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# Measuring Economic Activity in Real Time during COVID-19

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# Measuring Economic Activity in Real Time during COVID-19

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The COVID-19 pandemic and the measures in place to control its spread have widely disrupted economic activity. This *Economic Letter* provides an update of the Central Bank's Business Cycle Indicator (BCI). The BCI is a monthly summary indicator of overall economic conditions estimated from a larger dataset of high-frequency releases. At the peak of the containment measures in April, the BCI dropped to an unprecedented low. The decline in the indicator in April suggests that the initial economic impact of the COVID-19 pandemic was both sharper and deeper than the financial crisis of 2008/09. The latest preliminary estimate of the BCI for May 2020 points to some stabilisation in economic conditions, but the overall level of activity remains substantially below that observed prior to the COVID-19 outbreak.

## 1. Introduction

The COVID-19 pandemic has profoundly affected economic conditions in Ireland and around the world. To impede the transmission of the virus, many households, businesses and governments have implemented social distancing measures such as working from home, curtailment or full closure of activity in some sectors and limits on travel and social gatherings. The virus and the measures introduced to control its spread had an immediate impact on the economy but understanding the full scale of the effect is often challenging since some key economic data are published with a lag. For example, official National Accounts data on consumer spending and investment for the period April-June 2020 are not due to be published until September 2020. The latest preliminary estimate of the BCI for May 2020 suggests some stabilisation in economic activity

In the context of the rapidly changing COVID-19 pandemic, a wide range of data sources and analytical approaches can be used to help better understand the performance of the economy in real time. Providing timely information to policy makers is important in order to increase

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<sup>1</sup> Irish Economic Analysis Division, Central Bank of Ireland. The views expressed in this paper are those of the authors only and do not necessarily reflect the views of the Central Bank of Ireland. We would like to thank Mark Cassidy, Niall McInerney, Caroline Mehigan and Gerard O'Reilly for comments on an earlier draft.

our understanding of the scale of the crisis, for risk assessment purposes as well as to assist with the formulation of appropriate policy responses. To examine the impact of the crisis on businesses, the CSO launched a new Business Impact of COVID-19 Survey (BICS) which will be published monthly. The Central Bank has published new statistics on the demand for new loans using daily data from the Central Credit Register (McElligott et al., 2020). The Bank has also released new daily data on consumer spending on credit and debit cards and ATM withdrawals (Hopkins and Sherman, 2020).

Since the onset of the last financial crisis, the Central Bank has used a number of methods – including nowcasting – to get a better measure economic developments in real time (see D’Agostino, McQuinn and O’Brien (2009), Liebermann (2012) and Keeney *et al.* (2013). One such measure is a Business Cycle Indicator (BCI) which is used as part of the Bank’s toolkit for monitoring conditions in the Irish economy in a timely manner. An early version of this indicator was developed by Conefrey and Lieberman (2013). The version used in this analysis is described in detail in Conefrey and Walsh (2018).

The BCI is constructed from a monthly dataset of economic and financial data for Ireland and the purpose of the indicator is to capture the co-movement in this set of data. Underlying changes in the data are extracted using an approach known as Principal Component Analysis (PCA).<sup>2</sup> PCA allows us to extract a single factor from the data (known as the first principal component) which summarises the variation across a range of indicators of economic activity in Ireland. The BCI can be thought of simply as the single factor, common to all of the series, that explains most of the variation across the full dataset. The purpose of the indicator is to derive a measure of underlying economic activity – i.e. economic activity carried out in Ireland that affects the employment and incomes of Irish residents. As a result, we carefully select the data series used to estimate the indicator to ensure they exclude data that may be affected by the global activities of multinational enterprises.

Since it uses high-frequency data, the BCI is suitable for capturing turning points in the economy. Central Banks and other institutions around the world publish similar indicators to the BCI in order to track the performance of the economy in between the release of the official benchmark GDP data.<sup>3</sup> We find that the BCI we estimate captures well the different phases of growth and contraction in the Irish economy over the last 20 years.

