



**Gníomhaireacht Bainistíochta an Chisteáin Náisiúnta**  
**National Treasury Management Agency**

**Research technical note**  
**Understanding Ireland's Corporate Tax Revenue**

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<sup>1</sup> The views in this article are those of the author and do not necessarily reflect the views of the NTMA. He would like to thank Seamus Coffey (UCC) and Rossa White (NTMA) for comments and insight. The author also acknowledges the help of colleagues at the Department of Finance; individuals at the Central Bank of Ireland, Central Statistics Office, Revenue; and Colm Rogers (KPMG).



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## Understanding Ireland's Corporate Tax Revenue

### Summary

- Ireland's corporate tax (CT) regime is often discussed but corporate tax revenue is a relatively small percentage of overall tax revenue - 10-16% since 2000.
- CT receipts are concentrated in three broad ways: by size of payment, by company, by sector. One notable statistic is that the top ten companies in Ireland accounted for 40.7% of corporate tax receipts in 2015. That is up from a 23.8% average in 2008-12.
- In 2015, Irish CT receipts exceeded expectations by €2.3bn. Prior to the recent national accounts revisions we found broad macro-economic variables like GDP or Gross Operating Surplus (proxy for national - and institutional sector - accounts company profits) could not fully explain the out-performance. However, revisions to the recent national accounts mean these variables now track the CT outperformance quite well.
- Yet causation rather than the correlation is not quite so straightforward. There were three main reasons for the spike in GDP in 2015: (i) re-domiciling/inversions of several multinational companies (ii) movement of aircraft leasing company assets and (iii) the "onshoring" in Ireland of intellectual property (IP) by one or more large multinationals. All three boost GDP/GVA but we reckon that only the third factor may lead to a noticeable increase in Irish CT receipts: this leans against making hasty causal conclusions. We will know more in November when Revenue receives final 2015 tax returns.
- The increasing concentration of Irish CT receipts could pose risks for the Irish Exchequer: one is that the multinational companies who drive CT receipts will re-locate their business elsewhere. Research suggests that firms will continue to choose Ireland if policy on taxation, infrastructure and R&D remains competitive vis-à-vis other countries. A second threat is that Ireland is exposed to idiosyncratic company/sector risks which are hard to mitigate.
- The Government's forecast for 2016 CT revenue is prudent: market participants expect the Government to remain cautious about CT revenue when framing fiscal policy in the future.

### Introduction

Ireland's corporate tax regime is often discussed at length. What is sometimes over-looked is that corporate tax revenues are relatively small in comparison to Income tax or VAT. However in 2015, CT receipts were significantly larger than expected – the €6.9bn outturn exceeded the original profile by €2.3bn. Given the sometimes confusing nature of global tax arrangements, questions arise as to whether this increase is sustainable in the future and whether it poses risks from reliance on CT receipts for funding government policy.



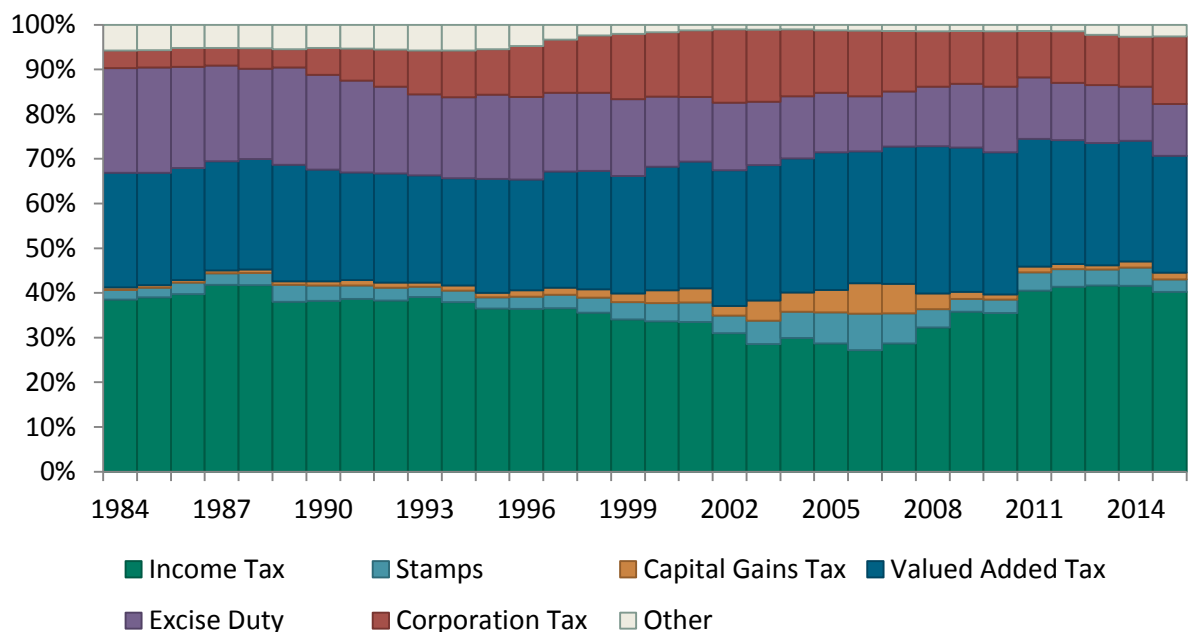
This note first assesses the available CT data to get a better sense of these receipts as a source of revenue for the state. Once we have put CT receipts in the proper context, we discuss the issue of concentration. The next section details a model of Irish corporate tax and what that says about the unexpectedly large 2015 CT receipts. The concluding section explores the implications of the findings of the analysis and any possible risk to Ireland’s corporate tax base.

