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# Global Economic Perspectives

## The UBS Surprise Indices

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### Surprises and markets

Asset prices reflect available information as well as expectations for future outcomes. Prices should therefore only move in response to unanticipated events, i.e., surprises. For 10 years, UBS has calibrated ‘surprise indices’ to reflect when incoming economic data differs from consensus expectations. As theory would predict, UBS surprise indices have enjoyed tight correlations with financial market outcomes, particularly in recent years.

### The full methodology

In this note we outline the methodology of our economic surprise indices. We also explore how our surprise indices can offer perspectives on global economic fundamentals, the business cycle and financial market outcomes.

### Some surprising messages

Our research reveals a number of key conclusions relevant for current investment decisions. First, a sustained recovery of risk asset prices is unlikely until global growth expectations adapt to weaker structural fundamentals. We note, for example, that high energy prices and de-leveraging have changed the relationship between economic outcomes and asset price developments. Second, correlations across economic regions and markets remain very high. What is also new is that the US economy is no longer the sole source of shocks—the US economy and capital markets respond to external shocks in ways not previously seen in the pre-crisis era. Finally, balance sheet health and commodity export exposure have become increasingly important predictors of economic success.

### Daily surprise indices on Bloomberg

With this publication, we also note that our full range of growth and inflation surprise indices can now be found on Bloomberg (see page UGSI). Henceforth, those indices will be updated on a daily basis.


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ANALYST CERTIFICATION AND REQUIRED DISCLOSURES BEGIN ON PAGE 26.

# The UBS surprise indices

*"The long run is a misleading guide to current affairs. In the long run we are all dead. Economists set themselves too easy, too useless a task if in the tempestuous seasons they can only tell us that when the storm is long past the ocean will be flat" (John Maynard Keynes)*

## Introduction

Economic data have a significant influence on financial market outcomes

Global economic data have a significant influence on financial market outcomes. That may sound trite, but it has never been more important than today. An understanding of where economic data are headed is therefore critical for investment decisions. To that end, UBS economists pay close attention to the gyrations in high-frequency, forward-looking macroeconomic indicators. But the propensity for the data to surprise consensus forecasts is also revealing, both for its impact on asset prices and in the way it can inform our judgement.

Surprise indices designed to capture the frequency at which the incoming economic dataflow have been missing consensus forecasts

The UBS economic surprise indices are specifically designed to capture the frequency and manner in which the incoming economic dataflow misses consensus forecasts. A downward trend in the growth surprise index, for example, suggests a tendency from economic activity to disappoint consensus forecasts. As we highlight below, those movements in surprise indices—growth as well as inflation—have coincided with market outcomes, particularly in recent years.

In this note we look at our indices in closer detail

In this note we outline in detail the methodological underpinning of our surprise indices. We also explore the degree to which the surprise index product can offer insights into the workings of the world economy and business cycle. We also elaborate on how our surprise indices are linked to asset price movements. We conclude with some observations about how we go about forecasting our surprise indices.

UBS global growth surprise index


Source: Bloomberg/UBS

# Key themes

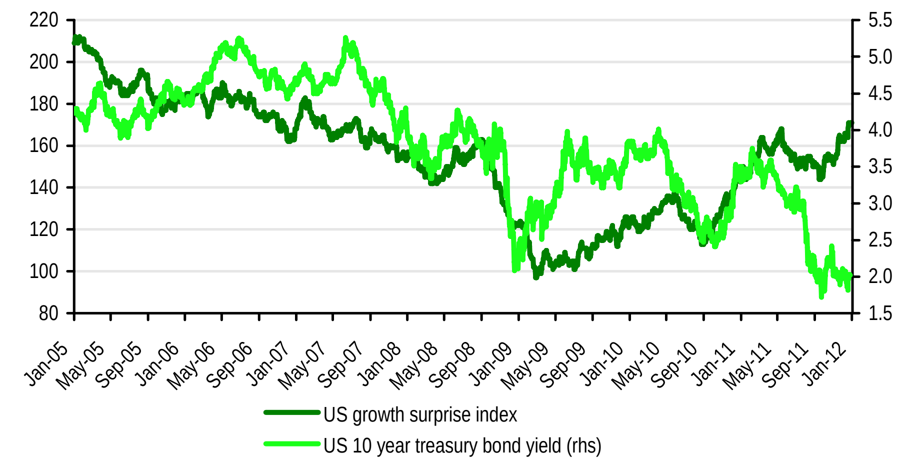
A full reading of this document will reveal a large body of information about the evolution of various countries' economic data and how that evolution is related to financial market performance. Before we delve into the details we highlight some of the more revealing themes and their implications.

## 1) Economics versus markets

Financial market outcomes are – at present – extremely highly correlated with macroeconomic outcomes

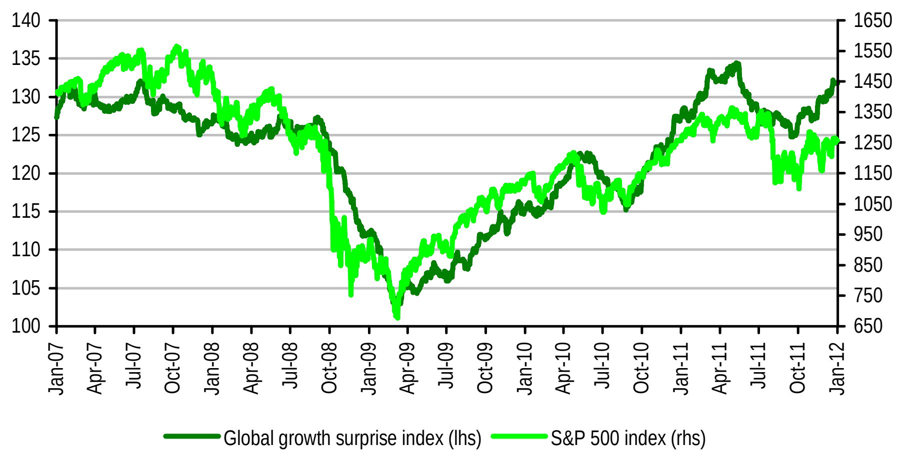
The first theme is that financial market outcomes are highly correlated with macroeconomic outcomes. Economic surprises have played a big role in determining investors' appetite for risk in recent years. This can be seen in the high correlations between our global growth surprise index and movements in equity markets, bond yields, commodity prices and other gauges of risk appetite (see charts below).

US growth surprise index versus US 10 year Treasury yield



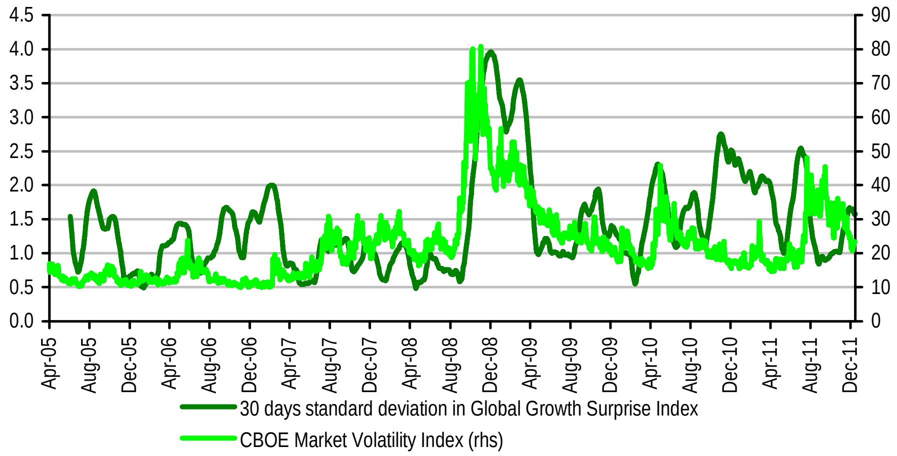

Source: Bloomberg/UBS

Global growth surprise index versus US S&P 500 index




Source: Bloomberg/UBS

Volatility of global growth surprise index versus VIX

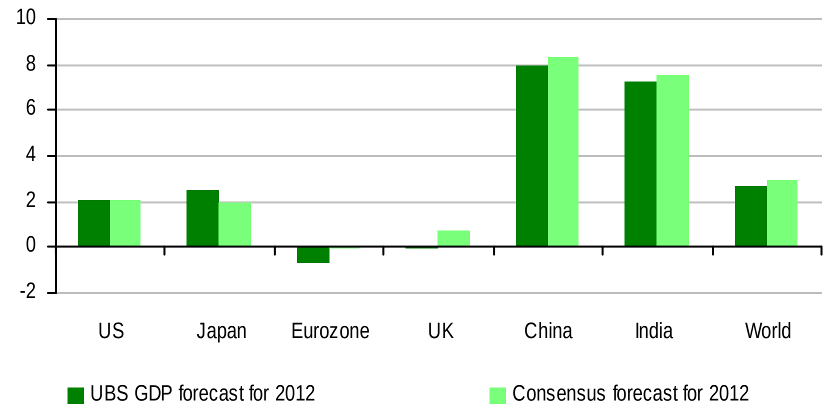



Source: Haver/Bloomberg/UBS

The implication is clear: Forming a view on how economic growth will evolve *relative* to expectations is critical for investment strategy and risk management. If, as we presently believe, consensus forecasts for economic activity are too high, the scope for a meaningful pick up in risk appetite will be limited.

