A Primer on Economic Overheating: What it means and how to measure it

PBO Publication 3 of 2019

Introduction

Recently, much attention has been given to whether the Irish economy is overheating or not. Both the Irish Fiscal Advisory Council (IFAC) and the Department of Finance have assessed that while the economy is not currently overheating, economic imbalances could emerge in the near future. A similar assessment was provided by other bodies such as the Central Bank of Ireland and the OECD.

An economy that is overheating and therefore producing an unsustainable level of output is a cause for concern, because if not managed effectively, it can eventually lead to large losses in income, high unemployment, large decreases in asset prices and large levels of unaffordable debt.

This note gives an overview of:

• What overheating is and the main policy tools available for macroeconomic management;

• Different methods to measure economic overheating and the issues with standard measurements;

• Additional cyclical indicators proposed by the PBO that are relatively straightforward and, along with some caveats, can complement standard ways of measuring overheating.

Defining Overheating

Overheating describes the situation where total demand for goods and services in an economy is increasing significantly faster than supply. Overheating tends to be characterised by unsustainably high levels of output, increasing price and wage inflation and high or “full” employment (i.e. when everyone who wants a job, has a job). When an economy is overheating, it is operating beyond potential productive capacity, meaning that supply is unable to match demand due to a lack of available resources such as labour and capital.

Overheating is problematic for a number of reasons. Prices can rise significantly due to high levels of demand. To meet this increased level of demand, suppliers will hire more workers in order to increase production. This is likely to lead to wage inflation as low unemployment means employers need to offer competitive wages to attract employees. Increases in employment and wages fuel the demand for goods and services, resulting in even greater inflation. This is called a wage-price spiral.

Persistent wage growth can also lead people to take on large levels of debt as they expect their incomes to be higher in the future or at least to continue at existing levels. However, if wage growth stalls or is less than expected, people may not be able to pay back these large amounts of debt which can threaten the financial stability of the economy.

Overheating can also weaken the international competitiveness of an economy. As domestic prices rise, foreign consumers are less likely to purchase these goods. Similarly, domestic consumers can now purchase foreign goods at a relatively cheaper price and therefore will increase consumption of foreign goods. National imports will increase and exports will decrease, causing a negative change in the balance of trade.

An overheating economy is ultimately unsustainable as persistent growth in inflation can lead to significant decreases in demand for domestic goods and services, causing decreased national output, decreased wages and increased unemployment.

Managing Overheating

Due to the risks stemming from overheating, policymakers should attempt to cool the economy down if it is growing too fast. To achieve this, there are generally two policy tools available: monetary policy and fiscal policy.

Monetary policy describes the ability of central banks or other monetary authorities to manage money supply in an economy through controlling interest rates, and targeting inflation and unemployment. In the Eurozone, monetary...
policy is managed centrally by an independent authority, the European Central Bank (ECB).

As monetary policy is not controlled nationally, fiscal policy is a very important tool in an Irish context to counter overheating. Fiscal policy refers to the ability of the Government to influence the economy through spending and taxation. Increasing taxation and lowering spending (i.e. contractionary fiscal policy) will slow down economic activity by taking money out of the economy. Alternatively, increasing spending and lowering taxes (i.e. expansionary fiscal policy) will increase economic activity, as money is being added to the economy.

The pro-active implementation of counter-cyclical fiscal policy can help smooth the peaks and troughs of economic cycles by adopting expansionary fiscal policy during recessions and contractionary fiscal policy during booms. As fiscal policy is controlled by national governments, it can be politically difficult to implement counter-cyclical policies, particularly when it involves raising taxes and reducing spending on key public services. However, it can help prevent the build-up of large fiscal imbalances and the subsequent need for sharp fiscal consolidation.

While fiscal policy is controlled nationally, EU fiscal rules frame Irish fiscal policy decisions. The EU fiscal rules are in place to prevent EU nations from adopting imprudent fiscal policies which may have negative economic spillover effects on other EU countries. There are two main fiscal rules that Ireland’s fiscal policy must follow:

1. The **Budgetary Rule** states that the structural budget balance\(^5\) should be close to balance or a small surplus.
2. The **Expenditure Benchmark** limits the net growth rate of government spending to the medium-term potential growth rate of an economy.

To abide by these rules, the underlying position of the economy, and therefore the degree to which the economy is overheating or not overheating, needs to be measured.

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\(^5\) The structural budget balance refers to the government budget balance adjusted for the effects of the economic cycle and once-off measures. The structural budget balance captures the underlying position of the public finances.

