eJournal of Tax Research

Volume 23, Number 1 June 2025
(Special Issue: Conference on Retirement of Professor Binh Tran-Nam)

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Atax UNSW

ISSN 1448-2398

eJournal of Tax Research

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PUBLISHER

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EDITORS' NOTE

The *eJournal of Tax Research* is a refereed journal that publishes original, scholarly works on all aspects of taxation. It aims to promote timely dissemination of research and public discussion of tax-related issues, from both theoretical and practical perspectives. It provides a channel for academics, researchers, practitioners, administrators, judges and policy makers to enhance their understanding and knowledge of taxation. The journal emphasises the interdisciplinary nature of taxation.

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Editorial

Special Issue: Conference on Aspects of Tax Administration and Economic Development to mark the retirement of Professor Binh Tran-Nam

This Special Issue of the *eJournal of Tax Research* comprises six articles that are a selection of papers that were originally presented at the Conference on Aspects of Tax Administration and Economic Development organised by Emeritus Professor Chris Evans of the University of New South Wales (UNSW) Business School, Professor Richard Krever of the University of Western Australia Law School, Professor Kerrie Sadiq of Queensland University of Technology Faculty of Business and Law, and Professor Michael Walpole of UNSW Business School, to mark the formal retirement of Professor Binh-Tran-Nam from the UNSW Business School. The Conference was held at Courtyard Bali Nusa Dua Resort over two days (5-6 November 2024).

The Conference program had 15 papers set out into six themed sessions, with each theme relating to aspects of Professor Tran-Nam's extensive range of research interests and contributions. The themes were:

1. Tax Complexity and Tax Compliance Costs (over two sessions);
2. Tax Compliance in Indonesia;
3. Tax Dispute Resolution;
4. Tax Policy, Sustainability and Reform;
5. Environmental Taxes and Sustainability; and
6. Income Inequality, Trade and Taxation.

In this Special Issue, we include revised papers from each of themes 1, 2, 4, and 6. The articles in this Special Issue expand on these core themes, incorporating the rich discussion and feedback provided over the course of the Conference reflecting upon the academic career of Professor Tran-Nam.

In the first article, Stark, Smulders and Odendaal[1] provide a South African perspective in their analysis of tax compliance costs. The authors observe that tax compliance costs represent an economic burden to society and can result in reduced tax compliance

[1] Karen Stark, Sharon Smulders and Elza Odendaal, 'How CHAID Analysis Can Assist Revenue Authorities in Analysing Tax Compliance Costs' (2025) 23(1) *eJournal of Tax Research*.

behaviour. Traditional techniques used to establish the determinants of tax compliance costs include regression and simple descriptive statistics. Stark and co-authors take a different approach, explaining how a Chi-square automatic interaction detection (CHAID) analysis, which is a decision tree modelling technique, was used to analyse the tax compliance costs of 10,260 individual taxpayers in South Africa. The authors find that CHAID analysis provided granular insights beyond traditional techniques to enable a better understanding of the determinants which could lead to targeted support to enhance taxpayer compliance and reduce government collection costs.

The next two articles provide an Indonesian perspective on tax compliance. Ferry and Hasseldine[2] observe that small and medium enterprise (SME) taxpayers globally were severely impacted by the Covid-19 pandemic. The authors analyse self-assessed presumptive tax payment data from 319 Indonesian tax offices to estimate how their capacity to submit self-assessed tax payments responsively changed during January 2016-February 2023. Ferry and Hasseldine predict the expected amount of self-assessed tax payments in 2020 without the presence of the pandemic (pre-pandemic) and in 2022 in the presence of the pandemic (post-pandemic). The authors' predictive analyses are then compared to actual tax payments during March 2020-February 2021 and March 2022-February 2023. Ferry and Hasseldine conclude that their benchmark case analysis may assist 'lesson-drawing' by tax administrations in developing countries to inform tax policy responses under presumptive tax systems.

Rosid, [3] in the second of the Indonesia-focused articles, states that optimising performance management in tax administration requires a nuanced approach that balances efficiency, effectiveness, and stakeholder engagement to enhance tax compliance and revenue collection. Rosid's study examines the effectiveness of service, supervision, and enforcement strategies on tax compliance within Indonesia's tax authorities, using a Balanced Scorecard (BSC) framework to address a critical knowledge gap in tax administration performance metrics. He employs quantitative analysis of comprehensive key performance indicator (KPI) data from 319 tax offices across Indonesia. Rosid's study reveals two principal findings. The first is that supervisory activities tend to be significant factors that influence tax compliance, underscoring the importance of targeted close monitoring in tax administration. Secondly, the relationship between tax compliance and revenue collection remains complex and inconclusive, indicating the need for further refinement of the strategic alignment within the BSC framework.

Rosid further argues that these implications are substantial for policymakers and offer evidence-based strategies to strengthen compliance and revenue generation in Indonesia. He also suggests that this study contributes to the broader literature on tax compliance, particularly within the context of developing economies, highlighting the need for tailored approaches that address the socioeconomic and cultural specificities of regions such as Indonesia. Collectively these findings support a multifaceted, context-sensitive approach to tax administration that promotes sustainable revenue mobilisation, while fostering public trust and compliance.

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[2] Ferry and John Hasseldine, 'An Analysis of the Pre- and Post-Coronavirus Pandemic Self-Assessed Tax Payments of SME Taxpayers in Indonesia' (2025) 23(1) *eJournal of Tax Research*.
[3] Arifin Rosid, 'Examining Causal Linkages in the Balanced Scorecard Framework: Evidence from the Indonesian Tax Administration' (2025) 23(1) *eJournal of Tax Research*.

Marriott and Sawyer,[4] in the fourth article, provide a New Zealand comparative to an earlier Australian analysis by Professor Tran-Nam. The authors comment that New Zealand's tax system has undergone significant reform during the last four decades, motivated by both domestic and international influences. From a domestic perspective, significant modernisation has ensured that it is 'fit for purpose' operationally. Alongside this focus, the foundational principles of equity, simplicity and efficiency have guided reforms. With an increasingly globalised and integrated world, New Zealand's tax system has needed to adjust to harmonise with standard international tax practices, and to deal with issues such as base erosion and profit shifting.

Marriott and Sawyer observe that reforms have been gradual, interposed by significant developments in both structure and composition of taxes. Major contributions to the evolving tax system include 'Rogernomics' during the 1980s, along with significant administrative and dispute resolution reforms in the 1990s. Several major tax reviews were prominent in the 2000s and 2010s. More recently, the 2020s are highlighted by the successful completion of Inland Revenue's Business Transformation and handling the government's fiscal response to Covid-19. In many respects, the authors suggest that New Zealand's tax reform has either led or followed developments in Australia. This, Marriott and Sawyer, argue, should not come as a surprise given the close economic and social ties between the two countries. The aim of Marriott and Sawyer's contribution is to critically examine New Zealand's tax system over the last 40 years, focusing on significant changes in tax policy, tax law and tax administration.

Brown and Sadiq,[5] in the penultimate article, observe that on 22 November 2023, the groundwork was laid for a new United Nations (UN) Tax Convention, paving the way for a shift in leadership in international tax policy away from the Organisation for Economic Co-operation and Development (OECD) and towards a democratised approach that would give developing nations a greater voice in addressing aggressive tax practices and profit shifting. The authors suggest that this move will also likely lead to a greater emphasis on sustainable development goals, which have the largest impact on the Global South, where strategies are needed to improve health and education, reduce inequality, and spur economic growth. Concurrently, Brown and Sadiq comment that it is well documented that a significant form of revenue for developing nations is taxation. However, the collection is generally lower than in developed nations. Further, increasing revenue from the corporate income tax base is the most realistic approach to aid economic development through the tax system.

Brown and Sadiq suggest that aggressive tax practices are one cause of low corporate tax revenue collection. The authors consider the most common practices multinational entities (MNE) use to shift profits to low- or no-tax jurisdictions. Noting that transfer pricing is a fundamental source of profit shifting, Brown and Sadiq discuss the benefits of an alternative model known as global formulary apportionment. In doing so, the advantages of its adoption for developing nations are discussed. The authors then undertake an empirical analysis using publicly available data contained in country-by-

[4] Lisa Marriott and Adrian Sawyer, 'New Zealand's Tax Reform Experience – Parallels with Australia' (2025) 23(1) *eJournal of Tax Research*.
[5] Rodney Brown and Kerrie Sadiq, 'The Democratisation of International Taxation: Stemming Aggressive Tax Practices for Economic Development" (2025) 23(1) *eJournal of Tax Research*.

country reports to determine the effects of a formulary apportionment model on developing nations.

Brown and Sadiq specifically investigate the potential increases or decreases in revenue collected using different apportionment formulas. Data contained in publicly available country-by-country reports are relied upon to estimate the likely revenue effects of these different formulas. The authors also demonstrate the likely simplification of such a model and its ability to stem aggressive tax practices such as transfer pricing and thin capitalisation. Brown and Sadiq's article concludes that the UN Tax Convention should propose a global formulary apportionment model for the allocation of profits between jurisdictions. However, they caution against the use of a formula that fails to adequately take into account the contributions to profits of MNEs that occur through genuine economic activity in developing nations.

Le, Ngoc and Van,[6] in the final article, examine a possible effect of deglobalisation and growing isolationism on countries' fiscal positions by studying the relationship between international trade and tax performance. Using cross-sectional data from 2021, the authors address the endogeneity between trade and tax performance by instrumenting for trade openness with geographical determinants of bilateral trade through gravity model estimations. They find that trade openness has a positive causal effect on tax revenue as a percentage of gross domestic product, controlling for neoclassical economic factors, tax policy, and institutional quality. The effect is more pronounced in lower-income countries and those relying more on indirect taxes, though these differences are not statistically significant.

Additionally, using stochastic frontier analysis Le and co-authors find that trade openness positively influences tax efficiency. Their results suggest that the current retreat from global trade may have significant implications for countries' fiscal capacity, particularly for emerging markets where trade plays a crucial role in economic development. These results, the authors argue, are particularly relevant as countries navigate the implementation of the Global Minimum Tax while global trade alliances undergo substantial restructuring.

Collectively these articles provide a rich variety of perspectives that honour the numerous contributions of Professor Tran-Nam during his career principally spent at the UNSW Business School. I was very honoured to have been invited and able to present a co-written paper with Professor Lisa Marriott that is included in this issue. On behalf of my co-author and myself, I would very much like to thank the regular Editors of the *Journal* for handling the review process for this article. I commend this Special Issue to you.

Adrian Sawyer*

Guest Editor

[6] Thai-Ha Le, Pham Thi Bich Ngoc and Pham Hoang Van, 'International Trade and Tax Performance' (2025) 23(1) *eJournal of Tax Research*.

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We appreciate the Guest Editor's work for this Special Issue and support to the *eJournal of Tax Research*. As co-editors, we wish to inform our readers that the review process for the article co-authored by the Guest Editor was managed independently by us and there was no conflict of interest.

We would also like to take this opportunity to thank Emeritus Professor Binh Tran-Nam for his long and outstanding service to the *Journal* as a founding Editor. It was our great honour to support the conference and publish this special issue in recognition of his scholarly contributions to the field of taxation – particularly in the very *Journal* he and Professor Rodney Fisher (who later moved to the University of Technology Sydney and retired there) established over two decades ago.

Youngdeok Lim and Yan Xu

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Emeritus Professor Binh Tran-Nam – a personal tribute

In November 2024 nearly 40 scholars from over a dozen different countries assembled at a colloquium in Bali, Indonesia to mark the retirement of Professor Binh Tran-Nam after a career that has spanned over 40 years of teaching and research at various universities in Australia, New Zealand, Vietnam and elsewhere. Fifteen papers were presented at this 'Aspects of Tax Administration and Economic Development' colloquium, some of which appear in this Special Issue of the *eJournal of Tax Research*. The range of the papers – across the full spectrum of topics in taxation and in economics and economic development – bears ample testimony to the depth and breadth of Binh's scholarship, and this short tribute by two of his longstanding colleagues and close friends will do scant justice to his many academic and other achievements over the last 40 years.

Binh was born in Hai Phong and grew up in what was then Sài Gòn, Vietnam. Upon completing high school, he received a Colombo Plan scholarship to study in Australia. He obtained a Bachelor of Economics (with first class honours and university medal) from James Cook University in 1976. Subsequently he won an Australian National University (ANU) Scholarship to complete a Master of Economics by course work at the ANU. His association with UNSW Sydney began in 1978, when he was awarded a Commonwealth Postgraduate Research Award to undertake a doctoral study in Economics under Research Professor Murray C Kemp, graduating in 1982.

Prior to returning to UNSW Sydney as a Lecturer in Taxation in the newly formed Australian School of Taxation (ATAX) in 1991, Binh lectured in Economics at University of Auckland (1982-85) and Deakin University (1989-91) and was a National Research Fellow in the Centre for Applied Economic Research at UNSW Sydney (1985-90). Over the years Binh has also held short-term appointments at the University of Technology Sydney, Nagoya City University, University of California (Santa Barbara), Vietnam National University of Agriculture, Ton Duc Thang University and RMIT University in Vietnam. He has taught, at undergraduate and postgraduate levels, a wide range of courses including microeconomics, macroeconomics, managerial economics, industrial economics, public finance, international trade, quantitative methods, econometrics, business finance, business law and taxation, tax policy framework, research methods in taxation and dissertation proposal. He also successfully supervised more than a dozen doctoral and MPhil candidates.

Binh's research interests focus on taxation, international trade and development economics, often complemented by his extensive knowledge and experience in quantitative methods and especially survey research. He has published over 100

refereed articles in academic journals in Australia, Canada, Germany, Japan, the Netherlands, New Zealand, the UK and the US. His research in Vietnam as a transition economy has yielded several articles and co-edited books, including *The Vietnamese Economy: Awakening the Dormant Dragon*, published by RoutledgeCurzon in January 2003.

We came to know Binh as a colleague and fellow teacher and researcher, and then as a close friend, when we joined ATAX at UNSW Sydney from overseas in 1992 and 1994 respectively. In Michael's case he and Binh productively shared an office for a year. We have since successfully and productively worked together on any number of major and minor research projects, culminating in a vast number of jointly written articles, chapters in books and full books. Our first joint venture, along with Katherine Ritchie, was to conduct what was then the world's largest postal survey (involving over 15,000 taxpayers) looking at the taxation compliance costs of both personal and business taxpayers in Australia, a research project commissioned by the Revenue Analysis Branch of the Australian Taxation Office (ATO). That project produced seminal works in the area and would neither have been possible nor so successful without Binh's tremendous academic input (particularly on the statistical side), tireless energy and great sense of humour, all combined with an amazingly analytical and insightful brain. Our own careers owed an enormous debt to Binh right from the outset, and that debt has continued to grow over the ensuing years.

Binh has attracted, on his own and with us and others, external peer-reviewed and competitive grants, together with commissioned research, that cumulatively total more than AUD 2 million. These awards include two Australian Research Council (ARC) Discovery Grants, three ARC Linkage grants, an ARC Linkage International Awards and Fellowships grant and a small ARC grant. Other competitive funding that he has obtained includes external grants from the Academy of the Social Sciences in Australia, Australasian Institute of Judicial Administration, Australian Agency for International Development (AusAID), Australia–Korea Foundation, Catalyst and CPA Australia. He has also acted as a consultant to AusAID, the Australian Taxation Office, Australian Vice-Chancellors' Committee, Board of Taxation, Department for International Development Vietnam, GIZ, New Zealand Inland Revenue, New South Wales Taxpayers' Association, Oxfam Vietnam, UNDP Vietnam, USAID, Victorian Community Services and World Bank Vietnam.

Binh served as a founding Co-Editor of this journal and the *International Journal of Development and Conflict,* and as an Associate Editor of the *Asia-Pacific Journal of Regional Science*. He is also a founding Editorial Board member of the *Journal of Chinese Tax and Policy* and *Public Sector Economics*, and an Advisory Board member of the *New Zealand Journal of Taxation Law and Policy*. He is, or has been, an International Fellow at the Tax Administration Research Centre (Exeter University–Institute for Fiscal Studies) and an Adjunct Research Fellow at the Tax Law and Policy Research Group (Monash University).

Binh's work has had a significant impact in Australia and overseas. He has sought to engage with the Australian community and government by working on topics of current interest and direct relevance to tax administration and tax policy-making in Australasia. His work on tax compliance costs and on personal tax reform has led to direct changes, and meaningful improvements, to Australia's tax system. Binh's research has also been

cited in Federal parliamentary debates and in the High Court. And, as a former Colombo Plan scholarship recipient, Binh has also contributed in a meaningful way to Vietnam's development. His engagement with Vietnam covers a wide range of activities including conference presentations and organisation, undergraduate and postgraduate teaching, research collaboration, policy advice and consultancy on tax and university reform to the Ministry of Finance and Ministry of Education and Training, respectively. He helped to establish the International Society of Vietnam Economists and was elected its inaugural Secretary in 2013 and President in 2019. Since 2015 he has become a Director of Vietnam Foundation, an Australia-based charitable organisation which aims to build schools and bridges and assist poor students in Vietnam.

Thankfully, some of Binh's work in Australia and in Vietnam has received the recognition it so thoroughly deserves. In January 2015, the Australasian Tax Teachers Association (ATTA) awarded him the Hill Medal in recognition of his 'outstanding contributions to tax teaching and tax policy in Australasia', and in January 2018 he was awarded lifetime membership of ATTA. For his services in Vietnam, he has been awarded VietnamNet's Achievement Award (for contribution to Vietnam's national development) in 2006, and the Vietnamese Foreign Affairs Minister's Certificate of Commendation (for effective contributions to scientific, economic research and international economic integration of Vietnam) in 2007.

Binh, of course, is not finished yet. Early in 2025 he was awarded Emeritus Professor status by UNSW Sydney, reflecting the very high esteem in which he is held by his home institution and by all his colleagues. That award marks not so much a retirement – though hopefully Binh will have more time to devote to the close family that means so much to him – but an opportunity for yet more research, publications, contribution and impact. We await, with some trepidation, the knock on the door, the phone call, or the late-night email that signals Binh's invitation to one or both of us to get involved in yet more collaboration, whether it might be another grant application, a publication of some sort, a major or minor research project or a conference presentation.

This Special Issue of the *eJournal of Tax Research*, will, we hope, be a fitting tribute to a wonderful colleague and a very good friend.

Chris Evans and Michael Walpole
UNSW Sydney, April 2025

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How CHAID analysis can assist revenue authorities in analysing tax compliance costs

Karen Stark,[*] Sharon Smulders[**] and Elza Odendaal[***]

Abstract

Tax compliance costs represent an economic burden to society and can result in reduced tax compliance behaviour. Traditional techniques used to establish the determinants of tax compliance costs include, inter alia, regression and simple descriptive statistics. This article explains how a Chi-square automatic interaction detection (CHAID) analysis, a decision tree modelling technique, was used to analyse the tax compliance costs of 10,260 individual taxpayers in South Africa. CHAID analysis provided granular insights beyond traditional techniques to enable a better understanding of the determinants which could lead to targeted support to enhance taxpayer compliance and reduce government collection costs.

Keywords: tax compliance costs, personal income tax, determinants, Chi-square automatic interaction detection (CHAID)

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1. INTRODUCTION AND MOTIVATION

The ultimate goal of tax policies is to raise sufficient revenue in a manner that minimises collection and enforcement costs (Alm, 1996). Tax compliance costs reduce the economic resources of taxpayers without providing any increase in the government's fiscal budget and are thus an economic problem for society (Eichfelder & Hechtner, 2018). Tax compliance costs also negatively affect entrepreneurship (Djankov et al., 2002) and impair the overall compliance within a tax system (Alm et al., 2010).

A review by Bruce-Twum and Schutte (2021) of 33 tax compliance cost studies published between 1992 and 2018 indicated that the primary technique used in analysing tax compliance cost data was regression (67%), while descriptive statistics were utilised in 33% of the studies and correlation in 18%.[1] Other analysis techniques used included the Individual Taxpayer Burden Model, Panel Data Analysis, Extrapolation, Simulation and Matrix Analysis (Bruce-Twum & Schutte, 2021). None were found using the Chi-square automatic interaction detection (CHAID) technique. CHAID offers a number of advantages over several more commonly used analysis techniques (such as regression) because it is non-parametric and non-linear (Önder & Uyar, 2017) and thus accommodates categorical variables without requiring data normality. It also segments data into subgroups based on statistically significant characteristics and then reveals unique patterns across different taxpayer groups, enhancing understanding of tax compliance cost determinants.

For this study, both multiple linear regression analysis, using forward stepwise modelling, and the CHAID technique were used to establish the determinants of tax compliance costs for individual taxpayers in South Africa for the 2018 year of assessment. The CHAID technique enabled the determination of patterns among the categorical variables considered as independent variables. This not only assisted in identifying the characteristics that will influence tax compliance costs but also in identifying different groups of taxpayers with different characteristics which have different levels of tax compliance costs. Knowing the determinants of tax compliance costs for the different taxpayer groups could assist with tax policy decisions and pinpoint areas that could alleviate the taxpayers' compliance burden.

The next section explains the methodology adopted in collecting the data and calculating the tax compliance costs; this is followed by a detailed discussion of the analyses performed, first on the scale items (for possible additional determinants), then the multiple linear regression. This is followed by the CHAID technique to explore linear and non-linear determinants of tax compliance costs. The findings of the regression and CHAID analysis are discussed and the conclusion is presented thereafter.

2. METHODOLOGY

A positivist research philosophy, functionalist paradigm and quantitative design were followed. An online questionnaire was used to collect the survey data, enabling various statistical techniques to be performed to analyse the data and quantify the tax compliance costs.

[1] The total percentages added to 161% since the coding was exhaustive.

2.1 The survey instrument

The online questionnaire was distributed by the South African Revenue Service (SARS) during March and April 2019 to a stratified random sample of individual taxpayers. The questionnaire included all the elements necessary to calculate tax compliance costs and to explore the determinants thereof. All tax-related activities of taxpayers were included as 'legitimate' tax compliance activities, in line with Tran-Nam, Evans and Lignier (2014), which included post-filing activities such as fulfilling verification and audit requests; lodging an objection; utilising the alternative dispute resolution process; and further litigation.

The data relevant to the determinants were obtained from responses regarding: Employment status (Q2), Who completed the tax return (Q4.1), Demographic questions (Q10.1-Q10.5) and Scale items (Q11.1-Q11.7). Some of the scale items have not previously been used in the context of tax compliance cost studies but were included in the questionnaire to test possible determinants and are explained in more detail later in the article.

Pilot testing of the questionnaire was performed and necessary adjustments were made. Lastly, the necessary ethical clearance was obtained and research ethics principles were adhered to during the research.

2.2 Response rate

In terms of the researchers' agreement with SARS, the questionnaire was delivered and administered by SARS. It was thus necessary for the researchers to rely on information and reports received from SARS relating to the distribution of the questionnaire. Despite this challenge, 14,100 responses were received and compared to the 145,037 persons who opened the email sent by SARS; the response rate equates to 9.7%. After the data cleaning process, the response rate drops to 7.07% (10,260 fully completed questionnaires). Even though the response rate is lower than the 29% obtained by Sapiei and Abdullah (2008) and 13.4% obtained by Tran-Nam et al. (2014), it is higher than the 2.36% obtained by Chattopadhyay and Das-Gupta (2002) and is thus deemed acceptable.

A wave analysis was conducted and assuming that late respondents can be used as a proxy for non-respondents, no non-response bias was detected for the survey.

2.3 Representativeness

The representativeness of the 10,260 responses collected was assessed against the population of individual taxpayers who submitted income tax returns for the 2018 year of assessment. The sample was found to be a good representation based on publicly available demographic characteristics such as taxpayer's location, age, gender and level of income (National Treasury & SARS, 2019) and thus no weighting was regarded necessary when determining the tax compliance costs.

2.4 Valuation of respondents' time

The valuation of a respondent's time was considered by requesting full-time employees to provide their gross monthly salaries (given that they are paid monthly) and asking for the (before-tax) hourly wage amounts from the other respondents (namely part-time employed, self-employed, retired or unemployed respondents). A follow-up question

regarding the respondent's income tax bracket helped to identify the marginal tax rate, to allow for using more than one valuation method of a respondent's time. Various valuation methods of valuing taxpayers' time have been recognised in the literature (Pope 1989, 1995); for example, each individual's valuation of their time or the same hourly value could be used for all respondents. These values could then be adjusted for tax and/or subjected to certain limitations. Six valuation methods were used to obtain a lower- and upper-bound estimate of tax compliance costs[2] but for the purposes of this article the tax compliance costs based on the weighted average after-tax hourly rates will be used.

3. SCALE ITEMS

The focus of this research was to examine taxpayer demographics, income, employment status and how SARS interactions influence tax compliance costs. The last factor, how SARS interactions influence tax compliance costs, was determined by including rating questions (scale items) in the questionnaire. These questions established whether or not taxpayers perceived the tax legislation and tax guidance issued by SARS as complex since the complexity of tax legislation has been identified as a determinant of tax compliance costs (Vaillancourt, 1989; Evans, 2003; Steyn, 2011). Another reason for including these questions was to consider the service orientation of SARS because Eichfelder and Kegels (2014) have found empirical evidence that the service orientation of a tax authority (or lack thereof) is significantly associated with higher tax compliance costs. From the perspective of the 'slippery slope' framework, the service orientation of tax authorities is not only relevant for the trust dimension of compliance (voluntary compliance) but also for the power dimension of compliance (enforced compliance): it can result in a cost advantage (for a customer-friendly administration) or a cost disadvantage (for a control-oriented administration) (Kirchler et al., 2008; Eichfelder & Kegels, 2014).

The questions in the questionnaire using scale items therefore related to the perceptions of the survey respondents regarding reasons for tax compliance (Q11.1); complexity (Q11.2); SARS's service quality (Q11.4); appeal procedures (Q11.5); assessments, audits and penalties (Q11.6); and SARS's consultation and communication regarding changes to its system (Q11.7). A 5-point Likert-style rating (1 = strongly disagree, 5 = strongly agree) was used to measure these constructs.

The first part of the analysis of the data discussed next provides a high-level overview of the extent to which the respondents agreed with the scale items provided. This is followed by an exploratory factor analysis to determine if the underlying factors could be seen as a unidimensional construct, which can then be used in the regression analyses. The identified factors that displayed satisfactory reliability, based on their Cronbach Alpha values, were then analysed further.

3.1 High-level overview of respondents' agreement with scale items

The first two questions containing scale items (Q11.1 and Q11.2) and the last question (Q11.7) were open to all respondents, but Q11.4 was only open to respondents who answered 'yes' to the following question (Q11.3): 'Did you have any interaction (via telephone, e-mail or in person) with a SARS official in the last 12 months?'. This was

[2] Refer to detailed discussion in sections 3.3 and 5.7 of Stark (2020).

done to ensure that only those taxpayers who had dealt with SARS directly provided answers to this question, thereby preventing respondents from answering based on hearsay. For the same reason, Q11.5 could only be answered by respondents who had used the appeal procedures, and Q11.6 by respondents who had been audited.

Table 1 sets out the mean of each scale item to provide an overview of the extent to which the respondents agreed with the items. For each item the minimum awarded was 1 (strongly disagree), 3 was neutral, and the maximum was 5 (strongly agree).

Table 1: Mean Ratings of Each Scale Item

	N	MEAN
Q11.1		
I pay my taxes to support the state and other citizens.		3.59
I pay my taxes without spending a long time thinking how I could reduce my tax.	9277	3.49
I pay my taxes reluctantly because the tax revenue is not spent appropriately.	9354	3.88
I pay my taxes even though I know that others do not.	9145	3.87
I pay my taxes because the punishment for tax evasion is severe.	9217	3.79
Q11.2		
Tax legislation is easy to read.	9244	2.94
Tax legislation is easy to understand.	9143	2.86
Guides issued by SARS are easy to read.	9250	3.30
Guides issued by SARS are easy to understand.	9217	3.25
It is easy to find the provisions in the tax legislation that apply to me.	8948	3.00
Q11.4		
SARS officials gave me precise answers (i.e. not vague).	4149	3.44
The information obtained from SARS corresponded to my needs.	4116	3.46
The answers provided by SARS were consistent regardless of who provided them (for example staff at different branches).	4104	3.30
SARS officials approached their jobs with professionalism and dedication.	4110	3.45
SARS officials are very capable to perform their jobs.	4105	3.40
Q11.5		

I have been able to express my views during those procedures.	237	2.73
I have had influence over the outcomes arrived at by those procedures.	233	2.42
Those procedures have been free of bias.	232	2.81
Those procedures have been fair and transparent.	231	2.47
Q11.6		
SARS investigates until it finds something.	3031	3.33
SARS primarily aims to punish.	3065	2.92
SARS's penalties are too severe relative to the offence.	2841	3.22
Q11.7		
SARS consults widely about how they might change things to make it easier for taxpayers to meet their obligations.	8619	3.04
SARS goes to great lengths to consult with the community over changes to its system.	8598	2.74
SARS communicates changes to its system clearly and effectively.	8850	2.91

From Table 1 it is clear that all items for Q11.1 and Q11.4 obtained a mean rating higher than 3, indicating for Q11.1 that there was a tendency to agree with coercive and persuasive reasons for tax compliance. For Q11.4 there was a tendency to agree with positive perceptions of SARS's service quality. The mean ratings of all the items for Q11.5 were lower than 3, indicating a tendency among respondents towards negative perceptions of their experiences during appeal procedures. The mean rating for the items in the other questions (Q11.2, Q11.6 and Q11.7) did not consistently tend towards either agreement or disagreement. Overall, the item that obtained the lowest mean rating (strongest disagreement) related to the appeal procedures – it stated: '*I have had influence over the outcomes arrived at by those procedures*'. The item that obtained the highest mean rating (strongest agreement) was '*I pay my taxes reluctantly because the tax revenue is not spent appropriately*'.

3.2 Exploratory factor analysis

An exploratory factor analysis was performed[3] in order to determine whether the items under each question constituted a unidimensional construct. The following six

[3] Principal axis factoring was used as the extraction method and Promax as the rotation method, as described by Costello and Osborne (2005). The appropriateness of conducting factor analysis was tested using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of Sphericity (Pallant, 2007). The KMO was equal to or higher than the acceptable threshold of 0.5 and the Bartlett's Test of Sphericity was statistically significant ($p < 0.001$) for the items in all the constructs (Pallant, 2007), indicating that a factor analysis was indeed appropriate for the constructs. For the '*reasons for tax compliance*' construct, two factors were identified based on the eigenvalue criterion (an eigenvalue greater than 1), thus indicating

unidimensional constructs, '*tax legislation complexity*' (Q11.2A), '*complexity of SARS guides*' (Q11.2B), '*SARS's service quality*' (Q11.4), '*appeal procedures*' (Q11.5), '*assessments, audits and penalties*' (Q11.6) and '*SARS's consultation and communication regarding changes to its system*' (Q11.7) were confirmed using the eigenvalue larger than 1 criterion and because the Cronbach Alpha values were all above the acknowledged exploratory threshold of 0.6 (as described by Field (2013)), the reliability was considered satisfactory.

The next section ascertains the determinants of the tax compliance costs of individual taxpayers based on the respondents' ratings of these six constructs and other variables (possible determinants). Results from the multiple linear regression analysis, using forward stepwise modelling, are presented first, followed by a CHAID decision tree modelling analysis to establish and interpret the most significant determinants of the tax compliance costs.

4. MULTIPLE LINEAR REGRESSION

Multiple linear regression modelling was conducted on the data to determine the determinants of tax compliance costs. Multiple regression modelling enables the identification of statistically significant predictors as well, enabling the comparison of the strength of the effect of each individual independent variable to the dependent variable by studying the standardised beta coefficients of each predictor. As it is known that large sample sizes do increase statistical significance, it was important to study the standardised beta coefficients in conjunction with the significance level indicated. The key determinants identified in the regression analysis were: self-employment (as compared to full-time employment), taxpayers who used paid help to submit their tax returns (in comparison to those who filed their own returns), and taxpayers in the higher tax brackets, specifically (in ZAR) 'R708,311 to R1,500,000' and 'Exceeding R1,500,000,' when compared to the reference tax bracket of 'Not exceeding R189,880'.

The regression analysis was followed by a CHAID analysis, which not only allowed for linear relationships but also non-linear relationships. It enabled the determination of patterns among the categorical variables considered as independent variables. This not only assisted in identifying the characteristics that will influence tax compliance costs but also in identifying different groups of taxpayers with different characteristics that have different levels of tax compliance costs.

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that the construct was not unidimensional. The items that clustered on the same factor (Factor 1) appear to imply coercive compliance while the items of Factor 2 appear to imply persuasive compliance. However, as the Cronbach Alpha coefficient values for these factors were only 0.517 and 0.443 respectively, the reliability of these items was not considered acceptable. Hence, this construct was not considered further, in line with Pallant (2007). For all the remaining constructs the analysis identified only one factor in each instance based on the eigenvalue criterion (an eigenvalue greater than 1). The Cronbach Alpha values for the unidimensional constructs, '*tax legislation complexity*' (Q11.2A), '*complexity of SARS guides*' (Q11.2B), '*SARS's service quality*' (Q11.4), '*appeal procedures*' (Q11.5), '*assessments, audits and penalties*' (Q11.6) and '*SARS's consultation and communication regarding changes to its system*' (Q11.7) were all above the acknowledged exploratory threshold of 0.6 and were thus considered satisfactory, as described by Field (2013). Two of the constructs (*tax legislation complexity* and *complexity of SARS guides*) consist of two items each. Two-item constructs are more prone to estimation problems, especially when the sample size is small (Kline, 2005; Eisinga et al., 2013), but the large sample in this study and the very high correlation between the two items (> 0.7) made these constructs admissible.

5. CHAID DECISION TREES

The CHAID technique offers a number of advantages over several more commonly used statistical analysis techniques (such as regression) because it is non-parametric and non-linear (Önder & Uyar, 2017). A CHAID analysis starts by finding independent variables that have a statistically significant association with or best explain the dependent or target variable. In this research, the dependent variable was tax compliance costs. The possible determinants of tax compliance costs were the independent variables. It then assesses the category groupings, or interval breaks in the case of continuous variables, to pick the most significant combination – the independent variables homogeneous with respect to the dependent variable (Thomas & Galambos, 2004). These subgroups of the independent variables continue to generate more subgroups for significant variables (determinants), making the relationships between the subgroups visible. In other words, CHAID analysis shows the determinants and their interactions with the dependent variable via a tree diagram using the chi-square or F statistics, Bonferroni method and category merger algorithm (Kass, 1980; Önder & Uyar, 2017). The independent variable with the strongest association with tax compliance costs (the best determinant) becomes the first branch in a tree with a leaf for each category that is significantly different relative, in this case, to tax compliance costs (Thomas & Galambos, 2004).

Identifying the potential determinants of tax compliance costs to be specified as independent variables for this CHAID decision tree modelling analysis was thus very important. Guyton et al. (2003) divided the determinants of tax compliance costs into three groups, namely those relating to taxpayer characteristics, tax compliance methods and tax return complexity. Tran-Nam et al. (2014) seemed to combine elements of the last two groups by stating that the use of paid tax agents is an indicator of tax complexity and therefore an important determinant of tax compliance costs.

Based on the data obtained in this research, the *taxpayer characteristics* included as independent variables were employment status, taxable income, location, gender, age, education level and tax knowledge. The *tax compliance method* was represented by the variable on the type of assistance (‘self’, ‘free help’, ‘paid help’ or ‘SARS employee’). Information regarding *complexity* was obtained from respondents’ ratings of the constructs ‘*tax legislation complexity*’ and ‘*SARS guides complexity*’ and these factor-based variables were therefore also included as independent variables. It is accepted that the finding by Eichfelder and Kegels (2014) that a (lack of) *service orientation* by a tax authority is significantly connected with higher tax compliance costs, results in a fourth group of determinants of tax compliance costs. The respondents’ ratings of the remaining four constructs (namely SARS’s service quality, appeal procedures, assessments, audits and penalties, and SARS’s consultation and communication regarding changes to its system) relate to SARS’s service orientation. These were therefore also included as independent variables.

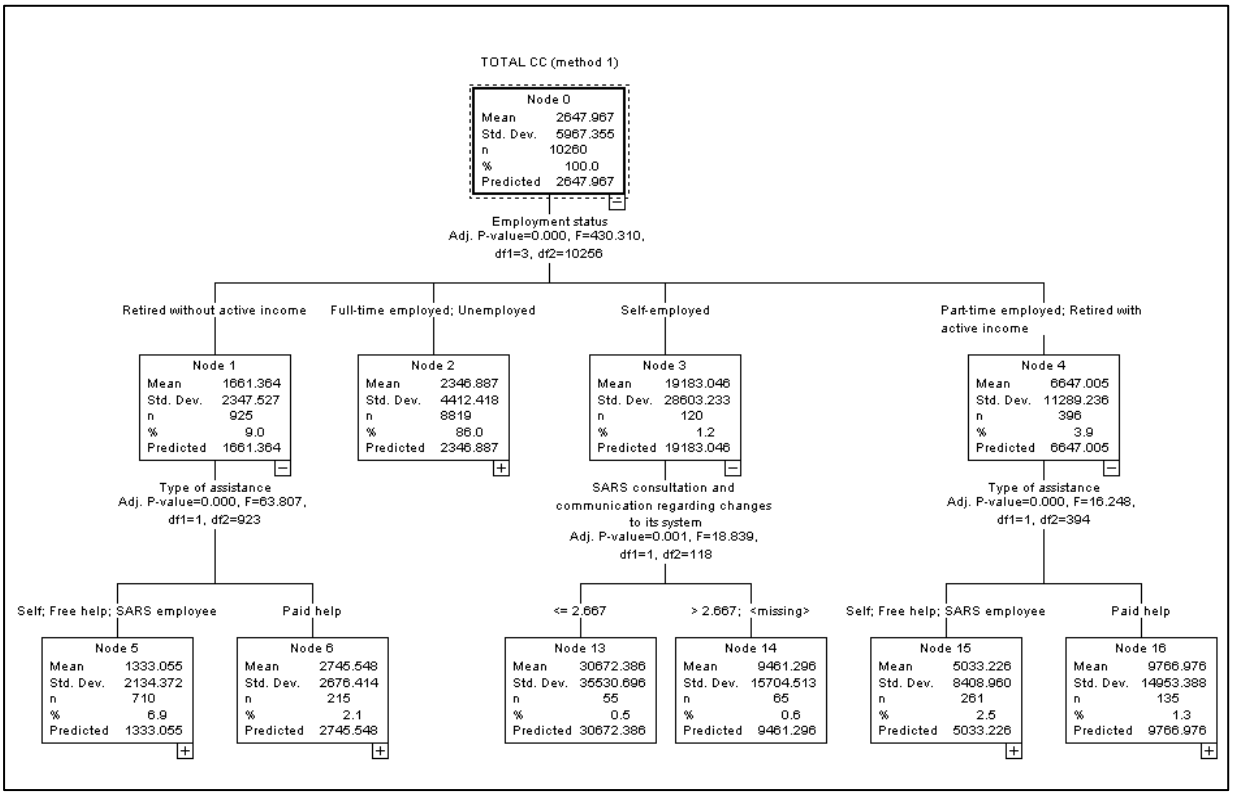
The results of the CHAID tree analyses will be presented next.

5.1 CHAID application to tax compliance costs

An example of the CHAID output from SPSS is provided in Figure 1 while subsequent Figures will present relevant information in a more user-friendly way. In Figure 1, Node 0 (also known as the ‘trunk’ of the tree) indicates the actual mean of the tax compliance costs of the 10,260 respondents using the weighted average after-tax hourly

rates valuation method[4] (abbreviated as 'TOTAL CC (method 1)' in the tree), namely R2,647.97 (Stark et al., 2024, p. 80).

Fig. 1: SPSS CHAID Output Example



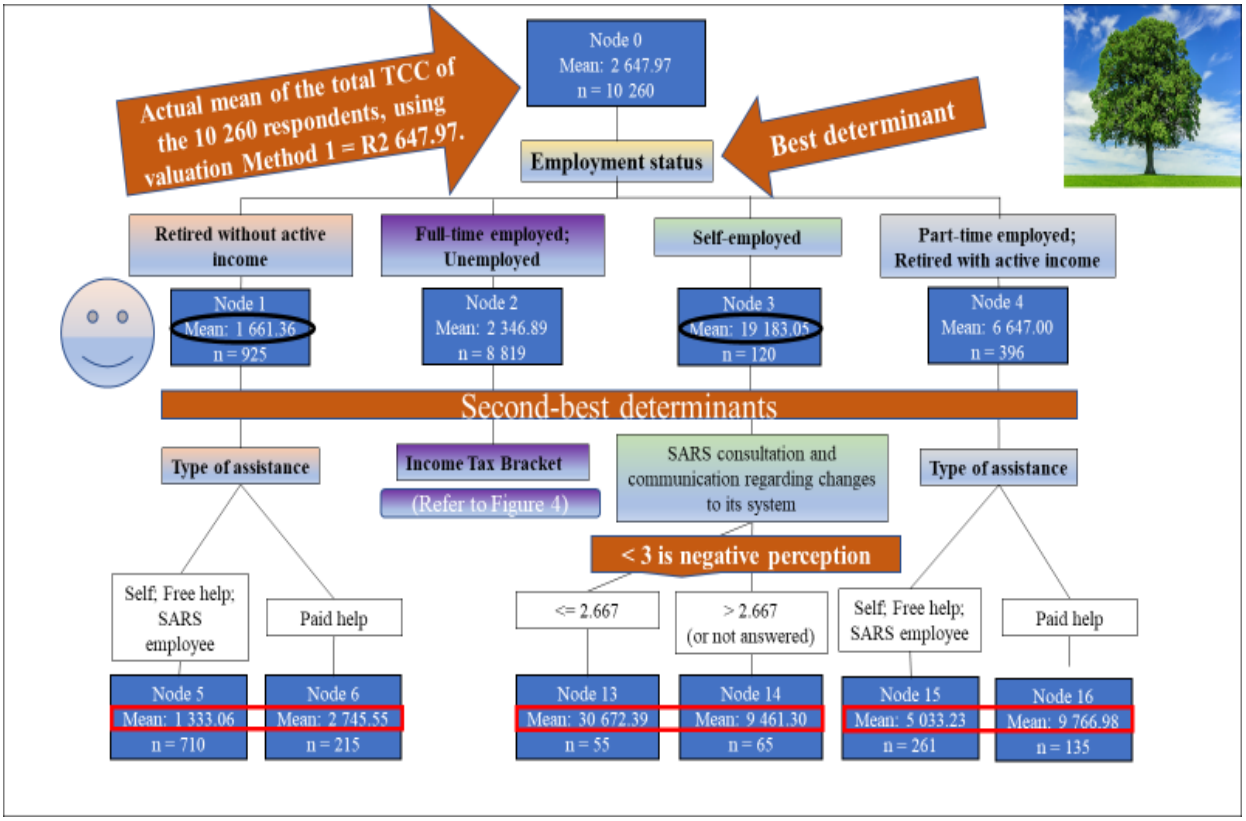
Source: authors' data and SPSS output.

From Figure 1, it is clear that the best determinant of the respondents' tax compliance costs was their *employment status* ($F=430.31$, $p<0.001$), indicated as the first layer of 'branches'. It is also clear that branches could further be expanded using the '+' indicators. To increase readability the visible branches will be managed in the discussion of the CHAID diagrams in the next figures.

Figure 2 presents the same information as contained in Figure 1 in a different format with additional clarifications.

[4] The first of the six methods to value an hour spent by respondents, as described in section 2.4.

Fig. 2: Tax Compliance Costs CHAID Tree with First and Second Layer of Branches Explained



Source: authors' data and diagram based on SPSS output.

As already pointed out in Figure 1 and indicated by the arrow on the right in Figure 2 the best determinant of the respondents' tax compliance costs was their *employment status*. The retired respondents without active income had the lowest average tax compliance costs (R1,661.36), and self-employed respondents' average tax compliance costs were the highest (R19,183.05). This corresponds to the findings of other studies[5] that employment status is a determinant of tax compliance costs and that self-employed individuals tend to have higher tax compliance costs than full-time employed individuals.

The second-best determinant of these respondents' tax compliance costs (the next layer of 'branches') depended on their employment status. For self-employed respondents, the second-best determinant was their perceptions relating to *SARS's consultation and communication of changes to its system*,[6] and *type of assistance* was the second-best

[5] For example, those by Allers (1994), Guyton et al. (2003), Lopes et al. (2012), Sandford et al. (1989) and Slemrod and Sorum (1984).
[6] $F=18.8$, $p<0.01$.

determinant for respondents who were retired without active income[7] or retired with active income/part-time employed.[8]

It is also clear from these second-best determinants in Figure 2 that respondents who used paid help[9] had on average almost double[10] the tax compliance costs of those who submitted income tax returns themselves, obtained free help from a family member or friend, or received assistance from a SARS employee. This finding that the use of paid assistance was a determinant of tax compliance costs corresponds to the literature.[11]

Figure 2 also illustrates that the tax compliance costs of self-employed respondents with a negative perception[12] of *SARS's consultation and communication on changes to its system* were on average three times[13] the costs of respondents who had a less negative perception.[14] This finding is in line with the finding by Eichfelder and Kegels (2014) that the lack of service orientation of a tax authority increases tax compliance costs.

When the CHAID tree was expanded to the last layer[15] (also known as 'twigs'), three determinants emerged, namely *SARS's consultation and communication of changes to its system*,[16] *education level*[17] and *gender*[18] (refer to Figure 3). However, no further layer for self-employed respondents was formed, given the small number of respondents with this employment status.[19]

Considering the last layer of determinants presented in Figure 3, it was found that the tax compliance costs of retired respondents without active income and who used paid assistance, were further influenced by their perceptions of *SARS's consultation and communication regarding changes to its system*. A negative perception rating[20] resulted in almost double[21] the tax compliance costs than a less negative[22] (or no) perception. Improving or finding alternative ways to consult and communicate changes to the SARS systems to these individuals is thus warranted. Considering this is an older generation, using electronic means of communication may not be ideal but outreach in the form of paper pamphlets may be more suitable.

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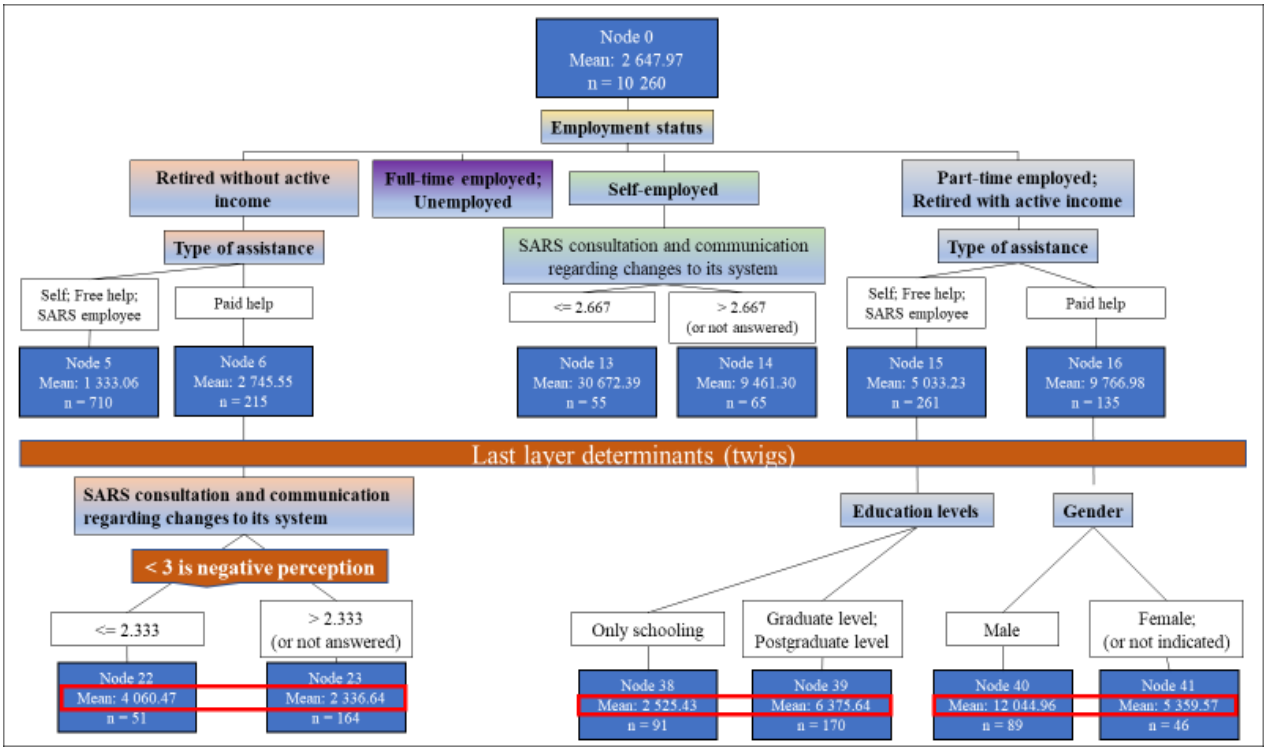
[7] F=63.8, p<0.001.
[8] F=16.2, p<0.001.
[9] Specifically, the retired (with and without active income) and part-time employed respondents.
[10] Comparing Nodes 5 and 6 (R1,333.06 and R2,745.55) and Nodes 15 and 16 (R5,033.23 and R9,766.98).
[11] For example, the studies by Blaufus et al. (2019) and Guyton et al. (2003).
[12] That was an average rating of 2.667 or less.
[13] Comparing Nodes 13 and 14 (R30,672.39 and R9,461.30).
[14] Keeping in mind that a rating of 3 was neutral, a rating above 2.667 may still be negative. Respondents who did not answer these questions were grouped with the respondents who had a rating of more than 2.667.
[15] For purpose of this analysis, the minimum number of cases for a new node was set at 40, which resulted in a maximum of three layers.
[16] F=17.3, p<0.01.
[17] F=13.0, p<0.01.
[18] F=6.3, p<0.05.
[19] The second layer of nodes (Nodes 13 and 14) consisted of only 55 and 65 respondents each, and the minimum number of cases (refer n 15, above) for a new node was not met. The second layer was thus closed in Figure 3 to enhance readability.
[20] A rating of 2.333 or less.
[21] Comparing Nodes 22 and 23 (R4,060.47 and R2,336.64).
[22] Keeping in mind that a rating of 3 was neutral, and therefore a rating above 2.333 may still be negative.

Fig. 3: Tax Compliance Costs CHAID Tree with Third-Layer Determinants



Source: authors' data and diagram based on SPSS output.

Figure 3 also illustrates that the tax compliance costs of respondents who were part-time employed or retired with active income and who did *not* use paid assistance, were further influenced by their *education* level. The tax compliance costs of respondents with graduate or postgraduate levels of education were on average two-and-a-half times[23] the tax compliance costs of those who only had a schooling level of education. Level of education was also reported as a determinant of tax compliance costs, for example, by Allers (1994), Klun (2004) and Mathieu et al. (2010). These findings confirm that the more educated a person is, the more time they tend to spend on their tax compliance activities.

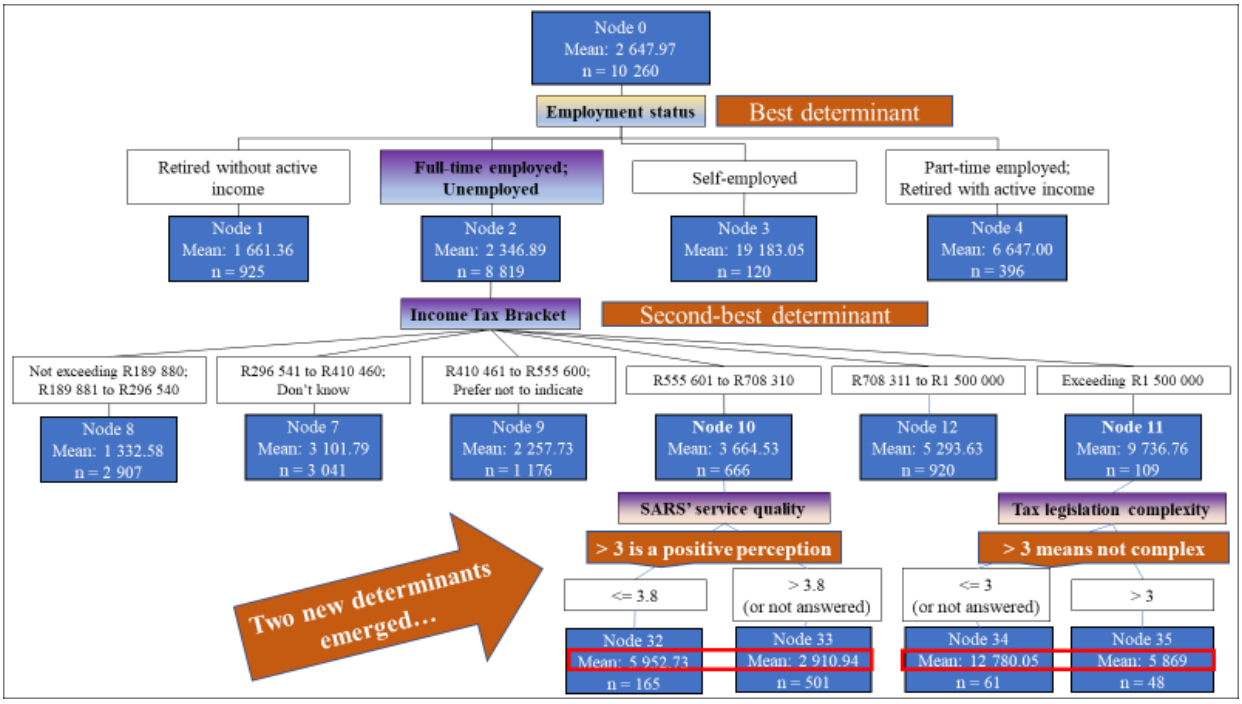
The tax compliance costs of respondents who were part-time employed or retired with active income and who used paid assistance, were further influenced by their *gender*. The tax compliance costs of male respondents was on average more than double[24] the tax compliance costs of the female respondents.[25] Allers (1994) and Blaufus et al. (2014) also reported that men spent more time completing their income tax returns than women. Reasons for this would require further research before determining what reforms could be put in place to reduce their tax compliance costs.

