PRSI. Given that employment losses are likely to be concentrated in low-paying sectors, the impacts may be somewhat lower than would be the case if employment losses were spread evenly across the income distribution. Consumption is also likely to be affected, lower VAT and excise receipts are likely.

Box F: Seasonal Adjustment of Exchequer Tax Revenues

Monthly cash tax and spending data published each month in the Exchequer Returns display cyclical, seasonal, and trend patterns that make direct comparisons between time periods challenging.

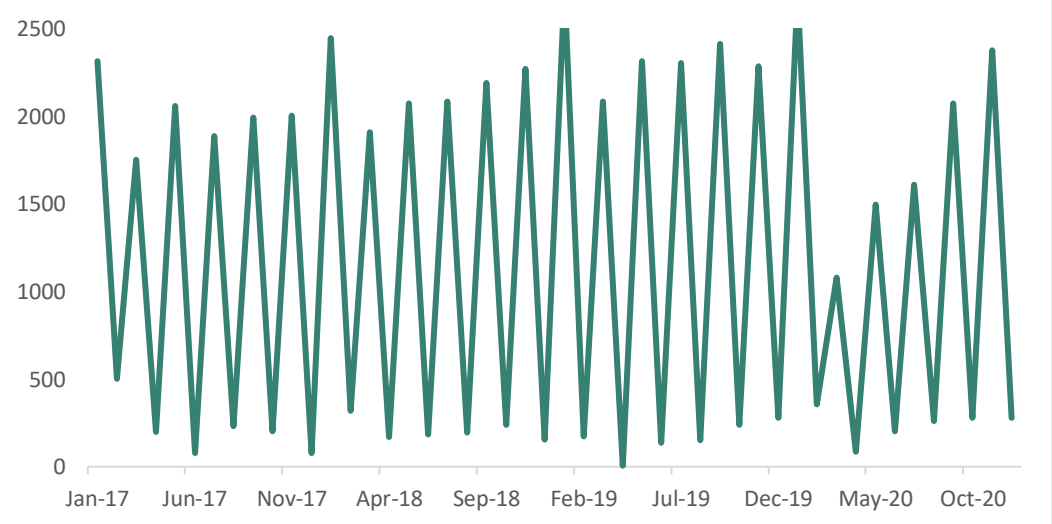
Revenue streams can vary significantly from month to month depending on the time of the year – and/or on expected variations in the timing of the year for economic transactions or tax payment dates. For example, high spending around Christmas boosts VAT receipts, as can be seen in Figure F.1 below, while November is the key month for Corporation tax receipts.

This can make it difficult to analyse underlying developments over time. The process of seasonal adjustment can be used to estimate and remove these various components of a time series dataset that often dominate the period-to-period changes, allowing for more reliable comparison of high-frequency datapoints. This has become critical during the Covid-19 crisis as the economic situation and policies have shifted rapidly.

The standard approach to assess these data has been to compare year-to-date figures between years to control for seasonal factors. Due to the sharp movements in activity this year, and multiple policy interventions, this approach is less reliable currently. This box sets out a method used by the Council in recent months to assist in analysing tax and spending by the Government when conditions have evolved quickly and when a clear interpretation of economic developments is vital.

Figure F.1: VAT outturns in Ireland

€ million



Source: Department of Finance.

Methodology

Two conditions should be met to consider seasonal adjustment. First, the time series dataset should ideally be at least five years long (Cholette, 1979), and, second, clear evidence of seasonality should be present.[54]

First, the data is preadjusted for missing observations, calendar effects, and other issues, before being disaggregated into estimated random and predictable components, such as seasonality, trend, and shocks. The relationship can be described as:

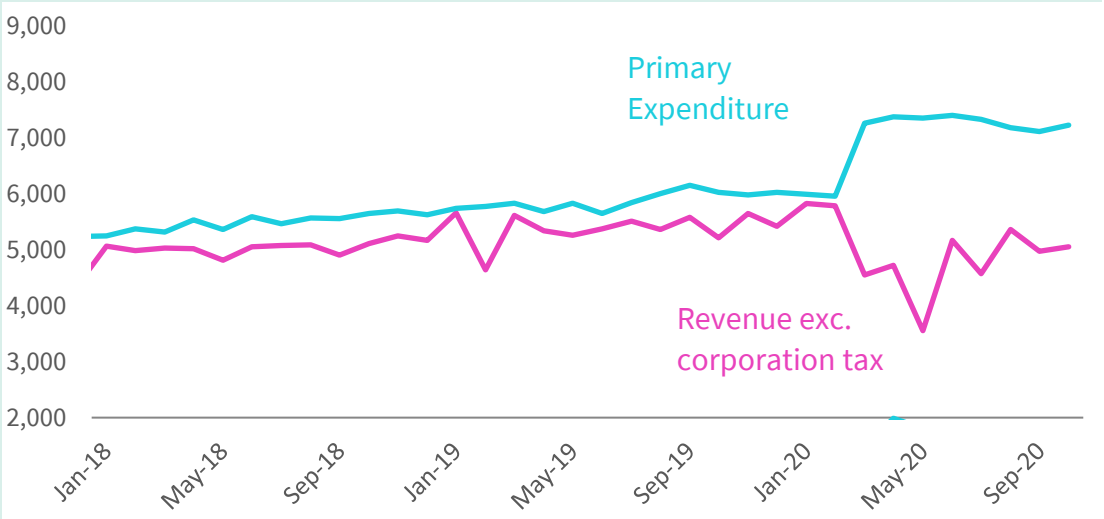
$$X_t = T_t + S_t + C_t + U_t$$

Where the original series is the sum of the trend (T), seasonal (S), calendar (C), and irregular components (U) respectively. The final seasonally adjusted series therefore is equal to the original series adjusted for both seasonal and calendar effects.

