

Time Diversification in Developed and Emerging Markets

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Keywords: stocks, bonds, Value at risk (VaR), investment horizon, time diversification, time in the market, emerging markets.

JEL code: G14, G15

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1. Introduction

A Google search of the term “time in the market” returns literally tens of thousands of hits.

Numerous financial commentators, fund managers, and financial planning websites advocate that it is “time in the market” that is critical to investment success. The claims are based on research that shows that in the long run stocks tend to outperform bonds, but as short term volatility is greater for stocks, shorter time horizons may result in lower realized returns compared to bonds. As such, an important practical investing question is: “How long do I need to be in the stock market in order to be confident that I will earn an adequate return?”

This question is particularly relevant if an investor has a predetermined exit point (e.g. retirement) and has to exit in a bear market or market crisis.

Unsurprisingly, many researchers have addressed this question. Siegel (1994) shows that in the long run US stocks outperform bonds and risk, as measured by standard deviation, is lower for stocks than bonds for 30 year investment horizons. In addition, since the beginning of the 19th century, no periods of 17 years or more produced negative returns after inflation for stocks. These results, which have attracted considerable attention, have formed the basis of the argument promoted by proponents of “time in the market” or “time diversification”. They suggest that better years more than compensate for poorer years over the long run, resulting in diminishing risk as the investment horizon increases.

Additional support for long horizon investing is provided in Porterba and Summers (1988) who report that variance ratios are lower for long compared to short investment horizons. They believe that this is evidence of mean-reversion in stock returns which would justify

increased equity allocations for long horizon investors. Campbell and Viceira (2002, 2005) show that both stocks and bonds experience less volatility over longer investment horizons but the effect is more pronounced for stocks. Further, Campbell and Viceira (2002, 2005) show, that for mean-reverting stocks, the optimal asset allocation policy for stocks is higher on average for conservative long-term investors.

However, the advantages of time diversification are not universally accepted. For example, Samuelson (1994) and Bodie (1995) argue that investors with constant relative risk aversion are unaffected by the investment horizon and therefore stock market risk is not reduced by the passage of time. Also, Jorion (2003) finds no significant evidence of long-term mean reversion using variance ratios in a sample of international markets.

Several recent studies have examined time diversification in international markets. Dimson, Marsh and Staunton (2004) examine real returns for 16 developed markets and find that over the long run, equities outperform inflation in every country. The authors argue that this is consistent with higher expected returns for risky equities and is essential if equities are to be attractive long-term investments. However, the authors conclude this is not evidence of guaranteed superior performance over the long run. Jorion (2003) also investigates the persistence of investment risk across time horizons in a sample dominated by developed countries. Jorion examines real stock returns over holding periods of up to 10 years and is to the best of our knowledge the first paper to explicitly use the value at risk (VaR) metric to measure downside risk of investing in a market. Jorion provides evidence of greater downside risk of investing in stock markets outside of the US, and of downside risk, and worst loss scenarios, declining as the investment horizon increases. Further, both Jorion (2003) and

Dimson, Marsh and Staunton (2004) show that downside stock market risk can be reduced through global diversification across predominantly developed markets.

This study extends the work on time diversification in several ways. Firstly, the VaR downside risk metric is used to compare the downside risk characteristics of both stocks and bonds over different investment horizons, extending out to horizons up to 40 years. The addition of downside risk in bonds is relevant as investors face a trade-off between investing in stocks or bonds. It is worthwhile considering the distribution of ending points for equivalent investments in both stocks and bonds over different investment horizons.

Secondly, no study to date has examined the influence of time diversification for a large group of emerging markets and compared the results to those in developed markets. The benefits of holding investments outside of the US are now widely accepted by the financial community and the importance of non-US markets also appears to be increasing, with fund managers increasing international allocations in both developed and emerging markets. For example, it has been reported that in 2007 the average global asset allocation fund had 57% of its money in international markets, compared with just 37% in 2002¹. Our study provides additional insight into investing in non-US markets by examining potential US dollar based returns of investing in both emerging and developed markets.

In the study we take care to measure returns from a US investment perspective by converting local currency returns into USD returns. Using US dollar total returns gives the study a realistic investor focus and means the results we present were achievable by an investor based

¹ The increasing asset allocation to non-US markets is highlighted in the Bloomberg article published on 26 April 2007
<http://www.iht.com/articles/2007/04/25/bloomberg/bxfund.php>.

in the US.² US dollar returns have the advantage of removing many of the distortions relating to inflation through the exchange rate adjustment.³

This paper provides evidence from the US and 48 other countries around the globe including 24 developed and 25 emerging countries, that downside risk improves for both stocks and bonds as the investment horizon is lengthened. The risk reduction is more pronounced in stocks than bonds. The study shows that short investment horizon investors hold heavy exposure to losses, but that these losses can be mitigated through increasing the investment horizon. For instance, once investors have held stocks 20 years, even if they happened to be so unlucky that they invested in the 5th percentile worst performing stock portfolio they would still make 4.82% return per annum in developed markets and 4.59% per annum in emerging markets.

The emerging market focus in the study provides useful insights. In these markets, downside risk over short horizons in both equities and bonds far exceeds the risk levels in developed markets. For instance, a stock market investor in the 5th percentile worst performing portfolio in emerging markets would have just \$0.466 in the dollar left after 3 years compared to \$0.667 in developed markets. Emerging market stocks have slightly higher average returns at the three year horizon which may have compensated for the increased risk exposure. Even at the comparatively long horizon of 10 years, emerging market stock portfolios still demonstrate material downside risk, where a dollar is worth \$0.77 in the 5th percentile downside portfolio compared to \$1.19 in the same developed market portfolio. It is not until

² It should be noted that historically foreign investment in certain markets was impossible and/or illegal and even though many barriers to global investing have been removed in recent decades, investors still have a strong home bias as noted by Dimson, Marsh and Staunton (2004).

³ This is particularly relevant for countries that experienced hyperinflation.

the 12 year “time in the market” horizon that the downside risk in emerging markets becomes acceptable. The same patterns were evident in emerging market bond portfolios for shorter investment horizons. The results presented assume that investors held equally weighted portfolios in securities that replicate the indices of the respective countries.

To be clear, we are not suggesting that investing in stocks is without risk. Indeed, a stock market investor always faces the risk of entering the market at the beginning of an extended decline. Rather, we contend that the risks incurred by an investor in the stock market are greatly reduced if they have investment horizons of 10 years or more and, given the evidence that stock markets tend to out-perform bond markets over these long term horizons, long term investors should ensure they have adequate exposure to equity markets.

The rest of the paper is organised as follows. Section 2 presents the data and selection of sample countries and the method is detailed in section 3. The results are presented and discussed in section 4 and section 5 concludes.

2. Data

We use monthly USD denominated stock and bond data from Global Financial Data (GFD). USD denominated returns are used to replicate actual long-run returns to US investors. In addition, the use of USD returns helps adjust for the effects of inflation over the long-run. The sample is selected from the 24 developed and 25 emerging markets included in the commonly followed Morgan Stanley Capital Indices.⁴ Bond market data are unavailable for 14 countries so we are restricted to conducting our analysis on the stock series for each of these markets.

⁴ There have been some changes to the composition of the MSCI since we generated our results. Luxembourg is no longer included as a developed country while Jordan has been

We study the total return gross stock index and the ten-year government bond total return index for each country. We follow Jorion and Goetzmann (1999) and use all available GFD data for our selected countries. This means our data has various start dates which make it less meaningful to directly compare countries performances, particularly if the span of coverage is relatively short. However, the use of the data allowed us to examine the impact of holding horizon on the measurement of downside risk in each location. The earliest stock and bond data we have is for the U.K. (start date August 1767), while the shortest series is Poland (April 1999). All time series data has an end date of September 2006. The interested reader should refer to Appendix 1 for more detail on our data.

