

Research

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DM Economic Surprise Index (DM ESI)

- The Danske Markets Economic Surprise Index (DM ESI) is a quantification of the latest macro data into an index. The index measures how positively or negatively the data has surprised – measuring the difference between actual release and consensus forecast. The index can thus be interpreted as whether the data was better or worse than consensus expected.
- The DM ESI gives a fast overview of surprises in historical and latest macro data. This is a useful input when determining current market drivers. Another use is that the index in some periods leads the market movements.
- The DM ESI so far operates for US growth and price data. It is scheduled for release every week to assist in giving an overview of the weekly surprises in macro data. In the future similar indices will arise in respect of the eurozone.

What is the DM ESI?

This document gives you an overview of what the Danske Markets Economic Surprise Index (DM ESI) does and how you can use it. It will also show the calculation of how the DM ESI is performed. It is split in three parts, using the index, the data handling and the statistical computation.

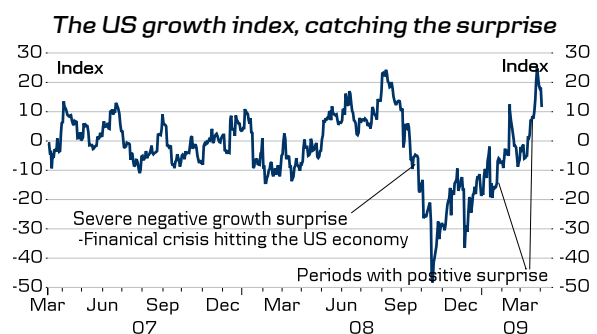
Using the index

DM ESI is best understood as a quantification of the latest macro release data into an index. The ESI can be either positive or negative. The index aggregates all the surprise factors of the sub index of surprise. The sub indexes are the individual released macro series measured as surprise. The sub indexes each have surprise contribution every time new data is released for the given series (not revisions though – they automatically replace old data).

The ESI is either positive if the aggregate contribution from surprise over a longer period is positive. An example of positive contribution could stem from a positive GDP surprise. Surprise is defined as the actual

release minus the expected value. Thus the positive surprise contributes positively to the index.

When economy began deteriorating sharply in October and surprised on the negative side the index shifted from positive to greatly negative value. And the latest development of positive surprise has also been caught by the index which is back in positive territory.

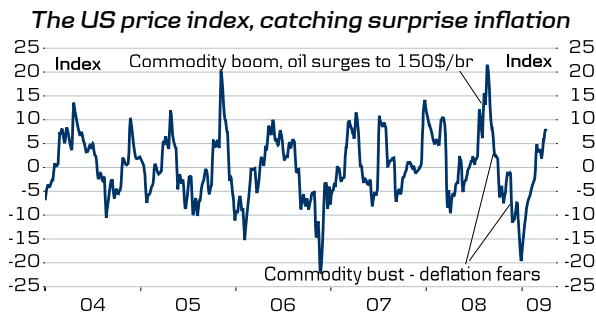


Source: Danske Markets

Likewise the ESI can assume negative values when the aggregate of contributions over a period has been consistently negative. An example of a negative sur-

prise contribution from a series could be the unemployment being higher than expected. That would be interpreted as negative surprise contribution. Thus when the index is negative, it is an indication that in the given period, the economy is deteriorating more than expected. And opposite, when the surprise is positive, it indicates more growth than expected by consensus.

The price surprise index is analogous to the growth index. As an example, when inflation is higher than expected it has a positive surprise contribution to the index.



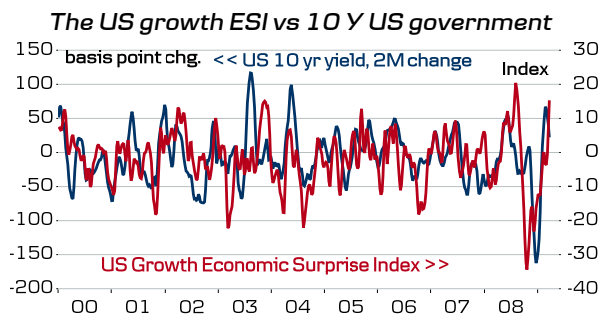
Source: Danske Markets

Catching the wave

The quantification exerts some correlation between stock and interest rates.

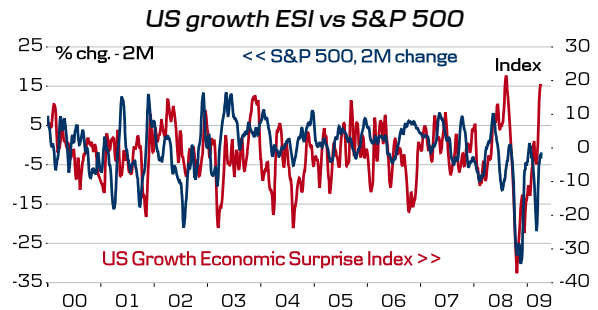
The correlation isn't perfect as the data used here is of limited scope and there are other market drivers. But it gives a very concise and objective idea of the change in the current macroeconomic expectations. Therefore it can be of use as another input in decision making.

