Evaluation of Budget 2023

Compliance Measures

Revenue
Cáin agus Custaim na hÉireann
Irish Tax and Customs

A revenue-raising Compliance Measure was included in Budget 2023.

The target yield was €80 million.

This target was **met**.

Direct additional yield totalling €81.9 million

Share Options Compliance Interventions	PAYE End of Year Reconciliation Project	PAYE Real-Time Risk Interventions	CAT Debt Management	EWSS Assurance Project
€18.2m	€11m	€6.1m	€14.1m	€32.5m

Tax Collection Context

PAYE

PAYE Receipts
€27.4 billion
↑ €2 billion on 2022

PAYE Modernisation enabling the right tax payments
Almost €100 million in total additional liabilities

RTSO

Receipts from exercising share options
€162 million
↑ €39 million on 2022

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Publications relating to the evaluation of Budget compliance measures can be found here:
https://revenue.ie/en/corporate/information-about-revenue/research/reviews/index.aspx

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1 Introduction

Budget 2023 included a revenue-raising Compliance Measure among the taxation policy changes.[1] It outlined that:

> *Revenue will conduct a range of targeted projects which will include PAYE compliance interventions involving a further focus on share schemes, and increased debt management activity. It is expected that these projects will yield additional Exchequer receipts arising from increased taxpayer compliance.*

These measures were projected at the time of the Budget (October 2022) to yield an additional €80 million to the Exchequer in 2023.

This report describes the targeted projects conducted by Revenue and evaluates whether the target yield was realised. A summary of the results is contained in Table 1. The anticipated yield of €80 million was met.

Table 1: Summary of Budget 2023 Compliance Measures

Measure	Estimated Yield
Share Schemes and Share Based Remuneration	€18.2m
Preliminary End of Year Reconciliation Project for PAYE Taxpayers	€11m
Targeted PAYE Compliance Interventions	€6.1m
Employment Wage Subsidy Scheme Assurance Project	€32.5m
CAT Debt Management	€14.1m
Total	**€81.9m**

Source: Revenue analysis.

This report follows a similar approach to analysis undertaken in respect of compliance measures in previous Budgets.[2] The outcomes of prior years' evaluations are summarised in Table 2.

[1] Summary of Budget 2023 Taxation Measures – Policy Changes, available at: https://www.gov.ie/pdf/?file=https://assets.gov.ie/235719/631a4fdc-885b-4522-8b87-7c31934062fa.pdf#page=null

[2] Evaluations of older Budget compliance measures are published at https://www.revenue.ie/en/corporate/information-about-revenue/research/reviews/index.aspx.

Table 2: Summary of Evaluations of Budget Compliance Measures

Budget Year	Measure	Ex Ante Target Yield (Full Year)	Ex Post Estimated Yield
2016	Addressing non-compliance in the oil market	€10m	€35m
	Addressing non-compliance in the construction sector	€20m	€56m
	Deploy enhanced debt analysis tool to reduce tax arrears	€20m	€56m
	Increase resources to confront non-compliance	€25m	€26m
2017	Section 110 and Funds changes	€50m	€63m
	Tackling Offshore tax evasion	€30m	€88m
	Increase resources to confront non-compliance	€50m	€62m
2018	Employer PAYE compliance project	€50m	€77m
	eCommerce/Online business compliance project	€30m	€26m
	Tax avoidance and base erosion capacity	€20m	€20m
2019	Employer PAYE Compliance Implementation	€50m	€65m
2020	Dividend Withholding Tax (DWT) Compliance	€80m	€72m

Source: Revenue analysis.

Note: the target yield is recorded each year in the Budget. The estimated yield is prepared and published by Revenue in the year following the Budget year.

2 Share Schemes and Share Based Remuneration (SBR)

2.1 Share Schemes and Share Based Remuneration (SBR) Overview

Share Schemes and Share Based Remuneration (SBR) have increasingly become a key element of remuneration packages provided by certain employers. For Revenue, it is important that both employers providing SBR and employees or directors in receipt of SBR fully understand their obligations to file and pay the relevant taxes in full and on time.

2.2 Employer obligations – Filing

Revenue receives returns each year from employers who operate SBR schemes. These returns indicate which employees have participated in a share scheme and if they have exercised, assigned or released share options. There are several year-end reporting obligations for employers including Forms ESA, KEEP1, RSS1 and ESS1. The standard filing deadline for such share schemes is 31 March following the year in which the activity arose. Penalties for failure to make returns may apply.