[23] Comparing Nodes 38 and 39 (R2,525.43 and R6,375.64).
[24] Comparing Nodes 40 and 41 (R12,044.96 and R5,359.57).
[25] Respondents who preferred not to indicate their gender were grouped with the female respondents.

The second-best determinant of the tax compliance costs of full-time employed (or unemployed) respondents, namely their *income tax bracket*,[26] was not considered in Figure 2 to enhance the readability of the CHAID tree and is now illustrated in Figure 4.

It should be noted that the groupings, in this case full-time employed and unemployed taxpayers, are not done manually. Category groupings or interval breaks in the case of continuous variables are done employing the CHAID technique, which picks the most significant combination – the independent variables homogeneous with respect to the dependent variable (Thomas & Galambos, 2004). A possible explanation for grouping these respondents together is that it is reasonable to expect that their main source of income would be indicated on an employee's tax certificate. If a now-unemployed person has worked for part of the year, that information pulls through to their tax return. Furthermore, with regard to income levels, it is possible that a now-unemployed person may have received a lump sum on retrenchment or loss of employment that increased their taxable income. However, these possible reasons are speculations and the researchers do not have enough information to substantiate these claims.

Fig. 4: Tax Compliance Costs CHAID Tree for Full-Time Employed (or Unemployed) Respondents



Source: authors' data and diagram based on SPSS output.

[26] F=215, p<0.001.

From Figure 4 it is clear that the average tax compliance costs increased from the lower tax brackets to the higher tax brackets,[27] namely from R1,332.58 for respondents whose taxable income fell in the lowest two tax brackets to R9,736.76 for respondents in the highest tax bracket. This can probably be partly attributed to higher hourly rates used by persons in the higher tax brackets to value their time spent on tax-related activities. It also corresponds to the findings of other studies that showed that a taxpayer's income level is a determinant of tax compliance costs, for example, the studies by Sandford et al. (1989), Pope and Fayle (1990), Allers (1994), Blaufus et al. (2019) and Blažić (2004).

Expanding the CHAID tree to the last layer, focusing on those respondents who were full-time employed (or unemployed), two of the previously discussed determinants[28] and two new determinants, *SARS's service quality*[29] and *tax legislation complexity*[30] emerged.[31] The tax compliance costs of respondents in this category of employment whose taxable income was '*R555,601 to R708,310*' were also influenced by their perceptions of SARS's service quality. The tax compliance costs of respondents with a very positive perception of SARS's service quality[32] were approximately half the cost of respondents with a less positive perception.[33] This finding supports the finding by Eichfelder and Kegels (2014) that a lack of service orientation of a tax authority increases tax compliance costs. It is therefore critical that SARS continues to strive to improve its services offered to taxpayers, especially to full-time employed and unemployed taxpayers as good service appears to reduce tax compliance costs and can improve tax compliance behaviour. Preparing guidance, in the form of a brochure for example, to those individuals that have become unemployed during the year could guide these taxpayers with their tax affairs and thus reduce their tax compliance costs.

Lastly, the tax compliance costs of respondents in this category of employment[34] whose taxable income '*exceeded R1,500,000*' were further influenced by their perceptions of the complexity of legislation. The tax compliance costs of the respondents who had a rating above 3 (and therefore did not regard the legislation as complex) were just less than half[35] the tax compliance costs of respondents who gave a neutral rating or considered the legislation complex.[36] This finding confirmed that tax legislation complexity is a determinant of tax compliance costs (Evans 2003), especially for high-income individuals in a South African context.

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[27] The order of the output nodes has been changed to reflect the tax brackets in increasing sequence from left to right.
[28] *SARS's consultation and communication regarding changes to its system* and *type of assistance.* These related to nodes 7, 8, 9 and 12 and were not discussed again because similar conclusions were found than were discussed earlier.
[29] $F=39.9$, $p<0.001$.
[30] $F=8.9$, $p<0.05$.
[31] Refer to Nodes 10 and 11 in Figure 4.
[32] Namely an average rating of 3.8.
[33] Keeping in mind that a rating of less than 3.8 is still positive until it drops below 3.
[34] Full-time employed or unemployed.
[35] Comparing Nodes 34 and 35 (R12,780.05 and R5,869.25).
[36] Respondents who did not provide a rating were grouped with respondents giving a rating of 3 or less.

5.2 Gains table for nodes

Table 2 provides an overview of the spread of the CHAID decision tree in the form of a gains table, sorted from the highest mean tax compliance costs (highlighted in orange) to the lowest (highlighted in green).

Table 2: Gains in Tax Compliance Costs for Nodes

Node	N	Percentage	Mean
13	55	0.5%	30 672.39
34	61	0.6%	12 780.05
40	89	0.9%	12 044.96
14	65	0.6%	9 461.30
37	269	2.6%	7 712.93
39	170	1.7%	6 375.64
32	165	1.6%	5 952.73
35	48	0.5%	5 869.25
41	46	0.4%	5 359.57
29	99	1.0%	5 219.42
36	651	6.3%	4 293.95
22	51	0.5%	4 060.47
25	521	5.1%	3 581.02
17	42	0.4%	3 529.74
28	303	3.0%	3 014.32
33	501	4.9%	2 910.93
30	244	2.4%	2 864.71
38	91	0.9%	2 525.42
23	164	1.6%	2 336.64
31	833	8.1%	1 727.95
18	164	1.6%	1 680.80
24	2 520	24.6%[37]	1 559.74
27	1 020	9.9%	1 284.11
20	259	2.5%	1 220.05
26	1 584	15.4%	1 042.10
19	144	1.4%	917.57
21	101	1.0%	737.08
	10 260	**100.0%**	**2 647.97**

Source: authors' data; SPSS output.

[37] Node 24 represents the highest percentage of the respondents (namely 24.6%) with a predicted tax compliance costs of R1,559.74. This node branched off from Node 7 (see Figure 4) and represents those respondents who did not obtain paid assistance.

Node 13 (the highest mean tax compliance costs of R30 672) represented the *self-employed* respondents with a negative perception [38] of *SARS's consultation and communication regarding changes to its system* (refer to Figure 2). This aspect is under the control of SARS and efforts could be made to improve transparency, engagement and clarity in its interactions, especially with self-employed taxpayers.

Retired respondents without active income who did *not* use paid assistance and had a positive perception[39] of *SARS's consultation and communication regarding changes to its system* (Node 21[40]) had the lowest mean tax compliance costs, namely R737. The changes to SARS's system, for example, pre-population of third-party information such as investment income, that apply to these taxpayers appear to be making it easier for these individuals to comply. SARS must, however, continue to strive to empower these older taxpayers *not* having to use paid assistance by providing easy-to-understand information in a familiar format.

5.3 Isolated independent variables

To gain insight into the impact of location, age, tax knowledge and appeal procedures on tax compliance costs and the associated groups, a separate CHAID analysis was conducted with these independent variables.

The resultant CHAID tree indicated that the tax compliance costs of respondents with a negative experience of the *appeal procedures*[41] (an average rating of 2 or less out of 5) were on average double the costs of respondents with a less negative experience (an average rating of more than 2 out of 5) and approximately five times the costs of respondents who did not appeal their income tax assessment using the alternative dispute resolution process. This finding is in line with the finding by Blaufus et al. (2019) that appeal procedures increase tax compliance costs.

For the 2023-24 financial year, SARS reported a 76% improvement in appeals being resolved, which provided greater certainty to many taxpayers and enhanced the reputation of the dispute framework (SARS, 2024, p. 40). In this report, SARS also confirmed its commitment to resolve disputes as quickly as possible and without resorting to unnecessary litigation.[42]

With regard to *age*,[43] three subgroups were formed among the respondents who did not use the alternative dispute resolution process. Respondents who were 34 years or younger (or did not indicate their age) had the lowest tax compliance costs. The 35 to 44-year-old respondents on average had slightly higher tax compliance costs than the younger age group while respondents who were 45 years and older on average had the highest tax compliance costs. This is in line with Blažić's (2004) finding that older persons spend more time on tax compliance activities. Lopes et al. (2012) also found that the elderly have higher psychological costs caused by anxiety and stress than younger taxpayers.

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[38] An average rating of 2.667 or less.
[39] An average rating of more than 3.667.
[40] Node 21 branched off from Node 5 in Figure 3, but was not discussed further.
[41] $F=146.6$, $p<0.001$.
[42] Ninety-seven per cent of appeals were resolved using the Alternative Dispute Resolution (ADR) process, which is an improvement from 95% in the 2022/23 financial year (SARS, 2024, p. 40).
[43] $F=31.9$, $p<0.001$.

Since the study, SARS has introduced new service offerings such as the MobiApp and self-service terminals. Older taxpayers who are not comfortable using the SARS MobiApp on their cell phones to, for example, submit their tax returns, make payments and submit supporting documents, can make use of the self-service terminals. These machines were deployed to migrate even more taxpayers to digital platforms where employees not only assisted taxpayers in fulfilling their tax obligations but also used these engagements to encourage migration to digital channels for future self-service (SARS, 2024, p. 39). A further introduction by SARS since the study was conducted that could also assist older taxpayers was auto-assessments.[44] However, it is suggested that it should be communicated more clearly that the auto-assessment must be edited if the taxpayer is entitled to claim additional medical expenses which is more probable for older persons.

The last layer in this CHAID tree contained the effect of *tax knowledge*[45] and *location*[46] on tax compliance costs. A relationship between the level of tax knowledge and tax compliance costs was only apparent for respondents 45 years and older. For these respondents, as their tax knowledge increased so did their tax compliance costs. Lastly, a relationship between location and tax compliance costs was only visible for respondents who were 34 to 44 years old. The tax compliance costs of these respondents residing in Gauteng, the Northern Cape, the Western Cape, Mpumalanga, or Limpopo, or not living in South Africa at all, were on average approximately 50% more than the tax compliance costs of respondents residing in the Eastern Cape, KwaZulu Natal, North West and the Free State province. Further research should be conducted to determine why this is the case as initiatives (if any) used in the provinces with lower tax compliance costs could be expanded to other provinces if not already implemented.

A few prior studies have found that sources of income and type of tax return were determinants of tax compliance costs, for example, Sandford et al. (1989), Pope and Fayle (1990), Allers (1994), Guyton et al. (2003) and Blaufus et al. (2019). Including *employment status* as one of the original 14 independent variables to a large extent already catered for the sources of income and type of tax return (for example, business income). However, it was decided to explore the sources of income and types of expenditure further since some respondents who were employed full-time could also have a more complex return as a result of, for example, a claim against a travel allowance which would not have been ascertained as a determinant of tax compliance costs based on employment status.

5.4 Sources of income and types of expenditure

A potential concern regarding multicollinearity between the different sources of income and types of expenditure was first addressed by running a multicollinearity test. Based on a variance inflation factor threshold of 10, as recommended by Pallant (2007), no multicollinearity was detected between the set of independent variables. Therefore, for this CHAID analysis, the 20 different sources of income provided in Q3.1 and the 11 types of expenses provided in Q3.2 were used as the independent variables and the tax compliance costs was selected as the dependent variable.

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[44] The population of taxpayers who were automatically assessed is, on average, more than 2.5 million per year for the first two years and increased to 3.8 million in the 2023/24 financial year (SARS, 2024, p. 40).
[45] $F=17.7$, $p<0.001$.
[46] $F=16.6$, $p<0.05$.

In the resultant CHAID tree, the best determinant from all sources of income and types of expenditure was '*expenditure relating to other business income*'[47] (other than farming and rental) which aligns well with the fact that employment status was found to be the best determinant of the tax compliance costs (refer to Figure 1). The tax compliance costs for respondents with this type of expenditure was significantly higher than for respondents who did not have such expenditure.

For the respondents who did not have '*expenditure relating to other business income*', the second-best determinant was '*travel expenses*'.[48] Respondents who incurred travel expenses had almost three times the tax compliance costs of respondents who did not incur travel expenses. Having travel expenses necessitates keeping a logbook and results in a more complex tax return because additional information is required. Furthermore, the tax compliance costs of respondents who incurred travel expenses without receiving a salary (for example, earning commission income) was slightly more than double the tax compliance costs of respondents earning a salary.

Lastly, for respondents who incurred neither '*expenditure relating to other business income*' nor '*travel expenses*', '*expenditure relating to rental income*'[49] was a determinant of tax compliance costs. The tax compliance costs of respondents who incurred expenditure relating to rental income was more than three times the tax compliance costs of respondents who did not incur such costs. Declaring expenditure relating to rental income also resulted in a more complex tax return because additional information must be declared.

Additional record-keeping in all the above scenarios is inevitable but the extent of the increase in tax compliance costs could maybe be mitigated if SARS creates an online platform where taxpayers can record certain expenses in real-time throughout the year which can then be pre-populated on their tax return.

The last consideration in ascertaining the determinants of tax compliance costs related to post-filing activities since *post-filing* tax compliance costs may place a significant burden on (typically only a few) taxpayers (Eichfelder & Vaillancourt, 2014).

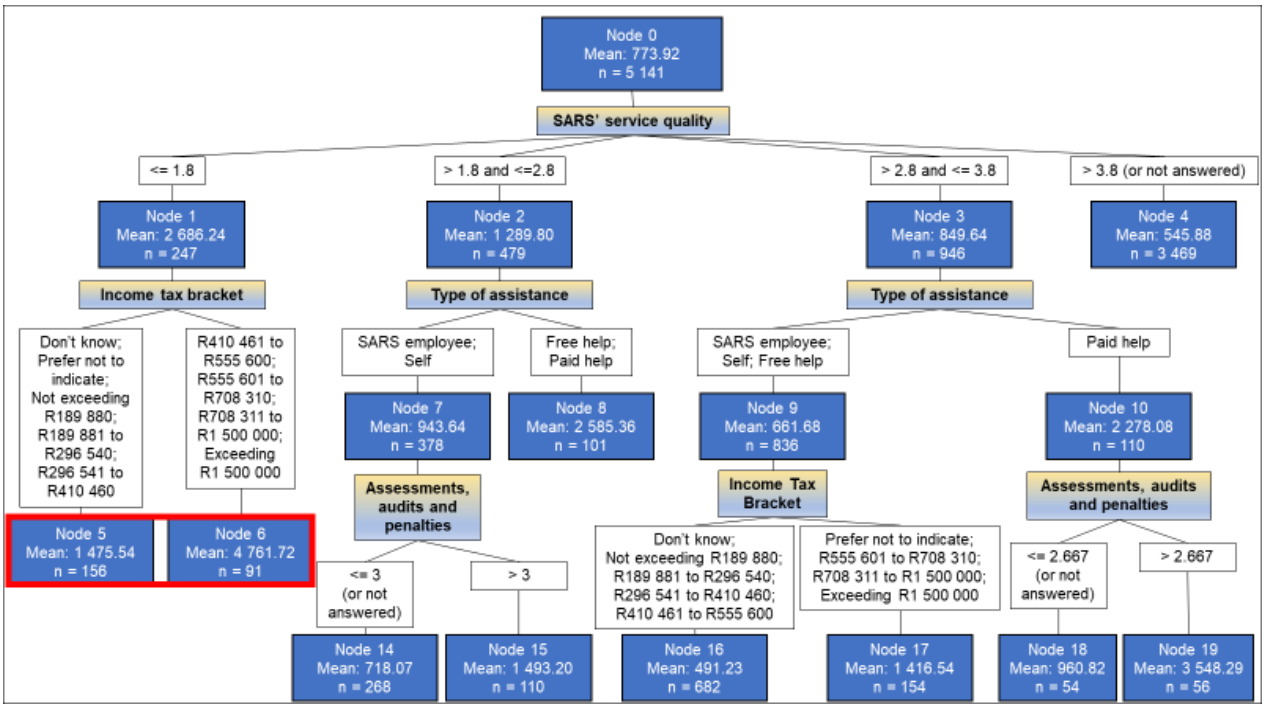
5.5 Post-filing tax compliance costs

It was found that the best determinant of post-filing tax compliance costs was *SARS's service quality*.[50] The CHAID tree diagram for post-filing activities is shown in Figure 5. For the sake of readability, Node 4 representing respondents with the most positive rating of SARS's service quality is not expanded further in the diagram. Figure 5 illustrates that the mean post-filing tax compliance costs of respondents with the most negative rating (<=1.8) of SARS's service quality and whose taxable income exceeded R410,460 (Node 6) were more than three times the costs of respondents with the same rating of SARS's service quality but with a taxable income of R410,460 or less (Node 5). Furthermore, comparing the mean post-filing tax compliance costs of the highest terminal node (Node 6) with the mean post-filing tax compliance costs of respondents with a rating of SARS's service quality higher than 3.8, the costs were almost nine times

[47] F=700.1, p<0.001.
[48] F=780.4, p<0.001.
[49] F=240.9, p<0.001.
[50] F=97.4, p<0.001.

higher. The other branches confirmed that the use of paid help and a more negative rating of assessments, audits and penalties increased (post-filing) tax compliance costs.

Fig. 5: Post-Filing Tax Compliance Costs CHAID Tree with All Three Layers and Indicating the Highest Terminal Node



Source: authors' data and diagram based on SPSS output.

6. CONCLUSION

The CHAID decision tree modelling technique was used to ascertain and segment the determinants of the tax compliance costs of individual taxpayers in South Africa. This was done by considering the respondents' ratings of six constructs ('*tax legislation complexity*', '*complexity of SARS guides*', '*SARS's service quality*', '*appeal procedures*', '*assessments, audits and penalties*' and '*SARS's consultation and communication regarding changes to its system*') as well as other characteristics of the respondents and the type of assistance they used to comply with their tax obligations as possible determinants. All of these possible determinants were the independent variables in the CHAID decision tree modelling technique. This technique showed the 'best' determinants (up to three levels) based on the independent variables that had the strongest association with tax compliance costs and their effects on tax compliance costs. The technique enabled the identification of specific groups of taxpayers associated with distinct ranges of these independent variables.

It was found that *employment status* and *income tax bracket* were the best determinants of tax compliance costs while *SARS's service quality* was the best determinant of *post-filing* tax compliance costs. Other determinants of tax compliance costs were the type

of assistance, gender, education level, tax legislation complexity, the complexity of SARS guides, SARS's service quality, assessments, audits and penalties, and SARS's consultation and communication regarding changes to its system. *Location*, *age*, *tax knowledge* and *appeal procedures* did not emerge as determinants of tax compliance costs using the CHAID technique due to other variables having a stronger relationship with costs but were isolated to gain insight into their impact on tax compliance costs and the associated groups.

By exploring sources of income and types of expenditure, it was found that '*expenditure relating to other business income*', '*travel expenses*', '*expenditure relating to rental income*' and '*salary income*' were determinants of tax compliance costs. Therefore, the determinants that emerged from the CHAID analyses in this research matched determinants from the three groups identified by Guyton et al. (2003), namely taxpayer characteristics, tax compliance methods and tax complexity. The determinants also related to the proposed fourth group, namely the service orientation of SARS – customer-friendly versus control-oriented as identified by Eichfelder and Kegels (2014).

This article showed how the CHAID technique could be used to provide a further dimension to ascertaining determinants of tax compliance costs, in addition to regression analysis used in several tax compliance cost studies, for example, by Slemrod and Sorum (1984), Vaillancourt et al. (2013) and Blaufus et al. (2019). This technique offers a number of advantages over several more commonly used analysis techniques because it is non-parametric and non-linear (Önder and Uyar, 2017). Furthermore, missing data do not present a problem, and normality and homogeneity assumptions of the data are not required. Linear relations between variables are neither assumed nor necessary. Moreover, the technique can be applied to continuous or discrete dependent and independent variables and its output is highly visual and easy to interpret with multiple trees (You et al., 2015; Önder and Uyar, 2017).

The CHAID technique outcomes thus identify the determinants, as with regression, however, they also determine the breakdown of individuals into specific groups according to the determinants that statistically significantly predict the dependent variable. This enables a better understanding of the influence of the continuous determinants' specific values (for example, SARS's service quality rating) and the categorical determinants (for example, education level and employment status) on tax compliance costs.

The CHAID technique thus provided an additional level of insight not possible with previously used data analysis techniques and could be a useful tool in future tax compliance cost studies. A more detailed level of patterns is visible which are powerful enough to enable specification and prioritisation of tax compliance cost initiatives by SARS.

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eJournal of Tax Research (2025) vol. 23, no. 1, pp. 32-61

An analysis of the pre- and post-coronavirus pandemic self-assessed tax payments of SME taxpayers in Indonesia

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Abstract

Small and medium enterprise (SME) taxpayers globally were severely impacted by the Covid-19 pandemic. This study analyses self-assessed presumptive tax payment data from 319 Indonesian tax offices to estimate how SME taxpayers' capacity to submit self-assessed tax payments responsively changed during January 2016-February 2023. We predict the expected amount of self-assessed tax payments in 2020 without the presence of the pandemic (pre-pandemic) and in 2022 in the presence of the pandemic (post-pandemic). Our predictive analyses are then compared to actual tax payments during March 2020-February 2021 and March 2022-February 2023. This benchmark case analysis may assist 'lesson-drawing' by tax administrations in developing countries to inform tax policy responses under presumptive tax systems.

Keywords: Covid, presumptive taxes, SME taxpayers, emerging economies, tax administration, data analytics

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1. INTRODUCTION

Tax revenues are crucial for public policy governance in most economies, particularly in emerging countries, where they mostly rely on the revenues to support their public policies. Among various tax revenues in Indonesia, self-assessed tax payments are especially important as these tax payments are submitted 'actively' based on the taxpayers' knowledge about the tax due on the taxable income earned. In aggregate, self-assessed tax receipts provide an input into a country's voluntary compliance rate and its relationship with tax agency enforcement action (see Lederman (2018) for an extensive review of this relationship).

The arrival of the coronavirus pandemic in 2020 drastically distorted various aspects of economic activities both globally, and in Indonesia. As the number of Covid-19 cases increased, the Indonesian government was forced to impose restrictions on mass gatherings, thus reducing most economic activities to limit the spread of the virulent disease (World Health Organization, 2020). This policy, in turn, influenced self-assessed tax compliance with a concomitant reduction in payment levels, especially those submitted by Indonesian small and medium enterprises (SMEs).

SMEs play an important role in Indonesia, absorbing 97% of the total workforce and contributing over 60% of its gross domestic product (GDP) in 2019 (Organisation for Economic Co-operation and Development (OECD), 2022). In response to their critical role and the reduction in tax payments, this study presents baseline evidence on how the self-assessed tax payments of Indonesian SMEs under a presumptive tax regime altered during the initial months of the pandemic, using revenue data from 32 regional tax offices. This study contributes to the literature on voluntary compliance under a presumptive tax by documenting the recovery of SME compliance with our repeat analysis over a second time period, two years after the pandemic.

Our study is motivated by two intersecting factors. First, it is evident that the coronavirus pandemic, as an extraordinary situation, acted as a severe shock to various economic sectors. However, attempts to indicate the influence of the pandemic on tax revenues are relatively limited, although tax systems were a critical policy focus of governments in responding to the pandemic (Daly, 2023). The second factor and primary objective of this research is to provide empirical data and analytical evidence on the use of presumptive taxes for SMEs designed to reduce compliance burden and increase compliance (Mas-Montserrat et al., 2023). Thus, this study provides a benchmark contribution to the literature of a developing country severely affected by Covid-19, in terms of pre- and post-pandemic tax receipts. The study is relevant in a wider context, of other developing countries, as they can extend this study's methodology and findings for the purposes of cross-national learning and benchmarking tax compliance through data analytics, to contribute to their own policy responses.

Although various studies have been undertaken into the influence of pandemic situations on economic activities (see, for example Susilawati et al., 2020), research which specifically examines the self-assessed tax payments of SMEs under a presumptive tax regime (in Indonesia or elsewhere), by reference to the coronavirus pandemic situation, is relatively scarce (Duve & Schutte, 2021). However, analysing the revenue impact of the pandemic is a useful starting point to identify the capacity differences of SME taxpayers in various regions and to synchronise tax policy settings in relation to the recovery of potential tax revenues, similar to various Covid-19-related policies used by various countries, including the Australian JobKeeper scheme (Corral

de Zubielqui & Harris, 2024) and the UK Self-Employment Income Support scheme (Chen et al., 2024; Daly, 2023).

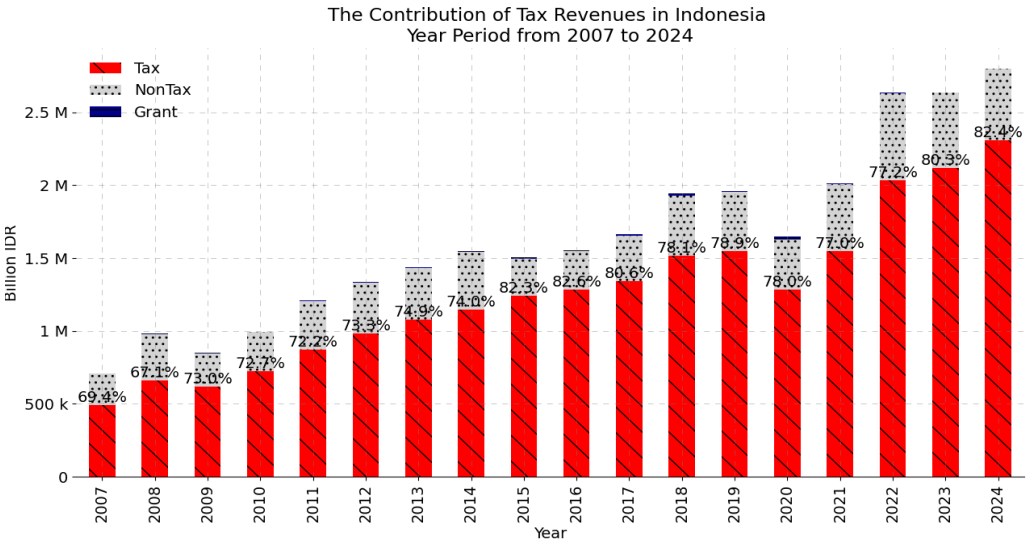
This article is structured as follows. The next section provides a brief review of the Indonesian tax system, with a focus on SMEs and outlines the Indonesian tax environment, the taxation of SMEs in Indonesia, and prior Indonesian tax compliance studies. Section 3 discusses prior literature on policy responses after Covid-19 and the pandemic's influence on self-assessed tax reporting behaviour. Section 4 outlines the materials, data and methods adopted in this study. Section 5 outlines our results and concluding remarks are offered in section 6.

2. INDONESIAN INSTITUTIONAL SME TAX ENVIRONMENT

2.1 Tax environment

Indonesia is the world's fourth most populous country with an estimated population of 281 million in 2024 (Central Bureau of Statistics, Indonesia, 2024), but with a relatively low tax/GDP ratio that has averaged around 10%-12% over the last decade (OECD, 2023). In Indonesia more than 70% of the national budget has been supported by tax revenue since 2009 (Central Bureau of Statistics, Indonesia, 2025). Figure 1 illustrates the importance of tax revenues in the state budget of Indonesia during the period from 2007 to 2024, and as a percentage of total government receipts.

Fig. 1: Indonesian Tax Revenue Contributions During the Period from 2007 to 2024 (IDR Billion)



Source: adapted from Central Bureau of Statistics, Indonesia (2025).

Indonesian state tax revenue is administered by the Directorate General of Taxes (DGT). Established in 1945 (Junisar & Priyatmoko, 2017), the DGT currently operates across 34 regional tax offices, in which the two largest are the large taxpayers regional tax

office and the Jakarta special regional tax office (Directorate General of Taxes, Indonesia, 2024a) and 32 regional tax offices serving SME taxpayers (Nuryanah et al., 2023). The main objective of implementing a market segment system was to concentrate on achieving targeted tax revenue by focusing on the most prominent contributing taxpayers (Parlaungan, 2017). However, the new system also has its drawbacks. In particular, the DGT has less focus on small- or low-contribution taxpayers such as personal income taxpayers. This is reflected in the tax revenue from personal income taxpayers who have contributed less than 2% of the total tax revenue during the period from 2014 to 2023 (Directorate General of Taxes, Indonesia, 2024b). Finally, as Hidayat (2024) concludes, the establishment of a Large Taxpayer Office does not necessarily result in increased tax compliance by firms.

The Indonesian government launched a series of tax reforms in 1983 which have been ongoing over the years since. These reforms commenced the shift from an official assessment to a self-assessment system (Odano, 1987) and then required taxpayers to comply with the tax law by self-registering, calculating taxable income, claiming tax credits deduction, and lodging tax returns. Tax offices, under the DGT, are organisationally structured to operate and conduct services according to the type of tax, e.g., personal income tax, corporate tax, withholding tax, and value added tax (VAT).

2.2 Taxing Indonesian SME businesses

In a global context, Indonesia is ranked 81st out of 188 countries in the latest World Bank/PwC *Paying Taxes* indicator (World Bank & PwC, 2019). One of the present authors (Ferry, 2022) has noted that Indonesian self-employed taxpayers can have difficulties in abiding by the tax law to calculate their tax liabilities and submit their tax returns without assistance. Thus, one of the hindrances that Indonesian self-employed taxpayers encounter in compliance is the ability to maintain proper bookkeeping and records. The government responded to this issue with the provision of a concession for SMEs by introducing the 'deemed net income' method of calculating their tax liability. This is a presumptive method to define net income by multiplying annual gross income by a specific rate in accordance with the business sector of the SMEs (Director General of Taxation Decree No. 536 Year 2000 regarding the Deemed of Net Income for Taxpayers who Compute Net Income Using Norms; Director General of Taxation Regulation No. 17 of 2015 concerning the Deemed of Net Income; see also Mas-Montserrat et al., 2023). Taxpayers who are eligible to apply this method only need to undertake simple recordkeeping by calculating gross income. This policy is designed to help reduce the SMEs' burden for those who would otherwise have difficulty in maintaining proper records. A further initiative was introduced in 2013, prescribed by Government Regulation No. 46, 2013 (GR-46/2013), by commencing the presumptive tax regime and applying a final tax at 1% rate on annual income up to IDR 4.8 billion (USD 291,885). Five years later, the rate was reduced to 0.5% (Government Regulation (PP) No. 23 of 2018 concerning Income Tax on Income from Business Received or Earned by Taxpayers with Certain Gross Turnover).

Tables 1 and 2 respectively describe the criteria of Micro, Small, and Medium Enterprises (MSMEs) in Indonesia, based on net assets and annual income and compare the tax rate applied between the taxpayers who apply the presumptive tax rate and those who use the conventional tax rate.

Table 1: The Criteria of Micro, Small, and Medium (MSM) Enterprises in Indonesia

	Criteria	
Enterprise	**Net Assets**	**Annual Income**
Micro	IDR 50 Million or less	IDR 300 Million or less
Small	> IDR 50 M − 500 Million	> IDR 300 M − 2.5 Billion
Medium	> IDR500 M − 10 Billion	> IDR 2.5 B − 50 Billion

Source: adapted from the Micro Small and Medium Enterprises Law No. 20 Year 2008.

Table 2: Tax Rate Applied for MSM Enterprises in Accordance with GR-46/2013

Enterprise	Presumptive Tax Rate	Conventional Tax Rate
Micro	Yes	No
Small	Yes	No
Medium		
- annual income up to IDR 4.8 Billion	Yes	No
- annual income > IDR 4.8 − 50 Billion	No	Yes

Source: adapted from the Micro Small and Medium Enterprises Law No. 20 Year 2008 and the Government Regulation No. 46 Year 2013.

Duve and Schutte (2021) and Aditya (2020) reviewed the intended compliance cost consequences of presumptive tax regimes, with Ferry and co-authors (2023) representing one of the earliest attempts to integrate opportunity costs and psychological costs based on the direct experience of Indonesian individual taxpayers. Their empirical results confirmed that the Indonesian presumptive tax regime significantly reduces explicit costs, although tax regime choice is not a significant determinant for implicit and psychological costs. Ferry et al. (2023) concluded that the psychological costs of tax compliance are more or less identical, despite the alternative tax regimes in place in Indonesia. This may have arisen as a result of the fact that individual SMEs who use the

presumptive tax regime need to prepare for conversion to the conventional tax regime in 2025, when the opportunity to use the presumptive tax expires. Hence, they may need to undertake similar recordkeeping practices as those who use the conventional tax regime.

The World Bank (Suharnoko Sjahrir et al., 2020) studied Indonesian SMEs just prior to the Covid-19 pandemic and noted that (at the time) compliance levels of SMEs were extremely low with only about 15% of SMEs filing and reporting their taxes in 2017 despite SMEs being the backbone of the Indonesian economy (OECD, 2022). The World Bank study sought to use behavioural insights to investigate the effects of a field experiment with an experimental design spanning three treatments (Simple, clear and salient information; Information plus public good provision; Information plus deterrence) neatly operationalised using a free calendar. The results indicated that sending any type of calendar increased the payment rate relative to the control group. The most successful calendar for increasing payment rate was however the third group (Information plus deterrence), corroborating earlier findings reported by Hasseldine and co-authors (2007). The World Bank study shows that the DGT has two available mechanisms to increase revenue: (1) to increase the rate of compliance (i.e., more SMEs paying taxes), a deterrence framing was more effective; and (2) to increase the value of payments (SMEs making higher tax payments), guidance information was more effective.

2.3 Prior Indonesian academic tax compliance research

Seminal contributions to the field of tax compliance research have stemmed from an interdisciplinary blend of economic modelling and fiscal psychology approaches and date back to the 1970s with pioneering work by Allingham and Sandmo (1972), Lewis (1982) and others. A large and continuing stream of research has since been published spanning both developed and developing countries. For broader reviews, see for example, the work of Alm (2019), Alm and Malezieux (2021), and Richardson and Sawyer (2001). During this century, tax compliance research has become much more common in developing economies, with Indonesia being no exception. Accordingly, the remainder of this section details a non-exhaustive summary of Indonesian tax compliance research prior to, during, and after, the Covid-19 pandemic, although the number of Indonesian studies published remains relatively limited, especially as other Indonesian studies were considered as out-of-frame due to a focus on VAT (e.g., Iswahyudi, 2017) or large companies (e.g., Purba & Tran, 2023).

Inasius (2019b) examined the relationship between taxpayers; trust in tax authorities, and their power on voluntary and enforced Indonesian tax compliance. Framed as a test of Kirchler and co-authors' (2008) slippery slope framework, 274 usable questionnaire responses were collected from SME retailers, with the study finding that trust in tax authorities was significantly associated with voluntary tax compliance, but perceived power was not significant, thereby providing only limited support for the slippery slope framework in this context.

In a separate related study, also motivated by the slippery slope framework, Inasius (2019a) surveyed Jakarta SMEs to investigate factors influencing compliance behaviour. His general findings were that referral groups, probability of audit, tax knowledge and perceptions of equity and fairness all influenced self-reported tax compliance.

Probowulan and Zulkarnnaeni (2022) carried out a meta-analysis on potential Indonesian tax non-compliance. However, this study is somewhat limited in that only 12 Indonesian studies were found over the 2010-2020 period on Google Scholar. Further, those authors did not explicitly identify or reference these studies, and meaningful interpretations from their analysis are difficult to establish. In a similar manner, Toly and co-authors (2023) studied 130 businesses in Surabaya finding that fairness perceptions influence tax compliance, but for their sample they did not find empirical support for trust in government affecting tax compliance.

Two studies addressed the relationships between tax knowledge, trust and tax compliance. Susanti and Sunardi (2023) studied 100 MSME respondents finding most taxpayers have a very basic knowledge of tax and lack trust in authority. Similarly, Fitria and co-authors (2024) used an online Google form to survey 350 Indonesian MSMEs from six provinces during July-October 2023. Their sample was well-educated (over 63% with a Bachelor's degree) suggesting a possible 'self-selection' effect, which may have contributed to their finding that tax knowledge increases SMEs' compliance intentions.

Timothy and Abbas's (2021) study provided more useful findings. Using survey data from 239 Indonesian SMEs they used structural equation modelling to report positive associations between tax morality and tax compliance, but they also found associations between perceptions of justice and weaker support for the association between trust in public authorities and compliance levels. Timothy and Abbas (2021, p. 176) concluded that intrinsic motivation has a meaningful association with Indonesian SMEs' compliance, providing support for Alm and Martinez-Vazquez's (2007) contention that to increase compliance in a developing country, social norms should be strengthened.

3. COVID-19 AND INDONESIAN SME TAX COMPLIANCE

As the world recovered from the coronavirus pandemic, policy-makers dedicated significant time and resources globally responding to the shock caused by Covid-19 (Daly, 2023). One OECD (2021) report commissioned by the G20 Finance Ministers and Central Bank Governors noted the slowing of economic growth, the acceleration of digitalisation, rising inequalities, and ageing populations. More specifically, the report detailed tax policy challenges faced by developing countries, and in the context of the present study, amongst other suggestions, noted that developing countries often have large informal sectors that narrow the tax base putting tax revenue under pressure, and that tax reform opportunities exist.

One such policy response has been the increasing use of presumptive tax regimes as noted by Duve and Schutte (2021), and with Mas-Monserrat and co-authors (2024) finding that a lack of data and analysis is one of the observed challenges, the current study responds by providing benchmark case evidence. Such evidence-based analysis can eventually allow for a more detailed understanding of the characteristics of the businesses operating in Indonesia and allow for the evaluation of whether the presumptive tax regime effectively incentivises business start-ups and increases tax compliance.

In framing tax compliance research, Alm (2022) highlighted three well-known frameworks that have sought to explain tax compliance (an enforcement paradigm, the slippery slope framework, and psychological contract theory) which he discussed in the context of experimental findings (see Alm, 2019) to make two broad conclusions. First,

trust is a major factor in shaping the effectiveness of public policies; and second, trust is not fixed but can vary significantly, and may even be influenced by systematic policy interventions (Alm, 2022, pp. 357-358). It is not within the scope of this study to simply repeat a discussion of the extensive evidence already provided by Alm (2019) and Lederman (2018) who both reviewed the support for, and implications of, an enforcement paradigm, a service paradigm, and a trust paradigm, but rather to draw on this literature in the context of Indonesian SMEs.

Saptono and Khozen (2023) framed their tax compliance study by using individuals' responses to the Covid-19 pandemic as an indicator for perceived fiscal exchange. That is, participants were asked questions relating to whether the Indonesian government's tax expenditures for Covid-19 were responsible, how satisfied participants were with social services delivery related to Covid-19, provision of infrastructure (e.g., hospitals), and the supply of related services (e.g., PCR/antigen tests), and how infected patients were all measured as a part of the structural equation model tested. They also noted the use by governments, including Indonesia, of fiscal policy responses to Covid-19 and their results on perceived fiscal exchange show that this predicted taxpayers' willingness to pay taxes.

Mas-Montserrat et al. (2024, p. 24) noted the importance of survey data in relation to the evaluation of presumptive tax regimes, and Nuryanah et al. (2023) provided this by evaluating the MSME tax administration reform using a survey study of 518 MSME respondents. They concluded that most survey participants perceived that the Indonesian presumptive tax regime is consistent with tax system principles of equity, certainty, convenience, and economy.

Anisykurlillah et al. (2024) focused on tax literacy and the need for the tax authority to enhance literacy especially for those taxpayers facing changes in tax rates. Erina et al. (2024) focused on tax morale, a construct also influenced by tax literacy, or tax awareness (see also, Widuri et al., 2024). The Erina et al. (2024) study noted that Indonesian tax morale is still low, with return non-filing being a problem at both individual and corporate levels. Likely, taxpayers are less motivated to file returns given relatively frequent tax amnesties being offered in Indonesia (see Inasius et al., 2020). Similar findings regarding tax morale, perceived fairness, and tax simplicity in relation to tax compliance intentions are also reported by Purnomo et al. (2024) and Tahar and Bandi (2024) in relation to the slippery slope framework.

4. MATERIALS AND METHODS

In this study, we collected a panel of monthly self-assessed presumptive tax payments data from the DGT's data warehouse, which includes self-assessed presumptive tax payments, using the specific code for the presumptive tax payments of 411128 420, administered in 319 small tax offices.[1] Following the study of Lütkepohl and Xu (2012), we transformed the absolute tax payments into log values to make the data variance more stable. The data was then regrouped into 43 cities (see the geographic distribution and the complete list of the tax offices in Appendix 1 and online datasets, respectively), based on the availability of the tax offices in the immediate vicinity. This enabled the researchers to more accurately observe the phenomenon of changing self-assessed tax

[1] Scholars who wish to undertake research related to the taxation of Indonesia may seek data support from the Directorate General of Taxes, Indonesia through the official online channel at https://eriset.pajak.go.id/.

payments in the regions that would provide additional information value over monthly tax statistics recorded by each tax office. To provide a general background of the data, Table 3 presents the descriptive statistics, including the averages (mean), standard deviations (std), minimums (min), and maximums (max) of the 43 cities' payment data (listed geographically from west to east Indonesia).

Table 3: Means, Standard Deviations, Minimums, and Maximums of Self-Assessed Presumptive Tax Payments (Log Values)

City	mean	std	min	q1	q2	q3	max
Aceh	8.76	0.11	8.59	8.68	8.74	8.83	9.07
Medan	10.05	0.14	9.67	9.94	10.06	10.14	10.29
Sibolga	9.52	0.10	9.25	9.46	9.52	9.58	9.71
Padang	9.16	0.14	8.88	9.03	9.19	9.26	9.41
Batam	9.57	0.20	9.02	9.35	9.63	9.71	9.88
Palembang	9.65	0.15	9.34	9.52	9.66	9.75	9.95
Pekanbaru	9.64	0.13	9.33	9.54	9.65	9.72	9.88
Bengkulu	8.69	0.11	8.45	8.60	8.70	8.76	9.05
Jambi	9.27	0.14	8.96	9.18	9.27	9.35	9.79
Belitung	9.23	0.12	8.92	9.17	9.24	9.30	9.52
Lampung	9.41	0.15	9.13	9.27	9.44	9.52	9.70
Tangerang	10.01	0.18	9.60	9.84	10.05	10.15	10.35
Jakarta	10.69	0.19	10.26	10.52	10.73	10.82	11.02
Depok	9.05	0.16	8.74	8.92	9.07	9.15	9.37
Bekasi	9.77	0.19	9.38	9.57	9.82	9.90	10.08
Bogor	9.48	0.16	9.16	9.33	9.52	9.59	9.77
Bandung	10.11	0.20	9.68	9.91	10.17	10.24	10.45
Cirebon	9.30	0.16	8.98	9.11	9.34	9.41	9.57
Semarang	10.05	0.15	9.70	9.92	10.08	10.15	10.30
Surakarta	9.97	0.15	9.67	9.87	9.99	10.08	10.34
Yogyakarta	9.58	0.18	9.22	9.41	9.64	9.71	9.91
Surabaya	10.15	0.18	9.78	9.97	10.20	10.27	10.43

Sidoarjo	9.86	0.15	9.56	9.69	9.91	9.97	10.13
Malang	9.95	0.13	9.68	9.85	9.98	10.04	10.19
Denpasar	9.77	0.27	9.30	9.50	9.89	9.98	10.12
Mataram	9.55	0.14	9.24	9.44	9.57	9.65	9.80
Pontianak	9.63	0.13	9.27	9.54	9.64	9.72	9.85
Palangkaraya	8.89	0.11	8.63	8.81	8.88	8.97	9.14
Banjarmasin	9.20	0.14	8.89	9.09	9.21	9.29	9.61
Balikpapan	9.54	0.13	9.27	9.45	9.56	9.63	9.80
Manado	9.23	0.12	8.92	9.15	9.23	9.31	9.51
Gorontalo	8.61	0.15	8.25	8.50	8.63	8.70	8.87
Palu	9.02	0.09	8.80	8.96	9.02	9.07	9.23
Mamuju	8.10	0.12	7.82	8.01	8.11	8.19	8.49
Makassar	9.63	0.13	9.32	9.53	9.66	9.71	9.85
Kendari	8.82	0.11	8.48	8.75	8.82	8.89	9.07
Ambon	9.02	0.10	8.71	8.97	9.02	9.08	9.24
Sorong	8.47	0.16	8.16	8.34	8.47	8.57	9.19
Timika	8.21	0.16	7.83	8.07	8.23	8.31	8.53
Jayapura	8.64	0.19	8.21	8.52	8.67	8.77	9.04
Biak	8.33	0.20	7.92	8.14	8.34	8.50	8.70
Manokwari	8.12	0.20	7.76	8.01	8.13	8.23	9.08
Merauke	8.30	0.17	7.90	8.17	8.33	8.42	8.63

Source: adapted from data analysis results.

Analysing the influence of the Covid-19 pandemic on tax revenue requires a careful estimation of how much revenue would be collected without the presence of the pandemic. Thus, to capture the expected self-assessed tax payments in the absence of the virus, we applied a Seasonal Auto-Regressive Integrated Moving Average (SARIMA) framework to the tax payments in each representative city during the 50-month period from January 2016 to February 2020. Next, we took account of the influence of the pandemic, and estimated the post-pandemic rebound in economic activity by re-applying the SARIMA models of the tax payments during the 74-month period from January 2016 to February 2022.

The SARIMA framework combines the analysis of past values (auto-regressive), difference order (integrated), and past residuals (moving-average) to determine the autocorrelation function within the time series. Initially developed by Box and Jenkins (1970), the framework was then adjusted by incorporating seasonal, repeated, and random trend effects so that the optimal fit of a time series analysis can be determined. Our analysis opted for these features by automatically applying a Python library of pmdarima 2.0.4 (Smith et al., 2017). We then comprehensively examined a series of SARIMA models and selected a model with the least prediction error.

After selecting the optimal fit model and generating predictions according to the model, the prediction results were compared to the proxy of the self-assessed tax revenues (log values), respectively during the period from March 2020 to February 2021 (during pandemic) and March 2022 to February 2023 (post-pandemic). Any difference arising between the predictions and the proxy values was assessed by applying established evaluation criteria, including Mean-Absolute-Error (MAE), Mean-Squared-Error (MSE), Root-Mean-Squared-Error (RMSE), and Mean-Absolute-Percentage-Error (MAPE). Following the analysis, the chosen SARIMA model for each city in the study was summarised together with the accuracy evaluations, and is reported in Appendices 2 and 3, respectively.

5. RESULTS

Table 4 shows the differences between the actual self-assessed tax revenues collected in 43 Indonesian cities and the predicted tax collections per our analytical model. The first panel on the left compares the gap during the Covid-19 pandemic situations commenced in Indonesia (from March 2020 to February 2021) and the second panel on the right contrasts the difference during the two years after the pandemic (from March 2022 to February 2023). As a reference, negative values indicate that the actual values were less than the predictions derived from the analysis whereas positive values imply that the actual tax revenues collected exceeded the SARIMA forecasts.

Table 4 shows that excepting the two cities of Banjarmasin and Belitung, all the cities recorded average negative values, indicating a negative growth during the pandemic. A further examination in the min column revealed the three deepest decreases were detected in Manokwari (-0.812), Denpasar (-0.602), and Kendari (-0.566). The results verified the outcomes in the average column, which showed the three lowest gaps appeared in Denpasar (-0.379), Kendari (-0.318), and Manokwari (-0.294).

Table 4: Influence of Covid-19 on the Self-Assessed Presumptive Tax Payments (Before and After)

Gap during Pandemic				Gap after Pandemic		
Min	Max	Mean	City	Min	Max	Mean
−0.223	−0.0235	−0.109	Aceh	−0.015	0.119	0.0605
−0.343	0.0838	−0.18	Medan	−0.00272	0.537	0.341
−0.209	0.112	−0.0112	Sibolga	−0.0454	0.334	0.177
−0.35	−0.0144	−0.21	Padang	0.0709	0.358	0.207
−0.392	0.0602	−0.152	Batam	0.125	0.642	0.502
−0.315	0.0217	−0.161	Palembang	−0.0262	0.269	0.169
−0.377	−0.0441	−0.218	Pekanbaru	−0.0465	0.379	0.232
−0.325	−0.0557	−0.17	Bengkulu	0.0343	0.225	0.146
−0.421	0.0548	−0.205	Jambi	−0.0202	0.346	0.191
−0.245	0.175	0.0142	Belitung	0.000585	0.31	0.208
−0.334	−0.0109	−0.13	Lampung	−0.0181	0.24	0.154
−0.498	0.0182	−0.287	Tangerang	0.0173	0.35	0.232
−0.451	0.0584	−0.133	Jakarta	0.0548	0.441	0.316
−0.333	0.479	−0.0673	Depok	−0.00816	0.316	0.195
−0.398	0.0255	−0.127	Bekasi	−0.00428	0.23	0.15
−0.337	0.0949	−0.0937	Bogor	−0.00997	0.33	0.17
−0.423	0.0985	−0.145	Bandung	0.0642	0.475	0.331
−0.326	0.0684	−0.219	Cirebon	0.00971	0.361	0.235
−0.257	0.0609	−0.0616	Semarang	0.0108	0.309	0.182
−0.282	0.0658	−0.0869	Surakarta	0.0342	0.335	0.224
−0.472	0.0653	−0.241	Yogyakarta	0.0212	0.4	0.239
−0.402	0.0674	−0.128	Surabaya	0.0307	0.444	0.308
−0.294	0.0438	−0.11	Sidoarjo	−0.0372	0.256	0.122
−0.256	0.0753	−0.0549	Malang	0.033	0.321	0.186
−0.602	0.0568	−0.379	Denpasar	0.0413	0.643	0.375
−0.377	−0.043	−0.227	Mataram	−0.00725	0.247	0.159

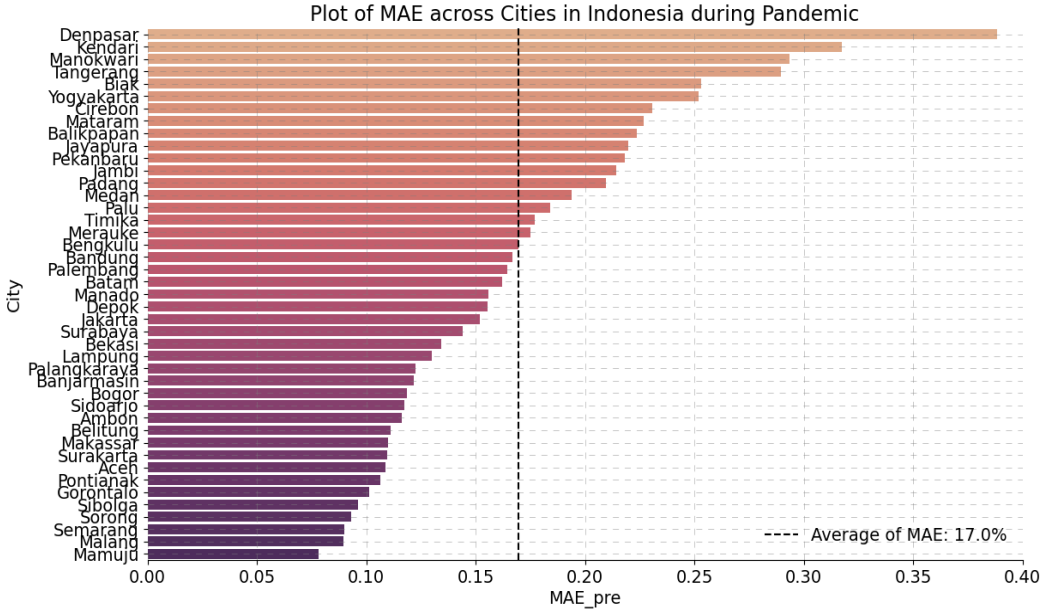
−0.271	0.121	−0.0305	Pontianak	−0.0827	0.407	0.259
−0.275	−0.0272	−0.122	Palangkaraya	−0.0473	0.272	0.111
−0.21	0.258	0.00822	Banjarmasin	−0.0639	0.437	0.225
−0.343	−0.016	−0.224	Balikpapan	0.00566	0.278	0.169
−0.301	0.00986	−0.154	Manado	0.0184	0.215	0.135
−0.335	0.0317	−0.0901	Gorontalo	−0.0336	0.27	0.161
−0.276	−0.045	−0.184	Palu	−0.0533	0.191	0.0783
−0.245	0.0333	−0.0712	Mamuju	−0.142	0.108	0.0258
−0.324	0.0591	−0.0934	Makassar	−0.0459	0.25	0.149
−0.566	−0.117	−0.318	Kendari	−0.102	0.201	0.124
−0.285	0.157	−0.0307	Ambon	0.0159	0.196	0.144
−0.174	0.173	0.0174	Sorong	−0.0195	0.344	0.177
−0.42	0.00708	−0.176	Timika	0.0502	0.247	0.193
−0.439	0.00976	−0.218	Jayapura	−0.054	0.252	0.124
−0.404	−0.0628	−0.253	Biak	0.00402	0.176	0.101
−0.812	−0.0435	−0.294	Manokwari	−0.317	0.246	0.0964
−0.329	0.11	−0.157	Merauke	−0.0456	0.203	0.109

Source: adapted from data analysis results.

The deepest decrease, which occurred in Denpasar, is highly likely due to the sudden changes in mobility, limiting individuals' access to retail and recreation outlets (Sparrow et al., 2020). As the region also substantially relies on tourism, it is unsurprising that Denpasar experienced the deepest economic contraction during the pandemic (Desdiani et al., 2022).

Our aggregate results for each of the 43 cities, together with the average decrease of around 0.17, are presented in Figure 2, which shows the decreasing self-assessed presumptive tax revenue as a percentage of mean absolute error.

