ABN·AMRO Investment Solutions

Strategy & Quantitative Research

Unravel The Output Gap

October 2018

KEY TAKEAWAY

- The potential growth is an unobservable variable, hence the **output gap** (actual growth – potential growth) **is difficult to accurately measure** with sometimes various estimates for the same region depending on the source and the method (structural approaches vs empirical filter estimations).

- **Whatever the measure is, in 2018, the output gap is closed in the Eurozone and in the US**, i.e. real activity growth is slightly above (or at least in line with) its potential. Unemployment rates below NAIRU estimates also testify that we are in the late-phase of the business cycle.

- Do closed output gaps lead to endogenous deceleration of growth due to labor market slack? Can growth further accelerate? Is a recession imminent? How risky assets behave after stretched output gaps? Are earnings cycles synchronized with the macroeconomic cycles?

- Answer 1: Historically, **a closed output has not been an early warning signal for recession or activity growth slowdown**. Even closed, output gaps can continue to increase (**Figures 1 to 4**).

- Answer 2**: Inflection points rather than the level of the output gap seem to be related to future recessions but this is not automatic** such as in 2001 in Eurozone or 2016 in US (slowdown without recession). (**Figures 1 and 2**).

- Answer 3: However, **output gap turning points are associated with risky assets downside risk** (with or without recession) with the intensity of the equity downside risk directly linked to macroeconomic downside risk (sell-off vs bear market). (**Figures 9 and 10**).

- Answer 4: **Turning point in earnings cycles** (upward/downward ratio) l**ead those of the output gaps and those of the equity market cycles**. (**Figures 5 to 8**).

- Activity growth is slightly decelerating in 2018 in Eurozone and will probably decelerate in the US in 2019 but the risk of recession remain subdued. This can explain the negative performance of the Eurozone equity market year-to-date (sell off/correction). **The intensity of this current sell-off will depend on the future behaviour of earnings expectations and revisions**.

DEFINITION AND ROLE OF THE OUTPUT GAP.

The output gap measures the deviation of GDP from its potential, it is defined as the difference between the actual output (an observable variable) and the potential output (an unobservable variable).

Usually, the output gap is expressed in terms of potential GDP as : $\frac{(GDP_{actual} - GDP_{potential})}{GDP_{potential}}$.

By its nature, it is difficult to accurately gauge the potential output. One way to estimate potential GDP is by simply fitting a linear time trend through actual GDP. More complex methods involve using simple or multivariate filter estimations (see Hodrick-Prescott, 1997 or IMF Working Paper, May 2017). One can also use structural models but the academic literature leans toward a conjoint use of both approach to estimate potential GDP.

The output gap can be either positive or negative. When the output gap is positive, the system produces more than its equilibrium capacity, unemployment decreases and inflation increases. When the output gap is negative, the system produces less than its equilibrium capacity, unemployment increases and inflation decreases. The output gap helps to quantify the nature of the economic cycle. It also helps to indicate which counter-cyclical policies might be used to influence the length and effects of the economic cycle.

DOES THE OUTPUT GAP FORECAST RECESSIONS?

The output gap is an essential measure to analyze fiscal or monetary policy and business cycle. As the **Figures 1 and 2** suggest, it seems that there is evidence of a link between economic recessions and the output gap. Nonetheless, when we compare for instance the US recessions following the dotcom crisis in 2001 and the 2008 crisis or the EZ recession following the Greek debt crisis, we see that the level of the output gap is not always related to a crisis. It is rather the change in the regime of the output gap which is linked to a recession (decreasing output gap) and its end (increasing output gap).

Being capable to identify such inflection points would be useful to forecast a probable recession period. Those turning points are not always related to a recession period. However, it remains a good warning signal of economic or financial tightening conditions.

It exists methods for predicting turning points. A first approach is to use leading indicators. Another approach is to use probit models (type of regression where the dependant variable can only take two values) as Chin, Geweke and Miller (2000) proposed to forecast inflection points in the US unemployment rate. One could think to adapt this model to predict turning points in the output gap but it is already difficult to agree on a unique measure of the potential GDP.

HOW TO CORRECTLY MEASURE THE OUTPUT GAP?

As mentioned above, it is difficult to converge on a unique measure for the potential GDP, hence the output gap. **Figures 3 and 4** show the annual output gap measured by different entities for US and EZ. None of these measures are the same because different methodologies are applied:

- The European commission uses a method based on economic factors to estimate potential growth. Calculations are based on economic rates and trends such as unemployment, demography, technology, etc.
- The OECD uses the Cobb-Douglas' function of production with 2 factors then the results are smoothed through the Hodrick-Prescott filter.
- The IMF estimates the potential output through linear filters. It uses the Kalman filter as a first approach and then it refines the estimation by exploiting two other methods.