2.3 Employee obligations – Filing and Paying

Employees or directors may be members of multiple share schemes, as a result they need to be aware of multiple tax 'events'.

Where a company grants a share option to an employee or director, they are given the right to acquire a pre-determined number of shares at a pre-determined price for a set period of time. These option schemes are commonly referred to as "unapproved share option schemes". Where share options are exercised, assigned, or released in an Employment Share Scheme, individuals are liable to pay tax on any gain. The Income Tax (IT), Universal Social Charge (USC) and Pay Related Social Insurance (PRSI) due, collectively known as Relevant Tax on Share Options (RTSO), must be paid within 30 days of exercising the option(s). Recipients are also considered 'chargeable persons' for the year in which they exercise, assign and/or release a share option and are required to complete an Income Tax Return (the Form 11 for chargeable persons).

Where recipients subsequently dispose of the shares they acquired, they may be liable to Capital Gains Tax (CGT), this disposal must be reported to Revenue by the employee, even if no tax is due. Dividend payments are also taxable, and individuals must declare this income to Revenue.

2.4 Share Based Remuneration: Service for Compliance

Under its strategic pillar of 'Service for Compliance', Revenue provides a wide range of supports to customers in meeting their tax obligations and understanding their entitlements. Revenue also provides a range of Helplines and a comprehensive suite of information for both employers operating share schemes and employees/directors in receipt of SBR on its website including:

- An employee hub: https://www.revenue.ie/en/additional-incomes/employment-related-shares/index.aspx
- An employer hub: https://www.revenue.ie/en/employing-people/shares-for-employees/index.aspx
- Self-assessment (Share Options only): https://www.revenue.ie/en/self-assessment-and-self-employment/shares-options/index.aspx
- Tax and Duty Manuals for tax practitioners and customers: https://www.revenue.ie/en/tax-professionals/tdm/share-schemes/index.aspx

Changes and updates were made to these webpages in 2023 to improve usability and comprehension, while new links which took the taxpayer directly to the tax return forms were also added to make it easier for taxpayers to comply with their pay and file obligations.

2.5 Share Based Remuneration: Compliance Activity

The National Share Options Compliance Project, initiated by Revenue in 2022, continued through 2023 with significant results.

The project team undertook many initiatives to develop and enhance awareness for taxpayers, which included:

- Sending a 'Level 1' compliance letter[3] to over 7,000 customers in May 2023.
- This built on contact in 2022 with approximately 1,200 employers operating Share Schemes, asking them to circulate an informational note to their employees/share recipients, advising them of their obligations to pay and file RTSO.
- Changes to certain Forms (KEEP 1), which allow companies to avail of the group provisions, went live in Q1 2023.
- Internal IT developments to enhance business intelligence in respect of SBR.

Alongside efforts to encourage and support taxpayers to meet their filing obligations the project team also carried out appropriate interventions where risks were identified.

The yield from these interventions in 2023 was €18.2 million.

2.6 Analysis of RTSO receipts

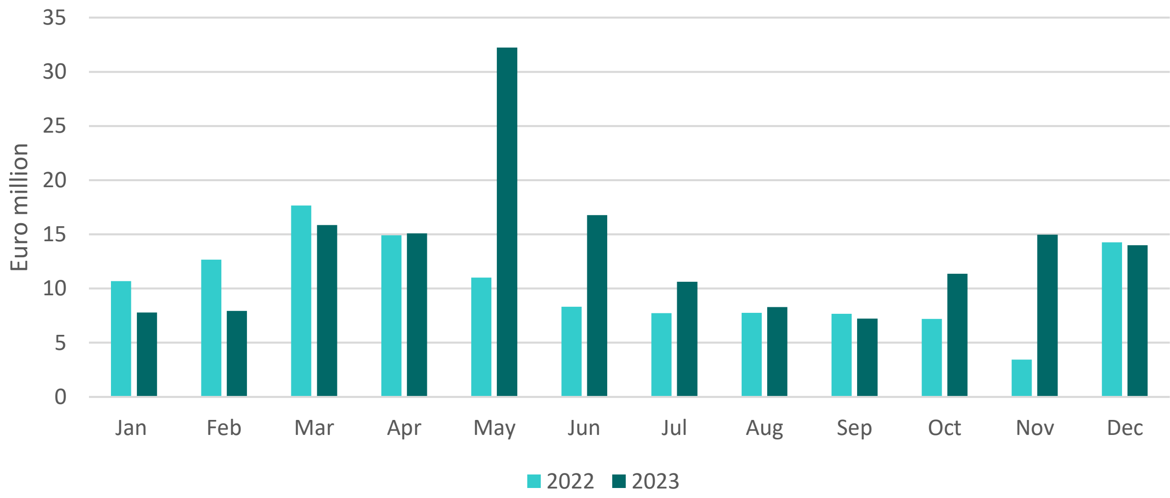
2.6.1 RTSO trends and the macroeconomic environment

