Demographics and International Investment*

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ABSTRACT

Population demographics impact both the time-series and cross-section of expected asset returns. A number of theories link the average age of a population to expected market returns. For example, Bakshi and Chen (1994) argue that an older population will demand a higher premium on equity investment because their risk aversion is higher. We argue that, in an international context, population demographics are more likely to reveal information about the risk exposure of a particular country. Our evidence supports the risk hypothesis.

* Version: November 14, 1996.

1. Introduction

Population demographics impact a variety of asset prices. For example, much is known about the impact of demographics on the valuation of mortgage pools. In this case, demographic characteristics are factored into the prepayment assumptions. However, less is known about the impact of demographics on equity returns. Furthermore, no work has been conducted on the relation between population demographics and international equity investments.

Much of the recent interest in demographics begins with the provocative work of Bakshi and Chen (1994). They present two hypotheses: a life-cycle investment hypothesis and a life-cycle risk aversion hypothesis. The first hypothesis suggests that equity demand increases with average age. Young people demand more housing than equities. As they get older, they invest relatively more in equities. The second hypothesis suggests that risk aversion increases with age. As one gets older and there are fewer paychecks on the horizon, risk aversion increases. Indeed, research by Harlow and Brown (1990) and Riley and Chow (1992) supports the view that increasing average age is associated with increasing relative risk aversion. Harlow and Brown document a biological relationship between aging and risk aversion. Riley and Chow find that, for a single 1984 cross-section of the U.S. population, relative risk aversion increases with age for those over 65, and decreases with age for those younger than 65. This suggests that society's relative risk aversion should increase as a country's population ages (that is, as a larger percentage of the population is over the age of 65). The implication is clear: to get an aging population to participate in the equity market, expected premiums must increase.

Bakshi and Chen (1994) formalize these hypotheses into an asset pricing model. They present evidence based on U.S. data that average age is correlated with expected asset returns in the post-1945 period. They also provide evidence that economy-wide estimated risk aversion is related to average age. Finally, their asset pricing model implies that expected real returns are related to the fluctuations in aggregate consumption along with its associated beta as well as demographic fluctuations and its associated risk sensitivity. Since demographic fluctuations are very persistent, this implies that changes in average age should predict asset returns.

The idea of our paper is to investigate whether these predictions have implications for international investment. In integrated capital markets, then expected returns in any country should be influenced by world macroeconomic fluctuations and changes in world average age. Each country has its own sensitivities to these fluctuations which determine the magnitude of the impact. Integrated capital markets are characterized by no barriers to investment and individual investors hold diversified world portfolios. In segmented capital markets, the characteristics of the local population come into play.

Our results indicate that there is little relation between the "beta" of world average age growth and expected returns. This can be interpreted as evidence against the global version Bakshi and Chen (1994) model or as evidence against the perfect integration of world capital markets.

However, we find a statistically significant cross-sectional time-series relation between real equity returns and the country-specific average age growth for a sample of 18 developed countries over the period 1970-1995. We also present evidence that demographics influence returns in a broader set of 45 developed and emerging countries. We suggest that the demographic variables reveal information about a country's risk exposure such as in the framework of Ferson and Harvey (1996). For example, countries with the highest growth in average age are often the least developed and riskiness countries for international investment. It is not surprising that the equity premium in these countries is high.

2. The Link Between Aging and Returns

2.1 Average Age and U.S. Stock Market Performance

The U.S. reports annual population estimates from ages 0 to 100 in the Bureau of the Census's PE-10 and PE-11 publications. Average age is defined is simply the sum of the proportion of the population in each age-year (age weight) times the age. While the focus of the paper is on average age, it is useful to begin by investigating the relation between age-weights and historical equity returns.

We calculate time-series correlations between each age-weight and U.S. real equity returns. The first panel in Figure 1 shows 76 time-series correlations (one for each age group from 0 to 75 years) over the 1926-1995 period. The second panel presents the same correlations calculated over the shorter 1970-1995 period. Both periods exhibit striking similarities.

In the overall period, the highest correlations are found for the 28-46 age range. In the more recent sample, the highest correlations are found for roughly the same range. That is, an increase in the proportion of the population in this age range positively impacts equity returns. This is the prime working age. It is this group (work prime) of the population that is likely the most productive. Indeed, this proportion explains 4% of the variance of real equity returns over the whole sample and 6% over the last 35 years.

There are many other interesting patterns in these graphs. However, some of the patterns could be spurious. For example, the positive association between the proportion of new born and real returns is probably linked to the fact that the work prime population is having children.

One contrast between the two periods is the influence of the retired segment. In the most recent period, the increase in the proportion of retired people is associated with higher real equity returns. This pattern is only weakly evident in the overall period. One reason for this difference is the tremendous increase in life expectancy experienced over the period 1926-1995. In 1926, life expectancy at birth was 57 years and in 1995 it was about 76 years. In 1926, those over the age of 64 represented 5.5% of the population of the US compared to 13.5% in 1995. The increased life expectancy is also reflected in the average age which increased from 28.1 years in 1926 to 35.3 years in 1995. The longer people live, or expect to live, the more likely they are to have a positive demand for equities.

Why should returns be associated with changes in average age? The basic idea pursued in Bakshi and Chen (1994) is that as people grow older they become more risk averse. If the age of retirement is constant and people on average view their paychecks as a relatively safe investment return (the return to human capital) and equities as relatively risky investments then their asset portfolio consists of a mix of safe (salary) and risky (equities) assets. As people age they get closer to retirement, the proportion of safe assets (remaining paychecks) in their portfolio declines, while the proportion of risky assets increases, thereby increasing the perceived risk of their portfolio. For a risk averse investor, the rational response to an increase in perceived risk is to demand an increase in expected return (to compensate for the higher risk) and/or shift to safer assets such has short-maturity Treasury bonds. Hence, there is reason to believe that the real rate of return on the stock market as a whole should increase as society ages.

This relation between average age growth and real stock value, first documented in Bakshi and Chen (1994), is presented in Figure 2.[1] The first panel shows the patterns for the full sample and the second panel uses post-war data (the initiation point of Bakshi and Chen). The third panel shows the more recent period which will be the focus of our examination of the international implications of demographics. In both panels, there is a clear positive relation between average age growth and equity returns.

2.2 International Demographics and Asset Pricing Theory

We begin our investigation by testing the Bakshi and Chen (1994) model in an international context. In their model presented in the context of the United States, asset expected returns are related to the risk exposures with respect to average age growth and the growth in the economy. In the international version of their model, expected returns in any country are related to their risk exposure with respect to world average age and world economic growth.

We initially focus on a sample of 18 countries which Morgan Stanley Capital International (MSCI) has followed since January 1970.[2] These are the countries that are most likely integrated into world capital markets. We focus on real equity returns and volatility

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[1] Bakshi and Chen (1994) use a different definition of average age. Only the population over 20 is included in the average.

calculated in U.S. dollar terms. In separate analysis, we augment our sample to include the 45 countries jointly tracked by MSCI and the International Finance Corporation (IFC). Many of these countries are not likely integrated into world capital markets, see Bekaert and Harvey (1995).

We focus on three demographic variables: average age growth, life expectancy growth and population growth. Data on population age weights and life expectancy come from the United Nations *Sex and Age Annual* (1994 Revision). This source provides annual demographic data for most countries in the world for the period 1950 to 2050. For the period 1990-2050, the UN provides three different demographic projections: so-called low, medium and high variant projections. The medium variant projection is the UN's base case for demographic change, while the low and high variant projections are essentially best case and worst case scenarios. In the forecasting part of our analysis, we use the UN base case, the medium variant projections.

Table 1 reports some summary statistics on the countries in our sample. Average real equity returns in U.S. dollars range from 0.2% for Italy to 14.5% for Hong Kong. Volatility is lowest in the United States, 14.2%, and highest in Hong Kong, 36%. When calculated in local currency terms the highest real returns are also found in Hong Kong (12.7%) and the lowest returns in Italy (-0.5%). Similar to the U.S. dollar returns, Hong Kong has the highest local real returns volatility, 49.5%, followed closely by Singapore, 48.1%. The lowest volatility is found for the United States, 14.2%. Average age growth is highest in Hong Kong and Singapore, 1.2% per year, and lowest in Austria, Sweden and the United Kingdom, 0.2% per year. The growth rate of life expectancy at birth ranges from a low of 0.1% per year, Denmark, to 0.4% per year for Australia, Hong Kong, Japan, and Singapore. Finally, population growth is highest in Hong Kong, 1.6% per year, and lowest in Belgium, Denmark, Germany, and the United Kingdom at 0.2% per year.

We also consider two aggregates: world and world-all countries. The MSCI world index is specialized to the developing countries whereas the world-all countries index includes

[2] MSCI added Finland, Ireland and New Zealand in January 1988.

developed and emerging markets. We define population aggregates accordingly: world and world-all countries.

Figure 3 provides an examination of the Bakshi and Chen (1994) asset pricing model in an international context. The first panel focuses on the 18 developed countries. These countries are the ones most likely to be integrated into world capital markets. Average real return is graphed against each country's beta with respect to world population growth. It is evident that there is no relation between average returns and the beta [the coefficient on the beta is 0.003 with a heteroskedasticity-consistent t-ratio of 0.4].