The countries chosen were components of the MSCI World Index which meet MSCI's criteria of being both replicable and investable by fund managers. The MSCI global equity indices are used by over 3,000 institutions to benchmark 3 trillion US dollars on a worldwide basis. It is the benchmark for more than 90% of all international equity assets under management in the US⁵.

3. Methodology

To construct our holding horizon return measure for each country we define P_t as the value of the stock price index in the month t . Annualised returns are measured over multiple months k and denoted in annualized form R_a :

$$R_{t-k,t}^a = (P_t / P_{t-k})^{1/n} - 1 \quad (1)$$

where n is the number of years in the interval, i.e., $n = k/12$. Investment horizons ranging from 1 year through to 40 years were examined on a rolling monthly window basis. By using

included as an emerging country. In addition, we were unable to source data for the Czech Republic.

⁵ For a full overview of the MSCI world and other international indices visit <http://www.mscibarra.com/products/indices/intl.jsp>.

a rolling monthly investment period for each horizon the methodology examines all possible monthly investment entry and exit points. This ensures our results are not biased against those with predetermined exit points⁶.

The length of the available data varies on a country by country basis, which means the number of qualifying countries in each investment horizon varies. To ensure comparability between stock and bond markets within a country we choose the most recent start date of the two series and take this as the start date for both series. We also apply a filter that drops an investment horizon in the country whenever the sample size falls below 50 observations to ensure our results are not driven by outliers. After these restrictions, 49 countries with stock data and 35 countries with bond data qualify. Almost all of these qualified for measuring returns out to a 5 year horizon. At the 40 year horizon there are 15 countries with stock data and 23 countries with bond data that have qualifying series.

The number of return estimates generated for each horizon per country is equal to $N-(t-k)-1$ where N is the number of monthly observations available in the country and $(t-k)$ is the investment horizon defined above. Effectively this meant that for the US, for example, where the data begins in October 1832, the number of monthly index observations through until September 2006 is 2,088 months and the sample size for the 40 year window assessment in the US is therefore 1,607 periods ($2,088 - (40*12)-1$). When we take the complete pool of 15 countries that have 40 year horizon data the sample size is 8,965 measurement periods, while t. The sample size for the 1 year horizon is 24,672 measurement periods.

⁶ While the method is not biased by predetermined entry and exit points one drawback is that each investment period observation is not independent. For example, for France there are only 11 truly independent 10 year investment horizons from 1895 to 2006 observations.

To conduct our risk analysis we employ the Value at Risk (VaR) methodology using the 5th percentile level of performance. The approach consists of measuring the realized return at the 5th percentile of all outcomes for the investment type and horizon in each country, then taking the average of all the country's VaRs for the horizon. Specifically, the 5th percentile is a value such that 5% of the observations are less than this value and that 95% are greater. The advantage in the 5th percentile approach to risk analysis is that it indicates the level of downside risk under 'normal' market conditions rather than focusing on the most extreme downside events. Empirical research reveals a strong positive relationship between VaR and stock returns and that it is a superior explanatory variable of portfolio returns (in terms of R²) compared to other risk factors such as volatility, size and beta⁷.

With the exception of Jorion (2003) and Dimson, Marsh and Staunton (2004), previous "time in the market" studies have focused on volatility measured by standard deviation as the risk measure for stocks and bonds. The problem with this approach is that standard deviation includes both upside outcomes as well as downside outcomes in its computation. Our study therefore extends these works by applying VaR to bonds as well as stocks and examining investment horizons greater than 10 years.

4. Results

We examine the risk of stocks and bonds over a range of investment horizons from the short term through to the long term. We find the risk of both stock and bonds, as measured by their 5th percentile downside return, declines dramatically as the holding period increases, particularly in the case of stocks. We begin our results section with a discussion of the return

⁷ For analysis of the relationship between stock returns and VaR and additional explanatory power of VaR after controlling for characteristics of market return, size, book-to-market ratio and liquidity see Bali and Cakici (2004).

characteristics of stocks and bonds over various holding periods and then discuss the VaR downside risk results.

Table 1 contains the mean per annum returns across various holding periods for each developed and emerging country.⁸ The differing start dates of each stock series reduce our ability to make direct comparisons of the performance of the various markets. However, general observations are possible. All 24 developed countries earn positive average stock returns for all investment horizons reported. With the exception of China and the Philippines, the other 23 emerging markets in our sample produce positive average stock returns for short one and two year investment horizons. Along with China and the Philippines, Indonesia and Argentina produce negative average returns over medium term investment periods.

The average one year developed market return for all 25 emerging markets is 20.59% compared to 14.22% for developed markets. The average emerging market two and three year returns are also higher than developed markets but this trend is reversed for longer holding periods. For five year holding periods, mean developed market return is 10.10% compared to 6.90% for the emerging markets.

(Insert Table 1 about Here)

It is apparent that countries where the series began within the last 30 years have higher mean stock returns. This is no doubt related to the post 1980s bull markets. The series that include the early part of the 20th century or before tend to have more modest mean stock returns. For

⁸ Our mean one-year return for the US market of 10.54%, which relates to the 1832 - 2006 period is very similar to Siegel's (1994) mean returns for the US market of 9.7% and 10.6% for the 1802 - 2001 and 1871 - 2001 periods respectively.

instance, the weakest developed country stock market is France with returns of less than 10% for each holding period and this series began in 1895. The US market experienced a 10.54% mean annual stock return since 1832. Greece is the best performed developed market, with annual returns in excess of 20% for holding periods of 1 to 2 years. The strong performance of Greece's equity market was enhanced by the appreciation of the currency over the period commencing 1976, which is when our stock series began.

South Korea is the strongest performing emerging stock market and experiences consistently high average returns for all investments holding periods. For instance South Korea generates an annual holding period average return of 25.04% through to 17.75% average for 40 year investment horizons. This makes South Korea consistently the best performed market overall. Many emerging markets (e.g. Brazil) experienced hyperinflation. This flows through to very strong local currency returns, but these are often not realizable by US investors as hyperinflation tends to be associated with sharp exchange rate declines. Thus our use of USD returns is more appropriate as it accounts for these distortions.

We present the returns to various bond holding periods in Table 2. A similar trend to stocks is evident where the average yearly returns are higher for the shorter holding periods. This is primarily due to the fact that the total returns to bonds (capital gains and yields) are positive over time and there is more volatility in short-term bond returns. It is also clear that the average per annum return to bonds is lower than stocks for each holding period. The average developed market bond return over the one-, two-, and three-year horizons are 9.11%, 8.63%, and 8.37% compared to average stock returns of 14.22%, 12.22%, and 11.26% over these same horizons. This trend is also evident in emerging markets. The average one-year

emerging market return is 20.59% for stocks and 9.58% for bonds. Mean two- and three-year stock (bond) returns in emerging markets are 14.29% (8.17%) and 11.30% (7.68%).

Consistent with the stock market results, Greece is the best performing developed market. Again, the appreciation of the Greek currency against the USD is a big factor in this. In the US the returns to bonds are among the lowest of all developed countries which is indicative of the tight control over inflation in the later part of the 20th century and smaller risk premium attached to U.S. government debt.

For all markets and investment horizons, negative mean bond returns only occur in the two emerging markets of Argentina and Turkey, with Turkey having particularly large negative mean returns for each holding period. The local currency Turkish returns are close to zero so this reflects the depreciation of the Turkish currency against the USD over the 1995 – 2006 period of the study.