**Corporate tax has not amounted to more than one sixth of overall tax revenue**

It is helpful before analysing corporate tax revenue to frame the discussion in the right context. Overall, corporate tax is a relatively small percentage of tax revenue. Figure 1 shows that since 2000, corporate tax has ranged from 10-16% of tax revenue.<sup>2</sup> In 2015, the percentage jumped to 15.1% up from 11.2% in 2014. This level of corporate tax receipts has not been seen since 2007.

Unlike the pre-crisis period, corporate tax is not replacing receipts from another tax-head. A decade ago, transitory tax receipts from the property boom (Stamp Duty and Capital Gains) were used to offset the lowering of income tax rates. In 2015 no such substitution was apparent – indeed if we showed Figure 1 in nominal euro rather than percentage share it would be evident that revenue from all the individual tax heads has increased.

**Figure 1: Composition of Tax Revenue**



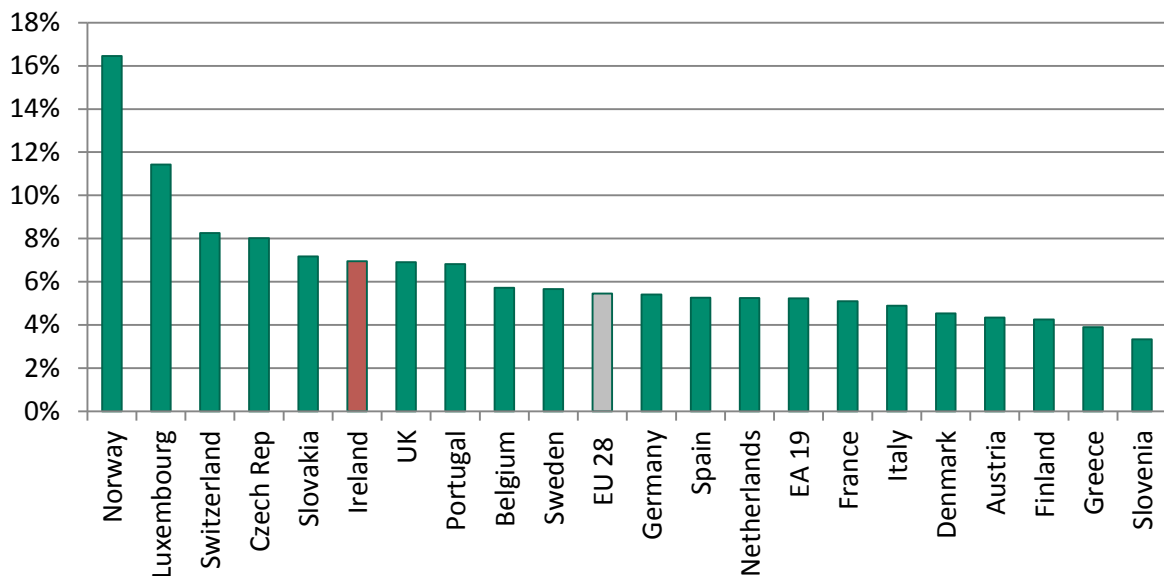
Source: Department of Finance (figures do not include social contributions and non-tax revenue)

<sup>2</sup> Tax revenue used in this calculation does not include social contributions receipts such as PRSI.