In 2023 RTSO net receipts were €162 million, representing an increase of €39 million on 2022. Figure 1 shows the monthly collections in both years. In principle, the actions undertaken via Revenue's National Share Options Compliance Project in late 2022 and during 2023 are likely to

[3] Level 1 compliance interventions are aimed at supporting taxpayers by reminding them of their obligations and providing them with the opportunity to correct errors without the expense and stress of a more in-depth inquiry. A Level 1 intervention is broad based and only occurs where Revenue has not already engaged in any detailed examination or review of the matters under consideration.

have supported the increase in RTSO receipts in 2023. For instance, the Level 1 letters issued at the end of May 2023 coincides with a large increase in RTSO in May and June 2023 compared to the same months in 2022.

Figure 1: Net Collection Relevant Tax on Share Options (RTSO)



Source: Revenue analysis.

However, total RTSO receipts depend indirectly on many factors which influence an employee's decision to exercise their share options. Such factors include stock market conditions, economic factors, tax policy changes, share options incentive structures and timing of share option grants, along with company and employee characteristics.

2.6.2 Modelling Revenue's impact

One approach to assess the impact of Revenue's compliance outreach is to develop an autoregressive integrated moving average (ARIMA) model and construct a counterfactual series reflecting a scenario where Revenue had not pursued its Service for Compliance actions or compliance interventions in 2023.

An ARIMA model that is deemed to best fit the data prior to January 2023 is used to forecast RTSO collected in each month of 2023. This forecasted series is assumed to represent the path the RTSO is likely to have taken if Revenue had not intervened in 2023. The difference between the RTSO collected and the forecast is a broad estimate of the impact of Revenue actions.

An ARIMA model is a univariate model which means this approach models the monthly collection of RTSO by solely taking into account trends, seasonality and past values in the series. While this is a useful modelling approach, it is important to note that the counterfactual forecast depends on the specific model parameters selected and that the underlying data generating process is stable. The forecasted series relies entirely on historical data and cannot take into account other potential confounding factors. However, forecasts from an appropriately selected model can act as a useful benchmark. It is also possible to include other explanatory variables in the model to help estimate RTSO. In this regard, consideration is given to stock market conditions (using the S&P stock price index) and macroeconomic conditions (using the unemployment rate and the interest rate).

The analysis indicates that the forecasted RTSO total of €142 million for 2023 (based on the preferred models), results in a difference of €20 million when compared to the realised collection figure of €162 million. To the extent that the models have accounted for important confounding influences on RTSO, a comparison with the caseworker compliance interventions yield of €18.2 million suggests that additional Revenue actions supporting compliance may have encouraged the collection of approximately an additional €2 million. This figure is not added to the total recorded by Revenue as arising from the Share Schemes and SBR compliance project, in order to keep the results as conservative as possible, but is nonetheless indicative of positive indirect effects of Revenue action. The RTSO data and the forecasted series are presented in Figure A2 in the Appendix.

2.7 Looking Ahead: Significant Change with effect from January 2024

A significant number of amendments to various sections of the Taxes Consolidation Act 1997 was provided for in the Finance Act (No.2) 2023, so that the taxation of a gain realised on the exercise, assignment, or release of a right to acquire shares or other assets is moved from self-assessment to the Pay As You Earn (PAYE) system. This treatment will apply to gains realised on or after 1 January 2024. As a result, the employer will be responsible for accounting for the income tax, Universal Social Charge and employee’s PRSI to Revenue as part of their payroll process.

3 Preliminary End of Year Reconciliation Project for PAYE Taxpayers

3.1 Project Overview

Revenue established a Preliminary End of Year Reconciliation (PEOYR) Project in 2022 which continued into 2023. The primary objective of the project is to build on the opportunities presented by PAYE Modernisation to leverage real time payroll, third party and PAYE data to reconcile the tax position of PAYE taxpayers for 2019 onwards.