Forming a view on how economic growth will evolve *relative* to expectations is critical for forming a view on financial markets

UBS GDP forecast for 2012 versus consensus forecasts



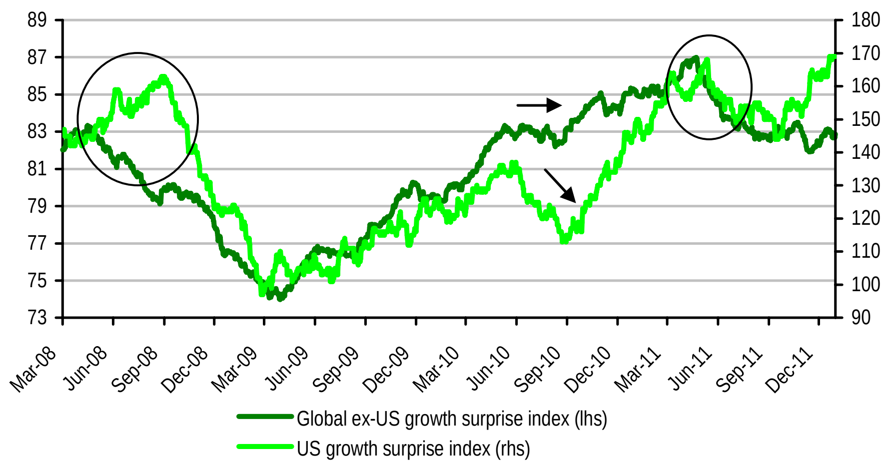

Source: Datastream/UBS estimates

## 2) Global (ex-US) data often leads US data

The second theme relates to the inter-connected nature of global growth. As the chart below indicates, global (ex-US) data surprises tend to be highly correlated with US data surprises. For example, a persistent tendency for US growth disappointments will tend to be matched by similar disappointments in other major developed and developing economies.

High inter-connected nature of global data surprises

US growth surprise index versus global (ex US) surprise index

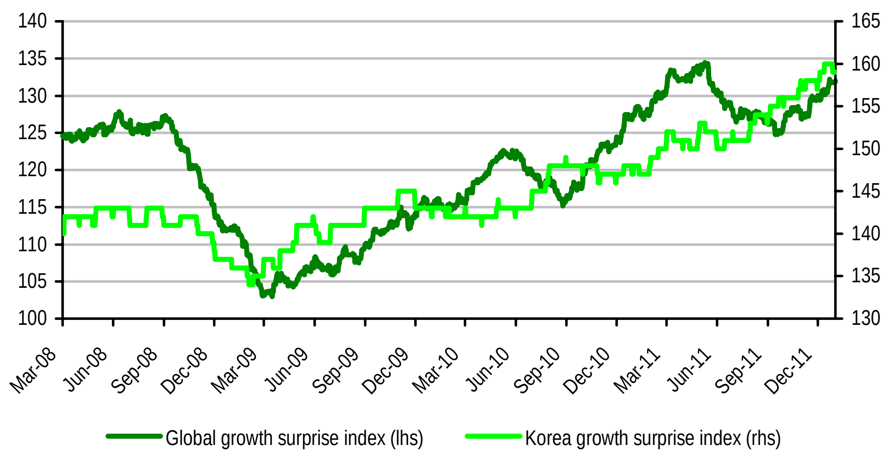



Source: Bloomberg/UBS

US economy not necessarily in pole position in the transmission of data shocks

That does not necessarily mean, however, that the US economy remains in its traditional role as driver of the global business and market cycle. On the whole, it is rather the other way around. Our global (ex-US) surprise index has tended to lead our US surprise index in recent years, as evidenced in that chart above. Notably, some economies that are particularly sensitive to gyrations in global trade (e.g., Korea) tend to foreshadow broader developments in the US and world economy.

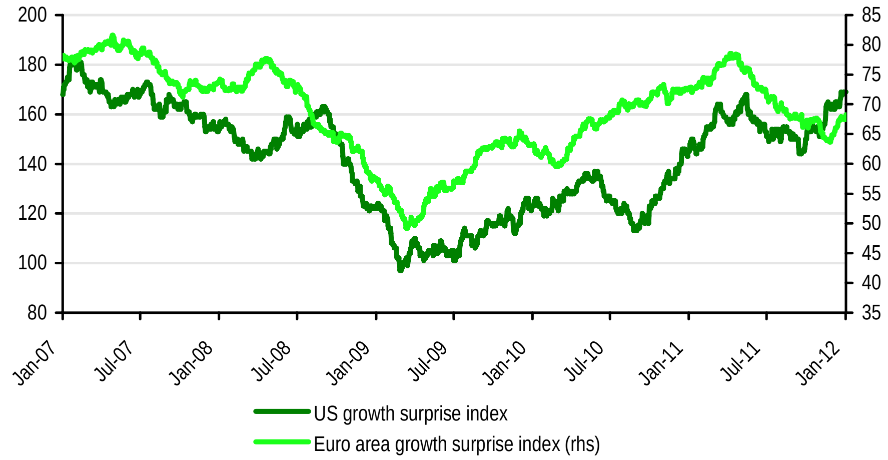
Korean growth surprise index vs global growth surprise index




Source: Bloomberg/UBS

The close correlation that exists between Euro area and US growth surprises is also noteworthy against the current turbulent backdrop. That trends in the former have frequently tended to lead the latter in recent years suggests some scope for more disappointing US data in the period immediately ahead.

Euro area growth surprise index versus US growth surprise index




Source: Bloomberg/UBS

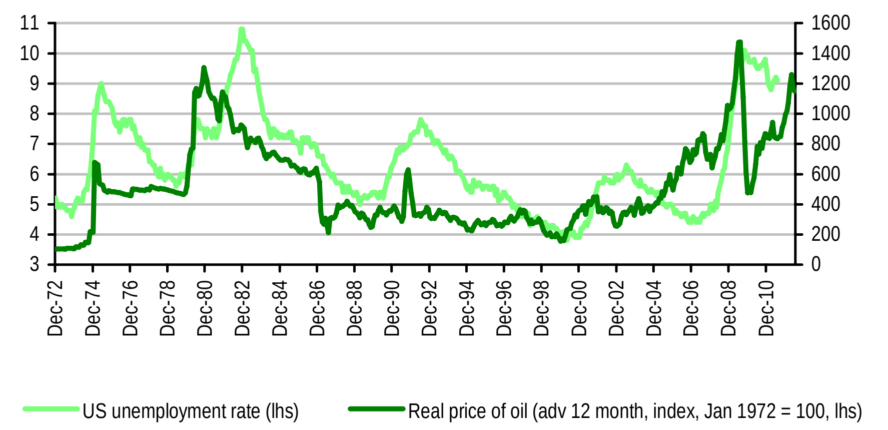
## 3) Watch Oil

Oil price gyrations are important

The third theme is the growing importance of energy (oil) prices. For all the recent angst over European and US sovereign debt issues, oscillations in economic surprises remain strongly influenced by the cost of oil.

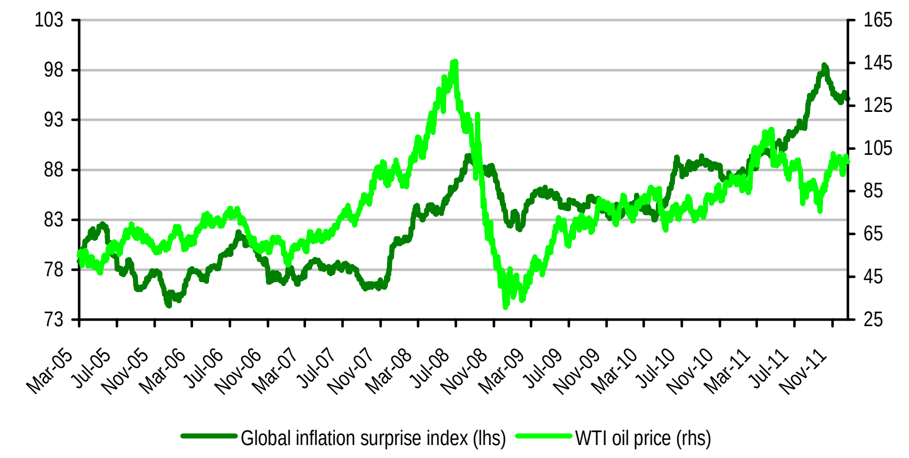
That is certainly true of inflation outcomes, as evidenced in the second chart below. But it is also true of growth outcomes, as represented by the inverse correlation between US inflation surprises and growth surprises. As an empirical matter, high levels of unemployment and the structural weakness in the performance of the US economy can be more easily linked to elevated real oil prices than, say, to private sector debt deleveraging.