(Insert Table 2 about Here)

Table 3 reports the results of our critical tests, the 5th percentile downside VaR return scores for stocks in each country. As mentioned before, this number gives an indication of the downside risk in the investment over that horizon.⁹ This table highlights that risk, measured in this manner, reduces with the length of the investment horizon. For developed markets the downside return metric has quite unfavourable values for shorter horizons, with average one year holding horizon 5th percentile return in developed markets of -24.49%. Even at five year horizons the average annual downside return score is -6.15% for developed markets. While

⁹ We verify that the results for 1% VaR levels are qualitatively similar.

we focus our analysis on returns per annum to ensure comparability across different investment horizons, we do also consider cumulative returns across holding periods to gain an insight into the total gains or losses made.

For instance, while -6.15% might sound a relatively low loss this converts into a five year holding period loss of 27 cents in every dollar invested. In fact the 5th worst cumulative holding period return¹⁰ does not improve until investment horizons are greater than five years. However, the downside average returns score improves greatly as the holding period increases beyond five year investment horizons. For the 10 year horizon it is positive, and for the 20 year horizon the downside return is positive 4.82%. The downside return metric converges to around 6.50% for longer holding horizons of up to 40 years which equates to over \$12 per dollar invested.

For emerging stock markets the average one year 5th percentile return ranges from -21.68% for Morocco to -91.68% for Russia with an average of -43.58% for all 25 emerging markets in our sample. While annual VaR reduces substantially as investment horizon increases, the cumulative holding period losses at the 5th worst percentile remain large over the short to medium term. For example, at the five and 10 year horizons the annual downside returns are still -15.11% and -2.58% which are equivalent to losing 56 cents and 23 cents in every dollar invested.

Another way to look at the risk of buying a stock portfolio at the wrong time is to count the number of markets where the holding horizon produces a negative result. Looking down the holding horizon columns we see that no market has been able to return investors capital at the

¹⁰ For example, the 5th percentile worst portfolio for two-, three-, four- and five-years are all worse than the one year average 5th percentile worst case scenario.

5^{th} percentile level for holding horizons of 3 years or less, and typically the time horizon required for reasonable outcomes is 10 years. Examining the 10 year horizon column we see that seven out of the 22 developed markets that qualified, or 32%, were still in the negative. The comparable figure in emerging markets was eight out of 13, or 62%. As the holding horizon is expanded ten, twenty, or more years the chance of getting stuck in an inferior stock portfolio reduces dramatically. By the twentieth year horizon you have a 5% chance of being in a loss position in your investment in only three out of twenty five countries, all of which were in developed countries and in periods directly linked to World War II, namely Italy, Japan, and France. It is interesting that Denmark has had a surprisingly low risk market in that by the fourth year horizon the downside VaR is positive 0.49%. Data was limited at the 20 year horizon for many emerging markets but for the four countries that have the data, none exhibit negative downside risk at the 20 year horizon.

(Insert Table 3 about Here)

The 5% VaR bond downside results reported in Table 4 are similar to their stock counterparts in that risk declines as the holding period increases. It is notable that domestic US bonds have a much better downside risk profile than foreign currency bonds. This is due to the exchange rate factor in foreign bonds. It is also evident that bond risk, based on the 5% VaR downside measure, is lower than stock market risk in the shorter investment horizons up to 5 years. For example, in the 1 year horizon for developed countries the risk measure for stocks is -24.49% while the similar measure for bonds is -13.62%. The relative risk of stocks and bonds, however, reverse at the 5-10 year horizon in developed markets. At 10 years, stock's downside returns average 1.81% versus -1.48% for bonds. A similar pattern is evident in the emerging countries, but the bond/stock cross over point is closer to 15 years.

(Insert Table 4 about Here)

We illustrate the changing nature of risk over different holding horizons with several figures.

Figure 1 and 2 graph the developed and emerging countries median, 5th percentile and 95th percentile stock return points respectively. It is shown that the likelihood of very large positive or negative returns is very much investment horizon related. When the investment horizon is short, such as for 1 year, the 95th and 5th percentile performance outcomes that can be experienced for developed (emerging) markets are +70% (+135%) and -24% (-45%). However, as the horizon is lengthened the up and downside return metrics start to converge. The downside VaR takes on much better outcomes and it steadily slopes upwards into positive territory. After 7-8 years for developed countries and 11-12 years for emerging markets, the VaR measure is breaking even, while the upside VaR is above 10% per annum.

(Insert Figure 1 & 2 about Here)

Relative risk across stock and bond markets is illustrated in Figure 3 (developed countries), Figure 4 (emerging countries) and Figure 5 (US). We directly compared the 5th percentile VaR statistics for stocks and bonds over the range of investment horizons. Figure 3 clearly shows that developed market stocks were riskier than bonds in holding horizons up to 4 years. For instance over a 1 year holding horizon the 5th percentile VaR for stocks is -25% but -15% for bonds. This reflects the commonly held view that stocks are riskier than bonds. However, over longer investment horizons the risk in stocks completely flips over. The figure reveals that after holding developed countries stocks for 5 years the downside risk is materially more favourable than the downside risk on bonds. Beyond 17 years the 5th percentile VaR level of return on stocks is above positive 5% return per annum. After a 30 year holding horizon,

stock performance at the 5th percentile level of return outperforms the mean level of return on bonds over the same horizon.

(Insert Figure 3 about Here)

Figure 4 demonstrates a similar pattern for emerging markets with bonds outperforming stocks in the shorter term and reversing for long investment horizons. The key difference is the substantially longer time it takes for the 5th percentile level of stock return to outperform bonds which is closer to 16 years.

(Insert Figure 4 about Here)

Figure 5 displays the US stock and bond market 5th percentile returns. The figure shows US bonds are very low risk for a US based investor with a break even point holding horizon of just over 1 year for the 5th percentile return. US stocks break even point 5th percentile return is 7 years and the cross over point where stocks become less risky than bonds is just under 9 years. Beyond that time horizon stocks begin to dominate bonds by a large margin.

(Insert Figure 5 about Here)

5. Conclusions

We explore the relative risk of stocks versus bonds over different investment horizons in a broad sample of developed and emerging countries using a downside 5th percentile VaR return analysis. The aim is to address the question of how long do investors need to be invested in order to have confidence that they will earn an adequate return. Using US dollar

total returns to give the study a realistic investor focus, we find the downside risk of both stock and bond markets improves as the holding period is increased. The value of a dollar invested in 5th percentile worst performing stock portfolio in developed markets turns positive, on average, after 7 years. The equivalent break even point horizon in emerging stock markets is 12 years. For international bond investments the break even point horizons are 17 years and 6 years for developed and emerging markets respectively. This compares to the break even point for an investment in US bonds of just over 1 year.

An analysis of the 5th percentile return provides a number of useful insights. Firstly, stock markets in developed nations display broadly similar risk characteristics to US stock markets in that the break even points are 7 years in both cases. Secondly, emerging country stock markets are, on average, nearly twice as risky as investing in the US or other developed country stock markets, unless the investment horizon is over 20 years. Thirdly, international bond markets, whether in developed markets or emerging markets, are much riskier than US bond market investments. It is noted that international bonds experience considerable downside risk without the commensurate upside potential of stocks.

The results across stocks and bonds and emerging and developed country markets are consistent with the view that investors with shorter investment horizons should seriously limit their exposure to risky assets and/or markets. Alternately, investors with longer time horizons should ensure they have sufficient exposure to equity markets, including diversification into foreign stocks in developed and emerging countries. Of course, investors should be aware that there is always the risk that equity markets will have different returns in the future to what they have in the past or that they will have the misfortune to enter the market just prior to a substantial decline in the market.

