worldwide crisis, can be used to confirm hypothesis 1 as well. Asian countries do have higher standard deviations, but they do not have lower average returns than western developed countries during these two periods of extreme volatility. However, the risk-return relationship during the Dot-Com Bubble Crash and September 11 is on the average better for the western developed countries, but the average return itself is better for the Asian countries. When looking at the average Sharpe ratio for both Asian and western developed countries during the Great Financial Crisis, the Asian countries have a better average Sharpe ratio. This means that hypothesis 1 gets rejected for the GFC.

The Asian Financial Crisis is too limited to be able to confirm or reject hypothesis 1. The Dot-Com Bubble Crash and September 11 confirms hypothesis 1. However, since the Great Financial Crisis is the most recent crisis in the financial markets it is tempting to reject hypothesis 1, and claim that Asian markets perform no worse than western developed

countries during periods of extreme volatility. Nevertheless, this might be a little too substantial. Since the results from the Dot-Com Bubble Crash and September 11 show otherwise and all periods of extreme volatility in the financial markets are individual, a general conclusion might be too superficial.

In the second part of the analysis, section 7, we revealed the sectors in Asian markets which have significantly influenced the systematic risk during periods of extreme volatility. Our findings suggest that the systematic risk in several Asian countries has been affected by periods of extreme volatility, within different sectors. The change in the systematic risk during a period of extreme volatility within one or more of the chosen FTSE sectors, whether the risk has been increased or decreased, affects the total systematic risk in the specific Asian country. The regression model applied in this section shows that there are significant differences in the systematic risk of a country during the period from 1994 – 2010 and during the selected periods of market turmoil, within different sectors. When a country is experiencing a reduction in systematic risk in a sector, the correlation between this country's return and the sector's return is negative and when a country is experiencing an increase in systematic risk in a sector, the correlation between the country's return and the sector's return is positive. If a sector in an Asian country is one of its' main industries, and this sector has influenced the country's systematic risk during a period of extreme volatility, it is natural to assume that that country's total risk is being affected significantly. The results from our analysis confirms hypothesis 2.

In the third and final part of the analyses, section 8, we constructed three optimal portfolios (defined as the minimum variance portfolios) from 2003 – 2010. We found that in an optimal portfolio based on data from 1993 – 2003, with restrictions on short-sales and a moderate required return, only one Asian country is being included in the portfolio. This country is India, with a portfolio share of about 9 %. Although this is a small share, and by only one Asian country, it still confirms hypothesis 3.

In the optimal portfolio, where short-sales were allowed, four of the Asian countries were invested in, while the remaining six were sold short. Hypothesis 3 is confirmed concerning the portfolio where short-sales are allowed, since the Asian countries are a part of this optimal portfolio.

We had two reasons for choosing to include naïve diversification in the analysis. The first reason is that we wanted to show how a portfolio performs when increasing and

decreasing the amount of Asian countries in the portfolio. The second reason is that when we constructed Portfolio 1, the optimizer only included one Asian country in the portfolio. This is a small amount, considering the fact that we are interested in the Asian countries' performance during the last years. Nevertheless, the naïve diversified portfolios cannot be used to draw any conclusions concerning hypothesis 3.

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11. Appendix

Country / Index	Exchange
Australia	Australian Stock Exchange
Austria	Vienna Stock Exchange
Belgium	Euronext
Canada	Toronto Stock Exchange
Denmark	Copenhagen Stock Exchange
Finland	Helsinki Stock Exchange
France	Euronext
Germany	Deutsche Börse
Greece	Athens Exchange
Hong Kong	Stock Exchange of Hong Kong
Ireland	Irish Stock Exchange
Italy	Borsa Italiana
Japan	Tokyo Stock Exchange, Osaka Stock Exchange, JASDAQ and Nagoya Stock Exchange
Netherlands	Euronext
New Zealand	New Zealand Stock Exchange and New Zealand Alternative Exchange
Norway	Oslo Stock Exchange
Portugal	Euronext
Singapore	Singapore Exchange
Spain	Madrid Stock Exchange
Sweden	Stockholm Stock Exchange, Nordic Growth Market, Nya Marknaden and Aktie Torget
Switzerland	Swiss Exchange
United Kingdom	London Stock Exchange
USA	New York Stock Exchange, NASDAQ and American Stock Exchange

Table A1: Developed stock markets included in this analysis

1993 – 2010

Country	Beta	R ²	Standard Error	t-Stat
Finland	1,56	48 %	0,11	13,93
Indonesia	1,54	23 %	0,19	7,89
Korea	1,47	31 %	0,15	9,71
Thailand	1,43	27 %	0,16	8,65
Sweden	1,43	66 %	0,07	20,14
Norway	1,35	57 %	0,08	16,63
Germany	1,27	71 %	0,05	22,59
Singapore	1,24	48 %	0,09	13,71
Greece	1,24	37 %	0,11	10,95
Spain	1,21	65 %	0,06	19,50
Netherlands	1,17	76 %	0,04	25,71
Canada	1,17	69 %	0,05	21,68
China	1,17	22 %	0,15	7,68
Hong Kong	1,16	41 %	0,09	12,02
Austria	1,14	47 %	0,08	13,44
France	1,13	76 %	0,04	25,35
Taiwan	1,12	28 %	0,12	9,02
Belgium	1,11	55 %	0,06	15,99
Australia	1,09	65 %	0,05	19,44
Italy	1,09	50 %	0,07	14,23
Ireland	1,08	54 %	0,06	15,66
New Zealand	1,02	45 %	0,07	12,91
India	1,01	23 %	0,12	7,98
Philippines	0,98	20 %	0,13	7,32
Denmark	0,97	55 %	0,06	16,03
Portugal	0,95	42 %	0,07	12,31
USA	0,94	87 %	0,02	37,54
Japan	0,90	46 %	0,06	13,17
United Kingdom	0,89	76 %	0,03	25,51
Malaysia	0,88	18 %	0,13	6,66
Switzerland	0,82	56 %	0,05	16,21