Historically Revenue only contacted PAYE taxpayers who formed part of a 'bulk issue' of approximately 40,000 taxpayers requiring them to file an Income Tax Return. In addition to this annual bulk issue, any PAYE taxpayer could review their tax liability and file a return in myAccount, the single access point for all Revenue's secure online services for PAYE customers. However, with the introduction of PAYE Modernisation in 2019, a Preliminary End of Year Statement (PEOYS) is now made available to all PAYE employees at the end of each year and is easily accessible in myAccount. The PEOYS provides a *preliminary* calculation of an employee's Income Tax and Universal Social Charge (USC) for the year, and indicates whether their tax position is balanced, underpaid, or overpaid.

The PEOYS is based on information available to Revenue. As such, if an employee wishes to claim additional tax credits or reliefs (such as the mortgage interest tax credit, the rent tax credit or health expenses relief), or declare other income earned outside the PAYE system, they must complete a PAYE Income Tax Return for the year. This will then generate a Statement of Liability confirming the *final* tax position for that year.

3.2 PEOYR: Service for Compliance

In 2022, the PEOYR Project team conducted an extensive letter campaign based on an analysis of unbalanced PEOYS. The first tranche of letters issued in September 2022 and continued to issue until end of October 2022. Overall, over 390,000 customers were contacted. These included cohorts who had previously received the Pandemic Unemployment Payment (PUP) or Temporary Wage Subsidy Scheme (TWSS). As a direct result of this campaign 183,000 PAYE Income Tax Returns have been submitted. €54 million has already been refunded to customers in respect of returns filed because of these letters. €44.1 million of outstanding liability has been established and is now being collected over a number of years through a reduction in the taxpayers' tax credits.

It is estimated that €11 million of the total outstanding liability was collected in 2023 through a reduction in taxpayers' tax credits.

The PEOYR Project continued in 2023 and over 96,000 individuals were contacted, who, according to their PEOYS, may have either overpaid or underpaid tax in one or more of the tax years 2019

– 2022 inclusive, advising them to file a PAYE Income Tax Return. Approximately 121,000 returns were filed by over 45,000 of the customers contacted. A total of €44.8 million has already been refunded to customers in respect of these returns. Approximately €3.7 million of outstanding liability was established and will be collected in future through a reduction in the taxpayers' tax credits.[4]

3.3 PEOYR: Compliance Activity

The introduction of PEOYS for all PAYE taxpayers enables Revenue to identify and analyse cases with apparent overpayments or underpayments as well as segment taxpayers into cases with indicators of risk or third-party income.

In November 2023, following in-depth analysis, the PEOYR Project team issued 70,000 Statements of Liability to customers who were required to file an Income Tax Return but failed to do so, despite having already been contacted. An additional €48.7 million in liability has been established from this activity and will be collected in the future.

3.3.1 PEOYR Project Results

The total amount of liability established since the initiation of this project is €96.5 million.[5] This will be collected by Revenue over a number of years, and it is estimated that **€11 million of the total was collected in 2023** through a reduction in taxpayers' tax credits.

The PEOYR Project will continue in 2024. Revenue will write to those individuals who, according to their PEOYS, may have either overpaid or underpaid tax in one or more of the tax years 2020 – 2023 inclusive. This letter campaign will further enhance the impact of an extensive public information campaign Revenue launched in January 2024, to raise awareness among PAYE taxpayers about the range of tax credits and reliefs available, and how they can claim them.

Since PAYE Modernisation in 2019, there has been a pronounced increase in the numbers of PAYE taxpayers filing their Income Tax Returns to claim their entitlements and declare any income not taxed through the PAYE system. It has also enabled Revenue to make both targeted and scaled service and compliance interventions – resulting in both tax refunds and tax collection - to ensure the right amount of tax is paid by PAYE taxpayers.

[4] This lower liability of €3.7 million relative to the previous year's result of €44.1 million reflects the lower level of customers in a preliminary underpayment position in the cohort of 96,000.

[5] €44.1 million and €3.7 million from the 2022 and 2023 letter campaigns respectively, as well as €48.7 million from the direct compliance actions taken by Revenue in 2023.

4 Targeted PAYE Compliance Interventions

4.1 Risk management

Revenue has a detailed programme of risk management interventions each year, which includes Business, Customs and PAYE domains. The overall yield in the PAYE domain arising from Revenue interventions in 2023 was €17.3 million (including tax, interest and penalties).

Tax compliance is monitored through a range of risk identification, assessment and evaluation programmes, together with processes that are supported by real-time data analytics and the interrogation of both taxpayer and third-party information. This approach enables Revenue to identify and quantify risk, ensuring that compliance resources focus on the non-compliant taxpayer, minimising the administrative burden on the compliant taxpayer.