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**Measuring Overheating**

The output gap is the lead indicator used to identify the cyclical position of an economy and to determine whether the economy is overheating. The output gap is the difference between the actual output being produced (generally measured by real GDP) and its potential level, which is the amount of output that an economy can produce while maintaining a constant level of inflation. When the output gap is positive, actual output exceeds potential output and the economy is assessed to be at risk of overheating. Alternatively, when the output gap is negative, actual output is below potential output and there is spare capacity (i.e. high unemployment) in the economy to increase production.

Figure 1 shows the Commission’s estimates of the output gap in Ireland from 2003 to 2020. Clear overheating is seen prior to 2007, followed by large negative output gaps during the recession. The economy is projected to operate close to potential output in 2018, with overheating pressures expected to emerge in the near future.

**Figure 1. Output Gap in Ireland**

![Output Gap in Ireland](image)

Source: AMECO (annual macro-economic database of the European Commission). A positive output gap (above the line) indicates overheating risks, while a negative output gap (below the line) indicates the risk of a recession.

Potential output and the output gap are unobservable variables and there are a number of different ways they can be estimated. Calculations of the output gap in Figure 1 are made using the EU methodological approach for estimating output gaps, or the Commonly Agreed Methodology (CAM). For Ireland (and also for other EU
countries) estimates of the output gap using the CAM have historically lacked accuracy and have been subject to large revisions. This is particularly evident during the pre-crisis period. It must be noted that estimates produced by other institutions such as the IMF and the OECD, which are based on alternative methodologies, also did not highlight the emergence of overheating pressures prior to 2007.

Estimating potential activity levels in real-time is difficult for any economy. However, the openness of Ireland’s economy, the flexibility of the Irish labour market and the presence of large multinational companies make Irish underlying activity levels particularly difficult to estimate, as activity can often change due to changes in global factors as opposed to domestic.

As the CAM is somewhat hampered by the necessity to fit all Member States and to a large extent does not take into account country specific factors, it is often seen as an inappropriate method for estimating the output gap in Ireland. Alternative methodologies are currently being explored by bodies such as the Department of Finance and the Irish Fiscal Advisory Council. Some of these approaches tailor the CAM for Irish specificities while others use different methodologies for estimating the output gap.

One of these methodologies, used by financial bodies mentioned previously, advocates for the inclusion of financial variables in the calculation. The addition of financial variables means that measures, such as changes in interest rates, credit growth or house prices, are taken into account when predicting the output gap. When using this method, a larger output gap in Ireland in 2007 is estimated compared to the estimate produced using CAM. This is because high levels of credit growth were a significant contributing factor to the 2007 financial crisis, so the inclusion of these variables leads to a more accurate estimate of the output gap during that period. However, it is uncertain whether financial variables will play a similarly critical role in future, given that future economic imbalances in Ireland may be caused by factors somewhat unrelated to the financial sector (which has also been subjected to tighter macro-prudential regulation since the crisis).

Box 1. Overheating and the Fiscal Stance

Governments’ discretionary decisions on tax and expenditure can allow for smoothing the peaks and troughs of economic cycles by supporting demand when it is weak and by dampening activity during boom periods. However, to do this, governments must adopt an appropriate counter-cyclical fiscal stance.

The European Fiscal Board, which is an independent body advising on and evaluating fiscal policies in the euro area, defines the fiscal stance as “a measure of the direction and extent of discretionary fiscal policy”. This needs to be informed by an understanding of the current cyclical position of an economy.

The conventional way to measure the fiscal stance is through changes in the Structural Primary Balance (SPB). The SPB is calculated by subtracting from the general government balance the changes in expenditure and revenue driven by the economic cycle (cyclical budgetary component), interest payments and one-off measures. Positive changes (improvements) in the structural primary balance indicate a contractionary fiscal stance, while negative changes (dis-improvements) are associated with an expansionary stance.

Figure 2 shows the fiscal stance (change in the structural primary balance) in Ireland from 2003 to 2020. The inclusion of estimates of the output gap allows us to assess the appropriateness of the fiscal stance with respect to the stabilisation function of fiscal policy (i.e. smoothing the economic cycle). Prior to 2007, when the Irish economy was overheating (positive output gap), the fiscal stance was broadly neutral or expansionary (particularly in 2007 when general government expenditure increased by 13.1% year-on-year). In hindsight, the most appropriate fiscal stance would have been contractionary. After two years of counter-cyclical fiscal policy in 2008 and 2009, the fiscal stance became pro-cyclical from 2010 to 2013 due to the implementation of fiscal consolidation measures to restore the sustainability of the public finances. In the most recent period, 2018 to 2019, the deterioration of the structural primary balance and the estimated positive output gap, suggest a lack of counter-cyclical fiscal policy.