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Table 1: Mean Stock Returns Across Different Holding Periods

Country	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	10 yrs	20 yrs	30 yrs	40 yrs
Developed Countries									
Australia	12.81	11.89	11.49	11.23	11.08	10.85	10.98	10.86	10.83
Austria	16.43	14.22	12.71	11.32	10.61	9.82	11.55	9.43	.
Belgium	13.20	12.20	11.61	11.12	10.82	10.75	11.31	10.91	10.80
Canada	11.75	10.59	10.05	9.66	9.58	10.01	10.11	9.84	9.77
Denmark	17.81	16.00	15.02	13.81	13.52	13.66	14.20	13.34	.
Finland	20.52	18.46	17.53	17.00	16.89	17.47	17.59	16.55	15.79
France	9.76	7.87	7.15	6.72	6.45	6.25	5.86	5.36	5.06
Germany	14.32	12.46	11.49	11.00	10.79	10.41	9.66	9.32	9.64
Greece	23.46	20.63	18.79	16.38	14.79	.	.	.	.
Hong Kong	12.00	9.55	7.99	6.19	5.49	.	.	.	.
Ireland	14.98	13.86	13.17	12.67	12.80	14.22	.	.	.
Italy	13.93	9.47	8.45	7.56	7.15	6.91	6.31	6.16	5.98
Japan	12.96	10.64	9.69	9.21	8.90	8.42	8.95	9.56	10.15
Luxembourg	20.80	15.48	13.13	11.59	11.02	11.74	.	.	.
Netherlands	15.04	14.42	14.10	13.76	13.62	13.79	14.02	13.95	13.71
New Zealand	10.15	9.35	9.23	8.61	8.24	7.97	.	.	.
Norway	16.86	13.13	11.58	10.02	9.48	10.52	11.03	9.38	.
Portugal	9.24	8.01	7.29	6.68	6.67	8.70	.	.	.
Singapore	12.04	8.92	7.23	6.00	5.43	3.42	.	.	.
Spain	12.46	11.00	10.33	9.78	9.35	9.11	9.40	8.73	8.95
Sweden	13.83	12.47	11.87	11.45	11.26	11.31	11.68	11.34	11.25
Switzerland	14.41	13.32	12.60	12.10	12.09	12.62	13.03	12.62	.
U.K.	11.88	9.62	8.58	7.76	7.27	6.41	5.80	5.63	5.49
US	10.54	9.65	9.27	9.09	9.05	9.09	8.95	8.85	8.72
Average	14.22	12.22	11.26	10.45	10.10	10.14	10.61	10.11	9.70

	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	10 yrs	20 yrs	30 yrs	40 yrs
Emerging Countries									
Argentina	13.59	4.02	-0.47	-0.96	0.05	.	.	.	.
Brazil	30.12	20.87	18.70	16.83	15.73	13.87	.	.	.
Chile	27.15	24.88	24.58	23.65	23.00	21.36	.	.	.
China	-1.95	-6.19	-7.49	-9.67	-11.90	.	.	.	.
Colombia	35.42	28.29	25.44	22.07	17.99	10.44	.	.	.
Egypt	42.01	32.92	21.99	14.27	9.21	.	.	.	.
Hungary	22.66	19.57	17.74	15.98	15.36	14.51	.	.	.
India	18.25	13.25	11.58	9.60	7.65	5.74	.	.	.
Indonesia	19.07	7.98	1.90	-1.01	-3.02	-9.34	.	.	.
Israel	10.24	8.33	7.51	5.70	5.03	.	.	.	.
South Korea	25.04	21.34	20.36	19.86	19.53	18.50	18.40	17.78	17.75
Malaysia	13.55	10.53	9.83	9.55	9.30	7.43	8.02	.	.
Mexico	20.73	16.70	14.18	12.45	12.38	.	.	.	.
Morocco	14.96	11.91	9.13	5.47	3.03	.	.	.	.
Pakistan	20.43	14.03	12.51	10.79	7.54	1.53	.	.	.
Peru	20.47	15.61	13.70	10.60	8.03	.	.	.	.
Philippines	-3.27	-4.78	-6.92	-9.54	-9.89	.	.	.	.
Poland	20.76	19.77	20.07	.	.	.	.	.	.
Russia	39.03	19.22	6.33	1.37	1.82	.	.	.	.
South Africa	16.50	14.07	12.68	11.76	11.17	10.46	11.48	11.04	10.51
Sri Lanka	14.17	6.39	5.09	3.93	1.47	.	.	.	.
Taiwan	11.80	4.28	2.71	2.31	2.23	3.15	.	.	.
Thailand	18.99	15.71	13.46	11.28	10.07	9.60	9.72	.	.
Turkey	32.83	18.20	12.65	7.45	1.47	.	.	.	.
Venezuela	32.07	20.24	15.15	10.52	8.34	7.54	.	.	.
Average	20.59	14.29	11.30	8.51	6.90	8.83	11.91	14.41	14.13

Notes: All data are total return indices sourced from Global Financial Data. Countries are classified as developed or emerging based according to MSCI classifications. All returns are percentage mean returns per annum.

Table 2: Mean Bond Returns Across Different Holding Periods

Country	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	10 yrs	20 yrs	30 yrs	40 yrs
Developed Countries									
Australia	5.96	5.59	5.37	5.21	5.09	4.92	4.59	4.29	4.24
Austria	11.97	11.65	11.36	11.09	10.85	10.52	11.16	10.48	.
Belgium	9.36	9.09	8.92	8.78	8.64	8.79	9.34	9.07	9.10
Canada	7.06	6.72	6.54	6.40	6.30	6.27	6.14	5.82	5.80
Denmark	13.44	13.05	13.04	13.14	13.36	14.29	14.76	13.44	.
Finland	9.89	9.69	9.56	9.44	9.24	9.54	9.82	9.64	9.09
France	3.60	2.60	2.14	1.89	1.66	1.20	0.50	-0.10	-0.60
Germany	8.18	7.96	7.80	7.68	7.54	7.64	7.95	7.88	7.84
Greece	21.66	21.60	20.94	20.08	18.96	.	.	.	.
Hong Kong	6.36	7.09	7.39	7.72	7.97	.	.	.	.
Ireland	10.44	10.49	10.23	9.83	9.17	8.80	.	.	.
Italy	5.97	4.71	4.16	3.72	3.39	2.44	1.15	1.27	1.51
Japan	5.49	4.26	3.74	3.48	3.23	2.40	1.42	0.85	1.34
New Zealand	15.34	14.12	13.47	12.91	12.17	10.84	.	.	.
Norway	9.70	9.59	9.43	9.20	8.93	8.73	9.89	8.45	.
Portugal	14.39	14.43	14.35	14.47	13.89	13.31	.	.	.
Singapore	5.63	5.59	5.42	5.28	4.93	3.87	.	.	.
Spain	6.11	5.55	5.08	4.74	4.44	4.39	4.95	4.76	4.70
Sweden	6.68	6.24	6.01	5.85	5.71	5.55	5.28	4.90	4.86
Switzerland	9.30	9.06	8.93	8.88	8.80	8.67	8.58	8.62	.
U.K.	12.49	10.27	9.84	9.44	9.15	8.31	6.31	5.27	4.74
US	5.04	4.98	4.95	4.95	4.94	4.89	4.77	4.53	4.34
Average	9.11	8.63	8.37	8.16	7.90	7.04	6.35	5.88	4.48
Emerging Countries									
Argentina	1.74	-1.96	-4.49	-3.27	-2.44	.	.	.	.
India	3.96	4.16	4.52	4.79	5.04	5.02	.	.	.
Israel	11.37	11.53	11.56	11.31	11.25	.	.	.	.
South Korea	15.62	14.12	14.07	14.08	14.20	14.85	15.58	15.15	13.82
Malaysia	7.34	6.91	6.76	6.81	6.80	6.41	6.71	.	.
Mexico	31.61	27.23	25.12	25.89	26.90	.	.	.	.
Pakistan	5.57	5.44	5.63	5.72	5.14	3.71	.	.	.
Philippines	14.85	13.80	13.42	13.29	13.57	.	.	.	.
Poland	20.86	22.48	22.13	.	.	.	.	.	.
South Africa	7.35	6.52	6.01	5.51	5.10	4.56	3.97	4.24	4.71
Thailand	9.94	8.16	8.24	8.46	8.39	7.50	9.56	.	.
Turkey	-20.55	-21.38	-22.01	-23.50	-25.07	.	.	.	.
Venezuela	14.85	9.22	8.93	8.18	8.48	10.46	.	.	.
Average	9.58	8.17	7.68	6.44	6.45	7.50	8.96	9.70	9.27

Notes: All data are total return indices on 10 year government bonds sourced from Global Financial Data. Countries are classified as developed or emerging based according to MSCI classifications. All returns are percentage mean returns per annum.

