

NBIM DISCUSSION NOTE

Economic Growth and Equity Returns

30/03/2012

We study the links between economic growth and equity market returns to evaluate whether structural changes to global growth composition have implications for longer-term strategic allocations. In particular, we assess whether the projected rise in emerging markets' share of the world economy warrants an allocation to emerging asset markets that deviates from market weights.

Main findings

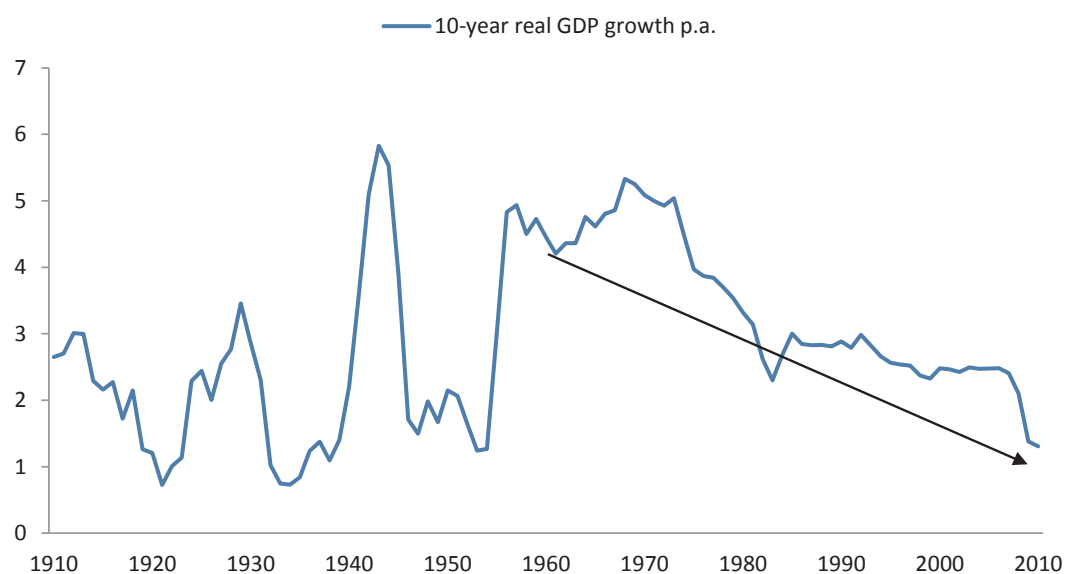
- Growth prospects are better in emerging markets than in developed countries for some decades to come due to favourable demographics and healthier public finances.
- The theoretical case for a positive relationship between economic growth and equity returns can be inferred from neoclassical growth theory.
- Finance theory, in particular an international version of the Capital Asset Pricing Model, emphasises the role of a market's covariance with the global portfolio, and not economic growth, as the main driver of expected returns.
- Restricted capital mobility or market segmentation could explain deviations from the international CAPM. Political and governance risks are also potential factors in determining expected returns.
- Empirical evidence in developed and emerging markets does not support the notion of a structural relationship between economic growth and equity returns. The two main reasons are: (a) some countries are better than others at converting GDP growth into profit growth, and (b) better growth prospects are often reflected in market prices.

This paper was part of the NBIM memo "On equity investments" (February 2012)

Introduction

The size and the growth of the overall economy are arguably important determinants of the profitability of firms that operate in that economy. As a minority equity investor in listed companies, the Government Pension Fund Global participates in the growth of economies across the world. This note addresses the question of whether there is a structural relationship between the economic growth of countries (and regions) and the equity returns of listed companies incorporated in those countries. Several secular developments motivate this note. First, trend GDP growth in the developed economies has been shifting downwards over the last 50 years. In Chart 1, we show the striking decline in the ten-year geometric average real GDP growth rate from around 5 percent in the 1960's and 1970's to just 1½ percent at the end of 2010 in 19¹ mostly developed economies.

Chart 1: Long-run economic growth in 19 economies (DMS countries)

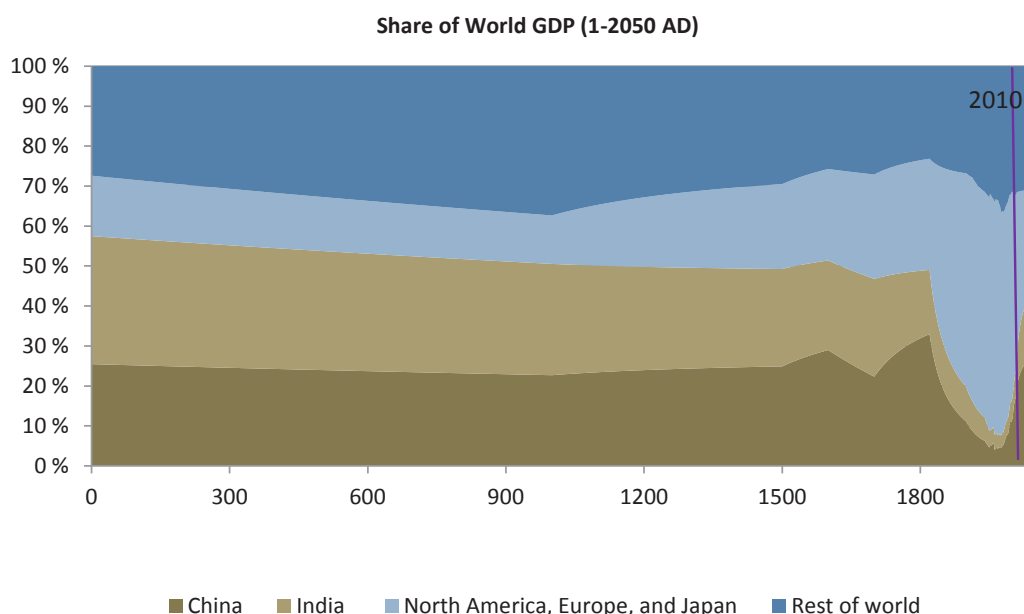


Source: Global Financial Data

The trend deceleration in the economic growth of advanced nations coincides with the emergence of large developing nations, including the world's most populous economies, China and India. In Chart 2, we show the share of the economies of China and India against the advanced nations in North America, Europe and Japan as well as the rest of the world from the year 1 AD to the present and including projections until 2050. It illustrates that the last 200 years have been highly unusual in the context of two millennia in that China and India have dropped sharply from what was their normal share of 50 percent of the economy to about 10 percent at its low point in the 1970's. The rise of the two countries towards 50 percent of the world economy is a return to a "normal" state that has existed for most of the past 2000 years.

¹ These 19 countries are also used in the long-run market return study of Dimson, Marsh and Staunton (2002, 2012) and are all OECD countries, with the exception of South Africa.

Chart 2: The world from 1 to 2050 AD

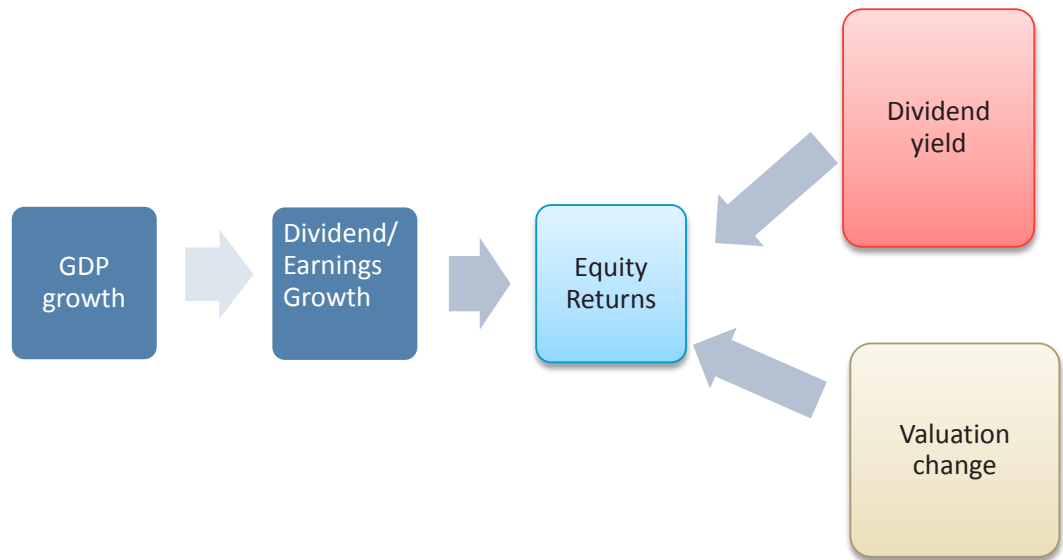


Source: Deutsche Bank, Maddison (2003), Hawksworth and Cookson (2008)

This projected rise of China and India to make up around half of the world economy over the next 40 or so years is in stark contrast to the combined current market capitalisation share of these countries in global equity indices of 3 percent. Even in relation to their current share of world GDP, which is 12 percent based on market exchange rates, they are arguably under-represented in world equity markets. A similar argument applies to emerging markets in the aggregate. In order to capture the supposedly superior growth prospects in these developing nations, should long-term investors raise their allocation to these markets above the market weight?