Oil prices and US unemployment



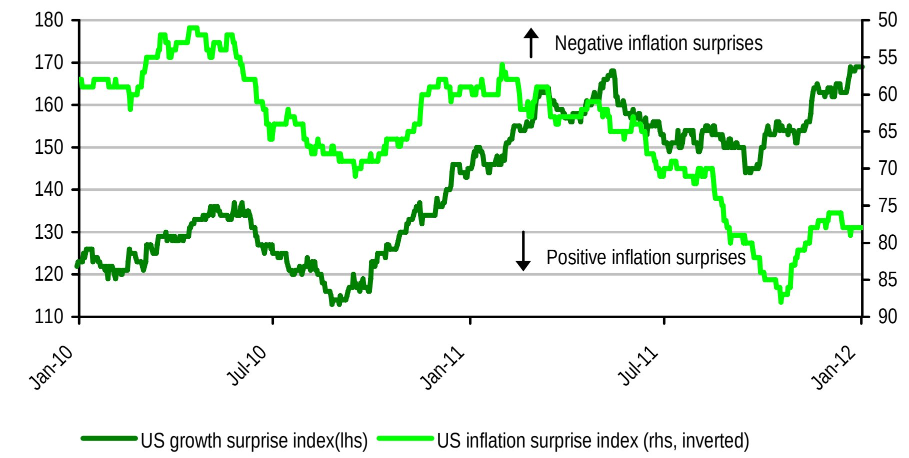

Source: Haver/BLS/UBS calculations

### Oil prices versus inflation surprise index




Source: Bloomberg/UBS

### US growth surprise index versus US inflation surprise index




Source: Bloomberg/UBS

From a cyclical vantage point that implies that inflation outcomes might surprise to the upside again in the period immediately ahead, given recent oil price hikes.

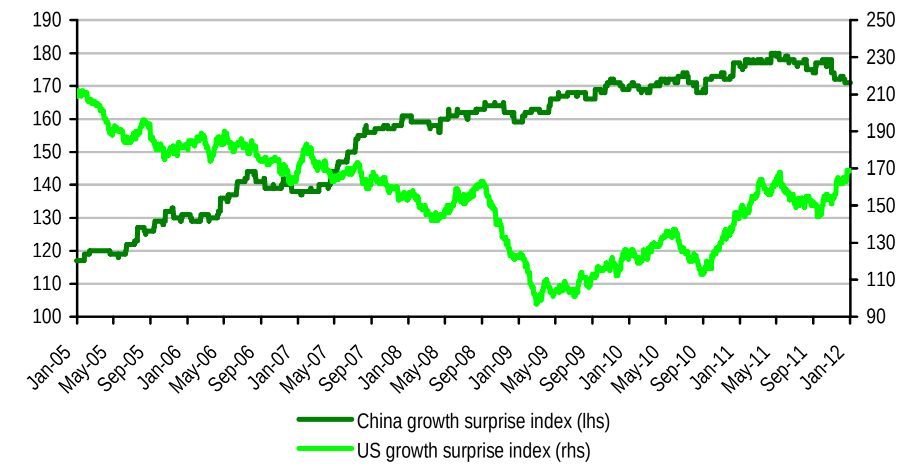
## 4) Balance sheets versus surprises

Balance sheet health is also crucial

The final theme concerns the role of balance sheets. When we combine an economy's sensitivity to oil prices (via its commodity export exposure) with its aggregate level of leverage (via our balance sheet risk metrics) we can explain reasonably well the capacity of an economy to surprise expectations in recent years.

China, for example, has demonstrated an unswerving capacity to generate positive growth surprises in recent years. The US, in contrast, has shown a greater proclivity to disappoint consensus growth forecasts. Perhaps it is no coincidence. China has enjoyed relatively low levels of balance sheet stress, in contrast to the US (see chart below). It begs the question, however, about how long it will take the consensus to recognize the importance of private and public sector balance sheet strength as a determinant of growth outcomes.

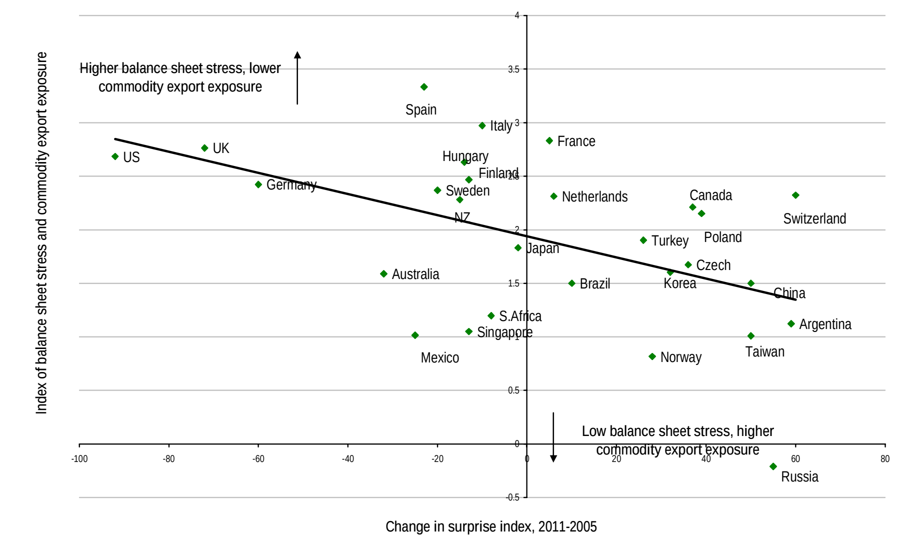
US versus China growth surprise index




Source: Bloomberg/UBS

The chart below reveals that the surprise indices for those economies with high balance sheet stress and high oil import exposures have tended to reflect growth disappointments. Lower stress oil producers, in contrast, have generally seen more positive outcomes (relative to consensus forecasts).

Surprises and balance sheet risk and commodity export exposure

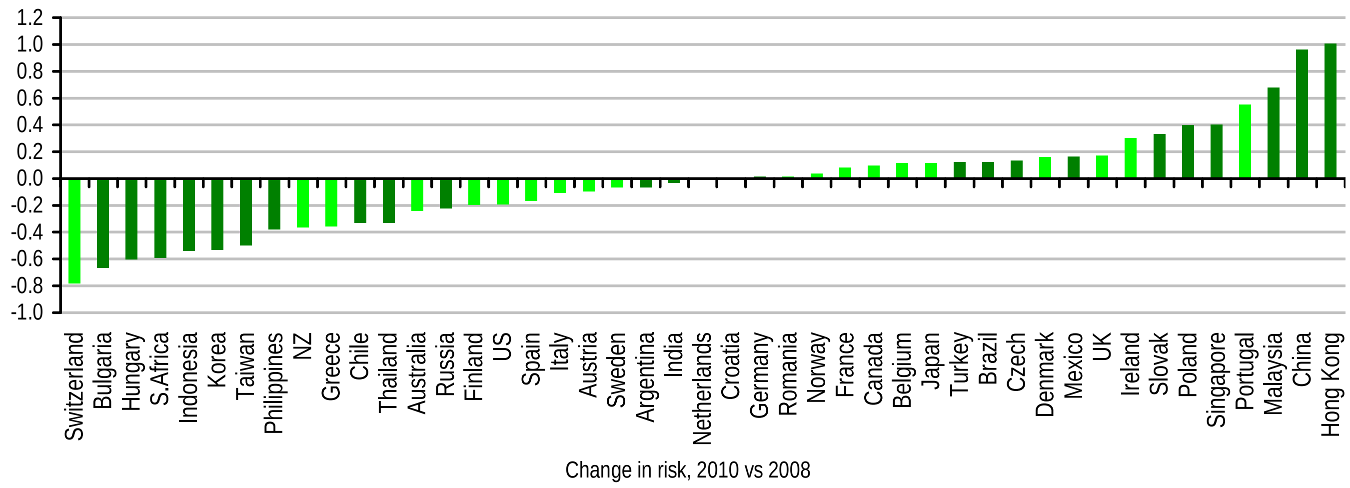



Source: Bloomberg/UBS

As the importance of balance sheet stress becomes more widely recognized, it is possible that countries that have been de-leveraging will tend to see more upside surprises, offset by fewer positive surprises from the fundamentally sounder balance sheet countries.