Table A2: R², standard error and t-Stat for the Betas for all countries from 1993 – 2010 (USD)

The Asian Financial Crisis

Country	Beta	R ²	Standard Error	t-Stat
Thailand	2,44	39 %	0,79	3,04
Malaysia	2,23	47 %	0,62	3,54
Indonesia	2,14	24 %	1,00	2,12
Philippines	1,90	53 %	0,46	4,04
Finland	1,60	65 %	0,30	5,17
Spain	1,48	73 %	0,24	6,15
Singapore	1,48	43 %	0,44	3,28
Greece	1,47	32 %	0,55	2,62
Hong Kong	1,42	38 %	0,47	2,96
China	1,35	21 %	0,69	1,94
Norway	1,35	57 %	0,31	4,33
Canada	1,32	80 %	0,17	7,67
Sweden	1,25	85 %	0,13	8,94
Germany	1,22	83 %	0,14	8,53
Taiwan	1,22	37 %	0,41	2,90
Korea	1,20	8 %	1,07	1,11
Portugal	1,12	64 %	0,21	5,08
Switzerland	1,11	77 %	0,16	6,94
Netherlands	1,07	81 %	0,13	7,92
New Zealand	1,06	54 %	0,25	4,12
Italy	1,05	48 %	0,28	3,65
Austria	1,02	55 %	0,24	4,18
USA	1,01	93 %	0,06	14,60
France	0,99	72 %	0,16	6,09
Australia	0,96	74 %	0,14	6,47
Denmark	0,89	61 %	0,18	4,70
Ireland	0,89	67 %	0,16	5,43
Japan	0,82	47 %	0,23	3,57
India	0,78	25 %	0,35	2,19
United Kingdom	0,68	75 %	0,10	6,52
Belgium	0,63	56 %	0,14	4,25

Table A3: R², standard error and t-Stat for the Betas for all countries during the Asian Financial Crisis (USD)

The Dot-Com Bubble Crash and September 11

Country	Beta	R ²	Standard Error	t-Stat
Korea	1,72	49 %	0,32	5,30
Sweden	1,57	67 %	0,20	7,68
Finland	1,37	25 %	0,43	3,12
Germany	1,37	68 %	0,17	7,98
Canada	1,29	78 %	0,12	10,29
Thailand	1,19	20 %	0,43	2,73
Netherlands	1,13	70 %	0,13	8,29
China	1,13	37 %	0,27	4,17
Taiwan	1,11	25 %	0,35	3,14
France	1,08	73 %	0,12	8,96
USA	1,07	93 %	0,05	20,50
Denmark	1,02	61 %	0,15	6,78
Spain	1,00	57 %	0,15	6,31
Norway	1,00	69 %	0,12	8,05
Singapore	0,95	30 %	0,26	3,56
Australia	0,94	54 %	0,15	5,91
Ireland	0,93	44 %	0,19	4,80
Hong Kong	0,93	43 %	0,19	4,74
Italy	0,81	45 %	0,16	4,96
United Kingdom	0,78	79 %	0,07	10,55
New Zealand	0,78	27 %	0,23	3,31
Japan	0,75	41 %	0,16	4,49
India	0,72	18 %	0,28	2,55
Belgium	0,72	35 %	0,18	3,95
Switzerland	0,72	47 %	0,14	5,10
Portugal	0,69	27 %	0,20	3,31
Greece	0,65	10 %	0,34	1,89
Indonesia	0,59	4 %	0,48	1,20
Philippines	0,56	9 %	0,32	1,70
Austria	0,47	19 %	0,17	2,66
Malaysia	0,34	5 %	0,25	1,31

Table A4: R², standard error and t-Stat for the Betas for all countries during the Dot-Com Bubble Crash and September 11 (USD)

The Great Financial Crisis

Country	Beta	R ²	Standard Error	t-Stat
Austria	2,17	0,91	0,17	12,5
Indonesia	1,94	0,66	0,35	5,49
Norway	1,92	0,7	0,31	5,98
Belgium	1,82	0,77	0,25	7,16
Greece	1,78	0,85	0,18	9,46
India	1,62	0,67	0,28	5,61
Thailand	1,51	0,67	0,26	5,57
Korea	1,50	0,71	0,24	6,14
China	1,47	0,55	0,33	4,35
Singapore	1,40	0,85	0,14	9,34
Netherlands	1,40	0,91	0,11	12,59
Spain	1,38	0,8	0,17	7,77
Germany	1,37	0,86	0,13	9,86
Australia	1,33	0,85	0,13	9,53
Denmark	1,32	0,78	0,17	7,33
Sweden	1,29	0,76	0,18	6,94
Italy	1,27	0,94	0,07	16,85
Canada	1,27	0,74	0,19	6,62
France	1,26	0,92	0,09	13,17
Portugal	1,21	0,73	0,18	6,51
Finland	1,20	0,72	0,19	6,24
Ireland	1,15	0,56	0,26	4,44
Hong Kong	1,10	0,71	0,18	6,09
Taiwan	1,09	0,55	0,25	4,28
New Zealand	1,07	0,81	0,13	8,1
United Kingdom	0,94	0,88	0,08	10,77
USA	0,88	0,95	0,05	16,89
Japan	0,86	0,8	0,11	7,84
Switzerland	0,78	0,72	0,12	6,29
Philippines	0,78	0,34	0,27	2,82
Malaysia	0,73	0,51	0,18	3,98

Table A5: R², standard error and t-Stat for the Betas for all countries during the Great Financial Crisis (USD)