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<sup>2</sup> Changes in macroeconomic indicators such as retail sales or surveys (e.g. the purchasing managers’ index (PMI)) capture both underlying changes in their business cycle component as well as short-run fluctuations which are mainly variable specific. The latter are noise and/or measurement errors, which is irrelevant in assessing the underlying state of the economy.

<sup>3</sup> See the Federal Reserve Bank of Atlanta GDPNow indicator <https://www.frbatlanta.org/cqer/research/gdpnow> and the Federal Reserve Bank of Chicago National Activity Index <https://www.chicagofed.org/research/data/cfnai/current-data> For Ireland, the Department of Finance has developed a nowcasting model similar to that in Conefrey and Walsh (2018), see Daly and Rehill (2020). IFAC (2020) calculate a monthly estimate of GDP based on the historic relationship between GDP growth and the composite PMI data for Ireland. Byrne, McQuinn and Morley (2014) estimate a model for nowcasting GDP building on earlier work in D’Agostino, McQuinn and O’Brien (2009).

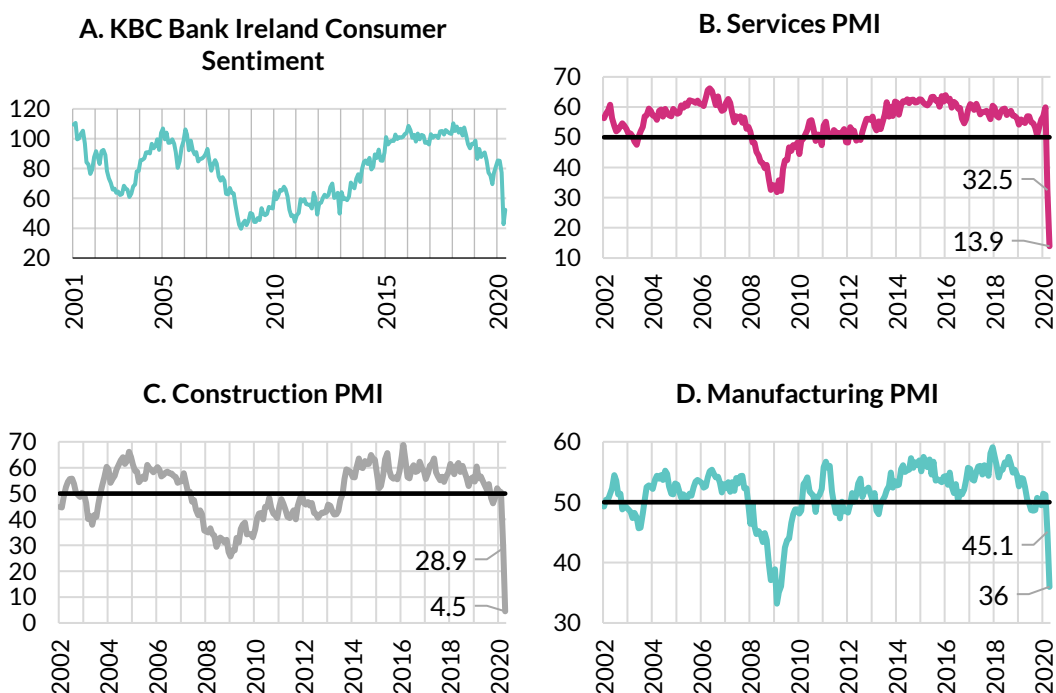
In this *Economic Letter*, we present the latest update of the BCI. With a complete panel of data for March and April, the BCI provides a measure of the scale of the initial impact of the COVID-19 crisis on overall economic activity during the peak of the containment measures. We also use the indicator to derive a preliminary estimate of domestic demand for Q1 2020.

The remainder of the Letter is organised as follows. Section 2 provides an overview of the trends in the key data series used to construct the BCI. The latest estimate of the BCI is presented in Section 3. In Section 4 we provide an advance estimate of domestic demand based on the indicator. Section 5 concludes.

