

Introduction

A recurring question in finance concerns the relationship between economic growth and stock market return. Recently, for example, some emerging market countries have experienced spectacular growth, and many institutional investors wonder if they should assign a higher weight to these countries (based on gross domestic product [GDP] rather than market capitalization). These investors hope that this higher weight will be justified by a subsequent higher return.

This question is not new; “supply-side” models have been developed to explain and forecast stock market returns based on macroeconomic performance. These models are based on the theory that equity returns have their roots in the productivity of the underlying real economy and long term returns cannot exceed or fall short of the growth rate of the underlying economy.

In this research bulletin, we empirically test the steps leading from GDP growth to stock returns. We use long-term MSCI equity index data and macroeconomic data to conduct this analysis.

Mechanics of Supply-Side Models

Supply-side models assume that GDP growth of the underlying economy flows to shareholders in three steps. First, it transforms into corporate profit growth; second, the aggregate earnings growth translates into earnings per share (EPS) growth, and finally EPS growth translates into stock price increases.

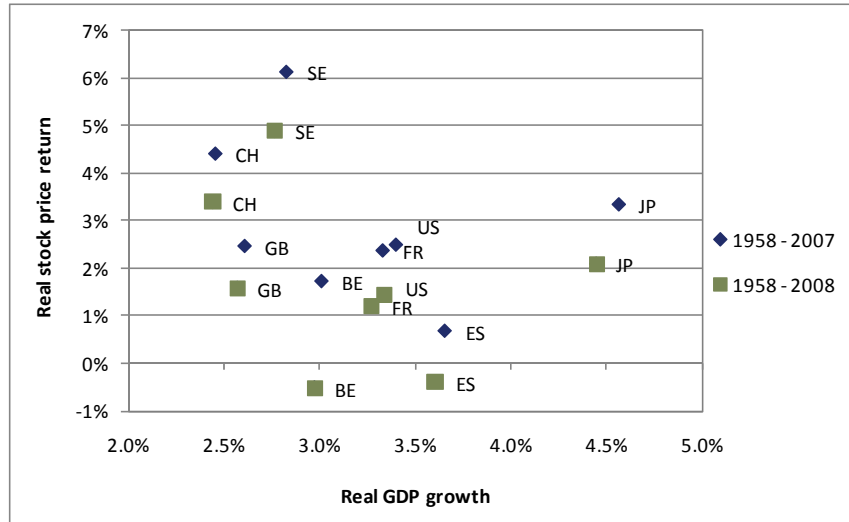
If we further assume that:

- the share of company profits in the total economy remains constant;
- investors have a claim on a constant proportion of those profits;
- valuation ratios are constant;
- the country’s stock market only lists domestic companies;
- the country’s economy is closed,

then we would expect an exact match between real price increase and real GDP growth. *This theory is simple and makes intuitive sense. But is it true in practice?*

Several studies (Dimson et al. [2002], Ritter [2005]) have examined whether countries with higher long-run real GDP growth also had higher long-run real stock market return. The surprising result was contrary to expectations -- the correlation between stock returns and economic growth across countries can be negative! Our own analysis confirms this empirical finding: Exhibit 1 plots stock returns versus GDP growth for eight developed markets between 1958 and 2008 and also shows negative correlation. Note, however, that these tests are dependent on the starting and ending point of the period analyzed; by changing the period by only one year to 1958-2007, we get very different results (although the observed correlation in this example is still negative). For example, the annualized return for Belgium is changed from 1.7% to -0.5%.

Exhibit 1: Annual real GDP growth versus annual real stock returns, 1958 – 2007 and 1958 – 2008