Fig. 2: Decreasing Self-Assessed Presumptive Tax Payments as the Percentage of Mean Absolute Error



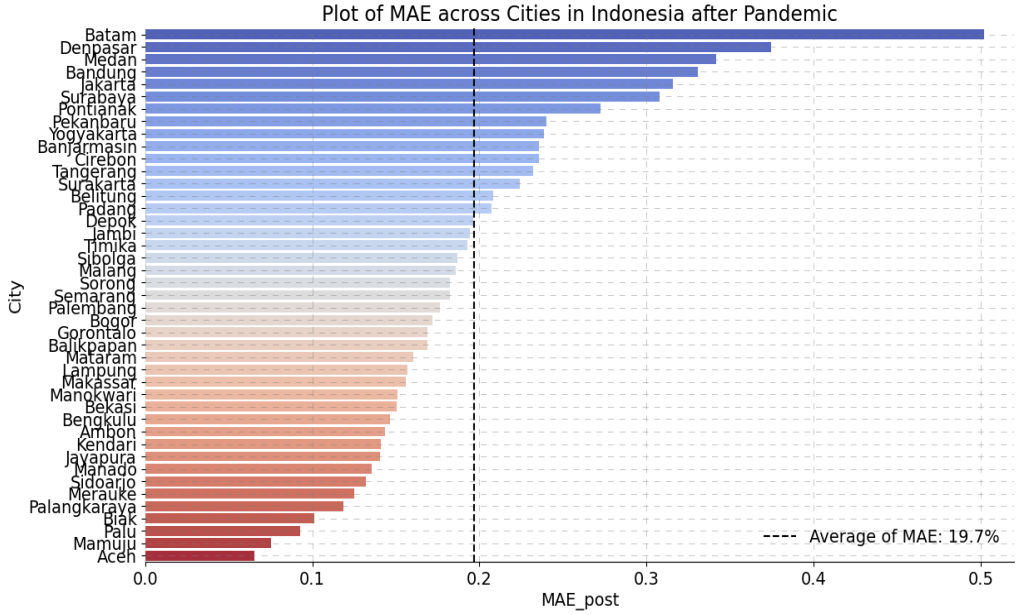
Source: adapted from data analysis results.

In contrast to the situation during the pandemic, all cities recorded positive average values. A closer examination in the max column revealed that the three highest jumps were spotted in the self-assessed tax payments in Denpasar (0.643), Batam (0.642), and Medan (0.537). A similar result emerged in the average values, which found the three topmost rebounds were detected in Batam (0.502), Denpasar (0.375), and Medan (0.341).

It appears that Batam, which has been designated as a special economic zone, recorded a quick recovery of wholesale and retail sectors whereas Denpasar gained the momentum of the ease of the travel restrictions, attracting the return of foreign travellers visiting the region. In the case of Medan, which is home to the resilient sector of agriculture industries and more particularly palm oil industry, creating fast economic rebounds, and therefore in line with the analysis of Anas et al. (2022).

Figure 3 illustrates the increasing self-assessed presumptive tax revenue as the percentage of MAE as well as the average increase among the 43 cities (approximately 0.197).

Fig. 3: Increasing Self-Assessed Presumptive Tax Payments as the Percentage of Mean Absolute Error



Source: adapted from data analysis results.

Overall, the analysis results indicate that the Covid-19 pandemic has reduced the expected self-assessed tax payments in 43 representative cities in Indonesia, with an average decrease around 17.0%, as illustrated in Figure 2. The hardest hit, which can be seen in the case of Denpasar, is notably due to the region being highly reliant on non-restricted access movements as well as experiencing large changes in retail and recreational activities, and therefore restricting its capacity to generate economic growth.

Fortunately, the influence of the pandemic has been reduced to an extent that after two years, self-assessed presumptive tax payments have now increased. This increase has been observed in 43 regions by an average of 19.7%, as shown in Figure 3. The highest economic rebounds were located in Batam, Denpasar, and Medan. While Batam and Medan are regions with dominant resilient and quick recovery sectors (agriculture in Medan and retail in Batam), Denpasar is a region with a robust tourism sector. To provide a complete set of our results, Appendices 4 and 5, respectively, display the influence of the Covid-19 pandemic situation on the self-assessed presumptive tax payments of SMEs across 43 cities in Indonesia during the pandemic and two years after the pandemic.

6. DISCUSSION AND CONCLUSION

The influence of Covid-19 on tax revenue collections, with a limited amount of available data, necessitated careful discussion, both within the Indonesia DGT and globally (Daly, 2023). In terms of presumptive tax regimes, there are a number of challenges (Mas-Montserrat et al., 2023, 2024) which include the problem of a lack of data and tax compliance analysis. This study provides an evidence-based analysis,

designed to allow for a more nuanced understanding of the characteristics of the businesses operating in Indonesia and an evaluation of whether the regime effectively incentivises business start-ups and increases tax compliance.

In terms of a wider context, we provide a benchmark contribution to the literature of a developing country severely affected by Covid-19, in terms of pre- and post-pandemic presumptive tax receipts. While the findings relate specifically to Indonesia, our study is relevant in a wider context, e.g., for other developing countries, as they can potentially replicate our methodology for cross-national 'lesson-drawing' to generate their own findings and benchmark their own tax compliance through data analytics, in order to feed into their own policy responses (Daly, 2023).

Our benchmark analysis focuses on the impact of the Covid-19 crisis on self-assessed presumptive tax payments submitted by the SMEs in 43 cities in Indonesia during the pandemic and post-pandemic period. More precisely, we applied a SARIMA framework to estimate the expected presumptive tax payments of SMEs and then compared it to their actual tax payments to evaluate the severity of the pandemic on the self-assessed presumptive tax revenue of SMEs.

We constructed our analyses in two consecutive phases with the first phase being during the pandemic, when the data of self-assessed presumptive tax payments of SMEs from January 2016 to February 2020 was used to generate the predicted self-assessed presumptive tax payments in March 2020-February 2021 (pandemic period). The second phase is based on a pandemic effect scenario when the similar data in the first phase was further extended to February 2022 and was applied to develop the prediction of self-assessed presumptive tax payments in March 2022-February 2023 (post-pandemic period).

Our primary finding indicates that during the pandemic, on average, the self-assessed presumptive tax payments submitted by SMEs decreased by 17.0%. The region which was most seriously impacted by the pandemic is noted to be severely dependent on non-restricted access movements. The results, while being specific to the presumptive tax revenues generated from the SMEs, are still approximately comparable with the analysis of Malkina (2021) in the Russian regions and the findings of Clemens and Veuger (2020) in the US, in which both studies report that the Covid-19 pandemic resulted in, respectively, total tax revenues losses of 13.9% and a decrease of income tax projection by 11.5% from the pre-Covid-19 period. Nonetheless, the decline of tax revenue in Indonesia is far worse than the average decrease of expected tax revenue in European countries (-4%) in 2020, as reported by Țibulcă (2022).

Secondly, we note that within two years after the pandemic, the Indonesian economy started to rebound, with SMEs' self-assessed presumptive tax payments, on average, increasing by 19.7%. This recovery has been attributed to the careful approach of the government in implementing conservative fiscal policy (Indrawati et al., 2024). In addition, Indonesia has benefited from an increase in commodity prices (see, for example: Fang & Shao, 2022 and Orhan, 2022) as regions with dominant trade and agriculture sectors recording significant increases.

This study is not without limitations. First, our study is context-specific, so may not be generalisable to other regions or time periods. Second, as information available to the DGT might change over time, as well as their administrative capacities, a recurrent evaluation incorporating any changes over time will need to be conducted and the need

for any required adjustments evaluated. Further, it is important to note that during the period under the study, the Government of Indonesia (2024) had initiated various tax incentives for Covid-19 handling and national economic recovery, such as the income tax borne by the government for taxpayers in the presumptive tax regimes. The total expenditures of such incentives for the four-year period starting from 2020 to 2023, respectively, are IDR 671 billion, 801 billion, 178 billion, and 99 billion. A further initiative is the exemption of presumptive tax for SME taxpayers whose recorded annual income is below IDR 500 million (see Government Regulation (PP) No. 55 of 2022 concerning Adjustments to the Regulation in the Field of Income Tax). The nature and analysis of such incentives and initiatives, however, are beyond the scope of this study, as we solely focus on the changes of the self-assessed presumptive tax payments of SMEs during and after the pandemic.

To conclude, this study reports clear differences across various regions in the correlation between the Covid-19 pandemic and self-assessed presumptive tax payments of SMEs in Indonesia. Future research could apply the setting of the study to thoroughly examine disaggregated tax types (such as income tax, VAT, land tax) and across different types of tax offices (e.g., large regional tax offices). In addition, future studies with better access to richer information could also extend our findings and focus on collecting primary data to assist in confirming more detailed and theory-driven research hypotheses.

The Covid-19 pandemic and its aftermath delivered sharp and salient lessons to governments worldwide about the importance of being aware of the threat of potential economic, geopolitical and health shocks. Clearly, it is critical for tax agencies to analyse and understand the compliance behaviour of all taxpayers (including SMEs), what drives it, and what policy responses are available. Some of this analysis requires an evaluation of not just enforcement activities, but also service provision to improve taxpayers' education and tax literacy. One unique Indonesian example, where a free calendar was provided to taxpayers, showcases what can potentially be achieved with a relatively simple administrative idea (Suharnoko Sjahrir et al., 2020). This study and other studies cited in our article, show that there now exists a sizable amount of research activity on Indonesian tax compliance and administration with no sign of abatement, as evidenced by the recent working papers of Bauer and Hidayat (2024) and Schipp et al. (2024).

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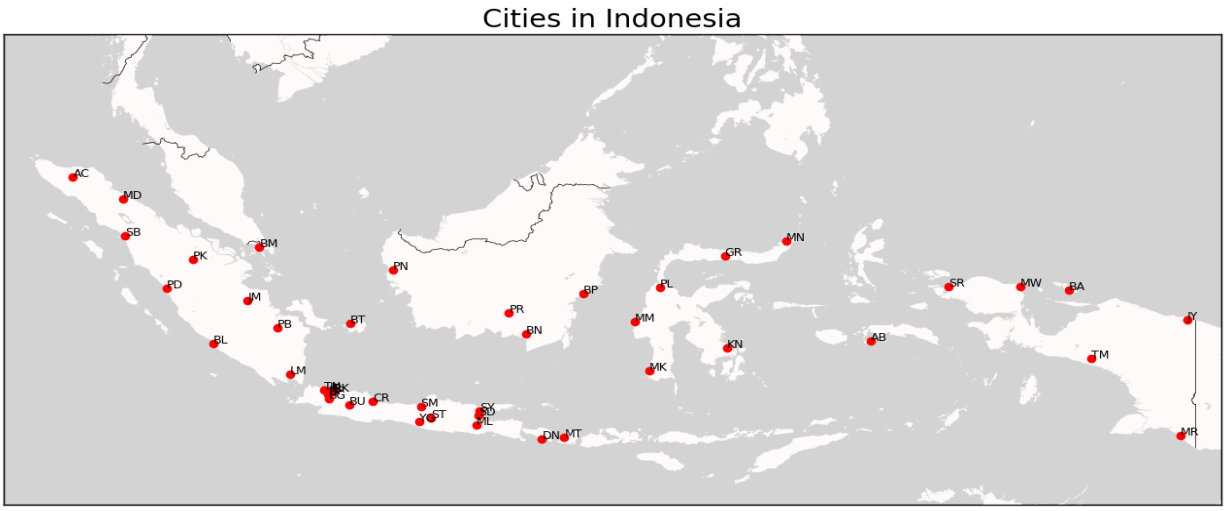
8. APPENDICES

Appendix 1: Distribution of Representative Cities in Indonesia



Appendix 2: Evaluation During Pandemic

City	Optimal_Model	MAE	MSE	RMSE	MAPE
Aceh	(1,1,0)(0,1,1)[12]	0.109	0.0162	0.127	0.0126
Medan	(1,1,0)(0,1,1)[12]	0.194	0.0447	0.212	0.0197
Sibolga	(1,1,0)(2,1,0)[12] intercept	0.0964	0.0125	0.112	0.0103
Padang	(0,1,1)(0,1,1)[12]	0.21	0.0517	0.227	0.0234
Batam	(1,1,0)(2,1,1)[12] intercept	0.162	0.0414	0.203	0.0174
Palembang	(1,1,0)(1,1,0)[12]	0.165	0.0363	0.191	0.0174
Pekanbaru	(1,1,0)(1,1,0)[12]	0.218	0.056	0.237	0.023
Bengkulu	(0,1,1)(2,1,0)[12] intercept	0.17	0.0363	0.19	0.0199
Jambi	(1,1,0)(1,1,0)[12]	0.214	0.0595	0.244	0.0236
Belitung	(0,1,1)(2,1,0)[12] intercept	0.111	0.0172	0.131	0.0121
Lampung	(2,1,0)(1,1,0)[12]	0.13	0.0261	0.162	0.0141
Tangerang	(0,1,0)(1,1,0)[12]	0.29	0.101	0.318	0.0298
Jakarta	(1,1,0)(1,1,0)[12] intercept	0.152	0.0437	0.209	0.0147
Depok	(0,1,1)(2,1,0)[12] intercept	0.156	0.0456	0.214	0.0174
Bekasi	(1,1,0)(1,1,0)[12] intercept	0.134	0.0323	0.18	0.0142
Bogor	(1,1,0)(1,1,0)[12] intercept	0.119	0.0256	0.16	0.0128
Bandung	(1,1,0)(1,1,0)[12] intercept	0.167	0.0444	0.211	0.0171
Cirebon	(1,1,0)(0,1,1)[12]	0.231	0.0597	0.244	0.0254
Semarang	(1,1,0)(2,1,0)[12] intercept	0.0901	0.0154	0.124	0.00913
Surakarta	(1,1,0)(2,1,0)[12] intercept	0.11	0.0204	0.143	0.0112
Yogyakarta	(2,1,0)(1,1,0)[12]	0.252	0.0746	0.273	0.027
Surabaya	(1,1,0)(1,1,0)[12] intercept	0.144	0.0346	0.186	0.0146
Sidoarjo	(1,1,0)(2,1,0)[12] intercept	0.118	0.0214	0.146	0.0122
Malang	(1,1,0)(2,1,0)[12] intercept	0.0896	0.0141	0.119	0.00916
Denpasar	(1,1,0)(2,1,0)[12] intercept	0.388	0.176	0.419	0.0414
Mataram	(1,1,0)(0,1,1)[12]	0.227	0.0585	0.242	0.0242
Pontianak	(1,1,0)(2,1,0)[12] intercept	0.107	0.0179	0.134	0.0112
Palangkaraya	(1,1,0)(0,1,1)[12]	0.122	0.0187	0.137	0.014
Banjarmasin	(0,1,1)(2,1,0)[12] intercept	0.122	0.0204	0.143	0.0133

Balikpapan	(0,1,0)(0,1,1)[12]	0.224	0.0586	0.242	0.0239
Manado	(1,1,0)(0,1,1)[12]	0.156	0.0311	0.176	0.0173
Gorontalo	(1,1,0)(2,1,0)[12] intercept	0.101	0.0219	0.148	0.0121
Palu	(0,1,0)(2,1,1)[12]	0.184	0.0379	0.195	0.0207
Mamuju	(0,1,1)(1,1,0)[12] intercept	0.0783	0.0106	0.103	0.00987
Makassar	(1,1,0)(2,1,0)[12] intercept	0.11	0.0229	0.151	0.0117
Kendari	(2,1,2)(0,1,1)[12]	0.318	0.114	0.337	0.0367
Ambon	(1,1,0)(1,1,0)[12] intercept	0.116	0.0197	0.14	0.0131
Sorong	(0,1,1)(2,1,0)[12] intercept	0.0931	0.0125	0.112	0.0112
Timika	(1,1,0)(2,1,0)[12] intercept	0.177	0.0421	0.205	0.0222
Jayapura	(0,1,1)(2,1,0)[12]	0.22	0.0669	0.259	0.0262
Biak	(1,1,0)(2,1,0)[12]	0.253	0.0703	0.265	0.0313
Manokwari	(0,1,1)(0,1,1)[12]	0.294	0.12	0.346	0.0373
Merauke	(1,1,0)(0,1,1)[12]	0.175	0.0394	0.199	0.0217

Source: adapted from data analysis results.

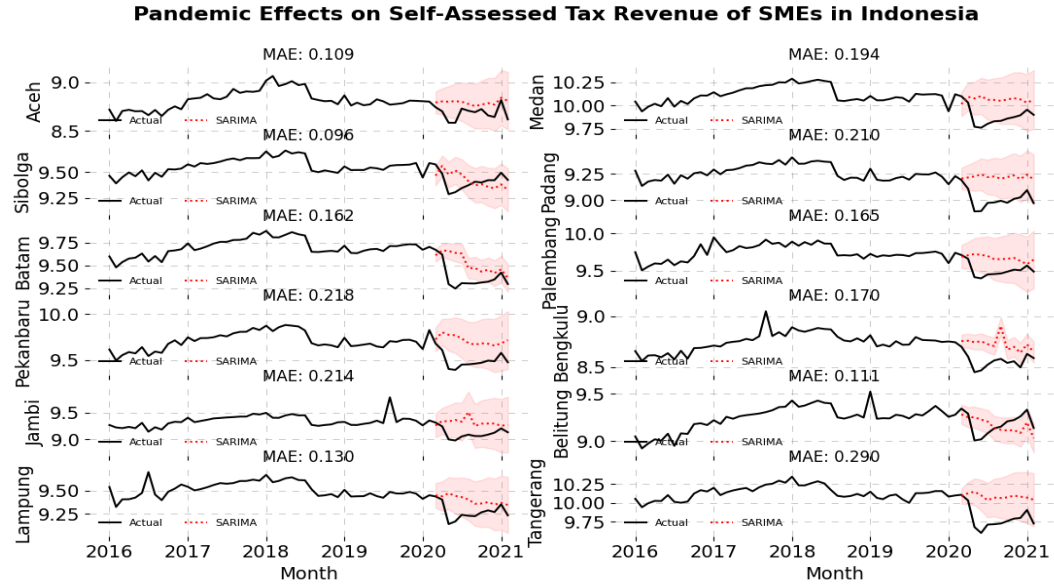
Appendix 3: Evaluation Post Pandemic

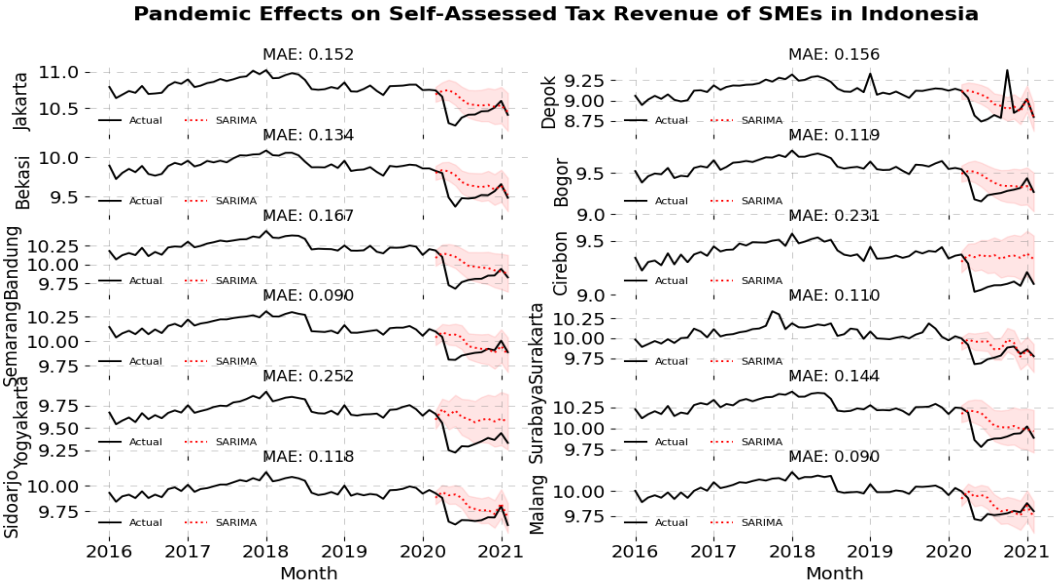
City	Optimal_Model	MAE	MSE	RMSE	MAPE
Aceh	(0,1,1)(0,1,1)[12]	0.0652	0.00535	0.0731	0.00748
Medan	(0,1,0)(2,1,0)[12]	0.342	0.147	0.383	0.0337
Sibolga	(0,1,1)(2,1,1)[12]	0.187	0.0448	0.212	0.0195
Padang	(0,1,0)(2,1,0)[12]	0.207	0.0486	0.22	0.0228
Batam	(0,1,0)(0,1,1)[12]	0.502	0.282	0.531	0.0527
Palembang	(0,1,1)(0,1,1)[12]	0.176	0.0385	0.196	0.0184
Pekanbaru	(1,1,0)(2,1,0)[12]	0.24	0.068	0.261	0.0249
Bengkulu	(1,1,0)(2,1,0)[12]	0.146	0.0245	0.157	0.0168
Jambi	(0,1,1)(2,1,0)[12]	0.194	0.0493	0.222	0.0209
Belitung	(0,1,0)(2,1,0)[12]	0.208	0.053	0.23	0.0224
Lampung	(0,1,1)(0,1,1)[12]	0.157	0.0304	0.174	0.0168
Tangerang	(0,1,0)(0,1,1)[12]	0.232	0.0641	0.253	0.0233
Jakarta	(0,1,0)(0,1,1)[12]	0.316	0.115	0.339	0.0295
Depok	(0,1,1)(2,1,0)[12]	0.196	0.0479	0.219	0.0218
Bekasi	(0,1,0)(0,1,1)[12]	0.15	0.0285	0.169	0.0156
Bogor	(0,1,0)(0,1,1)[12]	0.172	0.037	0.192	0.0183
Bandung	(0,1,0)(2,1,0)[12]	0.331	0.124	0.352	0.0329
Cirebon	(1,1,0)(2,1,0)[12]	0.235	0.0682	0.261	0.0254
Semarang	(0,1,0)(2,1,0)[12]	0.182	0.0403	0.201	0.0183
Surakarta	(0,1,0)(2,1,0)[12]	0.224	0.0561	0.237	0.0226
Yogyakarta	(0,1,0)(2,1,0)[12]	0.239	0.0673	0.259	0.0251
Surabaya	(0,1,0)(0,1,1)[12]	0.308	0.111	0.333	0.0305
Sidoarjo	(0,1,0)(2,1,1)[12]	0.132	0.0223	0.149	0.0135
Malang	(0,1,0)(2,1,0)[12]	0.186	0.0408	0.202	0.0188
Denpasar	(0,1,0)(2,1,0)[12]	0.375	0.162	0.403	0.0387
Mataram	(0,1,0)(2,1,0)[12]	0.161	0.0302	0.174	0.0169
Pontianak	(0,1,0)(2,1,1)[12]	0.273	0.0884	0.297	0.0281
Palangkaraya	(1,1,0)(0,1,1)[12]	0.119	0.0179	0.134	0.0134
Banjarmasin	(0,1,1)(0,1,1)[12] intercept	0.236	0.0674	0.26	0.0259

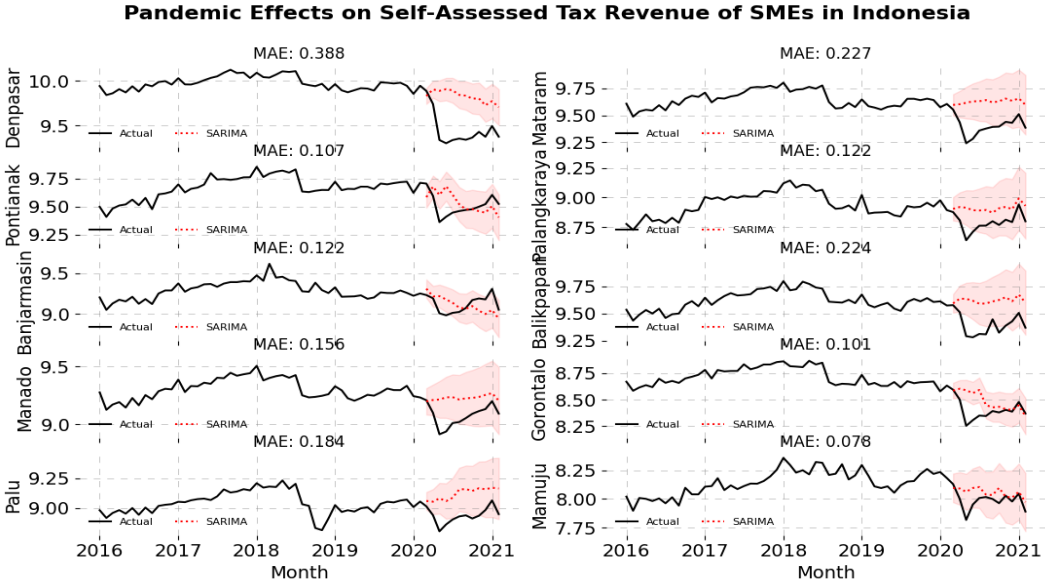
Balikpapan	(0,1,0)(0,1,1)[12]	0.169	0.0349	0.187	0.0178
Manado	(0,1,0)(2,1,0)[12]	0.135	0.0217	0.147	0.0147
Gorontalo	(1,1,0)(2,1,0)[12]	0.169	0.0346	0.186	0.0197
Palu	(0,1,0)(2,1,1)[12]	0.0929	0.011	0.105	0.0102
Mamuju	(0,1,1)(1,1,0)[12]	0.0755	0.00722	0.0849	0.00932
Makassar	(0,1,0)(2,1,1)[12]	0.156	0.031	0.176	0.0163
Kendari	(0,1,1)(2,1,0)[12]	0.141	0.0223	0.149	0.0161
Ambon	(0,1,0)(2,1,0)[12]	0.144	0.0239	0.155	0.016
Sorong	(0,1,1)(0,1,2)[12]	0.182	0.0421	0.205	0.0215
Timika	(1,1,0)(2,1,0)[12]	0.193	0.0404	0.201	0.0237
Jayapura	(0,1,1)(2,1,0)[12]	0.141	0.0241	0.155	0.0165
Biak	(0,1,0)(0,1,1)[12]	0.101	0.0131	0.114	0.0123
Manokwari	(0,1,1)(2,1,0)[12]	0.151	0.0311	0.176	0.0187
Merauke	(1,1,0)(0,1,1)[12]	0.125	0.0193	0.139	0.0152

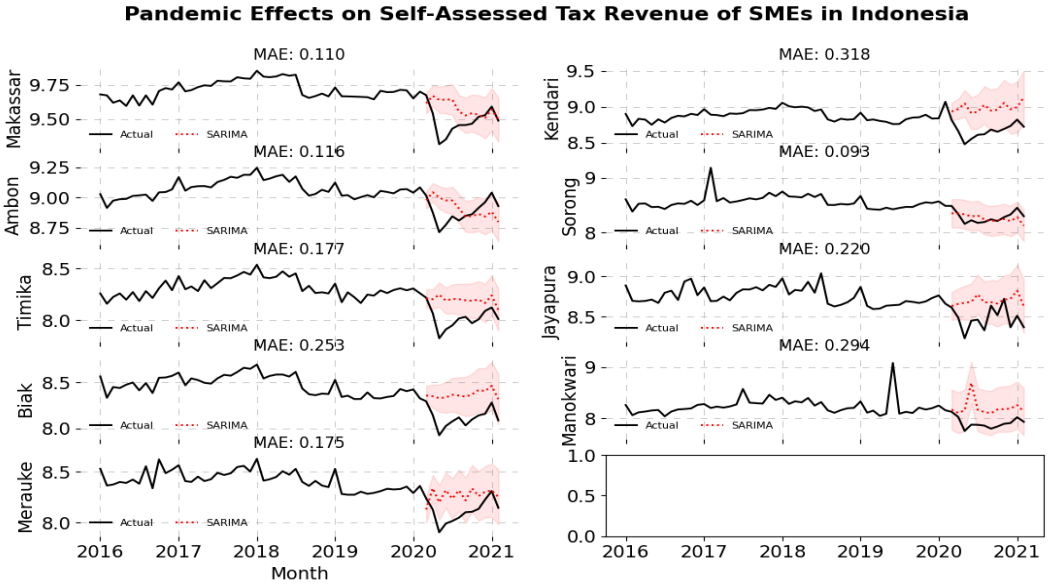
Source: adapted from data analysis results.

Appendix 4: Covid-19 Effects on Self-Assessed Presumptive Tax Revenues of SMEs in Indonesia

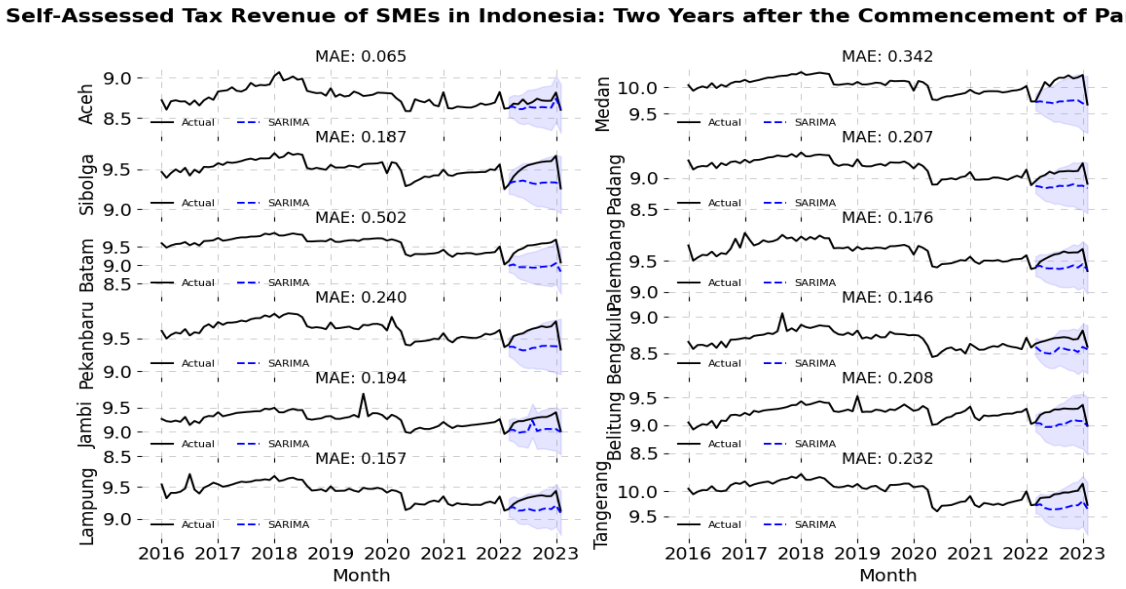


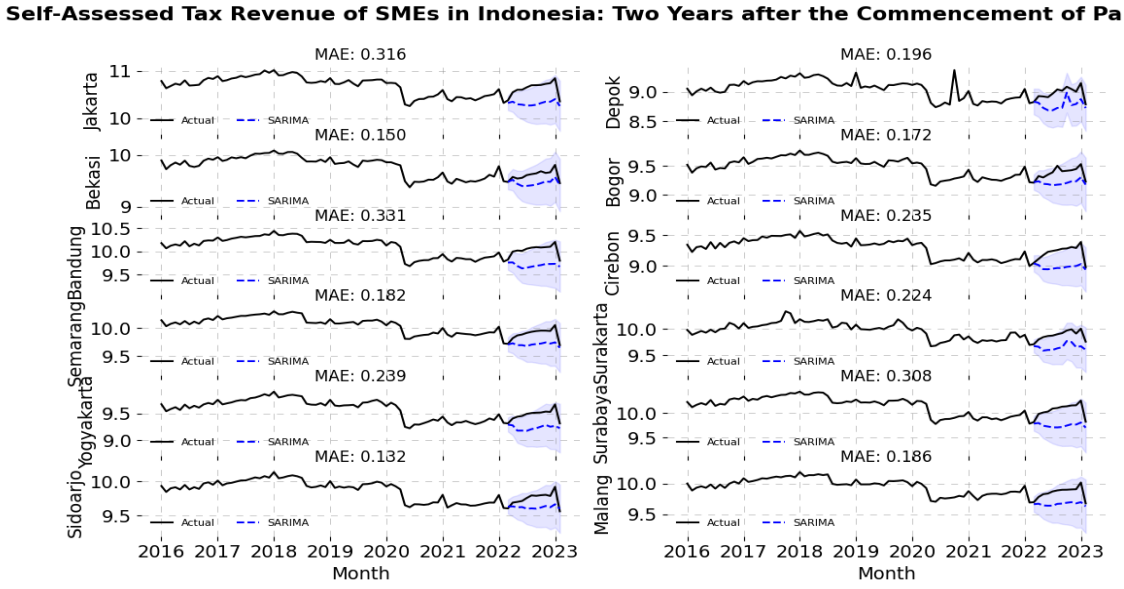


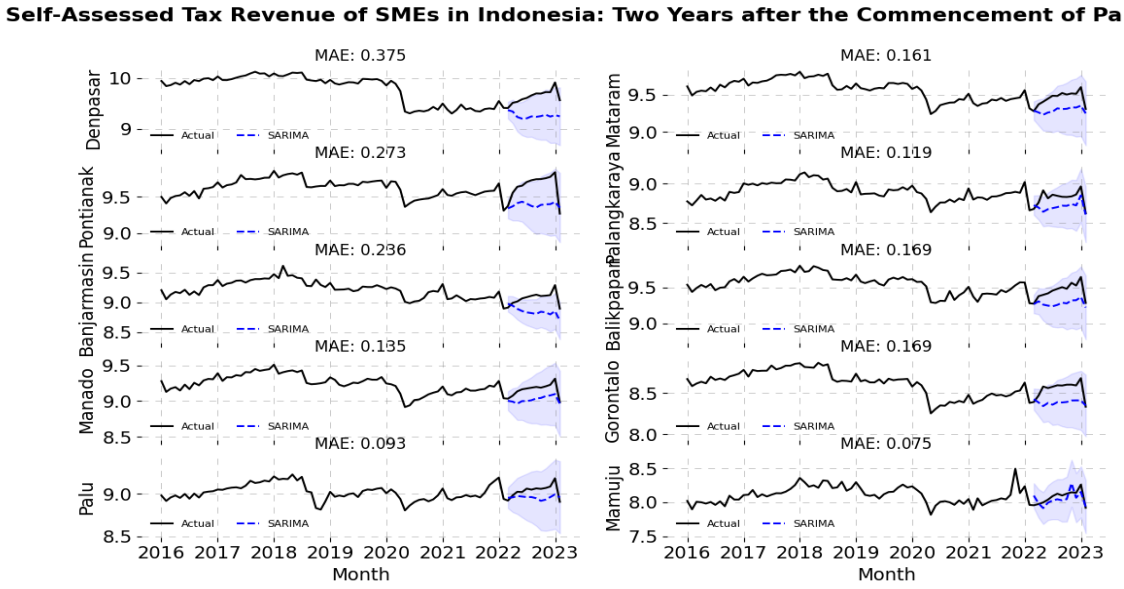

Pandemic Effects on Self-Assessed Tax Revenue of SMEs in Indonesia
Denpasar
MAE: 0.388
Pontianak
MAE: 0.107
Banjarmasin
MAE: 0.122
Manado
MAE: 0.156
Palu
MAE: 0.184
Mataram
MAE: 0.227
Palangkaraya
MAE: 0.122
Balikpapan
MAE: 0.224
Gorontalo
MAE: 0.101
Mamuju
MAE: 0.078
Actual
SARIMA
2016
2017
2018
2019
2020
2021
Month

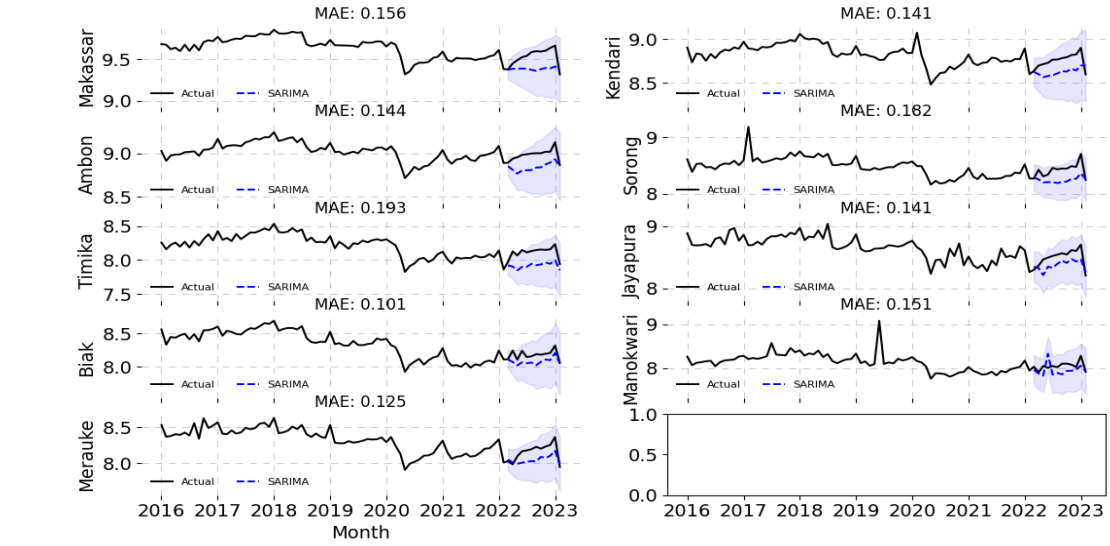

Pandemic Effects on Self-Assessed Tax Revenue of SMEs in Indonesia
Makassar
MAE: 0.110
Ambon
MAE: 0.116
Timika
MAE: 0.177
Biak
MAE: 0.253
Merauke
MAE: 0.175
Kendari
MAE: 0.318
Sorong
MAE: 0.093
Jayapura
MAE: 0.220
Manokwari
MAE: 0.294
Actual
SARIMA
2016
2017
2018
2019
2020
2021
Month

Appendix 5: Self-Assessed Presumptive Tax Revenues of SMEs in Indonesia: Two Years After the Commencement of Covid-19






Self-Assessed Tax Revenue of SMEs in Indonesia: Two Years after the Commencement of Pandemic
Denpasar
MAE: 0.375
Pontianak
MAE: 0.273
Banjarmasin
MAE: 0.236
Manado
MAE: 0.135
Palu
MAE: 0.093
Mataram
MAE: 0.161
Palangkaraya
MAE: 0.119
Balikpapan
MAE: 0.169
Gorontalo
MAE: 0.169
Mamuju
MAE: 0.075
Actual
SARIMA
2016 2017 2018 2019 2020 2021 2022 2023
Month


Self-Assessed Tax Revenue of SMEs in Indonesia: Two Years after the Commencement of Pandemic
Makassar
MAE: 0.156
Ambon
MAE: 0.144
Timika
MAE: 0.193
Biak
MAE: 0.101
Merauke
MAE: 0.125
Kendari
MAE: 0.141
Sorong
MAE: 0.182
Jayapura
MAE: 0.141
Manokwari
MAE: 0.151
Actual
SARIMA
2016 2017 2018 2019 2020 2021 2022 2023
Month

eJournal of Tax Research (2025) vol. 23, no. 1, pp. 62-101

Examining causal linkages in the Balanced Scorecard framework: evidence from the Indonesian tax administration

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Abstract

The concept of causality is central to the Balanced Scorecard (BSC) framework. However, empirical evidence supporting these hypothesised relationships is scarce, particularly in the context of tax administration. Drawing on the Indonesian tax administration strategy map, this study conducts a path analysis using comprehensive key performance indicator data from 319 small tax offices across the country. Two key findings emerge. First, while a majority of the linkages are positive, outreach and enforcement activities are the most significant drivers of tax compliance, highlighting the importance of close monitoring in tax administration. Second, the relationship between tax compliance and revenue collection is complex and inconclusive, indicating a need for refining strategic alignment within the BSC framework. These results offer important insights for policy-makers aiming to improve the design and implementation of performance-based management. They underscore the importance of adopting context-specific approaches that align institutional capacity and behavioural dynamics to strengthen compliance and support sustainable revenue mobilisation.

Keywords: Balanced Scorecards (BSC), strategy map, tax compliance, revenue collection

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1. INTRODUCTION

Ongoing challenges in tax compliance and revenue collection continue to undermine the effectiveness of public financing systems, particularly in developing economies. These functions are indispensable for financing essential government services, such as healthcare, education, and infrastructure, which are fundamental to economic development and societal welfare (Ameyaw & Dzaka, 2016; Okeke et al., 2018). Improving tax compliance is a critical prerequisite to achieving revenue sufficiency and long-term fiscal sustainability.

In both emerging and developed contexts, tax administrations face persistent obstacles related to compliance and revenue mobilisation. In developing countries, these challenges are often intensified by weak administrative capacities, limited enforcement mechanisms, and systemic inefficiencies. Akitoby and co-authors (2018) documented that those reforms, such as improved taxpayer registration, risk-based audits, and enhanced reporting systems, have significantly contributed to successful revenue mobilisation efforts. However, in the absence of such institutional innovations, fiscal performance remains suboptimal (Akitoby et al., 2018). Meanwhile, advanced economies, although institutionally stronger, contend with the tax base erosion risks emerging from digitalisation and the complexities of cross-border transactions (Akitoby et al., 2020). These cross-cutting concerns underscore the need for continuous reforms and robust performance management frameworks across jurisdictions.

Performance management is instrumental in improving tax administration. It facilitates streamlined operations, elevates compliance levels, and ensures stable revenue flows to support government objectives (Dabla-Norris et al., 2017). An effective performance framework not only strengthens fiscal governance but also promotes transparency, taxpayer trust, and efficient allocation of public resources (Efuntade, 2020; Kipilimba, 2018). Recognising these benefits, many emerging economies have prioritised domestic revenue mobilisation through performance-oriented administrative reforms (von Haldenwang & von Schiller, 2016).

In Indonesia, challenges to tax compliance are formidable. These include a large informal economy, entrenched corruption, and a consistently low tax-to-Gross Domestic Product (GDP) ratio (Olken & Singhal, 2011; Matsumoto, 2018; Bardey & Mejía, 2019; Tran-Nam, 2023; Hoy et al., 2024). Between 2009 and 2019, Indonesia's revenue performance was markedly below regional benchmarks, with collections as a percentage of GDP being less than two-thirds of the average for Emerging East Asia and less than half of the Emerging Market economy average (Hoy et al., 2024). In 2021, Indonesia's tax-to-GDP ratio stood at 9.1% – among the lowest globally – significantly trailing countries such as Cambodia (18.0%), the Philippines (15.2%), and Vietnam (14.7%). The Covid-19 pandemic further exacerbated this situation, temporarily reducing the ratio to 8.3% in 2020 (Qian & Poniatowski, 2025).

Despite adopting tax policy structures similar to those of regional peers, such as Malaysia and the Philippines, Indonesia persistently underperforms in revenue generation (Asian Development Bank, 2022). The primary culprit is poor compliance, as evidenced by the finding that approximately one-quarter of registered firms in Indonesia admit tax evasion – accounting for an estimated 2% of GDP in forgone revenue (Hoy et al., 2024).

To manage its performance, the Directorate General of Taxation (DGT) introduced the Balanced Scorecard (BSC) in 2010 as a strategic management tool to align internal operations with broader compliance and revenue objectives (Erawan et al., 2022). Structured around four perspectives – stakeholder, customer, internal process, and learning and growth – the BSC has enabled the DGT to integrate financial and non-financial indicators into its performance assessment process to enhance tax administration efficiency and tax compliance (output), which ultimately leads to tax revenue collection (outcome). Prior research suggests that public organisations adopting the BSC experience improvements in accountability, efficiency, and alignment between strategy and execution (Greatbanks & Tapp, 2007; Greiling, 2010; Hoque & Adams, 2011; Philbin, 2011; Fajriah & Meiyanti, 2022).

Studies show that BSC-based reforms can reinforce tax authorities' strategic focus, optimise resource allocation, and enhance compliance through improved service delivery and operational transparency (Akitoby et al., 2018; Bayale et al., 2022). By combining financial outcomes with behavioural, operational, and developmental dimensions, the BSC provides a comprehensive framework for performance evaluation (Chan, 2004; Naro & Travaillé, 2011). These multidimensional indicators not only capture compliance levels but also allow tax administrators to adjust policies based on stakeholder feedback and systemic inefficiencies, thereby reinforcing adaptive governance.

Nevertheless, effective implementation of BSC in public sector institutions remains complex and often fraught with difficulties. Rigorous planning, consistent communication and high levels of organisational commitment are required (Chang, 2007; Budayan et al., 2020). Empirical studies have revealed high failure rates and frequent inconsistencies in application, which are attributed to both theoretical ambiguities and contextual constraints (Awadallah & Allam, 2015). Although its strategic potential is well recognised, few empirical investigations have tested the BSC's practical effectiveness in improving compliance or revenue outcomes within tax administrations, particularly in developing countries (Chang et al., 2020).

The concept of causality is central to the BSC framework (Kober & Northcott, 2021). As originally proposed by Kaplan and Norton (1996), each performance indicator is assumed to be part of a causal chain linking activities, capabilities, and outcomes. Strategy maps were later developed to visually illustrate these hypothesised causal linkages (Kaplan & Norton, 2004). This notion has since been scrutinised in academic research, with some scholars questioning whether causality within BSC frameworks can be empirically verified or is primarily aspirational (Nørreklit, 2000; Nørreklit & Mitchell, 2007; Chenhall, 2009; Hoque, 2014). However, other studies have affirmed that aligning financial and non-financial performance measures enhances the effectiveness of strategic planning (Perera & Kariyawasam, 2024). When implemented with a clear causal logic, BSC can contribute to performance optimisation, organisational learning, and strategic agility.

In the Indonesian context, empirical evidence of the effectiveness of the BSC in tax administration is limited. To the best of the author's knowledge, no existing studies have empirically examined the causal linkages between the four BSC perspectives – learning and growth, internal processes, customer outcomes, and financial performance – within the operational framework of tax administration, leaving a significant gap in both academic literature and policy-oriented research. Despite more than a decade of DGT's commitment to BSC implementation, very little is known about whether its performance

indicators demonstrate causal coherence or are linked in a way that improves compliance and revenue outcomes.

This is a significant omission given that tax compliance and revenue collection are influenced not only by enforcement strategies but also by behavioural, institutional, and sociocultural factors (Luttmer & Singhal, 2014; Larsen & Brøgger, 2021). This is because tax compliance and revenue collection are influenced by internal and external factors (Organisation for Economic Co-operation and Development (OECD), 2004). Internal factors that affect the risks associated with tax system administration include an organisation's culture, structure, technological infrastructure, operational processes and the competencies of both personnel and the institution (OECD, 2014). For instance, certain tax reforms have improved individual taxpayer compliance while simultaneously straining organisational resources and reducing overall collection efficiency (Eka, 2019). Similarly, Indonesia's 2016 tax amnesty program produced mixed results, revealing simultaneous improvements in compliance and persistent systemic weaknesses (Inasius et al., 2020). These complexities highlight the challenges faced by tax administrations in crafting coherent reform strategies that yield durable outcomes (von Haldenwang & von Schiller, 2016).

Further, Indonesian tax offices face significant performance management challenges in both operational and strategic dimensions. Studies have identified difficulties in consistently achieving key performance indicators (*Indikator Kinerja Utama – IKU*) within the Balanced Scorecard approach, undermining organisational performance (Yusrifalda et al., 2024). Efficiency analyses using stochastic frontier methods have revealed interprovincial disparities and technical inefficiencies, indicating uneven resource utilisation and process optimisation across tax offices (Laksono & Widyawati, 2018).

Indonesia's geographic and socioeconomic landscape is notably heterogeneous, necessitating a clear distinction between the Java and non-Java categories. As the nation's economic and infrastructural hub, Java benefits from concentrated development efforts, government support, and enhanced market dynamics, contributing to higher welfare indices and distinct consumer preferences (Mardalena et al., 2023; Briawan et al., 2024). Non-Java regions often lag in these dimensions, experiencing slower economic progress and varied environmental quality linked to different demographic and social characteristics (Arman et al., 2017; Pujiati et al., 2023). Failing to separately analyse Java and non-Java areas may mask underlying disparities and lead to misinterpreted policy implications for the latter. The unique dynamics in each category highlight the need for tailored research methodologies that account for region-specific variations, facilitating effective and context-sensitive interventions (Jamil et al., 2022).

Understanding the operating context is vital for tax administration, enhancing strategies by ensuring that performance measures reflect internal dynamics and external influences (OECD, 2014). This ensures that indicators are part of a broader framework reflecting real-life challenges and opportunities. Contextual awareness mitigates the risk of overfocusing on limited output indicators. Without understanding the environment, outcome measures can mislead stakeholders; targets may seem arbitrary because of external variables (OECD, 2014).

Therefore, this study contributes to the literature by examining the causal linkages embedded within the DGT BSC strategy map, not only at the national level but also at

two main regional levels: Java and non-Java. Understanding these internal causal relationships is essential for enhancing compliance, which is a key determinant of fiscal resilience and administrative legitimacy (Batrancea et al., 2019; Lee, 2020). This is because the revenue-raising capacity of tax authorities can be evaluated effectively by examining both the process and output dimensions (von Soest, 2007).

From a tax administration perspective, these findings have significant implications. From a practical perspective, the absence of verified cause-and-effect linkages within a BSC framework leads to poor managerial choices, misdirected employee actions, counterproductive organisational behaviour, and ultimately underperformance (Nørreklit, 2000, 2003; Kaplan & Norton, 2008; Huelsbeck et al., 2011).

Therefore, through an empirical analysis of these internal relationship dynamics, this study seeks to provide policy-makers with actionable insights to enhance tax compliance strategies, thereby advancing Indonesia's broader revenue mobilisation objectives. By empirically testing the presence and significance of causal relationships among BSC elements, this study provides robust insights for policy-makers seeking to improve compliance strategies and optimise Indonesia's domestic revenue mobilisation framework.

The remainder of this article is organised as follows: Section 2 describes the empirical context, detailing the structure and function of the DGT's BSC; section 3 outlines the methodological approach employed to identify causal linkages; section 4 presents and discusses the empirical findings; and section 5 concludes with policy recommendations and implications for future research.

2. EMPIRICAL SETTING

2.1 Performance management

Effective performance management is a foundational pillar in the modernisation of tax administrations, especially in the pursuit of improved tax compliance, operational efficiency and sustainable revenue generation (Mansor, 2018). When strategically applied, performance management supports the development of tax systems that not only enhance collection outcomes but also streamline operations and align with broader developmental objectives (Dabla-Norris et al., 2017). In this context, performance management extends beyond mere revenue metrics to encompass the optimisation of processes, strategic resource allocation, and the deployment of tailored interventions aimed at mitigating non-compliance.

By adopting data-driven practices, tax authorities can systematically identify operational inefficiencies, establish performance benchmarks and implement measurable objectives that support evidence-based decision-making (von Soest, 2007). Despite its theoretical appeal and widespread advocacy, the empirical literature assessing the direct impact of performance management frameworks on tax compliance and revenue outcomes in developing economies is sparse (Chang et al., 2020). This lacuna signals the need for further empirical investigation into the causal mechanisms through which performance management translates into tangible improvements in tax administration. In this sense, strategic frameworks, such as benchmarking, offer structured methodologies for evaluating and enhancing tax operational efficiency (Dibie & Dibie, 2020). Aligning tax collection processes with strategic objectives enables tax administrations to effectively address fiscal demands, respond to changes in taxpayer

behaviour and promote a culture of compliance that optimises revenue collection (Mansor & Tayib, 2012).

Furthermore, the implementation of performance management practices must be aligned with evolving domestic and international fiscal dynamics. Bird and Zolt (2008) emphasised the necessity of structured planning and process re-engineering to ensure that tax systems are responsive to macroeconomic volatility. This responsiveness is critical in an era of intensifying tax competition, where adaptive strategies are essential to safeguard fiscal sovereignty and economic stability (Vrijburg & de Mooij, 2016). By illuminating the linkages between inputs, processes, and outcomes, evidence-based strategies advance the twin goals of efficiency and equity in tax administration (Wenzel & Taylor, 2003).

Thus, performance measurement frameworks are indispensable tools for diagnosing underperformance, directing corrective actions, and promoting accountability. They support alignment across the strategic, operational, and individual levels of tax organisations (Mansor & Tayib, 2012). Crandall (2010) noted that regular and integrated performance evaluation fosters a cohesive system in which objectives at all tiers reinforce each other, ultimately enabling responsive and effective governance. Integrating these practices allows tax administrations to better navigate complex fiscal environments, improve service delivery, and ensure a more equitable distribution of the tax burden across economic actors (Mansor, 2018).

2.2 Balanced Scorecard (BSC)

The Balanced Scorecard (BSC), which was first introduced by Kaplan and Norton (1992), emerged as a response to the limitations of traditional performance measurement systems that focused narrowly on short-term financial results. Designed to offer a holistic view of organisational performance, the BSC integrates financial and non-financial metrics within a structured framework, thereby providing a comprehensive tool for strategic alignment and operational execution (Kaplan, 2010). Its evolution into a strategic management system was marked by the introduction of the strategy map, which articulates how value creation unfolds through a chain of interconnected cause-and-effect relationships across four perspectives: Financial, Customer, Internal Process, and Learning and Growth (Kaplan & Norton, 2004, 2006, 2008).

This causal architecture distinguishes BSC from other performance frameworks. The four perspectives are not merely coexisting dimensions but are designed to operate sequentially, where improvements in organisational learning and growth – particularly in human capital – enhance internal processes, which then lead to improved customer satisfaction and ultimately financial outcomes (Kaplan & Norton, 1996; Zahoor & Sahaf, 2018; Cohen et al., 2008). The BSC translates an organisation's mission and strategy into measurable objectives, enabling a structured approach to performance management that is both comprehensive and actionable (Brui, 2018).

The BSC's influence extends well beyond the private sector. Its adaptability has facilitated its use in non-profit organisations and public institutions, including tax administrations, where financial returns are not the sole measure of success (Kober & Northcott, 2021; Malina, 2013). In public sector settings, strategic alignment between policy goals and service delivery can be effectively monitored through the BSC, which allows organisations to evaluate both output and outcome measures across multiple

dimensions (Greatbanks & Tapp, 2007; Greiling, 2010; Hoque & Adams, 2011; Philbin, 2011; Fajriah & Meiyanti, 2022). By bridging the divide between abstract strategy and operational detail, the BSC supports improvements in organisational efficiency, effectiveness and accountability (Anand et al., 2005; Atkinson, 2006; Ayoup, 2018a; Amer et al., 2022).