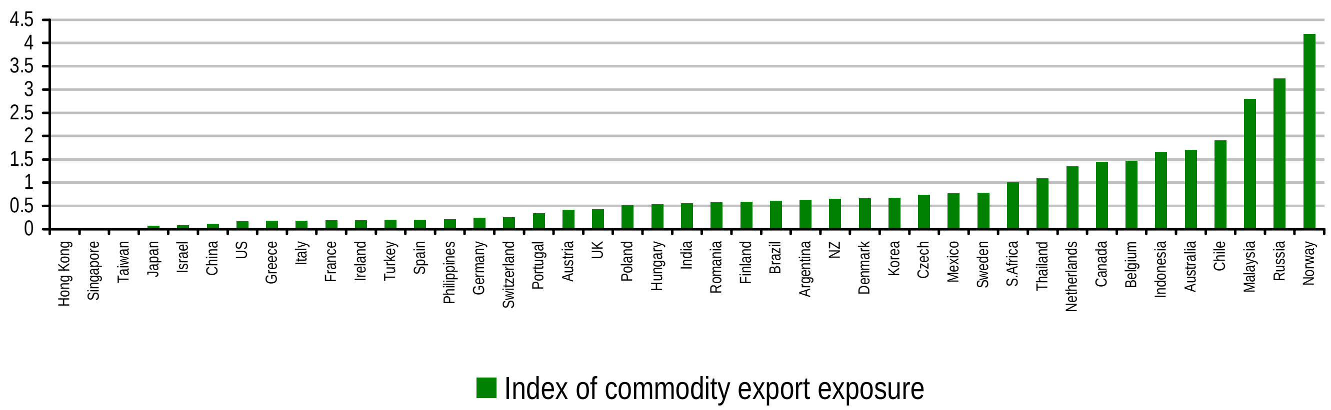
Economies that have been de-leveraging in recent times ought to elicit a higher proclivity to surprise on the upside in the period ahead

Change in balance sheet risk index, 2010 vs 2008




Source: UBS calculations

Index of commodity export exposure




Source: UBS

# Methodology

## Growth surprise indices

Our growth surprise indices are calculated using the data for economic outcomes and consensus forecasts from Bloomberg. When the outcome from a given economic data release, such as industrial production, housing starts, retail sales or GDP, exceeds the published consensus (by even the smallest of margins) our surprise index moves up by 1 point. When it falls short of the published Bloomberg consensus it moves down by 1 point. For indicators such as unemployment, the signs are reversed. No allowance is therefore made for the degree to which an outcome has deviated from the consensus forecast. And no allowance is made for subsequent revisions to economic data.

Our growth surprise indices are calculated using the data for economic outcomes and consensus forecasts from Bloomberg

The precise composition of our US growth surprise index is shown in more detail in the table at the end of this section. The composition is dictated by the indicators for which Bloomberg provides a published consensus forecast based on their regular surveys of forecasters. For major developed economies, such as the US, Japan and Western Europe, there are a fairly large number of indicators published each month. The composition of these country-specific indices is thus comparatively rich and offers a great deal of colour on those economies' behaviour. For less developed economies, such as China or Brazil, there are only a handful of indicators (at the time of writing) that are published on a monthly basis and for which Bloomberg provides a consensus forecast. To that extent, the emerging universe has less of a high frequency contribution to our global indices.

US growth surprise index


Source: Bloomberg/UBS

China growth surprise index


Source: Bloomberg/UBS

## Inflation surprise indices

Our inflation surprise indices are calculated exactly the same way as our growth surprise indices. When an inflation outcome (e.g., producer prices, import prices, wage inflation or consumer prices) exceeds the published consensus forecast our index moves up by one point. And when it falls short of the consensus our index moves down by one point.

Our inflation surprise indices are calculated exactly the same way as our growth surprise indices

As with our growth indices, there are a relatively large number of inflation releases that we can draw on for the developed economy complex. There are, in contrast, fewer observations for developing economies.

Japan inflation surprise index


Source: UBS/Bloomberg

Brazil inflation surprise index


Source: UBS/Bloomberg

## Productivity indices

Our productivity indices are a function of our growth surprise and inflation surprise indices. Specifically, they are calculated as an economy's growth surprise index minus its inflation surprise index.

Our productivity indices are a function of our growth surprise indices and our inflation surprise indices

The idea is straightforward. Productivity shocks tend to be associated with positive supply shocks. Those shocks generate stronger growth (relative to expectations) and a lower aggregate price level (relative to expectations). Thus we can infer whether or not productivity growth is surprising consensus forecasts by observing the pattern of growth and inflation surprises.

UK productivity surprise index


Source: UBS/Bloomberg

Russian productivity surprise index


Source: UBS/Bloomberg

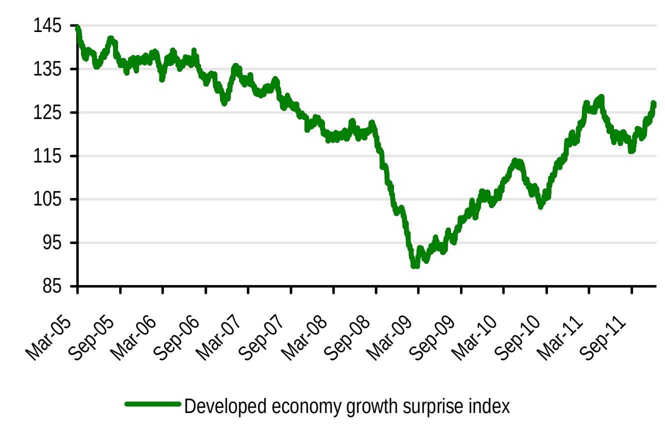
## Country and regional indices

We calculate growth, inflation and productivity surprise indices for a large number of developed and developing countries. The specific list is contained in the tables at the end of this section. Those country indices allow us to calculate regional and global aggregations as well.

Each of the aggregations is a GDP-weighted (PPP-adjusted) average of the country-specific indices that form the make-up of the relevant region. For example, our Latin American growth surprise index is calculated using the growth indices from those Latin American economies that form part of our global sample, specifically Brazil, Argentina and Mexico. Our global growth surprise index is calculated as a GDP-weighted average of the 28 country-specific growth surprise indices from our sample of developed and major developing economies.

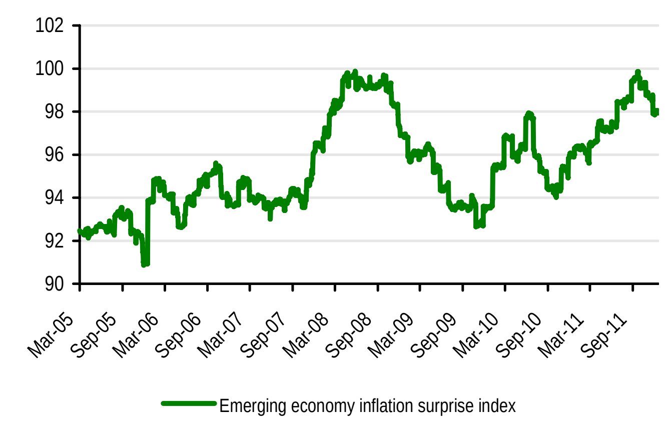
We calculate growth, inflation and productivity surprise indices for a large number of developed and developing countries

Developed economy growth surprise index




Source: UBS

Emerging economy inflation surprise index




Source: UBS

Eurozone growth surprise index


Source: UBS

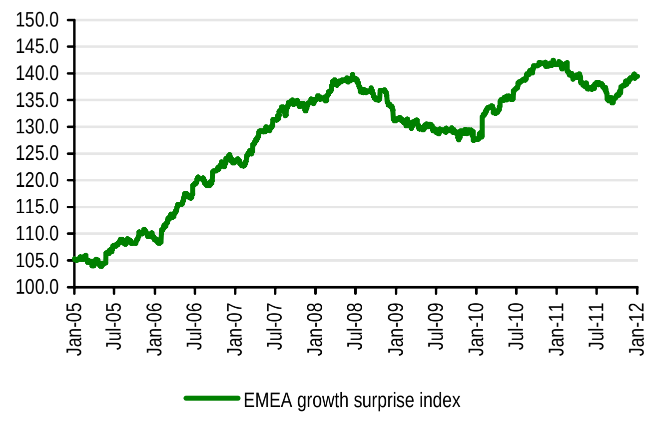
Latin American growth surprise index


Source: UBS

Asia growth surprise index


Source: UBS

EMEA growth surprise index




Source: UBS

## Sector-specific growth indices

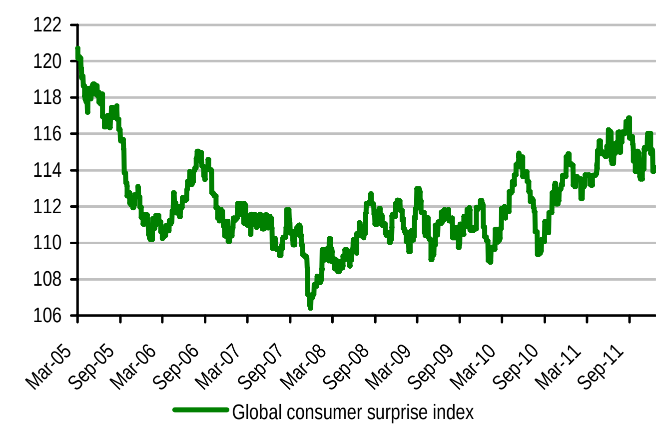
In addition to regional aggregations we also calculate sector-specific indices for manufacturing, non-manufacturing, and consumer spending activity as well as for some economies' (e.g., the US) labour market and housing activity. For example, the manufacturing indices are an aggregation of all of the releases that relate to manufacturing growth (e.g., ISM surveys, industrial production, factory orders, etc). The non-manufacturing index is an amalgam of every other economic indicator.