## 2. Data on Current Economic Conditions

The BCI is estimated using a broad range of the most up-to-date monthly data which falls into two categories: soft and hard data. *Soft data* refers to qualitative, or survey-based, information such as consumer sentiment and the Purchasing Managers’ Indices (PMIs). *Hard data* refers to quantitative information such as unemployment and retail sales.

Figure 1: Overview of soft data



Sources: KBC Bank Ireland, IHS Markit and Ulster Bank.

### Soft Data

In April 2020, consumer sentiment fell by 45 per cent reaching a near all-time low (see Figure 1A). This unprecedented fall in consumer sentiment occurred during a period in which mandatory “stay at home” restrictions were in place and many businesses had closed due to COVID-19. Coming into 2020, sentiment appeared to be on a rebound after declining throughout much of 2019, but this trend reversed abruptly in March amidst the COVID-19

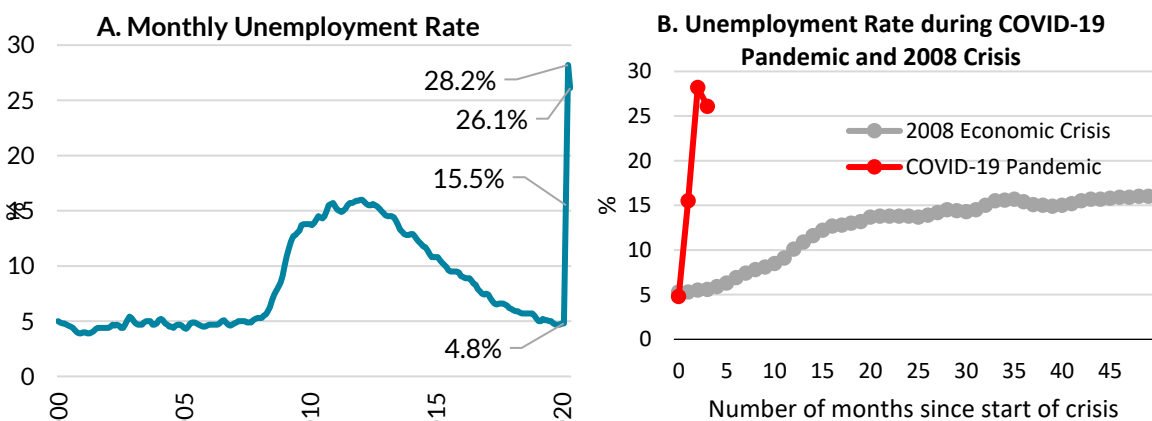
outbreak.<sup>4</sup> The latest data show that consumer sentiment bounced back by 22 per cent in May, however, the level of the index remains extremely low by historic standards.

The latest PMIs point to a broad-based decline in activity across the manufacturing, services, and construction sectors (see Figure 1B-D). In March 2020, the services and construction PMIs fell far below the 50 threshold which separates growth from contraction to 32.5 and 28.9, respectively. Both of these PMIs continued to fall in April to 13.9 and 4.5, respectively. In March, the manufacturing PMI had a relatively smaller drop below 50 to 45.1. In April, however, the manufacturing PMI continued to fall to 36.0. Overall, the soft data reflect a rapid deterioration in economic conditions due to the coronavirus pandemic during March and April.

### Hard Data

Perhaps the most striking evidence of the negative impact on economic activity during the COVID-19 outbreak can be seen in the labour market data, see Byrne *et al.*, (2020). After an initial jump from 4.8 per cent in February to 15.5 per cent in March, the monthly unemployment rate almost doubled in April to a new record high of 28.2 per cent (Figure 2A). Relative to the experience at the outset of the 2008 economic crisis, Figure 2B shows that the unemployment rate has risen much faster and to a substantially higher level during the current COVID-19 crisis. These numbers refer to the CSO’s COVID-19 adjusted monthly unemployment rate, which includes all those in receipt of pandemic unemployment payments. The standard measure of the monthly unemployment rate, which excludes this adjustment, increased less dramatically to 5.4 per cent in April. In May, the number of persons out of work fell by approximately 50,000 bringing the COVID-adjusted unemployment rate down to 26.1 per cent. This reduction in the unemployment rate in May reflects the impact of the easing of the containment measures which took place in Phase 1 of the re-opening plan.