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9 Casey (2018)
While beyond the scope of this note, it must be acknowledged that the conventional way to measure the fiscal stance is subject to real-time measurement issues. In addition to informing what the appropriate fiscal stance should be, the output gap (which is prone to mismeasurement in real-time) feeds into the calculation of the structural primary balance. Furthermore, an assessment of the appropriateness of the fiscal stance should consider long-term fiscal challenges (i.e. population ageing) and debt sustainability.

**Additional Indicators to Measure Overheating**

The macro economy is a complex environment and a number of different variables can indicate potential imbalances, which in turn may signal overheating. While the output gap is the key summary indicator used to gauge the current state of the economy, significant measurement issues call for the use of a number of different variables to assess overheating. These are used to complement analysis of output gap estimates by adding additional information regarding the performance of different aspects of the economy. A benefit of this approach is that it recognises that overheating can be caused by a number of different factors in the economy, including growth in lending, growth in employment, increasing inflation, changes in the balance of trade, etc. These multi-indicator approaches are used by a number of institutions. In a recent publication, IFAC has adopted a “heat map” approach to help identify the emergence of potential imbalances in the Irish economy. Heat maps visually show how different variables are performing at a point in time compared to their long-run average. If a number of different variables are operating above their long-term average, this may indicate that the economy is overheating. Alternatively, if a number of variables are performing below the long-run trend, this may indicate that the economy is performing below its potential level. The heat map tends to highlight a large number of variables operating above the long-term average in 2007, pointing to an economy that was overheating, whereas from 2008 to 2010 many variables were performing below trend, indicating that the economy was in a recession.

While this method does not quantify exactly how much the economy is either over performing or under performing, it is an easy way to display information on a number of economic measures and to quickly absorb information about how the economy is performing.

**Standard Indicators**

There are a number of important standard variables which are regularly analysed to assess overheating risks. Some of these cyclical indicators include:

- **Unemployment**: As discussed previously, an overheating economy will rapidly exhaust the pool of workers available. In such circumstances, we would expect the unemployment rate to fall significantly below its long-term or equilibrium level. In Ireland, the unemployment rate averaged 5% during the pre-crisis period (2002 to 2007). Due to the economic and financial crisis, it peaked at 15.5% in 2012. The unemployment rate (5.3% in December 2018) is now returning to levels seen prior to the crisis.

- **Wage Inflation and Price Inflation**: These measures refer to the so-called wage-price spiral effect discussed in the first section of this note. In Ireland, inflation was rising prior to 2008 and price levels reduced during the recession. In recent years, notwithstanding a fast growing economy, headline inflation has been low. These figures have been impacted by low oil prices. However, the latest data shows a pick up in domestic inflation (0.6%) and wage growth (3.2%)
compared to last years figures.\textsuperscript{13} Information on unemployment and inflation is conventionally used to inform the estimation of output gaps.

- **Current Account Balance:** Several studies\textsuperscript{14, 15} have found that the current account is an important indicator in helping predict the cyclical position of the economy. The trade balance (exports minus imports) is the largest element of the current account. Overheating tends to weaken national competitiveness due to increases in domestic prices, which in turn reduce exports, and increases in domestic incomes, which lead to increased imports. This negatively affects the current account balance. A widening current account deficit would also suggest that the economy is experiencing imbalances given that it is consuming more than it can produce. In Ireland we observed a widening current account deficit prior to the crisis, consistent with an overheating economy. However, in recent years, distortions to the national accounts due to the activity of foreign-owned multinational enterprises have complicated the interpretation of this indicator.

- **Financial Variables:** Borio \textit{et al.} (2013) showed that the financial cycle, changes in credit growth, house prices and interest rates closely interact with developments in the real (non-financial sector) economy. Periods of economic overheating are closely associated to (as well as amplified by) asset price booms and credit bubbles. This was particularly evident in Ireland in the past decade. While residential property prices\textsuperscript{16} have increased significantly since their lowest level in 2013 (by 83.8\% from March 2013 to October 2018), these are still 17.6\% below peak levels reached in April 2007 and do not appear to be fuelled by excessive credit growth.

### Additional Proposed Indicators

As discussed in the previous section, the main approaches to assess overheating in Ireland are now envisaging the analysis of a wide number of variables alongside estimates of the output gap. For a non-technical audience, some of these variables (e.g. unemployment) are easier to understand and conceptualise than others (e.g. changes in the current account balance).

