Is Economic Growth Good for Investors?

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Abstract:

The cross-country correlation of GDP growth per capita and inflation-adjusted stock returns is negative when long periods are analyzed. This is surprising, since economic growth, and especially unexpected growth, is presumably good for profits. The result holds for both developed countries and emerging markets. Economic growth comes partly from increased inputs of capital and labor, which don't necessarily benefit the stockholders of existing companies. Economic growth also comes from technological change, which does not necessarily lead to higher profits if competition between firms results in the benefits being passed to consumers and workers. Realized growth has both an expected and unexpected component. Apparently investors overpay for expected growth, and this overpayment more than offsets the benefits of unexpected growth.

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Is Economic Growth Good for Investors?

It is widely believed that economic growth is good for stock returns, and economic growth forecasts are a staple of international asset allocation decisions. Investing in emerging markets with good long-term growth prospects, such as China, is widely viewed as more attractive than investing in countries such as Argentina with prolonged periods of low growth that are expected to persist. But does economic growth benefit stockholders?

This article argues on both theoretical and empirical grounds that the answer is no. During the 112-year period starting in 1900 and ending in 2011, the cross-sectional correlation between the compounded real return on equities and the compounded growth rate of real per capita gross domestic product (GDP) for 19 countries is -0.39. This negative correlation implies that investors in 1900 would actually have been better off investing in the companies of countries that ended up experiencing lower per capita economic growth rather than investing in those countries that enjoyed higher average per capita growth rates. These 19 countries were primarily developed countries in 1900, and are primarily developed countries today. They probably accounted for over 90% of the world's market value of equity in 1900.

This negative correlation between per capita economic growth and equity returns has been experienced not only by developed countries, but by developing economies as well. For 15 emerging markets during the 24-year period from 1988 to 2011—including the BRIC countries of Brazil, Russia, India, and China—the correlation is a remarkably similar -0.41.

I am not arguing that economic growth is bad. There is ample evidence that people who live in countries with higher incomes have longer life spans, lower infant mortality, etc. Real

wages are higher. But although consumers and workers may benefit from economic growth, the owners of capital do not necessarily benefit. Unless technological change comes from existing firms with monopoly power, improvements in productivity raise the per capita income of consumers. Furthermore, a country can grow rapidly by applying more capital and labor without the owners of capital earning higher returns.

In this article, I start by documenting the negative correlations between long-run economic growth and stock returns for both developed countries and emerging markets. I then explain why the standard of living in a country can grow rapidly without investors earning abnormally high returns. I also discuss how an efficient allocation of capital can result in higher living standards. In addition to relating past per capita income growth to past stock returns, this article also considers the relation between economic growth and future expected returns.

The Negative Correlation between GDP Growth and Real Stock Returns

In Table 1, I summarize the existing evidence showing the negative correlation between real per capita gross domestic product (GDP) growth and real stock returns for 19 mostly developed countries that have had continuously operated stock markets since 1900.[1] The Table 1 numbers are illustrated graphically in Figure 1. The source of the average long-run stock returns, which include dividends and capital gains and are adjusted for inflation, is the *Credit Suisse Global Investment Returns Sourcebook 2012*, which is the most recent annual update of findings first published in 2002 in the book *Triumph of the Optimists* by Elroy Dimson, Paul Marsh, and Mike Staunton of London Business School.

[1] To the best of my knowledge, a negative cross-country correlation between real per capita GDP growth and real stock returns was first documented in the second edition of Jeremy Siegel's *Stocks for the Long Run* in 2002, with data beginning in 1970. Elroy Dimson, Paul Marsh, and Mike Staunton documented a negative correlation for 16 countries from 1900-2001 in their *Triumph of the Optimists* (2002), and they have presented extensive additional analysis for additional countries and other time periods in their 2005 and 2010 *Yearbooks*.

As reported in Table 1, The correlation of real per capita GDP growth and real stock returns for these 19 countries is -0.39 (p-value=0.10) when the returns are measured in local currencies. When the returns are adjusted for changes in the exchange rate relative to the U.S. dollar, so that the returns represent what a U.S. investor would have received, the correlation changes slightly, to -0.32 (p-value=0.14). The import of these findings is that an investor would have been better off avoiding countries where per capita GDP rose the most and would have been better off investing in countries with slower per capita growth.

As reported in the table, per capita GDP growth rates range from a low of 1.1% for South Africa to a high of 2.7% for Japan. The average compounded real returns on equities stretch on the low end from 1.7% for Italy to over 7% for Australia and South Africa, with returns in the U.S., Canada, and the U.K., falling in the range of 5 to 6%.

What do the high return countries have in common? The top seven countries, Australia, South Africa, the United States, Sweden, New Zealand, Canada, and the United Kingdom, all had the good fortune to not have had major wars fought on their territories in the last century, a misfortune that befell most of the continental European countries. Furthermore, the high return countries are predominately English-speaking countries with both an English common law tradition and long histories of democratic government. Lastly, many of these countries have had economies where the natural resources sector has played an important part.

In Table 1, growth rates over the last 112 years are reported. Appendix Table A-1 reports the levels of real per capita GDP in 1900 and 2011 and the compounded growth rates. The appendix table also reports the population levels in 1900 and the cumulative and annual population growth rates in each of the 19 countries used in Table 1.