**Figure 2: Overview of labour market data**



Source: CSO Monthly Unemployment release.

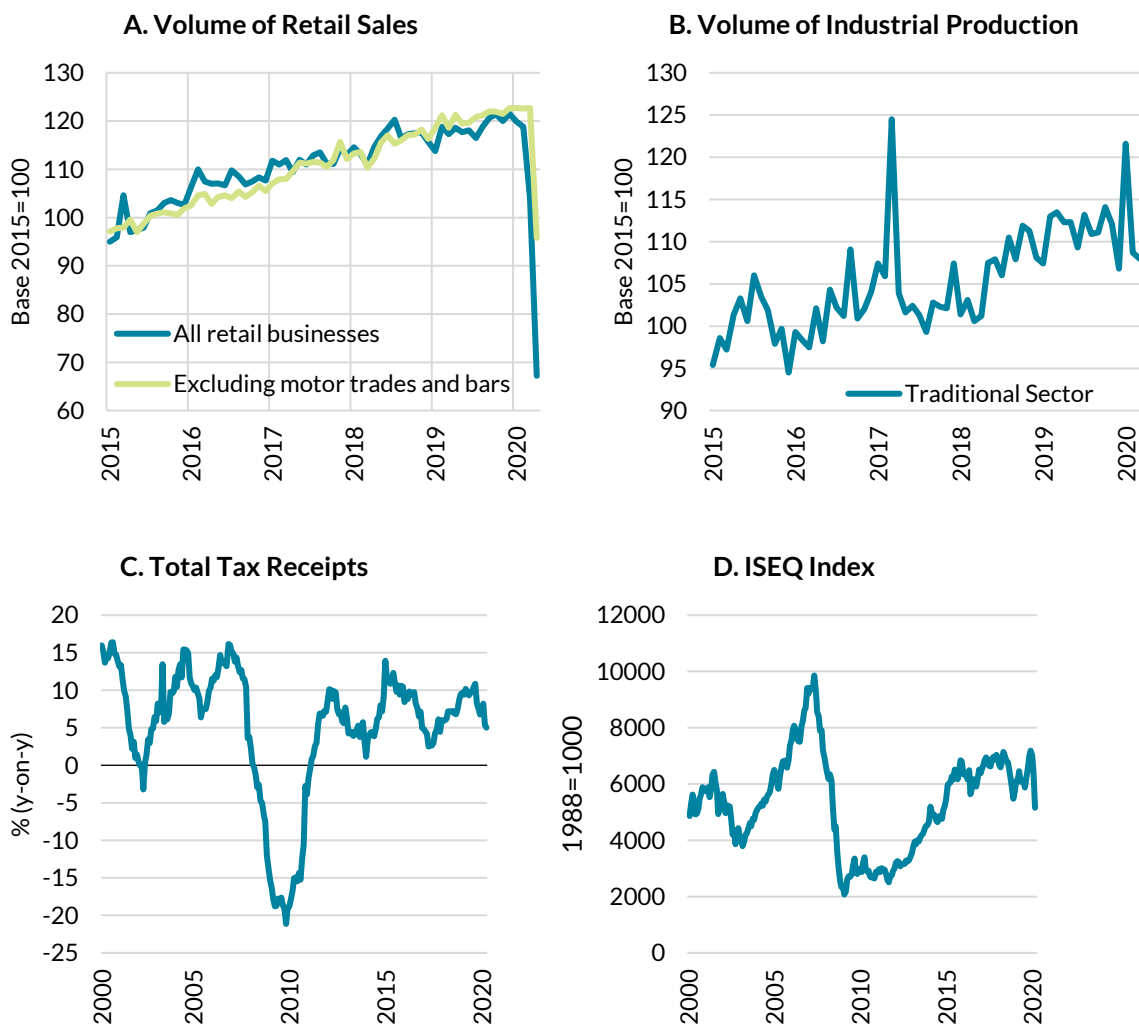
Source: CSO Monthly Unemployment release.  
 Note: Dates used for the start of the crises are January 2008 and February 2020.