1993 - 2010	Modified	Asia Crisis	Modified	Dot-Com + 9.11	Modified	GFC	Modified
Country	Sharpe ratio						
Denmark	0,267	Belgium	1,331	Austria	-0,014	Malaysia	-0,092
Finland	0,246	Italy	1,071	Switzerland	-0,023	Switzerland	-0,106
Switzerland	0,239	Portugal	0,938	New Zealand	-0,025	Japan	-0,108
Spain	0,237	Finland	0,799	Australia	-0,025	USA	-0,115
Sweden	0,204	Switzerland	0,747	Norway	-0,033	The World Index	-0,136
Canada	0,197	France	0,736	United Kingdom	-0,034	United Kingdom	-0,156
Norway	0,150	Germany	0,623	Korea	-0,044	Philippines	-0,169
Australia	0,135	Denmark	0,621	Denmark	-0,044	Hong Kong	-0,169
India	0,123	Spain	0,582	Belgium	-0,045	France	-0,194
Germany	0,066	United Kingdom	0,545	The World Index	-0,048	Canada	-0,197
Netherlands	0,063	Ireland	0,506	USA	-0,050	Denmark	-0,206
France	0,061	Netherlands	0,486	Malaysia	-0,052	Portugal	-0,206
Portugal	0,051	USA	0,400	Canada	-0,059	Taiwan	-0,209
USA	0,030	Sweden	0,387	Ireland	-0,061	Spain	-0,210
Korea	0,023	Greece	0,275	Japan	-0,062	New Zealand	-0,218
Italy	0,015	The World Index	0,092	Italy	-0,063	AC Asia Ex Japan	-0,232
Hong Kong	0,015	Austria	0,072	Netherlands	-0,068	Italy	-0,233
Greece	0,013	Canada	-0,047	France	-0,070	Germany	-0,234
Singapore	0,000	Australia	-0,059	Hong Kong	-0,071	Netherlands	-0,237
The World Index	0,000	Japan	-0,074	Spain	-0,072	Singapore	-0,238
AC Asia Ex Japan	-0,001	Norway	-0,096	AC Asia Ex Japan	-0,072	Thailand	-0,238
United Kingdom	-0,002	India	-0,103	Singapore	-0,075	Australia	-0,243
Belgium	-0,004	New Zealand	-0,122	Portugal	-0,087	Sweden	-0,259
New Zealand	-0,005	Taiwan	-0,198	China	-0,092	Finland	-0,298
Austria	-0,005	Hong Kong	-0,255	Thailand	-0,094	China	-0,304
Indonesia	-0,006	AC Asia Ex Japan	-0,298	Philippines	-0,102	India	-0,333
Taiwan	-0,006	Singapore	-0,302	India	-0,109	Korea	-0,340
Malaysia	-0,007	Philippines	-0,511	Germany	-0,125	Indonesia	-0,362
Ireland	-0,010	China	-0,616	Indonesia	-0,126	Ireland	-0,421
Japan	-0,011	Korea	-0,644	Taiwan	-0,160	Norway	-0,440
Philippines	-0,019	Malaysia	-0,899	Greece	-0,164	Greece	-0,442
China	-0,029	Thailand	-1,031	Sweden	-0,183	Belgium	-0,459
Thailand	-0,030	Indonesia	-1,434	Finland	-0,251	Austria	-0,569

Table A6: Sharpe ratios for all indices through all periods (USD)

1993 - 2010	USD	Currency	Asia Crisis	USD	Currency	Dot-Com + 9.11	USD	Currency	GFC	USD	Currency
Country	Loss/Gain	Risk									
Indonesia	-8,90 %	11,56 %	Indonesia	-114,60 %	15,44 %	Philippines	-9,53 %	3,75 %	Korea	-36,44 %	12,78 %
Philippines	-3,86 %	3,66 %	Malaysia	-38,35 %	11,02 %	Indonesia	-7,42 %	12,77 %	New Zealand	-29,03 %	6,92 %
India	-2,42 %	2,37 %	Philippines	-38,06 %	8,45 %	Taiwan	-4,98 %	1,30 %	United Kingdom	-25,22 %	3,08 %
Korea	-2,31 %	7,58 %	Thailand	-35,43 %	-1,06 %	Thailand	-4,90 %	5,34 %	Sweden	-23,28 %	8,16 %
Thailand	-1,60 %	3,26 %	Korea	-31,11 %	21,72 %	Australia	-4,74 %	8,40 %	Australia	-23,00 %	15,99 %
Malaysia	-1,58 %	2,95 %	New Zealand	-25,19 %	2,51 %	India	-3,99 %	0,63 %	Indonesia	-19,06 %	14,19 %
Taiwan	-1,36 %	2,21 %	Australia	-23,39 %	3,11 %	Japan	-3,98 %	3,98 %	Norway	-18,54 %	11,54 %
Greece	-0,57 %	1,11 %	Taiwan	-17,34 %	5,17 %	Canada	-3,45 %	3,35 %	India	-17,61 %	5,51 %
Spain	-0,07 %	1,53 %	Singapore	-15,40 %	6,02 %	Korea	-3,17 %	3,09 %	Canada	-17,25 %	11,37 %
Sweden	-0,07 %	2,79 %	India	-13,00 %	2,13 %	Sweden	-2,17 %	2,52 %	Ireland	-7,98 %	4,06 %
Hong Kong	-0,01 %	0,00 %	Canada	-8,44 %	4,31 %	New Zealand	-1,35 %	6,63 %	Belgium	-7,98 %	7,49 %
China	0,00 %	0,01 %	Japan	-8,00 %	4,36 %	Singapore	-1,19 %	1,36 %	Spain	-7,98 %	10,92 %
USA	0,00 %	0,00 %	Greece	-7,41 %	-2,55 %	United Kingdom	-0,15 %	-0,50 %	Germany	-7,98 %	10,16 %
Portugal	0,30 %	1,48 %	Norway	-7,40 %	4,19 %	Hong Kong	-0,08 %	0,00 %	France	-7,98 %	9,17 %
United Kingdom	0,38 %	1,42 %	Ireland	-4,16 %	-3,46 %	China	-0,07 %	-0,01 %	Austria	-7,98 %	8,49 %
Italy	0,53 %	1,69 %	Portugal	-2,91 %	-1,39 %	USA	0,00 %	0,00 %	Netherlands	-7,98 %	7,58 %
Ireland	0,68 %	0,39 %	Finland	-2,32 %	-0,27 %	Malaysia	0,00 %	0,00 %	Italy	-7,98 %	8,44 %
Singapore	0,91 %	2,65 %	Sweden	-2,29 %	1,24 %	Greece	0,22 %	3,25 %	Finland	-7,98 %	7,09 %
Belgium	0,98 %	2,02 %	Spain	-1,87 %	-1,56 %	Denmark	1,01 %	-0,57 %	Greece	-7,98 %	7,12 %
Austria	0,99 %	2,26 %	Netherlands	-1,60 %	-3,25 %	Portugal	1,01 %	3,03 %	Portugal	-7,98 %	7,40 %
Netherlands	1,00 %	0,70 %	Denmark	-1,41 %	-4,00 %	Ireland	1,01 %	-0,43 %	Denmark	-7,95 %	6,90 %
Germany	1,01 %	0,75 %	Germany	-1,37 %	-4,16 %	Italy	1,01 %	0,89 %	Malaysia	-5,96 %	4,54 %
Norway	1,07 %	3,49 %	Belgium	-1,36 %	-2,65 %	Netherlands	1,01 %	0,24 %	Philippines	-5,63 %	3,57 %
Denmark	1,11 %	0,71 %	Austria	-1,35 %	-1,39 %	France	1,01 %	0,52 %	Taiwan	-4,80 %	2,72 %
France	1,11 %	0,60 %	Italy	-1,34 %	-3,10 %	Austria	1,01 %	2,49 %	Thailand	-3,82 %	3,86 %
Canada	1,13 %	4,78 %	France	-0,94 %	-3,64 %	Spain	1,01 %	0,40 %	Singapore	-2,87 %	4,53 %
Finland	1,37 %	0,61 %	China	-0,03 %	-0,07 %	Finland	1,01 %	-0,99 %	USA	0,00 %	0,00 %
Australia	1,57 %	7,29 %	Hong Kong	-0,03 %	-0,09 %	Germany	1,01 %	-0,13 %	Hong Kong	0,13 %	-0,29 %
Japan	1,72 %	1,43 %	USA	0,00 %	0,00 %	Norway	4,80 %	-0,12 %	China	0,13 %	-0,08 %
New Zealand	2,04 %	5,64 %	Switzerland	1,39 %	-3,65 %	Switzerland	4,82 %	0,65 %	Switzerland	0,19 %	5,07 %
Switzerland	2,06 %	0,16 %	United Kingdom	2,36 %	-2,29 %				Japan	11,41 %	-4,49 %