The second panel of Figure 3 increases the sample to 45 countries. The results also show no significant relation between average returns and the population beta [coefficient on the beta is 0.002 with a t-ratio of 0.3]. When the emerging markets are considered separately, there is no relation between expected returns and beta. With these countries, the slope coefficient estimate is negative [t-ratio of 0.2].

Overall, there is little evidence support the influence of the population beta on expected returns. But there are many reasons to believe that the Bakshi and Chen (1994) framework is difficult to fit in an international framework. Aside from the issue of market integration, it turns out that countries with the highest average age growth are generally those with the lowest average age. That is, countries with relatively young populations seem to age more rapidly than relatively old populations. When we think about aging in the United States, we see a growing number of people living for an increasing number of years in retirement. In many other countries of the world, aging often means that people do not die, on average, during middle age. Aging in a global context then, does not simply mean that more people are retired. It means that a
country or society is undergoing some form of stress to past allocations of resources.

As we will see below, there does appear to be a relation between the population dynamics in a particular country and expected returns. We will pursue the hypothesis that the population characteristics are related to country risk. That is, in the previous exercise, we measured population risk as the covariance of a country's population growth rate to a world population growth rate. We now investigate whether the country's population growth rate reveals information about other types of risk.

2.3 International Demographics as Country Attributes

In the framework of Ferson and Harvey (1996), we consider a country's demographics as a 'country attribute' that proxies for risk exposure. Figure 4 illustrates the historical relation between real equity return and average age growth over the period 1970-1995. The first panel shows there is a positive relation between average returns calculated in U.S. dollar terms and average age growth. 17% of the variation in the cross-section of average real U.S. dollar returns is explained by average age growth. The second panel repeats the analysis with real local currency returns. In this case, only 7% of the variation is explained with average age growth.

Figure 5 extends the analysis to real equity returns volatility. Average age growth can explain 30% of the U.S. dollar returns volatility and 24% of the local returns volatility.

2.4 Average Age and Other Demographic Variables

We have already conjectured a positive relation between life expectancy growth and average age growth when examining the U.S. data. Cross-sectional evidence on this positive relation is presented in the first panel of Figure 6. Growth in life expectancy accounts for 40% of the cross-country variation in average age growth. An even sharper relation is found with population growth. The second panel in Figure 6 shows a strong positive relation. Population growth accounts for 51% of the cross-sectional variation in average age growth.

Table 2 attempts to sort out the information using regression analysis. A time-series cross-sectional regression is estimated by stacking all countries equity returns into one large vector. Using non-overlapping five year return data, there are 90 observations. In contrast to the graphical analysis in which only 18 observations are used to calculate an average on average regression, this regression specification is predictive. That is, average age, say for the U.K. in 1990 is matched with the U.K. equity returns from 1991 to 1995.

The results suggest a positive relation between next year's U.S. dollar real returns and average age. The t-statistic is 2.3 which is significant at the 5% level. The coefficient of 7.3 implies that a 0.1% increase in average age induces 73 bp in extra real annual returns. There is no relation between life expectancy growth or population growth and the next five year's real returns. When all three demographic variables are included in the regression, only average age growth has a significant coefficient. When local returns are examined in panel B, the message is very similar. For example, the coefficient on average age growth is 7.4 in the local returns regression versus 7.3 in the U.S. dollar regression in panel A. Hence, while life expectancy and population growth are related to average age growth, it appears that only average age growth influences future expected returns. This international evidence is consistent with the U.S. evidence detailed in Bakshi and Chen (1994).

The demographic variables are very persistent and it makes sense that their impact is greatest on longer horizon returns. Similar results were found were found with one year regressions. The signs on the attributes were all the same, except the explanatory decreased. For example the adjusted r-square decreases from 7.3% in the multi-year regressions versus 1.1% in the annual regressions. Similar results are found when the local real returns are examined. Results are available on request.

2.5 Other Developed and Emerging Markets

Table 3 presents the results of an expanded sample of 45 countries which include 26 emerging equity markets from the IFC and 3 additional countries from MSCI. There are 147 observations in the time-series cross-sectional regression. Consistent with the results in 18 markets, there is a positive relation between average age growth and real U.S. dollar equity returns. However, the inclusion of the additional countries reduces the level of significance. Consistent with Table 2, there is little information in the life-expectancy growth variable or the population growth variable. When we examine real local returns all the explanatory variables become significant. With a greater range of observations the demographic variables are better able to discriminate between high and low returns. Similar results are found using annual returns as the dependent variables, but again the significance levels drop across the board.

Harvey (1995) and Goetzmann and Jorion (1996) argue that there are a number of survivorship biases in emerging market returns. Harvey details how the IFC "backfilled" data from 1981 for 9 countries. Goetzmann and Jorion show that mean returns calculated after a market "re-emerges" are misleading because the mean does not take into account the period where the market had "submerged".

To partially address these issues, we reestimated the Table 3 regressions leaving out the 1976-1980 data and knocking out the first three years of data for all emerging markets. Goetzmann and Jorion (1996) argue that the period immediately after listing is likely to induce the most contamination. The results in Table 4 suggest that expunging these data has an important impact. For example, in Table 4, the average age growth coefficient is 8.5 and 2.7 standard errors from zero. Life expectancy growth also plays an important role entering the U.S. dollar regression with a coefficient 2.4 standard errors from zero and the local real returns regression 3.2 standard errors from zero.

Overall, there appears to be information in the change in average age that helps explain the cross-section of real asset returns. Next, we will examine a portfolio strategy that uses the information in average age. To make this strategy investible, we focus on the U.S. dollar returns.

3. Demographics as a Portfolio Attribute

3.1 Portfolio Simulations

To measure the out-of-sample information of average age growth, we divided the countries into quartiles based on each countries average age growth rate. The portfolios were constructed with initially equal investments. The quartiles were updated annually. The composition of a quartile portfolio changes as a country's decision variable moves it into a new quartile, or if the addition of a new country to the study universe moves a country into a new quartile. To be conservative, we allowed a one-year lag in the availability of the decision variable, average age growth. Because the portfolios are based on lagged information, their returns can be viewed as the out-of-sample performance of a portfolio selection strategy.

Figure 7 examines the returns and volatility to investing in countries with a high rate of average age growth. The return spread between the highest and the lowest average age growth quartiles exceeded 5% per year for our sample of 18 countries. Note, that the highest average age growth portfolio had a return volatility that was almost 6% higher than the volatility of the lowest average age growth portfolio. Nevertheless, in examining the 18 developed countries strategy, the Sharpe ratio for the high age growth portfolio is 0.47 compared to 0.31 for the low age growth portfolio. This result is consistent with the time-series cross-sectional regression results in Table 2. That is, the relation between average age growth and expected returns is positive. The Sharpe ratio of the equally weighted benchmark is 0.53 comparable to the third and fourth quartiles. Similar patterns are found for the capitalization weighted portfolios. The average returns monotonically increase in average age.

Figure 7A extends the analysis to the 45 countries in our sample. The performance and volatility of the both the equally weighted and capitalization weighted portfolios generally increase with average age growth. The reward to risk profiles suggest that the higher average age portfolios outperform the low average age portfolios. However, the high average age growth portfolio has a similar Sharpe ratio to the benchmarks.

3.2 Expected Returns Through to 2050

Given the information in average age, we undertake the task of forecasting returns through the year 2050. Of course, country expected returns models are usually based on a richer set of attributes. However, it is unusual to have access to forecasts of the attributes so far into the future. In addition, this exercise is only meant to be suggestive. Using the coefficient values from Table 3:

Expected Return = .055 + 8.5* Average Age Growth, or

Expected Return = .065 + 10.0* Life Expectancy Growth

We use the United Nations medium variant estimate of demographic change as our source for each countries average age growth rate and life expectancy growth rate from the year 1997 to the year 2050. Table 5 shows the growth rates that we use in our forecasting exercise for each of 45 countries. The prediction exercise could be extended to all countries in the world for which we have demographic data, but we limit the exercise this set of 45 countries. Indeed, the results, in Tables 3 & 4 suggest that the coefficient on average age growth is not that different when emerging markets are included in the sample. Table 5 calculates the expected based on the average age growth model and the life expectancy model.

3.3 Country Risk Ratings and Growth in Average Age

Our results suggest that average age growth contains some information about future returns. However, most of the information is concentrated in longer horizon returns. Given that the demographic variables are highly persistent (and predictable), it makes sense that they are more likely to contain information about longer horizon returns. In the context of asset pricing theory, the cross-section of demographic information is likely related to different risk exposures across countries.

Table 6 examines the correlation between expected average age growth, expected population growth and expected life expectancy growth and six risk indicators for 45 countries. The demographic indicators are based on the UN median forecast . The six risk indicators include: *International Country Risk Guide*'s (ICRG) political risk, ICRG financial risk, ICRG economic risk, ICRG composite risk, *Institutional Investor's* Country Credit Rating and *Euromoney*'s Country Credit Rating. These measures are used in Erb, Harvey and Viskanta (1996a,b) to explain the cross-section of international equity and fixed income returns.[3]

There is significant correlation across all the demographic variables and these risk indicators. For example, there is a -74% correlation between the credit rating variables and expected population growth indicating that higher growth is associated with lower ratings (higher risk). Similar correlations are found across the other demographic variables. The correlation between average age growth and political rating is -78% indicating that higher age growth countries have lower political risk ratings (higher risk).