In addition to the average stock returns and growth rates in per capita GDP, Table 1 also reports the average dividend yield and the growth rate of real dividends per share for 19 countries for the same 112 year period. One of the most notable patterns is the strong association between high dividend growth rates and high overall stock returns. On the one hand, such an association is not surprising since growing dividends tend to reflect increases in current (or expected future) earnings. But there is likely to be another effect at work here—namely, the role of dividends (and, in the case of the U.S., stock repurchases) in restraining what might be called "overinvestment," or the pursuit of growth-for-growth's sake. Take the case of Japan, where dividend per share growth has actually been negative in real terms, by an average of -2.4% per year, while the country was achieving the highest rate of growth (2.7%) in per capita GDP of any of the countries. Japanese policy makers have long professed their commitment to growth and full employment—if necessary at the expense of corporate profitability—and this commitment is reflected in the negative dividend growth and, until 1997, a ban on corporate repurchases of stock. The resistance to the payout of corporate cash reflects the goal of devoting corporate assets to preserving growth and employment. But, as the policymakers have been forced to recognize, the shareholder losses resulting from this pursuit of growth have arguably played a major role in the country's relatively poor economic performance since 1990.

Table 2 reports the mean geometric real return and mean growth rate of real per capita GDP over a shorter time period, that of the 42 years from 1970-2011, with Austria and Singapore added to the 19 countries used in Table 1. Over the 42 years since 1970, the correlation between per capita economic growth and real stock returns has been essentially zero for these countries, whether returns are measured in local currencies or U.S. dollars.[2] This lack of correlation shows

[2] Dimson, Marsh, and Staunton (2005, Chapter 3, Chart 31) also show that for some combinations of countries and time periods the correlation of real per capita GDP growth and real equity returns is zero or even positive.

that there is no guaranty of a negative correlation for all time periods and for all groups of countries.

Table 3 reports the mean geometric real return and the mean growth rate of real per capita GDP for 15 other countries over the even shorter 24-year period 1988-2011. These are countries that were, in 1988, generally viewed as emerging markets, and include the BRIC countries, even though the MSCI stock returns start later than 1988 for the BRICs. (China and Russia did not have stock markets in 1988. Indeed, almost no one predicted that the Berlin Wall would fall in November 1989 and that the Soviet Union would implode.) For these 15 countries, the correlation is -0.41 (p=0.13) in local currency units and -0.47 (p=0.08) in U.S. dollars.

The high economic growth and low stock returns in China are notable, especially considering the fact that China's stock market grew from being very small to a market value of approximately $4 trillion at the end of 2011. Much of the growth in aggregate market cap occurred by an expansion in the number of listed companies, with hundreds of initial public offerings occurring. Among the IPOs were those of China's four largest banks.

Economic Growth and Stock Returns

Why is there a negative cross-sectional correlation between real returns and real per capita income growth?

One reason is that part of the negative correlation between real stock returns and per capita real GDP growth reflects the tendency of investors to build expectations for high growth into prices at the start of the period. This is a major reason for why the returns on Chinese stocks during 1993-2011 have been low. However, when one uses 112 years of data, the effects of such anticipation on average realized returns should be fairly modest because even if the stock prices

at the beginning were twice as high in one country as another, the effect on the compounded average return is only about 0.6% per year.[3] But having said that, I think that there is a general tendency for markets to assign higher P/E and price-to-dividend multiples when economic growth is expected to be high, which has the effect of lowering realized returns because more capital must be committed by investors to receive the same level of earnings and the same dividends. If earnings and dividend growth eventually turn out to be as high as expected, then overall returns wouldn't be affected. But a variety of studies have reported that, when the dividend yields of U.S. companies are abnormally low, the growth rate of future dividends generally turns out to be lower, instead of higher, than usual.[4]

A simple numerical illustration will show how high valuations in intermediate periods will reduce compounded returns due to a lower dividend yield. Assume a two-year return horizon in a three period world (time=January 1, 2013; December 31, 2014; and December 31, 2015) with dividends of $1 per share paid on December 31st of each year. For case 1, assume prices of $10 at each of the three dates. The return for the first year is therefore 10%, and the return for the second year is 10%, giving a compound return of 10% per year. Alternatively, for case 2 assume a price of $10 at the beginning and end, but a price of $100 in the middle. The returns (including the dividend yield) are now 910% for the first year and –89% for the second year, giving a compounded return of 5.5% per year. The lower compounded return is attributable to the lower average dividend yield with the higher average share price. If countries with high economic growth rates consistently have stocks priced at higher multiples, the lower dividend yields that investors receive could explain part of the negative correlation.

[3] 1.006^{112} =1.954, or approximately 2.
[4] See Campbell and Shiller (2001) and Arnott and Asness (2003).

A second reason for the negative correlation between per capita GDP growth and stock returns, and probably the most important reason, is that stock returns are determined by per share earnings growth, not economy-wide earnings growth. Chapter 8 of Jeremy Siegel's (2008) *Stocks for the Long Run* points out that for valuing the market, aggregate earnings growth does not matter. Investors are concerned about the growth in a company's earnings per share (EPS). If savings are invested in companies that are not publicly traded, or savings are invested in newly issued shares (either IPOs or follow-on offers from existing publicly traded companies), the per share earnings of the existing companies do not increase. As mentioned previously, most of the growth in the market value of Chinese equities has not been from share price appreciation, but from an increase in the number of listed companies.