The Pay As You Earn (PAYE) Real-time Risk (RTR) system allows Revenue to respond rapidly to emerging risks in respect of non-compliance in the PAYE case base, and RTR rules are enhanced on an ongoing basis to ensure that Revenue delivers an effective response.

In 2023, the platform on which the PAYE RTR system is built was redeveloped, allowing for a more responsive system when new trends or risks emerge. This new platform replaced an existing PAYE RTR application which was originally introduced in 2013.The system on which the original platform was developed had come to the end of its useful life. The new PAYE RTR application provides the functionality to view risk rules created in real time, to turn rules on and off, create and amend rules as well as test rules in a simulator.

Where cases display non-compliance indicators, caseworkers respond progressively and, where appropriate, conduct a risk intervention under Revenue’s Compliance Intervention Framework. Each intervention is intended to be in the form which is most efficient in terms of time and resources, and which imposes the least cost on both the taxpayer and on Revenue, whilst properly addressing perceived risks.

4.2 Intervention Yield

4,795 interventions, prompted by the redeveloped PAYE RTR system, were closed in 2023.

These gave rise to a yield of €6.1 million.

5 Employment Wage Subsidy Scheme (EWSS) Compliance

The Employment Wage Subsidy Scheme (EWSS) was a COVID-19 economy-wide enterprise support scheme. The Scheme provided a subsidy to qualifying employers based on the numbers of eligible employees on the employer's payroll and was operated by Revenue through the payroll system. EWSS commenced with effect from 1 September 2020 and operated on a self-assessment basis.

5.1 Oversight

From inception, Revenue undertook a multi-faceted approach to compliance checks to safeguard the integrity of the Employment Wage Subsidy Scheme (EWSS). This included:

- Undertaking real time checking of PAYE compliance of employers availing of the scheme.
- Cross-referencing claim data against other Revenue data sources to identify anomalies or trends requiring attention.
- Real time engagement with employers, to facilitate timely resolution of issues.
- A risk-focused follow-up program of compliance interventions in accordance with the Code of Practice for Revenue Audit and Other Compliance Interventions.

5.2 Targeted Assurance Project

EWSS closed on 30 April 2022 for most employers, with certain employers impacted by public health regulations permitted to claim up to 31 May 2022. On its conclusion, Revenue instigated a final targeted assurance project to pursue the recoupment of any overpayments and provide overall assurance in respect of wage subsidy monies paid over the entirety of the scheme. This assurance project encompassed employers who were not previously contacted, segmenting the case base into various cohorts and adopting a tailored approach to match the claimant's behaviour and identified risks factors.

5.3 Actions and results

When the scheme closed, to enable employers to satisfy themselves that all claims were correct, Revenue provided an Eligibility Review Calculator. Employers were contacted in a series of bulk letter issues to encourage them to utilise this tool and compare results to data previously submitted on the Eligibility Review Forms. Over the course of 2023 there was extensive engagement with employers and a range of compliance interventions undertaken.

As a result of activity under this targeted assurance project in 2023 yield of approximately €32.5 million was achieved.

5.4 Overall Results from EWSS Compliance Activity

By the end of 2023, 9,310 interventions had been finalised on 8,494 employers, yielding an overall total €207.9 million in respect of EWSS compliance activity. This equates to less than 3% of all EWSS subsidies paid and PRSI credits claimed during the life of the scheme. These outcomes demonstrate high compliance by the majority of employers who participated in the scheme.

6 CAT Debt Management

6.1 Capital Acquisition Tax (CAT) Debt Management

Revenue established a CAT Debt Management Project in 2023. It is anticipated that in time CAT will move into Revenue's Debt Management Services (DMS), which is operated by Revenue's Collector General's Division, but in advance of this development it is essential that Revenue manage this debt effectively.

Revenue's CAT team therefore established a joint project with the Collector General's Division to reduce the level of CAT debt on a phased basis. The target of the 2023 project was all new debt created in 2022. At the beginning of 2023 there were 732 cases with outstanding debt available for collection of approximately €21.7 million. The key intervention was to introduce a payment compliance contact with the customer closer to the event in order to encourage prompt payment and to reduce the risk of the amount owed evolving into long term debt.

Each case was assigned to a case worker, where they manually reviewed the case. Following the initial review, a "Request for Payment Letter" was issued in March 2023 requesting payment within 30 days. If there was no payment within this timeframe, a second letter issued giving a further 7 days to make a payment. Lastly, if no payment was made, the case was transferred to the Collector General's to manage the debt in line with their enforcement practices for other tax heads.