Central to the BSC's utility is its embedded causal logic, which enables strategic coherence (Kober & Northcott, 2021). Each performance indicator is selected to reflect distinct objectives and reinforce a broader strategic pathway (Kaplan & Norton, 1996). Strategy maps were introduced to visualise this logic, offering a clear articulation of how improvements in one domain contribute to gains in another (Kaplan & Norton, 2004). This causal reasoning has been the subject of considerable academic scrutiny, with some scholars questioning its empirical verifiability, while others highlight its analytical and practical benefits (Nørreklit, 2000; Nørreklit & Mitchell, 2007; Chenhall, 2009; Hoque, 2014). Recent studies provide empirical support for the claim that strategic alignment among BSC dimensions can improve performance outcomes, especially when non-financial indicators serve as precursors to financial success (Perera & Kariyawasam, 2024).

However, the operationalisation of the BSC remains challenging. Effective implementation requires careful planning, consistent communication, and institutional commitment (Chang, 2007; Budayan et al., 2020). Organisational alignment across strategic, tactical, and operational levels is difficult to sustain, often leading to fragmented execution and diminished impact (Breton et al., 2017). High failure rates and significant variations in BSC interpretation further complicate its application, indicating persistent tensions between its theoretical coherence and practical utility (Awadallah & Allam, 2015). Additionally, while the BSC is widely adopted as a reporting instrument, its potential as a dynamic management tool to drive real-time decision-making and adaptive reform is frequently underutilised (Northcott & Ma'amora Taulapapa, 2012).

The BSC adaptations for the public and non-profit sectors have involved reconfiguring the objectives to better reflect stakeholder-centred goals. Marr (2009) proposed replacing the customer perspective with a broader stakeholder focus and shifting emphasis from profit maximisation to effective service delivery and resource stewardship. Nonetheless, internal processes and learning perspectives retain their central importance because they directly influence the capacity of public institutions to deliver on strategic mandates (Marr, 2009).

In the context of tax administration, the BSC has proven to be a valuable tool for capturing performance across multiple dimensions, including financial outcomes, stakeholder engagement, operational processes, and institutional learning (Ayoup, 2018b; Gębczyńska & Brajer-Marczak, 2020). This multi-perspective approach enables tax authorities to evaluate their performance not only in terms of revenue collection but also in building taxpayer trust, enhancing compliance behaviour and fostering organisational adaptability (Nyukorong, 2022). Furthermore, the BSC supports iterative learning by identifying performance gaps, facilitating targeted resource allocation and guiding reform initiatives (Biro et al., 2003; Radnor & Lovell, 2003).

Collectively, the literature has demonstrated that the BSC's theoretical strength lies in its causal logic and practical relevance in aligning strategic intentions with measurable outcomes. However, its effective application requires careful adaptation to the

institutional and sectoral contexts in which it is deployed. For tax administrations operating under complex fiscal and administrative constraints, the BSC offers a measurement framework and strategic instrument to achieve long-term compliance and revenue objectives.

2.3 Indonesia's tax administration strategy map

Empirical research in the Indonesian context underscores the importance of tax administration reforms in enhancing revenue generation and improving the broader investment climate (Brondolo et al., 2008; Eka, 2019). These findings suggest that refining existing strategies can yield gains in administrative efficiency, transparency, and taxpayer compliance. The persistent nature of Indonesia's fiscal challenges requires a robust and adaptive performance management system that can translate its strategic objectives into actionable outcomes.

Empirical research highlights the central role that internal tax administration processes play in shaping taxpayer compliance. Gangl, Hofmann and Kirchler (2015) demonstrated that a strong service climate, with professional procedures and effective communication, enhances the perceived legitimacy of tax authorities and fosters voluntary cooperation. However, these services are currently inadequate. Gangl and co-authors (2014) showed that although supervision does not necessarily improve payment timeliness, it remains vital to promote taxpayer awareness and trust. The absence of a supportive service environment may render strict controls counterproductive (Gangl et al., 2014; Gangl et al., 2015). On the enforcement side, the effectiveness of audits and legal interventions is assessed on the basis of their scope, intensity, and outcomes. Slemrod (2019) underscored the importance of randomised controlled trials in revealing how enforcement instruments shape taxpayer behaviour, while Eberhartinger and co-authors (2021) offered a metric of enforcement capacity – average personnel per 100 firms – linking administrative resources to enforcement. These indicators inform strategic resource allocation and serve as tools to curb tax evasion. The literature calls for a balanced tax administration strategy in which service quality (Gangl et al., 2015) cultivates trust and voluntary compliance, whereas supervision and enforcement (Gangl et al., 2014; Slemrod, 2019; Eberhartinger et al., 2021) provide safeguards to uphold system integrity.

The BSC has become a central instrument in this effort. It provides a structured and multidimensional framework that facilitates the alignment of strategic goals and operational performance while promoting transparency and accountability within public institutions (Ayoup, 2018b; Lucianetti et al., 2019). In response to these imperatives, the Indonesian government institutionalised the BSC as part of its broader strategy to reform public sector governance. Its implementation, in tandem with strategy maps, supports the articulation of cause-and-effect relationships among performance indicators and enhances the clarity and coherence of strategic planning processes (Erawan et al., 2022).

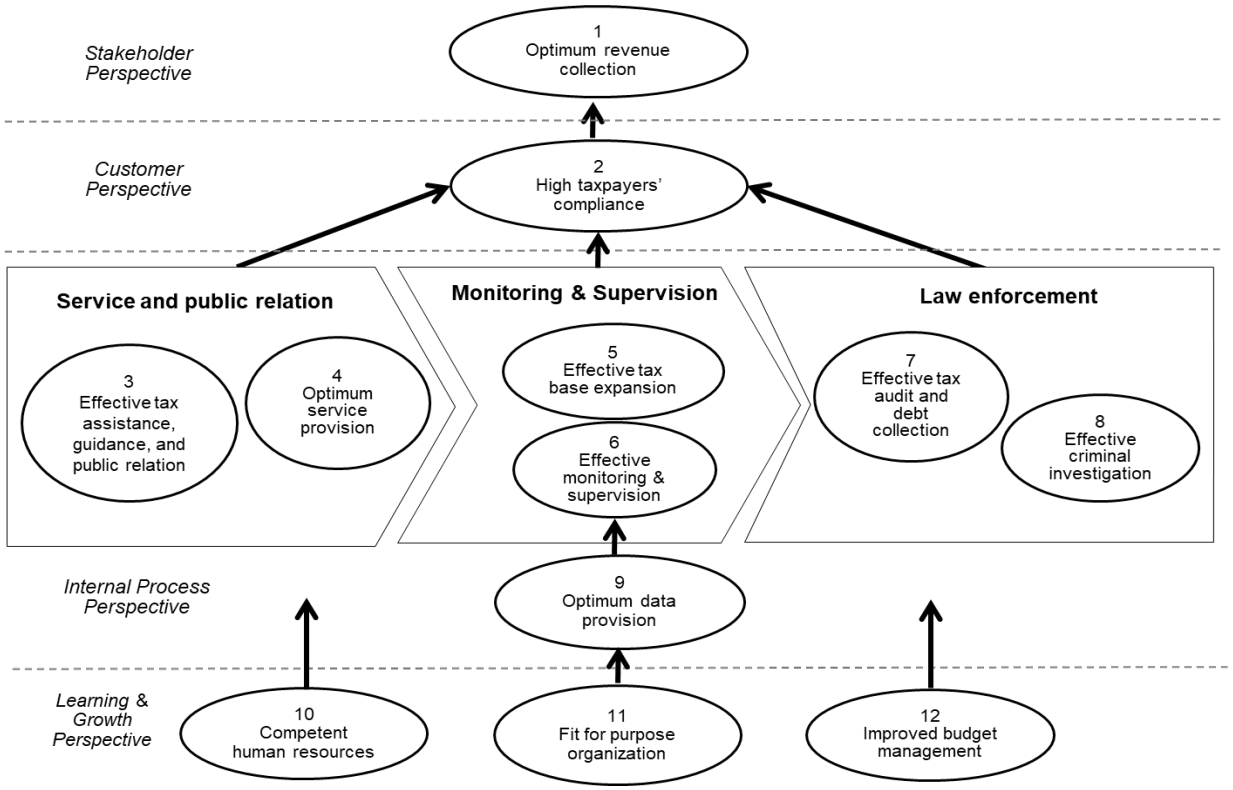
Specifically, the DGT adopted the BSC in accordance with Ministry of Finance Regulation No. 467/KMK.01/2014, which designated the BSC as the official performance management tool for all entities under the Ministry of Finance.[1] Notably,

[1] The Ministry of Finance Regulation No. 467/KMK.01/2014 can be accessed at https://e-ppid.kemenkeu.go.id/api/Medias/92612e70-de97-424e-965c-d6467862cd04 (accessed 19 November

the DGT's adaptation replaces the traditional financial perspective with a stakeholder perspective, reflecting the unique priorities of public-sector institutions. This modification aligns performance assessments with broader societal outcomes and public value creation.

Based on the Ministry of Finance Regulation No. 467/KMK.01/2014, the DGT's BSC framework encompasses four perspectives – stakeholders, customers, internal processes, and learning and growth – each designed to support strategic alignment and continuous organisational development. By integrating these dimensions, the DGT fosters an organisational culture oriented towards adaptability, responsiveness, and long-term performance improvement. Emphasising both internal processes (efficiency and capacity) and outputs (revenue collection) enables a comprehensive evaluation of tax administration performance (von Soest, 2007). This strategic model enhances the DGT's capacity to navigate the multifaceted challenges of tax administration by balancing revenue generation, taxpayer trust, and administrative effectiveness (DGT, 2023; Rivkin, 2004).

Fig. 1: Indonesia's Tax Administration Strategy Map



Source: DGT (2019, p. 9).

2024). This regulation has been updated by Ministry of Finance Regulation No. 300/KMK.01/2022 concerning Performance Management within the Ministry of Finance; however, the adoption of the Balanced Scorecard (BSC) framework remains in place.

Note: The graph is based on the DGT's official strategy map, adopting the Balanced Scorecard (BSC) framework as mandated by Ministry of Finance Regulation No. 467/KMK.01/2014. The causal linkages in the strategy map are central to this study, providing a structured basis for analysing performance relationships across perspectives; visually presenting them aids in understanding these interconnections. These linkages are hypothesised to be positive, expecting that improvements in one perspective enhance the subsequent perspective. The DGT modifies the financial perspective into a stakeholder perspective directly linked to financial data, particularly revenue collection, reflecting improved internal processes, learning, and growth.

Figure 1 presents the BSC framework as implemented within Indonesia's tax administration, delineating three strategic pillars designed to enhance taxpayer compliance: (1) service and public relations, (2) monitoring and supervision, and (3) law enforcement. The 'service and public relations' strategy prioritises taxpayer engagement through two principal objectives: providing tax assistance, guidance and outreach and optimising service quality and accessibility.

The monitoring and supervision pillar aims to expand the tax base by strengthening oversight mechanisms and enhancing the identification of non-compliant taxpayers. The 'law enforcement' component supports compliance through a combination of tax audits, debt recovery measures, and criminal investigations targeting serious violations of tax laws. Notably, three elements in the learning and growth perspective – employee competence development, budget management, and organisational adaptability – exhibit positive causal links with these three internal business process pillars, reinforcing their effectiveness and sustainability. Collectively, these causal links form an integrated strategic architecture that enables the DGT to address multiple dimensions of compliance and ensure more effective revenue mobilisation.

3. METHODOLOGY

3.1 Data

Empirically examining causal linkages within the Balanced Scorecard (BSC) framework presents methodological challenges, particularly due to limited access to comprehensive and standardised data across organisational units. To address this issue, the study adopts a census approach, utilising hand-collected administrative data sourced directly from all small tax offices (i.e., *Kantor Pelayanan Pajak Pratama* – KPP) across Indonesia. The resulting dataset comprises performance metrics from 319 tax offices, providing a nationally representative overview of operational efficiency and effectiveness within the DGT. To preserve homogeneity and ensure analytical comparability, 33 tax offices classified as large or medium were deliberately excluded because of their unique mandates, resource structures, and strategic orientations, which do not reflect standard regular tax office operations.

The dataset includes KPIs central to the BSC framework adopted by the DGT, such as tax revenue collection rates, tax return processing times, audit effectiveness, taxpayer service quality, and compliance levels. This study uses all 19 KPI data points from 319 tax offices, all measured on a ratio scale. Each KPI is aligned with one of the BSC perspectives, as conceptualised in the DGT official strategy map. These indicators allow

for a multidimensional assessment of tax office performance, thereby enabling the identification of best practices, regional disparities, and strategic misalignments within Indonesia's tax administration landscape.

Table 1 details the geographic distribution of the examined offices across the five principal regions: Java, Sumatra, Sulawesi, and Kalimantan, and a combined region comprising Bali, Nusa Tenggara, Papua, and Maluku. Java dominates with 202 tax offices, a distribution that includes all large (4) and special (9) offices, underscoring its demographic and economic centrality to national revenue collection. Sumatra has 71 offices, comprising four medium and 67 small offices, reflecting its moderate economic scale and administrative demand. Each of the remaining three regions – Sulawesi, Kalimantan, and the combined eastern region – hosts one medium office and approximately 26 to 27 small offices, indicative of their lower population densities and emerging economic roles.

Table 1: Tax Offices Under Investigation

No.	Regions	Tax office types				Total
		Large	Special	Medium	Small	
1	Java	4	9	13	176	202
2	Sumatra	-	-	4	67	71
3	Sulawesi	-	-	1	25	26
4	Kalimantan	-	-	1	26	27
5	Bali, Nusra, Papua, and Maluku	-	-	1	25	26
	Total	4	9	20	319	352

Source: author's elaboration.

The comprehensive KPI data presented in Table 2 facilitate a detailed analysis aimed at examining causal linkages among KPIs from four perspectives of the strategy map. Owing to constraints in data availability, this study focuses exclusively on data for financial year 2019. The following two factors justify the focus of this study. First, the conceptualisation of the strategy map implemented by the DGT remains fundamentally consistent. Second, the 2019 data reflect the standard operating conditions before the disruptions caused by the Covid-19 pandemic, providing a baseline for assessing typical business processes.

For policy-makers and tax administrators, these metrics serve as critical instruments to establish benchmarks, monitor progress over time, and inform strategic decisions to enhance tax compliance and revenue collection. KPI analysis not only facilitates the identification of causal linkages within the strategy map, but also identifies specific drivers of effective tax administration, ultimately contributing to a more resilient and adaptable tax system in Indonesia.

Table 2: Description of KPI Data Used in the Analysis

No.	Strategic Objectives	Code	Key Performance Indicators (KPI)	KPI Formula
	Stakeholder perspectives			
1.	Maximise state tax revenue	*S1a*	Percentage of tax revenue realisation	(Tax revenue received from routine sources/Target of tax revenue from routine sources) × 100%
		S1b	Percentage of effort tax revenues	(Tax revenue received from extra effort/Target of tax revenue from extra effort) × 100%[2]
		S1c	Growth in gross tax revenues	((Current year tax revenue–Previous year tax revenue) / Previous year tax revenue) × 100%
	Customer perspectives			
2.	Enhance taxpayer compliance	*C2a*	Formal compliance rate for Corporate Taxpayers and Individual Business Owners	(Total number of annual income tax returns submitted by corporate and individual resident taxpayers/Total number of registered corporate and individual resident taxpayers required to file annual returns) × 100%
		C2b	Payment compliance rate for Corporate Taxpayers and Individual Business Owners	[(60% × Number of corporate and non-employee individual resident taxpayers who made payments / Total registered corporate and individual resident taxpayers required to file annual returns) + (40% × Number of corporate and individual resident taxpayers who made payments above a specified threshold / Total registered corporate and individual resident taxpayers required to file annual returns)]
	Internal process perspectives			
3.	Optimising disseminatio n and service effectiveness	*IP3a*	Effectiveness rate of dissemination activities	((Counselling activity ratio × 100%) × 50%) + (Behavioural change ratio × 50%)
4.	Optimising tax services	*IP4a*	E-filing participation rate	(Number of e-Filing submissions/Number of targeted e-Filing taxpayers) × 100%
5.	Maximising tax base expansion	*IP5a*	Payment compliance rate of new taxpayers acquired through extensification efforts	(Number of new taxpayers who made payments/Target of new taxpayers who made payments) × 100%

[2] Effort is measured by the amount of revenue collected from previous fiscal years based on supervision or enforcement activities.

6.	Enhance taxpayer supervision	*IP6a*	The completion rate of data and/or information clarification requests	(Percentage of Supervision Reports (LHP2DK) for Annual Tax Returns × 50%) + (Percentage of LHP2DK for Periodic Tax Returns × 50%)
7.	Improve audit and enforcement measures	*IP7a*	Audit completion rate	(Number of realised special audit proposals/Target number of special audit proposals) × 100%
		IP7b	Rate of uncontested tax assessments	(Number of Tax Assessment Letters (SKP) not appealed/Number of SKP issued) × 100%
		IP7c	Active engagement rate in preventive billing	(number of preventive billings completed on time/Number of targeted preventive billings) × 100%
8.	Strengthen investigative processes	*IP8a*	Rate of IDLP (information, data, and whistleblowing report) submissions	(Number of IDLP submissions to Regional Offices/Target of IDLP submissions to Regional Offices) × 100%
9.	Ensure accurate tax data	*IP9a*	Timeliness of tax return documentation handling	(Number of tax returns packaged on time/Number of tax returns required to be packaged) × 100%
		IP9b	Provision rate of potential tax data	(Number of tax-related data made available/Number of tax-related data planned to be made available) × 100%
	Learning and growth perspectives			
10.	Develop competent human resources	*LG10a*	Compliance with training hours standards	(Percentage of employees meeting face-to-face training hours standard × 70%) + (Percentage of employees meeting e-learning hours standard × 30%)
11.	Establish an effective organisation	*LG11a*	Effectiveness of Organisational Performance Dialogue and Monitoring of Action Plans	(Realised points of organisational performance dialogue (DKO) assessment elements and Action Plan Monitoring/Maximum possible points of DKO assessment elements and Action Plan Monitoring) × 100%
12.	Quality budget management	*LG12a*	Quality rate of the execution of the budget	[90% × (9% × Budget absorption against net allocation + 32% × Achievement of actual outputs + 42% × Efficiency + 17% × Consistency)] + [10% × (Budget Implementation Performance Score from Directorate General of Treasury)]

Source: summarised from DGT (2019).

3.2 Empirical approach

Path analysis offers a robust empirical approach for examining complex interrelationships among variables, allowing for the simultaneous assessment of direct and indirect effects within a hypothesised model (Stage et al., 2004). Unlike traditional regression techniques, path analysis facilitates the exploration of structured causal pathways across multiple variables, albeit without definitively establishing causation (Edwards & Lambert, 2007). This method has gained wide application across various disciplines, including quality management, regional development, and behavioural sciences, where it has proven effective in uncovering the intricate dynamics underlying performance outcomes (Anderson et al., 1995; Fynes & Voss, 2001; Surall & Steppacher, 2018).

Path analysis, a form of multiple regression, explores causality within a structured framework (Stage et al., 2004).[3] It tests causal models by running sequential regressions, where a variable can be either an outcome or a predictor. These regressions identify direct and indirect effects, leading to an ultimate dependent variable, if specified. The approach analyses how variables contribute to outcomes within a hypothesised causal structure (Stage et al., 2004). In path analysis, exogenous variables are independent factors, whereas endogenous variables depend on exogenous variables and mediators (Awogbemi et al., 2022). The exogenous variables start the causal chain. Their effects on endogenous variables are examined directly and indirectly through mediators, with total effects decomposed into direct and indirect contributions (Stage et al., 2004; Awogbemi et al., 2022). This decomposition identifies the influence of exogenous factors on outcomes, facilitated by path diagrams and Structural Equation Modelling (SEM) (Stage et al., 2004).

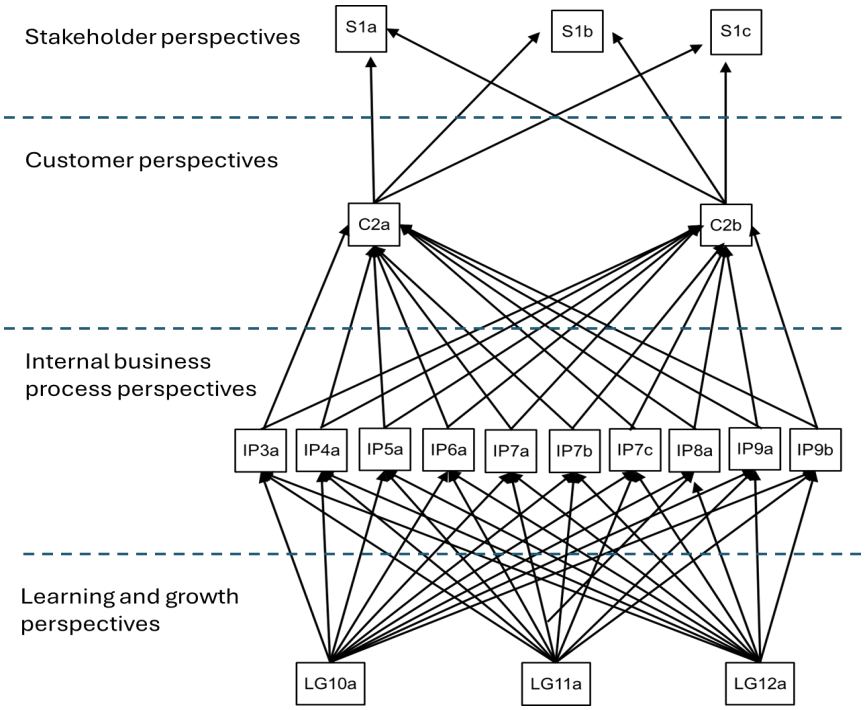
Utilising IBM SPSS Amos v.26, this study applies path analysis to evaluate the causal linkages embedded within the BSC strategy map implemented by Indonesia's DGT. Specifically, it investigates how strategic objectives within the strategy map – framed through the BSC lens – affect tax compliance and revenue collection across tax offices, both at national and regional levels. This statistical method provides an empirical basis for evidence-informed policy-making.

In taxation research, path analysis has been increasingly employed to test and refine theoretical models by elucidating the mechanisms linking tax-related behaviours with their antecedents. This analytical technique provides nuanced insights into the behavioural and institutional factors shaping compliance and revenue performance (Bauer et al., 2020; Rosid & Romadhaniah, 2023; Kanagaretnam et al., 2024). For example, Bauer and co-authors (2020) applied path analysis to explore the relationship between tax aggressiveness and financial opacity, whereas Kanagaretnam and co-authors (2024) examined how institutional quality moderates corporate tax evasion.

[3] Path analysis can be expressed algebraically using an econometric model or visually via a path diagram. The econometric model specifies structural relationships among variables using equations, thereby enabling statistical estimation and hypothesis testing (Kline, 2016). The visual path model depicts causal flows and mediating mechanisms within complex systems (Bollen, 1989). It helps researchers achieve conceptual clarity and is valuable for model development and communication. Bollen (1989) noted that path diagrams bridge theoretical constructs and empirical testing, enhancing model transparency and interpretability. For this reason, this study adopted the latter approach.

Figure 2 presents the hypothesised BSC path model, integrating the four strategic perspectives: learning and growth, internal business processes, customer, and stakeholder. In accordance with Kaplan and Norton's (1996) conceptual framework, the model posits that those improvements in learning and growth – reflected in competent human resources, sound organisational structures and efficient budget management – lead to enhanced internal processes, such as quality service delivery, expanded tax bases and effective supervision. These operational gains are expected to positively influence taxpayer compliance, which ultimately contributes to improved financial outcomes, namely revenue collection. The arrows in the model represent the assumed unidirectional causal flow, reinforcing the logic of cascading strategic influence.

Figure 2: Path Model Under Investigation



Note: *S1a* = Percentage of tax revenue realisation; *S1b* = Percentage of effort tax revenue realisation; *S1c* = Percentage growth in gross tax revenues; *C2a* = Formal compliance rate for Corporate Taxpayers and Individual Business Owners; *C2b* = Payment compliance rate for Corporate Taxpayers and Individual Business Owners; *IP3a* = Effectiveness rate of extension activities (%); *IP4a* = E-filing participation rate (%); *IP5a* = Payment compliance rate of new taxpayers acquired through extensification efforts; *IP6a* = Completion rate of requests for data and/or information clarification (%); *IP7a* = Audit completion rate (%); *IP7b* = Rate of uncontested tax assessments (%); *IP7c* = Active engagement rate in preventive billing (%); *IP8a* = Rate of IDLP (Investigation, Detection, and Prosecution) submissions (%); *IP9a* = Timeliness of tax return documentation handling; *IP9b* = Provision rate of potential tax data; *LG10a* = competent human resources; *LG11a* = Fit for purpose organisation; *LG12a* = Improved budget management.

4. RESULTS AND DISCUSSIONS

4.1 Results

4.1.1 Descriptive statistics

Table 3 (Appendix) presents evidence of significant regional disparities in tax performance metrics between Java and non-Java regions. For example, indicator *S1a* demonstrated a more concentrated distribution in Java, characterised by a narrower range and lower standard deviation relative to the national average. This pattern reflects a relatively homogeneous operational environment that is likely supported by consistent economic activity and administrative infrastructure. Conversely, the standard deviation for *S1a* in non-Java regions reaches 13.90, indicating greater variability and operational heterogeneity in tax performance in these areas.

This disparity extends to other indicators, such as *S1b*, *S1c*, *C2a*, and *IP3a*, which reveal wider data dispersion in non-Java regions. Such variability reflects the complex regional dynamics that influence taxpayer behaviour, administrative effectiveness and compliance rates across Indonesia's archipelagic geography. Notably, extreme values observed in certain variables – such as *IP7c*, which records a maximum of 10,980 in non-Java regions compared to only 780 in Java – suggest the presence of outliers or region-specific economic phenomena. The variables *IP5a* and *IP6a* also display considerable differences in both mean values and standard deviations, further highlighting the distinct administrative challenges in areas outside Java.

In contrast, Java exhibits greater consistency across several indicators, including *LG12a*, suggesting a more standardised application of tax administration practices. This uniformity may be attributed to more centralised oversight, better resource allocation and established infrastructure within the region. The elevated maximum values and pronounced variability in non-Java regions underscore the necessity of geographically differentiated policy responses. The observed volatility may stem from factors such as geographic remoteness, infrastructural limitations, and region-specific industry structures. These findings advocate the design of decentralised and adaptive tax administration strategies that account for each region's unique context.

Tables 4 and 5 (Appendix) complement this analysis by presenting a correlation matrix of key performance indicators across 319 tax offices. This matrix quantifies the strength and direction of bivariate associations, enabling researchers to identify patterns and detect issues like multicollinearity, which can distort results (Kim, 2019). By highlighting high inter-correlations, the matrix helps in decisions on subsequent analyses, ensuring data structure appropriateness (Holgado-Tello et al., 2010; Watkins, 2018). Incorporating a correlation matrix enhances transparency in data reporting, allowing researchers to assess the dataset's structure and ensure that further statistical procedures are based on a sound foundation (Asfahani, 2024).

Table 4 presents the correlation analysis of key tax performance indicators at the national level, revealing statistically significant relationships that inform the causal structure of the BSC framework. The strongest positive correlation was observed between *S1a* and *S1c* ($r = 0.581$, $p < 0.01$), indicating that improvements in one dimension were closely aligned with enhancements in the other. A similarly robust association was evident between *C2b* and *C2a* ($r = 0.637$, $p < 0.01$), suggesting that compliance outcomes and collection performance are interdependent. The positive

correlation between *LG12a* and *IP5a* ($r = 0.182$, $p < 0.01$) further supports the inference that learning and growth initiatives – particularly those related to internal capabilities – can improve internal process outcomes.

In contrast, several negative correlations indicate inverse relationships among variables, implying that gains in one domain may coincide with declines in others. For instance, *IP4a* and *C2a* ($r = -0.179$, $p < 0.01$) exhibited a moderate negative correlation, suggesting that administrative process enhancements may inadvertently hinder compliance outcomes. Additional inverse relationships, such as those between *IP7a* and *IP6a* ($r = -0.147$, $p < 0.01$) and *IP9b* and *C2b* ($r = -0.112$, $p < 0.05$), may reflect trade-offs resulting from resource reallocation or differing regional implementation practices in the field. The significance of these correlations ($p < 0.01$ and $p < 0.05$) affirms their reliability and underscores their importance for evidence-based policy formulation.

As Table 5 shows, subgroup analysis by region reveals further insights into the structural differences between Java and non-Java tax offices. In the Java group ($n = 176$), the most pronounced positive correlation was observed between *S1a* and *S1c* ($r = 0.721$, $p < 0.01$), reflecting a particularly strong operational dependence between these two stations. Additional correlations – such as *C2a* and *C2b* ($r = 0.614$, $p < 0.01$) and *IP5a* and *C2b* ($r = 0.567$, $p < 0.01$) – underscore the alignment of internal processes with compliance and collection outcomes. In contrast, the outside-Java group ($n = 143$) exhibited weaker positive correlations, such as *LG11a* and *LG12a* ($r = 0.257$, $p < 0.01$), *IP7a* and *LG11a* ($r = 0.308$, $p < 0.01$), and *IP9a* and *LG10a* ($r = 0.233$, $p < 0.01$), indicating moderate but less cohesive relationships among the performance indicators.

Negative correlations within the Java group revealed notable inverse dynamics. For example, *IP6a* and *LG12a* exhibit a strong negative correlation ($r = -0.313$, $p < 0.01$), potentially indicating tensions between technological investment outcomes and resource allocation. Other inverse relationships, such as between *C2a* and *IP4a* ($r = -0.287$, $p < 0.01$) and between *IP7b* and *IP9a* ($r = -0.120$, $p < 0.05$), further reflect the complex trade-offs in operational execution. In the outside-Java group, negative correlations were generally weaker, for example, *LG11a* and *C2a* ($r = -0.248$, $p < 0.01$), *IP7c* and *LG12a* ($r = -0.130$), and *IP9a* and *IP9b* ($r = -0.139$), suggesting more dispersed or context-specific interactions between variables.

Overall, the comparative analysis indicates that the tax offices in Java exhibit stronger and more statistically coherent correlations – both positive and negative – than their non-Java counterparts. This pattern may reflect a higher degree of systemic alignment, operational standardisation or integrated policy implementation within Java. Conversely, the weaker and more variable correlations in non-Java regions suggest that performance indicators may be influenced by localised conditions, decentralised practices or infrastructural disparities, reinforcing the need for region-specific strategies in tax administration.

4.1.2 Path analysis results

Figure 3 (Appendix) illustrates the path analysis of 56 hypothesised relationships within the BSC framework applied to Indonesia's tax administration. Table 6 (Appendix) provides the detailed results of the path analysis. Overall, most relationships were positive, with 61% at the national level (i.e., 34 out of 56), 57% at the Java level (i.e., 32 out of 56), and 59% at the non-Java level (i.e., 33 out of 56). Nationally, 14 relationships (25.0%) showed statistically significant positive effects, and six

relationships (10.73%) displayed significant negative effects. The remaining 36 relationships (64.29%) were statistically insignificant, suggesting that most causal pathways did not exert a uniform influence across the national sample. A regional breakdown reveals a similar pattern: in Java, 12 positive (21.4%) and four negative (7.14%) paths are significant, while 71.6% are insignificant; in non-Java regions, 10 positive (17.8%) and four negative (7.14%) relationships are significant, with 75.0% being statistically insignificant. These figures suggest that regional dynamics mediate the strength and direction of causal pathways embedded in the BSC framework.

Structurally, the BSC model is operationalised through four perspectives: learning and growth, internal business processes, customer and financial. Learning and growth indicators (*LG10a*: human resources, *LG11a*: organisational effectiveness, and *LG12a*: budgeting) influence internal processes (*IP3a-IP9b*), which in turn shape customer outcomes (*C2a*: formal compliance, *C2b*: payment compliance) and ultimately affect financial performance (*S1a-S1c)*. For example, *LG12a* significantly improved *IP5a* nationally (β = 0.173), whereas *LG11a* enhanced *IP7a* (β = 0.264) and *LG12a* supported *IP7a* (β = 0.170) and *IP7b* (β = 0.176). In non-Java regions, *LG12a* positively influenced *IP4a* (β = 0.138) and *IP9b* (β = 0.167), demonstrating region-specific pathways linking structural capabilities to operational effectiveness.

At the national level, the most prominent causal pathway begins with taxpayer outreach (*IP5a*), which exerts strong effects on formal (*C2a*, β = 0.329) and payment compliance (*C2b*, β = 0.470). Audit completion (*IP7a*) also contributes significantly to both *C2a* (β = 0.122) and *C2b* (β = 0.108), while payment compliance rate (*C2b*) has a negative influence on revenue collection (*S1a*, β = -0.106 and *S1b*, β = -0.157) as well as digital participation through e-filing (*IP4a*) negatively affects formal compliance (β = -0.178).

The negative relationship between tax payment indicators and revenue collection indicates an imbalance in taxpayer compliance and revenue targets. The tax payment variable emphasises minimal criteria by combining participation breadth and payment magnitude. However, a higher score does not ensure proportional revenue increases if payments are below the effective collection threshold or reflect low-value compliance. Revenue collection depends on the absolute value of payments relative to targets. If compliance improves mainly through low-value contributions, aggregate revenue may still fall short, indicating an inverse correlation. This could signal inefficiencies in taxpayer segmentation or overly optimistic revenue targets not aligned with the tax base's capacity or behaviour (Bird & Zolt, 2008), highlighting the need to balance quantity and quality in compliance strategies.

Learning and growth indicators further support internal process improvements: *LG10a* strengthens *IP4a* (β = 0.122) and *IP9a* (β = 0.157); *LG11a* improves *IP3a* (β = 0.094), *IP5a* (β = 0.110), and *IP7a* (β = 0.160); and *LG12a* boosts *IP7a* (β = 0.196) and *IP7b* (β = 0.110). At the customer-financial interface, formal compliance significantly increases tax revenue realisation (*S1a*, β = 0.120), whereas payment compliance is negatively associated with effort-based realisation (*S1b*, β = -0.157). These findings underscore the importance of outreach, audits, and organisational capacity in shaping national compliance and revenue outcomes.

In Java, taxpayer outreach (*IP5a*) continues to dominate as the key predictor of formal compliance (β = 0.271) and payment compliance (β = 0.405). However, audit-related indicators display weaker significance than in the national model. Internal capacity remained influential: *LG11a* improved *IP7a* (β = 0.264), while *LG12a* supported *IP7a*

(β = 0.170) and *IP7b* (β = 0.176). E-filing (*IP4a*) had a pronounced negative impact on formal compliance (β = -0.291). Notably, no significant positive pathways link compliance (*C2a* or *C2b*) to fiscal outcomes (*S1a*-*S1c*) in Java, indicating a potential decoupling between taxpayer behaviour and revenue performance, possibly due to saturation effects or declining marginal returns in mature administrative settings.

In contrast, the non-Java region exhibits stronger and more direct links between internal processes, compliance, and revenue. Outreach (*IP5a*) had the highest path coefficients for *C2a* (β = 0.332) and *C2b* (β = 0.572), followed by audit resolution (*IP7b*), which also positively influenced *C2a* (β = 0.173). Learning and growth indicators remain vital: *LG10a* improves *IP3a* (β = 0.237), whereas *LG12a* affects *IP4a* (β = 0.138) and *IP9b* (β = 0.167). Critically, formal compliance is significantly associated with *S1a* (β = 0.232) and *S1c* (β = 0.174), whereas payment compliance continues to exert a negative influence on *S1b* (β = -0.202). These results imply a more tightly integrated feedback loop in non-Java regions, where compliance behaviour drives fiscal performance more directly.

Customer outcomes (*C2a* and *C2b*) function as mediators in this model. Formal compliance enhances financial performance nationally and in non-Java models, particularly through *S1a* and *S1c*, whereas payment compliance has a consistently negative impact on *S1b* in both models. This bifurcation suggests that formal compliance (likely linked to declarations and reporting accuracy) translates more reliably into predictable revenue, whereas payment compliance may be hindered by enforcement constraints and capacity limitations.

Across internal business processes, *IP5a* remains a consistently strong predictor of compliance, with its effects being more pronounced in non-Java (β = 0.572 for *C2b*) than in Java (β = 0.405) and national (β = 0.470) models. Audit-related indicators show regionally contingent effects: in Java, their influence is attenuated; in non-Java, *IP7b* significantly supports compliance (β = 0.173), emphasising the role of procedural integrity in less formalised environments. These variations reflect how maturity levels, institutional contexts, and taxpayer characteristics shape the relative effectiveness of administrative strategies.

The comparative analysis underscores that, while the non-Java region has fewer statistically significant paths overall, it exhibits the strongest causal effects, particularly from intermediate indicators to compliance and compliance to revenue. This suggests that in developing country contexts, performance drivers, such as outreach, audit resolution, and procedural fairness, play a pivotal role in translating reform efforts into fiscal outcomes. The learning and growth variables (*LG10a*, *LG11a*, and *LG12a*) exhibited differentiated regional effects, revealing structural disparities. In Java, *LG11a* and *LG12a* influence audit processes (for example, *IP7a*, β = 0.264, and β = 0.176, respectively), reflecting institutional maturity. In the non-Java context, *LG10a* drives *IP3a* (β = 0.237), and *LG12a* enhances *IP9b* (β = 0.167), suggesting the need for foundational investments in human and technical capacity. At the national level, *LG12a*'s broad influence, spanning *IP5a*, *IP7a*, and *IP7b*, signals its central role in bridging strategic design and operational execution. Taken together, these findings validate the BSC's conceptual structure: improvements in learning and growth feed into internal processes that shape customer behaviour and ultimately affect financial outcomes. However, the strength and structure of these linkages vary significantly across regions, necessitating context-sensitive policies and management responses.

4.2 Discussion

The findings reinforce the BSC framework's potential as a strategic tool for improving tax compliance and revenue outcomes in Indonesia's decentralised tax administration. The significant influence of service-oriented and supervisory indicators – particularly those related to taxpayer outreach and compliance monitoring (e.g., *IP5a*) – on formal and payment compliance (*C2a* and *C2b*) supports prior studies that identified supervision as a key compliance driver (Chang et al., 2020; Dibie & Dibie, 2020). These results demonstrate that embedding structured supervisory mechanisms within the BSC framework is critical for reducing compliance gaps and aligning tax administration strategies with regional governance dynamics, echoing Bird and Zolt's (2008) argument regarding tailored administrative approaches in complex fiscal environments.

The main contribution of this study is the provision of empirical evidence on causal linkages among the four perspectives within the BSC framework, as adopted in the DGT strategy map. Using KPI data, this study systematically maps learning and growth, internal processes, customer, and financial perspectives using path analysis, thereby offering practical insights into how strategic initiatives in capacity-building and operations translate into compliance behaviour and fiscal outcomes. This empirical approach fills a critical gap in performance management research by validating the BSC's theoretical assumptions in the context of large-scale public tax administration.

A notable contribution of this study lies in its comparative regional analysis, which reveals important differences in the strength and structure of causal linkages between Java and non-Java tax offices. Java's tighter integration among BSC components, particularly the strong effects of internal processes on compliance outcomes, reflects the benefits of administrative coherence, established institutional routines, and higher resource capacity. This finding reinforces the notion that mature administrative environments may yield more consistent performance outcomes through top-down alignment. In contrast, non-Java regions exhibit looser interconnections and stronger dependencies on outreach and audit resolutions. These regional disparities highlight the need for decentralised strategies that prioritise service delivery, local resource adaptation and responsive compliance support, which is consistent with the differentiated policy frameworks proposed by Wells and Weiner (2005) and Alm and co-authors (2010).

Public sector adaptation of the BSC, as proposed by Marr (2009), provides a useful lens through which to interpret these regional variations. Rather than focusing exclusively on financial metrics, this model advocates performance systems centred on service equity, organisational learning and stakeholder engagement. For the DGT, shifting emphasis towards these dimensions, especially in underserved non-Java regions, may yield greater compliance and trust improvements than traditional revenue-focused measures. This shift is particularly relevant in emerging and informal economies, where enforcement-based strategies often underperform without complementary efforts to enhance taxpayer services and administrative fairness.

The path analysis results further highlight the strategic importance of internal business processes and learning and growth perspectives in driving tax administration performance. Investments in organisational capabilities, budget planning and human capital development (*LG10a-LG12a*) have measurable impacts on intermediate outputs, such as audit completion and taxpayer outreach, which in turn shape compliance behaviour. These findings echo earlier calls by Radnor and Lovell (2003) and Chavan

(2009) that tax administrations should strengthen organisational learning to sustain operational adaptability. Particularly in non-Java regions, where administrative maturity is still evolving, such capacity-building is not only beneficial but also necessary for translating strategies into compliance outcomes.

The observed limitations in linking compliance metrics (*C2a* and *C2b*) to revenue outcomes (*S1a*-*S1c*), especially in Java, suggest that the BSC model requires refinement to fully capture the economic complexity of compliance behaviour more fully. This supports earlier critiques by Wenzel and Taylor (2003) and Wells and Weiner (2005), who noted that standard BSC applications often underrepresent the influence of contextual variables. Incorporating additional explanatory factors, such as taxpayer literacy, sectoral composition, and digital accessibility, would provide a more nuanced understanding of the compliance-to-revenue chain, particularly in high-capacity regions where diminishing marginal returns may obscure policy effectiveness. The decoupling of compliance and revenue in Java suggests that even well-performing offices may require structural innovation to maintain responsiveness to revenue mobilisation.

Furthermore, the negative association between payment compliance (*C2b*) and effort-based revenue indicators (*S1b*) indicates potential inefficiency in enforcement or settlement mechanisms. This recurring pattern across regions highlights the need for better integration of audit resolution, dispute management, and taxpayer communication. As Blaufus and co-authors (2024) argued, coordinated actions among compliance and enforcement units improve procedural fairness, reduce taxpayer resistance, and boost voluntary compliance – an especially pertinent insight for improving Indonesia's audit strategies.

In response to these findings, the DGT would benefit from reinforcing a BSC model that reflects Marr's (2009) public sector recommendations of prioritising stakeholder trust, continuous institutional learning and equitable service delivery. This model should be adapted to Indonesia's administrative diversity by strengthening the linkages between learning and growth, internal operations, and revenue outcomes in ways that reflect regional conditions. Integrating socioeconomic metrics – such as regional GDP per capita, digital literacy, and informality indices – can strengthen the explanatory power of compliance strategies and reveal more granular intervention points.

Ultimately, this study provides empirical support for regionally adaptive BSC implementation in Indonesia. In Java, efforts should focus on addressing diminishing returns through innovation and better aligning digital initiatives with taxpayer realities. In non-Java regions, expanding outreach, training, and audit capacity remains essential. Nationally, strategic coherence across all four BSC perspectives anchored in evidence-based causality can serve as the foundation for a more equitable, efficient, and accountable tax administration system. Aligning these strategies with local needs will ensure that tax compliance efforts contribute not only to fiscal stability but also to broader goals of inclusive and responsive governance.

5. CONCLUSIONS AND RECOMMENDATIONS

This study reaffirms the utility of the BSC as a strategic performance framework for enhancing tax compliance and revenue mobilisation in Indonesia. By empirically validating causal linkages across four BSC perspectives – learning and growth, internal processes, customer (stakeholder), and financial – this research provides actionable insights for the DGT. The integration of supervisory and service-oriented strategies,

particularly in regions characterised by compliance disparities, such as non-Java areas, demonstrates that a flexible, stakeholder-centred BSC model is more effective in addressing regional tax administration challenges (Chang et al., 2020; Bardey & Mejía, 2019). Aligning with Marr's (2009) proposition for public-sector BSC adaptation, this approach emphasises strategic resource management and institutional learning over revenue maximisation, enabling more equitable and context-sensitive policy design.

A central recommendation is to reconceptualise the traditional 'customer' perspective as a broader stakeholder orientation, thereby enhancing taxpayer engagement and service responsiveness across diverse regions. Empirical evidence from Alm and co-authors (2019) highlights the role of behavioural and service design interventions in fostering voluntary compliance. Embedding such behavioural nudges in service and supervision strategies can reduce reliance on coercive enforcement and promote more inclusive compliance regimes. In this regard, the BSC framework should serve not only as a reporting mechanism but also as an iterative management tool that captures behavioural, regional, and institutional diversity.

Equally important is the prioritisation of internal processes and learning and growth perspectives, particularly in the form of capacity development, technological integration and organisational adaptability (Wynter & Oats, 2021). These dimensions were found to be essential precursors to effective compliance outcomes, especially in non-Java regions where administrative maturity is evolving. A stakeholder-focused BSC grounded in continuous institutional learning and adaptive performance management would empower the DGT to tailor compliance interventions and respond dynamically to shifting policy environments.

To further enhance strategic planning, the BSC should be expanded to incorporate socioeconomic and behavioural indicators, allowing for more granular diagnostics of region-specific compliance patterns. Establishing continuous feedback loops within the BSC framework – facilitated through real-time data and iterative evaluation – can strengthen its diagnostic capacity and improve the alignment between compliance efforts and fiscal outcomes. This is particularly relevant given the ambiguous and often weak linkages observed between compliance and financial metrics, which suggests the need for a more refined causal framework (Nørreklit, 2000; Wenzel & Taylor, 2003; Wells & Weiner, 2005; Nørreklit & Mitchell, 2007; Chenhall, 2009; Hoque, 2014).

Based on these findings, four key policy recommendations are proposed. First, the DGT should adopt a regionally adaptive BSC model centred on stakeholder outcomes, equitable service delivery and effective resource utilisation. Second, the agency should institutionalise a culture of continuous learning by investing in staff development, technology and evidence-based decision-making. Third, strategic reforms must prioritise regional equity by strengthening performance accountability in under-resourced regions, ensuring that tax administration advances not only compliance but also public trust and inclusive development. Fourth, consistent use of valid and reliable key performance indicators (KPIs) across all organisational levels is essential to ensure BSC implementation reflects accurate performance diagnostics, supports causal interpretation, and enhances managerial accountability. Standardising KPI definitions, data collection practices, and validation protocols reinforces the credibility and utility of BSC as a decision-making tool.

This study has several limitations. While only applicable in the Indonesian context, this study relies exclusively on secondary administrative data for the financial year 2019,

which may not capture dynamic behavioural, socioeconomic, or institutional changes over time. The cross-sectional design precludes a temporal assessment of causal pathways and limits its generalisability to post-pandemic contexts. Additionally, the absence of primary data, such as taxpayer perceptions and qualitative insights from local offices, constrains the interpretive depth of regional disparities.

Future research should incorporate longitudinal designs, multiyear datasets, and mixed method approaches to explore how causal linkages evolve across policy cycles and economic shifts. Integrating taxpayer survey data and contextual indicators – such as informality rates, compliance attitudes, and digital inclusion – will strengthen the explanatory power of the BSC model and support more granular, responsive tax policy interventions. Ultimately, a more dynamic, data-enriched BSC framework is essential to advancing Indonesia's long-term goals of equitable, efficient, and accountable tax administration.

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7. APPENDIX

Table 3: Descriptive Statistics (in Percentage)[61]

KPI	National (n=319)				Java (n=176)				Outside Java (n=143)			
	Minimum	Maximum	Mean	SD	Minimum	Maximum	Mean	SD	Minimum	Maximum	Mean	SD
S1a	3.63	147.68	90.93	11.49	70.05	147.68	89.81	8.96	3.63	120.30	92.32	13.90
S1b	41.94	324.68	106.12	32.18	41.94	259.81	107.27	30.02	48.92	324.68	104.69	34.72
S1c	-280.56	3,954.15	401.82	496.53	-208.30	3,294.12	389.27	410.30	-280.56	3,954.15	417.27	586.70
C2a	27.67	132.05	74.89	17.72	38.83	132.05	81.99	16.76	27.67	107.73	66.14	14.74
C2b	19.23	90.54	51.82	11.78	22.38	90.54	54.92	11.65	19.23	81.56	48.01	10.80
IP3a	62.64	123.60	86.68	9.56	66.60	100.00	89.10	8.65	62.64	123.60	83.71	9.81
IP4a	86.74	173.45	111.76	12.47	87.00	139.00	108.94	8.99	86.74	173.45	115.22	15.06
IP5a	54.05	238.14	111.35	16.71	58.61	238.14	114.19	18.98	54.05	152.44	107.87	12.62
IP6a	86.33	807.67	137.20	58.10	86.33	255.77	130.21	29.33	96.96	807.67	145.80	79.78
IP7a	30.58	377.53	126.47	50.20	38.61	377.53	138.26	54.19	30.58	264.83	111.97	40.49
IP7b	80.69	103.85	98.12	2.25	80.69	100.30	98.20	2.22	89.13	103.85	98.02	2.28
IP7c	10.20	10,980.00	248.81	619.86	10.20	780.00	212.93	122.79	80.00	10,980.00	292.97	915.60
IP8a	33.33	1,200.00	134.56	90.51	66.67	1,200.00	139.58	115.22	33.33	400.00	128.37	43.79
IP9a	81.99	100.00	99.03	1.83	81.99	100.00	99.17	1.79	91.28	100.00	98.85	1.86
IP9b	52.50	10,287.50	529.35	1,045.08	73.24	10,287.50	383.17	825.93	52.50	8,440.00	709.26	1,243.44
LG10a	79.90	100.00	99.11	2.04	79.90	100.00	99.02	2.36	91.38	100.00	99.23	1.57
LG11a	75.00	100.00	99.02	2.07	90.78	100.00	99.07	1.55	75.00	100.00	98.97	2.57
LG12a	69.33	119.55	94.79	5.70	69.33	119.55	95.86	6.43	76.94	108.26	93.48	4.32

Note: S1a = Percentage of tax revenue realisation; *S1b* = Percentage of effort tax revenue realisation; *S1c* = Percentage growth in gross tax revenues; *C2a* = Formal compliance rate for Corporate Taxpayers and Individual Business Owners; *C2b* = Payment compliance rate for Corporate Taxpayers and Individual Business Owners; *IP3a* = Effectiveness rate of extension activities (%); *IP4a* = E-filing participation rate (%); *IP5a* = Payment compliance rate of new taxpayers acquired through extensification efforts; *IP6a* = Completion rate of requests for data and/or information clarification (%); *IP7a* = Audit completion rate (%); *IP7b* = Rate of uncontested tax assessments (%); *IP7c* = Active engagement rate in preventive billing (%); *IP8a* = Rate of IDLP (Investigation, Detection, and Prosecution) submissions (%); *IP9a* = Timeliness of tax return documentation handling; *IP9b* = Provision rate of potential tax data; *LG10a* = competent human resources; *LG11a* = Fit for purpose organisation; *LG12a* = Improved budget management.

[61] A visual representation (i.e., histogram) of the descriptive statistics is provided in Figures 4-6 (Appendix).

Table 4: Correlation Matrix at National Level (n=319)

	S1a	*S1b*	*S1c*	*C2a*	*C2b*	*IP3a*	*IP4a*	*IP5a*	*IP6a*	*IP7a*	*IP7b*	*IP7c*	*IP8a*	*IP9a*	*IP9b*	*LG10a*	*LG11a*	*LG12a*
S1a	1																	
S1b	.227**	1																
S1c	.581**	.215**	1															
C2a	0.053	-0.010	0.057	1														
C2b	-0.030	-0.101	0.022	.637**	1													
IP3a	-0.077	0.058	-0.021	0.013	-0.013	1												
IP4a	0.076	0.058	0.031	-.179**	-0.065	-0.044	1											
IP5a	0.036	-0.019	0.075	.354**	.486**	0.076	-0.008	1										
IP6a	0.081	.286**	0.060	-0.065	-0.068	-0.068	0.032	0.015	1									
IP7a	-0.058	-0.067	.110*	.197**	.184**	0.010	-0.059	.123*	-.147**	1								
IP7b	-0.029	-0.023	-0.030	0.015	0.041	0.023	0.071	-0.045	0.006	0.041	1							
IP7c	-0.089	0.031	-0.051	-0.032	-0.019	0.070	-0.051	-0.015	-0.002	-0.006	0.032	1						
IP8a	-0.061	-0.028	-0.076	0.031	-0.048	0.061	-0.056	-0.047	-0.019	0.090	0.015	-0.014	1					
IP9a	-0.042	-0.036	-0.039	.181**	.146**	0.030	0.029	.128*	-0.011	.112*	-0.007	0.035	0.013	1				
IP9b	0.068	-.121*	0.054	-0.002	-.112*	-0.097	0.035	-0.031	-0.002	0.009	0.032	-0.014	0.004	-0.069	1			
LG10a	-0.100	0.027	-0.090	-0.031	0.015	0.020	.125*	0.028	0.044	-0.013	-0.088	0.001	0.001	.158**	-0.006	1		
LG11a	-0.083	-0.012	0.013	-0.050	0.024	0.097	0.009	.120*	0.077	.174**	0.000	0.028	0.015	-0.012	0.064	-0.061	1	
LG12a	.162**	-0.021	0.091	0.038	.138*	0.072	0.079	.182**	-.138*	.207**	0.105	-0.061	-0.004	0.016	0.019	0.042	0.068	1

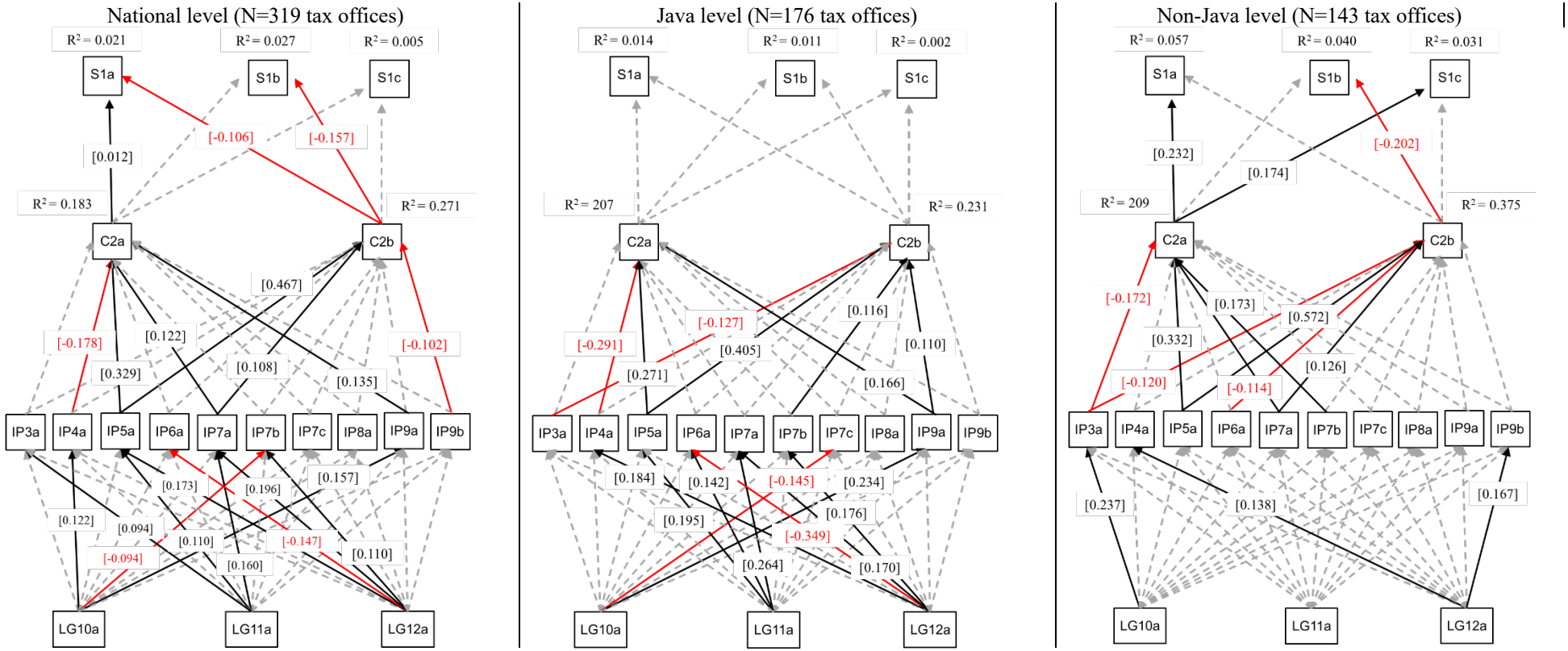
** The correlation was significant at the 0.01 level (2-tailed).
* The correlation was significant at the 0.05 level (2-tailed).