In comparison to other EU member states, Ireland’s ratio of corporate tax to general government revenue is above average. The EU average was 5.5% (2010-2014) whereas Ireland was just below 7%. In 2015, Ireland’s CT share increased to closer to 10%. Ireland also exceeds the OECD average when it comes to corporate tax revenue as a percentage of total tax revenue. Under the OECD measure, Ireland received 12% of its total tax revenue from corporate tax in 2015, with the OECD average likely closer to 8-9%. The OECD’s measure of total tax revenue has a broader definition than the Irish domestic measure as it includes social contributions. But it is not as broad as general government revenue which is used as the denominator in an EU-context.

**Figure 2: Corporate Tax Revenue as % of General Government Revenue**



Source: Eurostat (average 2010-2014)

### Composition of Irish Corporate tax receipts

Given the above context, we turn now to discuss the concentrated nature of Irish corporate tax receipts. Receipts in broad terms are concentrated in three ways: by size, by company, by sector. In particular, US multinational firms are important to Ireland.

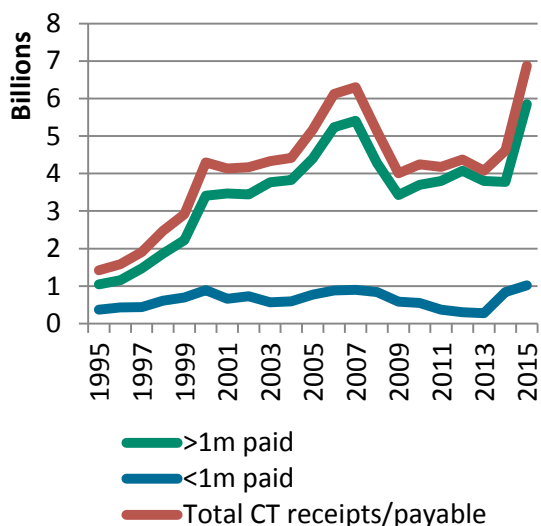
#### By Size:

Breaking down the amount of corporate tax paid by the size of the payment made by each firm shows the concentration of Irish corporate tax receipts. Some 85% of 2015 receipts were paid by the 1.4% of cases in which a company paid over €1m. This equates to roughly 550 cases out of 40,000. A share of 65.3% of receipts arose from those companies paying €10m or more (0.2% of cases or 80 cases). Of those 80 cases roughly a quarter was indigenous companies. Concentration was even



higher in the 2011-2013 period where smaller enterprises had low levels of profits and hence corporate tax due.

**Figure 3: Corporate Tax by size of payment**



Source: Revenue Reports & author's calculations

The breakdown shown in Figure 3 was created by taking data from the Revenue's annual statistical reports. There are three points to make about these series. From 1995 to 2001, the figures quoted are for the year ending in March of the next year. Afterwards, the data is for the calendar year. From 1995 to 2013, the data used is "tax payable for accounting periods ending in the year" while for 2014 and 2015 the figures are actual taxes paid in the year. Lastly, the series are in nominal terms so a gradual increase in the price level leads to tax payable trending above the €1m level. The series illustrate that the distribution of CT receipts is skewed towards large payers.

### By Company:

There is substantial concentration even within the large payers - those that pay €10m+ a year. Data from Revenue states that the percentage of total CT paid by the top 10 payers in 2015 was 40.7%. This concentration has increased recently. From 2008-12, the annual average CT paid by the top 10 payers was just less than €1bn or 23.8% of total CT receipts. In 2014 that figure jumped 70% to €1.7bn or 37.4% of all CT receipts before another large rise in 2015.

**Table 1: Corporate tax concentration by company**

|                                      | 2008-12<br>average | 2014  | 2015  |
|--------------------------------------|--------------------|-------|-------|
| <b>Total CT receipts (€m)</b>        | 4,091              | 4,617 | 6,873 |
| <b>Top 10 Companies CT paid (€m)</b> | 975                | 1,728 | 2,798 |
| <b>Top 10 companies CT %</b>         | 23.8%              | 37.4% | 40.7% |