As a result of Revenue's CAT Debt Management Project, €14.1 million was collected over the course of 2023, equivalent to a little over 2 per cent of CAT net receipts in 2023. The balance from the original debt of €21.7m is currently under collection.

7 Conclusion

This analysis assesses the impact of the Budget 2023 compliance measure and attempts to identify the additional tax that may be attributable to the implementation of targeted compliance and debt management projects during the year.

Revenue actions generated direct additional yield estimated at €81.9 million in 2023:

- €18.2 million from Share Scheme Compliance Interventions
- €11 million from the Preliminary End of Year Reconciliation Project for PAYE Taxpayers
- €6.1 million from targeted PAYE Compliance Risk Interventions
- €32.5 million from the Employment Wage Subsidy Scheme Final Assurance Project
- €14.1 million from CAT Debt Management

In conclusion, the target of €80 million for the Budget 2023 compliance measure has been met, as borne out by the analysis of the data now available for the year. It is worth noting that further yield from the Preliminary End of Year Reconciliation Project for PAYE Taxpayers has been identified, and Revenue expects to collect over €80 million in additional revenues over the next four years (2024-2027), highlighting the longer-term impact of this investment in compliance by Revenue.

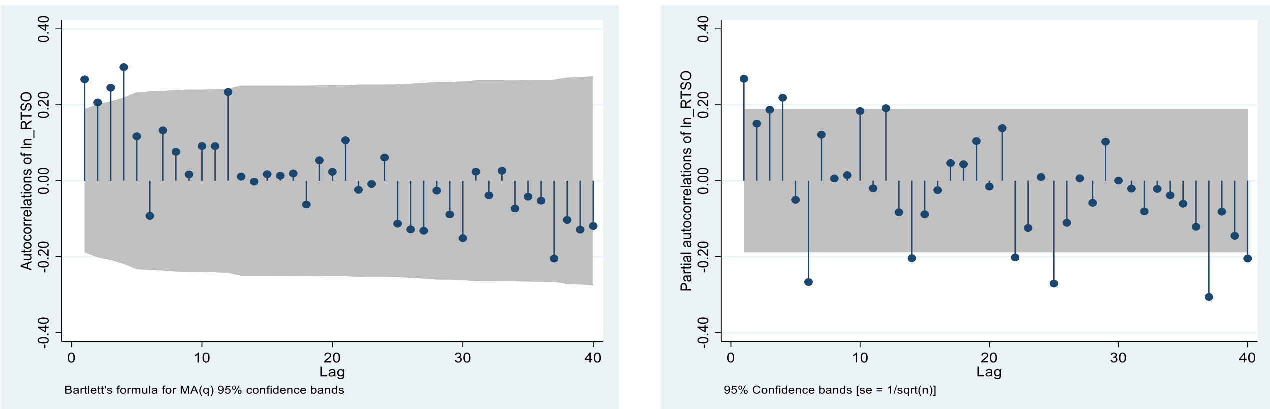
8 Appendix

This appendix provides further background to Section 2.6.2 of the main report. It outlines the time series modelling approach used to develop a statistical model that captures the inherent data generation process of the monthly RTSO series for the period January 2014 to December 2023. To this end, an Autoregressive Integrated Moving Average (ARIMA) model, which is a prominent approach in modelling and forecasting of time series data, is developed. These types of models seek to characterise the data by taking into account trends, seasonality and past values in the series.

A key challenge lies in the selection of an appropriate ARIMA model. Its selection depends on an iterative process entailing graphical and statistical examination of the data. As a first step, the RTSO series is transformed into logs and assessed for stationarity. In this regard, the augmented Dickey Fuller test indicates the data exhibits stationarity. The augmented Dickey Fuller test statistic (-7.7) exceeds the critical value at the 1 per cent significance level (i.e. -3.5) in absolute terms, therefore rejecting the presence of a unit root. However, the Hylleberg, Engle, Granger, Yoo seasonal unit root test statistic for the series (i.e. -2.23) does not exceed the critical value at the 10 per cent level of significance (i.e. -2.3) in absolute terms, which suggests the data are non-stationary at the annual (seasonal) frequency. This means it is necessary to seasonal difference the data. The plots of the autocorrelogram and partial autocorrelogram of the series indicates that it potentially follows a low order autoregressive process, while the significant terms in the PAC figure indicate seasonality effects in the data (Figure A1).