Table 3: Stock: 5th percentile returns (VaR)

Country	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	10 yrs	20 yrs	30 yrs	40 yrs
Developed Countries									
Australia	-17.17	-8.90	-3.46	-2.95	-0.55	5.96	7.07	7.64	8.79
Austria	-20.09	-16.20	-11.89	-8.66	-5.00	-1.88	7.63	7.53	.
Belgium	-16.57	-13.19	-8.69	-2.97	-0.30	3.35	6.02	7.13	10.01
Canada	-18.14	-9.97	-6.23	-2.47	-0.83	5.25	7.23	8.46	8.52
Denmark	-18.59	-6.05	-1.86	0.49	2.34	8.63	10.74	10.30	.
Finland	-25.11	-20.46	-14.65	-10.42	-5.78	8.41	11.57	13.02	14.77
France	-32.62	-22.40	-18.32	-15.31	-10.58	-5.03	-1.94	-0.49	-0.28
Germany	-22.87	-14.47	-8.08	-5.69	-4.23	2.53	4.34	7.18	7.07
Greece	-42.31	-34.72	-29.03	-18.77	-9.13	.	.	.	.
Hong Kong	-33.45	-19.10	-12.87	-4.22	-2.75	.	.	.	.
Ireland	-15.07	-7.10	-4.38	-3.67	0.05	11.47	.	.	.
Italy	-33.39	-25.61	-22.45	-18.73	-16.32	-7.84	-0.93	3.14	2.39
Japan	-34.07	-27.52	-32.18	-30.59	-24.74	-20.33	-8.82	-1.87	2.63
Luxembourg	-19.59	-14.65	-9.64	-4.69	-2.07	6.35	.	.	.
Netherlands	-17.48	-9.54	-4.05	-3.09	-1.83	5.41	8.14	11.15	12.46
New Zealand	-31.01	-19.03	-13.46	-14.39	-10.57	4.05	.	.	.
Norway	-30.01	-20.87	-15.68	-9.16	-9.57	3.94	7.38	6.05	.
Portugal	-27.58	-17.78	-15.02	-12.25	-8.01	6.44	.	.	.
Singapore	-28.58	-23.53	-17.75	-11.17	-8.43	-0.71	.	.	.
Spain	-29.60	-22.58	-20.47	-17.55	-15.55	-5.81	2.05	5.09	3.60
Sweden	-22.77	-13.27	-10.78	-7.67	-5.38	0.91	5.44	6.45	7.38
Switzerland	-17.78	-9.55	-6.78	-3.29	-0.67	7.08	10.76	10.57	.
U.K.	-15.24	-11.97	-9.27	-6.35	-4.68	-0.05	0.70	1.66	2.28
US	-18.59	-10.56	-5.90	-4.96	-3.04	1.60	4.54	5.76	5.95
Average	-24.49	-16.63	-12.62	-9.11	-6.15	1.81	4.82	6.40	6.58

	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	10 yrs	20 yrs	30 yrs	40 yrs
Emerging Countries									
Argentina	-50.57	-43.55	-34.61	-24.42	-22.23	.	.	.	.
Brazil	-46.41	-27.92	-11.33	-10.28	-13.14	5.88	.	.	.
Chile	-24.71	-15.41	-11.71	-8.65	-7.31	1.48	.	.	.
China	-49.19	-37.64	-27.54	-26.31	-25.65	.	.	.	.
Colombia	-35.45	-28.46	-26.17	-19.04	-13.92	0.43	.	.	.
Egypt	-41.25	-38.06	-25.09	-16.68	-16.52	.	.	.	.
Hungary	-36.03	-14.86	-10.74	-9.79	-3.54	5.19	.	.	.
India	-32.84	-19.48	-11.15	-9.99	-5.68	-2.01	.	.	.
Indonesia	-73.45	-57.26	-42.63	-39.07	-32.69	-16.55	.	.	.
Israel	-33.74	-27.23	-13.17	-6.48	-4.75	.	.	.	.
South Korea	-42.34	-23.93	-21.12	-13.06	-9.88	-4.01	7.58	11.88	14.33
Malaysia	-39.10	-31.63	-22.92	-19.95	-16.28	-3.07	1.99	.	.
Mexico	-26.48	-6.60	-3.21	2.64	-0.10	.	.	.	.
Morocco	-21.68	-18.42	-17.50	-15.11	-8.39	.	.	.	.
Pakistan	-45.65	-30.40	-21.65	-25.73	-20.00	-6.93	.	.	.
Peru	-29.59	-21.65	-17.13	-12.54	-8.68	.	.	.	.
Philippines	-53.77	-33.50	-27.09	-26.54	-24.33	.	.	.	.
Poland	-25.98	-15.99	-11.15	.	.	.	.	.	.
Russia	-91.68	-72.21	-51.83	-42.37	-32.98	.	.	.	.
South Africa	-32.18	-19.32	-10.75	-7.21	-6.00	1.69	4.69	7.80	9.57
Sri Lanka	-41.17	-28.96	-25.19	-23.76	-19.21	.	.	.	.
Taiwan	-47.77	-29.11	-24.42	-16.72	-9.79	-0.74	.	.	.
Thailand	-48.45	-44.95	-39.83	-35.38	-31.92	-11.20	4.10	.	.
Turkey	-64.91	-45.23	-35.40	-19.16	-14.90	.	.	.	.
Venezuela	-55.06	-29.02	-18.07	-13.57	-14.62	-3.71	.	.	.
Average	-43.58	-30.43	-22.46	-18.30	-15.11	-2.58	4.59	9.84	11.95

Notes: All data are sourced from Global Financial Data. Countries are classified as developed or emerging based according to MSCI classifications. Each row reflects the percentage of times that the stock index for each country generates a return below zero for a given holding period.