[3] Harlow (1993) provides the first study of the ICRG political risk rating. Diamonte, Liew and Stevens (1996) also study the ICRG political risk rating in the context of equity returns.

Figure 8 shows that the risk correlations are not just driven by the emerging capital markets. The graph of ICRG political risk and average age growth shows that the tightest relation between the two variables is found for the highest rated countries (non-emerging countries). An examination of other risk variables, ICRG composite risk and II country credit rating, shows similar patterns (not shown).

4. **Conclusions**

We have provided the first exploration of the role of population demographics in international equity investment. Indeed, demographics influence the prices of many financial assets. Our paper starts with the ideas that link equity returns and demographics presented in Bakshi and Chen (1994). They present a life-cycle investment theory that suggest that as the population ages, more capital is allocated to equity investment and less to housing. They also present a life-cycle risk aversion hypothesis. As investors get closer to retirement, they become more risk averse and demand a higher premium for investing in the equity market. These ideas imply that higher average age growth may be associated with higher expected returns.

Applying these ideas in an international context is difficult. First, in integrated world capital markets, it is the average age of the representative global investor that counts and we find little relation between world average demographic measures and expected returns. Indeed, the relation between local population dynamics and expected returns that we document in this paper may be interpreted as evidence against market integration. This is likely the case with many of the emerging markets in our sample, see Bekaert and Harvey (1995, 1997).

But we pursue an alternative interpretation. Following Ferson and Harvey (1996), we argue that population reveals information about risk. Demographics are country attributes, and highly persistent ones at that. For example, many of the countries with the highest average age growth are the poorest emerging markets (ones starting with the lowest average age) and the markets that carry the most volatility risk. These are also the countries which are most likely segmented from world capital markets.

The evidence we present suggests that the demographic attributes contain some information about future expected returns. Given that the demographic variables are slow moving and highly persistent, it makes little sense that they can be used to forecast short horizon returns. Instead, we find that these variables contain information about longer horizon returns. This is also consistent with the risk interpretation.

Finally, our analysis suggests a significant relation between the demographic variables and a number of risk measures using in the practice of country risk analysis. For example, 61% of the cross-sectional variation in 45 countries' political risk ratings can be accounted for by average age growth. This supports our contention that demographic data reveal information about risk exposure in an international context.

Notes

The authors would like to thank Zhiwu Chen for his comments on an earlier draft of this paper.

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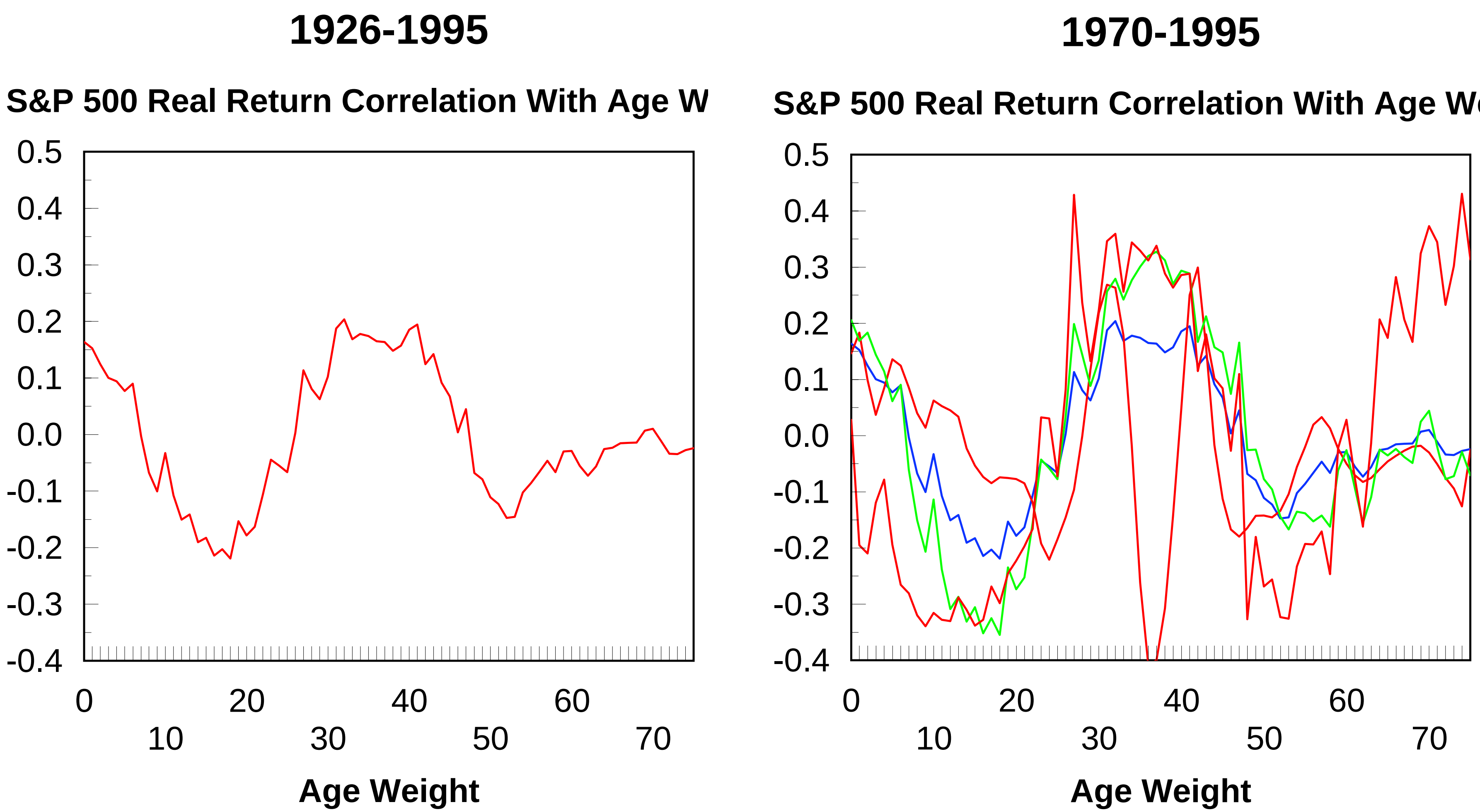
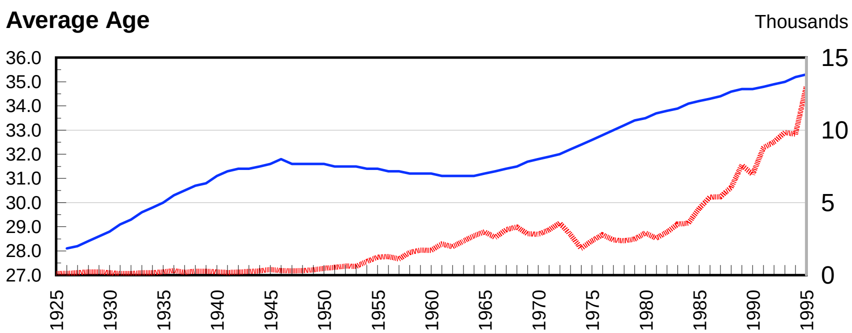
Figure 1
Correlation of US Age Weights and Real S&P 500 Returns



Real S&P 500 Total Returns are deflated by US Consumer Price Index (Source: Ibbotson Associates)
Age Weight is the number of people of a particular age divided by the total population. (Source: US Census Bureau)
For example, the five year old age weight is the number of five year olds divided by the total population.
Because of data consistentcy all ages cohorts greater than 75 are included in the last age cohort.

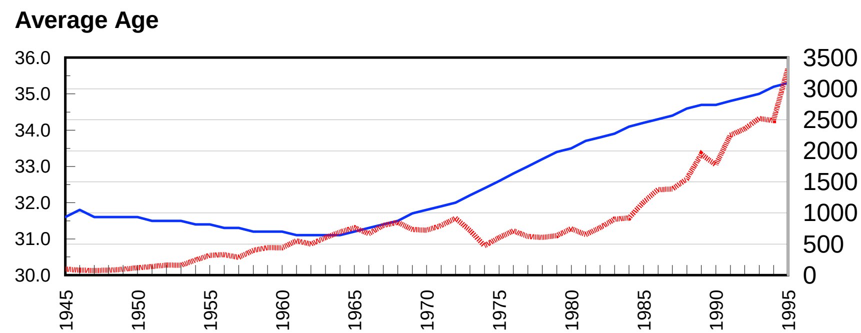
Figure 2
Relationship Between Average Age and Real Stock Values

Average Age and Real Equity Return Index
1925-1995



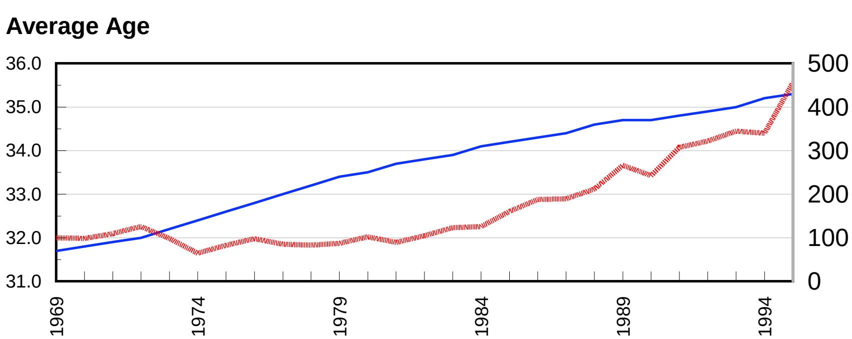
Average Age: US Census
S&P 500 & US CPI: Ibbotson Associates