Table A7: Loss/Gain and Currency Risk for all indices through all periods (USD-investor)

	Asia Crisis		Dot-Com+9.11		GFC	
	USD	Local	USD	Local	USD	Local
Correlation Developed/World Index:	0,80	0,82	0,70	0,70	0,90	0,82
Correlation between Developed Countries:	0,68	0,71	0,56	0,55	0,83	0,75
Correlation Asia/World Index:	0,57	0,60	0,47	0,47	0,79	0,75
Correlation between Asian Countries:	0,49	0,44	0,45	0,45	0,74	0,72
AC Asia ex Japan Index/World Index:	0,75	-	0,72	-	0,89	-

Table A8: Correlations during selected periods of extreme volatility

India					
Dot-Com+9.11	β	t-Stat	Std.Error	R ²	Correlation
Consumer goods	0,93	6,74	0,14	20 %	0,18
Consumer * Dot-ComDummy	-0,63	-2,31	0,27		
Adjusted (sum)	0,30				
Utilities	0,82	5,12	0,16	12 %	-0,17
Utilities * Dot-ComDummy	-1,05	-2,37	0,44		
Adjusted (sum)	-0,23				
GFC					
Consumer goods	0,61	4,72	0,13	21 %	0,68
Consumer * GFCDummy	0,94	2,94	0,32		
Adjusted (sum)	1,55				
Technology	0,47	5,73	0,08	23 %	0,60
Technology * GFCDummy	0,49	2,24	0,22		
Adjusted (sum)	0,96				
Utilities	0,43	2,53	0,17	14 %	0,64
Utilities * GFCDummy	0,99	2,87	0,35		
Adjusted (sum)	1,43				

Indonesia					
Asian Fin. Crisis	β	t-Stat	Std.Error	R ²	Correlation
Oil & Gas	0,82	4,53	0,18	16 %	0,57
Oil & Gas * AsiacrisisDummy	1,41	2,42	0,58		
Adjusted (sum)	2,22				
GFC					
Technology	0,46	3,30	0,14	11 %	0,69
Technology * GFCDummy	0,75	2,03	0,37		
Adjusted (sum)	1,21				
Utilities	0,71	2,60	0,27	11 %	0,78
Utilities * GFCDummy	1,17	2,11	0,55		
Adjusted (sum)	1,88				

Korea					
Dot-Com+9.11	β	t-Stat	Std.Error	R ²	Correlation
Utilities	0,78	3,69	0,21	7 %	-0,16
Utilities * Dot-ComDummy	-1,25	-2,13	0,59		
Adjusted (sum)	-0,47				

Malaysia					
Asia Fin. Crisis	β	t-Stat	Std.Error	R ²	Correlation
Oil & Gas	0,42	3,61	0,12	14 %	0,50
Oil & Gas * AsiacrisisDummy	1,05	2,80	0,37		
Adjusted (sum)	1,47				
Industrials	0,48	4,09	0,12	18 %	0,67
Industrials * AsiacrisisDummy	1,17	3,35	0,35		
Adjusted (sum)	1,65				
Consumer goods	0,48	3,59	0,13	13 %	0,52
Consumer * AsiacrisisDummy	0,74	2,13	0,35		
Adjusted (sum)	1,22				
Financials	0,40	3,69	0,11	14 %	0,63
Financials * AsiacrisisDummy	0,65	2,33	0,28		
Adjusted (sum)	1,05				
Utilities	0,36	2,29	0,16	7 %	0,59
Utilities * AsiacrisisDummy	1,54	2,41	0,64		
Adjusted (sum)	1,90				