Table 4: Bond: 5th percentile returns (VaR)

Country	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	10 yrs	20 yrs	30 yrs	40 yrs
Developed Countries									
Australia	-12.36	-9.23	-7.64	-5.12	-4.40	-0.88	0.80	1.97	2.74
Austria	-13.65	-7.15	-3.91	-1.54	-1.74	5.47	8.24	9.88	.
Belgium	-8.91	-7.60	-4.61	-3.46	-1.16	4.12	5.73	5.54	8.21
Canada	-6.02	-3.67	-1.65	-0.42	0.74	2.08	2.74	2.96	3.60
Denmark	-7.00	2.21	4.14	4.82	5.73	8.27	10.31	13.14	.
Finland	-13.21	-6.19	-4.23	-1.71	-0.48	3.35	4.89	8.17	8.15
France	-32.46	-28.88	-22.41	-20.54	-18.89	-17.45	-10.69	-7.24	-7.07
Germany	-9.32	-6.40	-4.64	-2.10	-0.85	4.91	5.74	6.00	7.14
Greece	-6.31	-0.10	3.10	7.60	10.39	.	.	.	.
Hong Kong	-6.08	0.62	1.96	3.48	3.32	.	.	.	.
Ireland	-11.84	-6.63	-4.01	-0.13	1.69	5.74	.	.	.
Italy	-32.24	-39.64	-29.33	-34.54	-32.46	-25.66	-13.86	-7.78	-5.57
Japan	-34.26	-43.17	-52.25	-42.05	-36.20	-35.40	-19.35	-12.42	-7.44
New Zealand	-10.38	-4.50	-4.39	-3.16	-1.18	6.30	.	.	.
Norway	-8.85	-6.01	-5.49	-3.80	-2.25	1.95	8.28	7.95	.
Portugal	-13.33	-7.83	-3.34	0.29	2.52	9.18	.	.	.
Singapore	-10.26	-6.50	-4.53	-2.87	-1.70	1.29	.	.	.
Spain	-19.57	-15.45	-10.42	-13.25	-10.97	-6.57	-2.84	-0.41	-0.37
Sweden	-15.65	-13.69	-8.60	-5.83	-4.18	0.34	1.35	2.16	3.11
Switzerland	-12.97	-6.86	-3.80	-3.75	-3.04	3.73	5.11	7.61	.
U.K.	-13.43	-8.97	-6.56	-4.86	-4.07	-2.29	-1.12	-0.29	0.95
US	-1.55	0.22	0.90	1.27	1.32	1.82	2.00	2.43	2.71
Average	-13.62	-10.25	-7.81	-5.98	-4.45	-1.48	0.46	2.48	1.34
Emerging Countries									
Argentina	-79.86	-58.85	-44.05	-34.08	-27.51	.	.	.	.
India	-20.72	-13.63	-10.58	-8.77	-7.35	-1.78	.	.	.
Israel	0.50	4.70	6.35	7.21	7.04	.	.	.	.
South Korea	-22.75	-11.62	-5.10	-2.21	1.10	8.84	12.08	13.72	12.81
Malaysia	-7.66	-10.28	-5.53	-3.78	-2.33	2.00	5.10	.	.
Mexico	-9.37	0.91	3.32	7.70	12.13	.	.	.	.
Pakistan	-11.06	-7.52	-3.43	-2.43	-1.66	-0.50	.	.	.
Philippines	-40.97	-8.20	1.49	-3.47	2.43	.	.	.	.
Poland	-19.52	1.61	12.14	.	.	.	.	.	.
South Africa	-21.95	-15.71	-9.25	-8.00	-8.59	-2.20	0.71	3.20	3.35
Thailand	-23.12	-19.34	-10.96	-5.56	-2.35	1.05	.	.	.
Turkey	-52.15	-44.09	-41.26	-40.50	-41.34	.	.	.	.
Venezuela	-41.47	-22.60	-13.93	-12.89	-10.22	-0.08	.	.	.
Average	-26.93	-15.74	-9.29	-8.90	-6.55	1.05	5.96	8.46	8.08