But now let us turn to the case of the U.S., where companies have returned large amounts of capital to investors through a combination of dividends and stock buybacks. It is puzzling why real dividends have not grown faster than they have. Over the 1900-2011 period, the average earnings yield for the U.S. has been just under 7% and the average dividend yield has been about 4.2%. This implies that the reinvestment rate has been about 2.8% of price, suggesting that the real growth rate of dividends per share should have been about 2.8%, rather than the 1.31% that Dimson, Marsh, and Staunton (2012) calculate, which is reported in Table 1 of this paper.

But if unrealistic expectations for growth are part of the explanation for the negative correlation between growth and stock returns, another, perhaps more significant, part may have to do with how the pursuit of growth by both countries and companies tends to affect investor returns. A fourth reason that GDP growth does not necessarily translate into high returns for minority stockholders is that managers may expropriate profits via sweetheart deals, tunneling, etc. There is a large literature focusing on this, but most of the emphasis has been on how

corporate governance problems would keep public equity markets from becoming large. The assumption is that minority investors would correctly evaluate in advance the chance of receiving future dividends, and if the legal and institutional mechanisms are weak, firms would be unable to sell equity to the public at terms that are attractive enough to make it an optimal financing/ownership mechanism. This assumes that investors price protect themselves.

If investors do not price protect themselves, then it is possible that public equity markets would be bigger than otherwise, but that realized returns would be low because profits would accrue to managers rather than minority shareholders. Alternatively, empire building may dominate, with too much of the profits reinvested in negative NPV projects and too little paid out as dividends.

Explaining Differences in Economic Growth

There is a huge literature on the determinants of economic growth, and this article can only touch on this issue. I will emphasize the connection with stock returns. Simply put, economic growth results from increased inputs of labor, capital, and technology. How efficiently these inputs are utilized also matters, and the efficiency is affected by culture, a country's institutions, and government policy.[5] I will discuss these three inputs in order.

Increases in labor inputs come about from either more people, a larger fraction of the population working, and more human capital per worker. In all developed and developing countries, other than those whose economies are based on natural resource extraction (i.e., middle eastern oil producers), the non-agricultural labor force has become a larger fraction of the

[5] A discussion of the role of institutions and policy, with a focus on relationship-based systems versus arms-length transaction systems, in allowing a country to achieve its potential is contained in "Which Capitalism? Lessons from the East Asian Crisis" by Raghuram G. Rajan and Luigi Zingales in the Fall 1998 *Journal of Applied Corporate Finance*.

population as a transition from being predominantly subsistence farmers to manufacturing and service workers has occurred. In much of Europe and its offshoots of Australia, Canada, New Zealand, and the U.S., this transition occurred very gradually. In East Asia, this transition has occurred rapidly.

Throughout almost the entire world, birth rates have fallen. When birth rates fall, women can then enter the labor force. The labor force can also grow rapidly for several decades when birth rates fall, with a twenty year lag, as children become adults and start to work, but before they get old and retire. This "demographic dividend" when a large part of the population is in its prime working years of 20-60 can supercharge growth rates for roughly forty years if it occurs suddenly, as has happened in East Asia. The demographic dividend can boost growth rates more modestly over a longer period of time if it occurs gradually, as has happened in Europe and its offshoots.

Economic growth can occur due to increased inputs of labor, but the output per worker will be higher if there is also more capital per worker. Capital can be accumulated both through a high savings rate by people or a high savings rate by the government or corporations. If corporate earnings are reinvested in positive net present value (NPV) projects, shareholders will benefit and stock returns can be high.

Lastly, technological change contributes to economic growth, as inputs are transformed into outputs more efficiently. The growth in agricultural productivity, partly due to improved seed genetics, has allowed a large fraction of the labor force to move out of agriculture in all developed countries.

To a remarkable extent, the economically advanced countries in 1900 continue to be the economically advanced countries today. The most notable exception is Japan, which has gone

from moderately poor to rich. Other East Asian countries (Hong Kong, S. Korea, Singapore, and Taiwan) have also reached Western European standards of living, but no African or Latin American countries have done so. Argentina is the only country whose classification has changed from relatively rich in 1900 to relatively poor and that is not included in the sample of 19 countries used in Table 1. And South Africa is the only one of those 19 countries in the sample that is, at best, only a middle income country today.

In analyzing differences in economic growth rates, it's useful to start by looking at the well-known critique of Asia's economic miracle by Paul Krugman and Alwyn Young.[6] Krugman and Young argue that the high growth rates achieved by the Soviet Union during the period 1930-1970, and the high growth rates in many East Asian countries in 1960-1993, resulted mainly from taking societies with vast amounts of under-utilized labor and very little capital, and applying capital (due to high savings rates) and labor (by moving people out of subsistence agriculture) together with mainly imported technology. While this transition was occurring, these economies experienced exceptionally high rates of economic growth, bolstered by the demographic dividend that is partly responsible for China's current high rate of growth.

Here, I am joining Krugman (1994) and Young (1995) in arguing that much of the economic growth in emerging markets comes from high savings rates (or foreign direct investment) and the more efficient utilization of labor, neither of which necessarily translates into higher profits accruing to the shareholders of existing firms in that market.