To put the discussion into a simple conceptual framework, it is useful to decompose the returns accruing to an equity investor into several components as shown in Chart 3. In this return accounting exercise, one can break down the total equity return into the dividend yield (the starting valuation), the change in the P/E ratio (the change in valuation) and the growth in dividends (or earnings) per share. Dividends and earnings are used interchangeably because dividends are driven by earnings in the long run even though payout rates may vary substantially over shorter horizons.

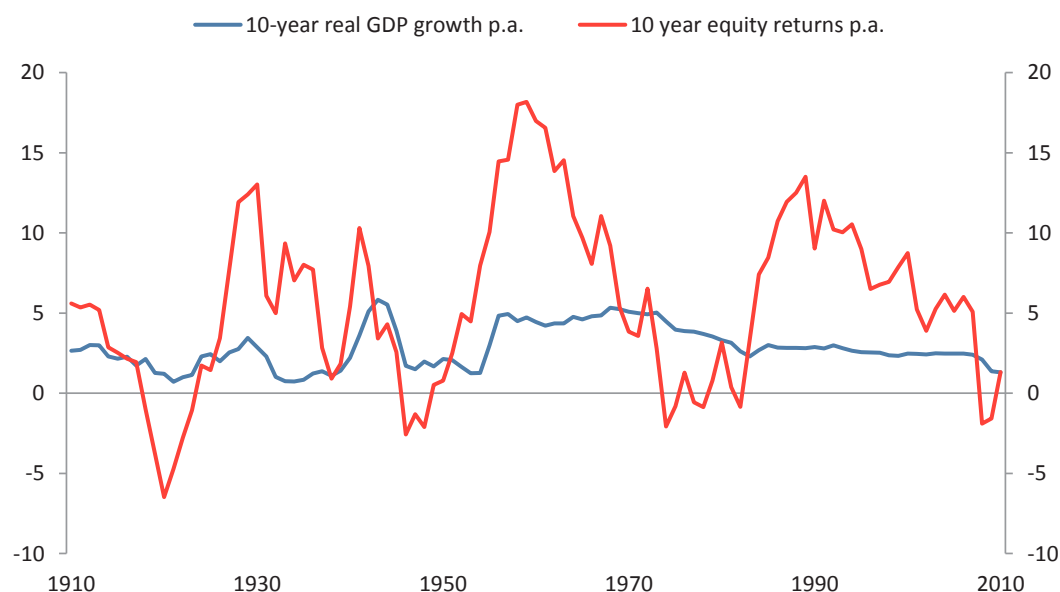
Chart 3: The growth-return relationship in a return accounting framework



It can be argued that only the growth of dividends is directly related to the growth rate of the economy. As we will show later, even that relationship between GDP and dividends or earnings growth is far from stable and straightforward. From this simple return accounting exercise, we can see that the link between economic growth and equity returns is unlikely to be a one-to-one association, as valuations and the change in valuations could also have a substantial impact on returns. Which of the three determinants is more important over various time horizons is ultimately an empirical question which we come back to later.

Chart 3 gives a general sense of the time series correlation between real GDP growth and real equity returns over a longer-term horizon of ten years for a world equity index formed on the 19 countries used in Dimson, Marsh and Staunton (2002, 2012), henceforth referred to as DMS. The first thing to note is that even over periods as long as ten years, mean equity returns are significantly more variable than GDP growth. For example, ten-year annualised GDP growth rates were very stable at around 3 percent in the two decades between 1985 and 2005, yet ten-year real annualised equity returns ranged from slightly negative to over +13 percent. Even over longer horizons, economic growth does not appear to be the most important determinant of equity returns.

Chart 4: Real GDP growth and equity returns in 19 DMS countries



Source: Global Financial Data, Morningstar

With that in mind, a more detailed theoretical and empirical analysis of the growth-return relationship is warranted.

The remainder of this note is organised as follows. We first survey available long-term projections for growth across countries, which mostly rely on neoclassical growth accounting frameworks and typically predict a significantly faster rate of economic growth in the developing world. We also discuss risks to those projections. We then review theories that link the rate of economic growth with the returns to capital as well as the empirical literature. Our own analysis of the empirical growth-return relationship supplements the literature survey. Finally, we examine the implications of the theoretical and empirical analysis for regional and country weights in the equity benchmark.

Global and regional growth prospects

A number of factors point to better growth prospects in developing countries compared to the advanced economies of North America, Europe and Japan. Favourable demographics, sounder public finances and the scope for productivity catch-up are the three most important factors.

In their initial, highly influential research on the so-called BRIC economies (an acronym for Brazil, Russia, India and China), the Goldman Sachs economists Wilson and Purushothaman (2003) used demographic projections in a model of capital accumulation and productivity growth to map out GDP growth, income per capita and currency movements in these economies until 2050.

In follow-up research, O'Neill and Stupnytska (2009) argue that emerging markets collectively appear to have come through the 2007-2009 financial crisis better than many of their developed-country counterparts. As the latter struggled with rapidly rising public debt, the contribution of developing countries to world economic activity increased during the crisis, a trend that the authors predict will continue. In particular, the likelihood of China overtaking the US as the world's largest economy by 2027 appears to have risen, as has the probability that the BRICs will overtake the G7 by 2032.

O'Neill and Stupnytska (2009) also update Goldman Sachs' decade-by-decade growth projections for the BRICs and compare them to those for the US, shown in the table below. Growth in the BRIC economies is forecast to be substantially faster than in the US in the current decade, but the growth differential is projected to decline slowly over coming decades.

Table 1: Decade-by-decade GDP growth projections for the BRIC economies vs. the US

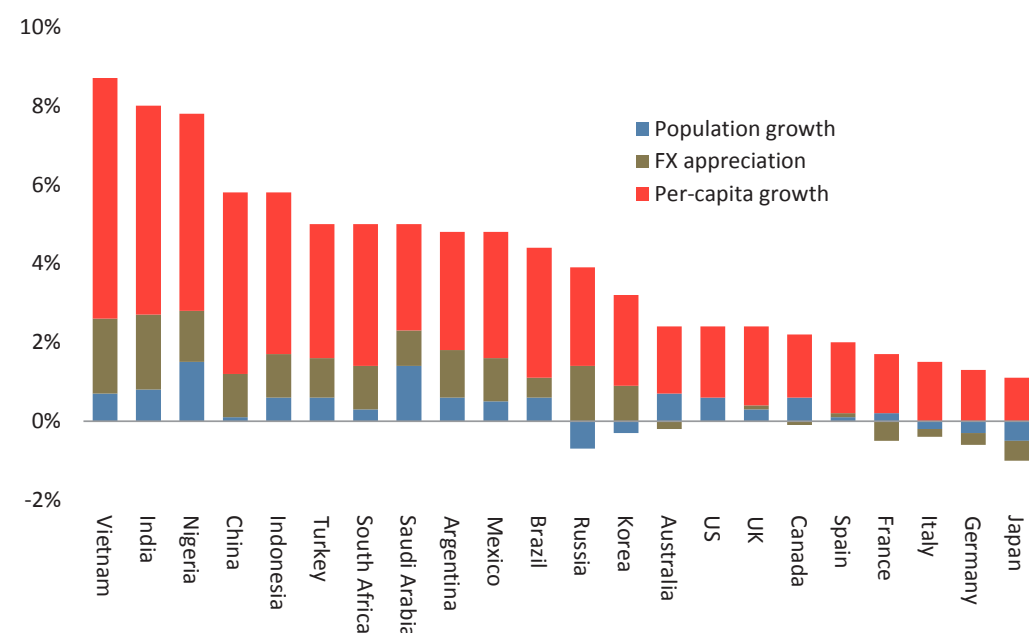
	2011-2020	2021-2030	2031-2040	2041-2050
Brazil	4.5	4.4	4.3	3.9
Russia	4.2	3	2.3	1.5
India	6.4	6.4	6.6	5.7
China	7.7	5.5	4.3	3.5
USA	2.1	2.4	2.7	2.6

Source: GSAM

The growth rates of Brazil and China are predicted to be only around 1 percentage point above that of the US by 2050. Russia is projected to grow by 1 percentage point less than America at the end of the forecast horizon. The exception to this convergence is India, which enjoys more favourable demographics, and maintains a substantial growth margin over the US.