The correlation with interest rate is quite obvious as it is largely driven by macro data and expectations.



Source: Danske Markets and Ecwin

The shock in the surprise index in October led the change in the interest rate and the stock prices. The following rebound and surge of stock prices we have seen lately was also caught by the index before it actually turned.



Source: Danske Markets and Ecwin

Computation of the index

In this section we will give a brief outline of the process of calculating the index. Computation of the series begins by calculating what we call the input,

$$\text{Input} = \text{Actual Release} - \text{Consensus Forecast}$$

Example of computation with GDP release

Actual Release	=	2,00
Consensus Forecast	=	1,00
Input	=	1.0 - 2.0 = 2,00
Std. Deviation of Input	=	2,00
Surprise	=	1.0 / 2.0 = 0,50

Variety		Monthly
Decayfactor		0,0693
Number of days	=	10,00
Decay	=	$\text{Exp}(-0.0693 \cdot 10) = 0,50$

Series Contribution	=	Surprise * Decay
	=	0.50 * 0.50 = 0,25

Source: Danske Markets

Thus the input is the deviation of the actual release from the expectations. The problem with the input is that the number is subjective to the series and therefore cannot be compared. This is solved by computing the standard deviation over the length of the series (currently since January 2000). The release difference is divided by the standard deviation and now we have calculated the "surprise" - the standardised deviation from the expected value.

Surprise = Input / Std. Dev. of Series (Input)

This number is comparable across different series which is very useful. We can now compute an index contribution from these numbers. The series contribution is computed by decaying the surprise day by day following the release. Thus if the fresh surprise has contribution of 1, then after three weeks it will have a contribution of a 0.5. The series contribution is computed as the product of Surprise and Decay;

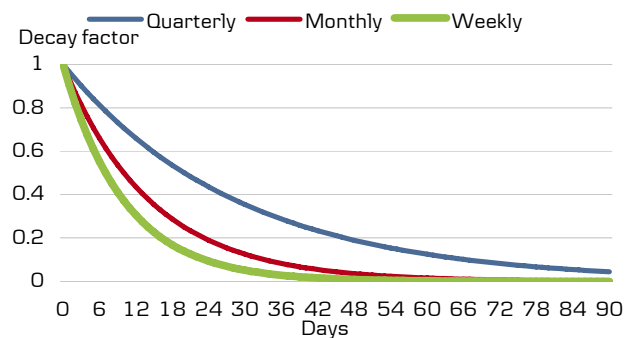
Series contribution of series = Surprise * Decay
(Time after release)

As the series comes in three varieties, weekly, monthly or quarterly they have to be treated differently. Thus the quarterly only contains the latest observation; the monthly contains the past three observations and the weekly has the past six weeks.

The Decay is an exponential function that decreases continually in value each day after the initial release. Therefore the different varieties of series have different Decay factors. There are tables included on the back with weights and Decay factors for each series.

Decay = $\text{Exp}[-\text{Decay factor} * \text{Days since release}]$

Decay factors by variety - diminishing over time...



Source: Danske Markets

With the knowledge of each series contribution we conclude the computation by aggregating the contribution, giving each series a weighting. Each Series weight is based on normative decision. The weightings can be seen in the appendix on the last page.

Index = $\sum (\text{Series contribution} * \text{Series weight})$

Appendix: Series

US Growth series	Weight	US Price series	Weight
GDP Q/Q	High	CPI-X m/m	High
ISM Manufacturing	High	PCE (non-GDP) Price Index	High
Non Farm Payrolls	High	CPI m/m	Medium
Retail ex autos	High	GDP Price Index	Medium
Building permits	Medium	ISM Prices Paid	Medium
Chicago PMI	Medium	PCE (GDP) Price Index	Medium
Conference Board - Consumer Confidence	Medium	PCE-deflator	Medium
Durable good orders	Medium	PPI-X m/m	Medium
Empire manufacturing	Medium	Average Hourly Earnings m/m	Low
Existing home sales	Medium	Employment Cost Index	Low
Housing starts	Medium	IPI m/m	Low
Industrial production	Medium	PPI m/m	Low
Initial Jobless Claims	Medium	Unit Labor Costs	Low
ISM non manufacturing	Medium		
New Home Sales	Medium		
Personal spending	Medium		
Philadelphia Fed	Medium		
U. of Michigan Confidence	Medium		
Unemployment Rate	Medium		
ADP Employment	Low		
Auto Sales	Low		
Construction spending	Low		
Consumer Credit	Low		
Continuous Claims	Low		
Factory Orders	Low		
House Price Index MOM	Low		
NAHB house price index	Low		
Pending home sales	Low		
Personal income	Low		
Richmond Fed Manufacturing Index	Low		
US Trade bal. Total	Low		

Disclosure

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