Average Age and Real Equity Return Index
1945-1995



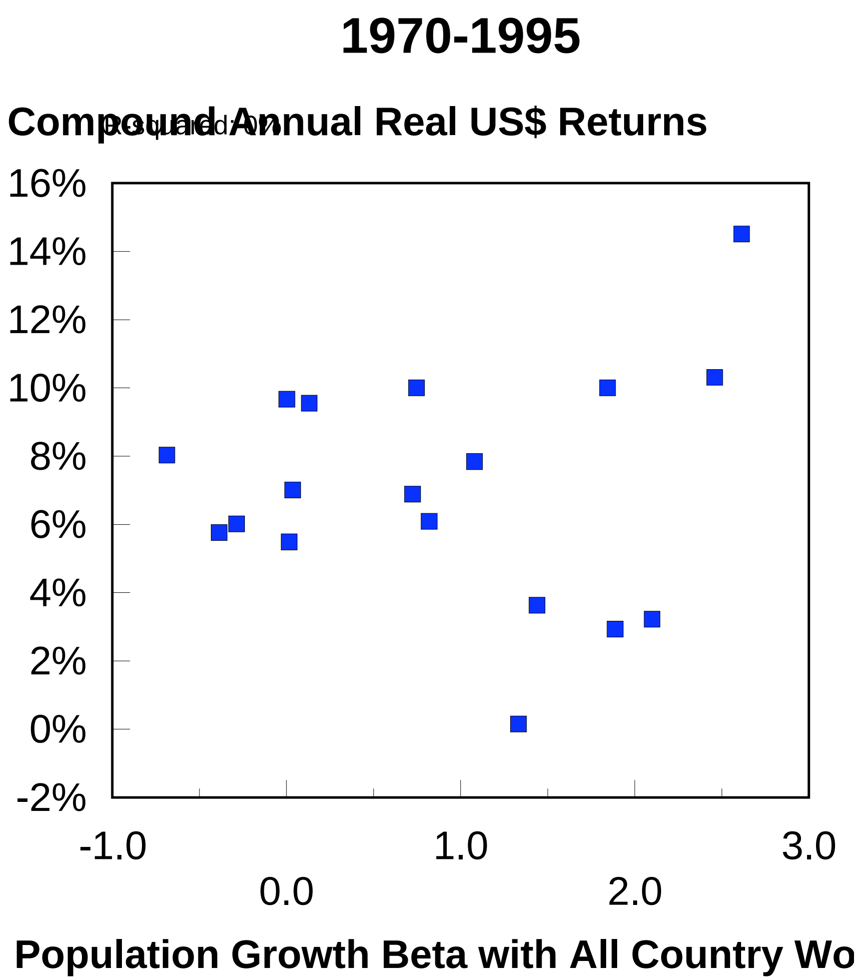
Average Age: US Census
S&P 500 & US CPI: Ibbotson Associates

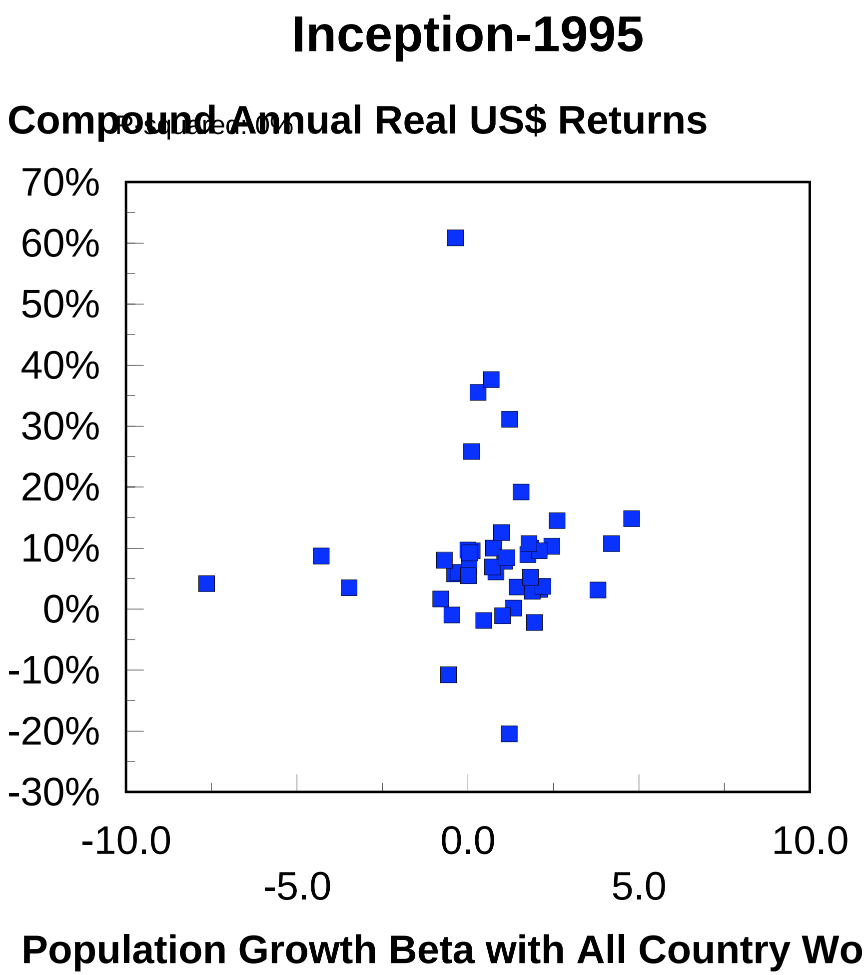
Average Age and Real Equity Return Index
1970-1995



Average Age: US Census
S&P 500 & US CPI: Ibbotson Associates

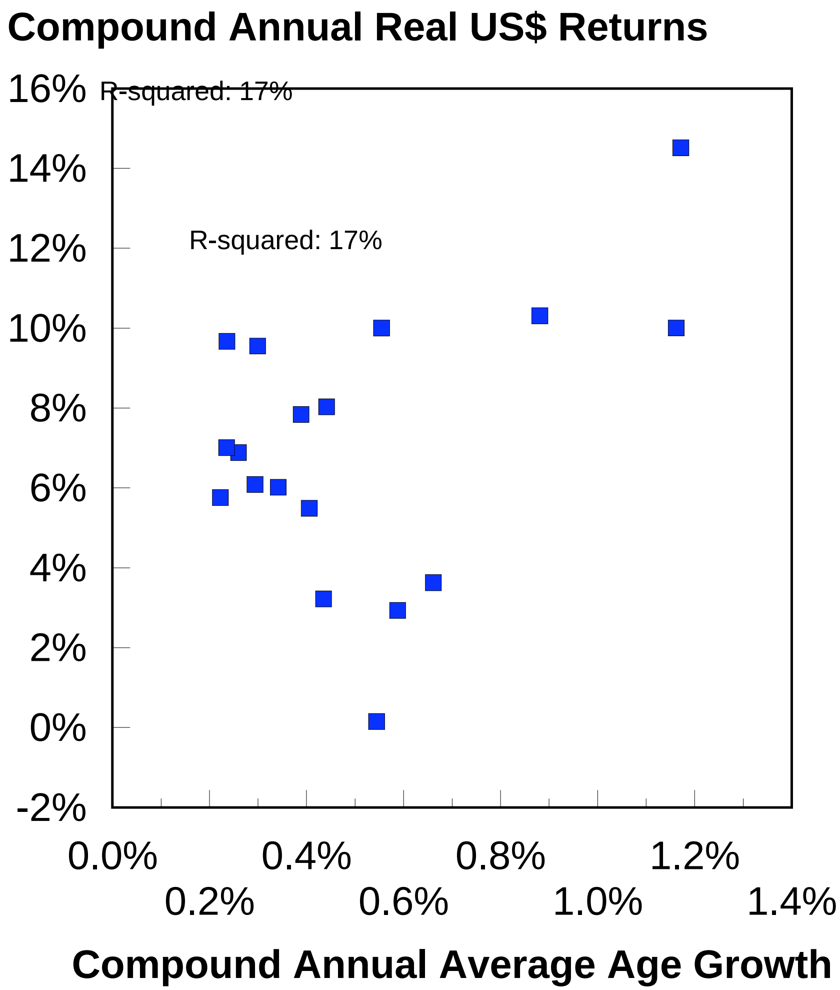
Figure 3
Real Equity Returns and Population Growth Beta
Sample: All Countries