In addition to regional aggregations we also calculate sector-specific indices

Global manufacturing surprise index


Source: Bloomberg/UBS

Global consumer surprise index




Source: Bloomberg/UBS

In addition, we break out the inflation indices into sub-components for surprises in headline consumer and producer prices, as well as core consumer and producer price inflation. We also calculate a 'developed economy wage surprise index' that captures the tendency for wage inflation to deviate from consensus forecasts.

In addition to this we break out our inflation indices into various sub-components

The UBS global growth and inflation index is a weighted aggregation of 28 countries.

Weights for the UBS global growth and inflation index

| Country | Weight |
|---|---|
| US | 0.29 |
| Argentina | 0.01 |
| Australia | 0.02 |
| Brazil | 0.04 |
| Canada | 0.03 |
| China | 0.13 |
| Czech | 0.00 |
| Finland | 0.00 |
| France | 0.04 |
| Germany | 0.06 |
| Hungary | 0.00 |
| Italy | 0.04 |
| Japan | 0.09 |
| Korea | 0.02 |
| Mexico | 0.03 |
| Netherlands | 0.01 |
| New Zealand | 0.00 |
| Norway | 0.01 |
| Poland | 0.01 |
| Russia | 0.04 |
| Singapore | 0.00 |
| South Africa | 0.01 |
| Spain | 0.03 |
| Sweden | 0.01 |
| Switzerland | 0.01 |
| Taiwan | 0.01 |
| Turkey | 0.01 |
| UK | 0.04 |
| World | 1 |

Source: UBS

The US, being the largest economy, has the biggest weighting. The US growth and inflation indexes are made up of economic indicators which measure growth and inflation respectively. For the US, the indicators used for the growth and inflation indexes are the most comprehensive, (see table below). For the other countries, the economic indicators used are drawn from a similar pool of indicators, where available and applicable.

## Example: constituent components of US growth and inflation index

| Growth Indicators | Inflation Indicators |
|---|---|
| Industrial Production | Headline and core consumer price indexes |
| Construction Spending | Headline and core producer price indexes |
| GDP | House Price index |
| Unemployment | ISM Prices paid |
| Initial Jobless Claims | Employment Cost index |
| Change in Manufacturing Payrolls and Nonfarm Payrolls indexes | Average Hourly Earnings |
| Retail sales less autos and Advance Retail Sales indexes | Unit Labor Costs |
| Total Vehicle Sales | Import Price index |
| Personal income and personal spending indexes | GDP Price index |
| Consumer Confidence (Michigan & Conference Board) | PCE Core |
| Consumer Credit | PCE Deflator |
| ISM Manufacturing index and non-Manufacturing indexes | |
| Durable Goods Orders | |
| Leading Indicators | |
| Factory Orders | |
| Empire State index | |
| Philadelphia Fed index | |
| Chicago PMI index | |
| Housing starts | |
| Building permits | |
| Existing home sales | |
| New home sales | |
| NAHB Housing Market index | |
| Business Inventories | |
| Wholesales Inventories | |
| Capacity Utilization | |
| Nonfarm Productivity | |

Source: UBS/Bloomberg

# Surprises and asset prices

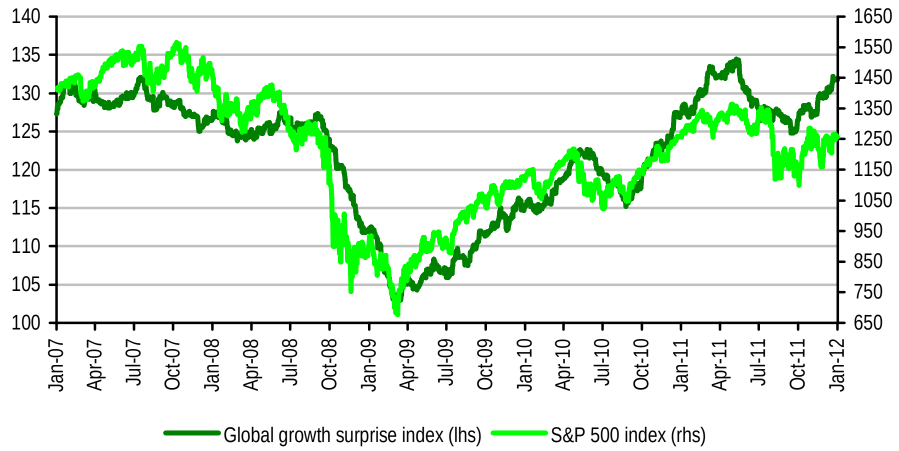
Financial market theory suggests that asset prices reflect known information and expectations of future outcomes. Inasmuch as those expectations should reflect views about how the economy will evolve, our economic surprise indices ought to be correlated with financial market outcomes. Indeed, that generally holds true, particularly in recent years.

Our surprise indices ought in theory to be closely correlated with the outcomes in many financial markets

For instance, our global growth surprise index has been well correlated with the US S&P 500 index since 2007. The health of the world economy (relative to expectations) has been pivotal for the performance of the US equity market since the onset of the financial crisis. That relationship is probably a function of both the importance of economic outcomes for earnings expectations as well as risk behaviour.

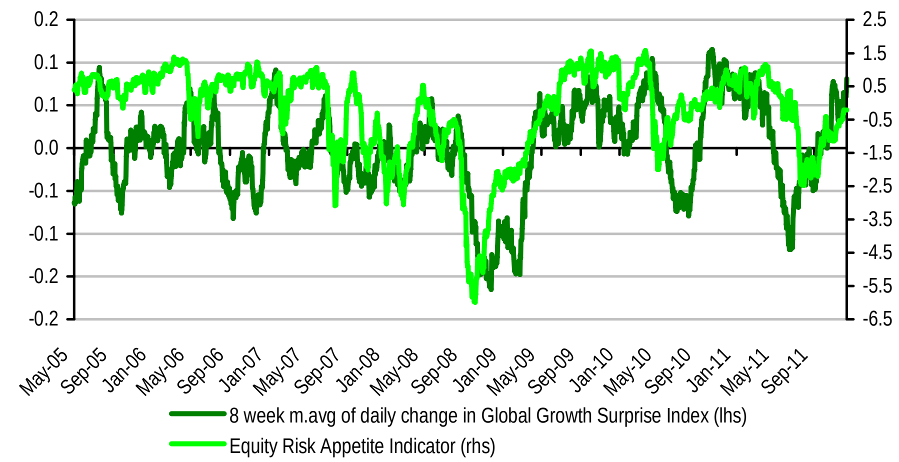
And that appears to generally hold true

Global growth surprise index and US S&P 500 index




Source: UBS

Global growth surprise index versus risk appetite indicator

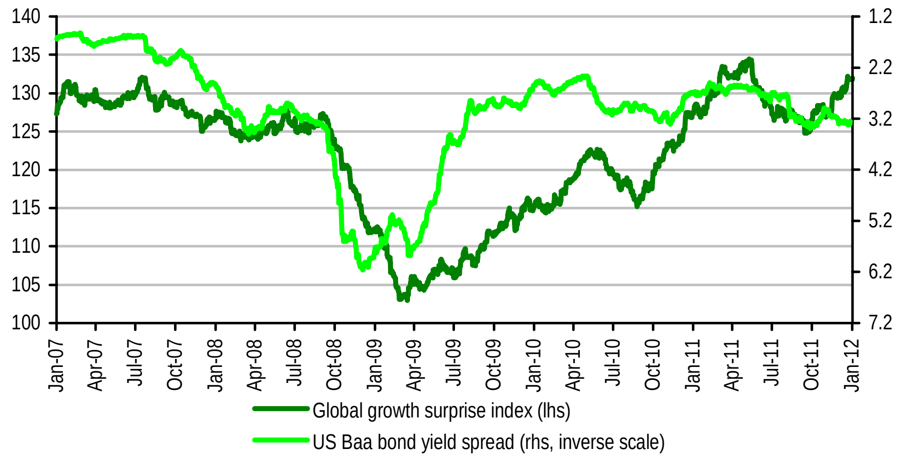



Source: UBS

Our growth indices have also enjoyed a close correlation with fixed income markets in recent years, for example, to movements in credit spreads and US Treasury yields. That is logical, given the close links between economic growth, subsequent inflation outcomes and expectations for Fed policy and their impacts on credit spreads and bond yields.