- Oxford Economics methodology is similar to the OECD approach.

Although there is not a unique measure of the output gap, all methodologies give the same pattern and more importantly the same inflection points which, we believe, are related to recession periods or at least punctual slowdown periods.

THE OUTPUT GAP AND THE FINANCIAL CYCLE.

Figures 5 and 6 compare the financial cycle through earnings revisions and market performance. Earnings revisions usually lead market performance, when the upward/downward ratio increases, financial markets are bullish and vice-versa.

Figures 7 and 8 show that the upward/downward ratio is also a leading indicator of turning points in the output gap. Consequently market performance and output gaps are closely related (**Figures 9 and 10**).

Nonetheless, turning points in the output gap are not always related to a bear market but most of the time to a punctual sell-off. A bear market is rather linked to a gradual decrease in the upward/downward ratio and a persistent decrease in the output gap.

WHAT DOES THE OUTPUT GAP TELL US TODAY?

Since the end of the 2008 crisis, we observe the longest period of negative output gap and it is difficult to say today if the output gap is really positive in the Eurozone.

If the potential output is still way above the actual GDP, we can expect that the output growth will continue to be strong, giving time for central banks to increase their interest rates. Nonetheless, if the output gap is close to zero, the output growth will probably decelerate. We have difficulties to gauge exactly the level of the output gap but we can guess whether the actual output growth converges on the potential output growth or if the potential output growth converges on the actual output growth. The former results from improvement in technology and demographics while the later results from increasing investment and labour force participation rate.

In the end of the 90', we saw an increase in the potential output growth thanks to a rising productivity in the US and increasing working population in Eurozone whereas before the 2008 crisis, we did not observe an increase in the potential output growth.

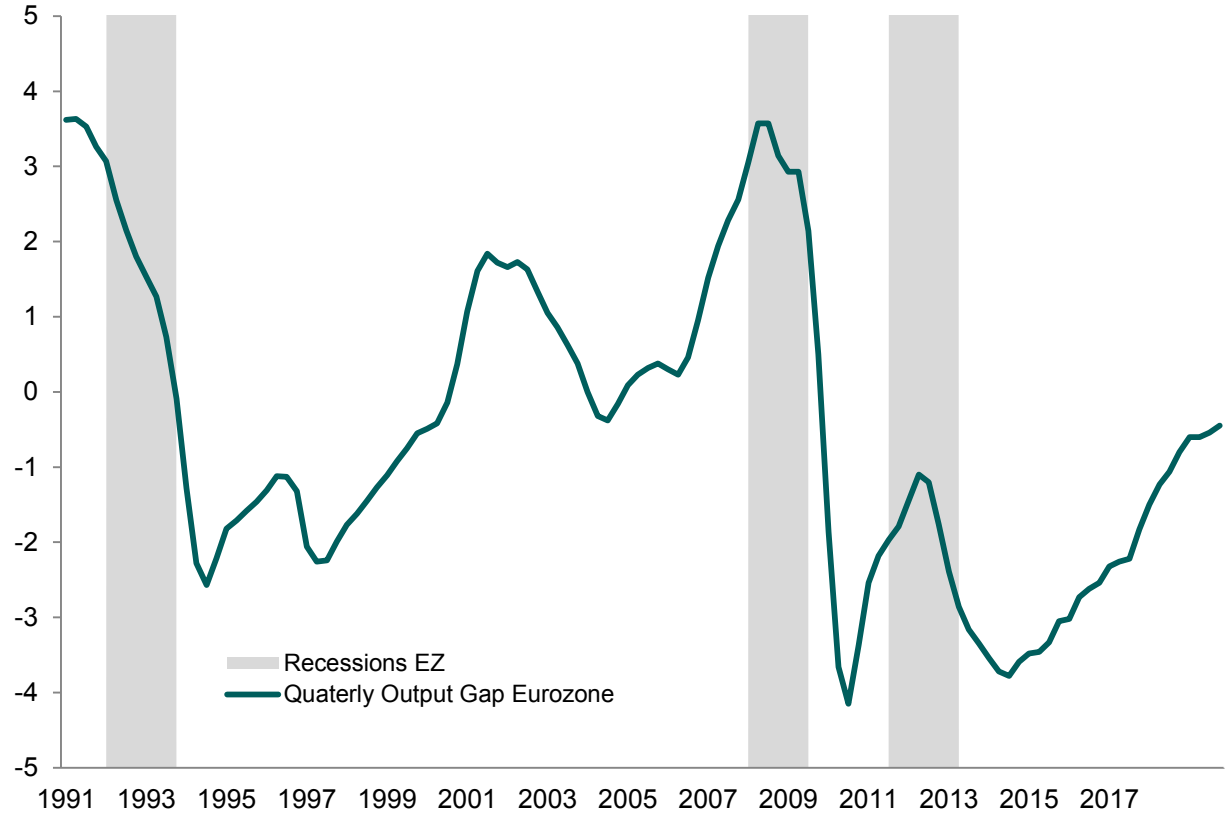
Today, the unemployment rate in US and Eurozone is close to the potential unemployment rate hence, it is more probable that the actual output growth will decelerate to reach the potential output growth.