These plots can be used to identify an initial specification of autoregressive and moving average terms that characterises the data generating process. However, it is important to consider other potential models when determining an appropriate model. Model selection is determined by taking into account test statistics such as Akaike Information Criterion (AIC) which assess the accuracy (or fit) of the model given the number of parameters included.

Figure A1: ACF and PACF of monthly RTSO, 2014-2022



Source: Revenue analysis.

To help identify an appropriate SARIMA model, a parameter selection algorithm (i.e. autoarima package in Stata) is estimated. Analysis of the model estimates and comparisons of the AIC of alternative specifications suggest an SARIMA(2,0,2)(1,1,1,12) with a constant is the most appropriate univariate specification (i.e. Model 1 in Table A1).

This model is compared to two alternative models. Model 3 considers the influence of the Standards and Poor 500 index monthly average closing price[6], the monthly unemployment rate for labour force participants aged between 15 and 74, and average interest rate on Irish consumer loans of between 1- and 5-years maturity on RTSO collected (the recent time series for these variables is presented in Figure A3). Model 4 also includes the lagged monthly changes in these variables. A comparison of the log likelihood ratio and AIC statistics suggests that Model 1 is a better fit. However, the difference in these statistics are not that large between Model 1 and Model 3. Also, to the extent that the S&P stock price index is positively and significantly associated with RTSO in Model 3 it would appear appropriate to consider forecasts from this model.

Before using these models to forecast RTSO, it is necessary to assess that the underlying univariate process is stable. The Portmanteau test indicates a failure to reject the null hypothesis that the residuals are white noise. An examination of the inverse roots of the ARMA process indicates that they are inside the unit root circle (i.e. the AR process is stationary and MA process is invertible).

With the requirements for a stable data generating process satisfied, the models are used to forecast the RTSO series from January to December 2023. The monthly forecasts are presented in Figure A2. To the extent that each of the model estimates are subject to a margin of error it is possible to consider the upper and lower estimates of the range of model estimates as a type of "standard error" bound. Such an approach enables discussion of an average forecast within an error band.

Monthly RTSO forecasts from Model 1 indicate an annual total of €147 million compared to €138 million for Model 3. Taking the average of these estimates and comparing them to the actual RTSO of €162 million collected results in a difference of €20 million. To the extent that the models have accounted for important confounding influences on RTSO, a comparison with the caseworker compliance interventions yield of €18 million suggests that additional Revenue actions supporting compliance may have encouraged the collection of an additional €2 million.

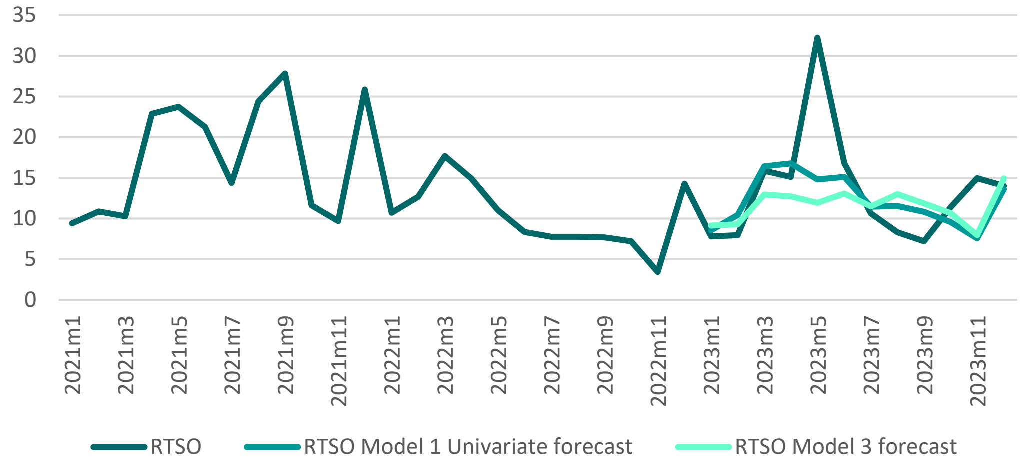
[6] This index was selected as a significant proportion of employee share options were granted by US companies.