Figure 1

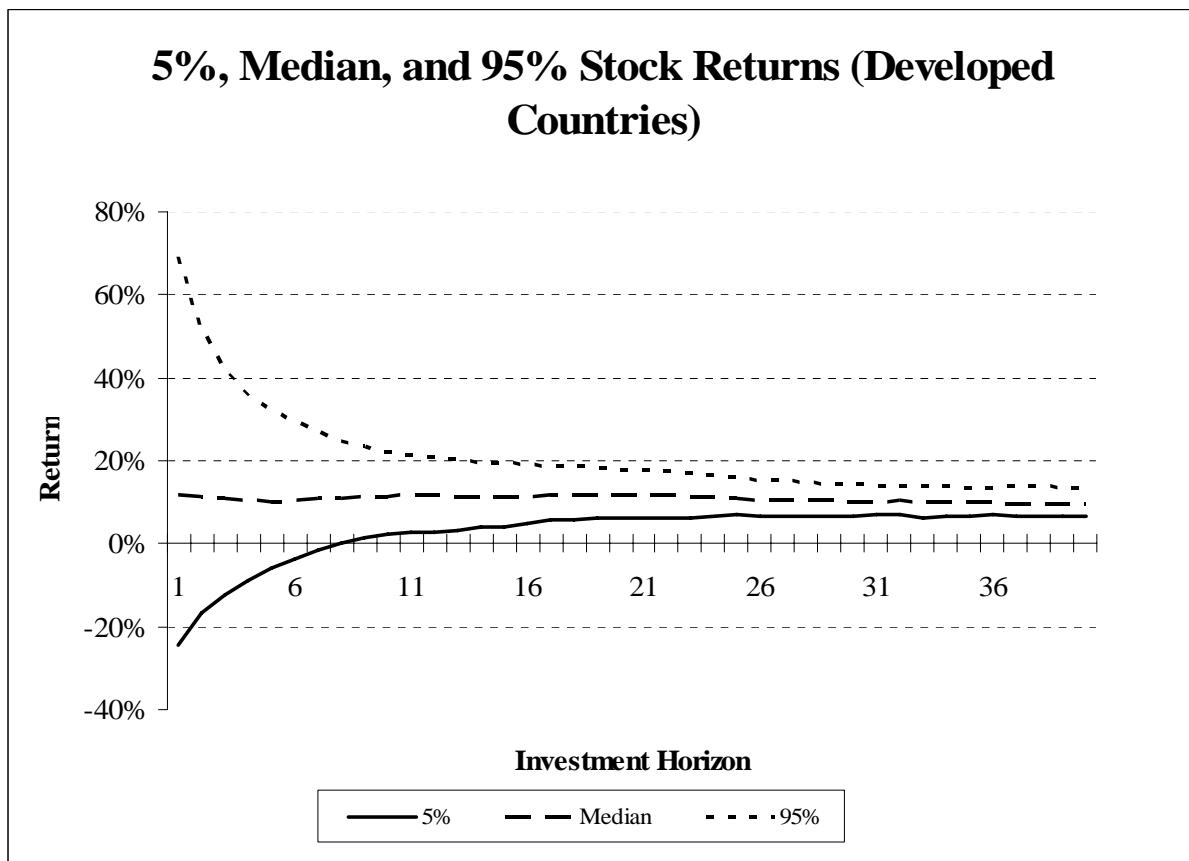


Figure 2

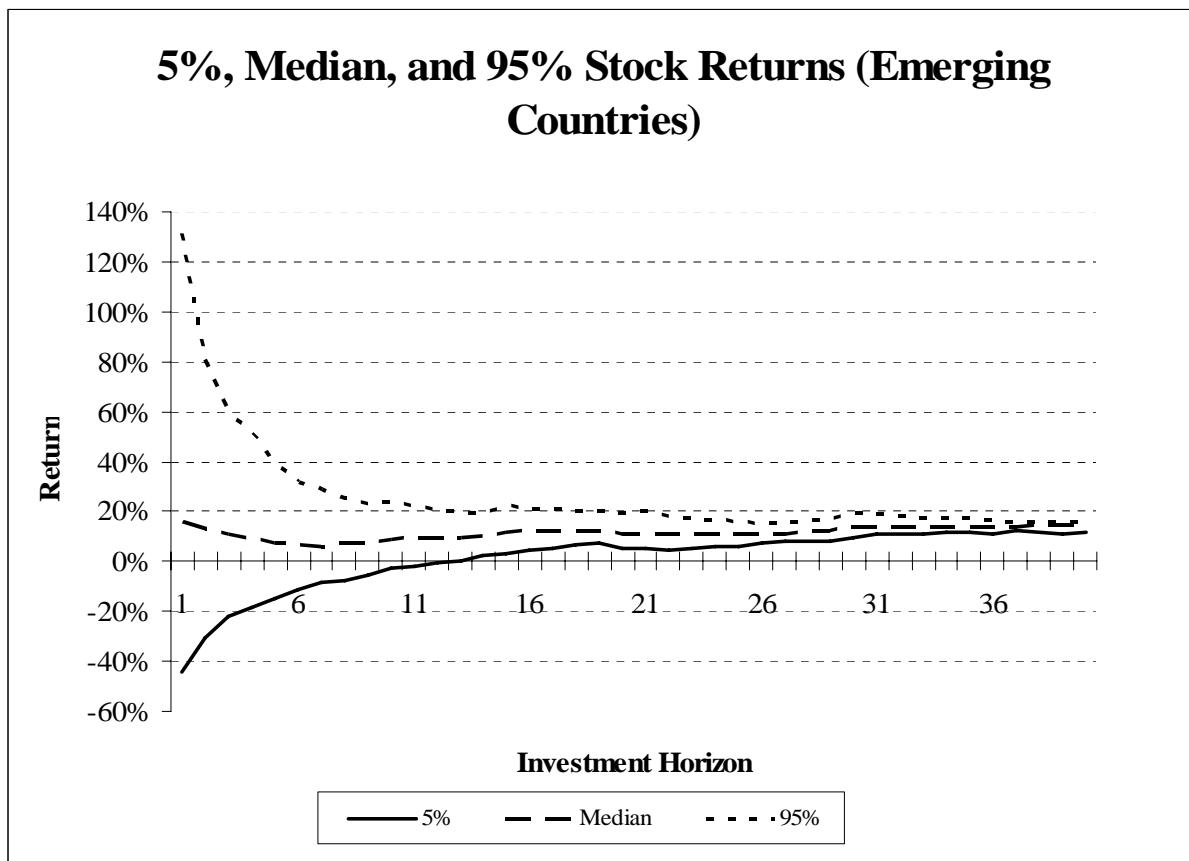


Figure 3

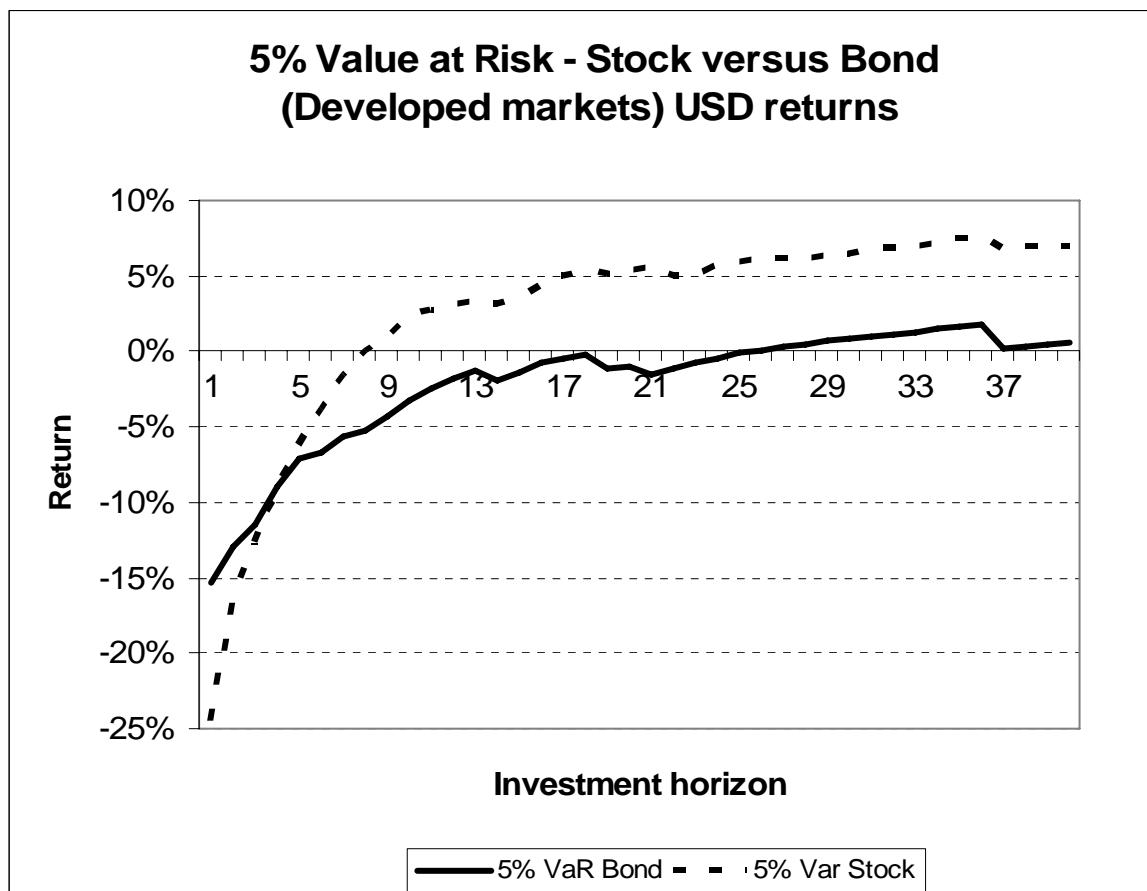


Figure 4

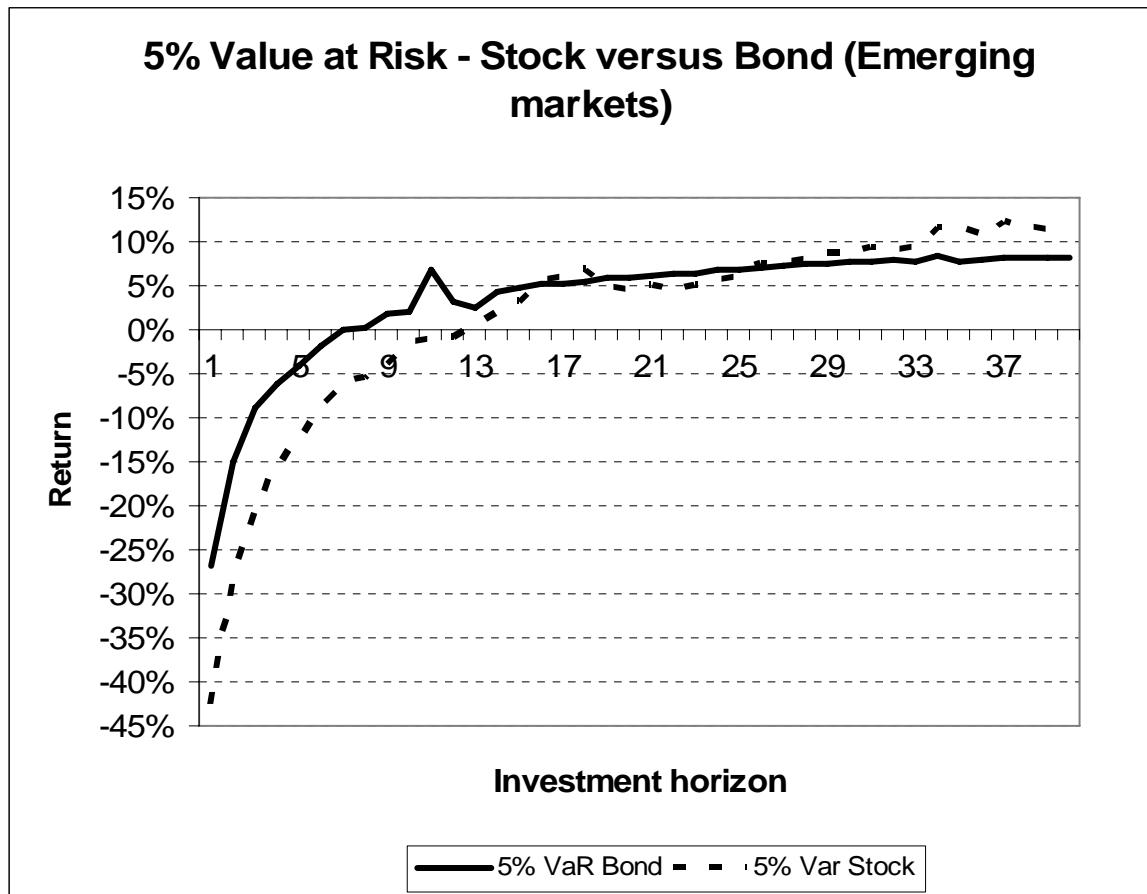
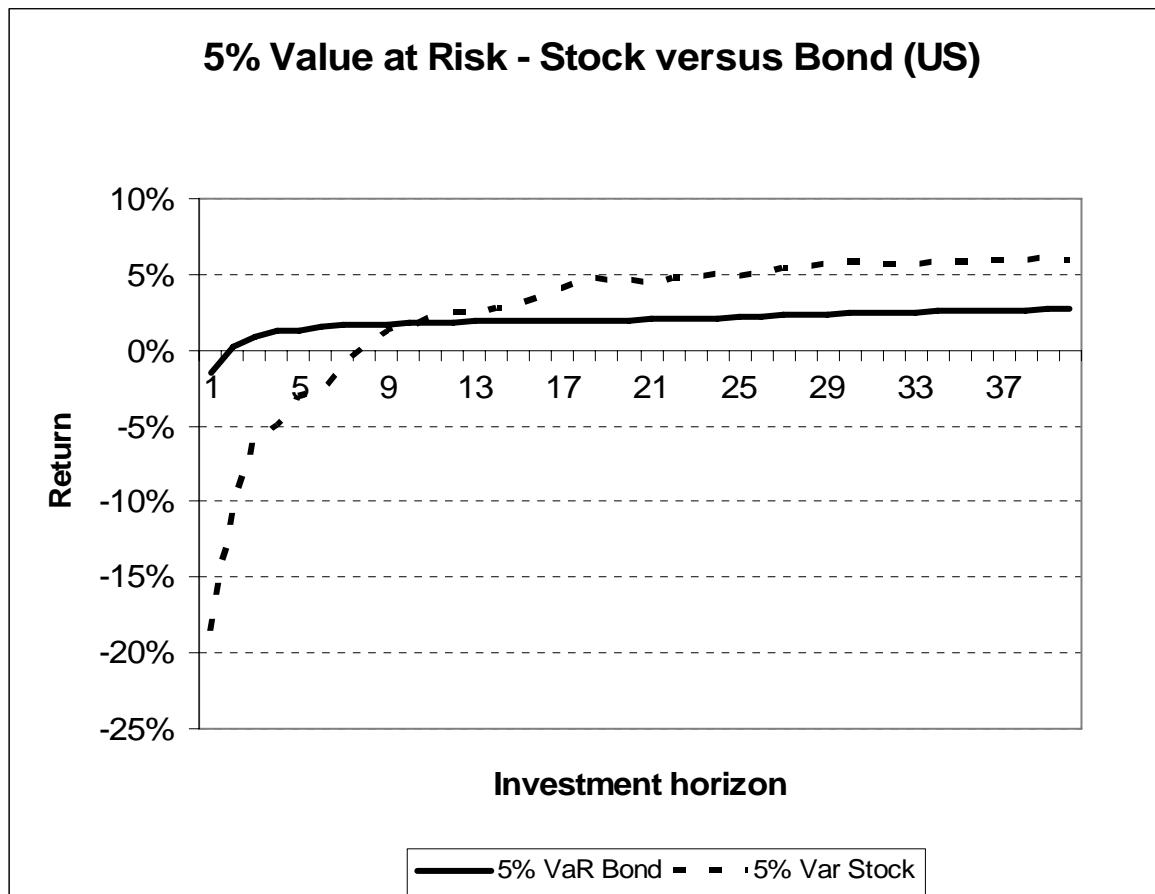


Figure 5



Appendix 1

Country Name	Stock Index	Start Date	N
Australia	Australia ASX Accumulation Index-All Ordinaries	9/1882	1,489
Austria	Vienna SE Return Index	12/1969	442
Belgium	Brussels All-Share Return Index (GFD ext)	12/1950	670
Canada	Canada S&P/TSX-300 Total Return Index	12/1933	874
Denmark	OMX Copenhagen All-Share Gross Index	12/1969	442
Finland	OMX Helsinki All-Share Gross Index	12/1961	538
France	France SBF-250 Total Return Index	2/1895	1,340
Germany	Germany CDAX Total Return Index (w/GFD ext)	1/1950	681
Greece	ASE Total Return General Index	8/1992	170
Hong Kong	Hang Seng Composite Return Index	5/1993	161
Ireland	ISEQ Overall Total Return Index	1/1988	225
Italy	Italy BCI Global Return Index (w/GFD ext)	12/1924	982
Japan	Japan Nikko Securities Composite Total Return	12/1920	1,030
Luxembourg	Luxembourg SE Total Return Index	12/1984	262
Netherlands	Netherlands Total Return Stock Index	12/1950	670
New Zealand	NZSE Gross Index	6/1986	244
Norway	Oslo SE OBX-25 Total Return Index	12/1969	442
Portugal	Lisbon BVL General Return Index	1/1988	225
Singapore	Singapore SE Return Index	11/1987	227
Spain	Barcelona SE-30 Return Index (w/GFD ext)	11/1940	791