Source: Revenue

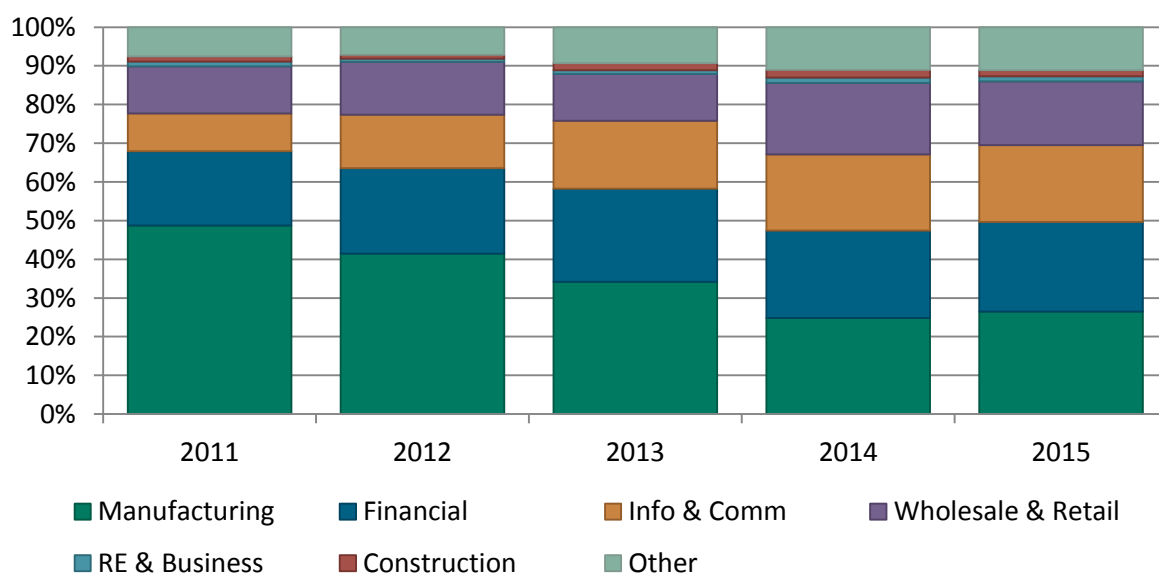


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## By Sector:

For confidentiality reasons Revenue does not release the identity of the companies in the top ten. However, we have a good sense of the sectors which the companies come from. Manufacturing (led by the pharmaceutical sector) was the largest payer of CT in 2015. More than a quarter of CT receipts came from the sector. Together with the financial & insurance sector and the information & communication sector, these “big three” accounted for 69.5% of CT receipts in 2015. Similar figures are found in previous years. Other than perhaps one or two large indigenous companies, it is likely that the top ten comes predominantly from the “big three” sectors.