[6] See "The Myth of Asia's Economic Miracle," by Paul Krugman in *Foreign Affairs* (1994) and "The Tyranny of Numbers: Confronting the Statistical Realities of the East Asian Growth Experience," by Alwyn Young in the *Quarterly Journal of Economics* (1995). Krugman's article gives a non-technical summary of Young's research. Because of the difference in the speed of publication between *Foreign Affairs* and the *Quarterly Journal of Economics*, Krugman's article was published first, even though Young's article was written first.

Although more capital investment generally means higher growth rates for national economies, higher investment does not necessarily mean higher returns for shareholders. According to finance theory, companies increase their own value mainly by undertaking new projects with positive NPVs; that is to say, projects in which the returns on capital are higher than the cost of capital—and the more such projects a company undertakes, the higher the returns to shareholders.

Within the U.S., some industries have grown over time, and others have declined. Industries that have grown during the last century include the airlines, computer hardware and software, automobiles, and pharmaceuticals. Industries that have declined in relative importance include railroads, steel, and tobacco. But the shareholders of airlines have not gotten rich, nor have the owners of auto companies during the last 45 years. Instead, in these industries many billions of dollars have been invested in negative NPV projects. Cigarette companies, on the other hand, have done very well for their shareholders, with a high fraction of their earnings paid out in dividends, even though a lawsuit settlement resulted in their agreement to pay hundreds of billions of dollars in payments to claimants starting in the late 1990s.

Suggestive evidence about the importance of reinvested earnings in accounting for the growth of stock market capitalization is contained in Dimson, Marsh, and Staunton (2002, Chapter 2). At the beginning of 1900, railroads made up 63% of the market cap of U.S. stocks. The return on reinvested capital in this industry, which now represents 0.2% of U.S. market cap, has not been high. Capital reinvested in the auto, steel, and airline industries also has not resulted in a high return on investment.

In addition to increased inputs of capital and labor, economic growth comes from technological progress. As Warren Buffett (1999), Jeremy Siegel (1999, 2000), and Robert

Arnott (2001) argue, technological change benefits consumers, but in a competitive economy, the owners of capital do not benefit.

Predicting Future Returns

In general, there is no consensus on how to estimate future stock returns. This is especially true for emerging markets, where frequently there are only limited data on past stock returns. This article argues that limited historical data on stock returns are not a constraint, since these data are irrelevant for estimating future returns, whether in emerging markets or developed countries. This point has been made before, although possibly not as explicitly, in Fama and French (2002) and Siegel (2002), among other places. Of greater originality, this article argues that not only is the past irrelevant, but to a large extent knowledge of the future real growth rate for an economy is also irrelevant.

In what follows, I argue that only four pieces of information are needed to estimate future equity returns. The first is the current P/E ratio, although earnings must be smoothed to adjust for business cycle fluctuations. The second is the fraction of corporate profits that will be paid out to shareholders via share repurchases and dividends, rather than accruing to managers or blockholders when corporate governance problems exist. The third is the return on capital for the reinvested earnings. If the money is invested in positive NPV projects, a high P/E ratio can be justified. The fourth is the probability of catastrophic loss, i.e., the chance that "normal" profits are a biased measure of expected profits because of "default" due to hyperinflation, revolution, nuclear war, etc. This fourth point is the survivorship bias issue, applied to the future.

The reason that future economic growth is largely irrelevant to predicting stock returns in an economy is because investors realize returns on stocks that they hold today. If an economy

grows because personal savings are invested in new firms, or invested in existing firms through debt and equity infusions, the gains on this capital investment do not accrue to existing shareholders. Empirically, what matters for stock returns is how much of an economy's growth comes from reinvestment of earnings into positive NPV investments in existing publicly traded companies, versus how much of it comes from personal savings that are then invested in private companies or in new issues of equity from existing companies.

The claim that knowledge of future economic growth rates is irrelevant must be qualified. In the short run, there is ample evidence that unexpected changes in economic growth affect stock prices. Stock prices decline when the probability of an economic recession increases, and stock prices increase when the probability of economic recovery increases. Recessions are definitely bad for corporate profitability, and cyclical recoveries are good. I would argue that cyclical effects should rationally have an effect on equity valuations, but the effects should be largely transitory, and thus should not have a big impact on the present value of dividends for a given firm.

I believe that the large stock price effects associated with recessions are partly due to higher risk aversion at the bottom of a recession, but also due partly to an irrational overreaction.[7] Overreaction results in excessive volatility and mean reversion over multi-year horizons. And certainly if there is an unexpected collapse of an economy, due, for instance, to war or expropriation, as happened in Russia in the years after 1917, this rationally affects returns (making them –100%).

[7] In the 2008 Financial Panic, drops in stock prices can be decomposed into 1) lower expected cash flows, due to an increase in the possibility of a world-wide depression, 2) higher risk, due to a higher probability of extreme scenarios, and 3) greater risk aversion, which corresponds to a higher market price per unit of risk. The third point is equivalent to higher expected returns on a point-forward basis. Irrational overreaction would occur if cash flow forecasts became excessively pessimistic or perceptions of risk were higher than objectively justified.

But, more generally, whether the Chinese economy grows by 7% per year or by 3% per year for the foreseeable future is largely irrelevant for the future returns on Chinese stocks. There is also an asymmetry—if a country has negative growth, this is probably bad for stocks. But for positive rates of long-term growth, whether the growth rate is 3% or 7% shouldn't matter.