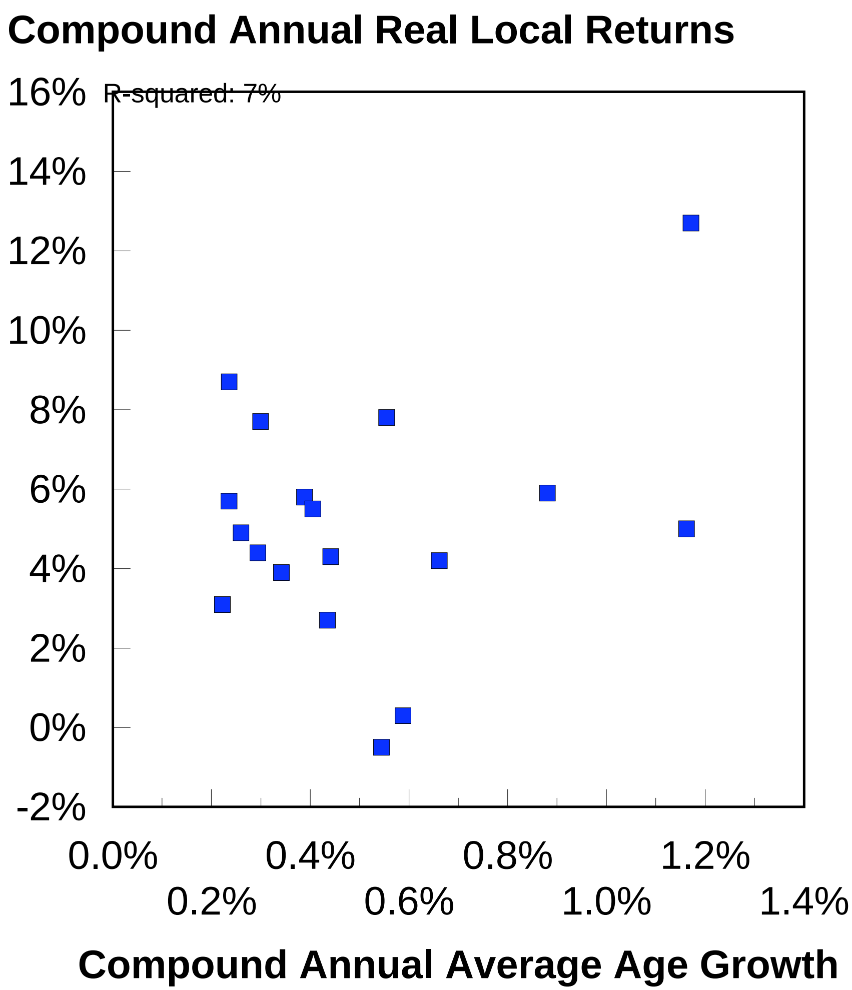




Return Data: MSCI Total Returns US$
Inflation Data: OECD and IMF
Population Growth: UN Population Division - Demographic Indicators and Sex and Age Annual 1950-2050 (1994 Revision)

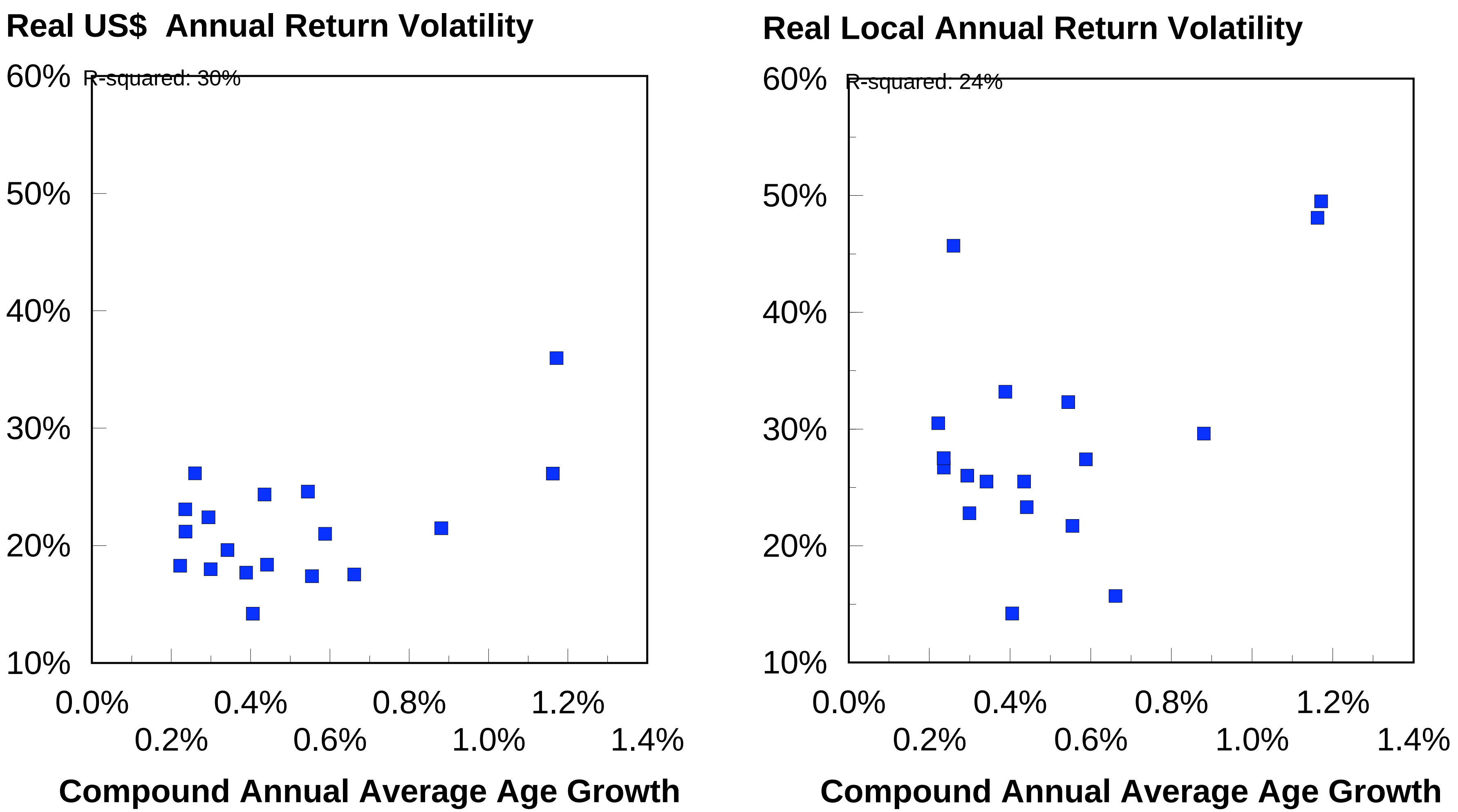
Exhibit 4
Real Equity Returns and Average Age Growth
Sample: Developed Countries (1970-1995)





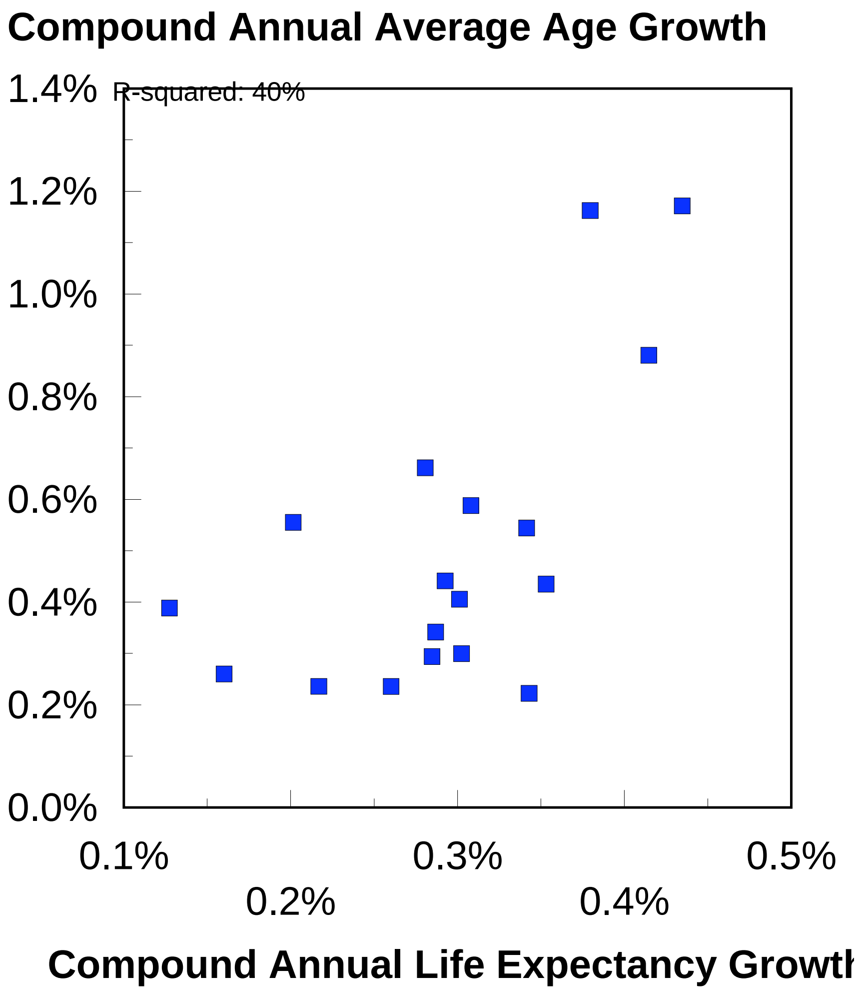
Return Data: MSCI Total Returns US$ and Local
Inflation Data: OECD and IMF
Average Age Growth: UN Population Division - Demographic Indicators and Sex and Age Annual 1950-2050 (1994 Revision)