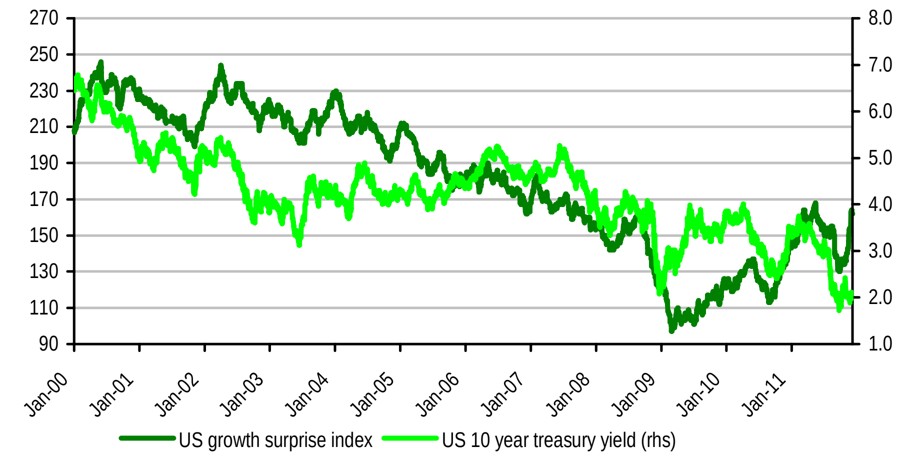
Close correlations with Treasury yields and credit spreads

Global growth surprise index versus US BAA credit spread




Source: Bloomberg/UBS

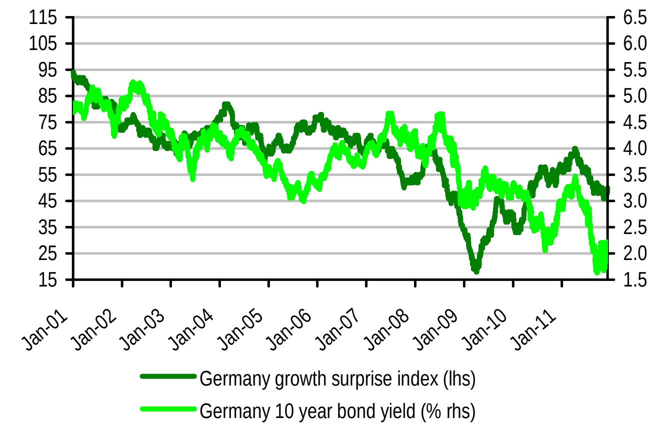
US growth surprise index versus US 10 year Treasury yield




Source: Bloomberg/UBS

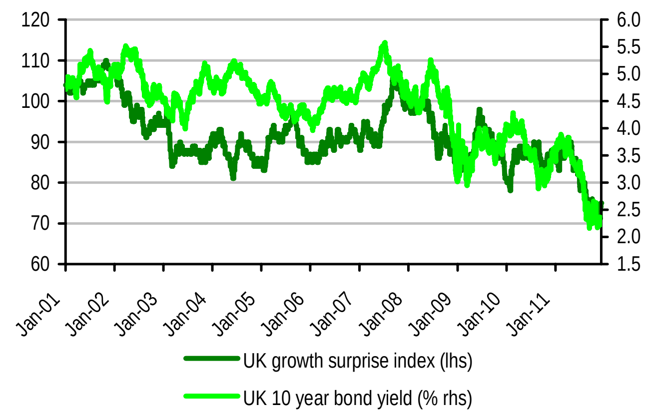
Correlations also exist between German and UK bond yields and their respective growth surprise indices.

German 10 year bond yield versus German growth surprise index




Source: Bloomberg/UBS

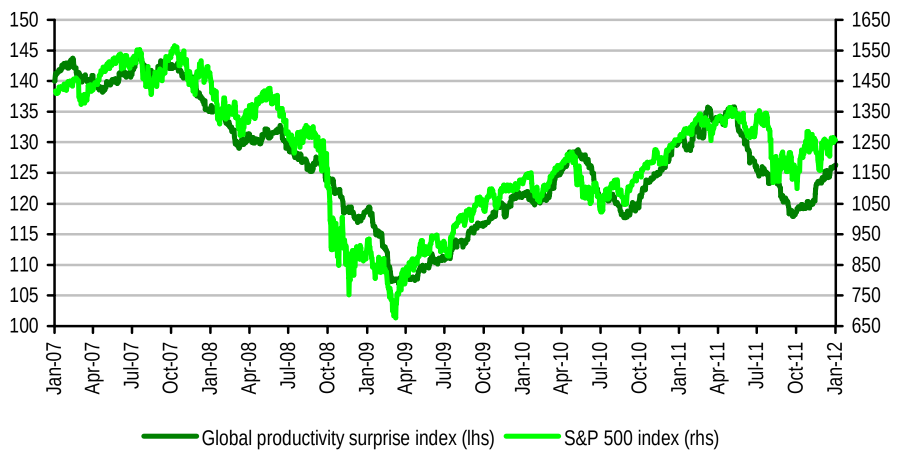
UK 10 year bond yield versus UK growth surprise index




Source: Bloomberg/UBS

Introducing inflation surprises is also revealing. For example, our global productivity surprise index has enjoyed a tight correlation with the US S&P 500 index, closer in fact than with the global growth surprise index alone.

Global productivity surprise index versus US S&P 500 index

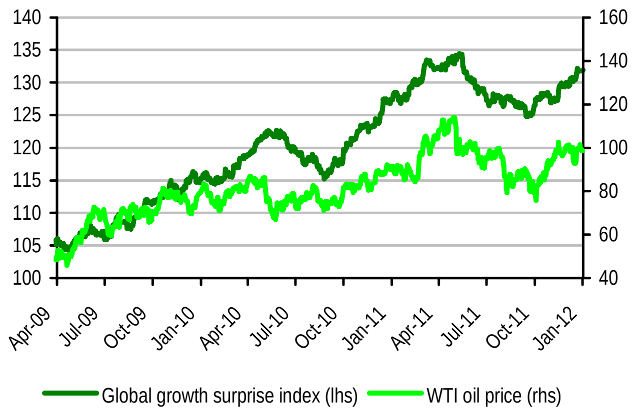



Source: Bloomberg/UBS

Close correlation with commodity prices as well in recent months

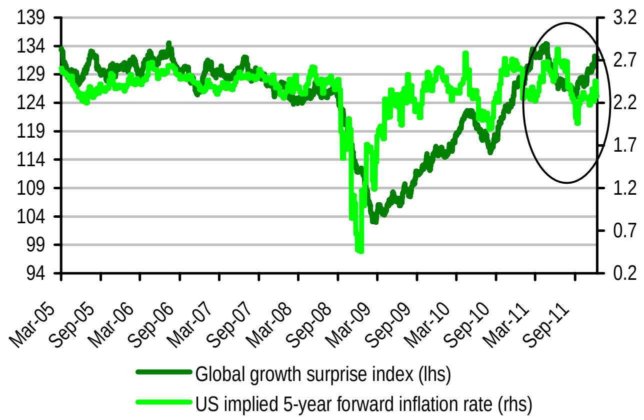
More recently, a tight correlation has emerged between our global growth surprise index and cyclically sensitive commodity prices, such as oil. As a result, the correlation between our surprise index and inflation breakeven rates has risen as well.

Global growth surprise index versus oil prices




Source: Bloomberg/UBS

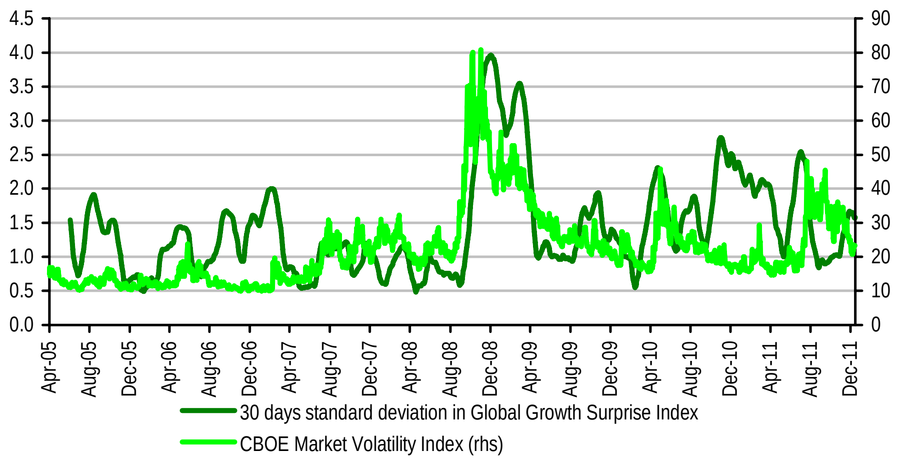
Global growth surprise index versus US 5yr breakeven inflation rate




Source: Bloomberg/UBS

The volatility of our surprise indices has also enjoyed a close connection with financial market volatility metrics, such as the VIX (see chart below).