Table 5: Correlation Matrix for Java (Above Diagonal, N=176) and Non-Java Levels (Below Diagonal, N=143)

	S1a	*S1b*	*S1c*	*C2a*	*C2b*	*IP3a*	*IP4a*	*IP5a*	*IP6a*	*IP7a*	*IP7b*	*IP7c*	*IP8a*	*IP9a*	*IP9b*	*LG10a*	*LG11a*	*LG12a*
S1a	1	0.100	.721**	0.073	0.005	0.088	-0.042	.201**	0.007	-0.070	-0.047	-0.031	-0.090	0.001	-0.016	-0.122	-0.045	0.092
S1b	.328**	1	0.132	-0.035	-0.087	0.030	0.122	-0.007	0.061	-0.094	0.003	0.026	-0.045	-0.097	-0.038	0.030	-0.144	0.018
S1c	.505**	.281**	1	0.026	0.045	0.086	0.078	.149*	-0.069	0.120	0.020	-0.024	-0.094	-0.051	0.013	-0.095	-0.035	0.141
C2a	0.161	-0.028	0.132	1	.614**	-0.113	-.287**	.297**	0.139	0.069	-0.144	0.094	0.020	.185*	0.041	0.016	0.138	-0.139
C2b	-0.001	-0.155	0.020	.560**	1	-0.145	-0.047	.412**	0.076	0.095	0.038	-0.068	-0.095	0.140	-0.034	0.053	.214**	0.046
IP3a	-0.146	0.065	-0.089	-0.154	-0.057	1	.180*	0.007	-0.055	-.149*	0.000	-0.103	0.033	-0.052	0.059	-0.078	0.088	0.090
IP4a	0.095	0.039	-0.003	0.091	0.054	-0.068	1	0.013	-0.038	-0.007	.181*	-0.033	-0.068	0.067	0.084	0.126	-0.065	.163*
IP5a	-0.101	-0.063	0.008	.336**	.567**	0.055	0.082	1	0.059	0.097	-0.120	-0.001	-0.051	0.105	0.033	0.045	.216**	.173*
IP6a	0.088	.417**	0.099	-0.083	-0.089	-0.026	0.009	0.048	1	-.235**	-0.114	0.057	-0.047	0.108	0.068	-0.025	0.051	-.313**
IP7a	0.005	-0.064	0.137	0.139	0.156	0.047	0.023	0.030	-0.085	1	0.078	0.022	0.052	0.017	0.102	-0.035	.308**	.237**
IP7b	-0.008	-0.052	-0.070	.188*	0.020	0.024	0.019	0.063	0.069	-0.043	1	-0.016	0.039	-0.120	0.001	-0.073	0.033	.167*
IP7c	-0.118	0.044	-0.066	-0.024	0.012	0.144	-0.080	-0.006	-0.015	0.016	0.054	1	0.070	0.057	.188*	-0.143	-0.046	-0.130
IP8a	-0.021	-0.006	-0.079	-0.053	-0.003	0.105	-0.025	-0.107	0.021	.196*	-0.067	-0.061	1	0.048	0.083	-0.015	0.020	-0.008
IP9a	-0.060	0.019	-0.025	0.126	0.110	0.065	0.045	0.137	-0.047	.216**	0.115	0.051	-0.114	1	-0.139	.233**	-0.022	0.017
IP9b	0.088	-.173*	0.071	0.113	-0.108	-0.141	-0.047	-0.045	-0.052	0.005	0.071	-0.052	-0.127	0.007	1	0.007	0.076	-0.019
LG10a	-0.109	0.030	-0.101	-0.066	-0.009	.225**	0.131	0.019	0.096	0.087	-0.116	0.031	0.101	0.048	-0.043	1	-0.138	0.033
LG11a	-0.099	0.070	0.040	-.248**	-0.138	0.099	0.051	0.034	0.092	0.068	-0.026	0.040	0.011	-0.009	0.065	0.015	1	.257**
LG12a	.341**	-0.108	0.061	0.097	0.159	-0.106	0.142	0.082	-0.027	-0.023	-0.019	-0.063	-0.064	-0.038	0.149	0.108	-0.134	1

** The correlation was significant at the 0.01 level (2-tailed).
* The correlation was significant at the 0.05 level (2-tailed).

Fig. 3: Path Analysis Results



Note: significant at the 0.01 level, standardised regression weight; dashed line = not significant relationship; black line = significant positive relationship, red line = significant negative relationship; *S1a* = Percentage of tax revenue realisation; *S1b* = Percentage of effort tax revenue realisation; *S1c* = Percentage growth in gross tax revenues; *C2a* = Formal compliance rate for Corporate Taxpayers and Individual Business Owners; *C2b* = Payment compliance rate for Corporate Taxpayers and Individual Business Owners; *IP3a* = Effectiveness rate of extension activities (%); *IP4a* = E-filing participation rate (%); *IP5a* = Payment compliance rate of new taxpayers acquired through extensification efforts; *IP6a* = Completion rate of requests for data and/or information clarification (%); *IP7a* = Audit completion rate (%); *IP7b* = Rate of uncontested tax assessments (%); *IP7c* = Active engagement rate in preventive billing (%); *IP8a* = Rate of IDLP (Investigation, Detection, and Prosecution) submissions (%); *IP9a* = Timeliness of tax return documentation handling; *IP9b* = Provision rate of potential tax data; *LG10a* = competent human resources; *LG11a* = Fit for purpose organisation; *LG12a* = Improved budget management.

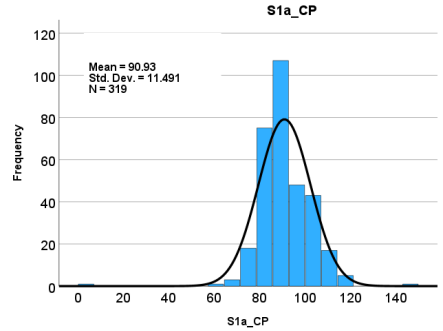
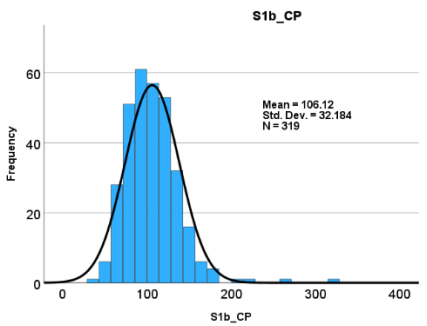
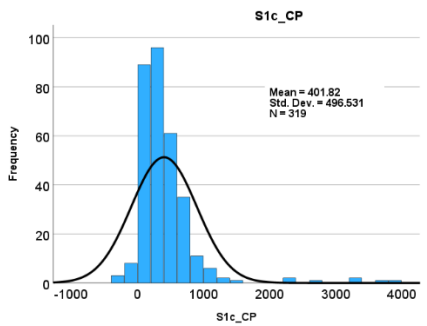
Table 6: Path Analysis Regression Results

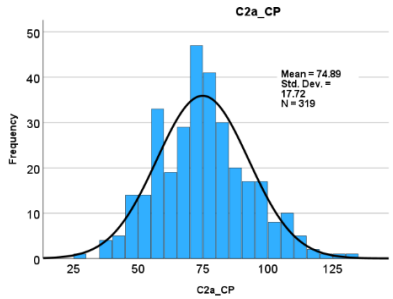
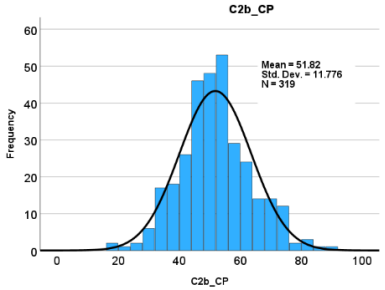
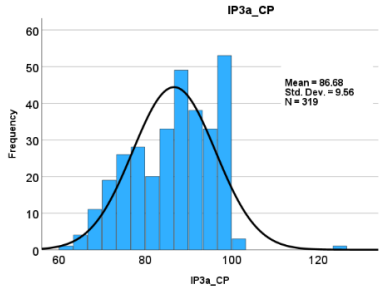
	Panel A: National level (N = 319 tax offices)							Panel B: Java level (N = 176 tax offices)							Panel C: Non-Java level (N = 143 tax offices)						
	Estimate (unstd)	**Estimate (std)**	**S.E.**	**C.R.**	**P value**	**Direction & sig.**		**Estimate (unstd)**	**Estimate (std)**	**S.E.**	**C.R.**	**P value**	**Direction & sig.**		**Estimate (unstd)**	**Estimate (std)**	**S.E.**	**C.R.**	**P value**	**Direction & sig.**	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Impact on *S1a*					$R^2 = 0.021$							$R^2 = 0.014$							$R^2 = 0.057$		
C2a	0.079	0.12	0.037	2.121	0.034	(+)	S	0.06	0.11	0.041	1.448	0.148	(+)	NS	0.221	0.232	0.08	2.766	0.006	(+)	S
C2b	-0.105	-0.106	0.056	-1.879	0.06	(-)	S	-0.049	-0.063	0.059	-0.833	0.405	(-)	NS	-0.170	-0.132	0.108	-1.571	0.116	(-)	NS
Impact on *S1b*					$R^2 = 0.027$							$R^2 = 0.011$							$R^2 = 0.040$		
C2a	0.165	0.089	0.104	1.581	0.114	(+)	NS	0.054	0.03	0.138	0.393	0.694	(+)	NS	0.199	0.084	0.201	0.992	0.321	(+)	NS
C2b	-0.434	-0.157	0.156	-2.775	0.006	(-)	S	-0.273	-0.106	0.196	-1.39	0.164	(-)	NS	-0.649	-0.202	0.272	-2.387	0.017	(-)	S
Impact on *S1c*					$R^2 = 0.005$							$R^2 = 0.002$							$R^2 = 0.031$		
C2a	2.016	0.071	1.618	1.246	0.213	(+)	NS	-0.064	-0.003	1.892	-0.034	0.973	(-)	NS	6.998	0.174	3.404	2.056	0.04	(+)	S
C2b	-1.007	-0.024	2.426	-0.415	0.678	(-)	NS	1.653	0.047	2.688	0.615	0.539	(+)	NS	-4.248	-0.078	4.612	-0.921	0.357	(-)	NS
Impact on *C2a*					$R^2 = 0.183$							$R^2 = 0.207$							$R^2 = 0.209$		
IP3a	-0.047	-0.026	0.093	-0.505	0.613	(-)	NS	-0.077	-0.04	0.129	-0.599	0.549	(-)	NS	-0.258	-0.172	0.112	-2.305	0.021	(-)	S
IP4a	-0.251	-0.178	0.071	-3.514	***	(-)	S	-0.536	-0.291	0.124	-4.308	***	(-)	S	0.049	0.05	0.073	0.667	0.505	(+)	NS
IP5a	0.345	0.329	0.053	6.483	***	(+)	S	0.236	0.271	0.059	4.004	***	(+)	S	0.386	0.332	0.087	4.444	***	(+)	S
IP6a	-0.014	-0.047	0.015	-0.936	0.349	(-)	NS	0.053	0.094	0.038	1.391	0.164	(+)	NS	-0.018	-0.099	0.014	-1.326	0.185	(-)	NS
IP7a	0.043	0.122	0.018	2.399	0.016	(+)	S	0.015	0.05	0.021	0.733	0.464	(+)	NS	0.046	0.126	0.027	1.686	0.092	(+)	S
IP7b	0.313	0.04	0.396	0.792	0.428	(+)	NS	-0.246	-0.033	0.503	-0.489	0.625	(-)	NS	1.114	0.173	0.48	2.32	0.02	(+)	S
IP7c	-0.001	-0.039	0.001	-0.778	0.437	(-)	NS	0.007	0.053	0.009	0.787	0.431	(+)	NS	0.000	-0.003	0.001	-0.039	0.969	(-)	NS
IP8a	0.005	0.024	0.01	0.472	0.637	(+)	NS	0	0.002	0.01	0.037	0.97	(-)	NS	0.002	0.007	0.025	0.089	0.929	(+)	NS
IP9a	1.299	0.135	0.487	2.669	0.008	(+)	S	1.539	0.166	0.624	2.467	0.014	(+)	S	0.307	0.039	0.589	0.521	0.603	(+)	NS
IP9b	0.000	0.018	0.001	0.352	0.724	(-)	NS	0.001	0.061	0.001	0.902	0.367	(+)	NS	0.001	0.089	0.001	1.194	0.232	(+)	NS
Impact on *C2b*					$R^2 = 0.271$							$R^2 = 0.231$							$R^2 = 0.375$		
IP3a	-0.082	-0.067	0.059	-1.404	0.16	(-)	NS	-0.171	-0.127	0.089	-1.908	0.056	(-)	S	-0.133	-0.12	0.073	-1.811	0.07	(-)	S
IP4a	-0.059	-0.063	0.045	-1.309	0.191	(-)	NS	-0.082	-0.063	0.086	-0.947	0.343	(-)	NS	-0.004	-0.005	0.048	-0.079	0.937	(-)	NS
IP5a	0.329	0.47	0.034	9.8	***	(+)	S	0.249	0.405	0.041	6.071	***	(+)	S	0.492	0.572	0.057	8.655	***	(+)	S
IP6a	-0.013	-0.063	0.01	-1.323	0.186	(-)	NS	0.022	0.056	0.027	0.839	0.401	(+)	NS	-0.016	-0.114	0.009	-1.729	0.084	(-)	S
IP7a	0.025	0.108	0.011	2.261	0.024	(+)	S	0.010	0.045	0.014	0.671	0.502	(+)	NS	0.034	0.126	0.018	1.9	0.057	(+)	S
IP7b	0.360	0.069	0.249	1.445	0.148	(+)	NS	0.609	0.116	0.349	1.745	0.081	(+)	S	0.035	0.007	0.314	0.111	0.911	(+)	NS
IP7c	0.000	-0.017	0.001	-0.347	0.729	(-)	NS	-0.008	-0.085	0.006	-1.275	0.202	(-)	NS	0.000	0.025	0.001	0.377	0.706	(-)	NS
IP8a	-0.005	-0.039	0.006	-0.815	0.415	(-)	NS	-0.008	-0.078	0.007	-1.17	0.242	(-)	NS	0.01	0.039	0.016	0.589	0.556	(+)	NS
IP9a	0.466	0.073	0.306	1.521	0.128	(+)	NS	0.719	0.11	0.432	1.662	0.097	(+)	S	0.055	0.009	0.385	0.142	0.887	(+)	NS
IP9b	-0.001	-0.102	0.001	-2.12	0.034	(-)	S	0.000	-0.005	0.001	-0.075	0.94	(-)	NS	-0.001	-0.1	0.001	-1.506	0.132	(-)	NS
Impact on on *IP3a*					$R^2 = 0.014$							$R^2 = 0.018$							$R^2 = 0.074$		
LG10a	0.108	0.023	0.261	0.415	0.678	(+)	NS	-0.267	-0.073	0.278	-0.959	0.338	(-)	NS	1.477	0.237	0.506	2.918	0.004	(+)	S
LG11a	0.433	0.094	0.259	1.675	0.094	(+)	S	0.326	0.058	0.439	0.743	0.458	(+)	NS	0.304	0.08	0.311	0.978	0.328	(+)	NS
LG12a	0.108	0.065	0.094	1.156	0.248	(+)	NS	0.104	0.077	0.105	0.995	0.32	(+)	NS	-0.275	-0.121	0.186	-1.481	0.139	(-)	NS
Impact on *IP4a*					$R^2 = 0.021$							$R^2 = 0.050$							$R^2 = 0.038$		
LG10a	0.746	0.122	0.339	2.199	0.028	(+)	S	0.404	0.106	0.284	1.419	0.156	(+)	NS	1.106	0.116	0.792	1.396	0.163	(+)	NS
LG11a	0.066	0.011	0.336	0.197	0.844	(+)	NS	-0.566	-0.097	0.449	-1.261	0.207	(-)	NS	0.396	0.068	0.486	0.814	0.416	(+)	NS
LG12a	0.16	0.073	0.122	1.311	0.19	(+)	NS	0.258	0.184	0.107	2.412	0.016	(+)	S	0.482	0.138	0.291	1.657	0.097	(+)	S
Impact on *IP5a*					$R^2 = 0.045$							$R^2 = 0.066$							$R^2 = 0.009$		

LG10a	0.223	0.027	0.449	0.496	0.62	(+)	NS	0.544	0.068	0.595	0.914	0.361	(+)	NS	0.074	0.009	0.674	0.11	0.912	(+)	NS
LG11a	0.890	0.11	0.445	1.999	0.046	(+)	S	2.393	0.195	0.939	2.547	0.011	(+)	S	0.222	0.045	0.414	0.538	0.591	(+)	NS
LG12a	0.508	0.173	0.161	3.152	0.002	(+)	S	0.355	0.12	0.224	1.588	0.112	(+)	NS	0.255	0.087	0.247	1.029	0.303	(+)	NS
Impact on *IP6a*					$R^2 = 0.030$							$R^2 = 0.116$							$R^2 = 0.018$		
LG10a	1.580	0.056	1.574	1.004	0.316	(+)	NS	0.078	0.006	0.894	0.088	0.93	(+)	NS	4.936	0.097	4.24	1.164	0.244	(+)	NS
LG11a	2.550	0.091	1.56	1.635	0.102	(+)	NS	2.694	0.142	1.412	1.909	0.056	(+)	S	2.698	0.087	2.604	1.036	0.3	(+)	NS
LG12a	-1.496	-0.147	0.565	-2.648	0.008	(-)	S	-1.594	-0.349	0.336	-4.74	***	(-)	S	-0.476	-0.026	1.557	-0.305	0.76	(-)	NS
Impact on *IP7a*					$R^2 = 0.069$							$R^2 = 0.122$							$R^2 = 0.013$		
LG10a	-0.278	-0.011	1.332	-0.209	0.835	(-)	NS	-0.088	-0.004	1.647	-0.053	0.957	(-)	NS	2.275	0.088	2.158	1.054	0.292	(+)	NS
LG11a	3.887	0.16	1.32	2.944	0.003	(+)	S	9.251	0.264	2.6	3.557	***	(+)	S	1.003	0.064	1.325	0.757	0.449	(+)	NS
LG12a	1.729	0.196	0.478	3.617	***	(+)	S	1.43	0.17	0.619	2.308	0.021	(+)	S	-0.229	-0.024	0.793	-0.289	0.773	(-)	NS
Impact on *IP7b*					$R^2 = 0.020$							$R^2 = 0.035$							$R^2 = 0.014$		
LG10a	-0.103	-0.094	0.061	-1.685	0.092	(-)	S	-0.078	-0.082	0.071	-1.096	0.273	(-)	NS	-0.166	-0.114	0.122	-1.362	0.173	(-)	NS
LG11a	-0.015	-0.013	0.061	-0.241	0.809	(-)	NS	-0.034	-0.024	0.112	-0.306	0.76	(-)	NS	-0.023	-0.026	0.075	-0.306	0.759	(-)	NS
LG12a	0.043	0.11	0.022	1.969	0.049	(+)	S	0.061	0.176	0.027	2.288	0.022	(+)	S	-0.005	-0.01	0.045	-0.116	0.908	(-)	NS
Impact on *IP7c*					$R^2 = 0.005$							$R^2 = 0.037$							$R^2 = 0.006$		
LG10a	1.637	0.005	17.008	0.096	0.923	(+)	NS	-7.519	-0.145	3.908	-1.924	0.054	(-)	S	21.549	0.037	48.952	0.44	0.66	(+)	NS
LG11a	9.631	0.032	16.853	0.571	0.568	(+)	NS	-2.863	-0.036	6.168	-0.464	0.643	(-)	NS	11.083	0.031	30.059	0.369	0.712	(+)	NS
LG12a	-6.851	-0.063	6.102	-1.123	0.262	(-)	NS	-2.21	-0.116	1.469	-1.504	0.133	(-)	NS	-13.212	-0.062	17.981	-0.735	0.462	(-)	NS
Impact on *IP8a*					$R^2 = 0.000$							$R^2 = 0.001$							$R^2 = 0.016$		
LG10a	0.101	0.002	2.489	0.04	0.968	(+)	NS	-0.589	-0.012	3.736	-0.158	0.875	(-)	NS	3.028	0.109	2.33	1.3	0.194	(+)	NS
LG11a	0.671	0.015	2.466	0.272	0.786	(+)	NS	1.588	0.021	5.897	0.269	0.788	(+)	NS	-0.014	-0.001	1.431	-0.01	0.992	(-)	NS
LG12a	-0.076	-0.005	0.893	-0.086	0.932	(-)	NS	-0.226	-0.013	1.405	-0.161	0.872	(-)	NS	-0.771	-0.076	0.856	-0.901	0.368	(-)	NS
Impact on *IP9a*					$R^2 = 0.025$							$R^2 = 0.055$							$R^2 = 0.004$		
LG10a	0.14	0.157	0.05	2.827	0.005	(+)	S	0.178	0.234	0.056	3.147	0.002	(+)	S	0.063	0.053	0.1	0.631	0.528	(+)	NS
LG11a	-0.002	-0.003	0.049	-0.051	0.96	(-)	NS	0.01	0.009	0.089	0.115	0.908	(+)	NS	-0.012	-0.016	0.061	-0.189	0.85	(-)	NS
LG12a	0.003	0.009	0.018	0.166	0.868	(+)	NS	0.002	0.007	0.021	0.088	0.93	(+)	NS	-0.02	-0.045	0.037	-0.534	0.593	(-)	NS
Impact on *IP9b*					$R^2 = 0.004$							$R^2 = 0.008$							$R^2 = 0.033$		
LG10a	-1.421	-0.003	28.682	-0.05	0.96	(-)	NS	7.433	0.021	26.687	0.279	0.781	(+)	NS	-49.174	-0.062	65.568	-0.75	0.453	(-)	NS
LG11a	31.741	0.063	28.42	1.117	0.264	(+)	NS	48.196	0.09	42.122	1.144	0.253	(+)	NS	42.748	0.088	40.262	1.062	0.288	(+)	NS
LG12a	2.642	0.014	10.29	0.257	0.797	(+)	NS	-5.456	-0.042	10.034	-0.544	0.587	(-)	NS	48.154	0.167	24.084	1.999	0.046	(+)	S

Note: S = statistically significant at the 0.10 level, NS = otherwise; *S1a* = Percentage of tax revenue realisation; *S1b* = Percentage of effort tax revenue realisation; *S1c* = Percentage growth in gross tax revenues; *C2a* = Formal compliance rate for Corporate Taxpayers and Individual Business Owners; *C2b* = Payment compliance rate for Corporate Taxpayers and Individual Business Owners; *IP3a* = Effectiveness rate of extension activities (%); *IP4a* = E-filing participation rate (%); *IP5a* = Payment compliance rate of new taxpayers acquired through extensification efforts; *IP6a* = Completion rate of requests for data and/or information clarification (%); *IP7a* = Audit completion rate (%); *IP7b* = Rate of uncontested tax assessments (%); *IP7c* = Active engagement rate in preventive billing (%); *IP8a* = Rate of IDLP (Investigation, Detection, and Prosecution) submissions (%); *IP9a* = Timeliness of tax return documentation handling; *IP9b* = Provision rate of potential tax; *LG10a* = competent human resources; *LG11a* = Fit for purpose organisation; *LG12a* = Improved budget management.

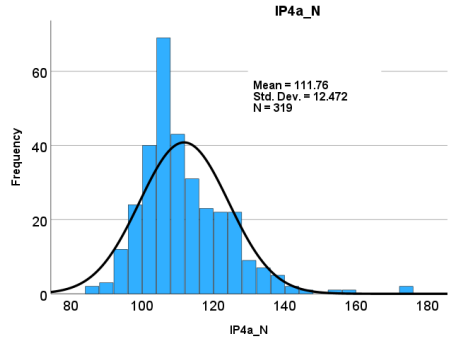
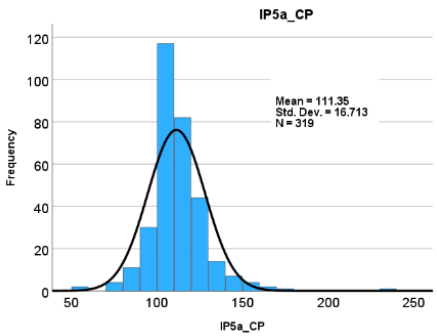
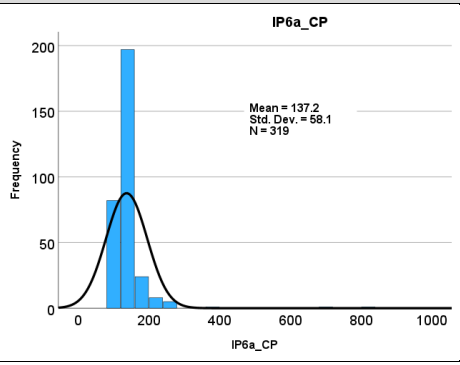
Fig. 4: Histograms for *S1a*, *S1b*, *S1c*, *C2a*, *C2b*, and *IP3a*

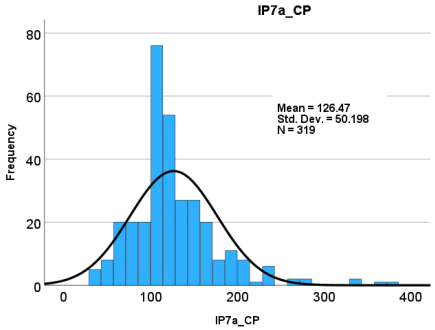
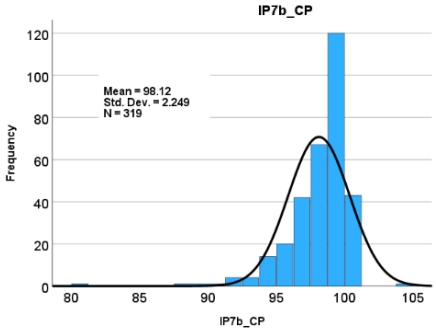
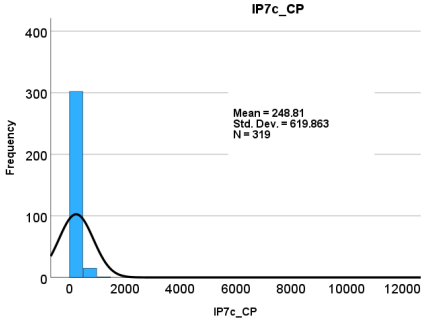
Panel A: *Percentage of tax revenue realisation*	**Panel B**: *Percentage of effort tax revenue realisation*	**Panel C:** *Growth in gross tax revenues (GDP)*
		

Panel D: *Formal compliance rate for corporate and individual taxpayers.*	**Panel E**: *Payment compliance rate for Corporate and Individual Taxpayers*	**Panel F**: *Effectiveness rate of extension activities*
		

Source: author's elaboration.

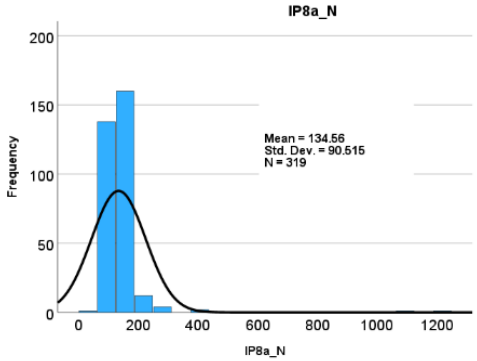
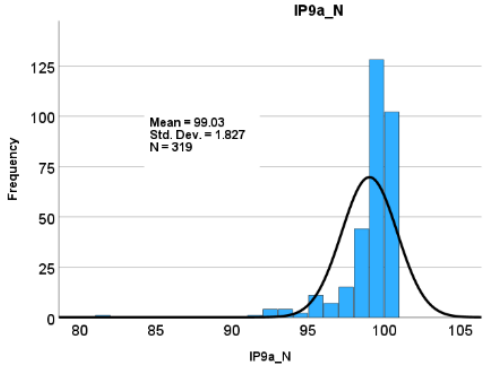
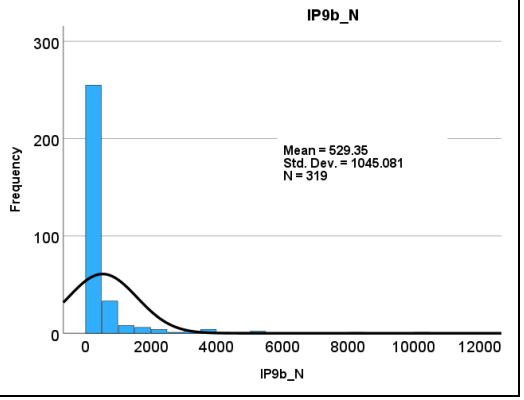
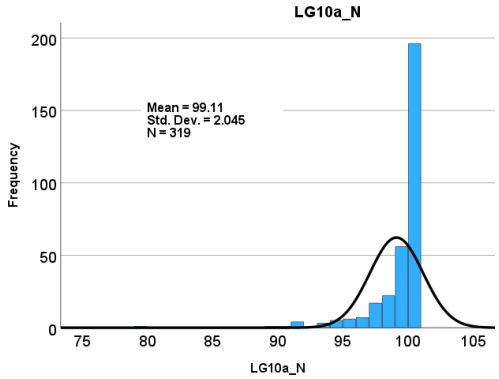
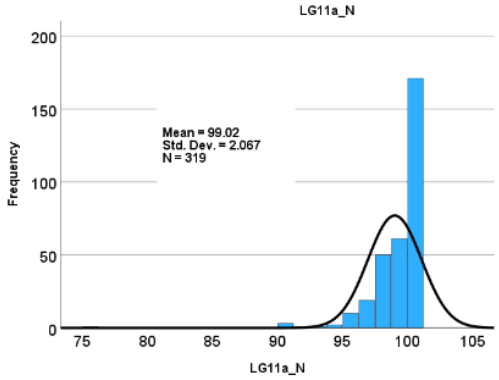
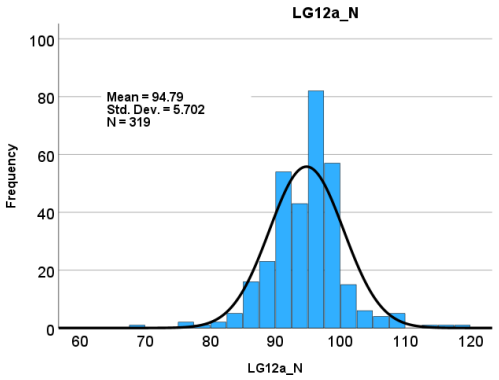
Fig. 5: Histograms for *IP4a*, *IP5a*, *IP6a*, *IP7a*, *IP7b*, and *IP7c*

Panel G: *E-filing participation rate*	**Panel H**: *Payment compliance rate of new taxpayers acquired through extensification efforts*	**Panel I**: *Completion rate of data and/or information clarification requests*
		

Panel J: *Audit completion rate*	**Panel K**: *Rate of uncontested tax assessments*	**Panel L**: *Active engagement rate in preventive billing*
		

Source: author's elaboration.

Fig. 6: Histograms for *IP8a*, *IP9a*, *IP9b*, *LG10a*, *LG11a*, and *LG12a*

Panel M: *Rate of IDLP (Investigation, Detection, and Prosecution) submissions*	**Panel N**: *Timeliness of tax return documentation handling*	**Panel O**: *Provision rate for potential tax data*
		
Panel P: *Competent human resources*	**Panel Q**: *Fit for purpose organisation.*	**Panel R**: *Improved budget management*
		

Source: author's elaboration.

eJournal of Tax Research (2025) vol. 23, no. 1, pp. 102-133

New Zealand's tax reform experience – parallels with Australia

Lisa Marriott* and Adrian Sawyer**

Abstract

New Zealand's tax system has undergone significant reform during the last four decades, motivated by both domestic and international influences. From a domestic perspective, significant modernisation has ensured that it is 'fit for purpose' operationally. Alongside this focus, the foundational principles of equity, simplicity and efficiency have guided reforms. With an increasingly globalised and integrated world, New Zealand's tax system has needed to adjust to harmonise with standard international tax practices, and to deal with issues such as base erosion and profit shifting. Reforms have been gradual, interposed by significant developments in both structure and composition of taxes. Major contributions to the evolving tax system include 'Rogernomics' during the 1980s, along with significant administrative and dispute resolution reforms in the 1990s. Several major tax reviews were prominent in the 2000s and 2010s. More recently, the 2020s are highlighted by the successful completion of Inland Revenue's Business Transformation and handling the government's fiscal response to Covid-19. In many respects New Zealand's tax reform has either led or followed developments in Australia. This should not come as a surprise given the close economic and social ties between the two countries. Thus, the aim of this article is to critically examine New Zealand's tax system over the last 40 years, focusing on significant changes in tax policy, tax law and tax administration.

Keywords: Australia, New Zealand, tax reform

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** Professor of Taxation, Te Kura Umanga | UC Business School, Te Whare Wānanga o Waitaha | University of Canterbury and Extraordinary Professor, University of South Africa (corresponding author – email: adrian.sawyer@canterbury.ac.nz). This article will follow the approach taken by Binh Tran-Nam, 'Australia's Tax Reform Experience: Lessons for Malaysia' in Mohamed Ariff and Yeah Kim Leng (eds), *Malaysia's Taxation System: Contemporary Practices, Issues and Future Direction* (Sunway University Press, 2020) 240. This article states the position in New Zealand as at 18 November 2024. An earlier version was presented at the *Aspects of Tax Administration and Economic Development Conference*, Bali, Indonesia, 5-6 November 2024. We would also like to thank the reviewers for their valuable comments on an earlier version of this article. Any remaining errors are ours.

1. INTRODUCTION

New Zealand and Australia have both experienced major tax reform in recent decades. Evidence of just some of the changes in New Zealand can be observed in the multitude of task forces, reviews, committees, and working groups over the past 40 years.[1] This article critically examines the significant tax reforms implemented over these 40 years, adopting the structure used by Professor Binh Tran-Nam to facilitate a comparison with Australia.[2] This involves a critical examination of New Zealand's tax reform experience from three perspectives: tax law reform, tax policy reform, and tax administration reform. While Tran-Nam's study focuses on a 30-year period, this article adopts a slightly longer focus and examines reforms in New Zealand over the last 40 years.

As this article builds on the work of Tran-Nam,[3] it necessarily focuses on some of the subject matter of Tran-Nam's scholarly work, specifically law reform, income tax and consumption tax policy, and administration. Therefore, we do not include any of the many other potential topics that could result in interesting comparisons between New Zealand and Australia, such as the different approaches to capital gains, international tax or the taxation of companies.

Australia, like New Zealand, has also experienced significant tax reforms in recent decades. While some reforms are similar, such as the introduction of goods and services tax (GST), there are often differences that reflect political, cultural, or historical influences. Like Tran-Nam, we use secondary data to critically examine tax reform in New Zealand, and we primarily focus on income and consumption taxes.

We start our discussion in section 2 with a brief outline of tax reform, including its drivers and objectives. We then discuss three components of tax reform over the next three sections: tax law reform; tax policy reform; and tax administration reform. The article concludes in section 6 with insights drawn from the comparison with Australia.

2. TAX REFORM OVERVIEW

This section discusses tax reform, starting with what we mean when we refer to this activity. We discuss the drivers and objectives of tax reform, together with the cyclical nature of the tax reform process. This section also provides some brief examples of tax reform implementation and outcomes in New Zealand.

2.1 What is tax reform?

Tax reform involves changing the complex and delicate balance of the tax system. Tran-Nam defines reform as 'a change for the better … that brings about net social benefits or a welfare improvement'.[4] While we agree that reforms are intended to improve the tax system, we will argue that this may not always eventuate, a fact also acknowledged by Tran-Nam. We observe that the success of tax reform is often judged by longevity,

[1] For an in-depth discussion see Adrian Sawyer, *The Effectiveness of Tax Reviews in New Zealand: An Evaluation and Proposal for Improvement* (Centre for Commercial and Corporate Law Inc, 2020).
[2] Binh Tran-Nam, 'Australia's Tax Reform Experience: Lessons for Malaysia' in Mohamed Ariff and Yeah Kim Leng (eds), *Malaysia's Taxation System: Contemporary Practices, Issues and Future Direction* (Sunway University Press, 2020) 240.
[3] Ibid.
[4] Ibid.

rather than any measure of Pareto efficiency. Further, as noted by Stewart, merely increasing a tax is not tax reform: changes must be considered alongside broader policy goals.[5] Tax reform should consider what the tax system is intended to do and how well it currently achieves that.

Over time New Zealand's tax principles to guide reforms have varied, not only in their composition, but also the relative weight placed on particular principles. This reflects the absence of any mutually agreed principles. New Zealand's current guiding tax design principles are:

- raising significant and sustainable funds to fund government expenditure;
- addressing income inequality through progressive rates and tax credits redistributing income;
- stimulating economic activity; and
- influencing behaviour through tax rules and rebates, such as encouraging research and development or discouraging pollution.[6]

Reforms that raise taxes typically require either increased government benefits or a lowering of taxes to ensure support.[7] The latter of these can be seen in Figures 1a and 1b which show core tax changes in New Zealand and Australia over the past 55 years. By 1980, over 60 per cent of total tax revenue was collected from individual income tax in New Zealand, while this was 44 per cent in Australia. The general pattern of decreased individual income tax collection and increased sales tax (now GST) is visible in New Zealand. This has been described as 'true tax reform' with the broadening of the base permitting lower tax rates, and a 'tax-mix switch'.[8] However, Australia does not have the same increase in the proportion of tax collected from sales tax/GST. This will be discussed further below and reflects the increases in GST rates that have occurred in New Zealand, but not in Australia.

Australia collects at the federal level a lower proportion of tax than New Zealand, as a proportion of gross domestic product (GDP). Organisation for Economic Co-operation and Development (OECD) data reports tax revenue as a percentage of GDP in Australia as 29.5 per cent (in 2021), while New Zealand is 34.6 per cent.[9] The higher percentage in New Zealand suggests that the government is collecting a greater share of the economy from tax.

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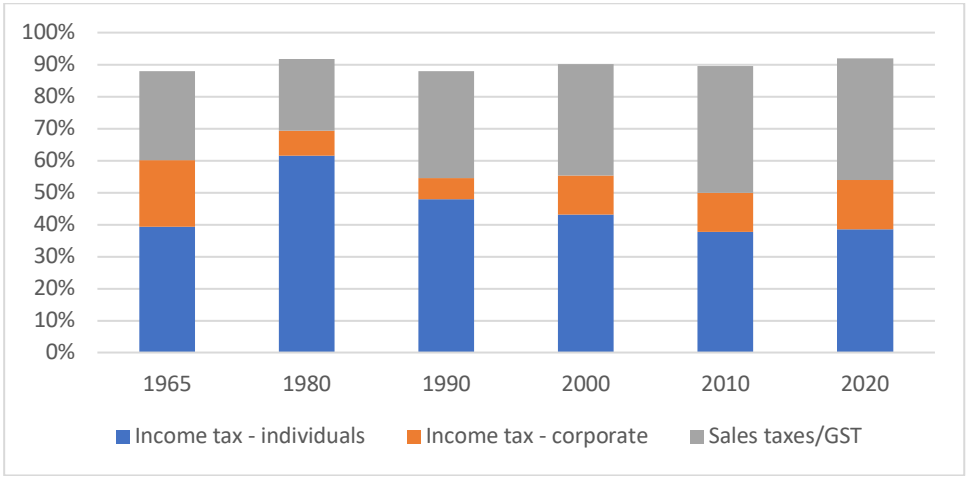
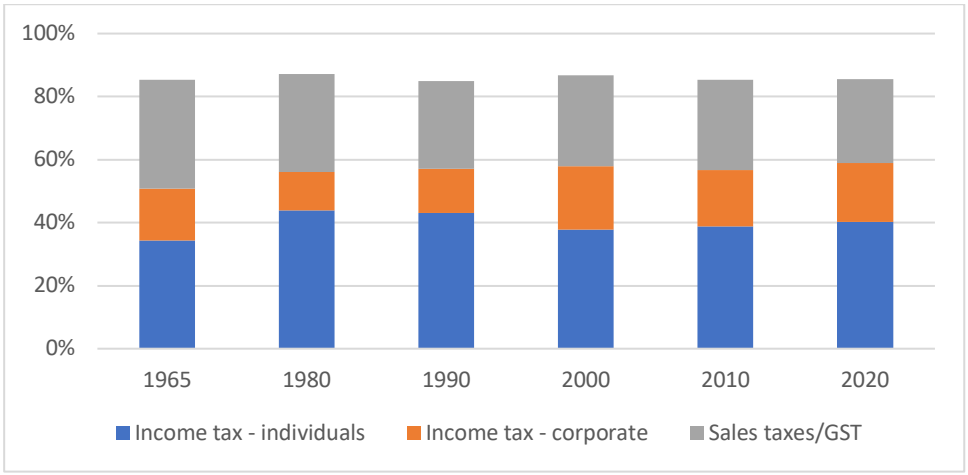
[5] Miranda Stewart, 'What Is Tax Reform For and What Can It Do?' (Parliament of Australia Library Lecture, 21 October 2015).
[6] Inland Revenue, *Briefing to the Incoming Minister* (November 2023).
[7] Stewart, above n 5.
[8] Robert Stephens, 'Radical Tax Reform in New Zealand' (1993) 14(3) *Fiscal Studies* 45, 45. This is a feature of New Zealand's Broad-Base Low-Rate (BBLR) model which we discuss in section 4 of this article.
[9] OECD, *Revenue Statistics 2023: Tax Revenue Buoyancy in OECD Countries 1965-2022* (OECD Publishing, 2023).

Fig. 1a: Changes in Core Taxes 1965-2020 – New Zealand (Percentage of Overall Tax Revenue)



Source: authors, from OECD, *Revenue Statistics 2023: Tax Revenue Buoyancy in OECD Countries 1965-2022* (OECD Publishing, 2023) Table 5.7.

Fig. 1b: Changes in Core Taxes 1965-2020 – Australia (Percentage of Overall Tax Revenue)



Source: authors, from OECD, *Revenue Statistics 2023: Tax Revenue Buoyancy in OECD Countries 1965-2022* (OECD Publishing, 2023) Table 5.1.

As noted above, a principle of tax design in New Zealand is addressing income inequality. One measure of inequality is the Gini coefficient. The Gini coefficient provides a measure from 0 to 1, where 0 represents perfect income equality (that is, everyone has the same income) and 1 is perfect income inequality (that is, one person

has all income). The Gini coefficients for Australia and New Zealand are shown in Table 1, both before and after the impact of taxes and transfers.

Table 1: Gini Coefficient (2019)[10]

	Australia	New Zealand
Before Taxes and transfers	0.441 (10th)	0.454 (16th)
After taxes and transfers	0.318 (23rd)	0.32 (24th)

The Gini coefficients provide an indication of the extent to which the tax and transfer system addresses inequality. Table 1 shows the similarities in Gini coefficients in the two countries. While Australia is slightly more equal than New Zealand before tax and transfers, both countries are similar after tax and transfers. However, what is potentially of more interest is the relative positioning of each country compared to other OECD countries. Table 1 also shows the position of Australia and New Zealand among 37 OECD countries, with a lower ranking meaning that the country is more equal. Australia is 10th highest of the OECD countries before taxes and transfers, while New Zealand is 16th, so they are among the more equal countries. However, after taxes and transfers, they are 23rd and 24th, indicating that the tax and transfer system does not assist with inequality to the same extent as most other OECD countries. As the tax and transfer system is intended to address income inequality, those systems in both New Zealand and Australia do not achieve this as well as most other OECD countries.

2.2 The tax reform cycle

Tran-Nam (citing Wardell-Johnson) suggests that tax reforms occur in a 12-year cycle in Australia, attributed to the 'parliamentary term of 3 years, public forgetfulness, and the government's forward economic estimate of 10 years'.[11] New Zealand has the same parliamentary term, and likely the same public memory (or lack thereof), but is somewhat more haphazard in the timing of reforms. In the second half of the 20th century, reforms were undertaken in 1951 (the Gibbs Committee)[12] and 1967 (the Ross Committee),[13] before a flurry of activity in the 1980s with the McCaw Review in 1982,[14] and the Valabh Committee[15] which published several papers in the late 1980s and early

[10] Colin Campbell-Hunt, 'OECD Comparisons Reveal an Unflattering Picture of Inequality in NZ – Could that Change?', *The Conversation* (3 October 2024) <https://theconversation.com/oecd-comparisons-reveal-an-unflattering-picture-of-inequality-in-nz-could-that-change-239306>.
[11] Tran-Nam, above n 2, 244. See also Grant Wardell-Johnson, 'Tomorrow and Tomorrow and Tomorrow: Tax Reform after Macbeth' (Paper Presented at the Corporate Tax Association Conference, Sydney, June 2016).
[12] Taxation Committee (Theodore Gibbs, chair), *Report of the Taxation Committee* (1951).
[13] Taxation Review Committee (Lewis Ross, chair), *Taxation in New Zealand: Report of the Taxation Review Committee* (1967).
[14] Task Force on Tax Reform (Peter McCaw, chair), *Report of the Task Force on Tax Reform* (1982).
[15] These include Consultative Committee on the Taxation of Income from Capital (Arthur Valabh, chair), *Key Reforms to the Scheme of Tax Legislation* (1991); Working Party on the Reorganisation of the Income Tax Act 1976 (Arthur Valabh, chair), *First Report of the Working Party* (1993) and *Second Report of the Working Party* (1993).

1990s.[16] A relatively high frequency of activity continued with reviews at nine-year intervals starting with the McLeod Review in 2001,[17] and followed by two further tax working groups[18] reporting in 2010 and 2019.[19]

2.3 Tax reform drivers and objectives

Tran-Nam observes several drivers of tax reforms in Australia, including the need for modernisation to efficiently collect adequate revenue, as well as the need to harmonise with common international tax practices.[20] Further drivers of change include the need to adapt to changing tax practices adopted by multinational organisations and external pressures, such as those from corporations. There may also be a need to reflect on contemporary issues, such as concerns for the environment, increasing digitisation of transactions, or encouraging retirement savings. Historical reasons for tax reform in New Zealand included economic restructuring and liberalisation in the 1980s, increasing neutrality, and removing 'economic privilege resulting from the vote-seeking policies' of the previous administration.[21]

Additional recommendations from the OECD are aimed at supporting sustainable economic growth. These include changing the composition of the tax system to collect more revenue from consumption and recurrent property taxes, and less from income taxes (specifically corporate income tax); broadening tax bases; 'greening' the tax system; and focusing on tax compliance.[22] A relatively consistent set of principles has been used to assess tax design in New Zealand.[23] These include efficiency and growth, equity and fairness, revenue integrity, fiscal cost, compliance and administration costs, and coherence.[24] The most recent Tax Working Group also notes the importance of predictability and certainty.[25]

2.4 Legislating for tax reporting principles

New Zealand took a novel approach to taxation through the tabling of the Taxation Principles Reporting Bill 2023 (the Bill) as part of Budget 2023 documentation. The driving force behind the Bill was the former Minister of Revenue, Hon David Parker, who has a strong passion for greater 'fairness' in the New Zealand tax system (as outlined in a speech given in April 2022[26]), in part to be enhanced through a broader tax base. The Bill was enacted in a partisan manner, following a brief period for public

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[16] Sawyer, above n 1.
[17] Tax Review 2001 (Robert McLeod, chair), *Tax Review 2001: Final Report* (2001).
[18] Victoria University of Wellington Tax Working Group (Bob Buckle, chair), *A Tax System for New Zealand's Future: Report of the Victoria University of Wellington Tax Working Group* (Centre for Accounting, Governance and Taxation Research, Victoria University of Wellington, 2010) ('Tax Working Group (2010)'); Tax Working Group (Hon Michael Cullen, chair), *Future of Tax: Final Report* (*Volume I: Recommendations*) (2019) ('Tax Working Group (2019)').
[19] Sawyer, above n 1.
[20] Tran-Nam, above n 2.
[21] Stephens, above n 8, 46.
[22] OECD, *Tax Policy Reform and Economic Growth*, Tax Policy Study No 20 (OECD Publishing, 2010).
[23] Tax Working Group (2010), above n 18; Tax Working Group (2019), above n 18.
[24] Tax Working Group (2010), above n 18.
[25] Tax Working Group (2019), above n 18.
[26] Hon David Parker (Minister of Revenue), 'Shining a Light on Unfairness in Our Tax System' (Speech Delivered at Victoria University of Wellington, 26 April 2022), <https://www.beehive.govt.nz/speech/shining-light-unfairness-our-tax-system> (accessed 14 March 2024).

submissions, and subsequently assented to on 29 August 2023. With a change in government following the October 2023 General Election, it was repealed on 22 December 2023. The *Taxation Principles Reporting Act 2023* set out a series of tax principles that were to be reported against by the Commissioner on a regular basis.[27] The last significant development occurred in late December 2023 when the new coalition government enacted under urgency the *Taxation Principles Reporting Repeal Act 2023*. One of the present authors comments on the rise and demise of this legislation, concluding:

> Why was there this great desire by the previous Labour Government to rush such fundamental and important legislation? The only reasonable conclusion is one that is deeply political and partisan, such that the government at the time of enactment of the Act did not expect to be in power after the upcoming 2023 General Election (which indeed became a reality on 14 October 2023). Furthermore, the new government's approach of repealing the Act under urgency is also deeply political and partisan. *Collectively the process of enacting the original Act and then the Repeal Act leaves a sour taste, as well as a missed opportunity to develop a non-partisan series of fundamental tax principles for reporting against*.[28]

Thus, New Zealand is effectively back where it was prior to having the fastest enactment and repeal of tax legislation in its history; the absence of any legislatively established guiding principles for tax reform.

2.5 Tax reform implementation and outcome

Like Australia, New Zealand has innovated with taxes, some successfully and others less so. Frequently, politics result in new taxes being short-lived when they do not match the ideological positions of a new government. A recent example is the colloquially called 'ute tax' and the clean car discount in New Zealand.[29] The initiative combines an incentive and a disincentive to encourage purchases of lower-emitting vehicles with the application of a rebate or fee when the vehicle is first registered. The value of the fee or rebate changed over time but could provide a fee of NZD 6,900 at its highest or a rebate of NZD 8,625 at its most generous.[30] The scheme was repealed in December 2023.[31]

We observe that the guiding tax design principles raised earlier in this article may be challenged with this example. The recent Inland Revenue *Briefing to the Incoming*

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[27] The first draft report was publicly released on 1 February 2024; see Inland Revenue (Policy and Regulatory Stewardship), *Taxation Principles Reporting Act: Annual Report* (Draft, December 2023).
[28] Adrian Sawyer, 'The Rise and Demise of the New Zealand's Taxation Principles Reporting Act – A Lost Opportunity?' [2024] (2) *British Tax Review* 261, 281 (emphasis added).
[29] *Land Transport (Clean Vehicle Discount Scheme Charges) Regulations 2022* (NZ), revoked on 1 January 2024.
[30] Hon Michael Wood (Minister of Transport) and Hon James Shaw (Minister for Climate Change), 'Biggest Year for Clean Cars on Record' (Release, 30 June 2022), <https://www.beehive.govt.nz/release/biggest-year-clean-cars-record>; Waka Kotahi New Zealand Transport Agency, 'Clean Car Discount Fee Pricing' (2023), <https://www.nzta.govt.nz/assets/vehicle/clean-car-programme/clean-car-discount-fee-pricing.pdf>.
[31] *Land Transport (Clean Vehicle Discount Scheme Repeal) Amendment Act 2023* (NZ).

Minister raised the importance of influencing behaviour through tax rules and rebates, specifically including those that discourage pollution.[32]

There are, however, also examples of successes. New Zealand's GST is typically acknowledged as a model for its type and will be discussed in more detail in section 4 of this article.[33] New Zealand also had success with the implementation of its primary retirement savings vehicle, KiwiSaver, in 2007. This has also withstood several changes in political leadership. However, with modest compulsory employer contributions that are taxed and a 50 per cent government co-contribution up to NZD 521.43 per year, it is considerably less generous than the tax incentives intended to encourage and reward retirement savings in Australia.[34] These are more aligned with the aforementioned tax design principles, with the GST making a strong and sustainable contribution to tax revenue collection, and KiwiSaver tax incentives positively influencing retirement saving behaviour.