**Figure 4: Corporate Tax by sector**



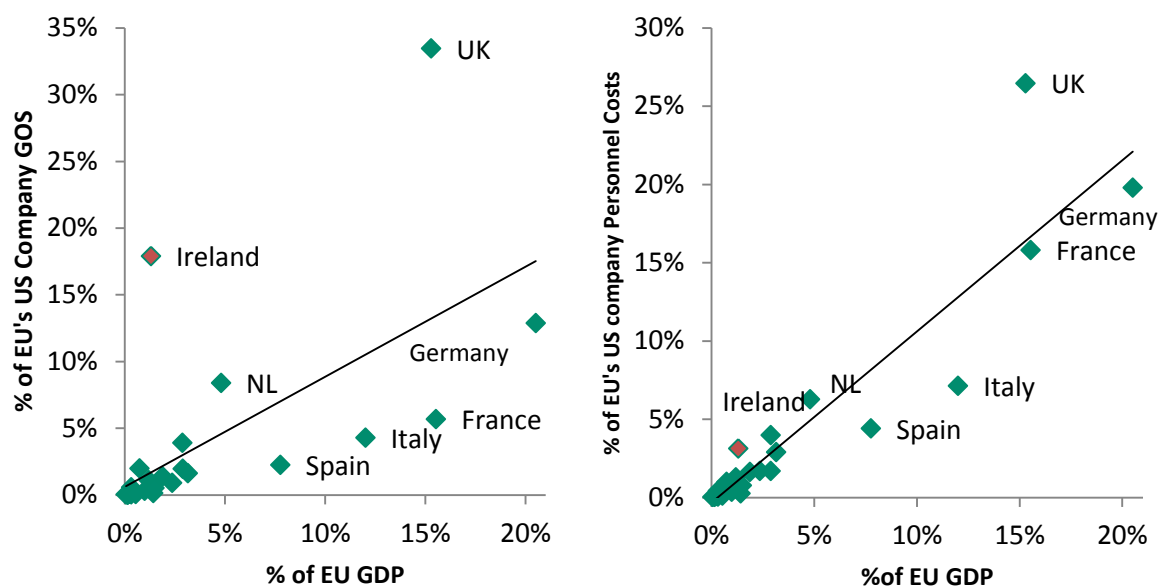
Source: Revenue

US multinational companies play a disproportionate role in Ireland’s economy more so than they do in other EU countries. One way to appreciate this is to compare the level of gross operating surplus (GOS) produced by US companies in each EU country against that country’s GDP. Figure 5 shows Ireland is a significant outlier. In 2013 (the latest year of data) 17.9% of GOS produced in the EU by US companies occurred here despite Ireland only accounting for 1.9% of EU GDP. The UK is the only country with a larger percentage of US GOS than Ireland. The ratio between US GOS in Ireland and Ireland’s GDP was approximately 13:1 – the next country in the rankings is below 3:1. If we turn to US companies’ personnel costs in the EU, Ireland is much more in line with the rest of Europe. Considering that the “big three” sectors located in Ireland are more capital than labour intensive, this situation makes intuitive sense.



If we look at the manufacturing sector in particular, it is more obvious that Ireland is an outlier. Manufacturing GOS for US companies is dominated in Ireland by pharmaceutical companies. Ireland accounts for over 30% of US manufacturing companies' GOS in the EU. Only the UK again comes close to Ireland's performance. For information & communication, Ireland equates to 19.2% of US firm's GOS - second behind the UK. A comparison of the respective financial services sectors would be useful, but a lack of data prevents this.

**Figure 5: Ireland: Outlier on US companies' GOS... more in line when it comes to personnel costs**



Source: Eurostat (2013)

### Modelling Irish corporate tax receipts to see if over-performance is explicable

To fully understand the dynamics of corporate tax and ascertain if the over-performance in 2015 is explainable, we estimated a dynamic regression model. This method was preferred given the highly seasonal nature of corporate tax receipts – a large majority of CT receipts are paid in May/June and November/December. To account for the seasonality, the method models the residual errors through an ARMA representation. The methodology used to build the models is based on Pankratz (1991). In the first stage, a general model is estimated. This contains lags of the exogenous variables and an ARMA representation of the errors. In the second stage, the general model was reduced by eliminating insignificant lags or ARMA terms to produce a more parsimonious model. In all cases, the ARMA representation was reduced to a single seasonal AR(1) process (i.e. using a 4 quarter lagged auto-regressive term to model the errors). In the final step, dummy variables were added to account for large residuals which helped reduce the errors to white noise. Tests of the residuals along with co-integrating vector tests help determine the validity of the models.



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We consulted previous literature to decide which exogenous variables to use. Gross Domestic Product (GDP) and Gross Operating Surplus (GOS) have been found to be useful predictors of corporate tax receipts<sup>3</sup>. In addition to these variables, Gross Value Added (GVA), total exports and service exports were also used as exogenous variables. Services exports were included as these have grown strongly since the turn of the century, changing the composition of Irish exports.<sup>4</sup> Lastly, GVA for the three largest CT paying sectors – manufacturing, IT and financial services – were aggregated to see if they could better explain the variation in CT receipts than the whole economy version of these metrics.

All variables were in nominal terms, modelled in logs and were not seasonally adjusted prior to the estimation process outlined above. The time period for the variables was 1998 – 2015. The recent revisions to the national accounts allow us to run the analysis using pre- and post-revision data series to ascertain whether the latest step change in GDP/GVA and other related variables can explain the jump in corporate tax receipts.

Prior to the revised national accounts data, the Central Bank of Ireland (CBI) estimated a dynamic regression model of corporate tax receipts using monthly data.<sup>5</sup> Various industrial production series were used as the principle exogenous variable. They find that their model can only explain 54% of the out-performance in 2015's corporate tax receipts. Industrial production data is informative for the economy as a whole – particularly given its monthly frequency – but it only covers certain sectors. Our analysis is similar in approach to the CBI work but expands the number of variables examined thereby incorporating two of the largest CT paying sectors – financial services and IT services. By moving to quarterly data, this note examines whether other macro-economic variables can explain the over-performance in 2015.

## **1. Results – data pre-revisions to national accounts do not adequately explain the over-shoot**

Across the various models estimated, none of the pre-revision models can fully explain the 2015 out-performance (Table 2). Despite considering broader variables which cover all sectors of the economy, our results pre-revisions only slightly improve on those of the CBI's work. Some models explain up to 57% of the over-performance but none of our estimates suggest CT receipts of over €6bn. The constructed GVA of the big three sectors gives the best fit of the pre-revision models. The export variable models interestingly perform the worst of the suite.