The current sell-off in European equity markets seems to be linked to a decelerating growth in the Eurozone. Earnings revisions fluctuate around the neutral zone since the last quarter of 2017 and the output gap is stable, thus a turning point might be close. Earnings revisions is the key variable to watch. If it further decreases below 0, we can expect a bear market. If it stays stable at the current levels, the actual sell-off is probably only punctual.

The situation is different in the US with a fading fiscal stimulus effect which negatively impact earnings expectations, nonetheless, the output gap trend is still upward.

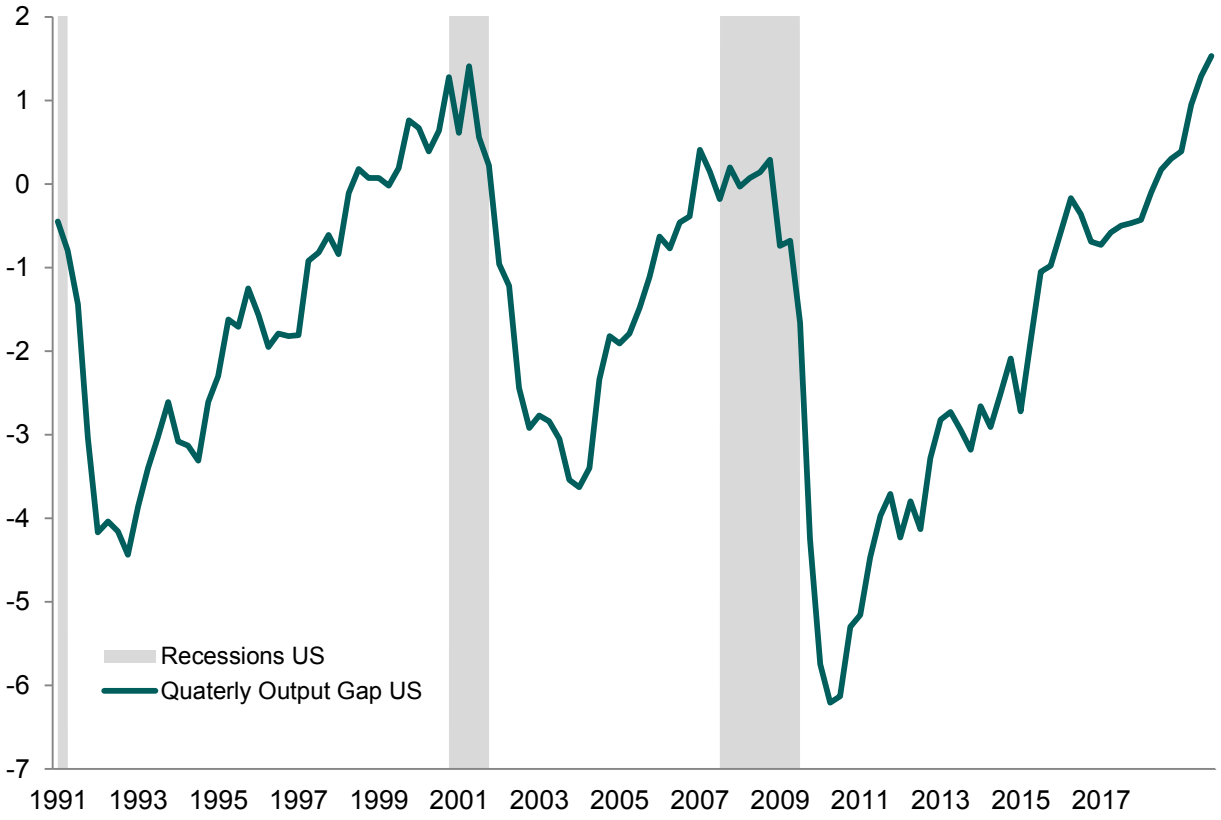
FIGURES

Figure 1. Quarterly Output Gap Eurozone (% of potential GDP) and Recessions