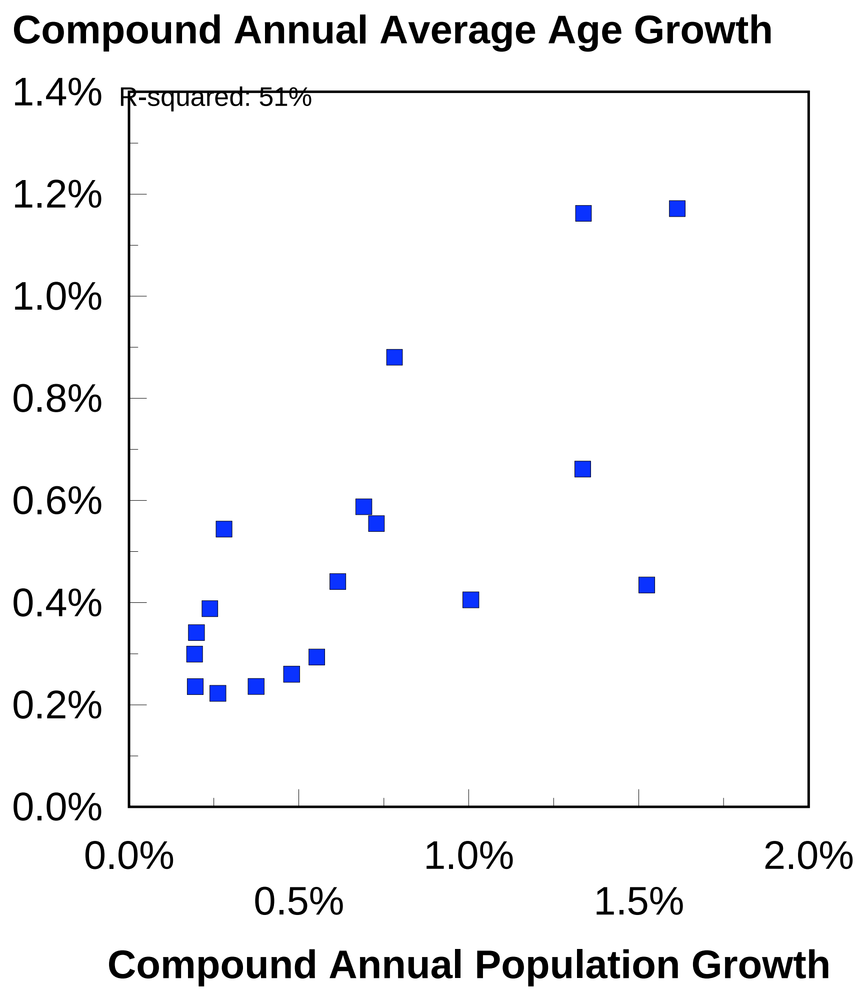
Figure 5
Equity Volatility and Average Age Growth
Sample: Developed Countries (1970-1995)



Return Data: MSCI Total Returns US$ and Local
Inflation Data: OECD and IMF
Average Age Growth: UN Population Division - Demographic Indicators and Sex and Age Annual 1950-2050 (1994 Revision)

Figure 6
Relations Among Demographic Variables
Sample: Developed Countries (1970-1995)





Average Age Growth: UN Population Division - Demographic Indicators and Sex and Age Annual 1950-2050 (1994 Revision)

Figure 7

Average Age Growth As Portfolio Attribute

Sample: Developed Countries (1970-1995)

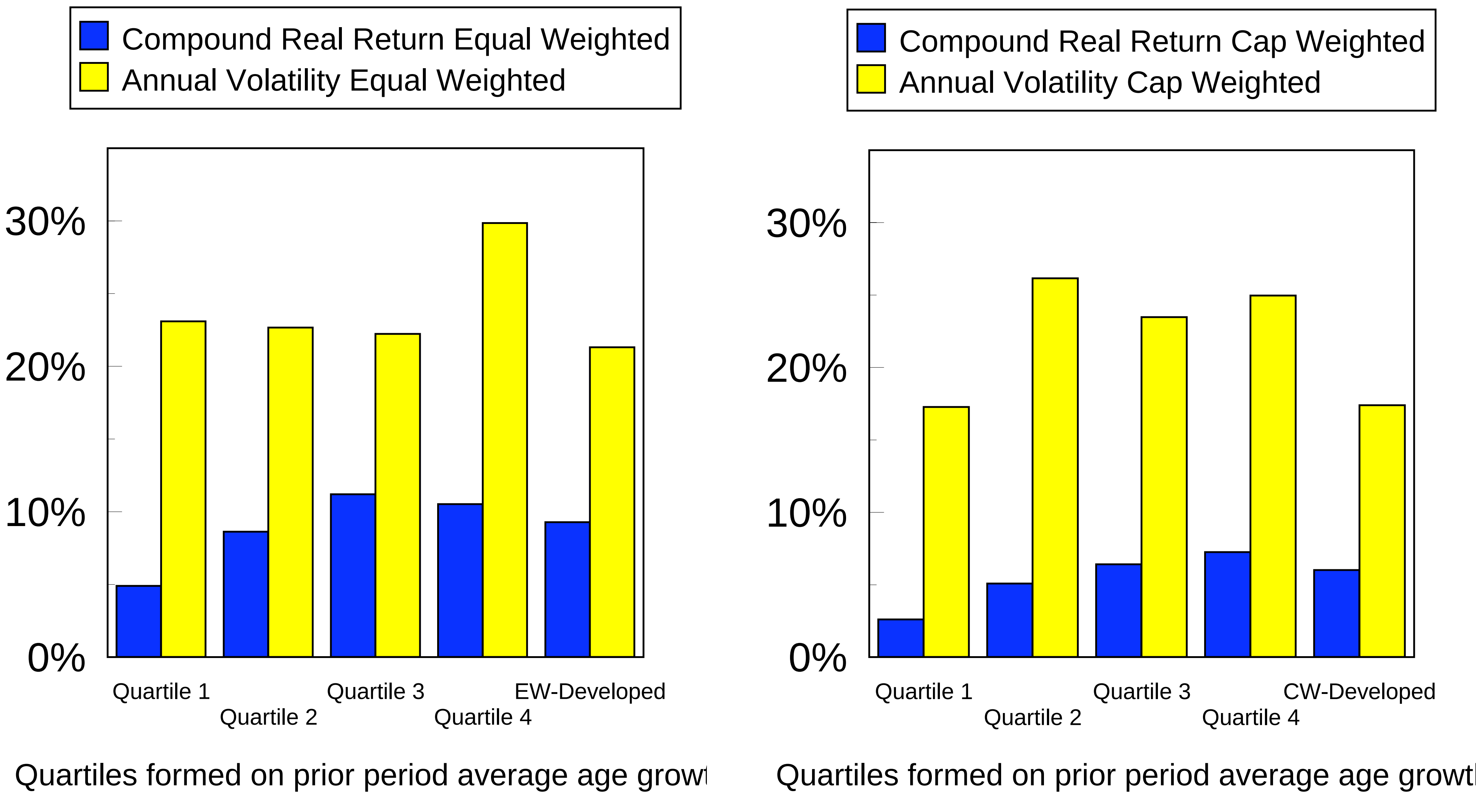


Figure 7A

Average Age Growth As Portfolio Attribute

Sample: All Countries (1970-1995)