Since historical returns are irrelevant in predicting future equity returns, whether or not prior realized returns are affected by survivorship bias is unimportant. But what if today's stock prices are depressed because of a concern that a catastrophic event may wipe out a country's financial markets? This should show up in both a high promised yield on bonds, and depressed P/E ratios. In this scenario, the earnings yield on stocks will overestimate future expected equity returns for the same reason that the yield to maturity on corporate bonds overestimates the expected return. In both cases, there is a "default" probability, and the expected returns are lower than the "promised" returns. Alternatively stated, if corporate governance problems are not of major importance, the smoothed earnings yield on the stock market is an estimate of the future expected return conditional on a catastrophic event not occurring.

The increased supplies of capital and labor can boost growth without the owners of existing companies reaping the benefits. Furthermore, the other major source of economic growth, technological change, doesn't benefit the owners of capital if competition keeps profit margins low.

If past stock returns are irrelevant for predicting future stock returns, and future economic growth rates are also irrelevant, what does matter? The answer is simple: earnings yields. Corporate earnings can either be paid out or reinvested (cash used by one company to acquire another publicly traded company is equivalent to a share repurchase—it is merely using company A's cash to retire company B's shares). Repurchases are similar to dividends, in that

cash flows out of the corporate sector into the hands of individuals, who then either buy newly issued shares or use the cash for consumption.

One way to forecast compounded real stock returns is to use the market's earnings yield, as propounded by Jeremy Siegel (1999 and 2008, Chapter 7):

$$E(r) = E^*/P$$

where E* is normalized earnings per share (EPS smoothed to take out business cycle effects). Earnings are either paid out as dividends or in share repurchases, or reinvested. Whether earnings are paid out or reinvested, the compounded real return will be the same if the average (normalized) ROE does not change over time.

As a matter of arithmetic, P/E ratios fluctuate due to changes in both the numerator and denominator. Since current earnings fluctuate based on business cycle effects, a market P/E might be temporarily high because earnings are temporarily depressed. This is why Campbell and Shiller (2001) use a ten-year moving average of earnings—this procedure smooth's out business cycle effects. Robert Shiller's website maintains an updated Excel file with the smoothed earnings yield on the S&P 500 index.

If earnings yields predict future stock returns on theoretical grounds, there should be empirical evidence supporting this. Campbell and Shiller (2001) note that when smoothed earnings yields are low, future returns will be lower than average unless earnings grow faster than average. They present evidence that when smoothed earnings yields are low, future real earnings growth is slightly lower than average. A low smoothed earnings yield does, however, predict low real stock price growth over the following ten years. In other words, P/E ratios revert towards the mean through price changes rather than earnings changes.

Conclusion

Surprisingly, the cross-country correlation of per capita real GDP growth and real stock returns is negative when long periods of time are used. This is true for both developed countries and emerging markets, and holds whether returns are measured in local currencies or U.S. dollars. While, as the saying goes, historical performance no guaranty of future returns, the evidence flies in the face of the intuition that economic growth should benefit stockholders.

Apparently, consumers and workers rather than the shareholders of existing companies gain all of the benefits of economic growth. Competition between companies appears to result in few of the benefits accruing to the shareholders of existing companies. While an increased capital stock and increased labor force participation are not of obvious benefit to shareholders, the fact that economic growth due to technological change does not seem to benefit shareholders is surprising. This does not mean that a company should not try to improve its technology. If the competition is becoming more efficient, failing to keep up with competitors will result in lower profits.

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Table 1

Real annual per capita GDP growth rates and stock returns, 1900-2011

Geometric mean real dividend growth rates, dividend yields, and real returns (dividends plus capital gains) per year from Dimson, Marsh, and Staunton (2012) are used for 19 countries for the 112 years from 1900-2011. For real per capita GDP growth, data come from an updated version of Angus Maddison (1995) *Monitoring the World Economy 1820-1992* Paris: OECD Development Centre Studies, as explained in Appendix Table A-1 for 1900-2008, and from the World Bank's *World Development Indicators* for 2008-2011. Real per capita income is expressed in terms of dollars of 1990 Geary-Khamis dollars (purchasing power parity-adjusted) through 2008 multiplied by the ratio of 2011/2008 real per capita income in local currency units from *World Development Indicators* to obtain the 2011 number. The South African GDP numbers start in 1913 rather than 1900. The equally weighted mean real return is 4.6% per year in local currency units and 4.7% per year in U.S. dollars, and the mean per capita growth rate of real GDP is 1.8% per year.

	1900-2011		1900-2011		
	Real dividend	Dividend	Real per capita	Mean real geometric return	
Country	per share growth	yield	GDP growth	Local currency	US dollars
Australia	0.99%	5.7%	1.68%	7.2%	7.3%
South Africa	1.05%	5.8%	1.13%	7.2%	6.4%
United States	1.31%	4.2%	1.85%	6.2%	6.2%
Sweden	1.80%	4.0%	2.21%	6.1%	6.2%
New Zealand	1.17%	5.4%	1.30%	5.8%	5.5%
Canada	0.67%	4.4%	1.96%	5.7%	5.7%
United Kingdom	0.45%	4.6%	1.48%	5.2%	5.2%
Finland	0.23%	4.8%	2.41%	5.0%	5.1%
Denmark	-0.96%	4.6%	1.86%	4.9%	5.4%
Netherlands	-0.61%	4.9%	1.78%	4.8%	5.2%
Switzerland	0.47%	3.5%	1.70%	4.1%	5.1%
Norway	-0.07%	4.0%	2.45%	4.1%	4.4%
Ireland	-1.29%	4.5%	2.30%	3.7%	4.0%
Japan	-2.36%	5.2%	2.69%	3.6%	4.2%
Spain	-0.58%	4.2%	2.14%	3.4%	3.5%
France	-0.75%	3.8%	1.85%	2.9%	2.8%
Germany	-1.27%	3.7%	1.78%	2.9%	3.2%
Belgium	-1.48%	3.7%	1.66%	2.4%	3.0%
Italy	-2.21%	4.0%	2.15%	1.7%	1.8%
Correlation of real growth and real returns				-0.39	-0.32
p-value				(0.10)	(0.18)