Singapore					
Dot-Com+9.11	β	t-Stat	Std.Error	R ²	Correlation
Financials	0,49	5,50	0,09	20 %	0,64
Financials * Dot-ComDummy	0,66	2,31	0,29		
Adjusted (sum)	1,15				
GFC					
Oil & Gas	0,47	4,07	0,11	19 %	0,82
Oil & Gas * GFCDummy	0,41	2,00	0,20		
Adjusted (sum)	0,87				
Industrials	0,55	4,95	0,11	23 %	0,81
Industrials * GFCDummy	0,43	2,02	0,21		
Adjusted (sum)	0,98				
Consumer goods	0,44	3,84	0,12	18 %	0,74
Consumer goods * GFCDummy	0,88	3,05	0,29		
Adjusted (sum)	1,32				
Technology	0,26	3,40	0,08	14 %	0,65
Technology * GFCDummy	0,56	2,75	0,20		
Adjusted (sum)	0,82				
Utilities	0,36	2,40	0,15	14 %	0,78
Utilities * GFCDummy	0,96	3,17	0,30		
Adjusted (sum)	1,32				

Taiwan					
Dot-Com+9.11	β	t-Stat	Std.Error	R ²	Correlation
Utilities	0,40	2,50	0,16	4 %	-0,24
Utilities * Dot-ComDummy	-0,93	-2,07	0,45		
Adjusted (sum)	-0,52				
GFC					
Technology	0,29	3,41	0,09	12 %	0,69
Technology * GFCDummy	0,51	2,26	0,23		
Adjusted (sum)	0,80				

Thailand					
Dot-Com+9.11	β	t-Stat	Std.Error	R ²	Correlation
Utilities	1,03	4,80	0,22	11 %	-0,10
Utilities * Dot-ComDummy	-1,34	-2,24	0,60		
Adjusted (sum)	-0,31				
GFC					
Consumer goods	0,54	2,91	0,18	11 %	0,83
Consumer goods * GFCDummy	1,04	2,28	0,46		
Adjusted (sum)	1,58				
Technology	0,25	2,05	0,12	8 %	0,74
Technology * GFCDummy	0,74	2,32	0,32		
Adjusted (sum)	0,99				

Table A9: Betas in Asian countries during periods of extreme volatility (USD)

US Dollars							Local Currency			
	Average	Standard		Portion	Portion		Average	Standard	Correlation/	
Dev. Countries	Return	Deviation	Beta/World	Correlation/ World	Country-specific risk	Systematic risk	Dev. Countries	Return	Deviation	World
Australia	7.99 %	20.77 %	1.089	0.807	34.83 %	65.17 %	Australia	6.42 %	13.47 %	0.751
Austria	3.30 %	25.47 %	1.137	0.687	52.78 %	47.22 %	Austria	2.31 %	23.21 %	0.667
Belgium	3.55 %	22.80 %	1.107	0.747	44.13 %	55.87 %	Belgium	2.56 %	20.77 %	0.723
Canada	9.41 %	21.48 %	1.167	0.836	30.04 %	69.96 %	Canada	8.29 %	16.70 %	0.824
Denmark	10.51 %	20.01 %	0.973	0.748	44.01 %	55.99 %	Denmark	9.41 %	19.29 %	0.674
Finland	13.62 %	34.34 %	1.561	0.700	51.00 %	49.00 %	Finland	12.25 %	33.72 %	0.643
France	6.40 %	19.89 %	1.127	0.872	23.91 %	76.09 %	France	5.28 %	19.29 %	0.794
Germany	6.70 %	23.08 %	1.269	0.846	28.36 %	71.64 %	Germany	5.69 %	22.33 %	0.784
Greece	5.59 %	31.13 %	1.235	0.611	62.72 %	37.28 %	Greece	6.17 %	30.02 %	0.557
Hong Kong	5.60 %	27.59 %	1.158	0.646	58.26 %	41.74 %	Hong Kong	5.61 %	27.59 %	0.647
Ireland	0.76 %	22.42 %	1.079	0.741	45.16 %	54.84 %	Ireland	0.09 %	22.03 %	0.661
Italy	5.54 %	23.62 %	1.086	0.708	49.93 %	50.07 %	Italy	5.01 %	21.93 %	0.662
Japan	-0.06 %	20.25 %	0.894	0.680	53.80 %	46.20 %	Japan	-1.79 %	18.82 %	0.669
Netherlands	6.47 %	20.58 %	1.170	0.875	23.40 %	76.60 %	Netherlands	5.47 %	19.87 %	0.803
New Zealand	3.13 %	23.27 %	1.017	0.672	54.78 %	45.22 %	New Zealand	1.09 %	17.63 %	0.559
Norway	9.27 %	27.33 %	1.350	0.760	42.20 %	57.80 %	Norway	8.19 %	23.84 %	0.749
Portugal	6.33 %	22.33 %	0.950	0.655	57.10 %	42.90 %	Portugal	6.03 %	20.85 %	0.604
Singapore	5.10 %	27.44 %	1.238	0.694	51.78 %	48.22 %	Singapore	4.19 %	24.79 %	0.682
Spain	10.61 %	22.94 %	1.205	0.808	34.67 %	65.33 %	Spain	10.68 %	21.41 %	0.768
Sweden	10.65 %	26.85 %	1.425	0.817	33.23 %	66.77 %	Sweden	10.72 %	24.06 %	0.723
Switzerland	9.19 %	16.80 %	0.821	0.752	43.44 %	56.56 %	Switzerland	7.13 %	16.64 %	0.721
United Kingdom	4.18 %	15.62 %	0.887	0.874	23.68 %	76.32 %	United Kingdom	3.80 %	14.20 %	0.832
USA	5.64 %	15.41 %	0.936	0.935	12.53 %	87.47 %	USA	5.64 %	15.41 %	0.935
The World Index	5.03 %	15.39 %								
AC Asia Ex Japan	4.69 %	26.25 %		0.734						
Asian Countries							Asian Countries			
China	-2.55 %	37.49 %	1.158	0.476	77.39 %	22.61 %	China	-2.55 %	37.48 %	0.476
Hong Kong	5.60 %	27.59 %	1.158	0.646	58.26 %	41.74 %	Hong Kong	5.61 %	27.59 %	0.647
India	9.08 %	31.58 %	1.005	0.490	76.02 %	23.98 %	India	11.51 %	29.21 %	0.465
Indonesia	4.02 %	48.54 %	1.531	0.485	76.43 %	23.57 %	Indonesia	12.93 %	36.98 %	0.507
Korea	6.12 %	39.96 %	1.465	0.564	68.14 %	31.86 %	Korea	8.43 %	32.38 %	0.520
Malaysia	3.06 %	31.75 %	0.876	0.425	81.97 %	18.03 %	Malaysia	4.65 %	28.80 %	0.434
Philippines	-0.65 %	32.62 %	0.970	0.458	79.03 %	20.97 %	Philippines	3.21 %	28.96 %	0.471
Singapore	5.10 %	27.44 %	1.238	0.694	51.78 %	48.22 %	Singapore	4.19 %	24.79 %	0.682
Taiwan	3.34 %	31.99 %	1.113	0.536	71.29 %	28.71 %	Taiwan	4.70 %	29.77 %	0.508
Thailand	-1.97 %	42.07 %	1.422	0.520	72.93 %	27.07 %	Thailand	-0.37 %	38.82 %	0.493