Volatility of global growth surprise index versus VIX

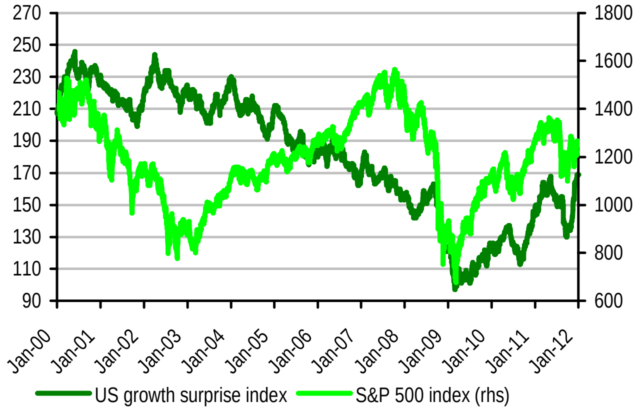



Source: Bloomberg/UBS

Matters are not always quite so straightforward

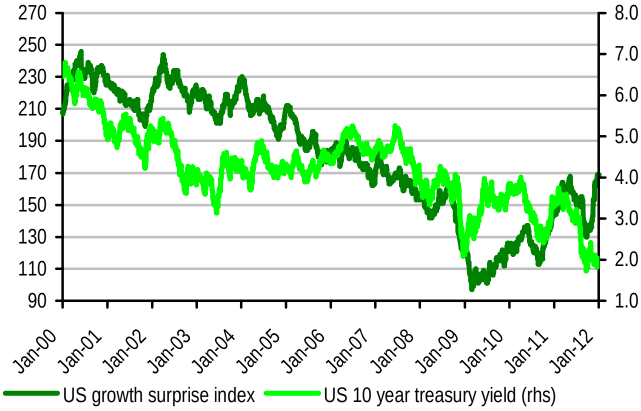
Of course, matters are not always quite so straightforward. We would be remiss if we did not flag some of the inconsistencies between our surprise indices and asset prices. Prior to 2006, for example, correlations were much looser than they are now as evidenced in the charts below. For now, 'macro matters', but that does not mean it will always be the case.

US growth surprise index versus US S&P 500 index from 2000




Source: Bloomberg/UBS

US growth surprise index versus US 10 year Treasury yield from 2000



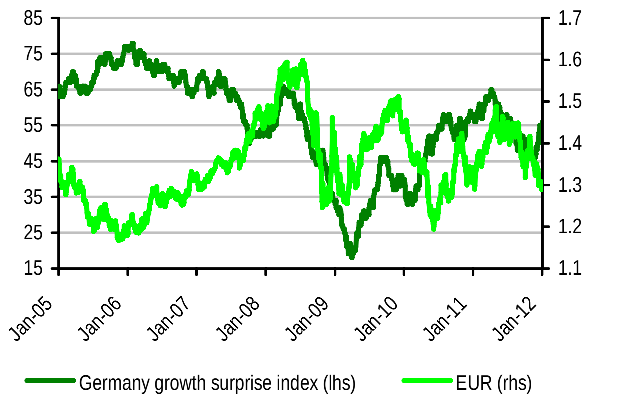

Source: Bloomberg/UBS

Correlations with foreign exchange rates are also not always as robust as the some theories might suggest

Correlations with exchange rates are also not always as robust as theory might suggest. The value of the euro, for example, appears more closely correlated with our German growth surprise index than with our Eurozone growth surprise index. The value of the Australian dollar has been un-related to the trend in our Australian growth surprise index, though that might reflect some misalignment (non-fundamental move). The value of sterling is more closely correlated with our UK growth surprise index. The yen has behaved rather differently to the performance of the Japanese economy.

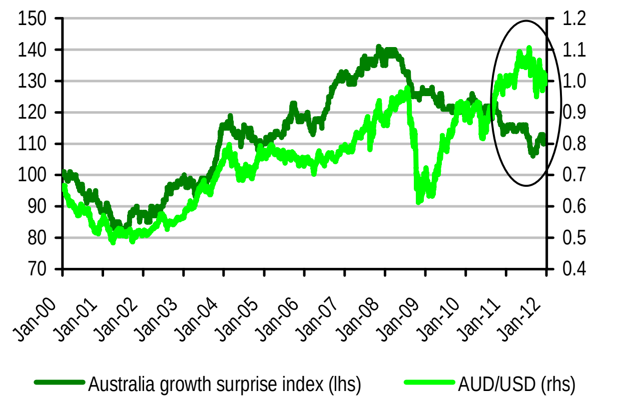
All of this testifies to the myriad factors that enter into the determination of any financial asset price. For Japan its role as an external creditor and high real interest rates may have been more influential in determining the value of the yen compared to the ebb and flow of Japanese economic data.

German growth surprise index versus the Euro



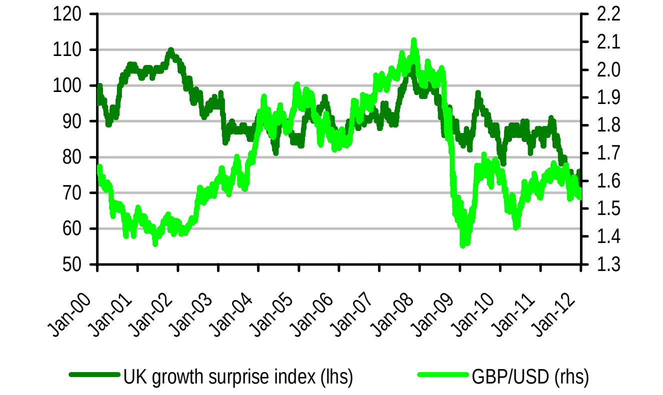

Source: Bloomberg/UBS

Australia growth surprise index versus the AUD



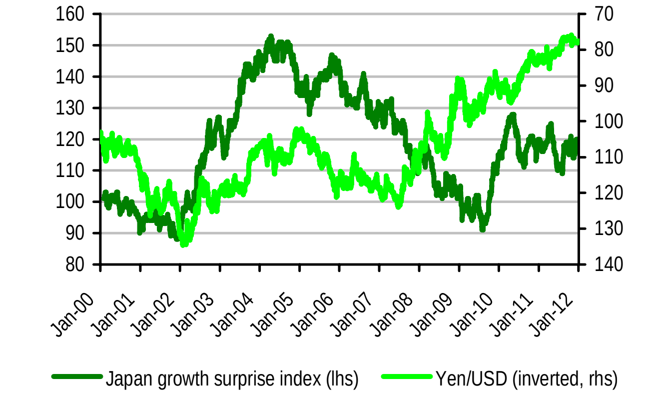

Source: Bloomberg/UBS

### UK growth surprise index versus GBP




Source: Bloomberg/UBS

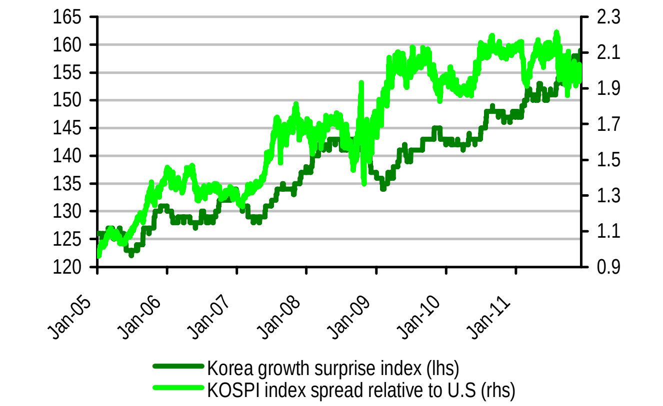
### Japan growth surprise index versus USD/JPY




Source: Bloomberg/UBS

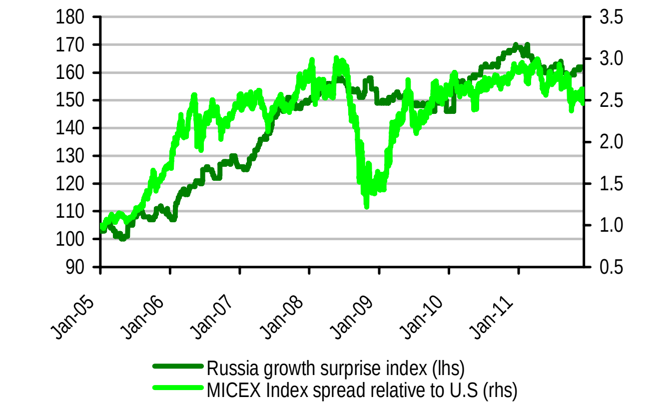
Finally, we note that in emerging economies there are some relationships that hold quite well. The spread between major emerging economy equity markets (versus the US market) and their respective growth surprise indices have been positively correlated in recent years. While real GDP growth, nominal GDP growth and currency performance are clearly important macro-determinants of asset prices it is how those growth rates compare with what had been discounted that arguably matters more.

