fall by €6.6 billion in 2020). Falling consumption means lower indirect tax receipts (*SPU 2020* forecasts a fall of €3.7 billion in VAT and excise receipts).

The general forecasting methodology used in *SPU 2020* for the various revenue headings is to project the change of revenue using the change in the associated macroeconomic driver, multiplied by an elasticity. The elasticity reflects how closely receipts move with its macroeconomic driver. Where applicable, any assumed impacts of policy changes are also included. In addition to these factors, judgement is often applied. Judgement can be helpful to take account of specific factors like changes in behaviour or where the elasticities may be misleading. Given the uncertainties at this time, there may be reasons to anticipate factors other than those typically considered as impacting on receipts. For example, specific sectors being more severely impacted may result in a larger effect on certain tax headings than would be anticipated by simply looking at the macroeconomic driver.

Box G: Experience of Falling Revenues in the 2008 Crisis

While the standard approach to revenue forecasting performs reasonably during normal times, past sharp downturns—notably in 2008—lead to very large falls in revenues.

This box evaluates how a standard revenue forecasting methodology would have performed in 2008, the most recent example of a sharp fall in revenue. This is useful in the current environment. If standard forecasting methodologies tend to underestimate or overestimate revenue when a sharp fall in activity and revenue occurs, then there may be a case for supplementing model-based forecasts with judgement.

While different revenue headings typically track changes in their respective macroeconomic drivers, this relationship might not hold during a recession. For example, if income losses were concentrated at the top of the income distribution and/or meant people earning less and moving to a lower tax bracket (where average tax rates are lower), this would result in a bigger loss in income tax revenue than predicted by looking at changes in aggregate income.

To assess this, the Council's standard forecasting methodology is used on the historical data for the 2008 crisis. The change in the macroeconomic driver is used, which is then multiplied by its elasticity. The elasticities used are those estimated using policy-adjusted revenue in Conroy (2019).

For example, for aggregate income tax (including USC), an elasticity of 1.4 is estimated in Conroy (2019).[35] When forecasting income tax, the Department forecasts PAYE income tax and USC separately. Elasticities of 2.1 and 1.2 respectively are used. If one weighted these elasticities by their share of 2019 receipts, a weighted average of 1.9 would result. Using a higher elasticity would mean forecasting stronger growth when income is rising, and larger falls when income is contracting.

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[35] This elasticity is estimated over the period 1987 – 2018.

The actual outturn of the macroeconomic driver is used for this exercise, so any errors are due to the forecasting methodology and not macroeconomic errors. The revenue forecasts are adjusted for the yield or the cost of tax policy changes.

Forecasts are examined in year (T), one year ahead (T+1) and two years ahead (T+2). The revenue headings examined are income tax (including USC), VAT and PRSI.

Table G.1: Income tax (including USC) forecast errors from standard model (percentage of receipts)

Forecast horizon	2009	2010	2011	2012	Average (2009–2012)
T	11.8	13.6	0.0	-4.4	5.3
T+1	12.4	24.9	10.7	-4.4	10.9
T+2	6.0	25.5	19.5	5.3	14.1

Source: Fiscal Council workings.
Note: Model projections use the outturn of the macroeconomic driver, an elasticity of 1.4 and budget day estimates of the cost/yield of income tax policy changes. Positive values indicate forecasts exceed the outturn. Negative values indicate outturns exceed the forecasts.

For income tax, we can see that the model forecast would have typically overestimated the outturns during this period by around 5 per cent in-year and by around 10 per cent and 15 per cent one- and two-years ahead respectively. Forecasts for 2010 were around 25 per cent too optimistic.[36] While based on a very small number of observations, these results may indicate that superior forecasts may be obtained by applying some negative judgement to the model-based forecasts during a severe downturn.

It is worth noting that the Department of Finance typically uses an elasticity (1.9 in aggregate terms) which is larger than that used for this exercise (1.4). So, for periods where economic activity is contracting, using the Department's methodology would lead to lower forecasts of revenue. Nevertheless, errors would be large if the past pattern were repeated.

Table G.2: VAT forecast errors using personal consumption as the macro driver (percentage of receipts)

Forecast horizon	2009	2010	2011	2012	Average (2009–2012)
T	13.0	3.4	1.5	-0.3	4.4
T+1	26.3	16.9	5.0	1.2	12.3
T+2	27.1	30.8	18.9	4.5	20.4

Source: Fiscal Council workings.
Note: Model projections use the outturn of the macroeconomic drivers, an elasticity of 1.0 (consumption) and budget day estimates of the cost/yield of VAT tax policy changes. Positive values indicate forecasts exceed the outturn. Negative values indicate outturns exceed the forecasts.

For VAT, initially we use only personal consumption as a macroeconomic driver. An elasticity of 1.0 is applied, as is done by the Department in forecasting VAT receipts. We find that forecasts using this approach (without any judgement applied) would have vastly overestimated VAT receipts. These errors grow over time, as errors cumulate.

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[36] It is worth noting that there were substantial income tax policy changes occurring in this period. If the yields from these policy changes were overestimated, then this could partially explain the forecasts exceeding the outturns.

This overestimation of VAT receipts in this period may be due to not taking account of the severe contraction in building and construction activity which took place. This activity has previously been found to be VAT rich (construction activity accounting for a third of VAT receipts in 2008). Using consumption as well as building and construction activity as macroeconomic drivers would have resulted in small negative forecast errors (before applying judgement) during this period (see Table G.3).

Table G.3: VAT Forecast Errors Using Personal Consumption and Building and Construction Investment as Macro Drivers (percentage of receipts)

Forecast horizon	2009	2010	2011	2012	Average (2009–2012)
T	2.8	-5.7	-2.4	-0.3	-1.4
T+1	9.0	-3.0	-8.0	-2.7	-1.2
T+2	7.0	2.9	-5.3	-8.1	-0.9

Source: Fiscal Council workings.
Note: Model projections use the outturn of the macroeconomic drivers, an elasticity of 0.8 (consumption) and 0.2 (building and construction) and budget day estimates of the cost/yield of VAT tax policy changes. Positive values indicate forecasts exceed the outturn. Negative values indicate outturns exceed the forecasts.

For PRSI, the elasticity estimated in Conroy (2019) is consistent with that used by the Department of Employment Affairs and Social Protection (1.0). We find that in-year forecasts have average errors close to zero (albeit with large errors in opposite directions in 2011 and 2012). When looking one or two years ahead, there is some evidence that forecasts may be biased downwards. Overall, there does not appear to be very strong evidence for applying judgement to model-based forecasts of PRSI, particularly if a conservatism bias applies.

Table G.4: PRSI forecast errors (percentage of receipts)

Forecast horizon	2009	2010	2011	2012	Average (2009-2012)
T	-0.8	-0.1	-10.3	14.2	0.8
T+1	-2.5	-0.9	-10.4	2.8	-2.8
T+2	-5.5	-2.6	-11.0	2.7	-4.1

Source: Fiscal Council workings.
Note: Model projections use the outturn of the macroeconomic driver, an elasticity of 1 and budget day estimates of the cost/yield of PRSI policy changes. Positive values indicate forecasts exceed the outturn. Negative values indicate outturns exceed the forecasts.

Focusing on **exchequer tax revenue**, *SPU 2020* forecasts a fall of 16.4 per cent in 2020. Income tax is forecast to fall by €4.7 billion (20.4 per cent) in 2020. This largely reflects the fall in income (macro driver) and employment (Figure 3.8). In addition to this macro driver effect, negative judgement (€0.4 billion) has been applied to the SPU forecasts (just under 2 per cent of income tax receipts). This is broadly