Using a similar approach, PricewaterhouseCoopers (2011) extend Goldman Sachs' projections to the G20 countries, deriving a long-term forecast of the shares of developed vs. emerging nations in the global economy. They use their short-term projections for real GDP growth between 2009 and 2014 and estimate long-term trend growth through extended Cobb-Douglas production functions thereafter. The inputs to growth are physical capital, labour, human capital and total factor productivity. After estimating the parameters of the function from historical data, the authors use the function to project potential GDP from 2015 until 2050. In this approach, emerging economies have stronger potential growth than the established OECD economies, based on generally faster population growth and the catch-up in productivity. However, similarly to Goldman Sachs' work, the projections implicitly assume that the countries follow broadly growth-friendly policies. Hence, they can be understood as indications of potential future GDP rather than predictions of the actual path, bearing in mind that shocks and policy mistakes may impact on the growth path.

Chart 5: Projected average growth rates in the G20+2, 2009-2050



Source: PwC

The projections are carried out in terms of purchasing power parity (PPP) exchange rates on the one hand, which adjust for the different price levels in advanced and emerging economies, and market exchange rates on the other. While PPP-based GDP figures are most suitable for comparisons of living standards and economic welfare, the levels based on market exchange rates are more relevant for international investing. Chart 5 shows the average annual growth rate projection from the PwC model for 22 countries to 2050 and its breakdown into three components: the contributions from per-capita GDP growth, population growth and changes in the exchange rate (which is assumed to slowly converge to the PPP level over the model horizon).

According to the PwC methodology, all countries considered “emerging countries” are projected to grow their GDP at market exchange rates considerably faster than developed nations. The differential between developed and developing nations is mainly driven by projected per-capita growth (through capital accumulation and productivity catch-up) and exchange rate appreciation rather than population growth.

In a rebuttal to the optimistic work by Goldman Sachs, PwC and others, Chancellor (2010) and Smith and Beceren (2011) argue strongly against the supply-side-driven view of emerging market growth and, in particular, of investing in emerging markets. They emphasise the importance of considering the potentially detrimental influence of the state in emerging countries’ capital markets, the risk of policy mistakes and the likelihood of speculative bubbles and subsequent financial crises.

Chancellor (2010) discusses how speculative manias are characterised by common features (“red flags”). Among these characteristics are:

- the emergence of a compelling growth story and strong faith in the competence of policymakers and other authorities;
- a strong increase in investment and property prices driven by rapid credit growth, high leverage and loose monetary policy;
- moral hazard created by state bailouts and increasing corruption.

The author then provides evidence for each of these red flags in today’s China. He argues that Chinese growth and investment markets are experiencing a bubble similar to the technology boom of the early 2000’s or the surge in subprime credit that culminated in the 2007-2009 financial crisis.

It can be argued that the evidence of the 2007-2009 crisis shows, contrary to the case made by Chancellor, that the developing nations were generally less vulnerable to the bursting of the real estate bubble in the US and the ensuing financial contagion than many developed countries. Whether this can be taken as an indication of a structural shift in the balance of risks for developed and emerging countries is open to debate.

However, our working assumption will be that developing nations continue to grow faster than advanced economies in the decades to come, driven by their more favourable demographic profile, better public finances and the potential for productivity catch-up. Unlike in the smooth projections of the supply-side models from Goldman Sachs and PwC, there are likely to be significant setbacks and crises along that path.

Growth and international returns: theoretical foundations

Equity returns should intuitively be linked to economic growth as national income is divided between the factors of production, including capital. Growth theory is therefore a starting point for discussing rates of return on capital.

Neoclassical growth theory and international rates of return

Many of the empirical tests of the growth-return nexus seem to be motivated by the neoclassical growth model, pioneered by Solow (1956). One of the key assumptions in the closed Solow economy is that capital is subject to diminishing returns, i.e. for a given level of labour input, additional capital input will raise output by less than previous units. Two key predictions emerge from the neoclassical

growth models that have a bearing on the cross-sectional relationship between income level on the one hand, and growth and the return on capital on the other. The first is that the rate of return on capital is higher in poor countries (those with low capital per capita) than in rich economies. The second is that countries starting from low income levels are predicted to grow faster and converge towards the living standards of wealthier economies, as long as other structural features such as government policies and savings rates are comparable. Several empirical studies have documented convergence for economies that are broadly similar. Dowrick and Nguyen (1989) report convergence for OECD countries. Barro et al. (1991) and Barro and Sala-i-Martin (1992) find that convergence occurred within countries, for example between the US states and the regions of Europe and Japan.

Introducing perfect international capital mobility yields a third prediction: capital will flow to the countries with the highest rates of return (in the model world, the poorest economies) until returns are equalised globally. A corollary of this prediction is that the liberalisation of international financial transactions produces substantial economic benefits as it facilitates the allocation of capital to its highest productivity use (Henry 2007). The prediction of the model's open-economy version for investment policy in the absence of risk considerations (and with the aim of return maximisation) could not be more clear-cut: all investments should go to the higher-return economy until rates of return are equalised.

However, empirical puzzles relating to the neoclassical model, in particular the Lucas (1990) paradox, make it somewhat unsatisfactory. The Lucas paradox describes the contradiction between the predictions of an international version of the neoclassical growth model and observed capital flows. Gross capital flows mainly take place between developed nations and the net flows to emerging markets have been negative in recent decades, not highly positive as predicted by the theory. What is more, growth theory ignores uncertainty, which is central to the finance view of asset pricing. Therefore, we turn to the international Capital Asset Pricing Model (ICAPM) as an alternative framework for describing asset returns across countries. We discuss how market segmentation and political risk could explain the empirical failure of the ICAPM.

International CAPM and market integration

In contrast to the growth literature, uncertainty plays a central role in the asset pricing literature. A natural starting point for determining the expected return in different markets, including emerging markets, is an international version of the Capital Asset Pricing Model. Karolyi and Stulz (2002) show that, in a world with perfect capital markets and identical consumption opportunities across countries, mean-variance optimising investors globally will all invest in the same portfolio, and assets will be priced according to an international version of the CAPM with the global index instead of the domestic index as the market portfolio.

In analogy to the traditional CAPM, the expected excess return of an asset is proportional to the asset's covariance (beta) with the market index, a result first obtained by Grauer, Litzenberger and Stehle (1976). With regard to emerging markets, one might expect these to have higher expected excess returns due to their higher risk, as measured by the volatility of returns. However, the international CAPM predicts that it is the covariance and not the variance that determines a national market's risk and consequently its excess return. Lastly, there is no explicit role for economic growth in determining asset returns unless macroeconomic variables have a bearing on a market's beta to the world index.

However, models with perfect international capital markets have had limited success in explaining portfolio holdings across countries and changes in portfolio holdings over time. An example of this is the "home bias" puzzle, which refers to the observation that investors overweight the securities of their own country in their portfolio. The home bias is inconsistent with the international CAPM, especially for countries that have a small weight in the world market portfolio. Imperfections in capital mobility, or segmentation of markets, have been examined as potential explanations for the home bias and other deviations from the international CAPM. Segmentation occurs when international investment flows are limited because of explicit constraints or barriers to international investment. Bekaert and Harvey (2000) and Henry (2000) provide evidence on the impact of removing barriers to international investment for emerging markets. Bekaert and Harvey argue that segmented markets are priced locally, i.e. according to their variance, while integrated markets are priced globally, in line with their beta to the world portfolio. Since emerging markets typically have high volatility but low betas, their equity may appreciate when they move from local to global pricing. This prediction is consistent with

the notion that stock market liberalisation reduces the liberalising country's cost of equity capital by allowing for risk-sharing between domestic and foreign agents.