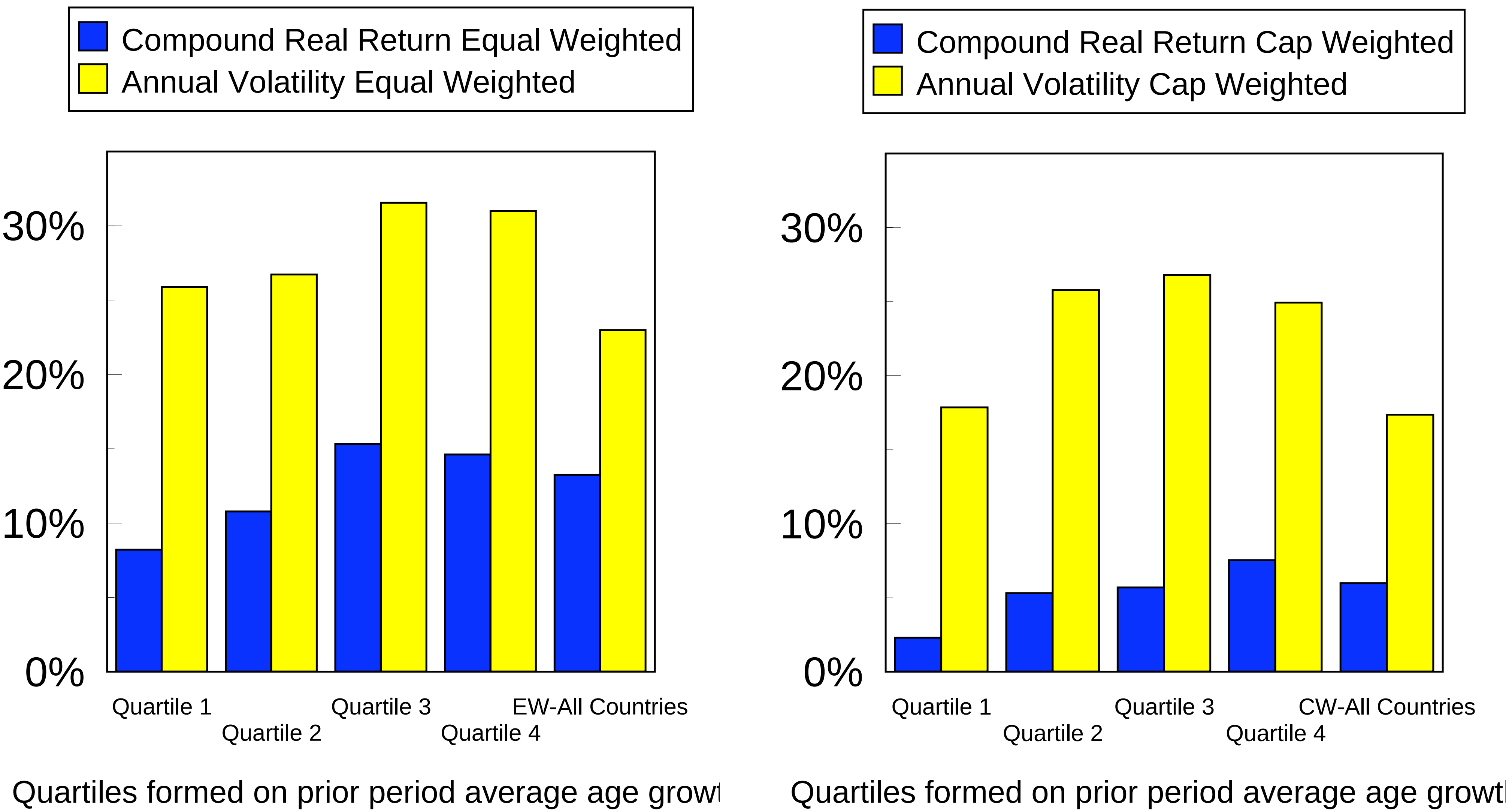
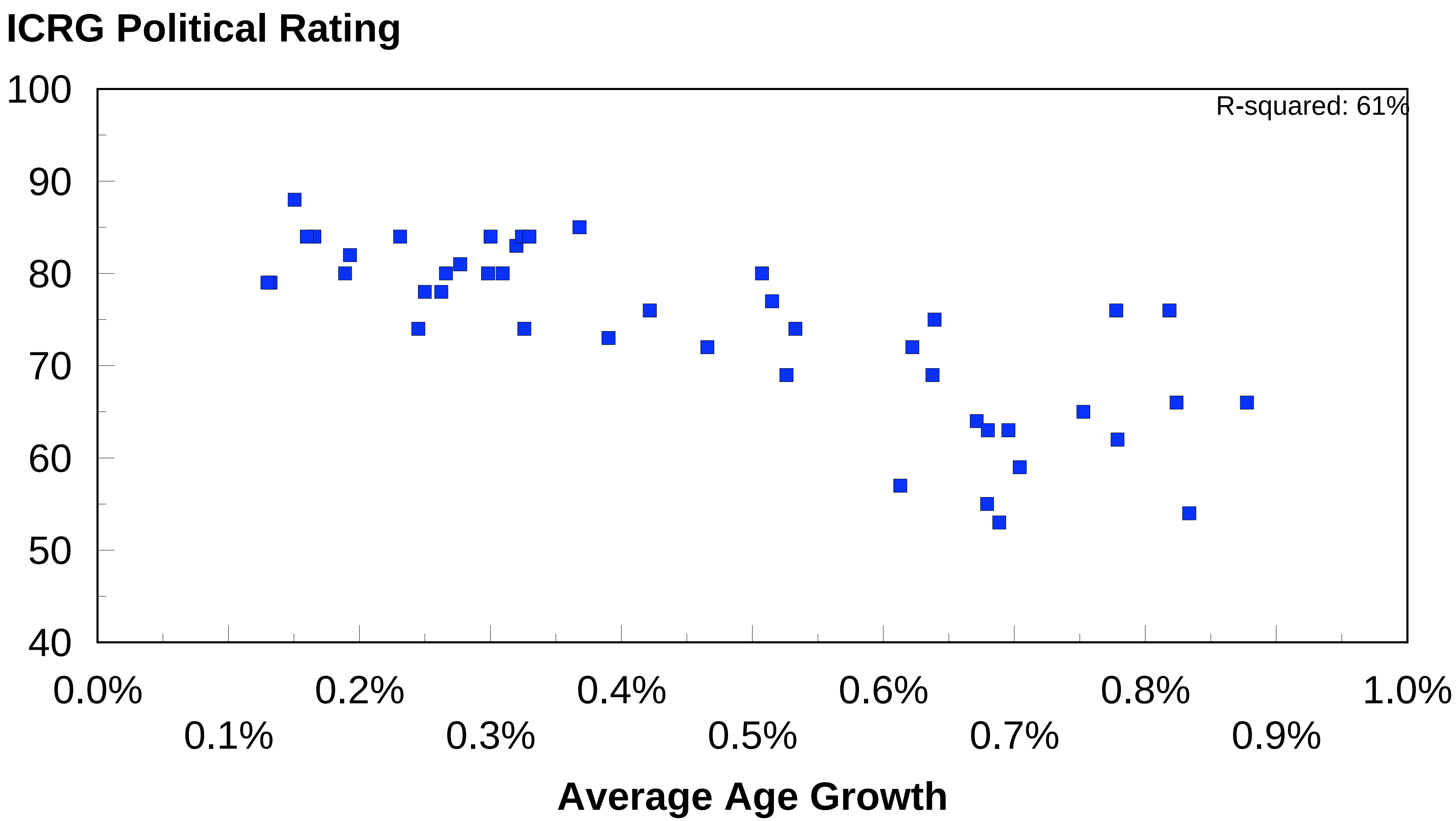


Figure 8
Country Risk and Average Age Growth
Sample: All Countries



ICRG Political Rating: December 1995

Average Age Growth: UN Population Division - Demographic Indicators 1950-2050 (Median Case)

Table 1
Summary Statistics - Developed Countries

Country	Compound Annual Real US$ Return	Annual Std Deviation US$ Return	Compound Annual Real Local Return	Annual Std Deviation Local Return	Average Age Growth	Life Expectancy Growth	Population Growth
Australia	3.2%	24.4%	2.7%	25.5%	0.4%	0.4%	1.5%
Austria	5.8%	18.3%	3.1%	30.5%	0.2%	0.3%	0.3%
Belgium	9.6%	18.0%	7.7%	22.8%	0.3%	0.3%	0.2%
Canada	3.6%	17.5%	4.2%	15.7%	0.7%	0.3%	1.3%
Denmark	7.8%	17.7%	5.8%	33.2%	0.4%	0.1%	0.2%
France	6.1%	22.4%	4.4%	26.0%	0.3%	0.3%	0.6%
Germany	6.0%	19.6%	3.9%	25.5%	0.3%	0.3%	0.2%
Hong Kong	14.5%	36.0%	12.7%	49.5%	1.2%	0.4%	1.6%
Italy	0.2%	24.6%	-0.5%	32.3%	0.5%	0.3%	0.3%
Japan	10.3%	21.5%	5.9%	29.6%	0.9%	0.4%	0.8%
Netherlands	10.0%	17.4%	7.8%	21.7%	0.6%	0.2%	0.7%
Norway	6.9%	26.2%	4.9%	45.7%	0.3%	0.2%	0.5%
Singapore	10.0%	26.1%	5.0%	48.1%	1.2%	0.4%	1.3%
Spain	2.9%	21.0%	0.3%	27.4%	0.6%	0.3%	0.7%
Sweden	9.7%	21.2%	8.7%	26.7%	0.2%	0.2%	0.4%
Switzerland	8.0%	18.4%	4.3%	23.3%	0.4%	0.3%	0.6%
United Kingdom	7.0%	23.1%	5.7%	27.5%	0.2%	0.3%	0.2%
United States	5.5%	14.2%	5.5%	14.2%	0.4%	0.3%	1.0%
Developed World	5.9%	17.3%			0.5%	0.2%	0.6%
All Country World	6.4%	15.3%			0.3%	0.5%	1.8%

Returns: MSCI US$ and Local Returns (Gross Dividends)
Real Local Returns: Annual Local Returns deflated by Local Inflation
Developed World: MSCI EAFE, All Country World: MSCI All Country World
Inflation: Consumer Price Indices (OECD, IMF)
Demographic Source:
UN Population Division - Demographic Indicators & Sex and Age Annual -- 1950-2050 (1994 Revision)

Table 2

Predicting Country Returns with Demographic Variables

Sample: Developed Countries: 1971-1995

	Intercept	Average Age Growth	Life Expectancy Growth	Population Growth	Adjusted R-Square	Number of Observations
Panel A: Real US Dollar Returns						
Coefficient	0.04	7.27			7.3%	90
T-Stat	2.41	2.30				
Coefficient	0.07		2.45		-1.0%	90
T-Stat	3.71		0.40			
Coefficient	0.09			-0.90	-0.8%	90
T-Stat	6.04			-0.46		
Coefficient	0.06	9.77	-3.67	-2.87	9.1%	90
T-Stat	3.28	2.43	-0.49	-1.61		
Panel B: Real Local Returns						
Coefficient	0.02	7.35			6.3%	90
T-Stat	1.18	2.13				
Coefficient	0.05		2.92		-1.0%	90
T-Stat	2.64		0.53			
Coefficient	0.07			-1.37	-0.4%	90
T-Stat	4.23			-0.63		
Coefficient	0.04	10.09	-2.63	-3.50	8.8%	90
T-Stat	2.14	2.34	-0.37	-1.74		

Dependent Variable: five year compound total returns (MSCI & IFCG).
Average Age Growth: previous year's growth in average age of total population.
Population Growth: previous year's growth in total population.
Life Expectancy Growth: previous year's change in life expectancy at birth.
Demographic Source: UN Population Division -
Demographic Indicators & Sex and Age Annual -- 1950-2050 (1994 Revision)
All t-stats utilize a heteroskedasticity consistent covariance matrix.