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<sup>3</sup> Department of Finance report can be found [here](#).

<sup>4</sup> For more on Irish Exports, see [Irish Exports: The facts, the fiction and the risks](#).

<sup>5</sup> The CBI Quarterly Bulletin can be found [here](#) (Box D pg. 26).





## 2. Results – New data do a good job of explaining the CT bonus, yet there are caveats

The models using post revisions data (released on the 12th July 2016) tracks the over-performance quite well. The four models estimated suggest that the excess CT receipts were to be expected given the increased presence of multinational companies. This finding suggests that government revenues have benefitted from the recent increase in activity from several multinational companies.

Yet the causal link rather than simple correlation is not quite so straightforward. There were three main reasons for the spike in GDP in 2015: (i) re-domiciling/inversions of several large multinationals (ii) the movement of aircraft leasing company assets and (iii) the “onshoring” in Ireland of intellectual property by one or more large multinationals leading, in particular to new contract manufacturing activity.<sup>6</sup> All three boost GDP/GVA but only the third probably leads to a significant increase in Irish corporate tax receipts.

**Table 2: Estimated results for 2015 CT receipts**

|   | <b>Model 1</b> | <b>Model 2</b> | <b>Model 3</b> | <b>Model 4</b> | <b>Model 5</b> | <b>Model 6</b> | <b>Model 7</b>   |
|---|----------------|----------------|----------------|----------------|----------------|----------------|------------------|
| Variables                                   | IP             | GDP            | GOS            | GVA            | GVA Big3       | Exports        | Services Exports |
| 2015 CT est. Pre-Revisions                  | €5.7bn         | €5.5bn         | €5.5bn         | €5.6bn         | €5.9bn         | €5.2bn         | €5.3bn           |
| % of Excess CT versus DoF profile explained | 47%            | 42%            | 39%            | 42%            | 57%            | 28%            | 32%              |
| 2015 CT est. Post-Revisions                 | -              | <b>€6.8bn</b>  | <b>€6.7bn</b>  | <b>€6.8bn</b>  | <b>€7.1bn</b>  | -              | -                |
| % of Excess CT versus DoF profile explained | -              | <b>95%</b>     | <b>93%</b>     | <b>95%</b>     | <b>109%</b>    | -              | -                |

Note: Actual CT receipts 2015: €6.87bn

Re-domiciling/inversions by multinationals are mainly used to reduce tax in other jurisdictions and would not necessarily impact the Irish tax paid by these companies. This is due in part to the double taxation relief which is a feature of Ireland’s - and most international - tax systems. To avoid double taxation on its world-wide income a company can claim relief on its tax bill if a subsidiary was taxed in other country and the Irish TopCo is subsequently taxed again. As Ireland’s rate of corporation tax is lower than most other countries, this relief often offsets the Irish tax liability. From our

<sup>6</sup> The difference between a re-domiciling and an inversion is that an inversion occurs through a merger of a company not already domiciled in Ireland with one already domiciled here.



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understanding, while the movement of aircraft leasing company assets affects the capital stock and national accounts flows to some extent, its impact on corporate tax receipts is minor.

The third reason for the GDP spike - the “onshoring” of IP assets by several multinational companies – probably does impact corporation tax receipts. The OECD’s Base Erosion and Profit Sharing (BEPS) programme means multinational companies will be unable to shift profits in the future to the same degree. Since the location of substance will be critical to the location of taxation, multinational companies may transfer more substance to low-tax countries to reduce their overall tax liability. Put simply, companies could think: if we cannot shift our liability to low-tax countries anymore then we might as well place (“onshore”) our operations in low tax countries.

This “onshoring” has led to extra contract manufacturing in our national accounts. Whether this leads to larger accounting profits (and hence higher CT receipts) depends on how an asset’s depreciation is treated and how quickly it becomes obsolete. Depreciation will offset profits if the IP asset has a short useful life – i.e. a large depreciation charge over a short few years. Similarly, write-offs can cancel out any profits if the product derived from the asset become out-dated quickly. If the company continues to innovate however, new products should replace obsolete/amortised ones on net. In this case, we would see a net increase in profits and tax from contract manufacturing. We will know more in November when Revenue receives all the relevant data.

The “big three” sector model indicates these sectors are a driving factor in corporate tax receipts which corroborates our earlier analysis of the CT data. The data series breaking down receipts into greater or less than €1m payment may be of interest in this case but are too short for modelling purposes.