Sovereign and governance risks

Once complete international financial liberalisation is achieved, traditional finance theory predicts that asset prices, portfolios and corporate finance decisions are not dependent on the country of residence or incorporation, a result Stulz (2005) has coined the "country irrelevance" proposition. Over recent decades, barriers to international investment have fallen substantially, first in advanced nations and later in emerging markets. Yet, many stylised facts still contradict the "country irrelevance" proposition. The previously mentioned "home bias" shows that the country of residence is of great importance to an investor's asset allocation. Moreover, the country of incorporation appears to impact corporate finance decisions more than a company's industry. This suggests that certain features of the traditional frictionless model are at odds with reality.

Even in the absence of explicit barriers to the free flow of capital, implicit barriers may well discourage international investment and provide an explanation for some of the paradoxes of international finance. Stulz (2005) outlines an alternative to the frictionless model that takes into account the risk of expropriation as one such implicit barrier. In his framework, all investors face the risk of expropriation by the sovereign, and minority investors additionally face the risk of expropriation by corporate insiders, who can either be controlling shareholders or the managers of the company (or both). Stulz argues that the country irrelevance proposition does not hold in this set-up due to the "twin agency problems" of state and insider expropriation risk. The country of incorporation becomes relevant even in the absence of cross-border barriers to international investment. Furthermore, Stulz offers expropriation risk as a potential solution to the Lucas paradox discussed previously. The twin agency problems create a wedge between the return on investment between countries that differ in their protection of outside investors, i.e. returns offered by countries with greater expropriation risk need to be higher in equilibrium and investment flows will cease before returns are equalised.

Bansal and Dahlquist (2002) apply the notion of expropriation risk to asset pricing, and in particular to explaining the expected returns of emerging markets stocks. They approximate the ex-ante risk of expropriation by combining various publicly available measures of financial and economic risk provided by the International Country Risk Guide (ICRG). Official country ratings and the spreads on dollar-denominated sovereign bonds are used as alternative proxies for expropriation risk. After taking account of the risk of appropriation, Bansal and Dahlquist (2002) find that country betas could account for the differences in risk premia quite well. In another example of this strand of research, Alfaro et al. (2008) argue that political risk, as proxied by the quality of institutions and policies, played an important role in determining international capital flows in the period between 1970 and 2000. Like Stulz, they offer political factors as potential explanations for the Lucas paradox.

Assessment

Motivated by the failure of the open-economy neoclassical growth model to explain capital flows and the failure of the international CAPM to explain the cross-section of international asset returns, authors have put forward political and expropriation risks as plausible explanations for the observed paradoxes. Expropriation in all its forms may also be invoked to rationalise long-term discrepancies that sometimes exist between the rate of economic growth and corporate earnings, in other words the "earnings dilution" that was observed in the US by Bernstein and Arnott (2003). Corporate insiders and the state, as well as other factors of production, may be able to appropriate some or all of the benefits of economic growth before it reaches earnings that can be distributed to minority shareholders.

In terms of the regional asset allocation of long-term investors, the theory of expropriation risk cautions against expecting the "free lunch" often observed after the emergence of a new market, the combination of high realised returns and low covariance with the world market portfolio. It may well be the case that taking on the political risk inherent in emerging markets is rewarded in the long run, and the theoretical finance literature suggests that investing early during or soon after a country's emergence increases the likelihood of earning the risk premium when a market transitions from "local" to "global" pricing. However, the literature on political risk suggests that the idiosyncratic country risk in new markets is likely to be high. With the exception of the open-economy version of the neoclassical growth model, economic growth is not a major factor in explaining asset returns. In our view, there is

thus no compelling reason to emphasise past or expected growth rates in choosing allocations over the other factors suggested by the literature, i.e. market segmentation, return covariance, political risks and relative valuations.

Growth and returns: empirical evidence

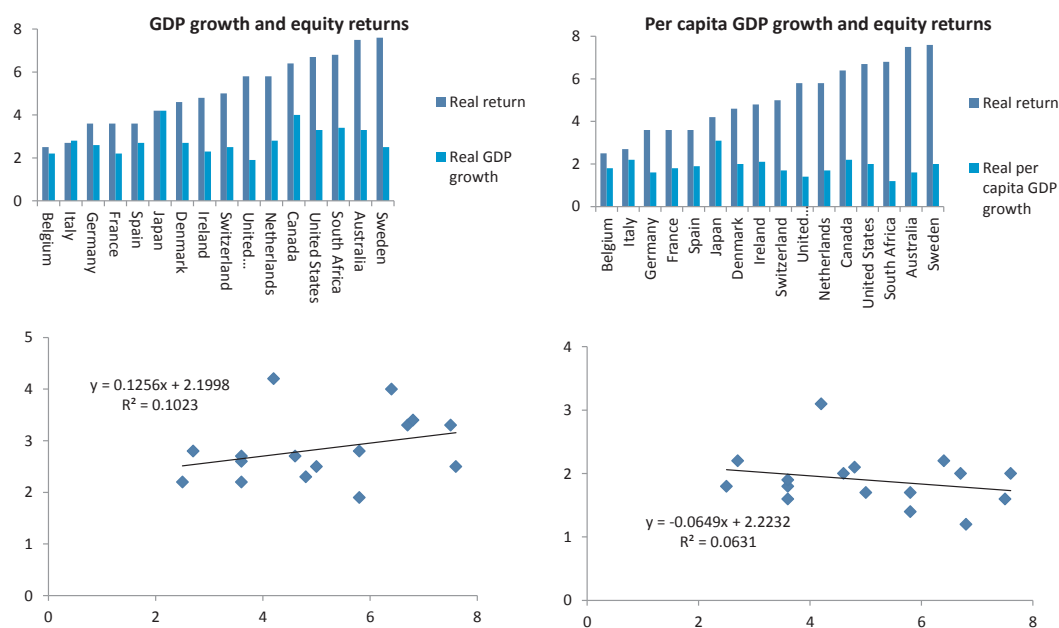
Due to the concurrence of significantly better economic growth in developing markets and significant outperformance of emerging equity markets during the last decade, interest in the growth-return relationship has recently intensified. We review the empirical academic and practitioner literature and present our own analysis of the growth-return relationship.

Survey of academic and practitioner literature

Surprisingly, there are few academic studies that address the issue empirically. One of them is Ritter (2005), who employs the returns from DMS (2002) together with per-capita GDP data from Maddison's (2003) database. Ritter finds that the cross-sectional correlation between the full-sample geometric average per-capita GDP growth rate and the geometric average real equity return for 16 of the DMS countries from 1900 to 2002 is -0.37. While this correlation is counterintuitive, it is statistically not significant at the 10 percent level, which indicates that per-capita growth is not an important differentiating factor of international equity returns. Ritter argues that the part of GDP growth that is driven by new and unlisted firms or by net debt and share issuance of existing firms does not benefit the holders of existing equity capital. Instead, the returns on existing shares depend, among other things, on whether companies can reinvest earnings in projects with positive net present value. The emphasis is therefore more on return on equity as a measure of a company's profitability rather than on GDP growth.

While Ritter concentrates on per-capita GDP, as this is justifiable from neoclassical growth theory, most practitioners are more concerned with the growth rate of the aggregate economy and its relationship to equity returns. When using aggregate GDP growth in the same 16 countries used in Ritter's study, we find a positive correlation of 0.32 between GDP growth and equity returns over the same period. However, just like the negative coefficient cited by Ritter, this should not be overstated as it is not statistically significant at the 10 percent level either. Furthermore, total GDP over such a long period could be subject to structural breaks such as significant migration waves or discontinuities in the definition of nation states.

Chart 6: Full-sample correlation GDP/per capita GDP vs. real equity returns, 1900-2000



Source: Bernstein and Arnott (2003)

By computing one correlation coefficient for the entire 100-year sample, Ritter ignores the within-sample correlations between growth and returns, which are more relevant to intermediate investment horizons of five to ten years. For example, a more useful question to ask may be whether economic growth and equity returns are correlated over holding periods of five to ten years.

Dimson, Marsh and Staunton (2010) extend Ritter's analysis to include the last decade to 2009, but also look at intermediate investment horizons and thereby address some of its shortcomings. The choice of sample period for correlation studies is of importance, as the growth and equity return figures in Table 2 illustrate. Over the last decade, the five emerging markets shown in the table experienced higher GDP growth than the five developed markets. Incidentally, the real (local currency) equity returns in developing countries also outpaced that in advanced markets significantly.