<sup>4</sup> In February, there was no change to consumer sentiment. In March, consumer sentiment fell by 9.3 per cent.

The latest data for the volume of retail sales for April 2020 show sharp reduction in total retail spending of over 40 per cent in year-on-year terms. Core retail spending, which excludes motor trades and bars, fell by over 20 per cent. This reflects the fact that during the peak of the lockdown period, the range of outlets open for business were limited to essential services, such as supermarkets and pharmacies.

The most recent data for the volume of industrial production for March 2020 show a reduction in traditional sector output during February and March of 3.8 per cent and 4.8 per cent, respectively (Figure 3B). The declines recorded up to March are relatively small compared to during 2008 and 2009, when traditional sector output fell by over 15 on an annual basis for several months.

**Figure 3: Overview of additional hard data**



Sources: CSO and Department of Finance.

The economic impact of the COVID-19 crisis is evident in the latest Exchequer Returns for April 2020 (Figure 3C). Overall tax revenues fell by 8 per cent relative to the same month in 2019 with revenue from excise duty down 50 per cent. The latter reflected the effect of lower

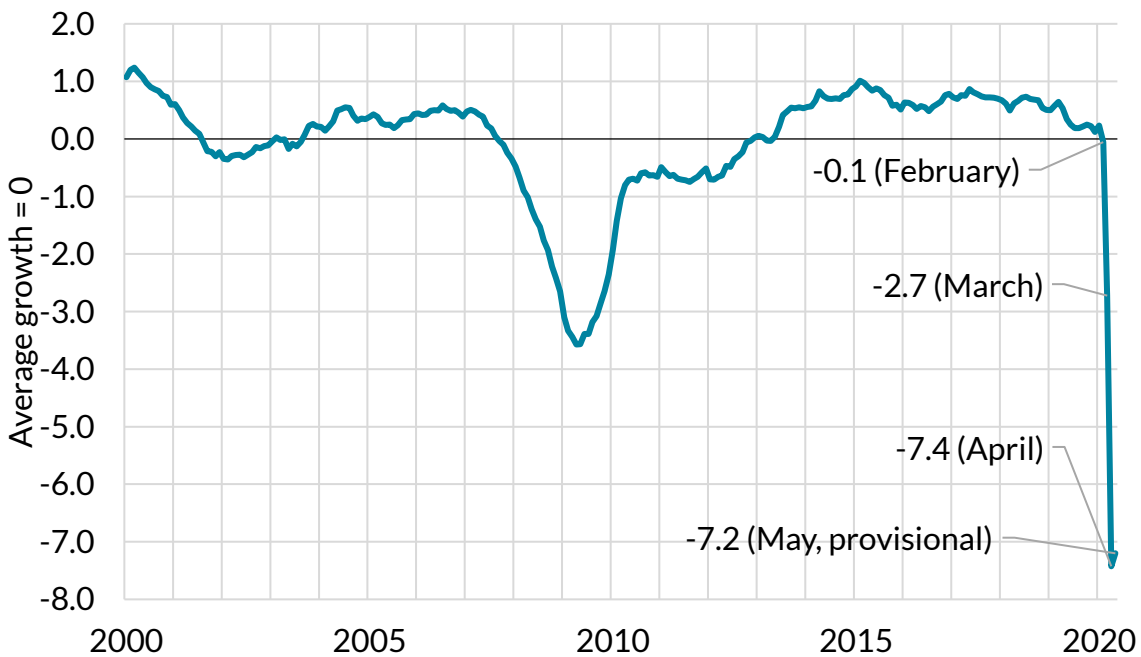
consumer spending, with a particularly large fall in expenditure on hotels and restaurants and new car sales.<sup>5</sup>

The BCI also takes into account credit and financial data such as the latest movements in the stock market and exchange rates as well as Central Bank statistics on spending on credit and debit cards. In relation to the latter, comparing the period from before the introduction of the containment measures in early March to the end of April, the data show that card spending had declined by around 25 per cent.