### Korea growth surprise index versus domestic equity market spread to US



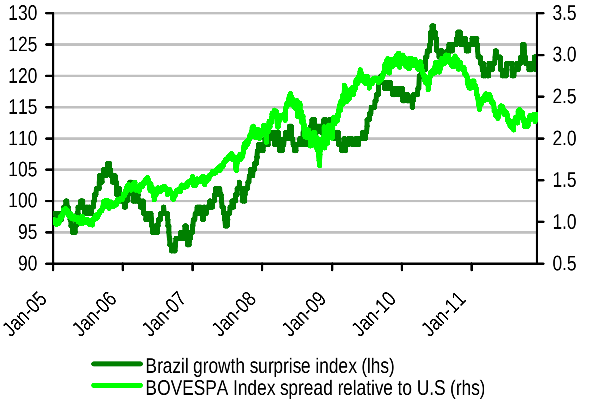

Source: Bloomberg/UBS

### Russia growth surprise index versus domestic equity market spread to US




Source: Bloomberg/UBS

## Brazil growth surprise index versus domestic equity market spread to US




Source: Bloomberg/UBS

## China growth surprise index versus domestic equity market spread to US


Source: Bloomberg/UBS

# Forecasting our surprise indices

Forecasting our surprise indices is not easy

In this final section we explain various methods to forecast the evolution of our surprise indices. The aim is simple. Given the correlations of our surprise indices to market outcomes, it is useful to consider when our surprise indices might change direction or persist in a trend. To be sure, forecasting economic surprises is not an easy exercise. After all, by construction the index captures what the consensus does not anticipate.

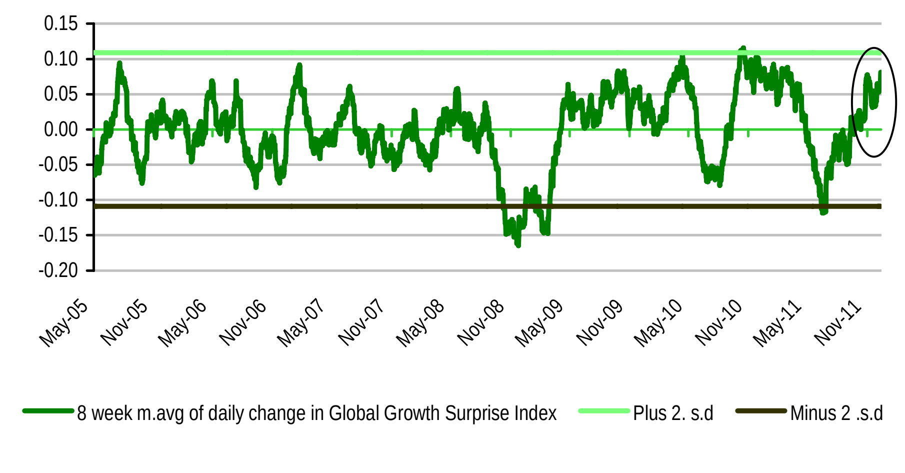
We deploy a combination of time series and fundamental analysis

There are some methods and indicators however that can be monitored which give some insight into how our surprise might behave. Some of these methods are based on time series analysis, whereas others are based on correlations or on fundamental macroeconomic analysis.

The time series approach relies on mean-reverting properties, as depicted in the chart below. The figure shows the eight-week moving average of the daily change in our global growth surprise index. Mean-reversion implies that forecasters adjust their expectations over any period in which the economic dataflow systematically deviates from consensus. Put simply, the consensus of forecasters adjusts to its errors. Mean reversion, as we have constructed it, assumes no systematic bias over time in consensus economic forecasts.

From a forecasting perspective, this implies that we should expect positive growth surprises (relative to forecasts) whenever our index is at unusually low levels. Equally we should expect disappointing economic outcomes when the index is at unusually high levels.

Global growth surprise index, 8 week moving average

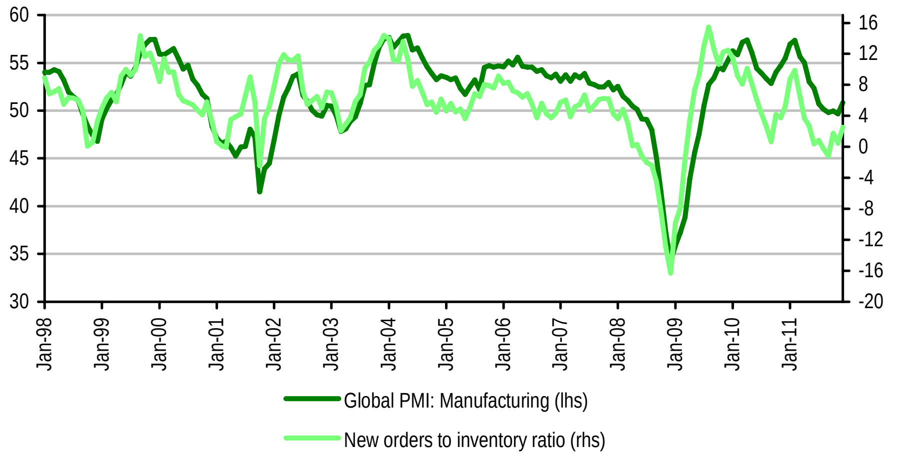



Source: Bloomberg/UBS

Inventory gyrations are important for the cyclical upswings and downswings in our indices

To some extent movements in surprise indices are cyclical and reflect the natural forces that cause up- and downswings in economic activity over the course of a cycle. One of the factors is inventory imbalances and the tendency for activity to ramp up when stocks are lean and to decelerate when stocks are high. A good forward looking indicator of the global economic cycle is the spread between new orders and inventory in the global purchasing managers' indices of manufacturing. Low levels foreshadow improvements in our global growth surprise index, and *vice versa*.

Global PMI: New orders to inventory spread

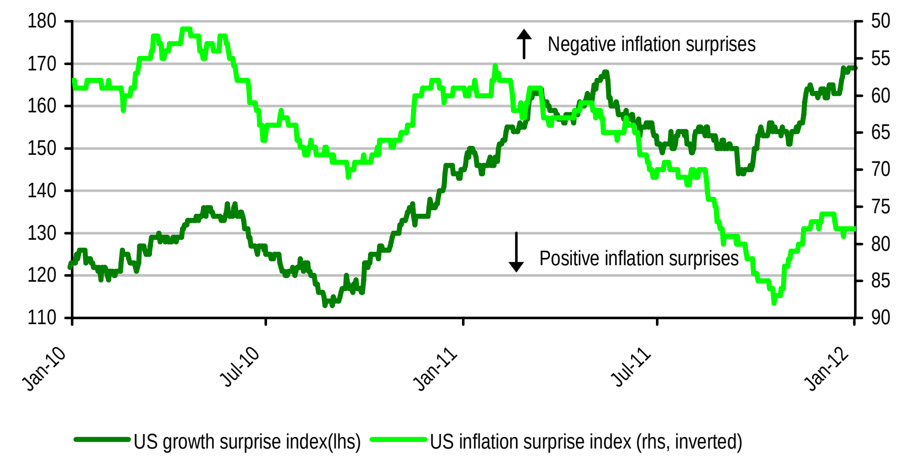



Source: Markit/Haver

As we noted above, oil prices are also influential

As we noted in the opening section of this report, shocks to economic activity elicit step changes in our surprise indices. Forecasters, in other words, are caught out. One of the more obvious sources of shocks in recent years has been oil prices. Supply shortages and geopolitical issues have produced material swings in our growth and inflation surprise indices. Recent years have witnessed an unusually strong dynamic between oil prices and inflation as well as growth outcomes. Higher-than-expected inflation, the by-product of higher oil prices, has resulted in unexpected growth weakness. From a forecasting perspective, this suggests that we ought to be aware of the impact that such shocks may have on our surprise indices.

US growth surprise index versus US inflation surprise index

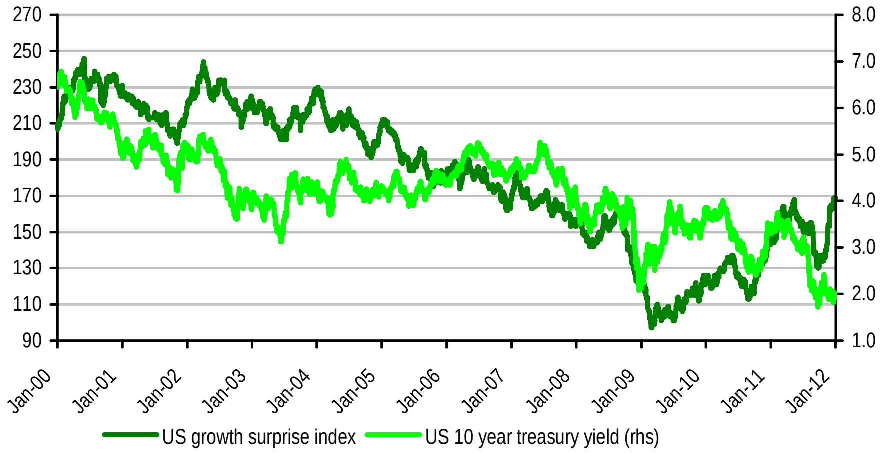



Source: Bloomberg/UBS

The Treasury market is also a good leading indicator

The final factor is the behaviour of the US Treasury market. As we observed above, the changes in ten-year US Treasury yields are closely correlated with the movements in our US growth surprise index. But to some extent US Treasury yields have tended to lead the swings in our surprise index. Markets are, after all, leading indicators, too.

## 10 year Treasury yields versus US growth surprise index




Source: Bloomberg/UBS

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