Sweden	OMX Stockholm Benchmark Gross Index (GFD ext)	12/1921	1,018
Switzerland	Swiss Performance Index	1/1966	489
U.K.	UK FTSE All-Share Return Index (w/GFD ext)	8/1767	2,870
US	S&P 500® Total Return Index (w/GFD ext)	10/1832	2,088
Argentina	Argentina Total Return Stock Index	12/1987	226
Brazil	Sao Paulo IBrX-50 Return Index	12/1987	226
Chile	Santiago SE Return Index	12/1982	286
China	China Stock Return Index	12/1992	166
Colombia	Colombia Stock Return Index	1/1988	225
Egypt	Egypt Stock Return Index	12/1994	142
Hungary	Budapest Stock Exchange Index (BUX)	1/1991	189
India	India Stocks Total Return Index	12/1987	226
Indonesia	Indonesia Stock Return Index	12/1987	226
Israel	Tel Aviv SE Return Index	10/1993	156
South Korea	South Korea Stocks Total Return Index	4/1962	534
Malaysia	Kuala Lumpur SE Return Index	11/1972	407
Mexico	Mexico SE Return Index	12/1994	142
Morocco	Morocco Stock Return Index	12/1994	142
Pakistan	Pakistan Stock Return Index	12/1987	226
Peru	Peru Stock Return Index	12/1992	166
Philippines	Philippines Return Stock Index	8/1996	122
Poland	Warsaw SE General Index (WIG)	4/1999	90
Russia	Russia Stock Return Index	12/1994	142
South Africa	Johannesburg SE Return Index	1/1960	561
Sri Lanka	Sri Lanka Stock Return Index	12/1992	166
Taiwan	Taiwan FTSE/TSE-50 Return Index	12/1987	226
Thailand	Bangkok SE Return Index	4/1975	378
Turkey	Turkey ISE-100 Total Return Index	12/1995	130
Venezuela	Venezuela Stock Return Index	12/1987	226