Tran-Nam identifies four key lessons for tax reform that can assist in managing change:

(a) tax reform should be revenue-neutral where possible. Financial modelling should be transparent and independent;

(b) those who are worse off from tax reform should be identified and compensated as much as possible. This requires clear identification of winners and losers;

(c) tax reform should be a long-term process as 'surprise tax reform announcements generally do not work'; and

(d) independent bodies should undertake long-term strategic reviews and meaningful consultation with stakeholders should occur.[35]

In New Zealand, financial modelling is typically undertaken by the New Zealand Treasury and, where provided to the public, is at an aggregate level rather than fully transparent. Typically, winners and losers are not identified or compensated. However, tax reforms are typically undertaken by independent bodies, with reasonable consultation and a long-term perspective.[36]

2.6 Summary

New Zealand has experienced multiple tax reforms over recent decades. Early reforms have been described as 'more dramatic and successful than elsewhere'.[37] However, measures of success differ depending on who is impacted and to what extent. The

[32] Inland Revenue, above n 6.
[33] Andrew Maples and Adrian Sawyer, 'The New Zealand GST and Its Global Impact: 30 Years On' (2017) 23(1) *New Zealand Journal of Taxation Law and Policy* 9; John F Due, 'The New Zealand Goods and Services (Value-Added) Tax – A Model for Other Countries' (1988) 36(1) *Canadian Tax Journal* 125.
[34] The compulsory employer contribution is currently 3 per cent. The employee may choose a contribution rate of 3 per cent, 4 per cent, 6 per cent, 8 per cent, or 10 per cent of their gross salary. The scheme member is required to contribute at least NZD 1,042.86 to receive the full government co-contribution. Note also that the scheme is voluntary. In some situations, KiwiSaver funds may be withdrawn to contribute towards a first home purchase.
[35] Tran-Nam, above n 2, 247.
[36] See Sawyer, above n 1 for a more in-depth discussion.
[37] Stephens, above n 8, 45.

following three sections engage in a more detailed discussion of New Zealand tax reforms, from the perspectives of law, policy, and administration.

3. TAX LAW REFORM

This section discusses tax law reform, commencing with the most critical issue being attempting to reduce the level of complexity. We discuss the approach that the New Zealand government has taken, comparing this with Australia. This section also sets out a brief evaluation of what was achieved and some of the shortcomings of the process.

3.1 Complexity

The 1990s was a time of increasing recognition by governments in a number of countries of growing complexity in their tax systems and the need for simplification. Australia, New Zealand and United Kingdom all embarked upon rewriting their tax legislation in the 1990s as an approach to reducing complexity, with each taking their own approach. Debate was emerging in many parts of the world that the growth in complexity was increasing the level of compliance costs faced by taxpayers and potentially leading to higher levels of noncompliance (with a significant portion being unintentional). Academic research had indicated that complexity was a significant factor that influenced taxpayers' compliance.[38]

A range of potential options could be followed to address (in part at least) these growing levels of complexity. These include rewriting the language into a style and format that more closely follows 'plain English', reviewing areas where the underlying policy is unduly complex or its intent is not clearly expressed (and simplifying that policy), reviewing the existing legislation to remove any parts that are redundant, and where possible consolidating current legislation that is scattered across various amending statutes into a single statute. A further option is to reorganise existing legislation into a different format that is more coherent and logical. These options can also be undertaken in various combinations, which then gives rise to whether changes should be undertaken in one single step or through a number of smaller steps.

As Tran-Nam observes,[39] it is important at the outset to be clear as to what is meant by simplification. 'Legislative simplification' involves rewriting existing legislation (the process followed in each of Australia, New Zealand and the United Kingdom), while 'effective simplification' refers to improving the ease of determining tax liability and incorporates the costs of compliance. Related to this, it is also necessary to ascertain what taxpayer obligations are essential, notwithstanding their complexity (known as

[38] See for example, Betty R Jackson and Valerie C Milliron, 'Tax Compliance Research: Findings, Problems and Prospects' (1986) 5 *Journal of Accounting Literature* 125; Maryann Richardson and Adrian J Sawyer, 'A Taxonomy of the Tax Compliance Literature: Further Findings, Problems and Prospects' (2001) 16(2) *Australian Tax Forum* 137; Sue Yong, Karen Lo, Brett Freudenberg and Adrian Sawyer, 'Tax Compliance in the New Millennium: Understanding the Variables' (2019) 34(4) *Australian Tax Forum* 766.
[39] Binh Tran-Nam, 'Tax Reform and Tax Simplification: Some Conceptual Issues and a Preliminary Assessment' (1999) 21(3) *Sydney Law Review* 500 ('Tax Reform and Tax Simplification').

necessary complexity), and those which are not necessary (known as unnecessary complexity).[40]

As will be seen in the discussion that follows, the New Zealand government opted for a combination of steps when undertaking its legislative simplification project but implemented this in a different manner to that of Australia, as discussed by Tran-Nam.[41]

3.2 Government responses and initiatives

New Zealand was the first of these three countries (Australia, New Zealand and the United Kingdom) to commence their process in 1993, following a recommendation in 1992 by the Consultative Committee on the Taxation of Income from Capital (known as the Valabh Committee)[42] to undertake a simplification review. This led to the Working Party on the Reorganisation of the Income Tax Act 1976 (Working Party)[43] commencing the first phase of the project. The Tax Rewrite Project (TRP) involved a reorganisation of the existing *Income Tax Act 1976* (ITA 1976) and *Inland Revenue Department Act 1974* (IRDA 1974) into three new statutes: the *Income Tax Act 1994* (ITA 1994), the *Tax Administration Act 1994* (TAA 1994) and the *Taxation Review Authorities Act 1994* (TRAA 1994). The next phase was to rewrite the new 'Core Provisions' of the ITA 1994 (Parts A – E and Y – definitions) and create a new *Income Tax Act 2004*. Phase three was to rewrite the remainder of the ITA 2004 to create the *Income Tax Act 2007*. Importantly the rewrite process stopped at this point and there has been no rewriting of TAA 1994 or TRAA 1994, or for that matter the *Goods and Services Tax Act 1985* (GSTA 1985).

A number of studies have been conducted in New Zealand analysing the issue of complexity measured through various readability measures, such as the Flesch Reading Ease and Flesch Kincaid Grade level methods, as well as the Cloze procedure.[44] These studies found that New Zealand's approach of reorganisation and rewriting led to some significant reduction in complexity and greater understandability (or readability), but have fallen short of what may have been achieved if the process was continued through to other taxing statutes. Furthermore, since no 'big P' policy issues were addressed, the

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[40] Tamer Budak, Simon James and Adrian Sawyer, 'International Experiences of Tax Simplification and Distinguishing Between Necessary and Unnecessary Complexity' (2016) 14(2) *eJournal of Tax Research* 337.

[41] Tran-Nam, above n 2, in section 3.

[42] Consultative Committee on the Taxation of Income from Capital (Valabh Committee), *Final Report of the Consultative Committee on the Taxation of Income from Capital* (1992).

[43] Working Party on the Reorganisation of the Income Tax Act 1976, *Second Report of the Working Party*, above n 15.

[44] See for example: Lin Mei Tan and Greg Tower, 'The Readability of Tax Laws: An Empirical Study in New Zealand' (1992) 9(3) *Australian Tax Forum* 355; Maryann Richardson and Adrian Sawyer, 'Complexity in the Expression of New Zealand Tax Laws: An Empirical Analysis' (1998) 14(3) *Australian Tax Forum* 325; J Harrison, *The Readability of the Income Tax Act 2004: A Report to Inland Revenue for the Rewrite Advisory Panel* (2006); R Castle, *Income Tax Act 2004: Parts A to E – A Model for a Review* (2006); R Castle, *The Income Tax Act 2004: Parts A to E – A Postimplementation Review: A Report to the Inland Revenue Department* (2006); Caroline Pau, Adrian Sawyer and Andrew Maples, 'Complexity of the New Zealand's Tax Laws: An Empirical Study' (2007) 22(1) *Australian Tax Forum* 59; Kathryn (Siu Ling) Saw and Adrian Sawyer, 'Complexity of New Zealand's Income Tax Legislation: The Final Installment' (2010) 25(2) *Australian Tax Forum* 213; Adrian Sawyer, 'Enhancing Compliance Through Improved Readability: Evidence from New Zealand's Rewrite "Experiment"' in Martha Eller Gangi and Alan Plumley (eds), *Recent Research on Tax Administration and Compliance: Selected Papers Given at the 2010 IRS Research Conference* (Internal Revenue Service, 2011) 221.

underlying complexity remains in many areas. An important feature that facilitated the relatively successful outcome in New Zealand was the Rewrite Advisory Panel (RAP), a feature not used in Australia.[45]

While calls have been made by many, including senior members of the New Zealand judiciary, to rewrite other statutes (including the TAA 1994 and GSTA 1985), these have fallen on deaf ears.[46] Thus, it would appear there is no longer a political appetite to undertake large-scale simplification exercises. Rather, small steps are taken on a frequent basis to simplify administrative processes where this is feasible.

In contrast, Australia commenced its rewrite process in 1994 following the Tax Simplification Task Force's recommendation in the early 1990s.[47] The Tax Law Improvement Project (TLIP) had a similar aim to New Zealand's project with respect to enhancing understandability, as well as to a lesser degree to reduce compliance costs. While Australia took the approach of rewriting various regimes and created a new statute (the *Income Tax Assessment Act 1997* – ITAA 1997), it left unwritten legislation in the old *Income Tax Assessment Act 1936*. Thus, one has to refer to two statutes, and as the project is only now reaching completion, this has added to the compliance obligations of taxpayers.

3.3 Summary

Tax law reform has been on and off the agenda in New Zealand over the last 40 years, with the greatest level of activity during the mid-1990s to mid-2000s. Much of this activity was necessitated largely as a result of the immense increase in content and scope of New Zealand's taxing statutes during the 1980s (for example, enactment of Fringe Benefits Tax (FBT), GST, international tax regimes and many others), along with the traditional drafting style that made the process of interpreting and applying tax legislation more complex than necessary.

Only the rewriting of the ITA led to what can be termed a new drafting style with the statute being structured in a similar manner to which a person may complete their tax return, with high-level core provisions, then the remaining parts set out in a logical structure to reflect this approach. Indications of defined words are also provided at the end of each section. As the other revenue statutes were not rewritten, they retain the old drafting style. This drafting style remains unique to the ITA, which is in part due to Inland Revenue having the ability to draft its own legislation; all other legislation in New Zealand is drafted by the Parliamentary Counsel Office (PCO).

The need for further tax reform is warranted, not only with respect to rewriting the other revenue statutes, but also to addressing many of the complex underlying policy issues to remove unnecessary complexity. Even more importantly, if New Zealand really

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[45] Adrian Sawyer, 'RAP(ping) in Taxation: A Review of New Zealand's Rewrite Advisory Panel and Its Potential for Adaptation to Other Jurisdictions' (2008) 37(3) *Australian Tax Review* 148.
[46] See Adrian Sawyer, 'New Zealand's Tax Rewrite Programme – In Pursuit of the (Elusive) Goal of Simplicity' [2007] (4) *British Tax Review* 405, 427. This refers to a statement made by then Supreme Court Judge, Rt Hon Peter Blanchard, 'Some Basic Concepts of New Zealand GST' in Richard Krever and David White (eds), *GST in Retrospect and Prospect* (Thomson Brookers, 2007) 91, 92. His Honour was referring to the GST Act, when he stated: '[it] is not, and never has been, a user-friendly statute'.
[47] See further Tran-Nam, 'Tax Reform and Tax Simplification', above n 39.

believes in its broad-base low-rate (BBLR) model, then substantial reform is needed to broaden the existing tax base to embrace the taxation of capital gains more fully, along with having some form of wealth taxation.[48] The undue burden placed on individuals through the income tax and GST remains unaddressed. Had a non-partisan series of tax principles been in place (such as through a revamped *Taxation Principles Reporting Act 2023*), the framework for undertaking a thorough review founded on agreed principles could have commenced. This could be buttressed through the creation of an 'independent' body to oversee the structure and operation of the tax system, similar to the Board of Taxation in Australia, or along the lines proposed by Sawyer.[49]

4. TAX POLICY REFORM

New Zealand is often lauded for its historic tax reform.[50] For example, Claus and co-authors outline the success of the reforms:

> New Zealand governments have frequently been praised for their commitment to tax reform, for developing a tax system that displays many desirable features, and for avoiding many of the pitfalls of numerous other OECD countries' tax systems.[51]

Similarly, Christensen observes the breadth of the reforms, stating that 'New Zealand moved further in neo-liberal tax reform than most other advanced economies over the last three decades'.[52]

Like Australia, reforms in New Zealand have adopted the BBLR model from the mid-1980s, with several reviews and working groups adopting this as an optimal approach for the tax system.[53] New Zealand's tax reform that broadened the tax base through introducing new taxes (such as a GST and a FBT), and reduced income tax rates in the 1980s was the most significant tax change in several decades.[54] That said, the scope or base of each particular tax may be extensive (broad) or narrow. In referring to the BBLR model, this means that the number of tax bases is broad rather than being narrowly focused on one or two bases (such as income tax and a consumption tax).

While Australia's reforms were motivated by revenue sufficiency, efficiency, equity, and simplicity,[55] New Zealand's most significant tax reforms were generated by economic crises. The country was described as 'close to being bankrupt in mid 1980s'.[56] The tax reforms in the 1980s in New Zealand were part of a comprehensive economic

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[48] Progressively through the 1990s New Zealand removed its land tax, estate duty and gift duty.
[49] Sawyer, above n 1.
[50] Stephens, above n 8; Robert A Buckle, 'Introduction: Tax Policy Reform New Zealand Style' (2010) 44(2) *New Zealand Economic Papers* 129.
[51] Iris Claus, Norman Gemmell, Michelle Harding and David White, 'Introduction' in Iris Claus, Norman Gemmell, Michelle Harding and David White (eds), *Tax Reform in Open Economies: International and Country Perspectives* (Edward Elgar, 2010) 1, 1.
[52] Johan Christensen, 'Bringing the Bureaucrats Back In: Neo-Liberal Tax Reform in New Zealand' (2012) 32(2) *Journal of Public Policy* 141, 141.
[53] Sawyer, above n 1, 60.
[54] Graeme Wells and Keith Fraser, *The Tax Switch and the CPI: An Occasional Paper* (Victoria University Press for the Institute of Policy Studies, 1986).
[55] Tran-Nam, above n 2.
[56] Sawyer, above n 1, 55.

restructuring and liberalisation of the economy. Since 1980, a range of institutional voices argued that significant tax reform was required both for raising revenue, but also to meet the desired criteria of efficiency and equity.[57]

Further economic challenges were visible after the Global Financial Crisis in 2010. However, Christensen notes that the 2010 reforms were less about economic crisis, which explained much of the 1980s tax reform. Instead, the challenging economic situation was used to justify breaking election promises not to increase the rate of GST.[58] Moreover, the powerful personalities and institutions of the 1980s, combined with the electoral system of the time, allowed for more radical action that was simply not possible some 25 years later where there was a need to manage coalition arrangements.

One notable difference in the tax policy environments is the influence of the Treasury on tax policy in Australia. Unlike New Zealand, the Australian Treasury 'has primary responsibility for advising on tax policy' in Australia.[59] While this is undertaken in conjunction with the Australian Taxation Office (ATO), the Australian Treasury has the lead role. By way of comparison, since 1995 tax policy in New Zealand has adopted the Generic Tax Policy Process (GTPP). Following the GTPP allows for the roles of Inland Revenue and the New Zealand Treasury to be determined according to the expertise in each department. Like Australia, both agencies provide advice on tax issues to the government but, unlike Australia, the New Zealand Treasury does not formally lead the process. The strong role of Inland Revenue in providing advice in New Zealand ensures that policy is also informed by implementation consideration (and administration practicalities), along with broader economic and strategic considerations provided by the New Zealand Treasury.[60]

4.1 Broadening of the tax base

Broadening of the tax base is widely recognised as a useful guiding principle for tax reform.[61] Tran-Nam suggests that Australian tax policy reform over the past 30 years 'can be characterised in terms of base-broadening and rate reduction'.[62] This trend is visible in most countries. Peter, Buttrick and Duncan report on the trends of 189 countries between 1981 and 2005, finding that high-income tax rates have 'declined significantly', with downward trends in all but low-income countries.[63] A similar trend in New Zealand will be shown in this and the following sections.

The McCaw Report in 1982 was tasked with taking a thorough and systematic review of all aspects of central government taxation.[64] Desirable reforms were identified as reducing the progressivity of the marginal tax rate scale, broadening the income tax base by taxing fringe benefits, and introducing a GST (although referred to as a value added

[57] Stephens, above n 8.
[58] Christensen, above n 52.
[59] Rob Heferen, Nicole Mitchell and Ian Amalo, 'Tax Policy Formulation in Australia' (2013) 2 *Economic Roundup* 1, 5.
[60] New Zealand Treasury, *Briefing to the Incoming Minister of Revenue* (February 2024), <https://www.treasury.govt.nz/publications/corporate-documents/briefings-incoming-ministers>.
[61] Claus et al, above n 51; Tran-Nam, above n 2.
[62] Tran-Nam, above n 2, 253.
[63] Klara Sabirianova Peter, Steve Buttrick and Denvil Duncan, 'Global Reform of Personal Income Taxation, 1981-2005: Evidence from 189 Countries' (2010) 63(3) *National Tax Journal* 447, 447.
[64] Task Force on Tax Reform, above n 14.

tax (VAT) at that point).[65] While recommendations were largely not taken up by the government at the time, several were taken up by the Labour government in the mid-1980s.

The particular need for the broadening of the tax base in New Zealand in the 1980s related to the historical erosion of the tax base through tax exemptions, incentives, and rebates.[66] Base broadening was again used to refer to the 2010 Budget, described by Buckle as a tax reform package that 'represented a switch in the New Zealand tax base achieved by reducing the heavy reliance on taxing incomes, increasing the taxation of spending and property investment income, and … introducing a variety of base broadening measures'.[67] Alongside these changes were a range of additional base-broadening measures involving depreciation and some changes to inward investment.[68] However, these base-broadening measures were considerably more measured than those of the 1980s.

4.1.1 Income tax

As noted, the dire economic situation in 1980s New Zealand created an environment where tax reform, along with economic reform, was essential. Thus, radical reforms were perhaps more acceptable than they may have otherwise been. Importantly the introduction of GST was accompanied by other tax changes that were at least intended for the package to have a neutral impact.[69]

The reforms of the mid-1980s introduced a separate tax on fringe benefits, closed many company tax loopholes, and removed many tax concessions, such as accelerated depreciation allowances.[70] As Stephens observes, the FBT was novel as payment was made by the employer, rather than the employee.[71] The structure of the FBT was intended to make employers indifferent between paying cash income and providing a non-cash benefit to employees.[72] However, the additional administrative and compliance costs were likely to result in a preference for cash payments that were taxed through the pay-as-you-earn (PAYE) system. While this extended the base, it did not add significantly to tax revenue collection, currently accounting for around 0.5 per cent of tax revenue.[73] However, from an efficiency perspective, the transfer of non-cash benefits to cash payments is likely to result in higher tax revenue collected, as there are fewer opportunities to avoid the tax.

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[65] Ibid 255.
[66] Simon James and Clinton Alley, 'Successful Tax Reform: The Experience of Value Added Tax in the United Kingdom and Goods and Services Tax in New Zealand' (2008) 8(1) *Journal of Finance and Management in Public Services* 35.
[67] Buckle, above n 50, 129.
[68] Ibid.
[69] James and Alley, above n 66.
[70] Stephens, above n 8.
[71] Ibid.
[72] Australia implemented its tax on fringe benefits in 1986 which was largely based on the New Zealand approach.
[73] Jessica Chaston, 'Budget 2023/24 – Summary of All Tax Collections', *Interest.co.nz* (19 May 2023), <https://www.interest.co.nz/public-policy/121283/budget-202324-summary-all-tax-collections>.

Before 1984, tax policy was used for economic management, with tax breaks provided to particular industries or activities.[74] For example, accelerated depreciation was introduced in 1945.[75] The Gibbs Report in 1951 recommended that depreciation allowances should be further enhanced.[76] As depreciation allowances reduce the cost of an investment, when these are targeted towards specific industries or businesses, resources may be directed towards activities that would otherwise be uneconomic.[77]

A further example is the investment allowances that were introduced in 1963.[78] These were intended to accelerate investment in industry, particularly the agricultural and manufacturing sectors. They took the form of an up-front deduction of a percentage of the cost of an asset, in addition to depreciation, meaning that the taxpayer could deduct more than the cost of an asset over its useful life.[79] Both accelerated depreciation and investment allowances were phased out by 1993.[80]

However, unlike Australia, New Zealand has never introduced a separate regime to tax capital gains. Rather, it has sought to tax certain 'capital gains' as ordinary income and apply the standard income tax rates to those gains. Numerous attempts to progress the debate have failed to lead to even draft legislation being tabled in Parliament.[81] This remains a significant deficiency in New Zealand's BBLR framework (along with the absence of any specific taxes on wealth), and a significant divergence between Australia and New Zealand's tax policy reform agendas.

4.1.2 Consumption tax

Like Australia, before the introduction of the comprehensive GST, New Zealand also had a wholesale sales tax. Australia's wholesale sales tax was introduced in 1930 at a flat rate of 2.5 per cent, New Zealand's was introduced in 1933 at a flat rate of 5 per cent.[82] At the end of its life, New Zealand's wholesale sales tax had 12 different specific and seven ad valorem rates that ranged from 10 per cent to 60 per cent 'on an arbitrary selected one-third of total personal consumption'.[83] It was well known for destroying industries, with boat-building and caravans being two commonly cited examples.[84] While estimates were that around one-third of consumption was subject to the wholesale sales tax in New Zealand, this was even lower in Australia at 22 per cent by 1995.[85] In

[74] Christensen, above n 52.
[75] Rob Vosslamber, 'The Road to Freedom? Hayek and New Zealand's Tax Depreciation" (2014) 9(1) *Journal of the Australasian Tax Teachers Association* 126.
[76] Sawyer, above n 1.
[77] Vosslamber, above n 75.
[78] Ibid.
[79] Ibid.
[80] Ibid.
[81] For a comprehensive review, see Andrew Maples and John Minas, 'Capital Gains Tax Reviews in New Zealand – The First 50 Years (1951-2000) (or the Wheel Turns Slowly)' (2023) 29(1) *New Zealand Journal of Taxation Law and Policy* 79.
[82] Due, above n 33.
[83] James and Alley, above n 66, 39.
[84] Roger Douglas, 'The New Zealand GST Policy Choice and Its Political Implications' in Richard Krever and David White (eds), *GST in Retrospect and Prospect* (Thomson Brookers, 2007) 3; Ian Dickson, 'The New Zealand GST Policy Choice: An Historical and Policy Perspective' in Richard Krever and David White (eds), *GST in Retrospect and Prospect* (Thomson Brookers, 2007) 45.
[85] Tran-Nam, above n 2.

the six years from 1984 to 1990, goods and services/sales taxes increased from 12.6 per cent of total tax revenue to 21.7 per cent in New Zealand.[86]

When GST was introduced in Australia in 2000 it, like New Zealand, was accompanied by a package of tax reforms including changes to social security and family assistance, personal income tax rate reductions, and business tax reforms.[87] However, the political environment in Australia necessitated compromises, which resulted in the removal of a range of basic food and other items from the GST base.[88] Food was viewed by many as one of the categories that should remain GST-free to the consumer, to the extent that the Australian Democrats refused to support the GST legislation unless basic foods were zero-rated.[89] Thus, while there was general agreement on the benefit of a broad-based consumption tax, the Australian GST did not benefit from base broadening to the same extent as New Zealand.

A further difference in the New Zealand and Australian approaches is visible with reference to financial services. In New Zealand, financial services to consumers are exempt from GST and financial services to businesses are zero-rated. This is to ensure that GST does not become a cost to business,[90] and at the time inclusion of financial services items was considered to be much too complex. In Australia, all financial services are exempt from GST, unless the entity making the financial supplies does not exceed the financial services threshold. The reason provided for this treatment is 'due to the difficulty in valuing them' and being 'consistent with international practice'.[91]

The reforms that were introduced on 1 October 1986 in New Zealand were also part of a package, with the removal of most of the wholesale sales taxes, introduction of GST, changes to the personal income tax scales, amendments to the company tax rate, and several changes to social welfare benefits.[92] It is no accident that the label 'GST' was adopted in New Zealand, rather than the nomenclature of VAT that was in the United Kingdom. Dickson writes that GST was adopted to distance the New Zealand system from that in the United Kingdom, where the VAT 'had received a lot of adverse publicity in New Zealand over the years'.[93]

As noted by Christensen, in 2006 New Zealand's GST had a base that was significantly broader than any other OECD country.[94] Unlike Australia and most other jurisdictions, New Zealand did not exempt basic food items from its GST. While this was considered prior to implementation, it was determined that 'zero-rating of necessities is a blunt instrument compared to the specific instrument of family support and adjustment of benefit rates'.[95] This is despite the recognised regressivity of the GST. The decisions

[86] Stephens, above n 8.
[87] Tran-Nam, above n 2.
[88] Richard Eccleston, 'Taxing Times: A Political Retrospective' (2002) 17(3) *Australian Tax Forum* 287.
[89] Fiona Martin, 'The Case for Specific Exemptions from the Goods and Services Tax: What Should We Do About Food, Health and Housing?' (2020) 18(1) *eJournal of Tax Research* 99.
[90] Tax Working Group, *Taxing Financial Services: Discussion Paper for Session 11 of the Tax Working Group* (Prepared by the Inland Revenue Department and the Treasury, 2018).
[91] Australian Treasury, *Tax Expenditures and Insights Statement* (2023) 184.
[92] Wells and Fraser, above n 54.
[93] Dickson, above n 84, 50.
[94] Christensen, above n 52.
[95] Stephens, above n 8, 55.

made around the small number of goods and services that are exempt from the GST were primarily made for pragmatic purposes, such as minimising compliance costs.[96]

Writing from a Treasury perspective, Dickson observes the importance of maintaining a comprehensive base of the GST, despite '[p]articularly sensitive commodities to tax would be virtually everything that was not already covered by the wholesale sales tax'.[97] In recognising that they could 'run a convincing argument on food and clothing', Dickson notes that in the absence of these inclusions, the potential tax revenue would reduce:

> almost to the point where it would not be worthwhile proceeding. On the other hand, if you could win the issue on food and clothing you would carry so much of the moral high ground that people seeking exemptions for newspapers or books … would find themselves unable to sustain a public position.[98]

Household expenditure figures of the time are worth noting. The bottom 20 per cent of households allocated 23-29 per cent of their budgets to food, while the top two deciles allocated 7-10 per cent.[99] Thus the regressivity of the tax was a challenge from an equity perspective but movements in income tax thresholds and increases in welfare benefits were intended to minimise the impact.

Roger Douglas, Minister of Finance from 1984 to 1988, and the 'Roger' of the economic policy in the 1980s that became known as 'Rogernomics', attributes the success of the GST to five key process elements: 'political will, the right people, the way in which the proposal was packaged, an effective consultative process, and an effective communication process'.[100] Notwithstanding these points, the economic crisis would have been visible to most and provided an important justification for radical policy.

4.2 Broadening of the tax base

Stephens observes that the reforms in the 1980s should have resulted in large efficiency gains, but did not, suggesting that 'supply-side economics, through tax reform, is not a panacea for more fundamental economic problems'.[101] Despite the arguments that the tax switch minimised the impact on the poorest, the reforms of the 1980s benefited the wealthy the most. While welfare benefits were increased by 5 per cent,[102] lower-income earners paid GST on most of their goods and services but benefited little from the tax cuts, which accrued to higher-income earners.[103]

4.2.1 Income tax

Australia's and New Zealand's individual income tax rates have both been reduced in two ways over recent decades. These are reductions in the top marginal income tax rate and changes to the income tax thresholds, which result in the top marginal income tax

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[96] James and Alley, above n 66.
[97] Dickson, above n 84, 51.
[98] Ibid.
[99] Dickson, above n 84.
[100] Douglas, above n 84, 3.
[101] Stephens, above n 8, 61.
[102] James and Alley, above n 66.
[103] Stephens, above n 8.

rate applying at a relatively high rate of earnings.[104] In 2024, $180,000[105] is the amount at which the top income rate applies in both countries. However, the highest marginal income tax rate is 39 per cent in New Zealand while it is 45 per cent in Australia.

Like New Zealand, Australia also had high income tax rates in the 1980s. Tran-Nam writes that the top rate steadily reduced from 60 per cent in 1985-86 to 45 per cent in 2006-07.[106] Personal income tax brackets were also enlarged, while company tax rates were reduced.[107]

Within a relatively short period, personal income tax was reduced in New Zealand from 64 per cent of total tax revenue collected (in 1984) to 49 per cent six years later in 1990.[108] New Zealand made greater cuts in top personal tax rates than the OECD average from 1985 to 2010.[109] New Zealand's top personal income tax rate of 33 per cent from October 1988 was the lowest in the OECD.[110] However, it should be noted that eight months after the top personal income tax rate was reduced to 33 per cent, the GST was increased to 12.5 per cent.[111] Figure 2 outlines the top personal tax rate from 1986 to 2024, along with the company tax rate for New Zealand and Australia.

[104] Tran-Nam, above n 2.
[105] In both Australian and New Zealand dollars. This increased to AUD 190,000 in Australia on 1 July 2024.
[106] Tran-Nam, above n 2.
[107] Ibid.
[108] Stephens, above n 8.
[109] Christensen, above n 52.
[110] Stephens, above n 8.
[111] James and Alley, above n 66.

Fig. 2: Company Tax Rates and Top Income Tax Rates for Individuals 1986-2024[112]

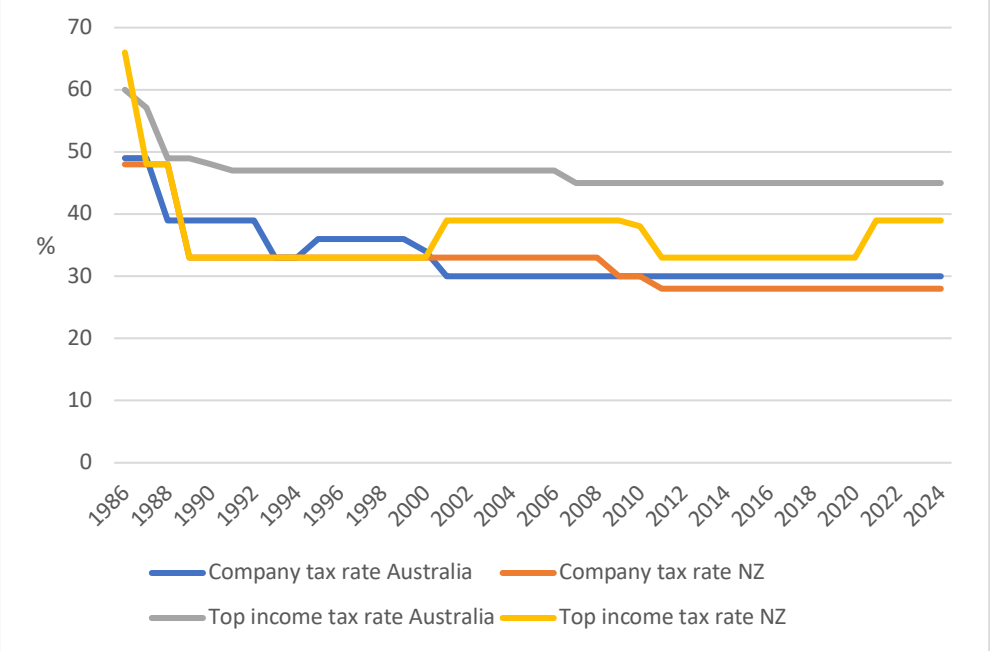


Figure 2 shows the decrease in all rates in the late 1980s. After the initial decline in the period shown, both countries' company tax rates have trended downwards. A similar downward trend can be seen in the Australian top income tax rate, although the decrease is not as significant as the company tax rate decreases. However, the top income tax rate in New Zealand has fluctuated noticeably more than the Australian rate, changing approximately every decade between 33 per cent and 39 per cent (frequently associated with a change between Labour-led and National-led governments).

Australia has had a tax-free threshold since 1915, which was initially intended to minimise the double taxation that could occur when individuals paid income tax at both a State and federal level.[113] However, in the present day it is intended to minimise the tax burden on low-income earners. New Zealand adopts a different approach to this issue and taxes from the first dollar earned. At the present time, the lowest rate is 10.5 per cent for income up to NZD 15,600. Instead, there is a system of tax credits, called Working for Families, which reduce the effective tax rate for lower-income earners. The aim of this is to ensure minimum incomes for those who have families and are employed and is also intended to mitigate potential disincentives to employment for lower-income

[112] Christensen, above n 52; Norman Gemmell, 'New Zealand's Tax Reforms and "Tax Sheltering" Behaviour' (Wellington School of Business and Government Working Paper 03/2020); Stephens, above n 8; Australian Taxation Office, 'Tax Rates – Australian Resident' (6 June 2024), <https://www.ato.gov.au/tax-rates-and-codes/tax-rates-australian-residents>; Australian Treasury, 'General Business Tax Issues' (chart data for *Re:Think: Tax Discussion Paper* (2015)), <https://treasury.gov.au/review/tax-white-paper/chart-data/5-general-business-tax-issues>. In Australia, from 2016, the company tax rate has been lower for a small business. Initially this was 28.5 per cent, gradually reducing to 25 per cent by 2022.

[113] Parliamentary Budget Office, 'Australia's Tax Mix' (Budget Explainer, 14 November 2024).

earners. New Zealand's approach is justified as being more targeted to those who are working with families.

From 1990 to 1999 there were few significant tax changes. However, for the next nine years, with a Labour government, there were changes to the marginal income tax rates. The political landscape in New Zealand typically witnesses greater base broadening and lower rates during periods of conservative (National-led) governments, with the opposite when a progressive (Labour-led) government is in power. The reforms under the National-led government in 2010 saw New Zealand move back towards a broader base with lower rates. The top income tax rate was reduced from 38 per cent to 33 per cent and GST was increased from 12.5 per cent to 15 per cent. Under the Labour-led government in 2021, the top marginal rate was again increased to 39 per cent, at least in part as a revenue-generating measure related to the Covid-19 pandemic. However, this Labour-led government failed to broaden the tax base significantly by continuing to distance itself from introducing a capital gains tax regime or other form of wealth taxation.

As shown in Figure 2 in section 2 of this article, the broad-base low rate was weakened with the increases in the top marginal tax rate to 38 or 39 per cent that occurred from 2001-2010 and again from 2021 to the present time. A current problem is that increases in the top marginal tax rate have been accompanied by significant bracket creep that has pushed many into higher marginal income tax brackets. This has been partially addressed with changes in thresholds implemented as part of Budget 2024 with the passing of the *Taxation (Budget) Measures Act 2024*.[114] With these changes in rates occurring on 31 July 2024, this has created significant complexity for the tax year ending March 2025 with a series of composite tax rates and thresholds.[115]

Table 2 provides a comparison of the personal income tax rates in Australia and New Zealand before and after changes in July 2024. While both countries amended their rates at the same time, Australia changed the thresholds and reduced the rates. However, in New Zealand the rates were unchanged and only the thresholds were expanded, resulting in less progressivity than that seen in Australia.

[114] See further Inland Revenue, *Taxation (Budget Measures) Act 2024* (Special Report, June 2024), <https://www.taxpolicy.ird.govt.nz/news/2024/sr-budget-measures> (accessed 31 May 2024).
[115] See further ibid 6-8.

Table 2: Personal Income Tax Rate Changes in Australia and New Zealand

Australia (AUD)			
Prior to 1 July 2024		**After 1 July 2024**	
Up to $18,200	0	Up to $18,200	0%
$18,201 - $45,000	19%	$18,201 - $45,000	16%
$45,001 - $120,000	32.5%	$45,001 - $135,000	30%
$120,001 - $180,000	37%	$135,001 - $190,000	37%
$180,001 and over	45%	$190,001 and over	45%
New Zealand (NZD)			
Prior to 31 July 2024		**After 31 July 2024**	
$0 - $14,000	10.5%	0 - $15,600	10.5%
$14,001 - $48,000	17.5%	$15,601 - $53,500	17.5%
$48,001 - $70,000	30%	$53,501 - $78,100	30%
$70,001 - $180,000	33%	$78,101 - $180,000	33%
$180,001 and over	39%	$180,000 and over	39%

4.2.2 Consumption tax

Like Australia, before the introduction of the GST, the wholesale sales tax in New Zealand had multiple rates on different items that resulted in inefficiencies, a lack of coherence, and inequities. With the introduction of GST in New Zealand, wholesale sales tax rates were lowered ahead of the introduction to minimise any impact on consumption.[116]

Unlike income taxes, which have had a general downward trend, GST in New Zealand has increased twice since its inception, when it was set at 10 per cent. As shown in Table 3, it increased to 12.5 per cent in 1989, where it remained for the following 20 years, before increasing to the current rate of 15 per cent in 2010. New Zealand's GST currently collects around one-quarter of New Zealand's total tax revenue.

Table 3: Sales Tax/GST Tax Rates 1984-2024[117]

	1984-1985	**1986-1988**	**1989-2009**	**2010-2024**
Wholesale sales tax/GST rate	10-50%	10%	12.5%	15%

Dickson observes the importance of a low rate for GST. When 10 per cent was settled on in the mid-1980s, this served the purpose of being a low rate, while ensuring GST

[116] Stephens, above n 8.
[117] Ibid.

was easy to calculate and comply with. Moreover, officials believed that 'the higher the tax rate, the greater would be the pressure for exemptions'.[118]

Douglas notes that 'ad hoc solutions that avoided the real problems New Zealand faced were never going to work'.[119] In referencing the ad hoc decisions and political compromises that had resulted in serious economic problems, Douglas described the tax system as 'a mess' but needed changes to be self-balancing, fair, as simple as possible, and broad-based so that the rate of the GST could be as low as possible.[120]

5. TAX ADMINISTRATION REFORM

Over the last 40 years the level of tax reform in New Zealand has matched that of Australia in terms of its significance and level of impact. Indeed, a significant amount of the reform in New Zealand has been developed alongside or followed earlier actions undertaken in Australia. In this section we explore developments within Inland Revenue in terms of how it has been restructured and operates, its approach to encouraging tax compliance, efforts to align the reporting of taxes more closely with their payment, the significant impact of technology-driven reforms, and the relatively little appetite New Zealand has for alternative dispute resolution (ADR) in resolving tax disputes.

5.1 Self-assessment, internal organisation, and the compliance model

New Zealand has operated a form of self-assessment over much of the last 40 years, although it was not formalised until 1998.[121] Formalisation of self-assessment occurred as part of the rewrite of tax legislation project, discussed in section 3 above. Specifically, legislating for self-assessment brought the TAA 1994 into line with modern administrative practices globally; it made the law consistent with New Zealand administrative practice and reforms (such as the then recently enacted penalties provisions, dispute resolution procedures and binding rulings legislation); and it clarified the law with respect to the Commissioner's discretions.

Like Australia, the administration of the tax system is in practice based on taxpayers initially assessing (calculating) their own tax liabilities by filing themselves (or via an agent) a tax return with Inland Revenue (principally via electronic filing). In the early 1990s major changes to the tax system led to most individual taxpayers not having to complete a tax return as their income was taxed at source (supported by third-party reporting). Nevertheless, taxpayers may be required to verify the content of their income statement that is held within their online portal (myIR). This abolition of return filing by individuals coincided with the removal of employee deductions for all items (the exceptions being for income protection insurance premiums and a tax agent's filing fees).

Inland Revenue has undergone a number of internal restructures, often following the appointment of a new Commissioner. Over the last 40 years Inland Revenue has been

[118] Dickson, above n 84, 56.
[119] Douglas, above n 84, 4.
[120] Ibid.
[121] Rt Hon Bill Birch (Treasurer and Minister of Finance and Minister of Revenue), *Legislating for Self-Assessment of Tax Liability: A Government Discussion Document* (August 1998).

organised along tax type, taxpayer type, and service type. Currently it works across business groups using terminology such as:

- Customer and Compliance Services – Individuals | Ratonga Kiritaki me te Tautukunga – Takitahi;
- Customer and Compliance Services – Business | Ratonga Kiritaki me te Tautukunga – Pakihi;
- Tax Counsel Office | Te Tari o te Rōia Tāke;
- Enterprise Design and Integrity | Hinonga Hoahoa me te Tika; and
- Enterprise Services | Ratonga Hinonga.[122]

With the enactment of the *Taxation (Annual Rates, Modernising Tax Administration and Remedial Matters) Act 2019*, Schedule 7, Disclosure Rules was inserted into the TAA 1994. This enables Inland Revenue to provide confidential information to other government bodies, to effectively administer its increasing number of 'non-tax' functions (these include delivering and administering many social policies such as child support, Working for Families, KiwiSaver and student loan repayments), as well as to enhance its core functions. Information exchange recognises the knowledge base, efficient information systems and reliability of Inland Revenue to deliver services on behalf of the government. It also recognises that as technology has expanded, a whole-of-government approach has been taken to see government departments and ministries work closer together, along with an increase in the number of service-level agreements (and exchange of information agreements both within and outside New Zealand).[123]

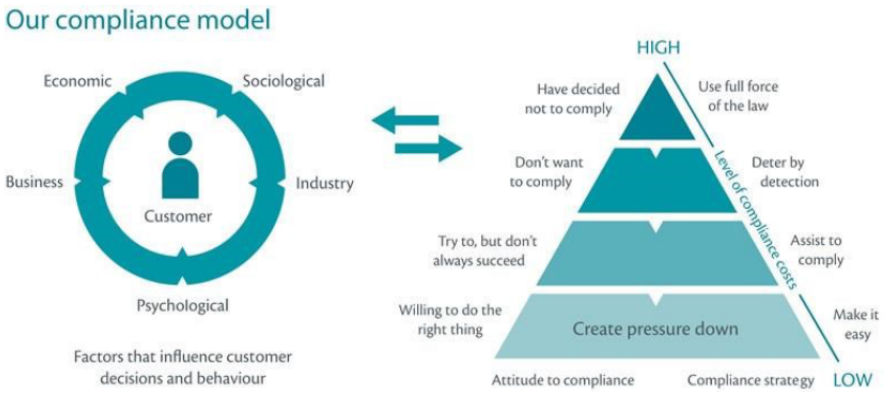
New Zealand's tax system assumes a voluntary compliance approach by taxpayers to meet their tax obligations, similar to that in Australia. This is an environment that depends upon an open, honest and transparent tax system where there are high levels of mutual trust and understanding between customers/taxpayers and the revenue agency (Inland Revenue).

In this regard it is important for a revenue authority to follow some form of compliance model. Inland Revenue's first formal compliance model was directly taken from that used by the Australian Taxation Office since 2000, when the then new Commissioner, David Butler, arrived in 2001. This model is essentially what is known as the

[122] See Inland Revenue, 'Our Organisational Structure', <https://www.ird.govt.nz/about-us/who-we-are/organisation-structure> (accessed 14 March 2024).
[123] Currently information sharing agreements within exist between Inland Revenue and New Zealand Police, New Zealand Customs Service, Serious Fraud Office, Department of Internal Affairs, Ministry of Social Development and the New Zealand Gang Intelligence Centre agencies. There are numerous other agreements with agencies, including the Accident Compensation Corporation, Callaghan Institute, Financial Markets Authority, Land Information NZ, Ministry of Business Information and Employment, Ministry of Health, Ministry of Housing and Urban Development, Ministry of Justice, Ministry of Culture and Heritage, Ministry for Primary Industries, Statistics NZ, Treasury, Veterans Affairs, and WorkSafe. See further Inland Revenue, 'Information Sharing', <https://www.ird.govt.nz/about-us/information-sharing> (accessed 14 November 2024). For details of external to New Zealand agreements, see Inland Revenue, 'Tax Treaties', <https://www.taxpolicy.ird.govt.nz/tax-treaties>.

Braithwaite Compliance Model (see Figure 3 below). As a behavioural model it was readily understood in both countries.

Fig. 3: Inland Revenue's Compliance Model (the Braithwaite Model)



Source: Alistair Hodson, 'Inland Revenue's New Circular Compliance Model – An Overview' (2018) 13(1) *Journal of the Australasian Tax Teachers Association* 187, 189, citing Inland Revenue.

However, in 2014, Inland Revenue's Customer Strategy Team introduced what they considered a more customer-centric focus, and a 'Right from the Start' approach, which is a fundamental part of the new compliance model (see Figure 4 below). When this model was introduced (and for some time later), it was not well understood by Inland Revenue staff and those outside the organisation.

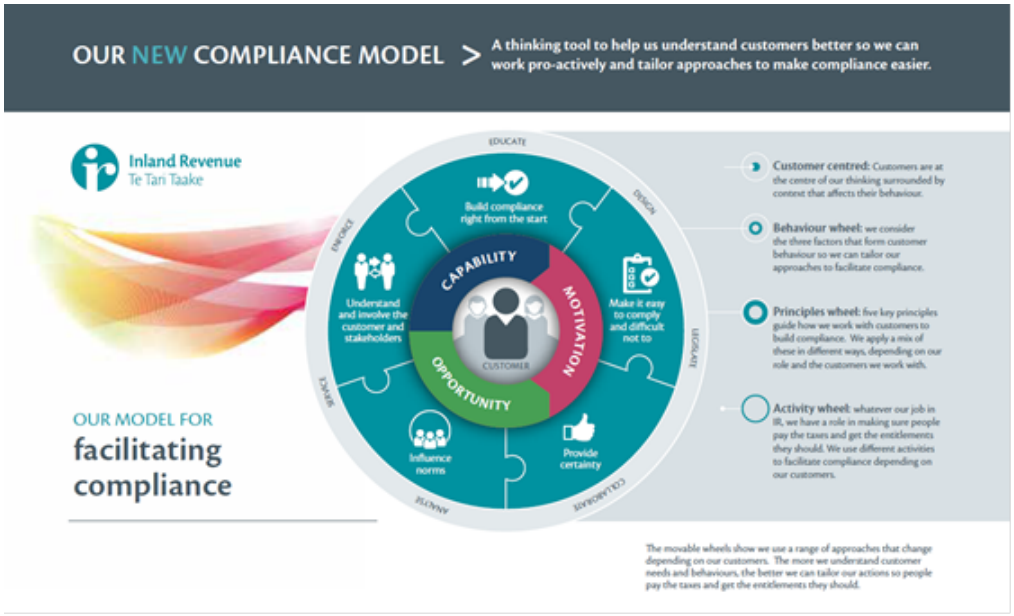
Specifically, Inland Revenue's current Compliance Model places greater emphasis on Inland Revenue understanding their 'customers' (a somewhat dubious concept), their lifecycles and perspectives. At the core of the Compliance Model are the three factors that form customer behaviour – capability, motivation and opportunity. *Capability* is how well customers can meet their obligations and access their entitlements. It includes their knowledge of rules that apply to them, their access to tools and assistance, and their ability to understand. *Motivation* is about the factors that create the willingness to comply and then actually follow through and do it. Motivation includes both social and personal norms. *Opportunity* is about how easy it is for a customer to comply or not comply with their obligations or access their entitlements.

In his comprehensive review of the new Compliance Model, Hodson observes:

> In reality the new compliance model is a *thinking tool, designed to get all staff, especially the front-line staff, to consider the customer in the centre of their analysis*. Inland Revenue consider they have moved from being a tax collector and enforcement organisation to more of a tax and social policy organisation.

Inland Revenue's social policy role and the new compliance model reflects this wider ambit of 'Customer'.[124]

Fig. 4: Inland Revenue's Compliance Model



Source: Inland Revenue, *Annual Report 2015* (2015) 17.

5.2 More cooperative tax culture

In addition to applying various compliance models, the creation of a culture of cooperation has been central to the operations of a modern revenue authority. This is evident in both Australia and New Zealand. Inland Revenue has recently started to undertake targeted compliance campaigns, focused on specific sectors and compliance issues and making use of a range of information obtained from questionnaires and follow-up interactions. For example, it has released guidance on its compliance focus for multinational enterprises in 2019,[125] targeting those with an annual turnover in New Zealand of over NZD 30 million.

New Zealand has been much less active than Australia with respect to entering into cooperative compliance agreements with large taxpayers, largely due to the small number of multinational enterprises headquartered in New Zealand (there are only around 20 with turnover of EUR 750 million or more). With such a small number of

[124] Alistair Hodson, 'Inland Revenue's New Circular Compliance Model – An Overview' (2018) 13(1) *Journal of the Australasian Tax Teachers Association* 187, 208-209 (emphasis added).
[125] Inland Revenue, *Multinational Enterprises Compliance Focus 2019* (2019). This is supported by a questionnaire sent to multinationals on an annual basis (see further Inland Revenue, 'International Questionnaire', <https://www.ird.govt.nz/international-tax/business/international-questionnaire> (accessed 14 March 2024)). The most recent edition was released in 2024; see <https://www.ird.govt.nz/international-tax/business/compliance-focus-for-multinational-enterprises>.

New Zealand-headquartered multinational corporations involved in cross-border activity that come within the OECD's country-by-country reporting obligations, Inland Revenue has been able to undertake extensive risk analysis of this group.[126]

Until 2009, Inland Revenue's internal charter was little more than a code of conduct as to how its staff should conduct themselves when engaging with taxpayers and some minimum expectations that taxpayers should expect. Following the outcome of the Wine Box Inquiry,[127] Inland Revenue developed and released a new Inland Revenue Charter (Charter) that sets out the minimal existing rights that taxpayers have and some further service expectations that taxpayers may have of Inland Revenue staff, along with what Inland Revenue expects of taxpayers (customers).[128] This Charter has no legal backing and taxpayers cannot seek to enforce it against Inland Revenue. Importantly it does refer to Inland Revenue's internal complaints management service and provides details of how taxpayers may contact the Ombudsman's office.

5.3 Unification of reporting and payment

New Zealand, like Australia and many other jurisdictions globally, imposes an income tax on personal income that includes a system of tax withholding at source on employment income (PAYE), and other categories of income (such as interest and dividends). This withholding mechanism has proved to be a highly efficient and effective arrangement for tax collection but imposes a burden on employers who must determine the appropriate amount of tax to be withheld from wages paid to their employees, remit taxes withheld to the tax authority, and report at year end details of wages and benefits paid and taxes (plus other deductions) withheld for each employee. Traditionally this had been undertaken on a fortnightly or monthly basis for most employers, with an end of year 'square-up'. This process would often end up with employees being under- or over-withheld based on factors such when they were employed part-time, had more than one job, and the like.

More recently, Inland Revenue has offered online and myIR services that give employers, tax agents, payroll bureaus and payroll intermediaries, secure and convenient methods of filing employment information schedules online in real time. It also requires employers to file an employment information form on every occasion they pay their employees. Employers with total annual PAYE and employer superannuation contribution tax (ESCT) of NZD 50,000 or more must file electronically. If they do not, then penalties will apply.[129] A number of software packages are available that enable an

[126] See further Adrian Sawyer and Kerrie Sadiq, 'Country-by-Country Tax Reporting: A Critical Analysis of Enhanced Regulatory Requirements for Multinational Corporations' (2019) 36(7) *Company and Securities Law Journal* 570.
[127] For a discussion of the Wine Box inquiry and subsequent developments, see Adrian Sawyer, 'The Wine-Box Inquiry: Never Mind the Findings but What About the Recommendations?' (1998) 52(2) *Bulletin for International Taxation* 58; Adrian J Sawyer, 'The Wine-Box Inquiry in New Zealand: Round Two – A "Gutted" Report but no "Knockout Punch"' (2001) 55(3) *Bulletin for International Taxation* 114.
[128] See further Inland Revenue, 'Our Charter', <https://www.ird.govt.nz/about-us/charter>. This charter is essentially two pages long and compares unfavourably with the ATO's charter in terms of content and usefulness.
[129] See *Tax Administration Act 1994* (NZ) s 139AA.

employer to send the required information plus the withheld tax directly to Inland Revenue in real time (that is, at the time of paying their employees).[130]

5.4 Technology-driven reforms

Granger and Sawyer provide an extensive review of the 'digital' journeys of Australia and New Zealand prior to and during the Covid-19 pandemic.[131] Their study applies a tax policy lens and largely positivist approach, with some normative suggestions. Their comparative case study approach observes

> … how the ATO and Inland Revenue Department evolved 'just in time' to meet the challenges of digitalization. *They have been resilient adaptors to keep pace as their countries embrace the opportunities of globalization and technology innovation*. Digitalization combined with smart data exploitation has created new opportunities and challenges for them.[132]

Granger and Sawyer identify five key policy features from the approaches taken by the ATO and Inland Revenue:

1. the design of information technology infrastructure is moving away from being tax-specific to being integrated and networked;
2. the role of tax administrations is expanding as a smart data hub for a whole-of-government approach;
3. the shift from merely consulting stakeholders during the design process to collaborating with them;
4. support people through transition, especially the vulnerable; and
5. managing ecosystem risks.[133]

Many recent reforms to the New Zealand tax administration have been technology-driven or facilitated by such. This includes the use of Inland Revenue's extensive databases, information made available through exchange or sharing agreements, and the completion of its Business Transformation project (BT project).

In its 2023 *Annual Report*, Inland Revenue states:

> Our technology is based on software as a service and commercial off-the-shelf products. This means third parties can collaborate with us easily, our people can access tools and data from any location, data is securely located and accessible in the event of a natural disaster and software is regularly updated.

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[130] Examples include MYOB and Xero.
[131] Jennie Granger and Adrian Sawyer, 'Digitally Prepared? The Journeys of the Revenue Administrations in Australia and New Zealand' in Nella Hendriyetty, Chris Evans, Chul Ju Kim and Farhad Taghizadeh-Hesary (eds), *Taxation in the Digital Economy: New Models in Asia and the Pacific* (Routledge, 2022) 166.
[132] Ibid 185 (emphasis added).
[133] Ibid 185-186.

> This year, *our focus has been on managing and enhancing our technology assets to ensure they support performance*. We'll continue to make updates to our core system, START, that allow us to benefit from advances in technology and gain efficiencies.[134]

From Inland Revenue's perspective, the BTP enabled it to upgrade the systems it had been using since the 1980s, systems that were becoming vulnerable and operating well beyond their originally intended scope and capability. The intent was to deliver a modern, digital revenue system that enabled customers/taxpayers to do as much for themselves as possible in a way and at a time that suited them. BTP is, as at the time of writing, the largest IT project in New Zealand's history, and one that was successfully completed (with minor teething issues), on time and on budget!