An Example: VAT returns in Ireland

Figure F.2 contains an illustrative example of isolating the components identified above, where Exchequer VAT returns from 2004 to the present day are decomposed using the TRAMO-SEATS method.[55] As can be seen above, the presence of trend, seasonal and irregular effects is clear. Much of the variation in this series can be attributed to the fact that VAT returns are due on a bi-monthly basis, leading to significant movements in the figures from month to month. However, consistently strong trend growth is observable alongside unexpected shocks.

Figure F.2: Seasonally adjusted revenue and primary expenditure



Source: Department of Finance and Fiscal Council workings.

Looking at 2020, the stop-start nature of economic activity since March, along with policy changes such as VAT forbearance and rate cuts has made standard comparisons such as between month-on-month or year-on-year outturns more difficult to interpret. For example, both Figures F.1 and F.3 show clearly the impact of the health restrictions on VAT intake, but with some significant differences. In the unadjusted case, VAT demonstrates predictable fluctuations as economic transactions become due. In normal times this would be less of an issue for interpreting the level of VAT returns but, with the economic policies taken in response to Covid-19, the usual correlations between months have broken down. Seasonally adjusted

[54] The IMF (2017) recommends this for quarterly datasets, specifically Quarterly National Accounts.
[55] More information on this technique is available in Gómez and Maravall (1996).

returns, as seen below, allow us to have a more intuitive understanding of where the current level stands relative to previous outturns.

Insights for fiscal policy

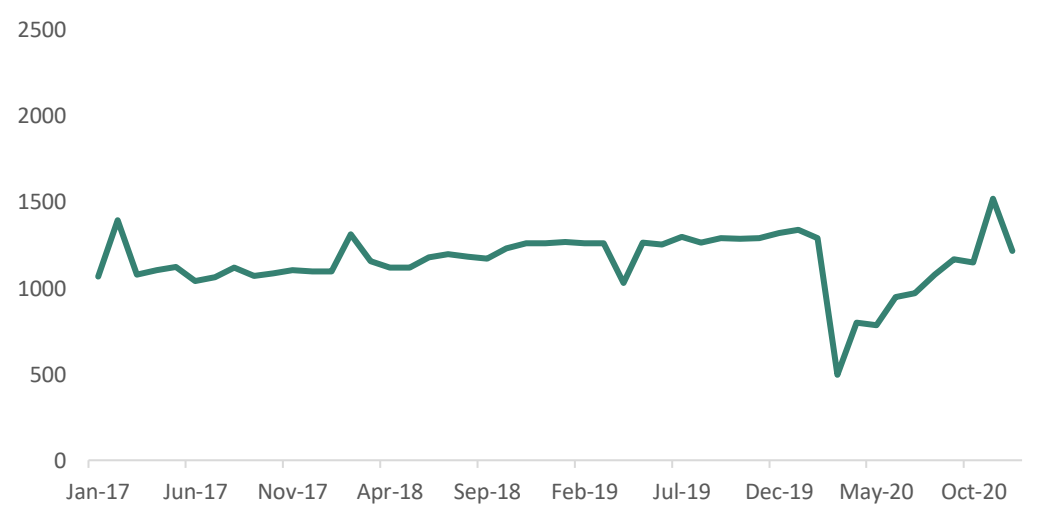
By providing a more appropriate assessment of the underlying starting point, using seasonally adjusted data can help inform the path of future outturns.

For example, on this basis, VAT in recent months is around 8.6% below the level in January. This provides a good starting point for making projections going forward. By contrast, the cumulative figure of 2020 is over 19% lower than the year before, but that does not provide a helpful guide to projecting forward as it is consistent with a wide range of levels.

For longer-term projections - even monthly profiles over a period of one year ahead for example - cumulative receipts and expenditures for a certain part of the year are often used to forecast. Clearly, such estimations can be contaminated by one off shocks, periods of above or-below trend growth, policy changes, or other factors. Applying the same process to both revenues and expenditures, as displayed in Figure F.2, can help inform an understanding of where the government's budget balance may settle in a given year.

Despite this, using seasonally adjusted data is not a panacea to understanding the underlying dynamics of the Government's finances. The process operates with a margin of error that can make precise estimations difficult. That said, it remains a valuable tool for analysts interested in evaluating rapidly changing economic situations.

Figure F.3: VAT outturns seasonally adjusted
€ million



Sources: Department of Finance and Fiscal Council workings.

Budget balance, 2020 and 2021

Budget 2021 anticipates a **general government deficit** of €21.6 billion (10.7 per cent of GNI*) in 2020. To give a sense of the scale and speed of revisions, Figure 3.12 shows the last three forecasts of the general government balance.