### **Risks from concentration**

Both the descriptive statistics and our model analysis show the high level of concentration in Irish CT receipts. Concentration in and of itself is not necessarily a bad feature of corporate tax. Attracting large profitable multinationals has been a core principle of Ireland’s economic model for decades with large positive effects for the economy as a whole. But there are risks to Irish CT receipts which arise from its concentration.

The first risk is the danger that the multinational companies who drive the receipts will re-locate their business elsewhere. Reasons for moving again could include an erosion of competitiveness in the current location driving firms to lower cost jurisdictions, changes to the tax environment (possible reform of the US corporate tax regime is an obvious example), a deterioration in the ease



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of doing business, or a lack of/loss of human capital. This risk can be mitigated in part by policy. Much research has been done on this issue. The literature in general suggests that firms will continue to choose Ireland as their FDI destination if policy with regards to taxation, infrastructure and R&D remains competitive vis-à-vis other countries.<sup>7</sup>

Taxation policy is an obvious area in which a loss of competitiveness could hurt Ireland's CT take. Amid the backdrop of the implementation of the BEPS programme, Ireland will need to remain competitive in this space.<sup>8</sup> The BEPS programme seeks to align taxation with substance. That is, it seeks a better alignment between the location of taxable profits and the location where economic activities and value creation occurs. Corporations will likely look to change their business model to limit their tax liability. These changes could include a reorganisation of group entities across countries and may include retreating from some regions. As mentioned above, the recent "onshoring" activity which affected the national accounts could be seen as a positive example of this occurring already in Ireland. Caution is necessary here though as the multinational companies in question could re-locate their assets just as quickly as they moved them to Ireland. Remaining competitive in this context will be important.

A final risk is that of idiosyncratic sector risk. Even if multinational companies choose to remain in Ireland, our dependence on these companies opens Ireland up to idiosyncratic company/sector shocks which are hard to mitigate. A downturn in the ICT sector for example could see lower profits and hence lower CT receipts for the state. This type of shock is not something Ireland can easily mitigate. The sectors that dominate Ireland's multinational base (ICT sector, pharma, and financial services) are globally-focussed and as such Irish domestic policy will have little effect. The risk that corporate tax may be affected by events outside of Ireland's control must be kept in mind when framing fiscal policy. Encouragingly, the profile for CT receipts for 2016 is conservative - €6.6bn or €0.3bn less than last year even though the economy is forecast to grow by 4-5%. This is prudent.

As an aside, the impact of the UK's EU referendum will likely hurt the corporation tax take – more so in later years than 2016. Furthermore, it is more likely that the smaller corporate tax payers will be affected. Small companies tend to be more Ireland/UK-centric whereas the MNCs in general are more globally focussed. At the same time, MNCs in Ireland tend to be in less cyclical sectors (pharma, IT). As a result, the impact of Brexit may disproportionately affect the <€1m CT payers.

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<sup>7</sup> For more on the literature, see [Irish Exports: The facts, the fiction and the risks](#)

<sup>8</sup> Indeed implementation in the EU is progressing quickly with much of the BEPS proposals being incorporated in the EU's latest anti-tax avoidance directive.



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## Conclusion

Ireland's CT receipts are concentrated in three ways: by size of payment, by company, by sector. Within this, US multinational firms are particularly important to Ireland – more so than any other EU member. In 2015 Irish CT revenue exceeded expectations. Our analysis found that the over-performance is correlated with the revised national accounts data which became available in July 2016. The obvious conclusion that can be drawn from this analysis is that CT receipts have benefitted from the recent increase in Ireland's capital stock: larger profits were recorded in the “big three” sectors and have been taxed accordingly. This may well be true, but we will not know more until Revenue receives all the relevant data in November. Company specific issues such as changes in tax code treatment, exchange rates, capital allowances, prepayments and losses carried forward may all have played a part here – making a definitive connection hasty.

The analysis also confirms our view that Ireland's corporate tax revenue is concentrated. This is not necessarily a bad feature, but there are two main risks which arise from it. There's a risk that the multinational companies will re-locate their business elsewhere leaving a shortfall in receipts. In a post BEPS world, business environment competitiveness vis-à-vis other European nations will be key for Ireland. Second, even if multinational companies choose to remain in Ireland, our dependence on these companies opens Ireland up to idiosyncratic company/sector shocks which are hard to mitigate. The forecast for corporate tax receipts for 2016 is prudent – market participants will expect projections to remain so in the future when framing fiscal policy.