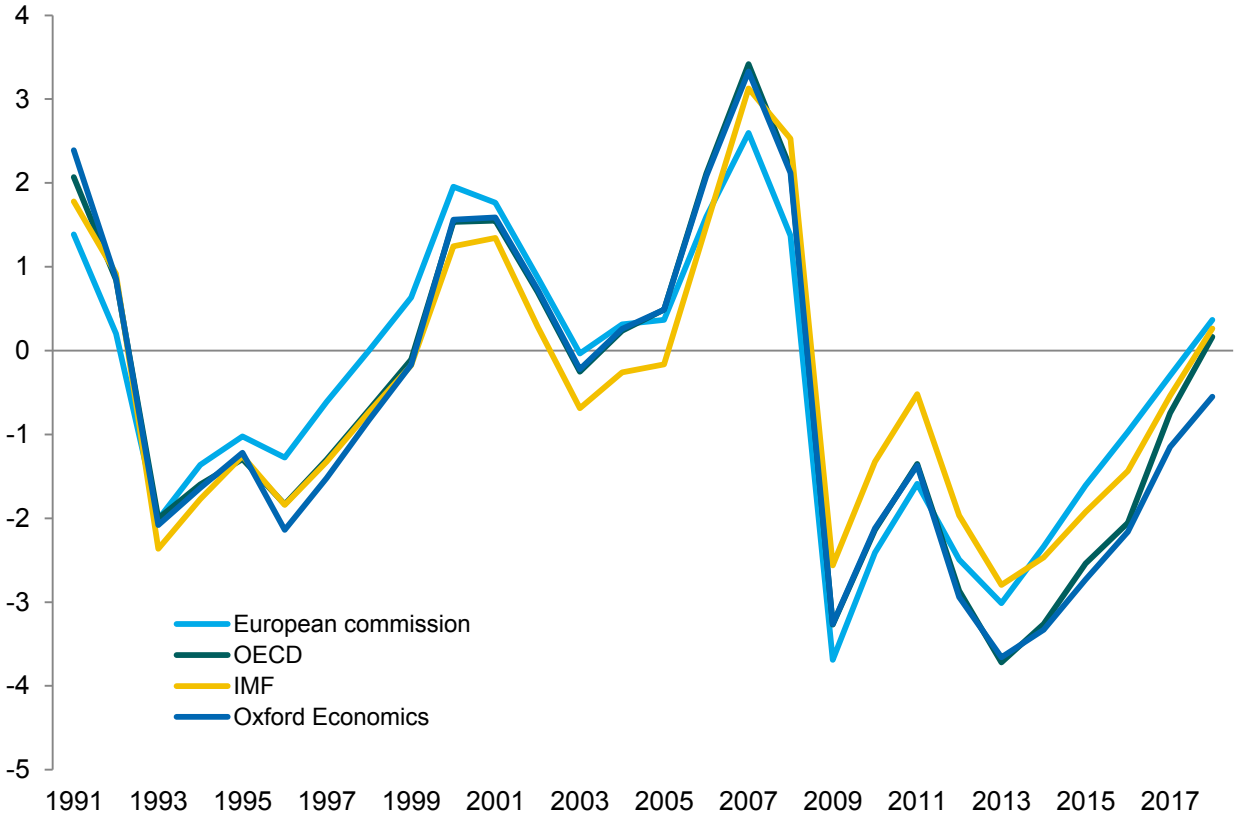
Sources: CEPR, Oxford Economics

Figure 2. Quarterly Output Gap US (% of potential GDP) and Recessions



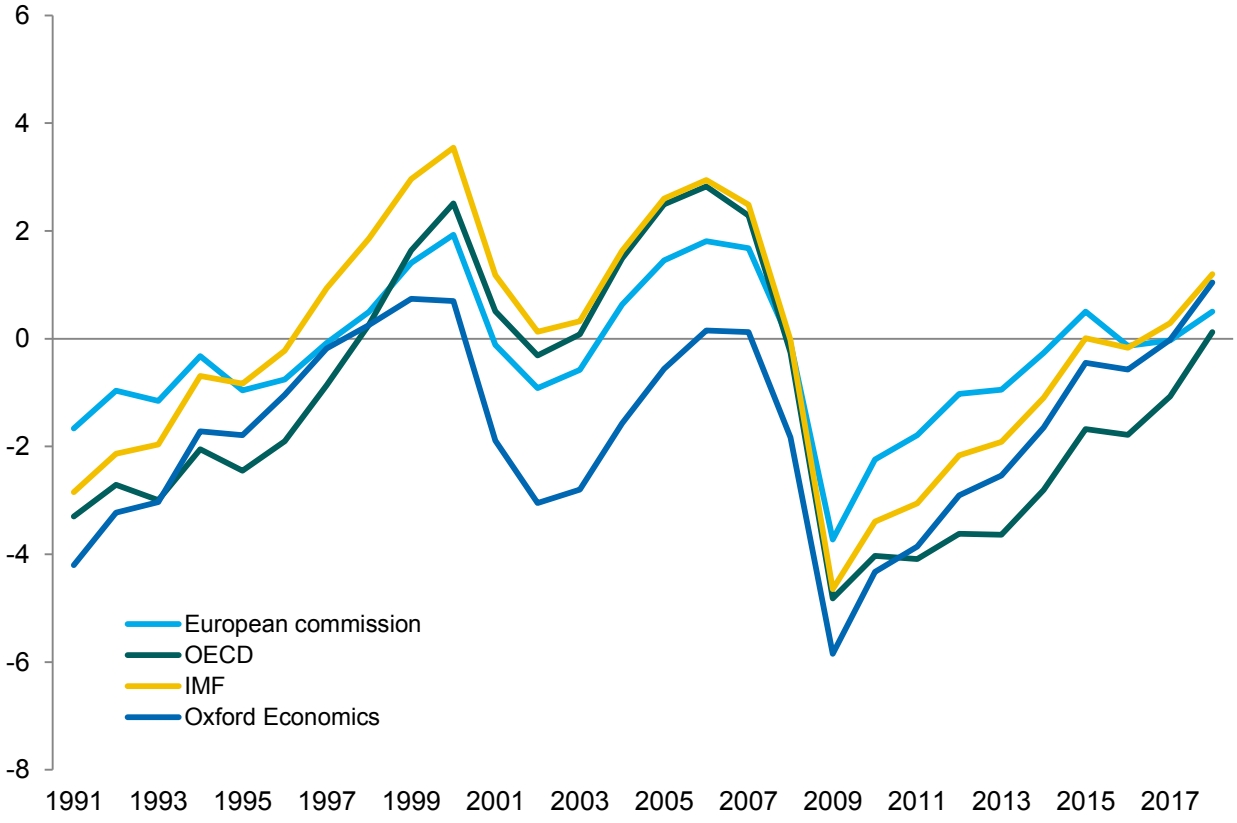
Sources: CEPR, Oxford Economics

Figure 3. Annual Output Gap Eurozone (% of potential GDP)



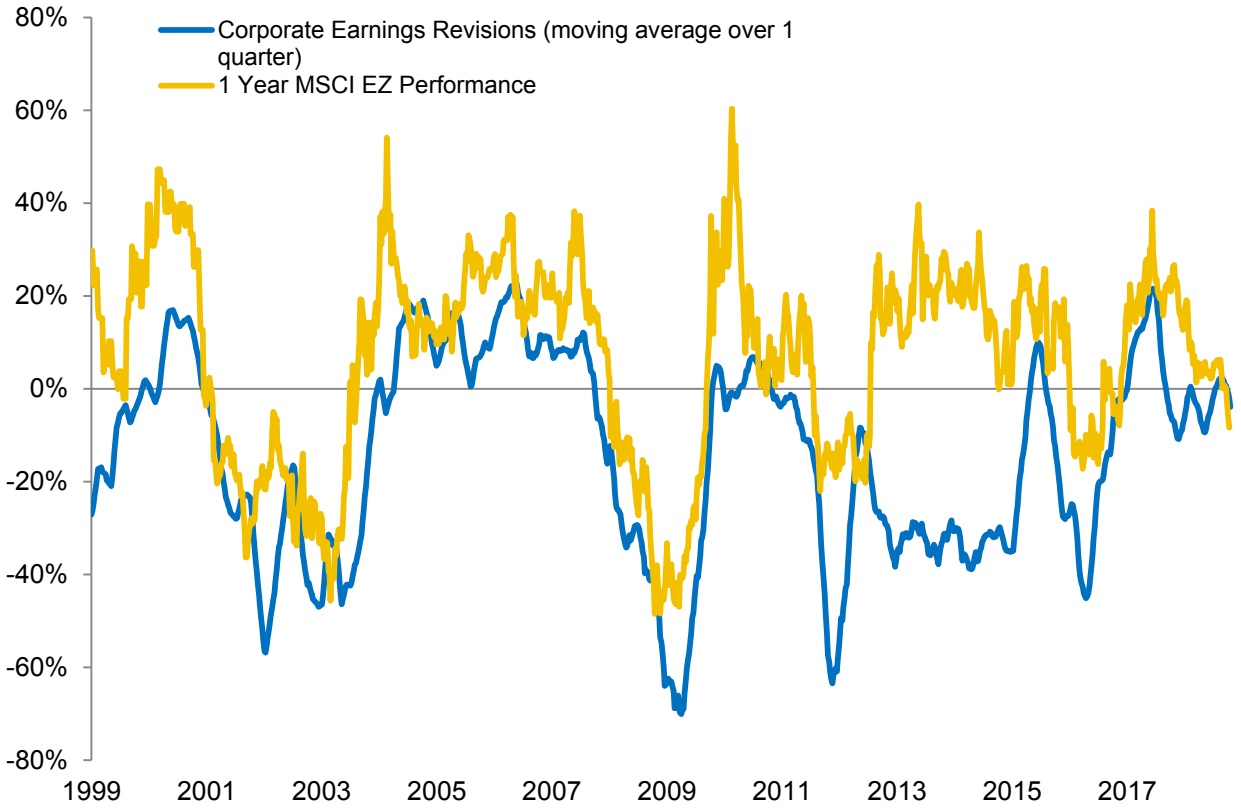
Sources: European Commission, Datastream