This final section discusses four additional indicators that are relatively straightforward and, along with some underpinning caveats, can complement standard ways of measuring overheating. The indicators proposed are:

1. Change in Road Volume;
2. New Businesses Registered;
3. Change in New Homes Constructed;
4. Percentage of New Hires.

While accessible, we are aware that these indicators could be impacted by structural changes in the economy as well as reflect broad economic developments or changes in preferences. However, to mitigate these issues we adopt the following strategies: i) we adjust these indicators for population changes; ii) we look at changes in these variables instead of their levels; iii) we standardise these changes by subtracting from each indicator the mean and dividing by the standard deviation. This method allows us to focus on the deviations from a long-term average for a particular year.

1. **Change in Road Volume**

The first measure proposed is the (standardised) change in volume of vehicles on Irish roads. If the economy is at risk of overheating we would expect that the volume of cars and vehicles on the road would be increasing at an unsustainable rate. This is because when an economy is at full employment, a large number of people are travelling to work. Also, due to high demand for goods and services, a large number of vehicles will be using the roads to transport goods.

Figure 3 shows for the years 2004 to 2017 the standardised change in road volume graphed with the output gap. The two variables follow similar trends over this period with changes in road volume largely

\textsuperscript{13} Figures come from the CSO. Price inflation refers to November 2018 and wage inflation refers to Q3 2018.

\textsuperscript{14} Darvas, & András (2015). \textit{Filling the Gap: Open Economy Considerations for more Reliable Potential Output Estimates}

\textsuperscript{15} Bénassy-Quéré (2016). \textit{Euro-area Fiscal Stance; definition, implementation and democratic legitimacy}

\textsuperscript{16} Figures from the CSO, Residential Property Price Index.
corresponding to changes in the output gap. The close relationship may indicate that if road volume is much higher than its long-term average, this could be an indication of overheating. This close relationship remains after changes in population over the same time period are taken into account.

2. New Businesses Registered

The second measure proposed is the (standardised) number of new businesses registered (scaled by working age population) in a given year. As overheating is generally characterised by unsustainably high demand and the availability of credit, it is expected that both production and the number of producers will increase to try to meet this demand. For this reason, significant increases compared to the long-term trend in new businesses registered may be an indication that the economy is overheating.

Figure 4 shows the standardised number of new businesses registered and the output gap, for the years 2004 to 2017. We observe a close relationship between these variables over this period.

3. Change in New Homes Constructed

The third proposed measure is the change in the number of new homes constructed, divided by the change in population. As wages rise, the demand for properties will increase. Producers will increase construction of properties to meet this demand. This will likely be facilitated by credit availability. If the growth of new houses constructed is faster than the growth in population, this may indicate that the economy could be at risk of overheating.

Figure 5 shows the relationship between the standardised change in new homes constructed (divided by population growth) graphed with the output gap for the years 1995 to 2017. A clear relationship can be seen between the two variables over this time period.

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17 The correlation between changes in road volume and the output gap for the time series available (2001 to 2017) was found to be 0.76. Correlation refers to how close two variables are related to each other. Correlation does not imply causation (i.e. changes in one variable causing changes in another variable). A correlation of 1 would signify the closest possible relationship.

18 The correlation for these variables for the time series available (2006 to 2016) was found to be 0.81.

19 The correlation for these variables for the time series available (1995 to 2017) was found to be 0.65.
Percentage of New Hires

The fourth measure proposed is the standardised percentage of total employees that are new hires. The high demand for employees and high wage inflation that is associated with an overheating economy is likely to lead to workers changing jobs more frequently. The number of new hires also includes the number of workers moving from unemployment to employment. Alternatively, when an economy is operating at below capacity, employment opportunities are sparse as producers are less likely to be expanding operations by hiring new staff. For these reasons, the percentage of new hires can be expected to fall below trend when the economy is underperforming, and above trend levels when an economy is overheating. Figure 6 shows the relationship between the standardised percentage of new hires and the output gap between 2006 and 2015. A close relationship can be seen over this period.\(^{20}\)

**Conclusion**

This note has provided an overview of what overheating means and how it is measured. The output gap is the standard indicator used to measure overheating however, it is an unobservable economic concept prone to mismeasurement in real-time. Analysing a multitude of variables, including estimates of the output gap can be the most informative way of assessing the cyclical position of the economy.

The PBO have proposed four additional indicators that are accessible to a non-technical audience and are found to track closely trends in the output gap. These may complement standard approaches and ease the understanding of economic overheating and how it affects and manifests in different parts of the economy.

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\(^{20}\) The correlation for these variables for the time series available (2006 to 2015) is found to be 0.76.
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