Table 2: GDP growth and real equity returns in selected countries

	2000-2009		1985-2009	
	GDP growth % p.a.	Real equity returns % p.a.	GDP growth % p.a.	Real equity returns % p.a.
China	9.9	7.7	9.9	2.6
India	7	9.5	6.2	11.2
Indonesia	5.1	6.8	4.7	0.4
Sri Lanka	4.9	9.4	4.7	2.2
Brazil	3.2	13.9	2.9	11.1
France	1.5	1.8	1.9	8.7
USA	1.9	2.7	2.8	7.3
UK	1.8	1	2.4	6.7
Germany	0.8	2.5	1.8	6.1
Japan	0.7	4.8	1.9	0.2

Source: DMS (2010)

Over a longer time period going back to the mid-1980's, however, the relationship is less clear-cut. While two emerging markets, India and Brazil, still top the rankings in terms of real equity returns, the other three countries' equity market performance is disappointing given their economic growth. Four of the five developed markets, on the other hand, delivered solid real equity returns of 6-9 percent while their economies grew much more slowly than their emerging counterparts.

Using per-capita GDP, DMS (2010) show that the relationship between coincident economic growth and equity returns for 44 countries over investment horizons of ten years over the 1970-2009 period is slightly positive on average, but statistically insignificant. Even so, coincident GDP growth cannot be employed in a real-time investment strategy because it would require knowledge of economic data for the same period for which the return is measured. An investable strategy has to use past GDP growth or requires an explicit forecast of future GDP growth.

In that spirit, DMS examine returns to country portfolios divided into quintiles based on their *past* five-year GDP growth rates and reconstituted on an annual basis. They find that high-growth economies identified using historical data have no discernible tendency to outperform their low-growth counterparts. In Table 3, the left column records the quintile country portfolio returns for the 19 DMS countries for the 1900-2009 period. The lowest-growth quintile yields nearly the same performance (+10.9 percent) as the highest-growth quintile (+11.1 percent), and the second-highest-growth quintile actually experiences the lowest growth. Looking at 83 countries for the same period does not change the conclusions substantially, as the lowest-growth quintile even surpasses its highest-growth counterpart.

In the 1972-2009 period, which is shown in the right column of the table, the lowest-growth quintile outperforms all other quintiles by a considerable margin. DMS attribute this arguably counterintuitive outperformance of low-growth markets to a “value effect” at country level. The lowest-growth markets will probably be shunned by investors due to their poor economic performance and higher distress risk, hence their lower valuations may set them up for higher returns in the future. High-growth markets, on the other hand, may appear less risky to investors and a lower risk premium is therefore priced, leading to less stellar returns.

Table 3: Returns from investing in markets based on five-year GDP growth

	1900–2009	1900–2009*	1972–2009*
	19 countries	83 countries	83 countries
Lowest growth	10.9	14.1	25.1
Lower growth	9.3	11.7	18.6
Middling growth	10.1	10.6	16.2
Higher growth	7.8	9	11.9
Highest growth	11.1	13.1	18.4

Source: DMS (2010)

However, the sceptical evidence of the growth-return relationship presented by Ritter and DMS is not unanimously accepted among practitioners. Daly (2010) studies the returns to physical capital from national income accounting data for a sample of developed and developing countries. He argues that there are substantial and persistent cross-country differences in the return on physical capital that are consistent with neoclassical theory. The return on capital is positively correlated with growth in GDP per capita and negatively correlated with the level of GDP per capita. Daly also presents some evidence that returns on equity investments are positively related to the return on physical capital, but that the latter bears no discernible relationship with equity valuations. Furthermore, he notes that capital flows between the developed and developing countries conform to the Lucas paradox, i.e. there is a net capital flow from emerging to advanced economies that is in contradiction to neoclassical growth theory.

From an empirical study of the determinants of these capital flows, Daly identifies demographic variables as being more important than proxies of expected return in driving international investments. He concludes that unconstrained investors therefore have an opportunity to seek out the markets with the highest return to capital (and hence equity returns) because other market participants’ flows are not primarily motivated by return considerations.

Another challenge to the Ritter result is presented by O’Neill, Stupnytska and Wrisdale (2011) who criticise the methodology of using one cross-sectional correlation coefficient for a full century of data. They argue that the link between GDP growth and equity returns is very strong when the forward-looking nature of equity investments is taken into account. In an empirical study that emphasises the correlations over shorter time periods, they concede that, as DMS (2005, 2010) showed, equity markets are a *leading* indicator of GDP growth and react in particular to surprises in GDP growth, i.e. deviations of GDP growth from consensus GDP expectations. They show that the sensitivity of equity returns to growth surprises is higher in emerging economies than in advanced markets and emphasise the importance of correctly predicting those surprises. This does not in fact contradict some of the evidence presented in DMS (2010), who demonstrate that investing into markets according to a perfect-foresight forecast of one-year-ahead GDP growth yields very high absolute and risk-adjusted returns. Unfortunately, perfect foresight in GDP predictions is a rare quality.

Lastly, the neoclassical model may be interpreted to apply to equity returns in the aggregate economy, not just the listed markets. The failure to find a strong relationship between economic growth and equity returns may be due the fact that most empirical studies focus on public markets and ignore the unlisted corporate sector.

On balance, however, we interpret the available literature as *not* being supportive of a strong relationship between economic growth and equity returns that would be implementable without superior forecasts of GDP growth.

Economic growth and earnings growth: dilution or concentration

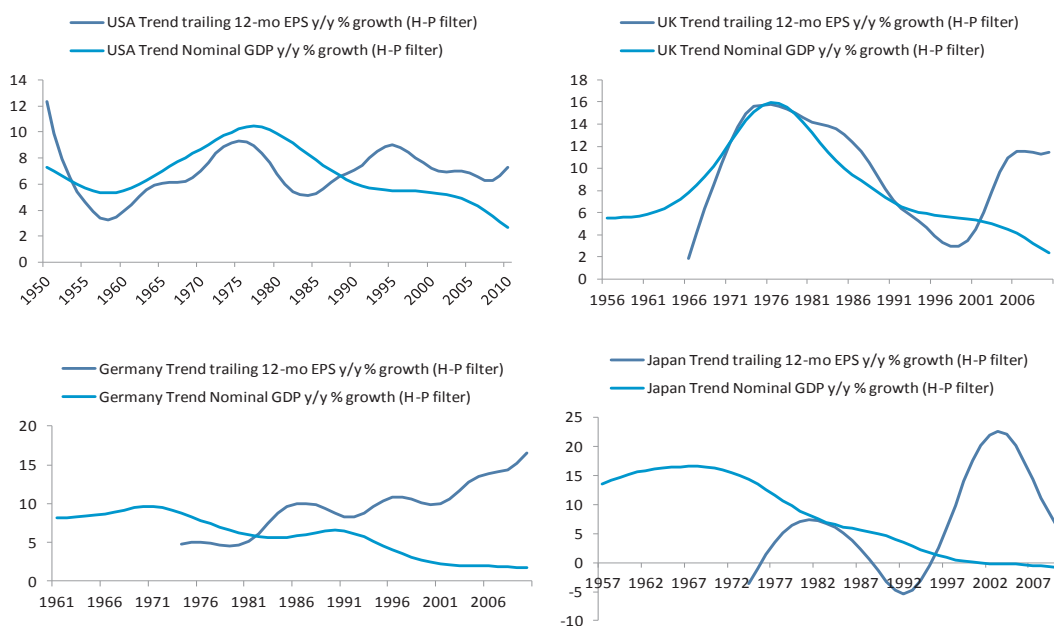
There are several possible reasons for the weak relationship between GDP growth and equity returns. One is that the link between economic growth and corporate earnings may be looser than commonly assumed. Studying a century of US data, Bernstein and Arnott (2003) find that the rate of earnings and dividend growth has lagged the pace of economic growth by about 2 percentage points, a phenomenon they call “dilution”.

Dilution can occur if a substantial part of economic growth is driven by the value added by new or unlisted enterprises, which does not benefit the shareholders of established companies. A similar effect arises when existing companies need to issue new shares or debt to fund their growth. While aggregate profits may rise, the earnings per share accruing to existing shareholders are diluted by the increase in shares or bonds outstanding. A phenomenon that may work against dilution, but one that should also be impounded in stock prices, is the fact that multinational companies are operating on a global rather than a domestic basis. They can tap into a global market and become linked to world growth rather than their home country’s GDP growth.