Table 3

Predicting Country Returns with Demographic Variables

Sample: All Countries: 1971-1995

	Intercept	Average Age Growth	Life Expectancy Growth	Population Growth	Adjusted R-Square	Number of Observations
Panel A: Real US Dollar Returns						
Coefficient	0.07	6.55			1.1%	147
T-Stat	2.95	1.92				
Coefficient	0.08		5.94		0.2%	147
T-Stat	3.33		0.93			
Coefficient	0.09			0.59	-0.6%	147
T-Stat	6.33			0.44		
Coefficient	0.05	6.10	5.03	0.00	0.4%	147
T-Stat	1.81	1.75	0.64	0.00		
Panel B: Real Local Returns						
Coefficient	0.06	5.05			0.8%	145
T-Stat	3.27	1.79				
Coefficient	0.04		10.10		2.8%	145
T-Stat	2.62		2.34			
Coefficient	0.06			2.43	1.9%	145
T-Stat	3.09			1.88		
Coefficient	0.02	4.28	6.65	1.60	3.2%	145
T-Stat	0.80	1.54	1.23	1.06		

Dependent Variable: five year compound total returns (MSCI & IFCG).
Average Age Growth: previous year's growth in average age of total population.
Population Growth: previous year's growth in total population.
Life Expectancy Growth: previous year's change in life expectancy at birth.
Demographic Source: UN Population Division -
Demographic Indicators & Sex and Age Annual -- 1950-2050 (1994 Revision)
All t-stats utilize a heteroskedasticity consistent covariance matrix.

Table 4
Predicting Country Returns with Demographic Variables
Sample: All Countries (Re-Emergence Bias Control): 1971-1995

	Intercept	Average Age Growth	Life Expectancy Growth	Population Growth	Adjusted R-Square	Number of Observations
Panel A: Real US Dollar Returns						
Coefficient	0.06	8.47			3.9%	121
T-Stat	3.00	2.72				
Coefficient	0.07		9.99		2.2%	121
T-Stat	4.58		2.35			
Coefficient	0.09			1.06	-0.3%	121
T-Stat	5.91			0.60		
Coefficient	0.04	7.24	7.31	0.13	3.9%	121
T-Stat	1.78	2.28	1.70	0.07		
Panel B: Real Local Returns						
Coefficient	0.04	7.43			3.3%	119
T-Stat	1.84	2.29				
Coefficient	0.04		10.86		3.3%	119
T-Stat	2.85		3.23			
Coefficient	0.06			1.27	0.0%	119
T-Stat	4.13			0.77		
Coefficient	0.01	5.96	8.42	0.31	4.3%	119
T-Stat	0.60	1.83	2.60	0.18		

Dependent Variable: five year compound total returns (MSCI & IFCG).
Re-Emerging Bias Control: All IFC returns prior to 1980 excluded and
first three years post-emergence excluded.
Average Age Growth: previous year's growth in average age of total population.
Population Growth: previous year's growth in total population.
Life Expectancy Growth: previous year's change in life expectancy at birth.
Demographic Source: UN Population Division -
Demographic Indicators & Sex and Age Annual -- 1950-2050 (1994 Revision)
All t-stats utilize a heteroskedasticity consistent covariance matrix.

Table 5
Global Demographic Models
Expected Compound Real US$ Returns: 1997-2050

Country	IFC or MSCI	Input: Annual Average Age Growth	Input: Annual Life Expectancy Growth	Output: Average Age Growth Model	Output: Life Expectancy Growth Model
Argentina	IFC	0.42%	0.19%	9.1%	8.5%
Australia	MSCI	0.32%	0.11%	8.4%	7.7%
Austria	MSCI	0.26%	0.14%	7.9%	8.0%
Belgium	MSCI	0.19%	0.14%	7.3%	8.0%
Brazil	IFC	0.67%	0.30%	11.4%	9.6%
Canada	MSCI	0.27%	0.11%	8.0%	7.7%
Chile	IFC	0.53%	0.14%	10.2%	8.0%
China	IFC	0.52%	0.20%	10.3%	9.0%
Colombia	IFC	0.70%	0.12%	11.7%	8.6%
Denmark	IFC	0.17%	0.13%	7.1%	7.8%
Finland	MSCI	0.15%	0.12%	6.9%	7.9%
France	MSCI	0.24%	0.12%	7.8%	7.8%
Germany	IFC	0.32%	0.11%	8.5%	7.8%
Greece	IFC	0.32%	0.10%	8.5%	7.6%
Hong Kong	MSCI	0.61%	0.23%	11.2%	7.6%
Hungary	IFC	0.13%	0.23%	6.7%	8.8%
India	IFC	0.70%	0.39%	11.5%	10.9%
Indonesia	IFC	0.68%	0.34%	11.5%	10.4%
Ireland	MSCI	0.37%	0.13%	8.8%	8.0%
Italy	MSCI	0.39%	0.13%	9.1%	7.9%
Japan	MSCI	0.29%	0.09%	8.3%	7.5%
Jordan	IFC	0.83%	0.24%	12.3%	9.2%
Malaysia	IFC	0.78%	0.20%	12.2%	8.7%
Mexico	IFC	0.82%	0.20%	12.7%	8.7%
Netherlands	MSCI	0.30%	0.11%	8.3%	7.7%
New Zealand	MSCI	0.33%	0.13%	8.3%	8.0%
Nigeria	IFC	0.70%	0.62%	11.1%	13.0%
Norway	MSCI	0.16%	0.10%	6.9%	7.5%
Pakistan	IFC	0.84%	0.37%	12.4%	10.7%
Philippines	IFC	0.78%	0.27%	12.2%	9.6%
Poland	IFC	0.24%	0.19%	7.8%	8.4%
Portugal	IFC	0.30%	0.14%	8.4%	8.1%
Singapore	MSCI	0.50%	0.16%	10.3%	8.3%
South Africa	IFC	0.65%	0.34%	10.8%	10.4%
South Korea	IFC	0.51%	0.20%	10.2%	8.7%
Spain	MSCI	0.46%	0.11%	9.8%	7.7%
Sri Lanka	IFC	0.61%	0.18%	11.0%	8.6%
Sweden	MSCI	0.13%	0.12%	6.6%	7.8%
Switzerland	MSCI	0.23%	0.10%	7.6%	7.6%
Thailand	IFC	0.63%	0.27%	11.3%	9.0%
Turkey	IFC	0.68%	0.27%	11.4%	9.6%
United Kingdom	MSCI	0.19%	0.12%	7.2%	7.8%
United States	MSCI	0.27%	0.13%	7.9%	7.9%
Venezuela	IFC	0.75%	0.19%	12.0%	8.5%
Zimbabwe	IFC	0.89%	0.76%	12.7%	13.3%

Real US$ Return Models (see Table 4).
Average Age Model Return = 5.5% + 8.5*Average Age Growth
Life Expectancy Growth Model Return = 6.5% + 10.0*Life Expectancy Growth
Projected returns do not match exactly because of multi-year projections.
1997-2050 growth derived from linking five-year projections.
Demographic Source: UN Population Division -
Demographic Indicators & Sex and Age Annual -- 1950-2050 (1994 Revision)
Medium variant case.

Table 6
Correlation of Risk Ratings and Demographic Variables

Risk Rating	Expected Average Age Growth	Expected Population Growth	Expected Life Expectancy Growth
Institutional Investor Country Credit Rating*	-0.71	-0.74	-0.69
Euromoney Country Risk Rating*	-0.69	-0.74	-0.69
IRCG Composite Rating**	-0.71	-0.68	-0.74
ICRG Political Rating**	-0.78	-0.62	-0.64
ICRG Financial Rating**	-0.64	-0.69	-0.78
ICRG Economic Rating**	-0.41	-0.55	-0.63

Sample: 45 Countries (MSCI & IFC)
Demographic Source: UN Population Division -
Demographic Indicators & Sex and Age Annual -- 1950-2050 (1994 Revision)
Medium variant case.
ICRG: Political Risk Services' International Country Risk Guide
Last Data Observation: * - September 1995, ** - December 1995.