The project was undertaken in stages, pre-tested, while the old FIRST system remained operative. This pre-testing revealed a number of failings that were subsequently addressed. After every major release and at regular intervals throughout the program, Inland Revenue conducted formal sessions to review what it had learnt, testing this on selected practitioners and other external parties. This allowed Inland Revenue to determine what worked well (and what did not), improve the efficiency of processes, cease doing anything that was no longer required and to share its findings publicly. The stages of the project were as follows:

> *Stage 1 (2016 to 2017)* to enable secure digital services – to enable the majority of customers to self-manage and reduce the businesses' compliance burden in fulfilling their PAYE obligations;
>
> *Stage 2 (2017 to 2019)* to streamline income and business tax processes – this leveraged the foundations delivered in the previous stage and further reduced the businesses' compliance burden to fulfil their tax obligations;
>
> *Stage 3 (2018 to 2020)* to streamline social policy delivery – this led to improving the delivery of the social policies that Inland Revenue administers; and
>
> *Stage 4 (2019 to 2021)* – Complete delivery of the future revenue system – from 2019 Inland Revenue progressively moved the remaining social policies that they administer to new systems and processes, completing the delivery of a modern, digital revenue system in 2021.

Writing in the context of taxpayers' rights, Sawyer[135] reviews the BTP over the period 2015 to 2019 (based upon where it was at the time). He concludes:

> To respond to the question posed near the commencement of this paper: Is BTP likely to enhance taxpayers' rights with respect to meeting their obligations and interacting with IR? *For those taxpayers who are in the at-risk groups*

[134] Inland Revenue, *Annual Report Te Tari Taake Pūrongo ā-Tau 2022-23* (2023) 58 (emphasis added).
[135] See Adrian Sawyer, 'The Impact of Digital Delivery on Taxpayer Assistance – A New Zealand Perspective' (Paper Presented at the Fourth International Conference on Taxpayers Rights, University of Minnesota Law School, Minneapolis, 23-24 May 2019). See also generally Inland Revenue's website at: <https://www.ird.govt.nz/about-us/business-transformation>.

> *(including the digitally challenged), as it stands their position will not be improved by BTP, and in fact may be made worse. The expected failure of the NZ Government to close the digital divide by 2020 exacerbates the situation.*[136]

The digital divide is far from being closed in New Zealand meaning that the concerns raised by Sawyer above remain.

5.5 Alternative dispute resolution

When the current disputes regime was introduced in 1997, its aim was to reduce the focus of disputes on preparing to take a dispute to court, to that of reaching a settlement before that stage. This was a major feature of the recommendations of the Organisational Review of Inland Revenue in 1994, chaired by Sir Ivor Richardson.[137] However, significant changes to the disputes process were not put in place until after a subsequent review following the release of a discussion document issued in 2003.[138] A further review of the new system was undertaken in 2010.[139]

Following these reviews, the conference phase of the internal process within Inland Revenue, which has the purpose of discussing and clarifying the various facts and issues, was enhanced. While the conference phase is not mandatory, it is encouraged as a way of resolving disputes without needing to proceed to the more formal stages. Furthermore, from 1 April 2010 a taxpayer whose dispute remains unresolved after the notice of response (NOR) phase is invited to attend a conference meeting and offered the opportunity to have any meetings facilitated by an Inland Revenue facilitator. The conference facilitator is a senior Inland Revenue officer who has not been involved in the dispute or given advice on the dispute prior to the dispute phase. The facilitator will have sufficient technical knowledge to understand and lead the conference meeting. Inland Revenue has trained a number of staff as conference facilitators who will attend a conference on request. Importantly, a facilitator does not have authority to resolve issues, but they do have the ability to determine when the conference phase is at an end if the parties are unable to agree on this point.

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[136] Sawyer, above n 143, 20-21 (emphasis added).

[137] Organisational Review Committee (Sir Ivor Richardson, chair), *Organisational Review of the Inland Revenue Department*, *Report to the Minister of Revenue (and on Tax Policy, Also to the Minister of Finance)* (April 1994). This review also recommended what would become New Zealand's world-leading tax policy process, the Generic Tax Policy Process (GTPP). See further Adrian Sawyer, 'Broadening the Scope of Consultation and Strategic Focus in Tax Policy Formulation – Some Recent Developments' (1996) 2(1) *New Zealand Journal of Taxation Law and Policy* 17; Peter Vial, 'The Generic Tax Policy Process: A "Jewel in Our Policy Formation Crown"?' (2012) 25(2) *New Zealand Universities Law Review* 318; Adrian Sawyer, 'Reviewing Tax Policy Development in New Zealand: Lessons from a Delicate Balancing of "Law and Politics"' (2013) 28(2) *Australian Tax Forum* 401; Lisa Marriott, 'Crown Consultation, Māori Engagement, and Tax Policy in Aotearoa New Zealand' (2021) 26(2) *New Zealand Journal of Taxation Law and Policy* 143; Lisa Marriott and Jessica C Lai, 'Indigenous Perspectives on and in Tax Research Policy' (2022) 37(3) *Australian Tax Forum* 383; Adrian Sawyer, 'Tax Policy Without Consultation: Is New Zealand on a "Slippery Slope"?' (2022) 37(4) *Australian Tax Forum* 481; Adrian Sawyer, 'Navigating Challenging Times: A New Zealand Perspective' (2023) 29(4) *New Zealand Journal of Taxation Law and Policy* 341.

[138] Hon Michael Cullen (Minister of Finance and Minister of Revenue), *Resolving Tax Disputes: A Legislative Review, a Government Discussion Document* (July 2003).

[139] Inland Revenue, *Disputes: A Review – An Officials' Issues Paper* (July 2010).

The facilitated conference is currently the only limited form of ADR within the tax disputes process in New Zealand. Calls[140] for expanding this to include independent facilitators, experienced mediators or even arbitration, have been resisted by Inland Revenue. Furthermore, governments to date appear to be unwilling to make any significant changes to the disputes process that involve ADR processes. One less confronting part of the court process, the Small Claims Division of the Taxation Review Authority (TRA), was removed on the basis that it was rarely used.[141] Thus, with respect to ADR, New Zealand is less progressive in this respect than Australia, where ADR options are available.[142]

One important development with effect from 21 June 2005 was the creation of the 'right of non-disclosure'. This is a statutory right set out in sections 20B to 20G of the TAA 1994 that belongs to taxpayers. It can apply to tax advice documents which the Commissioner seeks to have disclosed under his statutory powers to obtain information. While it is similar to legal professional privilege that a lawyer's advice to their client may attract, it only applies to advice provided by members of an approved advisor group concerning New Zealand taxation, where members are subject to a professional code of conduct and disciplinary processes. This right is also subject to review by the courts and comes with a number of exceptions.

Following a period of uncertainty after the announcement that the Administrative Appeals Tribunal (AAT) in Australia would be abolished with no indication of its replacement, on 7 December 2023 a new body to be called the Administrative Review Tribunal (ART) would be established.[143] The empowering legislation has recently been enacted, and its operation should be closely reviewed by New Zealand to ascertain how it could improve its disputes process, along with the ADR options available via the ATO.

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[140] See for example the work principally undertaken by Melinda Jone: Melinda Jone, 'Tax Dispute Systems Design: International Comparisons and the Development of Guidance from a New Zealand Perspective' (PhD Thesis, University of Canterbury, 2016); Melinda Jone, 'Evaluating Australia's Tax Dispute Resolution System: A Dispute Systems Design Perspective' (2015) 13(2) *eJournal of Tax Research* 552; Melinda Jone, 'Evaluating New Zealand's Tax Dispute Resolution System: A Dispute Systems Design Perspective' (2016) 22 *New Zealand Journal of Taxation Law and Policy* 228; Melinda Jone, 'What Can the United Kingdom's Tax Dispute Resolution System Learn from Australia? An Evaluation and Recommendations from a Dispute Systems Design Perspective' (2017) 32(1) *Australian Tax Forum* 59; Melinda Jone and Andrew J Maples, 'Mediation as an Alternative Option in Australia's Tax Disputes Resolution Process' (2012) 27(3) *Australian Tax Forum* 527; Melinda Jone and Andrew J Maples, 'Mediation as an Alternative Option in New Zealand's Tax Dispute Resolution Procedures' (2012) 18 *New Zealand Journal of Taxation Law and Policy* 412; Melinda Jone and Andrew J Maples, 'Mediation as an Alternative Option in New Zealand's Tax Disputes Resolution Procedures: Refining a Proposed Regime" (2013) 19 *New Zealand Journal of Taxation Law and Policy* 301.

[141] The TRA's jurisdiction was recently expanded to hear disputes involving issues charities.

[142] See further Australian Taxation Office, 'Alternative Dispute Resolution (ADR)', <https://www.ato.gov.au/individuals-and-families/your-tax-return/dispute-or-object-to-an-ato-decision/options-for-resolving-disputes/alternative-dispute-resolution-adr> (accessed 14 November 2024).

[143] See the Administrative Review Tribunal Bill 2024, receiving Assent on 3 June 2024. See further Parliament of Australia, 'Administrative Review Tribunal Bill 2024', <https://www.aph.gov.au/Parliamentary_Business/Bills_Legislation/Bills_Search_Results/Result?bId=r7117> (accessed 14 November 2024).

5.6 Summary

New Zealand's response to tax administration reform has been extensive and in many respects has followed or mirrored developments in Australia. Formalising administrative practices, internal reorganisation to better fit service delivery (accompanied by changes to the manner in which compliance is encouraged), have been the early developments. Drawing upon the gains and enhanced ability provided through digitalisation, Inland Revenue has been able to facilitate real-time receipt of information reporting and payments as it finalised its seven-year BT project. Without the BT project, there is no doubt that Inland Revenue's information system could 'fall over' at any time. The digitalisation process enabled Inland Revenue, like the ATO, to be nimble during the height of the Covid-19 pandemic, with Inland Revenue basing almost all interactions through the myIR and tax agent portals. One disappointing side effect has been the failure by the government and Inland Revenue to ensure that the digital divide has been closed.

Where New Zealand has failed to undertake much needed tax administration reform is to embrace genuine ADR, through Inland Revenue's resistance to recommend that mediation and possibly other forms of ADR be available to taxpayers. With the ongoing developments in technology, including generative AI, the future will no doubt bring further significant developments as the risks increase of unauthorised data access, identity fraud, and a lack of trust in whether communications are genuine, necessitating further legislative and administrative reforms.

6. CONCLUSIONS

Over the past four decades, like Australia, the New Zealand tax system has experienced very significant changes. Over that time there have been periods of extensive reform activity, instigated through prominent politicians, such as Roger Douglas in the 1980s, and by several tax working groups. These include reviews undertaken on average every eight to nine years, many of which have led to further tax reform.[144] The guiding principles have varied, but typically have included equity, efficiency, simplicity, coherence, as well as incorporating developments internationally. Indeed, for a brief period there was a set of legislated principles set out in the *Taxation Principles Reporting Act 2023*, prior to its repeal in December 2023. Major new taxes were introduced, including FBT and GST, and significant new administrative processes (penalties and dispute resolution, to name two), international tax regimes, and numerous base protection measures. Much of this was premised on New Zealand's BBLR model. However, from the 1990s onwards, BBLR has been afforded little more than lip service as the New Zealand tax base remains narrow through the absence of taxation of any form of wealth. Most recently the base erosion and profit shifting (BEPS) measures developed by the OECD are indicative of how New Zealand operates in a global economy and needs to respond as such. The reform has usually been developed through consultative means via the GTPP, although in more recent years, governments have largely abandoned this approach.

[144] See Sawyer, above n 1. Over the last 40 years, various tax reviews reported to governments in 1982, 1994, 1986-1998, 2001, 2010 and 2019.

Extensive effort, like that in Australia, has been to simplify processes and compliance obligations. This includes a moderately successful tax law rewrite project and streamlining of taxpayer interactions with Inland Revenue. This approach has been facilitated by increased reliance on digitalisation and the successful implementation of New Zealand's largest IT project through the BT project. Perhaps the most successful tax reform was the creation of the world-leading GST in the 1980s, at least from the perspective of efficiency and relative simplicity. However, the failure over time to recognise the regressive impact of the GST has severely affected many of the lower-income earners in New Zealand. Inland Revenue has shown that it can be nimble and adapt to changes in the environment, both domestically and internationally, becoming a leading tax administration agency globally. Nevertheless, it has resisted facilitating an environment that is more understanding of the challenges taxpayers face, such as through arguing against the use of ADR in tax disputes.

In summary, the New Zealand story with respect to tax reform over the last 40 years parallels the Australian story presented by Tran-Nam.[145] This is certainly no coincidence as policy-makers and governments in the two countries frequently meet and share ideas and proposals. That said, Australia and New Zealand have in numerous instances decided to take different paths with respect to their tax reform, tax mix and components of their respect tax administration processes.

[145] Tran-Nam, above n 2.

eJournal of Tax Research (2025) vol. 23, no. 1, pp.134-161

The democratisation of international taxation: stemming aggressive tax practices for economic development

Rodney Brown* and Kerrie Sadiq**

Abstract

On 22 November 2023, the groundwork was laid for a new United Nations (UN) Tax Convention, paving the way for a shift in leadership in international tax policy away from the OECD and towards a democratised approach that would give developing nations a greater voice in addressing aggressive tax practices and profit shifting. The move will also likely lead to a greater emphasis on sustainable development goals, which have the largest impact on the Global South, where strategies are needed to improve health and education, reduce inequality, and spur economic growth. Concurrently, it is well documented that a significant form of revenue for developing nations is taxation. However, the collection is generally lower than in developed nations. Further, increasing revenue from the corporate income tax base is the most realistic approach to aid economic development through the tax system. Aggressive tax practices are one cause of low corporate tax revenue collection. This article considers the most common practices multinational entities (MNE) use to shift profits to low- or no-tax jurisdictions. Noting that transfer pricing is a fundamental source of profit shifting, the article discusses the benefits of an alternative model known as global formulary apportionment. In doing so, the advantages of its adoption for developing nations are discussed. The article then undertakes an empirical analysis using publicly available data contained in country-by-country reports to determine the effects of a formulary apportionment model on developing nations. The study specifically investigates the potential increases or decreases in revenue collected using different apportionment formulas. Data contained in publicly available country-by-country reports are relied upon to estimate the likely revenue effects of these different formulas. The article also demonstrates the likely simplification of such a model and its ability to stem aggressive tax practices such as transfer pricing and thin capitalisation. The article concludes that the UN Tax Convention should propose a global formulary apportionment model for the allocation of profits between jurisdictions. However, it cautions against the use of a formula that fails to adequately take into account the contributions to profits of MNEs that occur through genuine economic activity in developing countries.

Keywords: corporate taxation, formulary apportionment, profit shifting, developing nations

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1. INTRODUCTION

In recent decades, the Organisation for Economic Co-operation and Development (OECD) has been seen as the leading global body tasked to design a cohesive international tax regime. In particular, since 2013, it has led a program of international tax reform to address base erosion and profit shifting (BEPS). However, since the inception of the BEPS program of reform, there has been discontent among a broader group of nations that view the OECD as a developed nations club that focuses on its own interests. Despite such initiatives as the OECD Inclusive Framework,[1] which is designed to include any nation that wishes to join, dissatisfaction with OECD reforms remains. Frustration with a lack of progress in stemming aggressive tax practices by multinational entities, combined with an ongoing view that any reforms that have been implemented benefit developed nations to a greater extent than the Global South, led to action at the United Nations.

On 22 November 2023, the groundwork was laid for a new United Nations Tax Convention, paving the way for a shift in leadership in international tax policy away from the OECD and towards a democratised approach that would give developing nations a greater voice.[2] On that date, the UN General Assembly adopted a resolution to begin the process of establishing a framework tax convention. It is suggested that the move will likely lead to a greater emphasis on sustainable development goals, which have the largest impact on the Global South,[3] where strategies are needed to improve health and education, reduce inequality, and spur economic growth.

A fundamental objective of the proposed UN Tax Convention is to establish an 'inclusive, fair, transparent, efficient, equitable, and effective international tax system for sustainable development, with a view to enhancing the legitimacy, certainty, resilience, and fairness of international tax rules'.[4] It is well documented that a significant form of revenue for developing nations is taxation and that the collection is generally lower than in developed nations.[5] Further, increasing revenue from the corporate income tax base is the most realistic approach to aid economic development through the tax system. As evidenced by the BEPS program of reform, aggressive tax

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[1] OECD, 'Base Erosion and Profit Shifting (BEPS)', <https://www.oecd.org/en/topics/policy-issues/base-erosion-and-profit-shifting-beps.html>.

[2] United Nations, *Promotion of Inclusive and Effective International Tax Cooperation at the United Nations*, GA Res 78/230, UN Doc A/C.2/78/L.18/Rev.1 (Revised Draft, 15 November 2023); Final Resolution: United Nations, *Promotion of Inclusive and Effective International Tax Cooperation at the United Nations*, A/Res/78/230 (Final Resolution, Adopted on 22 December 2023) ('*Promotion of Inclusive and Effective International Tax Cooperation*') <https://financing.desa.un.org/sites/default/files/2024-01/A.RES_.78.230_English.pdf>.

[3] The Global South broadly comprises Africa, Latin America and the Caribbean, Asia (excluding Israel, Japan, and South Korea) and Oceania (excluding Australia and New Zealand).

[4] United Nations, *Chair's Proposal for Draft Terms of Reference for a United Nations Framework Convention on International Tax Cooperation*, UN Doc A/AC.295/2024/L.4 (adopted by the Ad Hoc Committee to Draft Terms of Reference for a United Nations Framework Convention on International Tax Cooperation, 16 August 2024).

[5] See, for example, International Monetary Fund (IMF), *Corporate Taxation in the Global Economy* (2019); United Nations Conference on Trade and Development (UNCTAD), *Economic Development in Africa Report 2020: Tackling Illicit Financial Flows for Sustainable Development in Africa* (2020); Tax Justice Network, *State of Tax Justice 2023* (2023); Antonio Cascais, 'Chasing Africa's Tax Dodgers', *Deutsche Welle* (17 June 2021) <https://www.dw.com/en/africas-problem-with-tax-avoidance/a-48401574> (accessed 10 January 2025).

practices are a significant cause of low corporate tax revenue collection.[6] In particular, the practices of transfer pricing and excessive debt loading (thin capitalisation) are major causes of profit shifting from the true location of economic activity, often where that activity is in developing countries.

This article considers whether the UN Tax Convention proposal should include a formulary apportionment model for profit allocation of multinational entities (MNEs) by empirically testing the effects of this alternative model on developing nations. It does so to investigate the potential increases or decreases in revenue collected using different apportionment formulas. Data contained in publicly available country-by-country reports (CbCRs) are relied upon to estimate the likely revenue effects of these different formulas. The article also demonstrates the likely simplification of such a model and its ability to stem aggressive tax practices such as transfer pricing and thin capitalisation. In doing so, it first adds to the literature on the suitability of a global formulary apportionment approach for developing nations. Second, it builds on prior empirical studies that attempt to quantify the effects of global formulary apportionment on tax revenues at country level and arguably provides methodological improvements due to recently available data.

Following this introduction, section 2 of this article discusses the potential role of the UN tackling aggressive tax practices and ensuring developing countries are not net losers in any reform. Section 3 then highlights the most common practices of MNEs that enable these aggressive tax practices to continue, while section 4 provides an alternative model known as global formulary apportionment. Taking into account the required design elements of a formulary apportionment model, section 5 provides a discussion of the aspects that would need to be developed for a UN Model Tax Convention. Noting that global formulary apportionment is arguably a theoretically superior model, section 6 investigates through an empirical study, whether developing countries would be net winners under such a model and what formula is likely to produce such an outcome. Finally, in section 7, the article concludes that the UN Tax Convention should propose a global formulary apportionment model for the allocation of profits between jurisdictions. However, it cautions against the use of a formula that fails to adequately take into account the contributions to profits of MNEs that occur through genuine economic activity in developing countries.

2. THE ROLE OF THE UNITED NATIONS IN DEVELOPING AN INCLUSIVE TAX MODEL

For nearly a century, the design of international tax policy has been dominated by powerful developed countries through the international body known as the OECD.[7] After the Second World War, a more inclusive international body, the UN, attempted to set international tax rules suitable for all member states.[8] However, initiatives failed in 1954 when the UN discontinued its fiscal committee, leaving the role of developing international tax policy to the OECD.[9] The resulting design of the regime was one that

[6] OECD, BEPS Actions, BEPS 2015 Final Reports, <https://www.oecd.org/tax/beps/beps-actions/>.
[7] Peter Dietsch and Thomas Rixen, 'Global Tax Governance: What It Is and Why It Matters' in Peter Dietsch and Thomas Rixen (eds), *Global Tax Governance: What Is Wrong with It and How to Fix It* (ECPR Press, 2016) 1.
[8] Sunita Jogarajan, *Double Taxation and the League of Nations* (Cambridge University Press, 2018).
[9] Wouter van de Klippe, 'The Global South Is Fighting for a Voice in Global Tax Rules', *Center for International Policy* (28 February 2024) <https://internationalpolicy.org/publications/the-global-south-is-fighting-for-a-voice-in-global-tax-rules/> (accessed 11 January 2025).

represented the interests of OECD members, a small group of wealthy nations that excluded a large part of the global community.[10] While discontent was evident among developing countries and partially addressed by the OECD with its more recent Inclusive Framework, the lack of genuine reform to address aggressive tax practices by MNEs ultimately led to frustrations and calls for action to be undertaken at the UN.[11] It has been suggested that after a decade of OECD work on its BEPS agenda, the package falls well short of establishing effective and fair solutions for all countries, especially developing nations.[12] As a result, in 2023, the UN once more formalised its position on the design of an international tax system that represents all members. This process, which began with the UN tax resolution, sent a clear message to the world – developing countries would no longer play an ancillary role in the design of a global tax regime fit for the 21st century.

The UN tax resolution, entitled 'Promotion of Inclusive and Effective International Tax Cooperation at the United Nations', led by Nigeria, received support from 125 countries, with 48 countries opposing the resolution and a further nine countries abstaining from voting.[13] The latter two categories were predominantly comprised of OECD member countries such as Australia, Canada, the United States, the United Kingdom, and European Union members. These countries made it clear that maintaining the status quo was the preferred option.[14] Figures suggest that those who voted against the resolution are responsible for three-quarters of all countries' losses to tax havens yet represent only 15 per cent of the global population, in contrast to those countries that voted in favour of the resolution, which represent 80 per cent.[15]

At the outset, the UN tax resolution recognised the importance of ensuring the international tax regime is 'fully inclusive and more effective, both in procedural and substantive terms'.[16] It did so in the context of the 'corrosive effect that aggressive tax avoidance and tax evasion have on trust, the social compact, financial integrity, the rule of law and sustainable development, affecting the poorest and most vulnerable'.[17] The aim of the resolution is to ultimately develop a UN framework convention on international cooperation to achieve the goal of a fully inclusive and more effective international tax regime that helps to achieve the 2030 Agenda for Sustainable

[10] Linda Brosens and Jasper Bossuyt, 'Legitimacy in International Tax Law-Making: Can the OECD Remain the Guardian of Open Tax Norms?' (2020) 12(2) *World Tax Journal* 313, 362.
[11] Afton Titus, 'The Role of the United Nations in Ensuring Equitable Tax Policies for Developing Countries' (2025) *Journal of International Economic Law* (advance).
[12] Sol Picciotto, Muhammad Ashfaq Ahmed, Alex Cobham, Rasmi Ranjan Das, Emmanuel Eze and Bob Michel, *Beyond the Two Pillar Proposals: A Simplified Approach for Taxing Multinationals*, South Centre Tax Cooperation Policy Brief No 36 (26 October 2023) 2.
[13] United Nations, 'Second Committee Approves Nine Draft Resolutions, Including Texts on International Tax Cooperation, External Debt, Global Climate, Poverty Eradication' (Meetings Coverage, 22 November 2023) <https://press.un.org/en/2023/gaef3597.doc.htm>.
[14] See, for example, a discussion on Australia's approach: Kerrie Sadiq and Richard Krever, 'Why Is Australia Helping to Block a Move to Tax Multinational Corporations Properly?', *The Conversation* (8 April 2024) <https://theconversation.com/why-is-australia-helping-to-block-a-move-to-tax-multinational-corporations-properly-219305>.
[15] Mark Bou Mansour, '"No" Voters on UN Tax Reform Enable 75% of Global Tax Abuse', *Tax Justice Network* (23 November 2023) <https://taxjustice.net/press/no-voters-on-un-tax-reform-enable-75-of-global-tax-abuse/>.
[16] United Nations, *Promotion of Inclusive and Effective International Tax Cooperation*, above n 2, 1.
[17] Ibid.

Development and its 17 goals,[18] ensuring a balance of the three dimensions of sustainable development: the economic, social and environmental.[19]

In a significant step forward, on 16 August 2024, the ad hoc committee to draft terms of reference for a UN framework convention on international tax cooperation concluded its second session by approving a proposal containing those draft terms.[20] Again, the vote in favour of the terms of reference, totalling 110, was largely made up of developing nations, with 44 nations abstaining and eight voting against it, including Australia, Canada, Israel, Japan, New Zealand, the Republic of Korea, United Kingdom, and the United States.[21] The document entitled 'Chair's Proposal for Draft Terms of Reference for a United Nations Framework Convention on International Tax Cooperation', [22] establishes a robust framework for the objectives, principles, commitments, and capacity-building considerations for the framework convention. In line with a democratised approach, the terms of reference propose that, in setting the objectives, the framework should:

> 'a. Establish fully inclusive and effective international tax cooperation in terms of substance and process;
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> b. Establish a system of governance for international tax cooperation capable of responding to existing and future tax and tax-related challenges on an ongoing basis;
>
> c. Establish an inclusive, fair, transparent, efficient, equitable, and effective international tax system for sustainable development, with a view to enhancing the legitimacy, certainty, resilience, and fairness of international tax rules, while addressing challenges to strengthening domestic resource mobilization'.[23]

The terms of reference also provide that commitments to achieve these objectives include the fair allocation of taxing rights, including equitable taxation of MNEs, and international tax cooperation approaches that will contribute to the balanced and integrated achievement of sustainable development in its three dimensions: economic, social, and environmental.[24] In doing so, the terms of reference make explicit reference to the overarching objectives of the 17 Sustainable Development Goals.

On 27 November 2024, the 2nd Committee of the UN General Assembly passed a resolution that included the adoption of the Terms of Reference for a new Framework Convention on International Tax Cooperation and two early protocols. A similar pattern to previous voting ensued with 125 Member States voting in favour, 46 abstaining, and

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[18] Ibid 4.
[19] United Nations, 'Transforming Our World: The 2030 Agenda for Sustainable Development', <https://sdgs.un.org/2030agenda>.
[20] Eileen Travers, 'Why the World Needs a UN Global Tax Convention', *UN News* (16 August 2024), <https://news.un.org/en/story/2024/08/1153301>.
[21] Ibid.
[22] United Nations, *Chair's Proposal for Draft Terms of Reference for a United Nations Framework Convention on International Tax Cooperation*, UN Doc A/AC.295/2024/L.4 (adopted by the Ad Hoc Committee to Draft Terms of Reference for a United Nations Framework Convention on International Tax Cooperation, 16 August 2024).
[23] Ibid 2.
[24] Ibid 3.

9 voting against it.[25] UN Member States will begin negotiating the text of the UN Tax Convention and the two early protocols in February 2025.[26] Negotiations will be ongoing with three substantive sessions per year conducted by 'an open-ended intergovernmental negotiating committee engaging all Member States'.[27] It is unknown exactly what the UN tax convention will contain and what the models of international taxation will look like. However, the cohesive and inclusive nature of the work done to date suggests that meaningful changes are likely to be on the agenda.[28] The UN itself has made it clear that it wishes to become the global leader in tax reform to represent the majority of nations and the world's population.[29] It has done so in the context of taxing MNEs to ensure they pay their fair share and that additional revenues are collected by poorer countries.

The UN, in its endeavours to redesign the international tax system has stated that its 'global tax convention aims to ensure that large multinationals pay their fair share of taxes, regardless of where they operate, and is expected to generate significant additional tax revenues for many countries, especially those in the Global South'.[30] This new convention is likely to represent an historic and major shift in the approach to international tax.[31] The overarching objective will be to succeed where the OECD's BEPS program of reform has failed. This means addressing the fundamental flaws in the current regime and introducing a system that works for all and is fit for the 21st century. The question then becomes one of what this new regime should look like to achieve such goals. In the next section of this article, the current aggressive tax planning strategies adopted by MNEs are outlined to demonstrate the flaws in the current regime that need to be overcome.

3. CURRENT AGGRESSIVE TAX STRATEGIES

There is no doubt that significant global tax revenues are lost to aggressive tax planning strategies adopted by MNEs leading to base erosion and profit shifting. The Tax Justice Network estimates that USD 480 billion is lost each year because of global tax evasion.[32] Similarly, Cobham and Janský estimate the scale of global base erosion and profit shifting to be approximately USD 500 billion,[33] while Crivelli and co-authors estimate the loss to be approximately USD 650 billion.[34] Tax Justice Network findings indicate that approximately USD 47 billion per year, or 10 per cent, is attributed to lower-income countries. In numerical terms, this number is significantly smaller than the global losses of more developed nations. However, proportionally, losses by lower-income countries

[25] United Nations, 'Concluding Its Session, Second Committee Approves 4 Resolutions, 2 Decisions, including Texts on Tax Cooperation, Affordable Energy Access' (Meetings Coverage, 27 November 2024) <https://press.un.org/en/2024/gaef3614.doc.htm>.
[26] United Nations, 'Intergovernmental Negotiations for UN Framework Convention on International Tax Cooperation', <https://financing.desa.un.org/ru/node/6356>.
[27] Ibid.
[28] Van de Klippe, above n 9.
[29] United Nations, 'Why the World Needs a UN Global Tax Convention' (16 August 2024) <https://www.un.org/en/desa/why-world-needs-un-global-tax-convention>.
[30] Travers, above n 20.
[31] United Nations, 'Why the World Needs a UN Global Tax Convention', above n 29.
[32] Tax Justice Network, *State of Tax Justice 2023*, above n 5.
[33] Alex Cobham and Petr Janský, 'Global Distribution of Revenue Loss from Corporate Tax Avoidance: Re-Estimation and Country Results' (2018) 30(2) *Journal of International Development* 206.
[34] Ernesto Crivelli, Ruud De Mooij and Michael Keen, 'Base Erosion, Profit Shifting and Developing Countries' (2016) 72(3) *FinanzArchiv* 268.

represent almost half of their annual public health budgets.[35] Consistent with these findings, Crivelli and co-authors identified non-OECD countries as the biggest losers, with Cobham and Janský suggesting a significant gap between developed and developing economies due to revenue losses being a higher percentage of GDP for lower income nations. For African countries, the loss through tax abuse is greater than the total amount of foreign development aid they receive annually.[36]

Low-income countries are being depleted of tax revenues and are especially exposed to the profit shifting strategies used by MNEs as well as tax competition between jurisdictions. These same countries have limited capacity to address these issues, especially when coupled with increased complexity in implementing and administering OECD reform proposals such as the global minimum tax.[37] A common narrative around the tax evasion affecting lower-income income countries is that poor administrative infrastructure facilitates corruption and fails to address tax evasion and illicit financial flows.[38] This suggests that fault lies with those countries and their lack of ability to stem the flow of taxable profits out of their jurisdictional reach, rather than inherent flaws in the international tax regime as a whole. There is little doubt that many developing countries have inadequate administrative regimes and corruption. However, as evidenced by the OECD work on aggressive tax practices, there are flaws with the design of the global regime for allocating profits to jurisdictions where genuine activity occurs, and profits are generated. By far the most significant issue is the treatment of MNEs, for tax purposes, as if they are made of separate entities rather than a single global unit. By treating an MNE as having separate parts for tax purposes, profits are able to be shifted from one jurisdiction to another through aggressive tax strategies and highly artificial means.

The current international tax regime for allocating profits to domestic jurisdictions for corporate income tax purposes, which has existed for more than a century, is known as the transfer pricing regime, which contains the arm's length requirement for valuing internal transactions. Profits of MNEs are allocated to jurisdictions using what is known as the separate accounting methodology, which treats each MNE subsidiary or branch as a separate unrelated entity for tax purposes.[39] This is contrary to how an MNE operates in practice, where it is viewed as a global entity and one which aims to maximise global profits rather than jurisdiction-specific returns.[40] Because each part of the MNE is treated as a separate entity for tax purposes, cross-border transactions within the MNE need to be recognised and valued. Both double tax agreements[41] and domestic regimes[42] adopt transfer pricing rules that require these transactions to be valued using an arm's length price, determined as if the parts of the MNE are dealing with each other as unrelated third parties on normal commercial terms. Generally, the price is based on

[35] Tax Justice Network, *State of Tax Justice 2023*, above n 5, 13.
[36] Cascais, above n 5.
[37] IMF, above n 5.
[38] Van de Klippe, above n 9.
[39] Rhoda Brown and Lynne Oats, 'Accounting Profits, Tax Profits and Unitary Taxation (Revisited)' [2020] (1) *British Tax Review* 63.
[40] RH Coase, 'The Nature of the Firm' (1937) 4(16) *Economica* 386.
[41] See Article 9 of the OECD Model Tax Convention on Income and on Capital and the OECD Transfer Pricing Guidelines: OECD, *Model Tax Convention on Income and on Capital 2017* (OECD Publishing, 2012) art 9; OECD, *OECD Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations* (OECD Publishing, 2010).
[42] Referred to as 'Transfer Pricing Regimes'.

market values of comparable supplies of goods and services between unrelated entities.[43]

Over the last century, four significant issues have arisen in the application of the arm's length pricing requirement of transfer pricing regimes. First and foremost, the current system was designed in the early 20th century at a time when physical presence was a key feature of MNEs. These businesses expanded from their home country into foreign jurisdictions by physically establishing an office, factory, building site, etc, with capital investment in the jurisdiction, along with the employment of staff and often sales at that location. Many of these MNEs were horizontally integrated with the same functions undertaken in each jurisdiction. However, as time passed, MNEs tended to adopt a vertical business model that has become increasingly integrated, where separate entities across multiple jurisdictions performed different functions, depending on where it was cost-effective to do so. The tax system has simply not been able to keep pace with the development of global business.[44] Developing countries provided cheap labour and often, large markets. This initially introduced complexities into the transfer pricing regime as often it was difficult to value the transactions between vertical parts of the entity. More recently, this issue was compounded by modern business practices where a physical presence is no longer necessary.

A second challenge to the current international tax regime is the difficulty of valuing internal transactions, especially those that involve intangible assets and the provision of services such as marketing and advertising.[45] A determination of an arm's length price is one based on comparable transactions and requires an analysis of the functions, assets, and risk of the transaction, which, in practice, is highly complex and costly and places constraints on developing nations.[46] For developing nations, it is often extremely difficult to determine a comparable price and therefore, while it is argued that the OECD Guidelines are followed, resort is had to methods that are administratively simpler.[47] Compounding the problem is the fact that intangible assets are often held in low- or no-tax jurisdictions simply for the purposes of tax planning, with entities in other jurisdictions being charged for their use. Yet, it is impossible to value highly specific intangible assets such as branding logos that are held by MNEs.

Services provided by hubs in foreign jurisdictions established in low-tax jurisdictions and specifically designed to provide support activities are also difficult to value. The arm's length price of these types of transactions has been the source of protracted disputes with tax authorities around the world and creates a disproportional burden in loss of tax revenues and administrative compliance on developing nations. Often, developing countries have neither the skills nor resources to apply the checks required under the OECD transfer pricing approach.[48] As Singh states:

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[43] Amir Pichhadze, 'Transfer Pricing and the Arm's Length Principle After BEPS' (Book Review) [2020] (2) *British Tax Review* 241.
[44] Reuven S Avi-Yonah, 'Globalization, Tax Competition, and the Fiscal Crisis of the Welfare State' (2000) 113(7) *Harvard Law Review* 1573.
[45] Kimberly A Clausing, 'The Effect of Profit Shifting on the Corporate Tax Base in the United States and Beyond' (2016) 69(4) *National Tax Journal* 905.
[46] Vinay Kumar Singh, *Interaction of Transfer Pricing and Profit Attribution: Conceptual and Policy Issues for Developing Countries*, South Centre Tax Cooperation Policy Brief No 3 (August 2018).
[47] Sol Picciotto, 'Is the International Tax System Fit for Purpose, Especially for Developing Countries?' (International Centre for Tax and Development Working Paper 13, September 2013) 24.
[48] Picciotto, above n 47.

> The complexities of FAR- [Functions Performed, Assets Deployed and Risks Assumed] based TP [transfer pricing] and its inherent inability to objectively allocate profits among related parties is one of its most significant limitations from the perspective of developing countries, since it can create potential avenues for subjective application by taxpayers and tax authorities according to their respective objectives of tax minimization and tax maximization, leading to frequent disputes and tax litigation.[49]

The digitalisation of the economy poses a third challenge to the current international tax regime and has been a driving force in many of the global tax reforms over the last decade.[50] No longer is an MNE's physical presence in the form of an office, a factory or a shopfront, in a specific jurisdiction necessary to generate profits. Rather, it is the consumers who are in the jurisdiction that are driving the MNE's sales and therefore revenue. The lack of need for a physical presence leads to the fourth significant challenge to the current international tax regime, being a disconnect between the jurisdiction where the profits of an MNE are recognised for tax purposes and where the activities that generate those profits are located. The OECD recognises this problem which it refers to as the location of the economic activity or the real source of income, which is where activities such as sales take place, where the risk is assumed, and where value, for example, though manufacturing, is added.

While transfer pricing is the predominant way that MNEs are able to shift profits from high-tax jurisdictions to low- or no-tax jurisdictions, a second related means of doing so is through excessive debt loading or what is known as thin capitalisation.[51] This occurs where one part of the MNE, often the parent company, lends money to a subsidiary thereby creating debt rather than investing equity. The outcome is that the subsidiary (borrower) then makes interest payments to the parent company (lender), which attracts a tax deduction in the borrower's jurisdiction rather than profits being taxed and paid as a dividend to the parent company. It is a well-known and common strategy used by MNEs.[52] Not only does this shift profits from a high-tax country to a low- or no-tax country but litigated matters have revealed that, due to mismatch rules, this can result in an interest deduction in one jurisdiction without the interest being recognised as income in another jurisdiction.[53] Further compounding this tax planning strategy is the interest rate at which the money is lent, often at a rate that is advantageous to the MNE and different from the rate at which the parent company has borrowed the money on the basis that the arm's length price is what the subsidiary could borrow the money for. Studies suggest that the issue of excessive debt loading may be greater for developing countries with a finding that these nations are more prone to tax-induced

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[49] Singh, above n 46, 6.
[50] OECD, BEPS Actions, BEPS 2015 Final Reports, <https://www.oecd.org/tax/beps/beps-actions/>.
[51] For a discussion on the current OECD recommended model for addressing excessive debt loading, see OECD, *Limiting Base Erosion Involving Interest Deductions and Other Financial Payments, Action 4 – 2015 Final Report* (OECD Publishing, 2015).
[52] See, for example, Lars P Feld, Jost H Heckemeyer and Michael Overesch, 'Capital Structure Choice and Company Taxation: A Meta-Study' (2013) 37(8) *Journal of Banking and Finance* 2850; Stefan Goldbach, Jarle Møen, Dirk Schindler, Guttorm Schjelderup and Georg Wamser, 'The Tax-Efficient Use of Debt in Multinational Corporations' (2021) 71 *Journal of Corporate Finance* 102119.
[53] *Chevron Australia Holdings Pty Ltd v Federal Commissioner of Taxation* (2017) 251 FCR 40.

profit shifting.[54] One possible explanation given is the limited capacity of these countries to enforce rules that prevent such practices.[55]

Ultimately, the current transfer pricing regime has an inherent bias in favour of wealthy and low-tax jurisdictions and can be utilised by MNEs to shift profits, especially those MNEs that are large and hold valuable intangible assets.[56] It is these same MNEs who are residents of developed, high-income countries who support the ongoing use of the arm's length standard, a standard that, due to its administrative complexity and cost, cannot be adequately enforced by developing nations.[57] The current system is both expensive and time-consuming for administrators and taxpayers alike[58] and is becoming increasingly complex through the introduction of new reforms contained in the ongoing work of the OECD through its BEPS program.[59] Many developing countries had little in the way of anti-avoidance regimes prior to joining the OECD's Inclusive Framework and only implemented transfer pricing regimes in the last decade, with some still not having enacted domestic legislation. To this extent, as of 2019, approximately half of sub-Saharan Africa did not have any form of domestic transfer pricing rules, with the result that MNEs cannot be challenged by local authorities.[60]

The OECD, by its own admission, recognises that although BEPS affects all countries, developing economies suffer disproportionately from the practice due to their heavy reliance on corporate income tax, particularly from multinational enterprises.[61] It also acknowledges that 'engaging developing countries in the international tax agenda is vital, both to help address their specific needs and to ensure they can effectively participate in the process of standard-setting on international tax'.[62] At the same time, the OECDs reform measures have done little in the way of stopping transfer pricing and excessive debt-loading practices of MNEs that disproportionally affect developing countries. Given the failure of the OECD to make substantive reforms to the international tax regime to address these issues, the question remains as to what the UN Tax Convention could propose. The next section of this article suggests that global formulary apportionment may offer a solution that not only benefits all nations but in particular sees those benefits flow to developing countries.

4. GLOBAL FORMULARY APPORTIONMENT: AN ALTERNATIVE MODEL

The significant tax revenue losses and impact of the fundamental flaws in the current regime that continues to be advocated for by the OECD and its Member States suggest that lower-income countries may be more willing to engage in a paradigm shift that would curtail many of the aggressive tax practices of MNEs and provide greater tax

[54] Clemens Fuest, Shafik Hebous and Nadine Riedel, 'International Debt Shifting and Multinational Firms in Developing Economies' (2011) 113(2) *Economics Letters* 135.
[55] Ibid.
[56] Joel Cooper, Randall Fox, Jan Loeprick and Komal Mohindra, *Transfer Pricing and Developing Economies: A Handbook for Policy Makers and Practitioners* (World Bank, 2016).
[57] Yariv Brauner, 'Between Arm's Length and Formulary Apportionment' in Richard Krever and François Vaillancourt (eds), *The Allocation of Multinational Business Income: Reassessing the Formulary Apportionment Option* (Kluwer Law International, 2020) 209.
[58] Picciotto, above n 47.
[59] See IMF, above n 5.
[60] UNCTAD, above n 5.
[61] OECD, 'Base Erosion and Profit Shifting (BEPS)', above n 1.
[62] Ibid.

revenues to all.[63] While the catch-cry of the OECD BEPS program of work has been to equip governments with rules and instruments to address tax avoidance, ensuring that profits are taxed where economic activities generating them take place and where value is created,[64] this is not possible under the current separate accounting, arm's length regime. The treatment of MNEs as having separate parts for tax purposes is the fundamental reason there is the need for the BEPS reform agenda. Therefore, maintaining the current system fails to address this issue, and in order to tax MNEs in accordance with the economic reality that they operate as a single global entity, a tax system needs to recognise this.

A proposed alternative to the current arm's length pricing regime is global formulary apportionment, which comprises a unitary taxation system where profits are allocated to jurisdictions based on economic factors attributable to the creation of profits for the MNE.[65] This system would tax MNEs in every country where there is a significant economic presence and be based on real activities such as sales in those countries.[66] At the outset, global formulary apportionment has the advantage of starting from a position of reality that treats MNEs in accordance with their adopted business model in that they operate as a single firm to maximise global profits.[67] That is, all parts of the MNE are captured as a unitary entity that is commonly owned and controlled. It also reflects the economic integration that has and will continue to occur with modern MNEs that operate in a highly complex manner.[68] All legal entities within an MNE are treated as one and global pre-tax profits are consolidated. A globally agreed method of determining consolidated profits for tax purposes, including the scope of the group and scope of activities, ensures that all profits are captured and can then be allocated under a suitably designed formula.[69]

These globally agreed aggregated profits are allocated to jurisdictions using allocation keys contained in a globally agreed predetermined formula. In line with the notion that profits should be taxed in the location of economic activity, it is recognised that production and sales are essential elements to the generation of profits, with both observable input and output factors generally making up the formula to be used. Supply and demand are balanced with sales, representing an output destination factor, and assets and labour, representing production or input, place of origin factors. As such, sales, physical assets, and labour are the most commonly used allocation keys. Once the formula is applied and profits are allocated to the jurisdiction where economic activity

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[63] Picciotto et al, above n 12, 2.
[64] OECD, 'Base Erosion and Profit Shifting (BEPS)', above n 1.
[65] Reuven S Avi-Yonah, Kimberly A Clausing and Michael C Durst, 'Allocating Business Profits for Tax Purposes: A Proposal to Adopt a Formulary Profit Split' (2009) 9(5) *Florida Tax Review* 497; Sol Picciotto, 'Towards Unitary Taxation: Combined Reporting and Formulary Apportionment' in Thomas Pogge and Krishen Mehta (eds), *Global Tax Fairness* (Oxford University Press, 2016) 221 ('Towards Unitary Taxation'); Richard Krever and François Vaillancourt (eds), *The Allocation of Multinational Business Income: Reassessing the Formulary Apportionment Option* (Kluwer Law International, 2020); Sol Picciotto and Jeffery M Kadet, 'The Transition to Unitary Taxation' (2022) 108(4) *Tax Notes International* 453.
[66] Picciotto et al, above n 12, 2.
[67] 'Introduction' in Sol Picciotto (ed), *Taxing Multinational Enterprises as Unitary Firms* (Institute of Development Studies, 2017) 1.
[68] IMF, above n 5, 31.
[69] Kerrie Sadiq, 'A Framework for Assessing Business Sector Formulary Apportionment' in Richard Krever and François Vaillancourt (eds), *The Allocation of Multinational Business Income: Reassessing the Formulary Apportionment Option* (Kluwer Law International, 2020) 185.

has occurred, national sovereignty is maintained as individual countries determine the effective corporate tax rate to be applied.[70]

Formulary apportionment models are neither new nor novel and have been used for many decades in some jurisdictions to allocate subnational profits.[71] Most commonly cited are the models in place in the United States and Canada, where different formulas are applied depending on state/province and industry. Formulary apportionment has also been incorporated into the European Commission's various corporate tax proposals for use within the EU. Initially, formulary apportionment was part of the original *Common Consolidated Corporate Tax Base* (CCCTB) proposal in 2011[72] and the modified two-stage approach in 2016.[73] In 2021, the CCCTB proposal was withdrawn and replaced with the *Business in Europe: Framework for Income Taxation* (BEFIT) proposal.[74] BEFIT contains many of the key features of a global formulary apportionment model where the profits of EU members of an MNE are consolidated into a single tax base and then allocated to Member States using a formula that better reflects the digitalised economy but still incorporates key factors including sales (by destination), assets (including intangibles) and labour (employee numbers and payroll costs). The latest EU proposal, released in September 2023, is an updated BEFIT model designed to reduce the burden of tax compliance for large MNEs operating in the EU.[75] This updated proposal includes a new single set of rules to determine the tax base of MNEs (applying a common set of tax adjustments to financial accounting statements); tax bases of all members of a group to be aggregated into one single tax base; and allocation of a percentage of the aggregated tax base to each group member based on the average taxable results in the prior three fiscal years. This model, if adopted, will be optional for small MNEs but mandatory for large MNEs (turnover exceeding EUR 750 million) and will operate in parallel to the OECD/G20 Inclusive Framework Two-Pillar solution.[76]

Currently, there is also an element of formulary apportionment in the design of the OECD Pillar One proposal.[77] It focuses on the allocation of taxing rights with new rules transferring some of those rights from home countries to countries in which real business activity occurs irrespective of physical presence. Under the current proposal, as revised in July 2023, for in-scope MNEs, revenue will be sourced to end-market jurisdictions where goods or services are used or consumed by customers. This proposal takes into account residual profit where the relevant measure of profit will be financial accounting income with a small number of adjustments.[78] The share of taxable profit will be determined using the 'fractional apportionment method' involving three steps:

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[70] Subject to the current global minimum tax regime.
[71] Picciotto, 'Towards Unitary Taxation', above n 65.
[72] European Commission, *Proposal for a Council Directive on a Common Consolidated Corporate Tax Base (CCCTB)*, COM(2011) 121/4 (2011) <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52011PC0121>.
[73] European Commission, *Proposal for a Council Directive on a Common Corporate Tax Base (CCCTB)*, COM(2016) 685 final (25 October 2016).
[74] European Commission, *Communication from the Commission to the European Parliament and the Council: Business Taxation for the 21st Century*, COM(2021) 251 final (18 May 2021).
[75] European Commission, *Proposal for a Council Directive on Business in Europe: Framework for Income Taxation (BEFIT)*, COM(2023) 532 final (12 September 2023).
[76] Ibid.
[77] OECD, *Programme of Work to Develop a Consensus Solution to the Tax Challenges Arising from the Digitalisation of the Economy* (OECD Publishing, 2019); OECD, *Statement on a Two-Pillar Solution to Address the Tax Challenges Arising from the Digitalisation of the Economy* (1 July 2021).
[78] See Avi-Yonah, Clausing and Durst, above n 65, for a discussion on a residual profit method.

determine the profit to be divided; select an allocation key; and apply this formula to allocate a fraction of the profit to jurisdictions. The allocation key may include any combination of sales, users, assets and employees. Unfortunately, the current proposal would result in only a small amount of the profits of a select number of MNEs being subject to any apportionment, with most of the profits falling within existing rules.[79]

The overarching arguments for global formulary apportionment are threefold.[80] First, such a system would better align the allocation of profits with an MNE's real economic activity. This would result in corporate tax being paid in the jurisdictions that generate the profits for the entity as a whole rather than the specific parts of the entity based on a legal notion of location. The allocation keys represent value creation, whether through a proxy for production such as labour and capital, or sales. A model that taxes the overall profits of an MNE also results in those profits being taxed once and only once. That is, there is no opportunity for double taxation or less than single taxation. Ancillary to the substantive benefit of ensuring tax revenues are collected in the country where economic activity occurs, an approach that allocates profits based on economic reality has the benefit of providing a more straightforward system for both revenue authorities and MNEs to administer.[81]

Second, global formulary apportionment completely ignores intra-group transactions, thereby removing the fiction of the arm's length price. The need to place a value on internal transfers and charges disappears as only transactions external to the group as a whole are taken into account. Transfer pricing regimes for tax purposes become redundant. Further, depending on the allocation keys used, the ability to shift profits to locations where intangible property is held is removed. Tax liabilities under a formulary apportionment regime are based on global income with that income allocated to locations where real economic activity occurs. The use of low- or no-tax jurisdictions is significantly reduced as very little activity occurs in these locations, and therefore, very little profit would be allocated for the purposes of taxation and there would be no tax savings.[82]

The ability to significantly reduce aggressive tax planning is also coupled with reduced compliance costs for MNEs and administrative costs for revenue authorities. Put simply, formulary apportionment removes the opportunity for profit shifting through such means as transfer pricing and excessive debt loading.[83] The replacement of transfer pricing regimes would mean that audits and complex legal matters are redundant. By its very nature, a formulary apportionment model that is global adopts universal standards such as financial reporting requirements which means that it is much less costly to administer, thereby reducing the disadvantages faced by developing countries that lack the human capital and resources to manage a transfer pricing regime.[84] A lack of revenue authority resources and capacity is well documented as a challenge to developing countries and simplification of tax policies is key to removing constraints faced by these

[79] Picciotto et al, above n 12.
[80] See contributions in Krever and Vaillancourt, above n 65; Sol Picciotto (ed), *Taxing Multinational Enterprises as Unitary Firms* (Institute of Development Studies, 2017).
[81] Picciotto et al, above n 12, 3.
[82] Reuven S Avi-Yonah and Kimberly A Clausing, 'A Proposal to Adopt Formulary Apportionment for Corporate Income Taxation: The Hamilton Project' (University of Michigan Law School Law & Economics Working Papers, 2007); Avi-Yonah, Clausing and Durst, above n 65.
[83] IMF, above n 5.
[84] Brauner, above n 57, 237.

nations.[85] Studies reveal that tax compliance costs in developing countries is also higher.[86] Again, the substantive benefits of reduced base erosion and profit shifting is complemented by reduced complexity and compliance costs.

The third major advantage of a global formulary apportionment regime is that the overall ability of MNEs to shift profits is significantly reduced because allocation keys such as labour and tangible assets represent real activity and investment in a country. These factors would need to be shifted to a jurisdiction to shift profit allocation. This would represent genuine economic activity being shifted, which results in host country tax bases being protected. Countries that offer tax incentives and/or low or no corporate taxes are no longer attractive to MNEs as there is no genuine activity in the location in order to attract an allocation of profits. Countries would only attract the business of MNEs where they offer real investment opportunities such as a workforce with relevant skills along with suitable infrastructure.[87] In doing so, local firms would no longer be at a disadvantage compared to MNEs that can currently take advantage of the ability to shift profits under the current international tax rules. Also contributing to the reduction in profit shifting is the potential transparent nature of formulary apportionment. A global formulary apportionment model shifts the administration for the distribution of profits to be taxed away from the current one-sided MNE approach to a revenue authority, agreement-based approach, potentially operating within treaties.[88]

Global formulary apportionment's broad and underlying benefits apply equally to developed countries and developing countries, the latter in which corporate income tax is essential for the improvement of health and education, the reduction of inequality, and economic growth. The above discussion highlights the fact that formulary apportionment has the ability to stem MNEs' aggressive tax planning strategies adopted through transfer pricing and excessive debt-loading practices. In addition to the substantive benefit of potentially increasing tax revenues, it is argued that formulary apportionment also provides a simplified way of taxing MNEs, thereby reducing administrative costs for revenue authorities. However, while it can be argued that global formulary apportionment is a theoretically superior model for the profit allocation of MNEs, the design elements are not without challenges. The next section of this article considers these challenges.