Table 2

Mean real stock returns and per capita GDP growth for 21 countries for 42 years, 1970-2011

Stock returns come from Datastream, where the Datastream information is the MSCI total return indices with dividends being reinvested. Inflation adjustments for stock returns are made using December to December changes in the CPI. Geometric mean real GDP per capita growth rates (using constant local currency units) come from the World Bank's *World Development Indicators* (WDI). The mean real return is 4.9% per year in local currencies and 5.6% per year in US dollars and the mean real per capita GDP growth rate is 2.0% per year.

	Mean geometric real	Mean geometric real return	
Country	GDP per capita growth	Local currency	US dollars
Australia	1.8%	3.6%	4.7%
Austria	2.3%	2.3%	3.5%
Belgium	2.0%	5.4%	6.2%
Canada	1.7%	5.3%	5.4%
Denmark	1.5%	6.8%	8.0%
Finland	2.4%	7.9%	8.5%
France	1.8%	4.6%	5.1%
Germany	1.7%	5.8%	4.9%
Ireland	3.3%	3.1%	4.2%
Italy	1.8%	0.3%	0.7%
Japan	2.0%	2.3%	4.6%
Netherlands	1.9%	6.2%	7.2%
New Zealand	1.2%	4.1%	4.9%
Norway	2.4%	5.6%	6.7%
Singapore	5.1%	5.9%	6.6%
South Africa	0.6%	6.9%	6.3%
Spain	2.0%	2.9%	4.5%
Sweden	1.8%	8.8%	8.8%
Switzerland	1.0%	4.6%	6.7%
United Kingdom	2.0%	4.9%	5.6%
United States	1.7%	4.9%	4.9%
Correlation of real growth and real returns		-0.04	0.01
p-value		(0.87)	(0.95)

Table 3

Mean real stock returns and per capita GDP growth for 15 countries for (up to) 24 years

Stock returns come from Datastream, where the MSCI total return indices with dividends being reinvested are used with CPI deflators from the World Bank's *World Development Indicators* (WDI). For real returns, inflation is measured from December to December. For real per capita income, the average level of the price level in a year is used to convert nominal GDP to real GDP. Geometric mean real GDP per capita growth rates (using constant local currency units) come from WDI. Returns for the BRIC countries (Brazil, Russia, India, and China) start after 1988 and their per capita real GDP growth rate is computed for the same years as for the stock returns.

		Mean geometric real	Mean geometric real return	
Country	**Years**	**GDP per capita growth**	**Local currency**	**US dollars**
Argentina	1988-2011	2.4%	10.4%	12.9%
Brazil	1993-2011	2.0%	13.3%	10.7%
Chile	1988-2011	4.0%	14.1%	15.2%
China	1993-2011	9.4%	-5.5%	-5.7%
India	1993-2011	5.1%	4.1%	4.1%
Jordan	1988-2011	0.9%	1.2%	0.3%
Malaysia	1988-2011	3.9%	6.8%	5.9%
Mexico	1988-2011	1.2%	15.0%	17.1%
Philippines	1988-2011	1.8%	3.1%	4.3%
Portugal	1988-2011	1.9%	-0.9%	0.0%
Russia	1995-2011	3.6%	-6.8%	-2.2%
South Korea	1988-2011	4.7%	4.2%	4.1%
Taiwan	1988-2011	4.3%	4.9%	2.8%
Thailand	1988-2011	4.1%	5.4%	5.2%
Turkey	1988-2011	2.4%	5.0%	6.9%
Correlation of real growth and real returns			-0.41	-0.47
p-value			(0.13)	(0.08)

Appendix Table A-1
Levels and growth rate of per capita GDP for 19 countries, 1900-2011

	Real per capita GDP, $1990			Population	Population growth	
Country	1900	2011	Per annum	in 1900, m	Cumulative	Per annum
United Kingdom	4,492	22,866	1.48%	38.000	65%	0.45%
New Zealand	4,298	18,000	1.30%	0.967	357%	1.38%
United States	4,091	30,755	1.85%	76.212	309%	1.28%
Australia	4,013	25,406	1.68%	4.000	467%	1.57%
Switzerland	3,833	24,985	1.70%	3.525	124%	0.73%
Belgium	3,731	23,309	1.66%	6.136	79%	0.52%
Netherlands	3,424	24,131	1.78%	5.616	197%	0.99%
Denmark	3,017	23,377	1.86%	2.182	157%	0.86%
Germany	2,985	21,175	1.78%	56.000	46%	0.34%
Canada	2,911	25,104	1.96%	5.500	527%	1.66%
France	2,876	21,891	1.85%	41.000	54%	0.39%
Ireland	2,736	25,304	2.30%	4.466	3%	0.03%
Sweden	2,209	24,941	2.21%	5.140	83%	0.54%
Norway	1,877	27,560	2.45%	2.240	123%	0.72%
Spain	1,786	18,808	2.14%	20.750	123%	0.72%
Italy	1,785	18,940	2.15%	33.000	84%	0.55%
Finland	1,668	23,449	2.41%	2.656	103%	0.64%
South Africa	1,602	4,830	1.13%	5.014	907%	2.10%
Japan	1,180	22,333	2.69%	42.000	205%	1.01%