### 3. Business Cycle Indicator

Our latest estimate of the BCI is shown in Figure 4 and takes on board the soft and hard data discussed above, as well as some additional information such as exchange rates, interest rates, equity prices and consumer prices. The indicator has the following interpretation: values of the indicator below zero imply below average growth in overall economic activity while values above zero imply above average growth. By construction, the indicator has a mean of zero and standard deviation of one.

**Figure 4: Business Cycle Indicator (BCI) 2000-2020**



Source: Own calculations.

The most recent estimates show that the BCI declined sharply in March 2020 to a level comparable to that experienced during the 2008/09 economic crisis. The BCI fell even further in April to a level far below that recorded during the 2008 crisis. The level of the indicator in April represented a new all-time low based on the 20-year history of the series and is

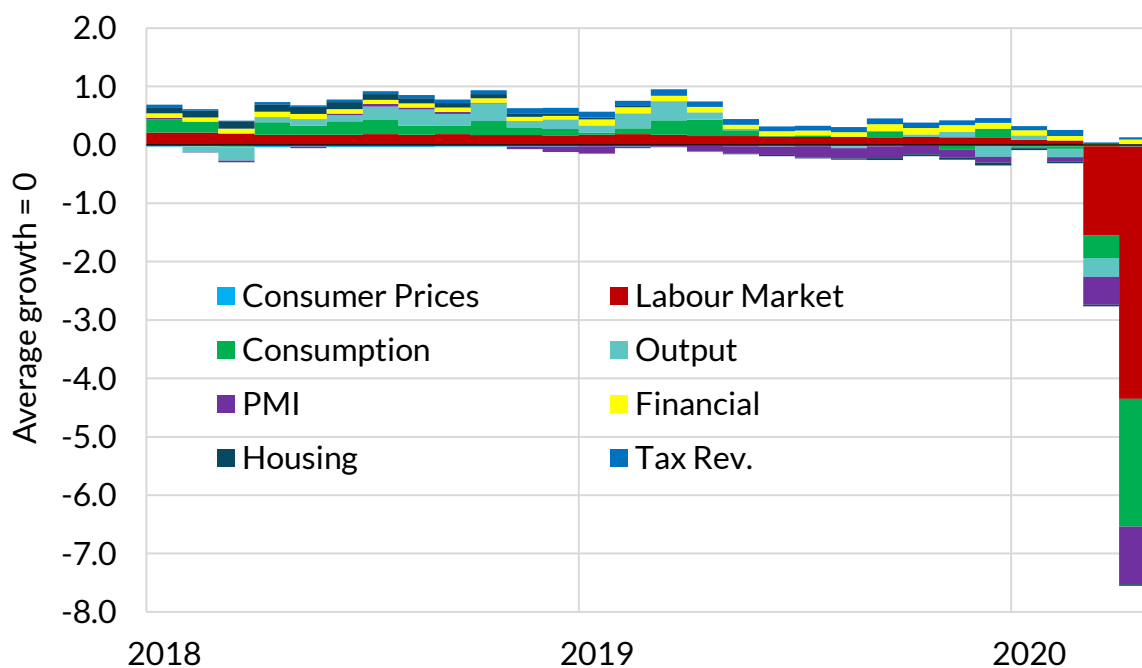
<sup>5</sup> To smooth out monthly volatility in the Exchequer data due to timing issues (for example, VAT is paid every two months), we take the change in annualised tax revenues when estimating the BCI. As a result, monthly changes in Exchequer data are likely to take some time to pass through fully to the BCI.

consistent with a very sharp and deep contraction in domestic activity.<sup>6</sup> Figure 4 includes a preliminary estimate of the BCI for May based on data available up to 3 June. The estimate for May points to a marginal improvement in economic conditions compared to April suggesting some stabilisation in activity during the month. The overall level of the BCI remains substantially below that observed prior to the emergence of the COVID-19 crisis. A final estimate for May will be available once the full set of monthly data has been published.