Figure 4. Annual Output Gap US (% of potential GDP)



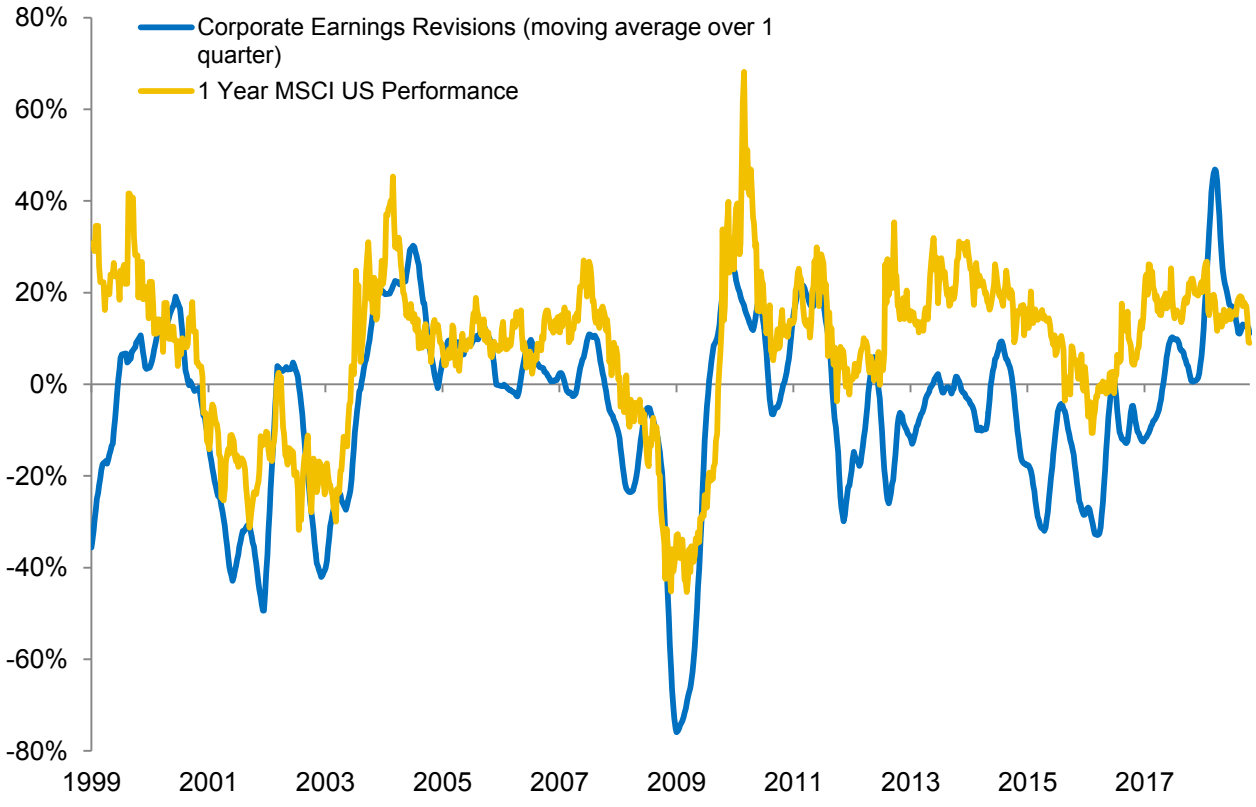
Sources: European Commission, Datastream