Sources: For the real per capita GDP numbers, "Statistics on World Population, GDP and Per Capital GDP, AD 1-2008" (horizontal file, copywrite Angus Maddison, University of Groningen) available at http://www.ggdc.net/maddison/oriindex.htm, in 1990 international Geary-Khamis (purchasing power parity-adjusted) dollars. Ireland and South Africa have 1913 numbers rather than 1900 numbers for real per capita GDP, so the per annum growth rate of real GDP per capita is computed by taking the 98th root of the 2011/1913 ratio. The 2011 numbers come from taking the 2008 Maddison numbers and multiplying by the ratio of 2011 to 2008 real GDP per capita in local currency unit numbers from the World Bank. For Finland and New Zealand, tradingeconomics.com is the source of the 2011 real per capita GDP numbers relative to 2008.

Population in 1900 is given in millions, with 1900 populations from http://en.wikipedia.org/wiki/List_of_countries_by_population_in_1900 except for South Africa, Finland, France, and Ireland. The Irish population is from www.libraryireland.com, which gives a UK population of 41.150 million in 1900. The Finnish population is from http://www.vaestoliitto.fi/@Bin/236655/YB+09_Statistics.pdf for 1900. The French population in 1900 is given as 38 million by Wikipedia but 41 million at http://www.worldmapper.org/posters/worldmapper_map9_ver5.pdf http://en.wikipedia.org/wiki/South_Africa gives a South African population of 5.014 million. 2011 populations are from the Population Reference Bureau at http://www.prb.org/pdf11/2011population-data-sheet_eng.pdf