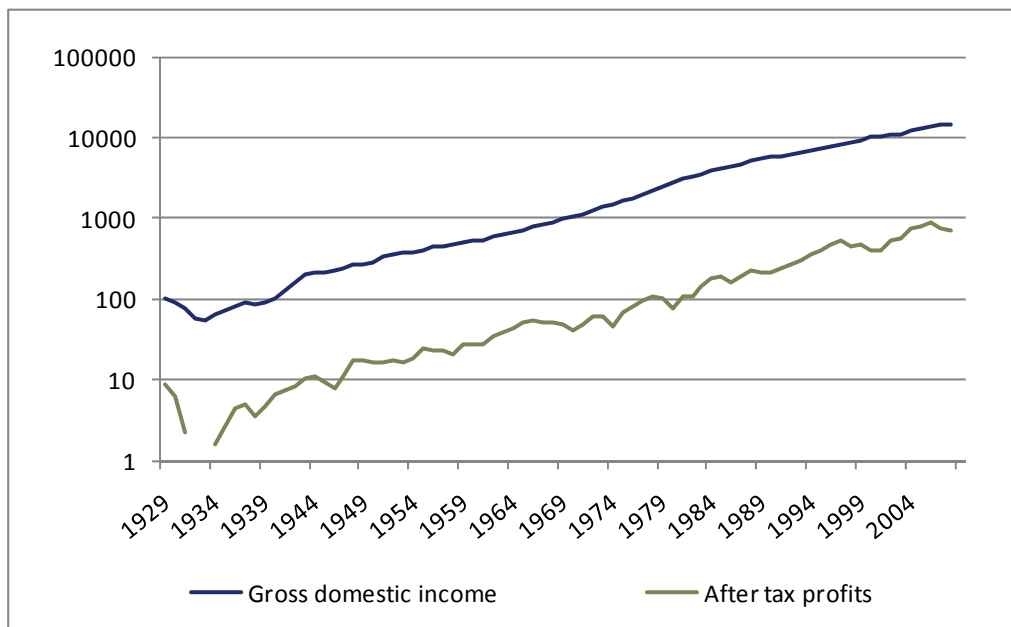
Source: MSCI Barra, IMF, OECD. Growth rates are annualized.

How can we reconcile these empirical findings with the theoretical argument? We will examine the steps leading from GDP growth to stock market performance and show that many assumptions of supply-side models can be challenged and need to be refined.

GDP and Aggregate Earnings

We start by examining the relationship between GDP and aggregate corporate earnings. In Exhibit 2, we use the United States as an example and plot US GDP and corporate earnings (which represent 4-6% of the GDP) from 1929 until 2008. We infer that growth of GDP and aggregate corporate earnings have been remarkably similar throughout the last 80 years, with the exception of 1932 and 1933 when profits were actually negative. This supports the first assumption of supply-side models: over the long run, aggregate corporate earnings tend to grow at the same pace as GDP.

Exhibit 2: Gross domestic product and after-tax corporate profits in the United States, 1929 – 2008



Source: US Department of Commerce, annual data as of 2008. Note that negative values cannot be represented on a log-scale graph.

Aggregate Earnings and EPS

We next examine the theory that aggregate corporate earnings growth translates into EPS growth. This assumption may be somewhat hasty (Bernstein and Arnott [2003]). There is indeed a distinction between growth in aggregate earnings of an economy and the growth in earnings per share to which *current* investors have a claim. These two growth rates do not necessarily match, since there are factors that can dilute aggregate earnings. A portion of GDP growth comes from capital increases, such as new share issuances, rights issues, or IPOs, which increase aggregate earnings but are not accessible to current investors. In fact, investors do not automatically participate in the profits of new companies. When buying shares of new businesses, they have to dilute their holdings in the “old” economy or invest additional capital. This dilution causes the growth in EPS available to current investors to be lower than growth in aggregate earnings. A simple measure of dilution suggested by Bernstein and Arnott is the difference between the growth of the aggregate market capitalization for a market and the performance of the aggregate index for that market. Based on very long term US data, this dilution is estimated to subtract 2% from real GDP growth.

EPS and Stock Prices

The last assumption in the theory that leads from GDP growth to equity performance is that EPS growth translates into stock price increases. This is only true however, if there are no changes in valuations (the price to earnings ratio) as illustrated by the equation below:

$$1 + r = (1 + g_{rEPS})(1 + g_{PE})$$

where r is the price return of the stock, g_{rEPS} is the growth rate in real earnings per share and g_{PE} is the growth rate in the price-to-earnings ratio. Some research claims that there are no reasons for valuations to change over the long term, which supports the supply-side models. However, empirical tests show that valuations have generally expanded over the last 40 years (see ‘What Drives Long Term Equity Returns?’ MSCI Barra [2010]). This can be explained in several ways,

for example, due to different regimes (declining inflation), better market and information efficiency, or improved corporate governance.

Exhibit 3 correlates the historical data for the MSCI developed market countries over the last 40 years. To relate the data to economic growth, the last two columns display the amounts by which EPS and price returns have fallen compared to GDP growth rates.

We find that the mean “slippage” between real GDP growth and EPS growth is 2.3%. On average, stock prices have followed GDP more closely; the mean difference is only 0.3%. This is a consequence of the considerable expansion (2.0%) in the PE ratio during the same period that offset the earnings dilution effect.