Table A10: Key figures for all countries from 1993 – 2010

US Dollars							Local Currency			
	Average	Standard		Correlation/	Portion	Portion		Average	Standard	Correlation/
Dev. Countries	Return	Deviation	Beta/World	World	Country-specific	Systematic	Dev. Countries	Return	Deviation	World
					risk	risk				
Australia	-21,78 %	21,21 %	0,956	0,866	25,04 %	74,96 %	Australia	1,60 %	18,10 %	0,811
Austria	7,86 %	26,30 %	1,021	0,746	44,39 %	55,61 %	Austria	9,20 %	27,69 %	0,811
Belgium	27,50 %	16,14 %	0,631	0,751	43,61 %	56,39 %	Belgium	28,86 %	18,79 %	0,799
Canada	-10,63 %	28,28 %	1,324	0,899	19,20 %	80,80 %	Canada	-2,19 %	23,98 %	0,898
Denmark	19,51 %	21,82 %	0,889	0,783	38,73 %	61,27 %	Denmark	20,92 %	25,82 %	0,777
Finland	36,15 %	37,78 %	1,594	0,810	34,34 %	65,66 %	Finland	38,47 %	38,05 %	0,864
France	22,28 %	22,17 %	0,984	0,852	27,35 %	72,65 %	France	23,22 %	25,80 %	0,847
Germany	21,87 %	25,55 %	1,219	0,916	16,11 %	83,89 %	Germany	23,23 %	29,71 %	0,884
Greece	19,42 %	48,91 %	1,462	0,574	67,05 %	32,95 %	Greece	26,83 %	51,46 %	0,578
Hong Kong	-52,27 %	43,78 %	1,417	0,621	61,37 %	38,63 %	Hong Kong	-52,24 %	43,86 %	0,620
Ireland	16,43 %	20,71 %	0,889	0,824	32,12 %	67,88 %	Ireland	20,59 %	24,17 %	0,851
Italy	36,78 %	28,78 %	1,047	0,698	51,24 %	48,76 %	Italy	38,12 %	31,88 %	0,704
Japan	-26,25 %	22,97 %	0,827	0,691	52,25 %	47,75 %	Japan	-18,25 %	18,61 %	0,833
Netherlands	16,97 %	22,67 %	1,068	0,904	18,22 %	81,78 %	Netherlands	18,57 %	25,92 %	0,899
New Zealand	-38,54 %	27,51 %	1,061	0,741	45,13 %	54,87 %	New Zealand	-13,36 %	25,00 %	0,758
Norway	-22,26 %	34,15 %	1,346	0,757	42,68 %	57,32 %	Norway	-14,86 %	29,95 %	0,837
Portugal	30,92 %	26,60 %	1,116	0,806	35,12 %	64,88 %	Portugal	33,83 %	28,00 %	0,867
Singapore	-64,42 %	42,90 %	1,475	0,660	56,41 %	43,59 %	Singapore	-49,02 %	36,89 %	0,643
Spain	25,32 %	33,24 %	1,479	0,855	26,95 %	73,05 %	Spain	27,19 %	34,80 %	0,900
Sweden	16,01 %	25,99 %	1,249	0,922	14,90 %	85,10 %	Sweden	18,30 %	24,75 %	0,932
Switzerland	24,08 %	24,26 %	1,112	0,880	22,48 %	77,52 %	Switzerland	22,69 %	27,91 %	0,918
United Kingdom	14,15 %	15,06 %	0,680	0,867	24,77 %	75,23 %	United Kingdom	11,79 %	17,35 %	0,822
USA	13,95 %	20,00 %	1,009	0,969	6,16 %	93,84 %	USA	13,95 %	20,00 %	0,969
The World Index	7,73 %	19,20 %								
AC Asia Ex Japan	-73,33 %	37,61 %		0,749						
Asian Countries							Asian Countries			
China	-103,77 %	56,20 %	1,349	0,461	78,77 %	21,23 %	China	-103,74 %	56,27 %	0,460
Hong Kong	-52,27 %	43,78 %	1,417	0,621	61,37 %	38,63 %	Hong Kong	-52,24 %	43,86 %	0,620
India	-28,91 %	29,58 %	0,778	0,505	74,48 %	25,52 %	India	-15,91 %	27,45 %	0,525
Indonesia	-167,39 %	82,72 %	2,131	0,495	75,53 %	24,47 %	Indonesia	-52,79 %	67,29 %	0,725
Korea	-74,20 %	80,35 %	1,198	0,286	91,81 %	8,19 %	Korea	-43,10 %	58,63 %	0,260
Malaysia	-138,60 %	62,19 %	2,228	0,688	52,68 %	47,32 %	Malaysia	-100,25 %	51,17 %	0,753
Philippines	-97,17 %	49,59 %	1,896	0,734	46,09 %	53,91 %	Philippines	-59,12 %	41,14 %	0,840
Singapore	-64,42 %	42,90 %	1,475	0,660	56,41 %	43,59 %	Singapore	-49,02 %	36,89 %	0,643
Taiwan	-46,04 %	38,17 %	1,218	0,613	62,43 %	37,57 %	Taiwan	-28,70 %	32,99 %	0,614
Thailand	-133,51 %	73,91 %	2,427	0,631	60,22 %	39,78 %	Thailand	-98,08 %	74,97 %	0,513