Looking at the long-term trends in GDP and EPS growth, we find that dilution, i.e. the phenomenon of GDP growth outpacing earnings growth, has given way to the opposite effect in several developed markets. We can call this “concentration” or “crowding-in”, and it is shown in Chart 7. The “dilution” identified by Bernstein and Arnott is visible in the upper left panel, which depicts the trend growth in nominal GDP and EPS for the US. Between the mid-1950’s and the early 1990’s, nominal EPS growth lags the trend in nominal GDP by a few percentage points although they appear to broadly co-vary. From the early 1990’s onwards, the relative growth rates reverse and nominal earnings remain around 8 percent while nominal GDP growth initially decelerates towards 5 percent and slows down further at the end of the last decade.

The figures for the UK, Germany and Japan show similar patterns, although the timing of the relative EPS acceleration varies from country to country. In Germany, earnings start outpacing GDP as early as the 1980’s, whereas the UK and Japan only experience the same phenomenon in the late 1990’s and the 2000’s. In some shape or form, EPS growth decouples from national GDP growth in the developed markets considered here.

Chart 7: Nominal GDP and EPS trends in four major economies



Source: Deutsche Bank, IBES, Datastream

There are several possible explanations for this. The first is that globalisation, the opening of hitherto segregated markets in the developing world, has made multinational firms that are headquartered in the advanced economies less dependent on economic growth in their domestic markets. The second reason is that the corporate sector has been able to capture a greater share of GDP in the last two or even three decades, which may also be related to the effects of globalisation.

As China and India became more integrated into the world economy and the fall of the Iron Curtain in the early 1990's opened up former Communist economies to world trade, the effective supply of labour arguably increased by a substantial amount. The decreasing bargaining power of labour as a factor of production allowed firms in developed and emerging economies to grow rapidly without putting upward pressure on wages. A greater share of the value added was arguably captured by the owners of capital rather than the suppliers of labour, enabling corporate profits to increase at a faster rate than aggregate GDP.

As capital cannot continue increasing its share of national income indefinitely, unlevered profit growth on a global level must, in the very long run, be capped by GDP growth. Notwithstanding that long-run relationship, the trends shown here demonstrate that the profit growth of firms incorporated in a certain country can deviate substantially from domestic GDP growth over years and even decades. Equating a company's profit growth potential with its home market's prospects for GDP is clearly too simplistic.

An empirical analysis of growth and returns

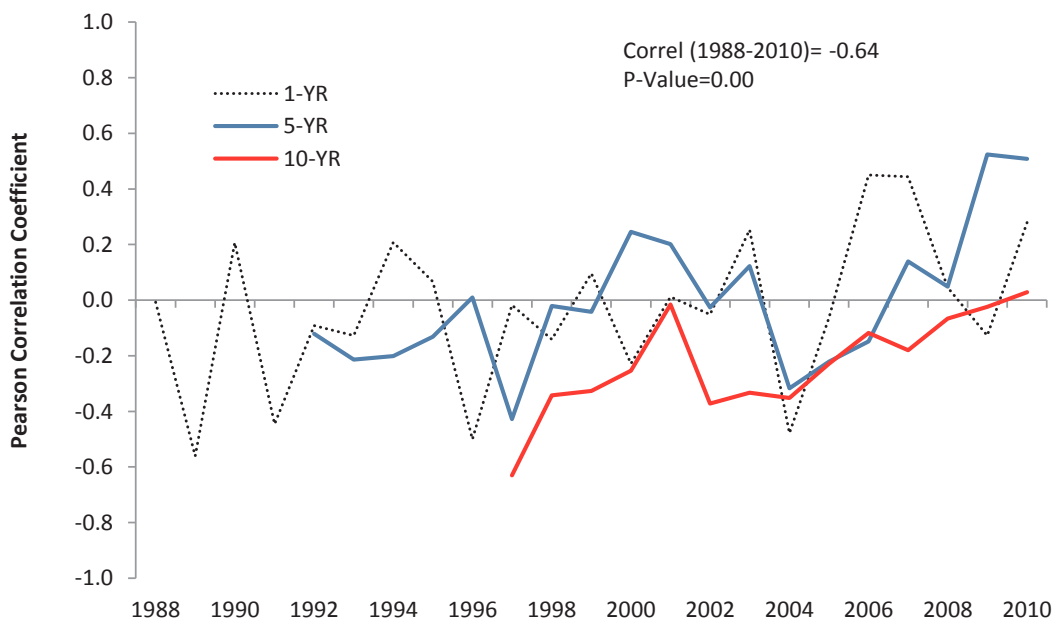
For longer-term asset allocation, time horizons of five to ten years may be as relevant as the full-sample correlations studied by Ritter (2005) or the year-by-year co-movements of economic growth and equity returns emphasised by O'Neill, Stupnytska and Wisdale (2011).

In this section, we study the growth-return relationship over intermediate time horizons in a cross-section of developed and developing countries. A limitation we face is that reliable return data for emerging markets is only available for the period after 1987 when MSCI started publishing their EM indices, although comparable single-country data is available from S&P/IFC going back to 1975. Nonetheless, a simple correlation analysis for the 1988-2010 period yields useful insights. In Chart 8, we show the rolling one-, five- and ten-year cross-sectional correlation coefficients between real GDP

growth and real USD equity returns for 21 emerging market countries. The full-sample correlation is reported as -0.64 and statistically significant at the 1 percent level.

This is corroborated by rolling ten-year correlations that are negative throughout the sample. On the other hand, the one- and five-year correlations fluctuate around zero, which indicates that the relationship between growth and economic returns is faint over these short- to medium-term horizons.

Chart 8: Real GDP growth rates vs. real USD returns for 20 emerging market countries, 1988-2010



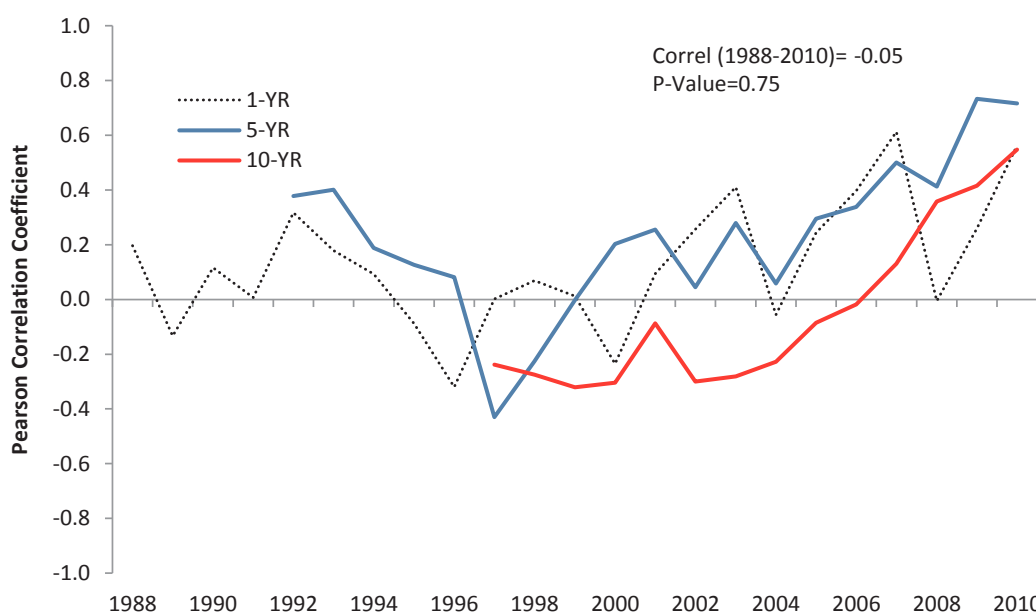
Source: IMF World Economic Outlook (September 2011), FactSet

All told, we conclude from the analysis of emerging market countries that growth does not impact returns positively over investment periods that are relevant to a longer-term investor. If anything, there is some evidence that higher-growth countries' equity markets have performed less well when other emerging market countries are the peer group.

Of even greater interest is an analogous analysis of a sample of 39 countries that pools developed and emerging economies, which is shown in Chart 9. The full-sample correlation is still negative although not statistically significant. The intermediate-horizon correlations offer a more mixed picture. One-year correlations oscillate around zero while five-year correlations are more often positive, especially in the 2000's. Ten-year correlations are negative until the mid-2000's when they also turn positive.

It appears that a positive correlation between growth and equity returns emerged in the last decade. When developed and developing markets are considered together, the incidence of strong relative GDP growth in the emerging world and the outperformance of emerging equity markets in the 2000's yields the positive relationship during that period.