Exhibit 3: Real GDP, real earnings per share, real price growth and price-to-earnings growth¹ for selected countries, 1969 – 2009

1969 - 2009	Real GDP growth rates	Real stock price return	Real EPS growth rates	PE change	GDP growth minus stock price return	GDP growth minus EPS growth
Australia	3.1%	0.0%	0.5%	-0.4%	3.1%	2.7%
Norway	3.0%	2.7%	0.9%	1.8%	0.3%	2.1%
Spain	3.0%	-1.4%	n. a.	n. a.	4.5%	n. a.
Canada	2.9%	2.5%	1.3%	1.1%	0.4%	1.6%
United States	2.8%	1.6%	0.0%	1.6%	1.2%	2.8%
Japan	2.8%	1.5%	not meaningful	not meaningful	1.3%	n. a.
Austria	2.6%	0.6%	-1.9%	2.6%	1.9%	4.6%
Netherlands	2.4%	1.9%	-2.6%	4.6%	0.5%	5.1%
France	2.3%	1.7%	n. a.	n. a.	0.6%	n. a.
Belgium	2.3%	0.6%	-2.8%	3.5%	1.7%	5.3%
United Kingdom	2.2%	1.1%	1.6%	-0.6%	1.1%	0.5%
Sweden	2.1%	5.8%	4.4%	1.3%	-3.5%	-2.3%
Italy	2.0%	-1.7%	n. a.	n. a.	3.8%	n. a.
Germany	1.8%	1.6%	-1.1%	2.7%	0.3%	2.9%
Denmark	1.7%	3.6%	1.2%	2.4%	-1.9%	0.5%
Switzerland	1.5%	2.6%	-0.5%	3.1%	-1.1%	2.0%
Average	2.4%	2.0%	0.1%	2.0%	0.3%	2.3%
MSCI ACWI ¹	2.7%	2.1%	0.6%	1.5%	0.6%	2.1%

Source: MSCI Barra, US Department of Agriculture, OECD. Average based on all countries excluding Spain, Japan, France, Italy.

From this data we infer that although the average long term equity performance was similar to GDP growth, this was due to the increasing valuations offsetting the dilution effect. Variance among countries is striking. In one extreme case, the EPS of the MSCI Sweden Index has grown 2.3% faster than Sweden’s GDP and the index itself has performed 3.5% better than the GDP. At the other extreme, the MSCI Spain Index grew 4.5% slower than Spain’s GDP.

International Considerations and Other Arguments

The prior examples suggest there may be complications in the simple model that has GDP mechanically flowing through to stock returns.

For example, part of the difference among countries may be explained by the different level of openness of the economies, and by the disparities in the proportion of listed companies. Indeed, a company’s profit can be earned outside the country in which it is listed. As economic globalization continues, more firms operate in several locations throughout the world.

¹ The price return, EPS growth rate, and PE change for the MSCI All Country World Index (ACWI) is based on a combination of MSCI World Index data prior to December 31, 1987, and MSCI ACWI data after that date. Similarly, real GDP growth is based on summing GDPs of countries included in the MSCI World Index prior to December 31, 1987, and in MSCI ACWI after that date.

Consequently, parts of the production process for these multinational firms are not reflected in the country's GDP. This can create a discrepancy between the company's performance and the local economy. On the other hand, the company's revenues and share price largely depend on the global GDP growth, as an increasing proportion of its products is sold abroad.

