Box B: A bottom-up assessment of income tax forecasts across sectors

Income tax receipts were exceptionally strong in 2021, despite significant restrictions on activity due to Covid-19. As a share of labour income, the effective tax rate (ETR) increased by two percentage points to 24 per cent between 2020 and 2021. This followed a stronger outturn for income tax receipts in 2020 compared to official forecasts.

The *Stability Programme Update (SPU) 2022* projects a higher ETR to remain for 2022–2025. To assess the plausibility of the aggregate income tax forecasts contained in *SPU 2022*, this box generates a bottom-up estimate of income tax forecasts across sectors, summarising the findings of a recent analytical note by Timoney (2022).

Three groups are used in presenting the bottom-up projections, based on the ranking of 16 sectors of the economy according to their hourly wages in 2019, and they are called 'High 5', 'Middle 6', and 'Low 5'.[18]

The first section of the box presents background data on employee taxes and hourly wages across sectors. The second section uses decompositions of hours worked and hourly wages to forecast wages and salaries across sectors, consistently with total wages and salaries in *SPU 2022*. The final section forecasts ETRs and employee taxes by sector.

Employee taxes and hourly wages across sectors

The main components of income taxes are employee taxes — that is, "pay as you earn" (PAYE) and universal social charge (USC, which replaced the income levy in 2011) — and they are presented in Figure B1, with *SPU 2022* forecasts for 2022–2025 also included. In 2021, employee taxes recovered strongly for all sector groups following a weaker 2020 as a result of Covid-19.
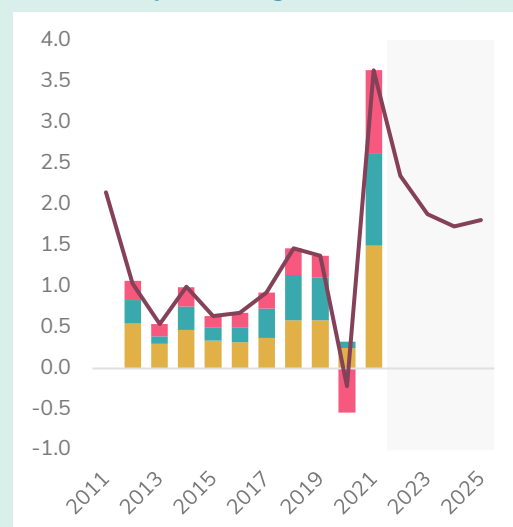
Figure B1: Employee taxes grew across all sector groups in 2021
€ billion

A. Levels
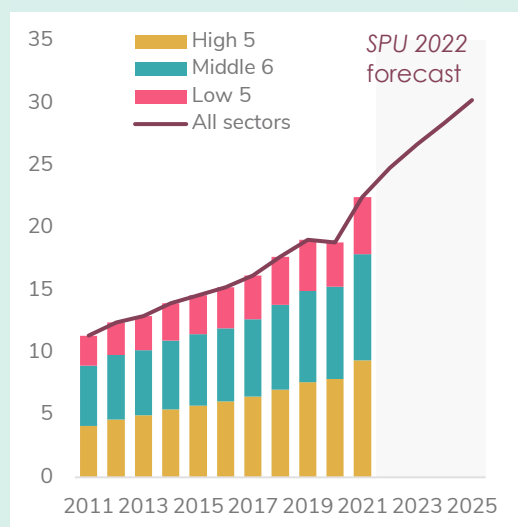
B. Year-on-year changes

Sources: Revenue Commissioners, Department of Finance, and Fiscal Council workings. Get the data.
Notes: Income tax mainly comprises "pay as you earn" (PAYE), universal social charge (USC, which replaced the income levy in 2011), and self-assessed income taxes. It also includes life assurance exit tax, deposit interest retention tax, professional services withholding tax, dividend withholding tax, and miscellaneous income tax.