Chart 9: Real GDP vs. real USD returns for 39 countries, 1988-2010



Source: IMF World Economic Outlook (September 2011), DMS (2010), FactSet

Whether this positive correlation lasts is debatable. The longer history studied by Ritter and DMS and the instability of correlations in our own analysis shown in Chart 8 and Chart 9 suggest that the co-movements of economic growth and equity returns are likely to be temporary and period-specific rather than structural. However, the simple correlation study employed here cannot reveal much about the reasons behind the unconvincing empirical growth-return relationship.

A more granular decomposition of equity returns is needed. We therefore examine the drivers of long-run returns of developed and emerging equity markets using data over the period 1988-2010. We decompose equity returns into several components to test empirically the steps leading from GDP growth to stock returns. We employ decomposition methods similar to those used by Ibbotson and Chen (2002) and MSCI (2010), who study the supply-side link between GDP growth and equity returns for developed markets. In our analysis, we consider both developed and emerging markets.

To examine the link between GDP growth rates and equity returns, we compare the average real GDP growth rates for 20 developed and 21 emerging markets to the average stock price returns for those countries, decomposing the equity returns into the change in the country-specific inflation rate, the change in the exchange rate, the growth in EPS, and the growth in the price-to-earnings (P/E) ratio as follows:

$$R_i \approx \Delta CPI_i + \Delta FX_i + g_{EPS,i} + g_{P/E,i}$$

where

R_i = Average nominal equity price return in USD for country i

ΔCPI_i = Average annual CPI inflation rate for country i

ΔFX_i = Average annual change in the exchange rate of country i with respect to USD

$g_{EPS,i}$ = Average annual growth of 12-month trailing earnings per share for country i

$g_{P/E,i}$ = Average annual P/E growth of country i with respect to USD

The results of the decomposition analysis are reported in Table 4². Equity returns in each country are proxied by the returns of the respective MSCI equity index for each country. As indicated in the second column of Table 4, equity return and EPS data are available starting in 1988 for the developed countries and for a handful of the emerging market countries.³

First, we observe that high real GDP growth does not translate universally into high profit (EPS) growth across countries. Whereas emerging market countries have posted significantly higher real GDP growth rates (6.34 percent) than developed market countries (2.12 percent), emerging markets have been less successful in converting these higher growth rates into returns for existing shareholders. Countries such as China, the Philippines and Malaysia provide striking examples of this discrepancy. Although real GDP in China grew by 9.85 percent on average over the period 1995-2010, real EPS declined by 0.50 percent and valuation levels remained largely the same. As a result, China generated a “slippage” of 10.34 percent between its GDP growth and EPS growth and a comparable slippage between its GDP growth and stock price returns over this period. At the other end of the spectrum, EPS growth in small, open economies such as Sweden, Switzerland and Denmark has significantly outpaced growth in real GDP. As the last column in Table 4 suggests, real GDP growth does not appear to be a particularly strong determinant of earnings growth for many of the countries in our sample.

Second, stock price returns appear to be driven by fundamentals over the long run. As one would expect, high EPS growth rates are generally associated with commensurately high price returns. For example, developed countries such as Sweden, Switzerland and Denmark and emerging market countries such as Peru, the Czech Republic and Egypt have posted some of the highest EPS growth rates and equity returns of all the countries in the sample. Conversely, countries with negative EPS growth rates such as Belgium, China and New Zealand have recorded relatively low equity returns in local currency of 1.71 percent, 1.36 percent, and -0.15 percent respectively.

Third, the cross-country variation in the gap between GDP growth rates and equity returns is largely accounted for by the difference between GDP growth rates and EPS growth rates. For example, countries such as Peru, Egypt and South Africa, whose growth in EPS has largely outpaced growth in real GDP, have also posted exceptionally high equity returns relative to growth in GDP. On the other hand, countries such as Australia, Singapore and New Zealand, whose EPS growth has lagged growth in real GDP, have realised relatively low equity returns.

2 An alternative decomposition approach is to start with total returns on the left-hand side and include dividend yields on the right-hand side. Results under this alternative high decomposition are similar to those reported in Table 4.

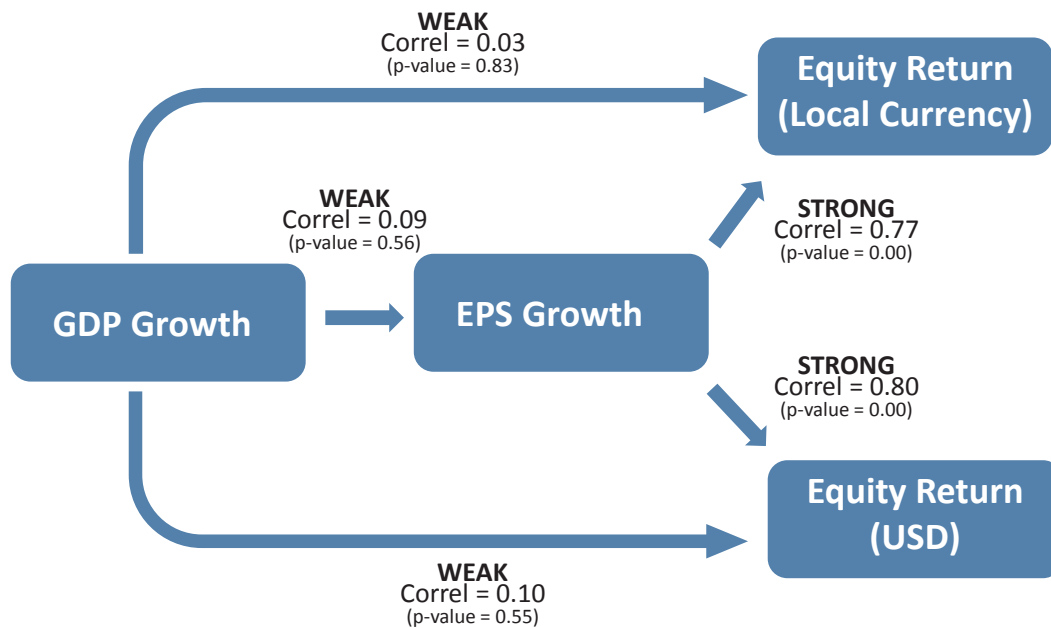
3 For each country we consider the longest period for which both equity return and EPS data are available. For most of the emerging market countries in the sample, the EPS history is shorter than that for returns.