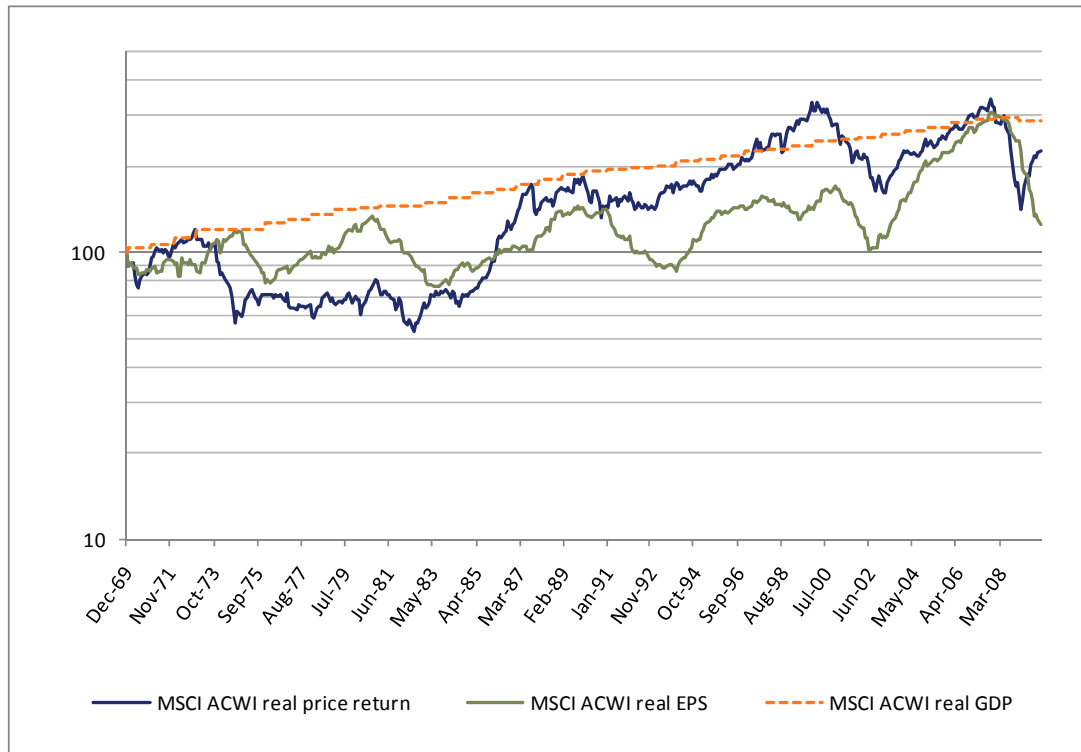
This decoupling effect is amplified because the biggest firms in each country, and consequently in each country index, tend to be multinational companies. This decoupling between company listing and company contribution to GDP may disappear if we consider an aggregate of countries. Indeed, by taking a large set of countries (ideally the whole global economy), the majority of production – even those of multinational firms – will become domestic and contribute to the aggregate GDP. When comparing the growth of this aggregate GDP to the performance of the aggregate stock market of the same set of countries, the distorting effect of companies listed in one country and producing in another can be almost totally discarded.

In Exhibit 4, we investigate this idea by looking at global equity returns as represented by a combination² of the MSCI All Country World Index (ACWI) and the MSCI World Index, and comparing them to the GDP growth of countries included in the same indices. The countries included in this combined index are a good approximation of the global economy. Although it only included 16 developed market countries in 1969 (US, Canada, Japan, Australia, and countries from Europe), those countries represented 78% percent of the global economic production, as measured by their real GDP. The coverage ratio jumped above 80% in 1988, when emerging markets are included in the combined index, and reached 93% in 2009.

Using this aggregation, we see that long term trends in real GDP and equity prices are more similar for global equities than for most individual markets. The annual real GDP growth rate of the MSCI World and MSCI ACWI countries between 1969 and 2009 was 2.7% and real price return was 2.1%. However, the dilution effect is still observable as real EPS grew at a 0.6% annual pace -- the wedge between GDP growth and EPS growth was 2.1% over the last 40 years, but real stock price lagged GDP growth by only 0.6%. This can be attributed to the extreme expansion in the PE ratio during the long bull market of the 1980s.

² Global equity return calculation is based on a combination of MSCI World Index returns prior to January 1, 1988, and MSCI ACWI returns after that date.

Exhibit 4: MSCI ACWI³ real price return, real EPS and real GDP growth, 1969 – 2009