### Individual Contributions to the BCI

Figure 5 shows how much each individual data block contributed to the BCI over time.<sup>7</sup> The chart shows that the labour market, in particular unemployment rate developments, were favourable in 2019 and contributed positively to the BCI. In March 2020, as labour market conditions deteriorated, the labour contribution turned sharply negative. The contribution of output and consumption to overall activity also switched from positive to a large negative impact in March and April 2020 compared to the preceding months. The financial block (credit data) and the Exchequer tax data also acted as a drag on the overall BCI in March and April, although their contributions are small relative to the effects from the labour market and consumption.<sup>8</sup>

**Figure 5: Individual Contributions to the BCI**



Source: Own calculations.

<sup>6</sup> Industrial production data for April has not been released by the CSO at the time of writing, so the output block has a zero contribution to the BCI in April.

<sup>7</sup> Since the estimate of the BCI for May is provisional and is based on a partial sample of the monthly data available up to 3 June, the decomposition in Figure 5 ends in April 2020.

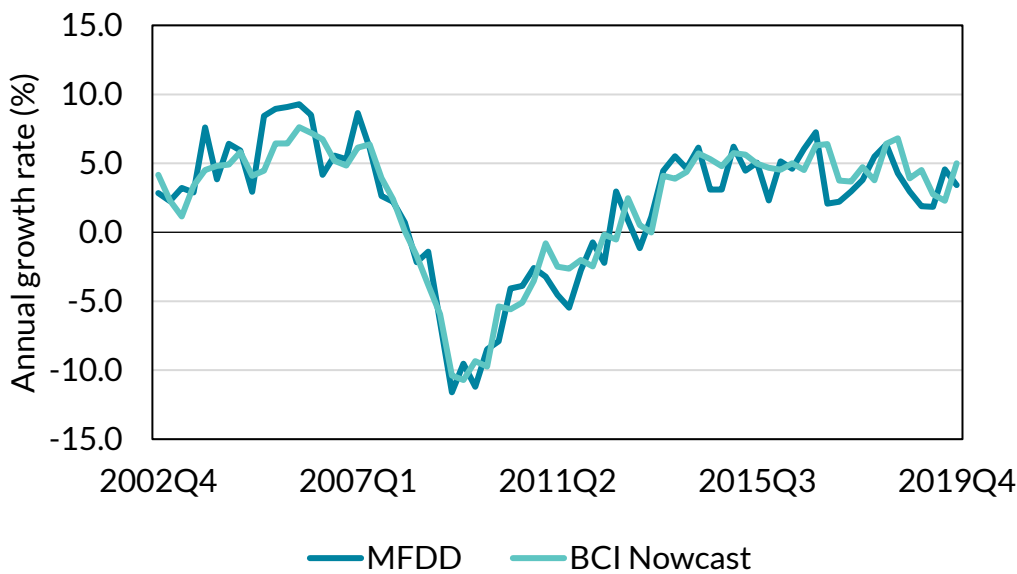
<sup>8</sup> The smaller contribution from some variables in particular months may reflect the fact that the information in these data is already captured in other series included in the model.



## 4. Estimating Domestic Demand

As described in Conefrey and Walsh (2018), the BCI can be used to produce estimates of modified final domestic demand (MFDD).<sup>9</sup> Figure 6 compares the within-sample forecasts of modified domestic demand using the BCI to the actual outturn for MFDD. As the chart shows, from 2002 up to the end of 2019 the BCI forecasts closely match the actual outturn for modified domestic demand. Since the BCI is monthly and has been estimated up to April 2020, we can use it to produce an estimate of modified domestic demand for Q1 2020.

**Figure 6: Actual MFDD and Forecast of MFDD based on the Business Cycle Indicator**



Source: Own calculations.