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[18] 'High 5': information/communication (J), real estate (L), professional/scientific/technical (M), financial/insurance (K), and education (P). 'Middle 6': mining/utilities (B, D and E), human health/social work (Q), administrative/support (N), manufacturing (C), public administration/ defence (O), and other activities (R–T). 'Low 5': wholesale/retail (G), transport/storage (H), construction (F), accommodation/food services (I), and agriculture/forestry/fishing (A)

Table B1 summarises the pre-pandemic shares of employee taxes, wages and salaries, and hours worked in 2019 for the three sector groupings introduced above. The differences among these shares illustrate the progressivity of employee taxes.

Table B1: Employee taxes, wages and salaries, and hours worked in 2019

Percentage of total for employees in all sectors

|	High 5	Middle 6	Low 5
PAYE and USC	40	38	22
Wages and salaries	33	42	25
Hours worked	22	43	36

Sources: Eurostat; and Fiscal Council calculations.
Note: The sector groupings are based on a ranking of 2019 hourly employee wages for NACE Rev 2 sectors.

Figure B2 presents data for 1995–2021 for employees' hourly wages in the Irish economy. This shows that the 'High 5' sector grouping has seen considerably faster hourly wage growth over time compared to the 'Middle 6' and 'Low 5'. For the two groups with lower wages, the pandemic resulted in an increase in average hourly wages in 2020 and 2021, since job losses were concentrated among workers with the lowest wages.

Figure B2: Employee hourly wages have grown rapidly for the five sectors with the highest 2019 hourly wages

€ per hour worked
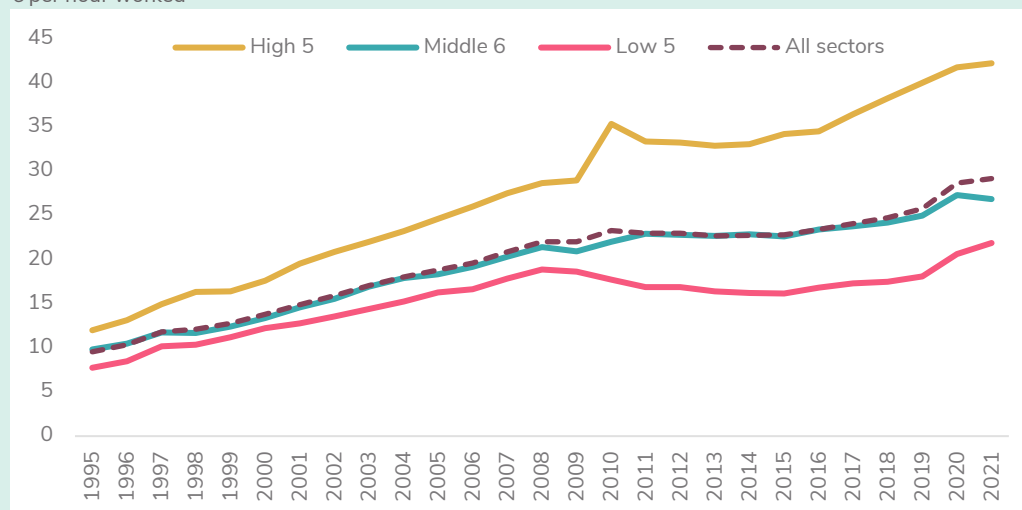
Sources: Eurostat, CSO, and Fiscal Council workings. Get the data.
Notes: The sector groupings are based on a ranking of 2019 employee wages per hour worked for NACE Rev 2 sectors.

This also shows that there has been a long-standing trend divergence between the higher-paid and other sectors in terms of the hourly wage. This reflects stronger productivity growth in the higher pay sectors. By contrast, average hourly wages have barely increased in cash terms since the Great Recession in the lowest paid sectors, implying a decline in real wages.

### Forecasting wages and salaries by sector (consistent with SPU 2022 projections)

The slow-changing nature of hours worked shares across sectors provides a simple basis for forecasting the share of each sector using linear trend extensions. The sample period used is from

ten-year trends for sectoral shares (2012–2021).[19] Multiplying the implied projections for hours worked with ten-year trends in hourly wages results in a preliminary, "uncalibrated" projection for employee wages and salaries. As shown in Figure B3.A, this approach is insufficient to explain the official forecasts for wages and salaries, falling short by €9.5 billion (7.7 per cent) in 2025.