Figure 5. MSCI Eurozone vs Earnings revisions



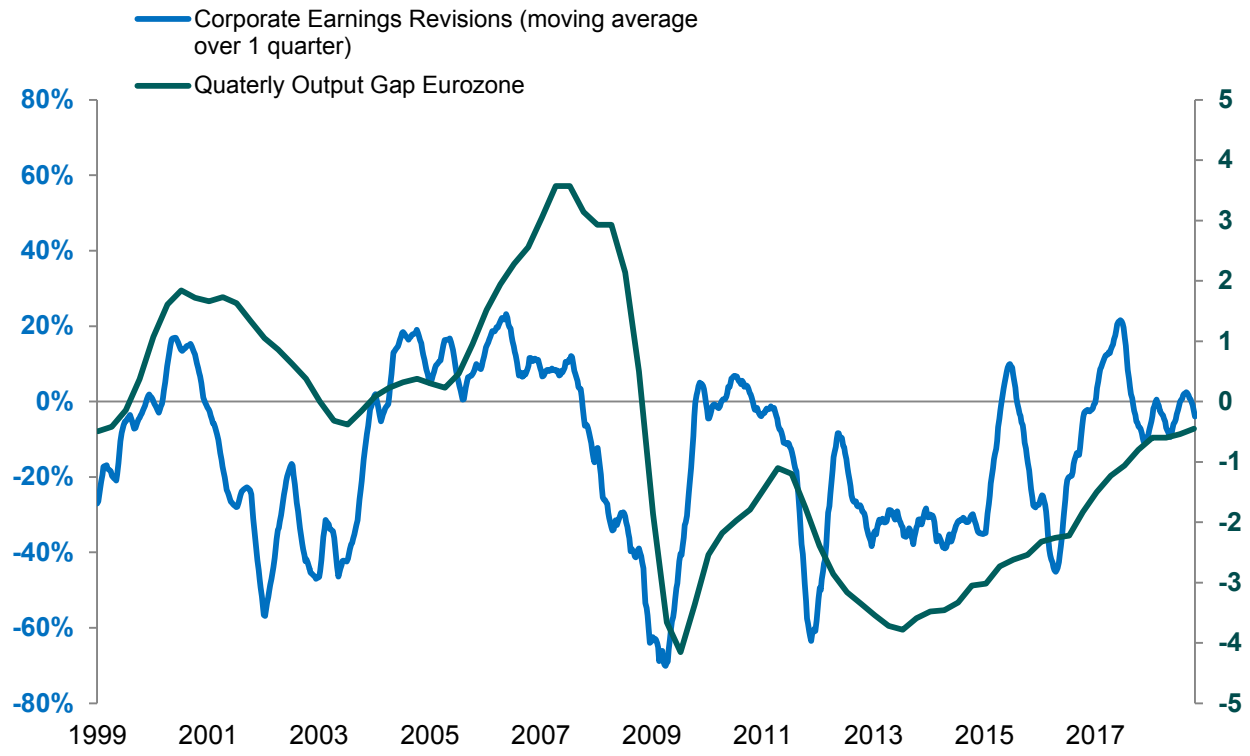
Sources: Datastream. Earnings revisions = (number of upward revisions – number of downward revisions)/number of estimates

Figure 6. MSCI US vs Earnings revisions



Sources: Datastream. Earnings revisions = (number of upward revisions – number of downward revisions)/number of estimates