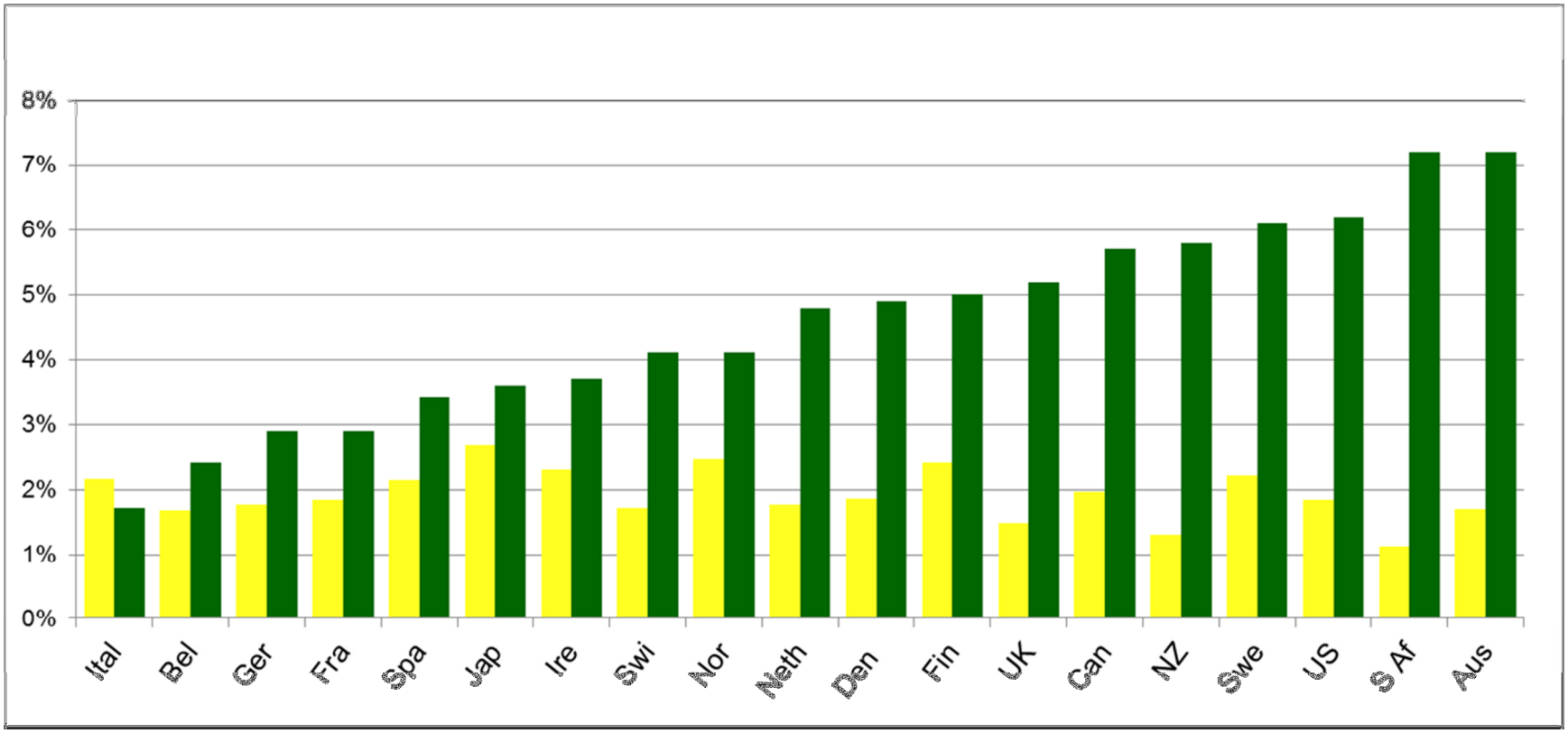

Figure 1. Real per capita GDP growth rate per annum (on left in yellow) and real equity return per annum (on right, in green), 1900-2011. The real return data (dividends plus capital gains, adjusted for inflation, in local currency units) are from Dimson, Marsh, and Staunton (2012). Real per capita GDP growth rates are from the World Bank, Dimson, Marsh, and Stanton (2012), and Maddison (2010).

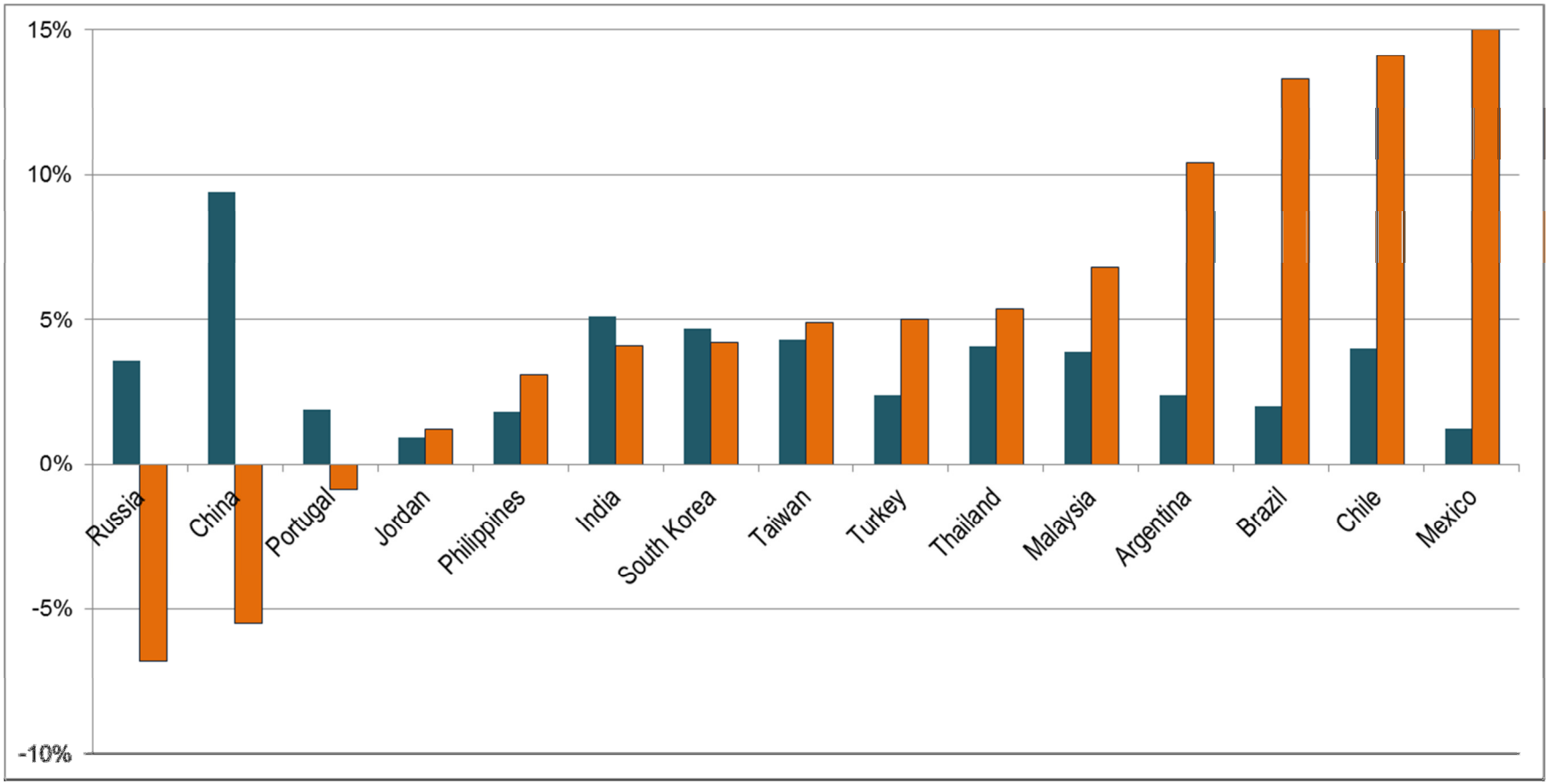

Figure 2. Real per capita GDP growth rate per annum (on left in blue) and real equity return per annum (on right, in orange), 1988-2011. The real return data (dividends plus capital gains, adjusted for inflation, in local currency units) are from MSCI (2012). Real per capita GDP growth rates are from the World Bank. For the BRIC countries of Brazil, Russia, India, and China, the numbers start in 1993 or 1995 rather than 1988.