Table A1: Estimates and diagnostic test from selected SARIMA and SARIMAX models

	1	2	3	4
S&P $_{t-1}$			1.42***	1.31**
			(0.53)	(0.63)
Unemployment rate $_{t-1}$			0.1	0.1
			(0.06)	(0.07)
Interest rate $_{t-1}$			0.17	0.13
			(0.14)	(0.16)
Δ S&P $_{t-1}$				0.41
				(0.86)
Δ Unemployment rate $_{t-1}$				-0.03
				(0.22)
Δ Interest rate $_{t-1}$				-0.42
				(0.53)
Constant	0.03	0.03	-0.03	
	(0.04)	(0.03)	(0.08)	
ARMA				
AR $_{t-1}$	1.42***			
	(0.16)			
AR $_{t-2}$	-0.71***			
	(0.14)			
MA $_{t-1}$	-1.35***	0.24**	0.17	0.19
	(0.12)	(0.11)	(0.11)	(0.12)
MA $_{t-2}$	0.84***			
	(0.1)			
ARMA12				
AR $_{t-1}$	0.08			
	(0.25)			
MA $_{t-1}$	-0.68***	-0.60***	-0.61***	-0.61***
	(0.22)	(0.11)	(0.12)	(0.14)
SARIMA parameter specification	(2,0,2) x (1,1,1,12)	(0,0,1) x (0,1,1,12)	(0,0,1) x (0,1,1,12)	(0,0,1) x (0,1,1,12)
Log likelihood	-55.34	-62.86	-57.11	-56.23
AIC	126.69	133.72	128.21	132.47
SIC	147.2	143.98	146.09	157.9
Observations	96	96	95	94
Portmanteau test for white noise (test statistic, Prob >χ^2)	32.95, 0.77	42.92, 0.34	36.40, 0.68	34.34, 0.72
AR parameters satisfy stability condition	yes	yes	yes	yes
MA parameters satisfy invertibility condition	yes	yes	yes	yes

Note: Dependent variable is the natural log of RTSO. Explanatory variables include the log of average monthly S&P closing price, monthly change in the average monthly S&P closing price, the unemployment rate and it monthly change, the interest rate and its monthly change.

Figure A2: RTSO series, actual versus forecast



Source: Revenue analysis.

Figure A3: Trends in Explanatory Macroeconomic Variables

Figure 2(a)

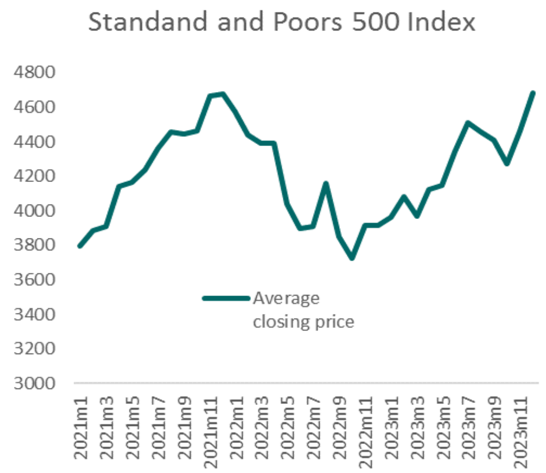


Figure 2(b)

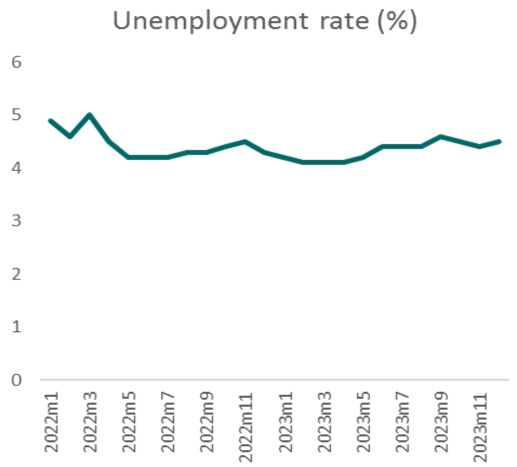
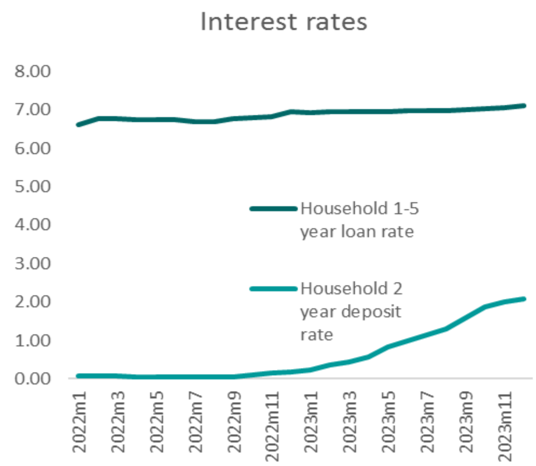


Figure 2(c)



Source: S&P 500 Index, CSO and Central Bank data.