Figure 7. Corporate Earnings Revisions Eurozone vs Output gap

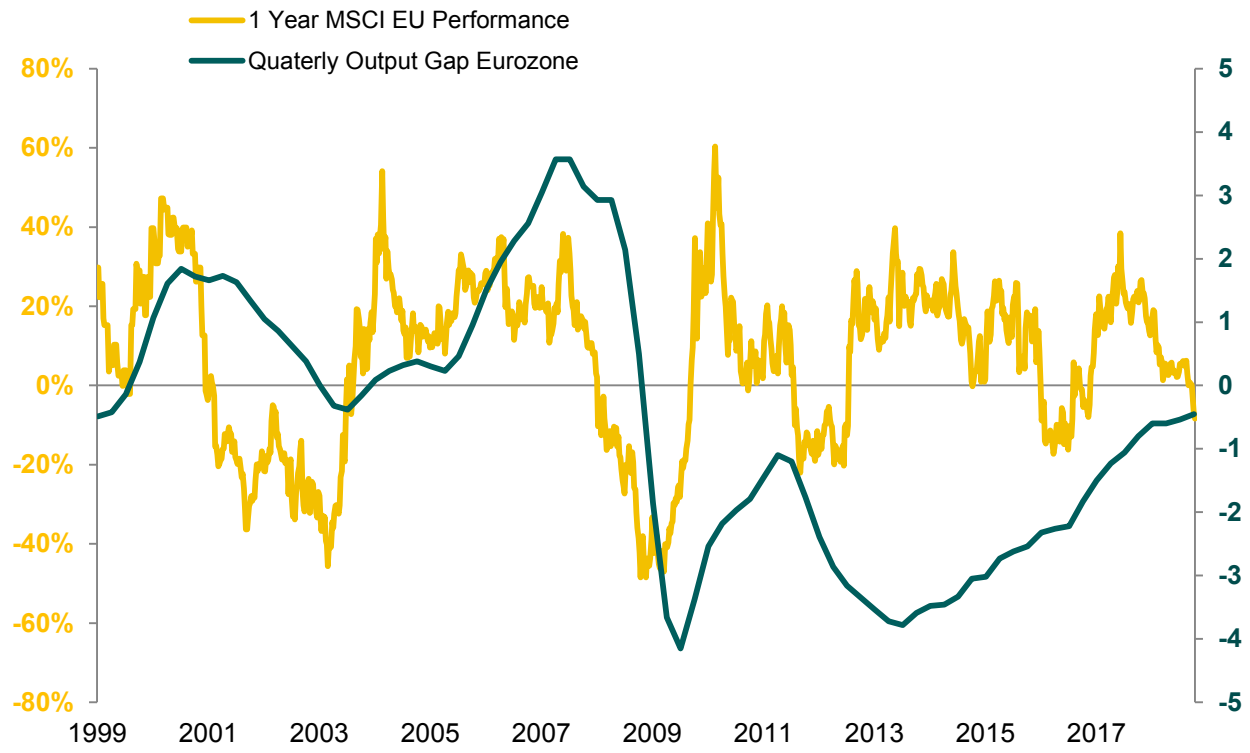


Sources: Datastream, Oxford Economics. Earnings revisions = (number of upward revisions – number of downward revisions)/number of estimates

Figure 8. Corporate Earnings Revisions US vs Output gap

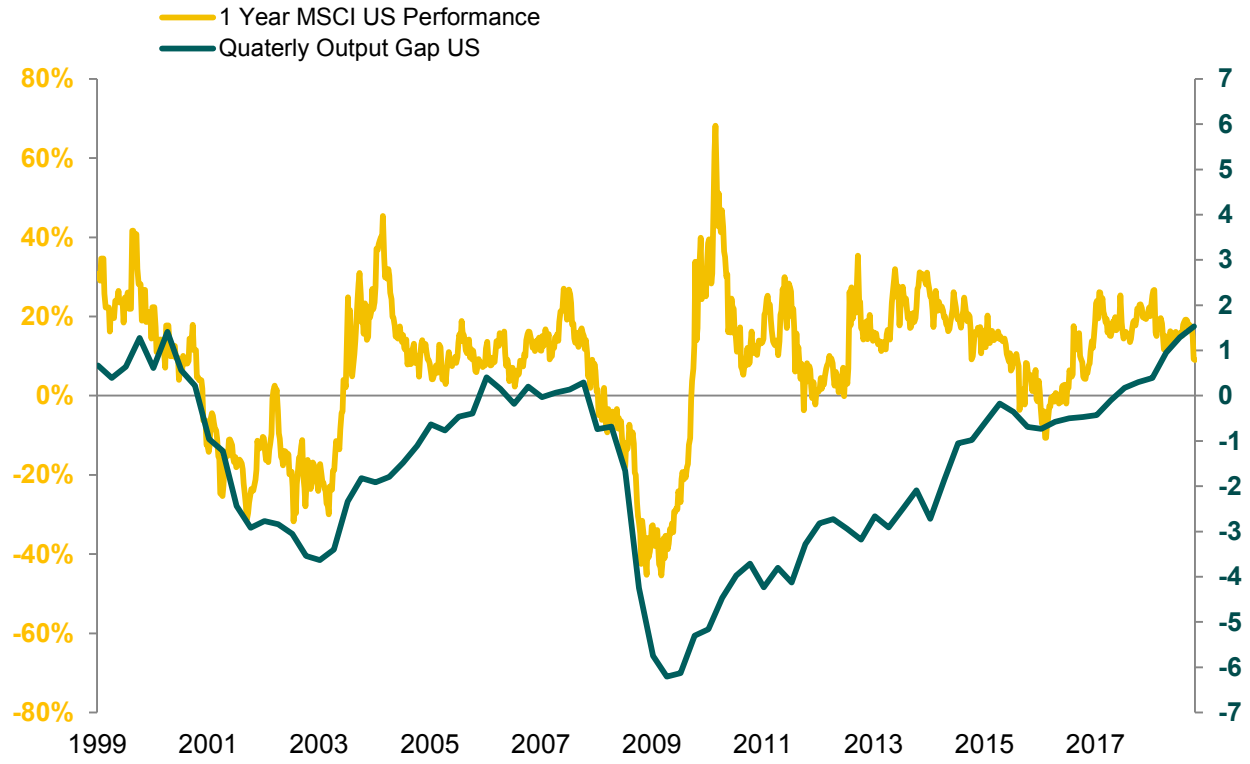
Sources: Datastream, Oxford Economics. Earnings revisions = (number of upward revisions – number of downward revisions)/number of estimates.

Figure 9. MSCI Eurozone vs Output gap



Sources: Datastream, Oxford Economics

Figure 10. MSCI US vs Output gap



Sources: Datastream, Oxford Economics

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Public limited company with a board of directors and a supervisory board
with a share capital of 4,324,048 euros
registered with the Paris trade and companies registry with n° 410 204 390,
Registered office: 3 avenue Hoche, 75008 Paris, France,
Authorised by the *Autorité des Marchés Financiers* (French Financial Markets Authority) on 20/09/1999
as a portfolio management company with n° GP99027