## References

- Forecasting with dynamic regression models: Alan Pankratz, 1991, (John Wiley and Sons, New York), ISBN 0-471-61528-5
- Report of the Tax Forecasting Methodology Review Group: Department of Finance, 2008
- Irish Exports: The facts, the fiction and the risks: David Purdue and Hansi Huang, NTMA, 2016
- Box D: Corporation Tax Receipts in 2015: Reamonn Lydon, Diarmaid Smyth and Graeme Walsh, Central Bank of Ireland Quarterly Bulletin No. 1, January 2016



## Appendix: Regression Results

Table A1 – Pre revisions to National Income and Expenditure (2015)

| Variable                     | Model 1            | Model 2            | Model 3          | Model 4           | Model 5            | Model 6           | Model 7           |
|------------------------------|--------------------|--------------------|------------------|-------------------|--------------------|-------------------|-------------------|
| <b>Industrial Production</b> | 1.348<br>(2.437)   |                    |                  |                   |                    |                   |                   |
| <b>GDP</b>                   |                    | 1.693<br>(2.138)   |                  |                   |                    |                   |                   |
| <b>GOS(-1)</b>               |                    |                    | 1.08<br>(2.046)  |                   |                    |                   |                   |
| <b>GVA</b>                   |                    |                    |                  | 1.524<br>(1.926)  |                    |                   |                   |
| <b>GVA Big3(-1)</b>          |                    |                    |                  |                   | 2.179<br>(2.572)   |                   |                   |
| <b>Exports (-1)</b>          |                    |                    |                  |                   |                    | 0.852<br>(1.696)  |                   |
| <b>Services Exports</b>      |                    |                    |                  |                   |                    |                   | 1.276<br>(1.826)  |
| <b>Constant</b>              | 7.537<br>(2.748)   | -4.422<br>(-0.509) | 3.498<br>(.670)  | -2.328<br>(-0.27) | -7.603<br>(-0.898) | -.488<br>(-0.056) | 0.819<br>(0.110)  |
| <b>AR(4)</b>                 | 0.8642<br>(15.539) | .868<br>(15.883)   | .868<br>(14.752) | 0.857<br>(15.200) | 0.879<br>(18.956)  | 0.864<br>(15.433) | 0.886<br>(18.292) |
| <b>Dummy Variables</b>       | *                  | *                  | *                | *                 | *                  | *                 | *                 |
| <b>R-Squared</b>             | 0.81               | 0.81               | 0.78             | 0.81              | 0.81               | 0.80              | 0.79              |
| <b>White Noise</b>           | *                  | *                  | *                | *                 | *                  | *                 | *                 |
| <b>Residuals</b>             |                    |                    |                  |                   |                    |                   |                   |
| <b>CI vector</b>             | *                  | *                  |                  | *                 | *                  | *                 | *                 |
| <b>Time Period</b>           | 1998-<br>2015      | 1998-<br>2015      | 2000-<br>2015    | 1998-<br>2015     | 1998-<br>2015      | 1998-<br>2015     | 1999-<br>2015     |



**Table A2 – Post revisions to National Income and Expenditure (2015)**

| Variable                     | Model 2            | Model 3          | Model 4            | Model 5           |
|------------------------------|--------------------|------------------|--------------------|-------------------|
| <b>New GDP</b>               | 1.487<br>(2.762)   |                  |                    |                   |
| <b>New GOS(-1)</b>           |                    | 0.735<br>(2.229) |                    |                   |
| <b>New GVA</b>               |                    |                  | 1.414<br>(2.659)   | 0.934<br>(2.407)  |
| <b>New GVA Big3(-1)</b>      |                    |                  |                    |                   |
| <b>Constant</b>              | -2.228<br>(-0.374) | 6.788<br>(2.115) | -1.256<br>(-0.216) | 4.722<br>(1.196)  |
| <b>AR(4)</b>                 | .871<br>(16.100)   | .859<br>(14.273) | 0.868<br>(15.694)  | 0.877<br>(15.907) |
| <b>Dummy Variables</b>       | *                  | *                | *                  | *                 |
| <b>R-Squared</b>             | 0.82               | 0.78             | 0.82               | 0.81              |
| <b>White Noise Residuals</b> | *                  | *                | *                  | *                 |
| <b>CI vector</b>             | *                  | *                | *                  | *                 |
| <b>Time Period</b>           | 1998-2015          | 2000-2015        | 1998-2015          | 1998-2015         |

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