Table A11: Key figures for all countries during the Asian Financial Crisis

US Dollars							Local Currency				
	Average	Standard		Correlation/	Portion	Portion		Average	Standard	Correlation/	
Dev. Countries	Return	Deviation	Beta/World	World	Country-specific	Systematic	Dev. Countries	Return	Deviation	World	
					risk	risk					
Australia	-6.23 %	21.35 %	0.940	0.740	45.31 %	54.69 %	Australia	-1.49 %	12.95 %	0.657	
Austria	-2.73 %	17.98 %	0.475	0.444	80.28 %	19.72 %	Austria	-3.74 %	15.49 %	0.502	
Belgium	-16.65 %	20.54 %	0.724	0.592	64.95 %	35.05 %	Belgium	-17.67 %	18.80 %	0.634	
Canada	-18.85 %	24.47 %	1.291	0.886	21.49 %	78.51 %	Canada	-15.40 %	21.11 %	0.857	
Denmark	-14.88 %	21.94 %	1.023	0.783	38.63 %	61.37 %	Denmark	-15.88 %	22.51 %	0.754	
Finland	-49.69 %	45.60 %	1.364	0.502	74.76 %	25.24 %	Finland	-50.70 %	46.58 %	0.489	
France	-27.80 %	21.25 %	1.084	0.857	26.52 %	73.48 %	France	-28.81 %	20.72 %	0.868	
Germany	-39.97 %	27.67 %	1.366	0.829	31.24 %	68.76 %	Germany	-40.98 %	27.80 %	0.818	
Greece	-44.69 %	32.82 %	0.647	0.331	89.02 %	10.98 %	Greece	-44.91 %	29.56 %	0.361	
Hong Kong	-24.78 %	23.66 %	0.931	0.661	56.26 %	43.74 %	Hong Kong	-24.69 %	23.66 %	0.663	
Ireland	-20.38 %	23.59 %	0.935	0.666	55.69 %	44.31 %	Ireland	-21.39 %	24.02 %	0.645	
Italy	-25.85 %	20.14 %	0.813	0.678	54.01 %	45.99 %	Italy	-26.86 %	19.26 %	0.699	
Japan	-26.20 %	19.76 %	0.754	0.641	58.94 %	41.06 %	Japan	-22.22 %	15.78 %	0.61	
Netherlands	-24.58 %	22.74 %	1.136	0.839	29.63 %	70.37 %	Netherlands	-25.59 %	22.50 %	0.837	
New Zealand	-4.62 %	24.75 %	0.775	0.526	72.32 %	27.68 %	New Zealand	-3.27 %	18.12 %	0.432	
Norway	-11.21 %	20.21 %	1.000	0.831	30.87 %	69.13 %	Norway	-16.00 %	20.33 %	0.803	
Portugal	-34.26 %	22.00 %	0.686	0.524	72.56 %	27.44 %	Portugal	-35.27 %	18.97 %	0.596	
Singapore	-20.79 %	28.85 %	0.949	0.553	69.44 %	30.56 %	Singapore	-19.60 %	27.48 %	0.566	
Spain	-27.17 %	22.17 %	1.004	0.761	42.13 %	57.87 %	Spain	-28.18 %	21.77 %	0.766	
Sweden	-51.82 %	31.97 %	1.565	0.823	32.34 %	67.66 %	Sweden	-49.65 %	29.45 %	0.797	
Switzerland	-8.03 %	17.57 %	0.720	0.688	52.66 %	47.34 %	Switzerland	-12.85 %	16.92 %	0.776	
United Kingdom	-17.90 %	14.76 %	0.783	0.891	20.65 %	79.35 %	United Kingdom	-17.75 %	15.26 %	0.906	
USA	-21.63 %	18.52 %	1.066	0.967	6.45 %	93.55 %	USA	-21.63 %	18.52 %	0.967	
The World Index	-23.10 %	16.80 %									
AC Asia Ex Japan	-24.29 %	24.34 %		0.722							
Asian Countries							Asian Countries				
China	-24.20 %	31.00 %	1.130	0.613	62.48 %	37.52 %	China	-24.13 %	31.01 %	0.613	
Hong Kong	-24.78 %	23.66 %	0.931	0.661	56.26 %	43.74 %	Hong Kong	-24.69 %	23.66 %	0.663	
India	-33.15 %	28.23 %	0.720	0.428	81.66 %	18.34 %	India	-29.16 %	27.60 %	0.44	
Indonesia	-22.59 %	45.10 %	0.586	0.218	95.23 %	4.77 %	Indonesia	-15.17 %	32.33 %	0.213	
Korea	-5.44 %	41.05 %	1.715	0.702	50.75 %	49.25 %	Korea	-2.26 %	37.96 %	0.686	
Malaysia	-16.41 %	23.86 %	0.336	0.237	94.41 %	5.59 %	Malaysia	-16.41 %	23.86 %	0.239	
Philippines	-27.53 %	31.12 %	0.560	0.302	90.86 %	9.14 %	Philippines	-17.99 %	27.38 %	0.36	
Singapore	-20.79 %	28.85 %	0.949	0.553	69.44 %	30.56 %	Singapore	-19.60 %	27.48 %	0.566	
Taiwan	-38.08 %	36.90 %	1.107	0.504	74.59 %	25.41 %	Taiwan	-33.10 %	35.60 %	0.492	
Thailand	-16.07 %	43.89 %	1.183	0.453	79.52 %	20.48 %	Thailand	-11.17 %	38.56 %	0.458	