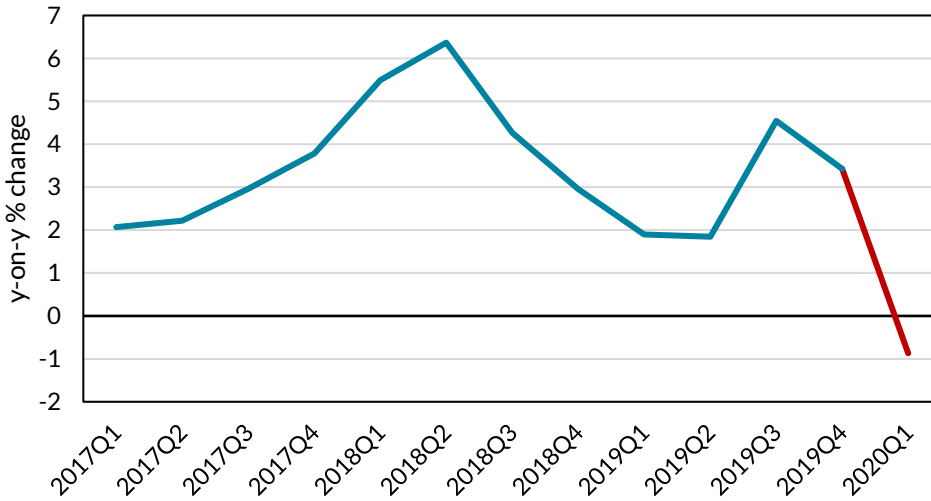
In 2019, modified domestic demand grew by just under 3 per cent with a 3.4 per cent increase in Q4 2019 on an annual basis. For Q1 2020, the BCI suggests a sharp reversal of the trend of steady growth in domestic activity observed up to the end of 2019. The estimate of MFDD based on the BCI suggests a contraction in domestic demand of around 0.9 per cent on an annual basis in Q1. A provisional estimate of MFDD was published by the CSO on 5 June and also shows a sharp slowdown in activity with growth of just 0.6 per cent in Q1 2020 compared to Q1 2019. This estimate is subject to revision in later CSO releases.

Even though the main effects of the COVID-19 crisis only materialised in March (i.e. for one month of the first quarter), the estimate from the BCI and the provisional CSO estimate both suggests that growth in domestic demand in the first quarter slowed sharply and may already have turned negative. Given the scale of the decline in the BCI in April, and with economic

<sup>9</sup> Modified domestic demand is a National Accounts aggregate published by the CSO that provides a measure of domestic economic activity. It consists of personal consumption, government spending and a modified investment series that excludes aircraft related to leasing, R&D service imports and trade in intellectual property.

conditions remaining weak in May, a significantly larger reduction in domestic demand in Q2 is likely.

**Figure 7: BCI Estimate of MFDD for Q1 2020**



Source: CSO and own calculations.

Notes: The solid grey line shows the outturn for modified final domestic demand up to Q4 2019. The red line shows the estimate for MFDD for Q1 2020 based on the BCI.

## 5. Conclusion

In this Economic Letter, we present an update of the Central Bank’s Business Cycle Indicator which captures the early impact of the COVID-19 crisis on the Irish economy. Our methodology allows us to use the most recent information from a range of monthly data releases to help decipher changes in economic activity since the onset of the COVID-19 crisis. The monthly economic and financial data on which the indicator is based are carefully selected to ensure they contain meaningful information on economic conditions in Ireland. The BCI summarises the information from these data to provide a timely indication of the effect of the COVID-19 crisis on overall economic activity.

The BCI shows that the level of activity fell dramatically in March and April 2020 during the peak of the COVID-19 containment measures to a level well below that witnessed during the 2008/09 economic crisis. The main drivers behind this reduction in activity were the unprecedented deterioration in the labour market, the decline in consumption and the downturn in trading activity amongst firms. As new data become available, the indicator will be updated regularly to inform assessments of the current state of the economy as the planned easing of the COVID-19 restrictions progresses.

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