Table 4: Real GDP, EPS and P/E growth for emerging and developed markets

Country	Data Available		Real GDP Growth Rate (Local Currency)	Nominal Stock Price Return (USD)	Nominal Stock Price Return (Local Currency)	FX Change	CPI Inflation	FX Change	Real EPS Growth	P/E Change	Real GDP Growth - Real EPS Growth (Local Currency)
	From	To									
Developed Markets											
Switzerland	1988	2010	1.60%	9.86%	7.51%	2.19%	1.66%	2.19%	5.31%	0.42%	-3.70%
Sweden	1988	2010	2.08%	9.65%	10.12%	-0.42%	2.41%	-0.42%	5.64%	1.78%	-3.56%
Denmark	1988	2010	1.57%	10.41%	9.35%	0.96%	2.25%	0.96%	4.66%	2.18%	-3.10%
Germany	1988	2010	1.71%	6.49%	5.54%	0.90%	2.01%	0.90%	3.52%	-0.06%	-1.81%
Finland	1988	2010	2.03%	6.97%	7.28%	-0.28%	2.16%	-0.28%	3.41%	1.55%	-1.38%
France	1988	2010	1.70%	6.10%	5.08%	0.98%	1.95%	0.98%	2.84%	0.22%	-1.13%
Spain	1988	2010	2.65%	5.66%	6.09%	-0.41%	3.70%	-0.41%	3.37%	-1.03%	-0.72%
Austria	1988	2010	2.21%	5.18%	4.24%	0.90%	1.99%	0.90%	2.84%	-0.62%	-0.63%
USA	1988	2010	2.50%	7.28%	7.28%	0.00%	2.82%	0.00%	2.71%	1.58%	-0.22%
Netherlands	1988	2010	2.45%	6.66%	5.70%	0.90%	2.17%	0.90%	2.66%	0.78%	-0.22%
United Kingdom	1988	2010	1.93%	4.73%	5.42%	-0.65%	2.72%	-0.65%	1.50%	1.12%	0.44%
Norway	1988	2010	2.51%	7.31%	6.72%	0.55%	2.37%	0.55%	2.00%	2.20%	0.51%
Canada	1988	2010	2.30%	8.14%	7.24%	0.83%	2.26%	0.83%	1.77%	3.05%	0.53%
Japan	1988	2010	1.35%	-2.23%	-4.13%	1.99%	0.50%	1.99%	0.44%	-5.02%	0.91%
Italy	1988	2010	1.08%	1.64%	2.09%	-0.45%	3.27%	-0.45%	-0.43%	-0.70%	1.51%
Hong Kong	1988	2010	3.89%	8.52%	8.50%	0.02%	3.50%	0.02%	2.15%	2.62%	1.74%
Australia	1988	2010	3.25%	6.50%	5.62%	0.84%	3.03%	0.84%	0.45%	2.05%	2.80%
Belgium	1988	2010	2.02%	2.72%	1.71%	0.99%	2.13%	0.99%	-1.14%	0.74%	3.16%
Singapore	1988	2010	6.72%	6.97%	4.97%	1.91%	1.78%	1.91%	3.26%	-0.13%	3.45%
New Zealand	1988	2010	2.39%	0.85%	-0.15%	1.00%	2.54%	1.00%	-5.38%	2.92%	7.77%
Emerging Markets											
Czech Republic	2000	2010	3.19%	20.23%	12.11%	7.24%	2.54%	7.24%	16.97%	-6.53%	-13.78%
Peru	1994	2010	4.84%	15.50%	17.98%	-2.10%	4.29%	-2.10%	12.20%	0.83%	-7.36%
Egypt	2000	2010	4.93%	20.28%	25.16%	-3.91%	7.88%	-3.91%	11.69%	3.88%	-6.76%
Brazil	1999	2010	3.64%	14.01%	13.14%	0.76%	6.69%	0.76%	8.80%	-2.53%	-5.16%
Russia	1998	2010	5.34%	24.94%	24.36%	0.47%	18.01%	0.47%	9.94%	-4.14%	-4.60%
Colombia	1994	2010	3.15%	13.22%	19.30%	-5.10%	9.50%	-5.10%	5.82%	2.96%	-2.66%
Mexico	1992	2010	2.43%	9.13%	17.79%	-7.35%	10.47%	-7.35%	4.43%	2.10%	-2.00%
South Africa	1993	2010	3.25%	7.88%	10.66%	-2.52%	6.51%	-2.52%	4.34%	-0.42%	-1.09%
Morocco	2001	2010	4.67%	14.22%	10.20%	3.65%	1.95%	3.65%	4.96%	2.99%	-0.29%
Chile	1994	2010	4.32%	7.16%	8.15%	-0.91%	4.14%	-0.91%	4.59%	-0.71%	-0.27%
Taiwan	1988	2010	5.36%	1.67%	1.82%	-0.15%	1.98%	-0.15%	5.26%	-5.14%	0.10%
Hungary	1998	2010	2.32%	7.09%	6.76%	0.31%	6.32%	0.31%	2.10%	-1.65%	0.22%
Turkey	1994	2010	4.14%	11.50%	40.36%	-20.56%	36.77%	-20.56%	2.71%	-0.08%	1.43%
India	1994	2010	7.02%	8.80%	11.24%	-2.19%	6.95%	-2.19%	4.43%	-0.41%	2.59%
Malaysia	1993	2010	5.22%	0.43%	1.23%	-0.79%	2.63%	-0.79%	2.19%	-3.48%	3.04%
Korea	1988	2010	5.57%	3.46%	5.86%	-2.27%	4.40%	-2.27%	2.08%	-0.66%	3.49%
Thailand	1988	2010	5.04%	4.07%	4.93%	-0.82%	3.00%	-0.82%	0.91%	0.95%	4.12%
Indonesia	1991	2010	4.46%	5.04%	13.71%	-7.63%	10.89%	-7.63%	-0.07%	2.62%	4.53%
Poland	1995	2010	4.39%	7.11%	8.41%	-1.20%	5.97%	-1.20%	-2.12%	4.51%	6.51%
Philippines	1988	2010	3.88%	4.26%	7.85%	-3.33%	7.39%	-3.33%	-4.51%	5.17%	8.39%
China	1995	2010	9.85%	1.33%	1.36%	-0.02%	2.03%	-0.02%	-0.50%	-0.16%	10.34%
Equally-Weighted:											
Average DM	1988	2010	2.40%	5.97%	5.31%	0.64%	2.36%	0.64%	2.08%	0.78%	0.32%
Average EM	1994	2010	4.62%	9.59%	12.49%	-2.31%	7.63%	-2.31%	4.58%	0.00%	0.04%
Average DM + EM	1991	2010	3.53%	7.82%	8.99%	-0.87%	5.06%	-0.87%	3.36%	0.38%	0.17%
GDP-Weighted:											
Average DM	1988	2010	2.12%	5.27%	4.77%	0.50%	2.33%	0.50%	2.15%	0.20%	-0.03%
Average EM	1994	2010	6.34%	7.87%	10.37%	-1.99%	7.30%	-1.99%	3.35%	-0.50%	2.99%
Average DM + EM	1991	2010	3.46%	6.09%	6.54%	-0.29%	3.91%	-0.29%	2.53%	-0.03%	0.93%

Source: FactSet, IMF World Economic Database (September 2011)

Chart 10: Summary of the growth-earnings-return relationship



Note: Correlations calculated from real GDP, EPS and equity return data for 20 developed and 21 emerging market countries over the period 1988-2010. Equity returns for each country are proxied by the returns of the country-specific MSCI equity index.

The key findings of the decomposition analysis are visualised in Chart 10, which shows the conceptual linkages from GDP growth to EPS growth and ultimately equity returns. The most striking aspect of our study is that the cross-sectional correlation between full-sample GDP and earnings growth is only 0.09 and statistically not different from zero in this sample of 41 developed and emerging economies. Something similar holds true for the relationship between GDP growth and equity returns. However, the correlation between EPS growth and equity returns is highly positive and significant at 0.77 if equity returns are measured in local currency and 0.80 if equity returns are measured in USD. As one would intuitively expect, high earnings growth translates into good investment returns. The “weak link” in this chain seems to be between GDP and earnings, which are not as closely related as one would expect. Factors relating to the composition of economic growth, the openness of economies, and political and corporate governance may explain this divergence. We conclude that it is therefore unsatisfactory to base strategic regional allocation decisions on the economic growth outlook alone.

Conclusion

In this note, we reviewed the case for allocating weights to regions and countries in a global equity index according to their economic growth prospects.

We surveyed several private-sector projections for long-term economic growth across regions and countries. Growth prospects are better in emerging markets than in developed countries for some decades to come due to favourable demographics and healthier public finances.

The theoretical case for a positive relationship between economic growth and equity returns can be derived from an open-economy version of neoclassical growth theory. Economic growth does not play an important role in other asset-pricing models. An international version of the Capital Asset Pricing Model emphasises the role of a market's covariance with the global portfolio, not GDP growth, as the main driver for expected returns. Restricted capital mobility or market segmentation could explain deviations from the international CAPM. Political and governance risks are also potential factors in determining expected returns. The international CAPM with time-varying segmentation suggests that investing early during or soon after a country's emergence increases the likelihood of higher returns when a market transitions from "local" to "global" pricing. However, the literature on political risk suggests that the idiosyncratic country risk in these new markets is likely to be high.

We then reviewed the existing empirical evidence on the growth-return relationship and conducted our own correlation and return decomposition studies. The available evidence in developed and emerging markets does not support the notion of a structural relationship between economic growth and equity returns. Full-sample and rolling correlations over intermediate time horizons are either negative or zero for most periods and country groups. A mild positive correlation emerges during the last decade when developed and emerging markets are pooled together. Whether that correlation will persist is doubtful given the long history of unstable and weak associations between growth and equity returns.

A decomposition of returns reveals one reason behind the lack of a strong link between GDP and equity returns. Some countries cannot convert high GDP growth rates into equivalent profit growth, while other countries' corporate sector matches or even outpaces domestic GDP growth rates. The other explanation is that equity markets may occasionally and temporarily underestimate a country's growth but will not continue to do so indefinitely, i.e. prices will reflect differences in growth prospects on average. In well-functioning markets, there may well be rewards for priced risks, but it is hard to imagine that abnormal returns for closely-monitored economic fundamentals such as GDP growth would persist.

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Norges Bank Investment Management (NBIM)

Bankplassen 2
Postboks 1179 Sentrum
N-0107 Oslo

Tel.: +47 24 07 30 00
www.nbim.no