To match this, a "calibrated" version of the estimates is constructed by allocating the differences for the total each year in proportion to each sector's share of total wages and salaries. This raises the level of the average hourly wage by about €2.50 (8 per cent) for 2025. Using these "calibrated" data for wages and salaries allows for the derivation of the implied employee hourly wage rates over the forecast horizon in terms of the bottom-up picture (Figure B3.B).

Figure B3: Calibrating hourly wages and salaries

A. Uncalibrated projection for employee wages, and target
€ billion
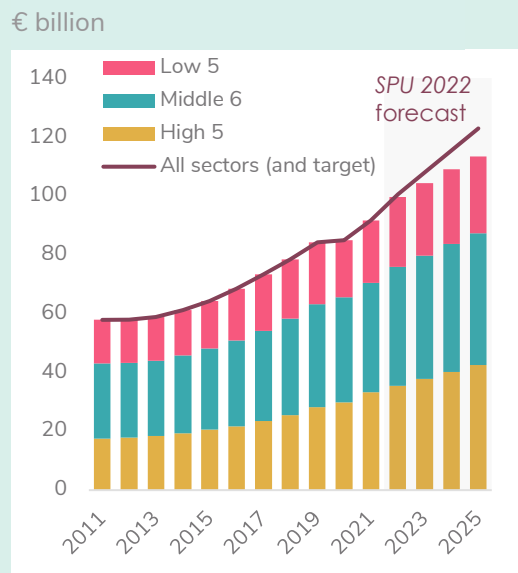
B. Employee hourly wages
€ per hour worked
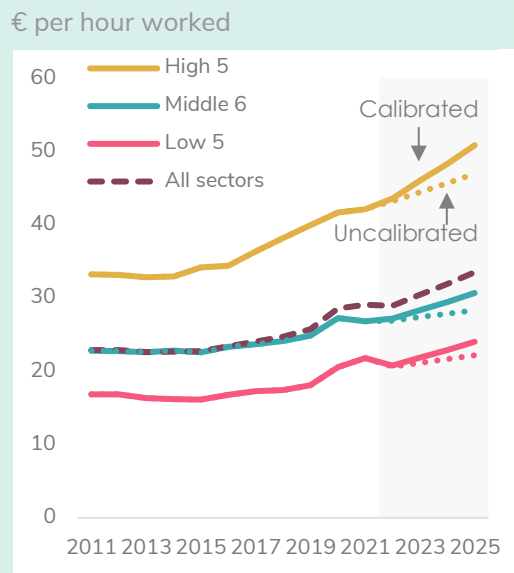
Sources: Revenue Commissioners; Eurostat; Department of Finance; and Fiscal Council workings. Get the data.
Notes: In panel A, the uncalibrated wages and salaries projections come from multiplying the hours worked decomposition by the ten-year linear trend extensions of employee hourly wages (dotted lines in panel B).

Forecasting effective tax rates and employee taxes by sector

To forecast income taxes across sectors, one approach is to use projected hourly wages derived in the previous section and to match them to expected sectoral effective tax rates (ETRs). The idea is that higher wage sectors will have higher ETRs and so a shift in income towards them will raise the economy-wide average tax rate.[20]

Using available data, the average elasticity of tax revenue to income growth over 2011–2021 is calculated across sectors as 1.3 for 'High 5', 0.8 for 'Middle 6', 0.9 for 'Low 5', and 1.1 for all

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[19] Employee hours worked data from Eurostat are used up to 2019, but extended forward for 2020 and 2021 using actual hours worked data published by the CSO. This is to reflect the impact of the pandemic on hours worked more accurately, since standard ILO labour market data included many Pandemic Unemployment Payment recipients as employed. For 2022–2025, the series for employee hours worked is extended using the SPU 2022 forecasts for the growth rate in total hours worked.

[20] However, compositional effects can affect these results. For example, if a sector experiences a shift towards part-time workers instead of full-time workers, along with no change in its hours worked or employee wages, then the ETR for that sector is likely to decline — owing to a lower average tax burden on part-time workers relative to full-time workers. This scenario would not imply a positive elasticity of the sector's ETR with respect to its hourly pay.

sectors. The elasticity of around 1 for total income suggests that the ETR is relatively constant, and in line with other estimates of the relationship between income tax and wages.[21]

This reflects the fact those the income gains of those in the 'High 5' sectors have been driven by wages taxed at the higher marginal tax rates and that starting salaries are high. By contrast, the elasticity is less than 1 in the other sectors, possibly reflecting the greater role of increases in the number of jobs in these sectors where people tend to start at a low marginal tax rate and more part-time work.