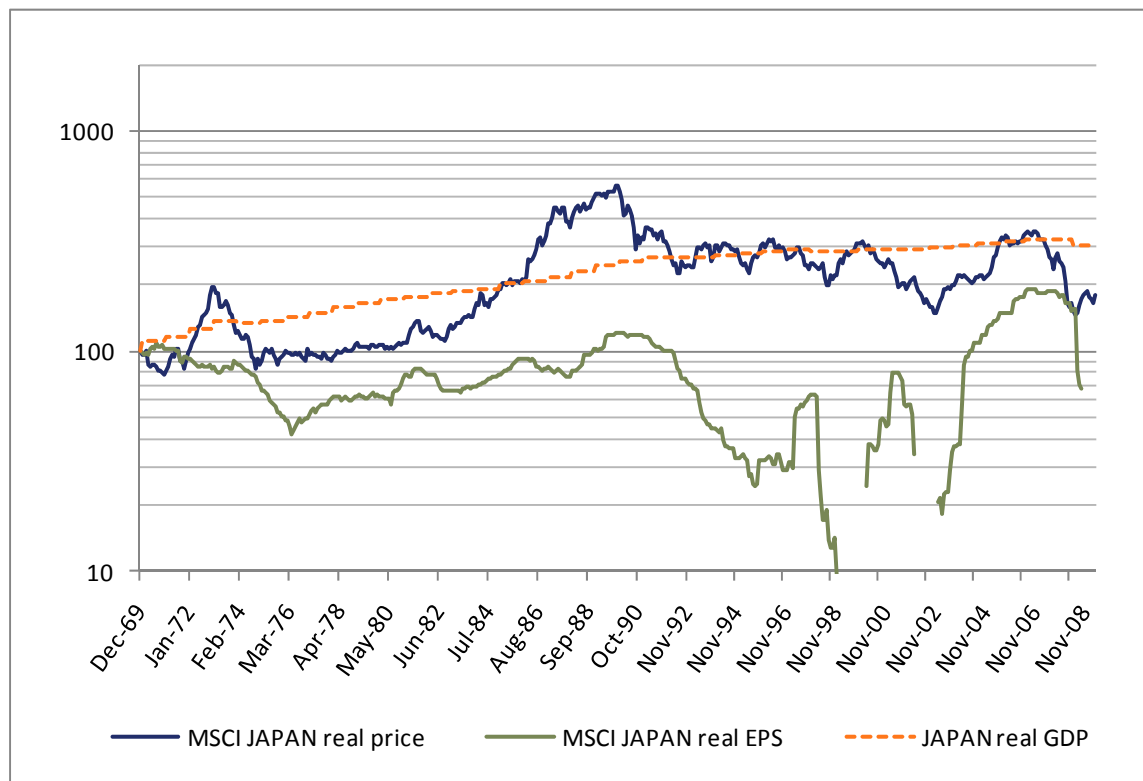


Source: MSCI Barra, US Department of Agriculture, data as of December 2009. Real GDP growth is shown as a chain-linked index to avoid the distorting effect of changes in the country composition of the corresponding global equity indices (MSCI World before January 1, 1988 and MSCI ACWI after that date). Real index and per share data is obtained by deflating by the global GDP deflator.

An additional argument by Siegel (1998) to explain the lack of observable correlation between GDP growth and stock returns is that expected economic growth is already impounded into the prices, thus lowering future returns. As shown in Exhibit 5, Japan is an example of this effect. We see that growth expectations were overly optimistic and 20 years of future growth were already discounted in the 1980s when stock prices grew faster than GDP. In the last two decades, equity performance was negative, while the GDP continued to grow.

³ MSCI ACWI is replaced by the MSCI World Index prior to January 1, 1988.

Exhibit 5: MSCI Japan Index real price return, real EPS and real GDP growth, in JPY, 1969 – 2009



Source: MSCI Barra, US Department of Agriculture. Note that negative values cannot be represented on a log-scale graph.

Conclusions

We may intuitively think of stock returns as a result of the underlying real economy growth. However, we have observed that long term real earnings growth fell behind long term GDP growth in many countries over the observed period.

Several factors may explain this discrepancy. First, in today's integrated world we need to look at global rather than local markets. Second, a significant part of economic growth comes from new enterprises and not the high growth of existing ones; this leads to a dilution of GDP growth before it reaches shareholders. Lastly, expected economic growth may be built into the prices and thus reduce future realized returns.

In their refined version, supply-side models tie a country's stock returns to its GDP growth, but they do not suggest a perfect match between the two variables. Instead, they view real GDP growth as a cap on long-run stock returns, as other factors dilute GDP before it reaches shareholders.

However, the empirical analysis of the presumed link between GDP and stock growth has certain limitations. Although we use a relatively long-term international equity data set, the analysis results are dependent on the start and end dates of the time series, since the economy and stocks follow cyclical patterns. Another issue concerns the role of investors' expectations. If expectation of future GDP growth is entirely built into today's valuations, stock price movements

will tend to precede developments in the underlying economy. A deeper analysis is needed to test for a lag between the two time series.

References

- William J. Bernstein and Robert D. Arnott, Earnings growth: the two percent dilution, *Financial Analyst Journal*, September/October 2003, 47 – 55
- Bradford Cornell, Economic Growth and Equity Investing, *Financial Analyst Journal*, Volume 66, 2010
- Jeffrey J. Diermeier, Roger G. Ibbotson and Laurence B. Siegel, The Supply of Capital Market Returns, *Financial Analyst Journal*, March/April 1984, 74 - 80
- Elroy Dimson, Paul Marsh and Mike Staunton, *Triumph of the Optimists: 101 Years of Global Investment Returns*, 2002, Princeton University Press, Princeton
- Jay R. Ritter, Economic growth and equity returns, *Pacific-Basin Finance Journal* 13 (2005) 489 – 503
- Jeremy J. Siegel, *Stocks for the Long Run*, 1998, Second edition, McGraw-Hill
- What Drives Long Term Equity Returns?, MSCI Barra Research Bulletin, January 2010

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