Table A12: Key figures for all countries during the Dot-Com Bubble Crash and September 11

US Dollars							Local Currency				
	Average	Standard		Correlation/	Portion	Portion		Average	Standard	Correlation/	
Dev. Countries	Return	Deviation	Beta/World	World	Country-specific	Systematic	Dev. Countries	Return	Deviation	World	
					risk	risk					
Australia	-69,08 %	33,39 %	1,328	0,927	14,16 %	85,84 %	Australia	-46,08 %	17,40 %	0,848	
Austria	-103,94 %	52,83 %	2,166	0,955	8,76 %	91,24 %	Austria	-95,95 %	44,35 %	0,914	
Belgium	-91,57 %	48,17 %	1,819	0,880	22,62 %	77,38 %	Belgium	-83,59 %	40,68 %	0,798	
Canada	-53,88 %	34,19 %	1,267	0,863	25,46 %	74,54 %	Canada	-36,63 %	22,82 %	0,854	
Denmark	-55,52 %	34,75 %	1,319	0,884	21,82 %	78,18 %	Denmark	-47,57 %	27,84 %	0,749	
Finland	-86,93 %	32,99 %	1,203	0,850	27,79 %	72,21 %	Finland	-78,94 %	25,90 %	0,695	
France	-59,72 %	30,62 %	1,261	0,959	7,96 %	92,04 %	France	-51,73 %	21,45 %	0,904	
Germany	-64,33 %	34,42 %	1,375	0,931	13,35 %	86,65 %	Germany	-56,35 %	24,26 %	0,908	
Greece	-94,84 %	44,87 %	1,782	0,925	14,35 %	85,65 %	Greece	-86,85 %	37,75 %	0,835	
Hong Kong	-51,74 %	30,43 %	1,102	0,844	28,82 %	71,18 %	Hong Kong	-51,87 %	30,72 %	0,846	
Ireland	-114,54 %	35,62 %	1,148	0,751	43,57 %	56,43 %	Ireland	-106,56 %	31,56 %	0,533	
Italy	-73,03 %	30,46 %	1,274	0,975	5,01 %	94,99 %	Italy	-65,05 %	22,02 %	0,894	
Japan	-44,53 %	22,44 %	0,863	0,897	19,61 %	80,39 %	Japan	-55,95 %	26,93 %	0,887	
Netherlands	-65,96 %	33,97 %	1,394	0,956	8,64 %	91,36 %	Netherlands	-57,97 %	26,40 %	0,853	
New Zealand	-75,14 %	27,70 %	1,073	0,902	18,60 %	81,40 %	New Zealand	-46,12 %	20,78 %	0,572	
Norway	-79,12 %	53,02 %	1,911	0,840	29,49 %	70,51 %	Norway	-60,58 %	41,48 %	0,828	
Portugal	-59,45 %	32,68 %	1,206	0,860	26,08 %	73,92 %	Portugal	-51,47 %	25,28 %	0,717	
Singapore	-63,70 %	35,23 %	1,396	0,924	14,71 %	85,29 %	Singapore	-60,82 %	30,70 %	0,883	
Spain	-54,73 %	36,02 %	1,384	0,895	19,88 %	80,12 %	Spain	-46,75 %	25,10 %	0,886	
Sweden	-71,55 %	34,37 %	1,288	0,873	23,74 %	76,26 %	Sweden	-48,28 %	26,21 %	0,708	
Switzerland	-45,79 %	21,40 %	0,782	0,852	27,43 %	72,57 %	Switzerland	-45,99 %	16,33 %	0,759	
United Kingdom	-63,01 %	23,36 %	0,944	0,941	11,45 %	88,55 %	United Kingdom	-37,80 %	20,28 %	0,89	
USA	-51,02 %	21,04 %	0,880	0,975	4,99 %	95,01 %	USA	-51,02 %	21,04 %	0,974	
The World Index	-54,87 %	23,30 %									
AC Asia Ex Japan	-62,74 %	34,89 %		0,893							
Asian Countries							Asian Countries				
China	-62,83 %	45,68 %	1,465	0,747	44,14 %	55,86 %	China	-62,96 %	45,76 %	0,753	
Hong Kong	-51,74 %	30,43 %	1,102	0,844	28,82 %	71,18 %	Hong Kong	-51,87 %	30,72 %	0,846	
India	-68,79 %	45,88 %	1,621	0,823	32,23 %	67,77 %	India	-51,18 %	40,36 %	0,807	
Indonesia	-61,90 %	55,17 %	1,936	0,818	33,16 %	66,84 %	Indonesia	-42,84 %	40,98 %	0,782	
Korea	-78,61 %	41,35 %	1,501	0,846	28,43 %	71,57 %	Korea	-42,17 %	28,56 %	0,761	
Malaysia	-35,20 %	23,60 %	0,726	0,717	48,63 %	51,37 %	Malaysia	-29,25 %	19,06 %	0,639	
Philippines	-51,04 %	30,83 %	0,779	0,589	65,32 %	34,68 %	Philippines	-45,41 %	27,26 %	0,531	
Singapore	-63,70 %	35,23 %	1,396	0,924	14,71 %	85,29 %	Singapore	-60,82 %	30,70 %	0,883	
Taiwan	-57,46 %	34,06 %	1,084	0,742	44,99 %	55,01 %	Taiwan	-52,66 %	31,34 %	0,689	
Thailand	-51,93 %	42,70 %	1,505	0,821	32,52 %	67,48 %	Thailand	-48,11 %	38,84 %	0,825	

Table A13: Key figures for all countries during the Great Financial Crisis