Using these elasticities, and the derived hourly wages by sector, estimated employee taxes paid by sector can be calculated with the following equation:

$$Income\ tax_t = Wages_t * ETR_{t-1} * (1 + \beta * \%\Delta hourly\ pay_t)$$

Figure B4.A presents these bottom-up projections compared to the *SPU 2022* forecasts for employee taxes, building on the calibrated wages by sector from the previous section (Figure B3.A). In Figure B4.B, the derived ETRs are shown, including the implied *SPU 2022* projection.
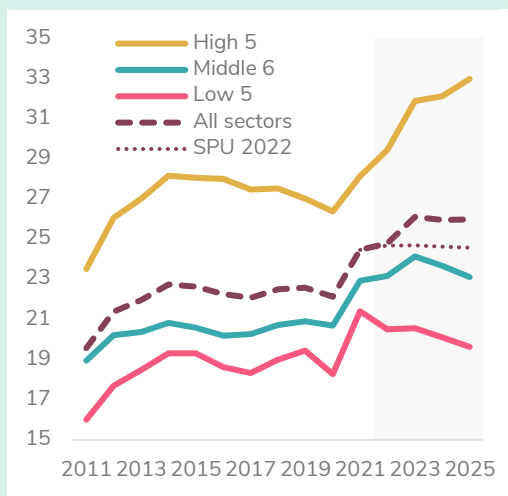
Figure B4: Bottom-up projections of employee taxes

A. Levels (and SPU 2022 forecast)
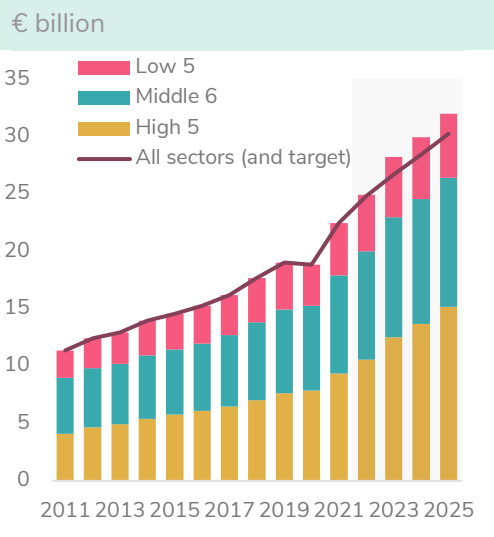
B. Estimated effective tax rates across sectors

Sources: Revenue Commissioners; Eurostat; Department of Finance; and Fiscal Council workings. Get the data.
Notes: In panel A, the bottom-up projections come from multiplying calibrated wages and salaries (see Figure 9A in Timoney, 2022) by the elasticity-based extensions of ETRs shown in panel B.

Over the forecast horizon, the bottom-up approach implies a higher level of income taxes than the official projections shown in *SPU 2022* for the same aggregate pay increase. This suggests that the increase in the aggregate ETR can more than be explained by aggregate pay growth from a bottom-up perspective, and by 2025, the bottom-up sum of projected tax receipts is €1.7 billion (5.8 per cent) above *SPU 2022* forecasts, implying a larger rise in the aggregate effective tax rate. This could partly reflect negative judgements applied by the Department of Finance to their PAYE and USC projections — see section S5 for further details on these judgements.

While this would appear encouraging in terms of supporting the idea that the upward shift in the average effective tax rate can be explained by sectoral factors, this conclusion should be treated with caution given the many assumptions required and the recent nature of this shift, at a time when the economy was subject to a number of sectoral shocks.

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[21] See Table 5 in Conroy (2020) for a summary of estimated income tax elasticities in Ireland. Conroy's estimated elasticity using policy-adjusted income tax is 1.4, considerably higher than 0.8 when using income tax not adjusted for policy changes.