5. DESIGNING A FORMULARY APPORTIONMENT MODEL

Despite the theoretical attractiveness of global formulary apportionment, arguing that developing countries should advocate for such a model as part of the UN Framework Convention on International Tax Cooperation is fraught with difficulties. A globally adopted formulary appointment regime contains several components that need to be agreed upon: a test for taxable presence; a definition of the tax base to be divided, that is, a globally agreed means of calculating consolidated pre-tax profits; a determination of the allocation keys used to apportion the tax base; and an agreed formula for allocation of a share of those pre-tax profits to the relevant jurisdictions.

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[85] IMF, 'Tax Administration in Developing Countries: Strategies and Tools of Implementation' (Background Paper for the 1988 World Bank World Development Report, 1989).
[86] Wollela Abehodie Yesegat, Jacqueline Coolidge and Laurent Olivier Corthay, 'Tax Compliance Costs in Developing Countries: Evidence from Ethiopia' (2017) 15(1) *eJournal of Tax Research* 77.
[87] Picciotto et al, above n 12, 3.
[88] Brauner, above n 57.

Formulary apportionment would require a move away from the traditional physical presence approach to nexus that gives a country the right to tax, to the adoption of a new nexus for taxing rights. It has already been recognised that the traditional concept of the permanent establishment contained in the current regime is outdated, with proposals that nexus should be based on 'significant economic presence'. A great deal of work has been done on this concept by the OECD in its work on Pillar One[89] and domestic jurisdictions where sales are captured for the purposes of indirect taxes.[90] The most likely approach within a formulary apportionment model is to impose a minimum sales threshold, such as in the Pillar One proposal.[91] However, such factors as the existence of a user base and associated data, the volume of digital content derived from the jurisdiction, billing and collection in local currency or with a local form of payment, the maintenance of a website in a local language, responsibility for the final delivery of goods to customers or other support services (eg, after-sales service, repairs and maintenance), or sustained marketing and sales promotion activities (whether online or not) to attract customers could be used.[92]

A more challenging aspect of global formulary apportionment is the allocation of an MNE's consolidated pre-tax profits. This would also require agreement on the methodology for determining the global consolidated pre-tax profits to be apportioned (the tax base), and the apportionment factors or allocation keys and the formula to be used. The concept of the tax base is generally thought to be relatively simple, with financial accounting standards providing the basis for determining the consolidated group and accounts. Examples of the use of financial accounting standards and the resulting statements are already contained in CbCR models, and are the subject of this study. However, this would not come without challenges such as any adjustments that may need to be made for tax purposes.

The most difficult component of a formulary apportionment model is the formula itself, with the allocation keys and weightings needing to be determined. The allocation keys traditionally included in any formula are assets, employees (payroll and/or number), and sales as these are the factors that are considered to contribute to the profits of an MNE. While each factor contributes to profits, under a formulary apportionment model, any factor used also attracts tax. As such, the consequences of adoption need to be considered. For example, the use of the production factors of capital and labour means that countries with lower tax rates may attract MNEs, and non-tax incentives may be more likely to drive investment. On the other hand, a destination-based sales factor that focuses on demand will have little effect on any investment decision by the MNE. The use of a capital factor also comes with challenges as to what is included. Generally, the inclusion of intangible assets is rejected on the basis that a formula should be designed to allocate profits to the location of physical activity. Tangible assets have a geographical connection with a country on the basis that the assets are required as an

[89] OECD, 'Addressing the Tax Challenges of the Digitalisation of the Economy – Policy Note, as Approved by the Inclusive Framework on BEPS on 23 January 2019' (2019).
[90] Picciotto et al, above n 12, 4.
[91] OECD, 'Multilateral Convention to Implement Amount A of Pillar One', <https://www.oecd.org/en/topics/sub-issues/reallocation-of-taxing-rights-to-market-jurisdictions/multilateral-convention-to-implement-amount-a-of-pillar-one.html>.
[92] Transfer Pricing Specialists, 'OECD Issues a Discussion Paper on Taxation of the Digital Economy', <https://international-tps.com/oecd-issues-a-discussion-paper-on-taxation-of-the-digital-economy/>.

element of production. In contrast, intangible assets may be held in any location without a business rationale beyond reducing taxes.

An employment factor is logical. However, it creates inequities where it is based on payroll alone. Significant wage disparities between jurisdictions may result in a disproportionate share of profits being allocated to countries with high wage rates. An employee factor based on number of employees is important to low-income countries where the labour force is cheap. Prior literature notes that developing countries gain mostly if employment receives a larger weighting in the formula.[93]

Support for formulary apportionment is often based on the premise that it would benefit developing nations by increasing corporate tax revenue and making administration easier.[94] Prior empirical research supports the assertion that global revenue may increase under formulary apportionment due to a reallocation of the tax base away from low- and no-tax jurisdictions and towards high-tax countries, with the potential for distributional effects to be large.[95] The International Monetary Fund (IMF), using aggregate data on US MNEs and firm-level data on global MNEs, has previously provided some observations for the application of formulary apportionment for developing countries.[96] However, results differ significantly based on the datasets, and coverage of developing counties is limited. The IMF found that advanced economies are more likely to gain revenue if apportionment is by value added, payroll or sales, and somewhat less likely to benefit if it is by employment; 'investment hubs' are likely to experience significant reductions in tax base; emerging economies tend to benefit from formulary apportionment, although this is clearest for apportionment by employment or sales, and less so if by value added or payroll; and developing economies may benefit if apportionment is largely by employment.[97]

While there are numerous proposals and logic to the argument that the importance of production factors means that developing countries would benefit, the question remains as to whether and what formula would assist developing nations in increased tax revenue. As noted by the IMF in 2019 little evidence is available to support both the premise that developing countries would be better off and what formula would provide such a benefit.[98] Without empirical evidence that developing nations would, in fact, collect more corporate tax revenue under an allocation model, any proposals remain theoretical. The next section of this article contributes to the literature on the benefits of

[93] Thornton Matheson, Sebastian Beer, Maria Coelho, Li Liu and Oana Luca, 'Formulary Apportionment in Theory and Practice' in Ruud de Mooij, Alexander Klemm and Victoria Perry, (eds), *Corporate Income Taxes Under Pressure: Why Reform Is Needed and How It Could Be Designed* (International Monetary Fund, 2021) 283.
[94] See for example, Sol Picciotto, 'Taxing Multinational Enterprises as Unitary Firms' (International Centre for Tax and Development Working Paper No 53, 2016).
[95] See, for example, Michael P Devereux and Simon Loretz, 'The Effects of EU Formula Apportionment on Corporate Tax Revenues' (2008) 29(1) *Fiscal Studies* 1; James R Hines, Jr, 'Income Misattribution Under Formula Apportionment' (2010) 54(1) *European Economic Review* 108; Alex Cobham and Simon Loretz, 'International Distribution of the Corporate Tax Base: Implications of Different Apportionment Factors Under Unitary Taxation' (International Centre for Tax and Development Working Paper No 27, 2014).
[96] IMF, above n 5, 33.
[97] Ibid.
[98] Ibid 32.

global formulary apportionment for developing countries by empirically testing the redistribution of global profits of MNEs.

6. EMPIRICALLY TESTING FORMULARY APPORTIONMENT

This empirical study aims to assess the effects of a formulary apportionment model on developing nations and investigate potential increases or decreases in revenue collected using different apportionment formulas. The availability of voluntary disclosures under the OECD Action 13 and GRI 207 reporting mechanisms means that it is possible to determine, with some degree of confidence, the country-level effects of a shift to formulary apportionment.

Traditionally, assessing the impact and effectiveness of formulary apportionment has been challenging due to the relative non-accessibility and, specifically, data limitations in relation to both the pre-tax profits and the relevant apportionment factors.[99] While consolidated financial statements provide a level of confidence to stakeholders regarding an MNE's tax position, they do not provide jurisdiction-level tax data and, hence, cannot be used to determine the effects of a formulary apportionment model. However, recent developments in public country-by-country reporting, both voluntary and mandatory, have reduced information asymmetry caused by MNE tax returns and accompanying documents being available only to revenue authorities, and mean that it is now possible to predict the effects of different formulas under a global formulary apportionment model to a reasonable level of accuracy. Prior studies highlight the fact that there has previously been insufficient suitable data to facilitate the comprehensive assessment of formulary apportionment proposals and suggest that it is likely that comprehensive CbCR data would resolve data limitation issues and enable more precise assessments over a wide range of policy scenarios.[100]

Mandatory public disclosure of CbCRs has been a requirement for financial institutions in the EU since 2013,[101] while the Extractive Industries Transparency Initiative means that some MNEs in the extractive industry publicly disclose a CbCR disclosing taxes and payments to governments at a project level.[102] Beyond these mandatory disclosure requirements, numerous MNEs now voluntarily disclose their CbCRs at a more granular level. The most common disclosure mechanisms that provide relevant information are the Global Reporting Initiative (GRI) standards[103] and the public release of CbCRs under the OECD's BEPS Action 13 minimum standards.

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[99] Kerrie Sadiq, Richard Krever and Devika Bhatia, 'International Taxation and the Frustrations of Formulary Apportionment Estimation' (2024) *Journal of Accounting Literature* (advance).

[100] See, for example, Alex Cobham, Petr Janský, Chris Jones and Yama Temouri, 'An Evaluation of the Effects of the European Commission's Proposals for the Common Consolidated Corporate Tax Base' (2021) 28(1) *Transnational Corporations* 29; Ruud De Mooij, Li Liu and Dinar Prihardini, 'An Assessment of Global Formula Apportionment' (2021) 74(2) *National Tax Journal* 431.

[101] European Parliament and Council of the European Union, *Directive 2013/36/EU on Access to the Activity of Credit Institutions and the Prudential Supervision of Credit Institutions and Investment Firms, Amending Directive 2002/87/EC and Repealing Directives 2006/48/EC and 2006/49/EC* [2013] OJ L176/338.

[102] Extractive Industries Transparency Initiative (EITI), *Progress Report 2023*.

[103] See GRI, <https://www.globalreporting.org/>: the Global Reporting Initiative (GRI) has described itself as 'an independent not-for-profit organization that leads a global multi-stakeholder process to develop and refine rigorous yet practical sustainability reporting. Using the GRI Standards, organizations can understand and act on the full range of their impacts. GRI's consistent, comparable and globally applicable standards have become the world's most widely used sustainability reporting standards. The GRI Standards are

Since 2016, large MNEs headquartered in countries implementing the OECD's BEPS minimum standards have been required to submit a non-public CbCR to revenue authorities. Action 13, entitled *Transfer Pricing Documentation and Country-by-Country Reporting*, requires MNEs headquartered in an Inclusive Framework member country with consolidated revenue exceeding EUR 750 million to lodge an annual CbCR with the local revenue authority. The report, containing information on revenues (third-party and related-party), profit (loss) before income tax, income tax paid and accrued, employee numbers, stated capital, retained earnings, and tangible assets, for each jurisdiction in which the MNE operates, is designed to be a transfer pricing risk assessment tool for use by revenue authorities for transfer pricing assessments.[104] While mandatory, these CbCRs are not publicly available. However, consistent with calls for increased voluntary disclosure of corporate tax practices, some MNEs voluntarily disclose this information more broadly.

Beyond the formal OECD reporting requirements, the Global Sustainability Standards Board, an independent organisation providing standards for sustainability and ESG reporting (GRI Standards), provides a global standard for tax transparency. The first global standard for tax transparency, GRI 207 was announced in December 2019 and is widely regarded as global best practice.[105] Unlike the OECD's BEPS Action 13, GRI 207 is specifically designed for public reporting. GRI 207 is effective for reports published on or after 1 January 2021, although earlier adoption was encouraged, and consists of four key disclosures: (i) 207-1 Approach to tax; (ii) 207-2 Tax governance, control and risk management; (iii) 207-3 Stakeholder engagement and management of concerns related to tax; and (iv) 207-4 Country-by-country reporting.

The suitability of the use of this data to determine the consolidated pre-tax profit base and subsequent allocation of those profits across countries using global formulary apportionment has previously been considered, finding that heterogeneity across CbCRs 'inhibits a clean determination of an MNE's consolidated pre-tax profit base and hampers comparisons across firms'.[106] Of significance is the 'potential double counting of intra-group transactions, inconsistent treatment of discontinued operations and equity-accounted associates and joint ventures, non-disclosure of items or countries, and differing definitions of disclosure items'.[107]

The starting point for a formulary appointment model is aggregate jurisdiction-level information in the CbCRs. MNEs achieve this in one of two ways: a top-down approach that splits balances in the audited consolidated financial statements into countries of origin and a bottom-up approach that aggregates subsidiary-level financial statements to determine CbCR figures. The first approach incorporates all intra-group transactions that are eliminated in the consolidated financial statements resulting in post-elimination CbCR data. This means there is no double counting of intra-group transactions. The second approach provides data on a pre-consolidated basis and excludes eliminations,

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trusted by thousands of organizations around the world, providing the building blocks for transparent reporting, and helping them to manage risks and opportunities and support strategic decision-making'.

[104] OECD, *Guidance on Transfer Pricing Documentation and Country-by-Country Reporting* (OECD Publishing, 2014).

[105] Global Sustainability Standards Board, *GRI 207: Tax 2019* (Topic Standard, 2019) <https://www.globalreporting.org/>.

[106] Rodney J Brown, Bjorn N Jorgensen and Kerrie Sadiq, 'Revisiting Unitary Taxation with Formulary Apportionment Using Public Country-by-Country Reports' [2024] (3) *British Tax Review* 407, 408.

[107] Ibid.

resulting in the potential for double counting of intra-group revenue and profits such as related-party dividends. To this extent, where MNEs adopt the CbCR recommended approach under the GRI 207 standard, more suitable data is likely to be provided as compared to the OECD Action 13 reports.

Paragraph 2.2.1 of GRI 207-4 specifically requires certain figures in CbCRs to be reconciled with corresponding amounts in audited consolidated financial statements with an explanation for any differences. Third-party revenues, profit/(loss) before tax, tangible assets and cash taxes paid must be reconciled or explained, so the risk of double counting intra-group transactions is removed. The OECD reporting requirements are inconsistent with a reconciliation with financial statements as it is a requirement under this standard that MNEs provide CbCR reporting based on aggregation rather than consolidation.[108] MNEs may provide limited information on eliminations but often without country specific data.

The current study takes advantage of this recently available data and analyses a unique hand-collected data set of 231 CbCRs disclosed by firms that voluntarily report under GRI 207 or disclose their OECD Action 13 CbCR. An online search was conducted to identify voluntary CbCR disclosures using publicly available sources, including members of the European Business Tax Forum (EBTF), B Team endorsing companies, and GRI early adopters.[109] The process identified an initial sample of 90 firms and a total of 333 CbCRs up to 30 June 2024. CbCRs were hand collected, and the information contained therein coded into an Excel spreadsheet. The data recorded consists of the CbCR's location, the reporting framework adopted, whether information was provided regarding the exclusion of related-party dividends from revenues and pre-tax profits, the items disclosed, and whether CbCR totals for key disclosure items reconciled to the corresponding items in the annual report.

To account for the potential double counting of intra-group transactions, the sample was restricted to those CbCRs where the total profit before tax figure reconciles to the corresponding amount in the Consolidated Income Statement within +/- 10 per cent. This reduces the initial sample by 15 firms and 102 CbCRs giving a final sample of 231 CbCRs voluntarily disclosed by 75 firms across the 2015-2023 period. The firms are headquartered in 16 countries and operate in 14 different industries. By restricting the sample to these firms, the chance of counterfactual pre-tax profit estimation errors driven by intra-group transactions as discussed above is minimised. The unitary tax base is defined as the consolidated pre-tax profit/(loss) for financial accounting purposes without adjustments for tax purposes, as this is the only profit figure disclosed in CbCRs. A variety of reporting currencies are observed and so all amounts are converted to EUR millions using average exchange rates.

To estimate the shift in pre-tax profits and tax revenues between countries under a global formulary apportionment model, it is initially necessary to rely on a classification system of developed versus developing countries. While various international organisations such as the World Bank and the UN use their own classification system

[108] The BEPS Action 13 Report and model legislation permits the 'top-down' approach for jurisdictions that allow consolidated reporting for tax purposes: OECD, *Transfer Pricing Documentation and Country-by-Country Reporting, Action 13 – 2015 Final Report* (OECD Publishing, 2015).

[109] Other sources include early GRI adopters (see GRI, 'Universal Standards', <https://www.globalreporting.org/standards/standards-development/universal-standards/>).

and terminology, there is no universally agreed list. For the purposes of this study, both of those lists are relied upon. First, the 2022 World Bank country classifications contained in the UN's *World Economic Situation and Prospects* report were used to categorise countries into four groups: 'high income', 'upper middle income', 'lower middle income', and 'low income' (Appendix 2). [110] These classifications are determined by reference to gross national income (GNI) per capita. Second, the UN classifications system, containing three categories was used, with those categories being 'developed', 'in transition', and 'developing' (Appendix 3).[111] CbCR disclosures are nuanced in that they report data at the jurisdictional level and so there are some jurisdictions that are not included in the World Bank and UN country classifications. Therefore, we classify these jurisdictions so that they align with their nearest neighbour or with the country they have constitutional links with. For example, Guernsey and Jersey are given the same classification as the UK and Monaco is given the same classification as France. Finally, an 'unclassified' category is used to include those countries reported in an 'Other' category in CbCRs. Despite CbCR reporting rules requiring data to be reported at the country level, some firms aggregate countries into an 'Other' group thereby obfuscating the information.

Four different formulas were then tested to estimate the shift in consolidated pre-tax profits and tax revenues from high-income countries to lower-income countries. First, a modified version of the EU's proposed CCCTB multi-factor formula is applied:

$$\hat{}PBT_{i,j,t} = \tfrac{1}{3}*REV\_TP_{i,j,t} + \tfrac{1}{3}*EMP\_NUM_{i,j,t} + \tfrac{1}{3}*AST\_TAN_{i,j,t}$$

PBT is the estimated pre-tax profits/(losses) allocated by firm *i* to country *j* in year *t* while *REV_TP*, *EMP_NUM* and *AST_TAN* are the equally weighted third-party revenues, number of employees and tangible assets recognised by firm *i* in country *j* in year *t*, respectively. The differences between the observed pre-tax profit/(loss) and counterfactual pre-tax profit/(loss) are then calculated. All variables are defined in Appendix 1.

Three additional alternative formulas were then applied to determine the counterfactual PBT:

$$\hat{}PBT_{i,j,t} = \tfrac{1}{2}*REV\_TP_{i,j,t} + \tfrac{1}{2}*EMP\_NUM_{i,j,t}$$

$$\hat{}PBT_{i,j,t} = \tfrac{1}{2}*REV\_TP_{i,j,t} + \tfrac{1}{2}*AST\_TAN_{i,j,t}$$

$$\hat{}PBT_{i,j,t} = \tfrac{1}{2}*EMP\_NUM_{i,j,t} + \tfrac{1}{2}*AST\_TAN_{i,j,t}$$

The results of the reallocation of pre-tax profits using the World Bank country classification are presented in Table 1 (Appendix 4), while the results of the reallocation of pre-tax profits using the UN country classification are presented in Table 2 (Appendix 5).

Contrary to expectations, the results demonstrate that 'high income' (Table 1) and 'developed' (Table 2) countries have a net gain of pre-tax profits using all four formulas, while 'in transition' countries have a net loss using all four formulas, and 'developing' countries *have a net loss of pre-tax profits* using three of the four formulas. Similarly,

[110] United Nations, *World Economic Situation and Prospects 2022* (2022).
[111] These categories are also listed in the UN *World Economic Situation and Prospects* report, ibid.

while 'low income' countries gain pre-tax profits under three of the four formulas, the gains are small relative to the gains for 'high income' and 'lower middle income' countries. Overall, the results do not align with the general expectation that 'developing' countries and 'low income' countries would gain significantly under a formulary apportionment system.

However, upon further investigation, there are 19 nations that are classified as 'developing' countries by the UN yet are classified as 'high income' countries by the World Bank. These 19 nations are Bahamas, Bahrain, Barbados, Brunei, Chile, Hong Kong SAR, Israel, Kuwait, Macau, Oman, Panama, Qatar, Saudi Arabia, Singapore, South Korea, Taiwan, Trinidad and Tobago, United Arab Emirates (UAE), and Uruguay. Many of these jurisdictions are anomalous entrants on the 'developing countries' list. For example, Bahamas, Bahrain, Barbados, Brunei, Hong Kong SAR, Panama, and Singapore are commonly found on tax haven lists used in the empirical tax literature or are low- or no-tax jurisdictions such as Oman and the UAE. Given these anomalies, these 19 countries were reclassified from 'developing' to 'developed' countries.

The adjusted redistribution of pre-tax profits using the UN country classification are presented in Panel A of Table 3 (Appendix 6). The results are more in line with expectations that 'developing countries' stand to benefit from a formulary apportionment system. Specifically, 'developing countries' gain additional pre-tax profits under three of the four formulas ranging from EUR 458 million to EUR 18,030 million representing an increase of 0.4 per cent and 15.3 per cent on the total pre-tax profits of EUR 117,749 million, respectively. The largest gain is generated when using an equal weighting of employee numbers and tangible assets which demonstrates developing countries do better when there is a heavier weighting to real economic factors. Unlike revenues, physical factors are less mobile and hence less manipulatable. The gain in aggregate pre-tax profits of EUR 18,030 million translates to additional total corporate tax revenues of approximately EUR 2,705 million using the recently adopted global minimum corporate tax rate of 15 per cent.[112]

Further, the UN provides an additional classification called 'least developed countries' which is a subset of its 'developing countries' classification (see Appendix 3). The results from estimating the four formulas for this group of countries is presented in Panel B of Table 3. Despite the fact these countries do not have significant activity reported in them in CbCRs (an aggregate pre-tax profit of EUR 3,257 million), they have additional pre-tax profit redistributed to them under three of the four formulas. Specifically, the increases under the first, third and fourth formulas of EUR 1,245 million, 1,887 million, and 2,979 million represent increases of 38.2 per cent, 57.9 per cent and 91.5 per cent, on the total pre-tax profit of EUR 3,257 million, respectively.

7. CONCLUSION

In the real world, MNEs operate as unitary enterprises under a central management and control model in which they aim to maximise global profits, by taking advantage of economic globalisation. Negative externalities are internalised, and synergies are provided. At the same time, activities and markets are located and accessed on a global scale, providing these entities with much greater profits than what would be earned by

[112] This assumes that pre-tax accounting profits are a reasonable proxy for taxable profits.

separate enterprises.[113] Yet, contrary to the business reality, from a legal perspective, and more specifically, currently from a taxing perspective, MNEs lack a unitary corpus. Logically, however, 'each MNE should be taxed on its global profits, with taxing rights allocated to all countries in proportion to that MNE's real activities in each country'.[114] A global formulary apportionment model would achieve this through global consolidated profits of an MNE being allocated to the jurisdiction in which there is a significant economic presence. Each country would maintain national sovereignty around its corporate tax rates which could work in concert with the current global minimum tax of 15 per cent.[115]

To date, the OECD BEPS program of reform has failed to address many of the aggressive tax strategies adopted by MNEs. Previous literature suggests that:

> [t]he only simple and effective way to deliver on the aims of the BEPS project is to tax MNEs in accordance with the economic reality that they operate as unitary enterprises under common ownership and control. This means that they should be taxed in every country where they have a significant economic presence (including sales), based on an apportionment of their total global profits for taxation in proportion to their real economic activities in that country.[116]

The IMF has recognised that formulary apportionment offers a simpler system for developing countries as compared to complex transfer pricing regimes thereby reducing the challenges faced by these nations.[117]

The ideal mechanism for a move towards global formulary apportionment is through a model treaty developed and supported by a global tax body.[118] To date, there is little suggestion that the OECD would be willing to advance such a strategy in any meaningful way. At the UN General Assembly in July 2023, the Report of the Secretary-General on the Promotion of Inclusive and Effective International Tax Cooperation at the United Nations provided a clear statement on the need for a tax regime that works for all jurisdictions, both administratively and in terms of ensuring taxes are paid where economic activity occurs, including through relevant market participation.[119]

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[113] Coase, above n 40.
[114] Picciotto et al, above n 12, 3.
[115] Implemented under Pillar Two of the OECD's program of reform.
[116] Picciotto et al, above n 12, 2.
[117] Juan Carlos Benitez, Mario Mansour, Miguel Pecho and Charles Vellutini, *Building Tax Capacity in Developing Countries* (IMF Staff Discussion Note SDN/2023/006, 2023); IMF, above n 5.
[118] Picciotto et al, above n 12, 2.
[119] United Nations, *Promotion of Inclusive and Effective International Tax Cooperation at the United Nations, Report of the Secretary-General*, UN Doc A/78/235 (26 July 2023) para 12.

8. APPENDICES

Appendix 1: Variable Definitions and Country Classifications

All variables are disclosed in country *j* by firm *i* in year *t.*

Variable	Mnemonic
Revenue – Third Party	REV_TP
Profit/(loss) before tax	PBT
Tangible assets	AST_TAN
Employees – number	EMP_NUM

Appendix 2: World Bank Country Classifications 2022

'High Income': Australia, Austria, Bahamas, Bahrain, Barbados, Belgium, Brunei, Darussalam, Canada, Chile, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong SAR, Hungary, Iceland, Ireland, Israel, Italy, Japan, Kuwait, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Oman, Panama, Poland, Portugal, Qatar, Republic of Korea, Romania, Saudi Arabia, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, Taiwan, Province of China, Trinidad and Tobago, United Arab Emirates, United Kingdom, United States, Uruguay.

'Upper middle income': Albania, Argentina, Armenia, Azerbaijan, Belarus, Belize, Bosnia, and Herzegovina, Botswana, Brazil, Bulgaria, China, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Equatorial Guinea, Fiji, Gabon, Georgia, Guatemala, Guyana, Iraq, Jamaica, Jordan, Kazakhstan, Libya, Malaysia, Maldives, Mauritius, Mexico, Montenegro, Namibia, North Macedonia, Paraguay, Peru, Republic of Moldova, Russian Federation, Serbia, South Africa, Suriname, Thailand, Türkiye, Turkmenistan.

'Lower middle income': Algeria, Angola, Bangladesh, Benin, Bhutan, Bolivia (Plurinational State of), Cabo, Verde, Cambodia, Cameroon, Comoros, Congo, Côte d'Ivoire, Djibouti, Egypt, El Salvador, Eswatini, Ghana, Haiti, Honduras, India, Indonesia, Iran (Islamic Republic of), Kenya, Kiribati, Kyrgyzstan, Lao People's Democratic Republic, Lebanon, Lesotho, Mauritania, Mongolia, Morocco, Myanmar, Nepal, Nicaragua, Nigeria, Pakistan, Papua New Guinea, Philippines, Samoa, Sao Tome and Principe, Senegal, Solomon Islands, Sri Lanka, State of Palestine, Tajikistan, Timor-Leste, Tunisia, Ukraine, United Republic of Tanzania, Uzbekistan, Vanuatu, Viet Nam, Zimbabwe.

'Low income': Afghanistan, Burkina Faso, Burundi, Central African Republic, Chad, Democratic People's Republic of Korea, Democratic Republic of the Congo, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Sierra Leone, Somalia, South Sudan, Sudan, Syrian Arab Republic, Togo, Uganda, Yemen, Zambia.

Appendix 3: United Nations Country Classifications 2022

'Developed': Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States.

'In transition': Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Georgia, Kazakhstan, Kyrgyzstan, Republic of Moldova, Montenegro, North Macedonia, Russian Federation, Serbia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan.

'Developing': Afghanistan, Algeria, Angola, Argentina, Bahamas, Bahrain, Barbados, Bangladesh, Belize, Benin, Bhutan, Bolivia (Plurinational State of), Botswana, Brazil, Brunei Darussalam, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Central African Republic, Chad, Chile, China, Colombia, Comoros, Costa Rica, Cuba, Democratic Republic of the Congo, Congo, Côte d'Ivoire, Democratic People's Republic of Korea, Djibouti, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Fiji, Gabon, Gambia, Ghana, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hong Kong SAR, India, Indonesia, Iran (Islamic Republic of), Iraq, Israel, Jamaica, Jordan, Kenya, Kiribati, Kuwait, Lao People's Democratic Republic, Lebanon, Lesotho, Liberia, Libya, Madagascar, Mauritania, Mexico, Morocco, Malaysia, Malawi, Maldives, Mali, Mauritius, Mexico, Mongolia, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Niger, Nigeria, Oman, State of Palestine, Panama, Papua New Guinea, Pakistan, Paraguay, Peru, Philippines, Qatar, Rwanda, Samoa, Sao Tome and Principe, Saudi Arabia, Senegal, Sierra Leone, Singapore, Solomon Islands, Somalia, South Africa, Republic of Korea, South Sudan, Sri Lanka, Sudan, Suriname, Taiwan Province of China, United Republic of Tanzania, Thailand, Timor-Leste, Togo, Trinidad and Tobago, Tunisia, Türkiye, Syrian Arab Republic, United Arab Emirates, Uganda, Uruguay, Vanuatu, Venezuela (Bolivarian Republic of), Viet Nam, Yemen, Zambia, Zimbabwe.

'Least developed': Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, South Sudan, Sudan, Timor Leste, Togo, Tuvalu, Uganda, United Republic of Tanzania, Yemen, Zambia.

Appendix 4

Table 1: Redistribution of Profits Using Formulary Apportionment: World Bank Country Classifications (EUR million)

Jurisdiction		⅓*REV_TP + ⅓*EMP_NUM + ⅓*AST_TAN	½*REV_TP + ½*EMP_NUM	½*REV_TP + ½*AST_TAN	½*EMP_NUM + ½*AST_TAN
High income:	TO	€147,379	€157,497	€168,771	€139,577
	FROM	(€116,620)	(€128,096)	(€117,911)	(€127,560)
	NET	€30,759	€29,401	€50,859	€12,016
Upper middle income:	TO	€19,642	€22,185	€14,353	€25,436
	FROM	(€34,128)	(€32,297)	(€43,588)	(€29,547)
	NET	(€14,486)	(€10,112)	(€29,235)	(€4,110)
Lower middle income:	TO	€25,290	€24,954	€20,330	€30,884
	FROM	(€17,922)	(€21,629)	(€17,913)	(€14,521)
	NET	€7,368	€3,325	€2,417	€16,363
Low income:	TO	€1,347	€1,132	€1,141	€1,889
	FROM	(€427)	(€1,282)	(€108)	(€11)
	NET	€920	(€150)	€1,034	€1,878
Unclassified:	TO	€0	€0	€0	€0
	FROM	(€24,562)	(€22,464)	(€25,075)	(€26,146)
	NET	(€24,562)	(€22,464)	(€25,075)	(€26,146)
TOTAL		-	-	-	-

Appendix 5

Table 2: Redistribution of Profits Using Formulary Apportionment: United Nations Country Classifications (EUR million)

Jurisdiction		⅓*REV_TP + ⅓*EMP_NUM + ⅓*AST_TAN	½*REV_TP + ½*EMP_NUM	½*REV_TP + ½*AST_TAN	½*EMP_NUM + ½*AST_TAN
Developed:	TO	€137,661	€136,245	€146,089	€133,839
	FROM	(€94,810)	(€106,363)	(€96,936)	(€84,323)
	NET	€42,850	€29,882	€49,153	€49,517
In transition:	TO	€1,450	€1,515	€1,559	€2,711
	FROM	(€8,538)	(€12,297)	(€7,459)	(€7,292)
	NET	(€7,088)	(€10,782)	(€5,900)	(€4,581)
Developing:	TO	€54,548	€68,008	€56,947	€61,235
	FROM	(€65,750)	(€64,644)	(€75,124)	(€80,024)
	NET	(€11,201)	€3,363	(€18,178)	(€18,789)
Unclassified:	TO	€0	€0	€0	€0
	FROM	(€24,562)	(€22,464)	(€25,075)	(€26,146)
	NET	(€24,562)	(€22,464)	(€25,075)	(€26,146)
TOTAL		-	-	-	-

Appendix 6

Table 3: Adjusted Redistribution of Profits Using Formulary Apportionment: United Nations Country Classifications (EUR million)

Panel A

Jurisdiction		⅓*REV_TP + ⅓*EMP_NUM + ⅓*AST_TAN	½*REV_TP + ½*EMP_NUM	½*REV_TP + ½*AST_TAN	½*EMP_NUM + ½*AST_TAN
Developed:	TO	€147,811	€158,126	€168,771	€140,257
	FROM	(€116,620)	(€128,096)	(€117,923)	(€127,560)
	NET	€31,192	€30,031	€50,848	€12,697
In transition:	TO	€1,450	€1,515	€1,559	€2,711
	FROM	(€8,538)	(€12,297)	(€7,459)	(€7,292)
	NET	(€7,088)	(€10,782)	(€5,900)	(€4,581)
Developing:	TO	€44,398	€46,127	€34,265	€54,818
	FROM	(€43,940)	(€42,912)	(€54,138)	(€36,788)
	NET	€458	€3,215	(€19,872)	€18,030
Unclassified:	TO	€0	€0	€0	€0
	FROM	(€24,562)	(€22,464)	(€25,075)	(€26,146)
	NET	(€24,562)	(€22,464)	(€25,075)	(€26,146)
TOTAL		-	-	-	-

Panel B

Jurisdiction		⅓*REV_TP + ⅓*EMP_NUM + ⅓*AST_TAN	½*REV_TP + ½*EMP_NUM	½*REV_TP + ½*AST_TAN	½*EMP_NUM + ½*AST_TAN
Least developed:	TO	€6,820	€6,601	€6,593	€7,385
	FROM	(€5,575)	(€7,732)	(€4,706)	(€4,406)
	NET	€1,245	(€1,131)	€1,887	€2,979

eJournal of Tax Research (2025) vol. 23, no. 1, pp. 162-190

International trade and tax performance

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Abstract

This article examines a possible effect of de-globalisation and growing isolationism on countries' fiscal capacities by studying the relationship between international trade and tax performance. We address the endogeneity between trade and tax performance by instrumenting for trade openness with geographical determinants of bilateral trade through gravity model estimations. We find that trade openness has a positive causal effect on tax revenue as a percentage of GDP. Additionally, applying stochastic frontier analysis we find that trade openness positively influences tax efficiency. Our results suggest that the current retreat from global trade may have negative implications for countries' fiscal capacities, particularly for emerging markets where trade plays a crucial role in economic development.

Keywords: international trade, global tax, tax ratio, tax effort, tax inefficiency

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1. INTRODUCTION

'[T]he most beautiful word in the dictionary is tariff'.
– Donald Trump, quoted in Leonard (2024).

For decades, the expansion of global trade has played a central role in driving economic growth, promoting interdependence, and reducing poverty worldwide. Recent trends, however, indicate a retreat from global integration or even de-globalisation. Leading up to 2019, international merchandise trade has been on the decline and after a brief expansion following the collapse during the Covid-19 pandemic, resumed its slide through 2023 (see Fig. 1); trade in services, while growing, is still just one-third the volume of merchandise trade. This decline in global trade appears likely to accelerate as major industrialised nations increasingly embrace protectionist policies. The shift began notably in 2018, when President Donald Trump's administration began the US-China trade war and this protectionist trend has intensified dramatically in 2025, with President Trump initiating a broader trade war by imposing increased tariffs on all trading partners, including America's closest allies and largest economic partners.

Fig. 1: The Retreat of World Trade

Source: United Nations Conference on Trade and Development (UNCTAD), 'Global trade update' (March 2025).

Meanwhile, multilateral institutions like the World Trade Organization, heretofore responsible for upholding the global trading system, have experienced a substantial erosion of their influence and effectiveness.

This de-globalisation trend poses challenges for many countries, particularly for emerging markets for which international trade plays a significant role in the economy. To understand one critical impact of this retreat from world trade, in this article we study the effect of international trade on tax performance. In addition to the timeliness of the research question, our analysis contributes to the literature on trade and tax performance by addressing the endogeneity of these variables which allows us to estimate the causal effect of trade openness on tax performance. We employ two complementary methodological approaches. First, we use instrumental variable regression techniques to estimate trade's causal effect on the tax ratio (tax revenue as a percentage of gross domestic product (GDP)). Second, we apply stochastic frontier analysis following Tran-Nam and Le (2022) to assess how trade affects tax efficiency or the degree to which countries achieve their tax revenue potential given their economic and structural characteristics. Our findings suggest that trade openness has a positive causal effect on the tax ratio while our stochastic frontier analysis finds that trade openness positively influences tax efficiency.

In contrast to our article, previous studies on the relationship between trade and taxation have been mainly correlational, not causal. For example, Slemrod (2004) finds that openness is negatively associated with corporate tax rates and suggests the former is causing the latter due to international competitive pressures. Hines (2007) suggests that countries adjust tax policy in response to capital mobility but mainly motivate the argument with correlations in the data.

Morrissey and co-authors (2016) find that tax revenue in lower-income countries is more vulnerable to terms of trade shocks but this analysis also remains correlational in nature leaving the possibility that omitted factors could account for both countries' production specialisation and the ability to collect taxes. Similar limitations exist in the Khattry and Rao (2002) study on trade liberalisation and tax revenue. Studies such as Holzner, Jovanović and Vukšić (2021) consider the effect of corporate tax rates on exports and imports. This type of question is the reverse of the one we ask in this article and illustrates that correlational analysis could be biased by reverse causal effects as well. Baunsgaard and Keen (2010) do try to identify a causal relationship between trade liberalisation and lost revenue and the replacement of that revenue with value added taxes. The authors of that study employ a Generalised Method of Moments methodology which is an alternative to our instrumental variables approach. Our stochastic frontier analysis of trade's effect on tax inefficiency goes beyond these studies.

The article proceeds as follows. In the next section, we provide a theoretical discussion of the relationship between trade and tax performance and also of other factors that might affect tax performance. That is followed by a section in which we describe the methodology including a detailed description of the construction of the instrumental variable and the variables used in the gravity regressions to construct that instrument. We also describe the stochastic frontier analysis to study trade's effect on tax efficiency. This is followed by a detailed discussion of the results and a conclusion.

2. TRADE AND OTHER FACTORS AFFECTING TAX PERFORMANCE: THEORETICAL MOTIVATIONS

International trade can influence a country's tax performance through multiple channels that affect both the tax base and the efficiency of tax collection. Trade directly affects tax revenue through trade taxes and customs duties. While trade liberalisation typically reduces tariff rates, potentially decreasing direct revenue from trade taxes, the corresponding increase in trade volume can partially or fully offset this loss (see Khattry and Rao (2002) and Baunsgaard and Keen (2010)). Since a policy variable, namely tariff rates, drives both trade flows and tax collection this creates endogeneity in these two variables.

International trade can also expand the tax base. As shown by Frankel and Romer (1999), trade can promote economic growth through efficiency gains from specialisation, technology transfer, and market expansion. Firms engaging with international markets can also experience productivity gains through competition. Trade-oriented firms typically operate in the formal sector which makes tax collection easier. Trade is also often associated with foreign direct investment, which can expand the corporate tax base.

The efficiency of tax administration can also be enhanced by international trade. Trade integration creates pressure for institutional improvements, including tax administration reforms. Countries seeking to participate effectively in global markets frequently adopt international best practices in governance to remain competitive. Trade agreements facilitate information flows which can enhance tax collection while trade facilitation typically involves modernisation and digitalisation of trade documentation which can have positive spillovers for tax administration more generally.

As these various mechanisms suggest, the relationship between trade and tax performance is complex and inherently endogenous. We employ a reduced-form instrumental variable analysis that addresses this endogeneity to tease out estimates of the causal effect of trade on tax performance. The context for the above mechanisms is usually one of trade expansion and liberalisation. We apply our findings to try to understand the possible effects of the current trend toward trade contraction and restriction on tax performance.

Of course, besides international trade, other country-level factors can influence a nation's tax performance. If these factors are correlated with trade openness, omitting them from the analysis could bias our estimates. Therefore, we include the following variables as controls in our regressions. While the inclusion of these variables is for the purpose of obtaining unbiased estimates of the causal effect of international trade on the tax ratio, for completeness, we discuss their theoretical relationships with the tax ratio below. A full list of variables used in our analysis along with the data sources is given in Table 1 (Appendix).

1. *GDP per capita* (+): higher income levels generally expand the tax base through multiple channels. Wealthier economies typically have larger formal sectors, more sophisticated financial systems, and greater administrative capacity to enforce tax compliance. We therefore expect a positive coefficient on this variable.

2. *Agricultural share of GDP* (−): agriculture poses challenges for tax collection, particularly in developing economies. The sector often consists of numerous

small, informal producers that are difficult to monitor and tax effectively. Agricultural products also frequently receive preferential tax treatment for food security and distributional concerns. We anticipate a negative relationship between agricultural share and tax performance.

3. *Education level* (+): education can influence tax performance through multiple channels. Better-educated populations may have higher tax morale and better understanding of the tax system, increasing compliance. Education also correlates with higher-skilled employment in the formal sector, which is more easily taxed than informal activities. We expect a positive coefficient on education measures.

4. *Tax rate* (−/+): the effect of statutory tax rates on revenue collection is theoretically ambiguous. Higher rates increase revenue collection mechanically if the tax base remains constant. However, excessive rates may encourage evasion, avoidance, or reduced economic activity, potentially decreasing the tax base. We include this variable primarily as a control without a strong directional hypothesis.

5. *Tax compliance burden* (−): complex tax systems with high compliance costs discourage formal sector participation and facilitate evasion. We expect a negative relationship between compliance burden measures and tax performance.

6. *Population growth* (−): rapid population growth often strains administrative capacity, particularly in developing countries. Fast-growing populations may outpace the expansion of tax administration resources, potentially reducing collection efficiency. We expect a negative coefficient on this variable.

7. *Working age population* (+): a larger proportion of working-age individuals in the population should expand the tax base, particularly for income and payroll taxes. We anticipate a positive relationship with tax performance.

8. *Institutional quality* (+): strong institutions are fundamental to effective tax collection. We expect a positive coefficient on measures of institutional quality.

For our estimates of the effect of international trade on tax inefficiency, we also include in our regressions control variables that might be correlated with both trade and tax inefficiency and bias the estimates if omitted:

1. *Size of shadow economy* (+): activities in the shadow economy make tax collection more difficult.

2. *Corruption* (+): corruption makes tax collection more difficult.

3. *Population growth rate* (+): it is more difficult to administer a rapidly growing population of taxpayers.

3. METHODOLOGY: ESTIMATING THE EFFECT OF TRADE ON TAX RATIO AND TAX INEFFICIENCY

The focus of this article is on quantifying the causal relationship between international trade and tax performance across countries. We employ two complementary methodological approaches to examine this relationship. First, we estimate the causal

effect of international trade on the tax ratio (tax revenue as a percentage of GDP) using instrumental variable regression techniques.

This approach addresses the inherent endogeneity between trade openness and tax systems by identifying exogenous geographical determinants of bilateral trade flows. Second, we utilise stochastic frontier analysis to estimate the effect of international trade on tax efficiency – the degree to which countries achieve their tax revenue potential given their economic and structural characteristics.

We first examine the relationship between a country's exposure to international trade and its tax ratio. The baseline model we estimate takes the following form:

$$\ln(T_i) = \beta_0 + \ln(Trade_i) + \Sigma\ \beta_i z_i + v_i \quad (1)$$

where $ln(T_i)$ represents the natural log of the tax ratio for country *i* defined as tax revenue as a percentage of GDP, $Trade_i$ is exports plus imports as a percentage of GDP, z_i represents a vector of country-level control variables which we detailed in the previous section. v_i is a random error term accounting for exogenous shocks, assumed to be independently normally distributed.

3.1 Estimating the effect of international trade on the tax ratio: constructing the instrument

The relationship between trade openness and tax performance is inherently endogenous, creating challenges in identifying causal effects. Several mechanisms drive this endogeneity. For example, countries with more efficient tax systems may be better positioned to liberalise trade by having alternative revenue sources to replace declining tariffs. Conversely, countries heavily dependent on trade taxes may resist liberalisation to protect fiscal revenues. Additionally, unobserved factors such as institutional quality simultaneously affect both trade policy and tax collection capacity – well-functioning institutions tend to promote both trade openness and effective taxation. Even the direction of causality is ambiguous: while trade may enhance tax performance through economic growth, countries with stronger fiscal systems may more readily engage in international trade due to better infrastructure and administrative capabilities funded by tax revenues. These complex bidirectional relationships necessitate an identification strategy that isolates the causal effect of trade on tax performance.

To address this endogeneity, we construct an instrumental variable for trade openness based on the level of bilateral trade predicted from exogenous geographical variables in a gravity model regression. This approach was first introduced by Frankel and Romer (1999) to study the effect of trade on income. The most basic gravity model of international trade posits that bilateral trade flows between countries are proportional to their economic sizes and inversely related to the distance between them. The expanded gravity regression we apply here takes the following form:

$$\ln \text{Trade}_{ij} = \beta_0 + \beta_1 \ln D_{ij} + \beta_2 \ln N_i + \beta_3 \ln A_i + \beta_4 \ln N_j + \beta_5 \ln A_j + \beta_6 L_{ij} + \beta_7 B_{ij} + \beta_8 B_{ij} \ln D_{ij} + \beta_9 B_{ij} \ln N_i + \beta_{10} B_{ij} \ln A_i + \beta_{11} B_{ij} \ln N_j + \beta_{12} B_{ij} \ln A_j + \beta_{13} B_{ij} L_{ij} + e_{ij} \quad (2)$$

where $Trade_{ij}$ is bilateral trade between countries i and j measured as exports plus imports divided by GDP for country i in year 2021, D_{ij} is the distance between countries i and j, N is population (in thousands), A is area (in km^2), L_{ij} is a dummy for common language countries, B_{ij} is a dummy variable for a common border between the two countries. Below is a discussion of these exogeneous variables and the expected theoretical relationship to trade openness:

1. D_{ij}, *Distance between countries* (−): geographic distance increases transportation costs and information frictions, thereby reducing trade intensity. We expect a negative coefficient on this variable, with the magnitude of trade declining as distance increases.

2. B_{ij}, *Shared border* (+): countries sharing a land border typically experience enhanced trade due to lower transportation costs and increased opportunities for market integration. We expect a positive coefficient on this dummy variable.

3. L_{ij}, *Common language* (+): a shared language reduces communication barriers and transaction costs while facilitating business relationships. We anticipate a positive coefficient on this variable.

4. *A, Country land area* (−/+): the relationship between land area and trade intensity is complex. Countries with larger land areas tend to have more diverse resources and larger domestic markets, reducing their need for international trade (−). However, larger economies may also have greater capacity to engage in international trade through economies of scale in production (+).

5. *N, Country population* (−/+): population size similarly has competing effects on trade intensity. Countries with larger populations have larger domestic markets, potentially reducing their reliance on international trade (−). Conversely, more populous countries may benefit from economies of scale in production, allowing them to specialise and export more efficiently (+).

Since we are interested in using this regression as a prediction model, we also include interactions of the variables to better predict trade. The regression estimate is used to predict trade between two countries. Then, for each country i in the sample, we sum the predicted bilateral trade over all trading partners to obtain one constructed trade share for country i. This we use as the instrument for actual trade share. For robustness, because many country pairs have zero trade flows, we also estimate the gravity regressions above using a Poisson pseudo-maximum likelihood estimator with trade share as the outcome variable. As we show in the next section, the results are not that different from the ordinary least squares (OLS) estimates using log trade share. We thus use the OLS estimates for the construction of the instrumental variable.

We also explore the effects of international trade on the tax ratio for different country types by breaking the sample into different groups. We defined a country as ‘non-rich’ if it had GDP per capita below USD 10,000 in 2021. Low- and middle-income countries might be more sensitive to changes in the trade regime as international trade is a bigger

share in the economies. It is also possible that the exports and imports do not affect a country's tax performance symmetrically. To examine this possibility, we define the country as a 'net export' country if the value of its exports exceeds the value of its imports. Finally, the mode of tax administration might also affect the relationship of tax performance and trade. A country is an 'indirect tax type' country if revenue from indirect taxes exceeds that from direct taxes. We include these dummy variables in the regressions and also their interactions with the trade variable.

3.2 Studying tax inefficiency and trade using stochastic frontier analysis

As a second exercise, we estimate the effect of trade and other factors on a country's tax inefficiency using a stochastic frontier model. First, we use the estimates of equation 1 to predict a maximum tax revenue a country could collect conditional on the country characteristics. The stochastic frontier model assumes that the observed tax ratio has two random components, an exogenous shock assumed normally distributed and a second random term representing inefficiency of the tax collection system. That is:

$$\ln(T_i) = \beta_0 + \Sigma\ \beta_i z_i + v_i - u_i \qquad (3)$$

where:

- T_i represents the tax ratio for country i,
- z_i represents the vector of explanatory variables including trade,
- v_i is the random error term accounting for exogenous shocks, assumed to be identically normally distributed,
- u_i represents inefficiency, where $u_i \geq 0$, and two alternative distributional assumptions are considered:
  - Half-normal distribution: $u_i \sim N^+(0, \sigma^2)$,
  - Exponential distribution: $u_i \sim Exp(\sigma^2)$.

A country's tax effort is defined as the ratio of the actual tax ratio to its potential tax ratio – defined as the maximum another country with similar characteristics can achieve. The negative of the log-transform of Tax Effort (*TE*) is then its Tax Inefficiency, ($\ln TE = -u_i$). Thus, tax inefficiency can be calculated given the assumption on the distribution of u_i.

In the second step, we regress tax inefficiency on a set of explanatory variables to estimate its determinants including trade:

$$u_i = \sum \gamma_i \omega_i + \xi_i$$

where:

- ω_i includes trade, control of corruption, voice and accountability, size of the shadow economy, and tax compliance burden,
- γ_i represents the coefficients to be estimated, and
- ξ_i is the error term.

The study uses cross-sectional data from 2021 obtained from several international sources, as shown in Table 1 (Appendix).

4. RESULTS

4.1 Trade and tax ratios: instrumental variable results

Table 2 shows descriptive statistics for variables used in the gravity model estimations. Since many countries do not trade with each other leaving zero for the trade share variable, in addition to the OLS estimates using log of trade share as our trade variable, we also estimate the gravity model using Poisson pseudo-maximum likelihood (PPML) without the log transformation. See also Table 3. Results are shown in Table 4.

Table 2: Descriptive Statistics for Trade Determinants Regressions

Variable	Obs	Mean	Std. Dev.	Min	Max
lntradeshare	15,779	-3.523	2.954	-16.294	5.273
lnarea	21,609	11.660	2.447	3.989	16.611
lnpop	21,609	9.130	1.938	3.981	14.161
lndist	21,609	8.647	0.859	1.792	9.894
comlang	21,609	0.141	0.348	0	1
contig	21,609	0.020	0.141	0	1

Table 3: The Bilateral Trade Equation

	Variable	Interaction
Ln area (country i)	-0.101***	-0.0135
	(0.0133)	(0.0867)
Ln area (country j)	-0.221***	0.0778
	(0.0130)	(0.0897)
Ln population (country i)	0.0886***	-0.527***
	(0.0164)	(0.0932)
Ln population (country j)	1.067***	-0.447***
	(0.0155)	(0.0821)
Ln distance	-1.220***	0.903***
	(0.0219)	(0.176)
Common language	0.218***	-0.527***
	(0.0575)	(0.161)
Common border	4.162***	
	(0.729)	
Constant	-0.176	
	(0.213)	
Observations	15,779	
R-squared	0.412	

The dependent variable is the log of imports plus exports as a share of GDP. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4: The Extended Bilateral Trade Equation

	(1) OLS Full Sample	(2) PPML Full Sample	(3) OLS Ex. Singapore & HK	(4) PPML Ex. Singapore & HK
Ln area (country i)	-0.0381*	-0.0438	0.00616	0.0406
	(0.0216)	(0.0381)	(0.0101)	(0.0275)
Ln area (country j)	-0.0828***	-0.0813**	-0.0749***	-0.0894**
	(0.00910)	(0.0387)	(0.00804)	(0.0378)
Ln population (country i)	0.00483	-0.0642	-0.0372***	-0.148***
	(0.0217)	(0.0436)	(0.0132)	(0.0350)
Ln population (country j)	0.320***	0.766***	0.295***	0.762***
	(0.0198)	(0.0276)	(0.0136)	(0.0266)
Ln distance	-0.303***	-0.654***	-0.309***	-0.676***
	(0.0247)	(0.0679)	(0.0227)	(0.0719)
Common language	0.187***	0.258**	0.100*	0.143
	(0.0672)	(0.106)	(0.0515)	(0.106)
Common border	3.929***	1.162***	3.519***	1.087***
	(0.606)	(0.151)	(0.421)	(0.140)
Constant	1.401***	-1.288***	1.447***	-1.177**
	(0.249)	(0.473)	(0.224)	(0.472)
Observations	21,609	21,609	21,315	21,315
R-squared	0.119	0.158	0.145	0.097

The dependent variable is log of imports plus exports as a share of GDP. Data are from 2021. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

For the full sample, the OLS and PPLM estimates are of similar magnitude with signs on the coefficient estimates. Larger countries in terms of land area tend to trade less. Countries tend to trade more with more populous countries. Countries that share a border or a common language trade more with each other while distance reduces trade between countries. We repeat the estimates omitting Hong Kong and Singapore from the sample. Hong Kong was historically an intermediary economy while Singapore is characterised as a port economy whose trade might not depend as much on these geographical factors. Hong Kong was also of course under Chinese rule in 2021. The estimates omitting Hong Kong and Singapore are not qualitatively different from the results using the full sample.

We are not interested in the interpretation of the coefficient estimates per se. We instead use these estimates to predict the volume of trade between two countries. Then for each country, we aggregate over all trading partners to arrive at a constructed trade share for each country. This variable is determined by arguably exogenous factors. To use it as an instrument for our analysis of trade effects on tax performance, we must assume that these exogenous variables only affect tax performance by way of trade (that is, it satisfies the exclusion restriction). We include control variables in the analysis that can account for any relationships that are present outside of the trade channel.

Figure 2 shows that constructed trade share and actual trade share are strongly positively correlated. The relationship is still highly significant even after controlling for a

country's population and land area. Variation in constructed trade share explains about 35% of the variation in actual trade share. These results are shown in Table 5.

Fig. 2: Constructed versus Actual Trade Share

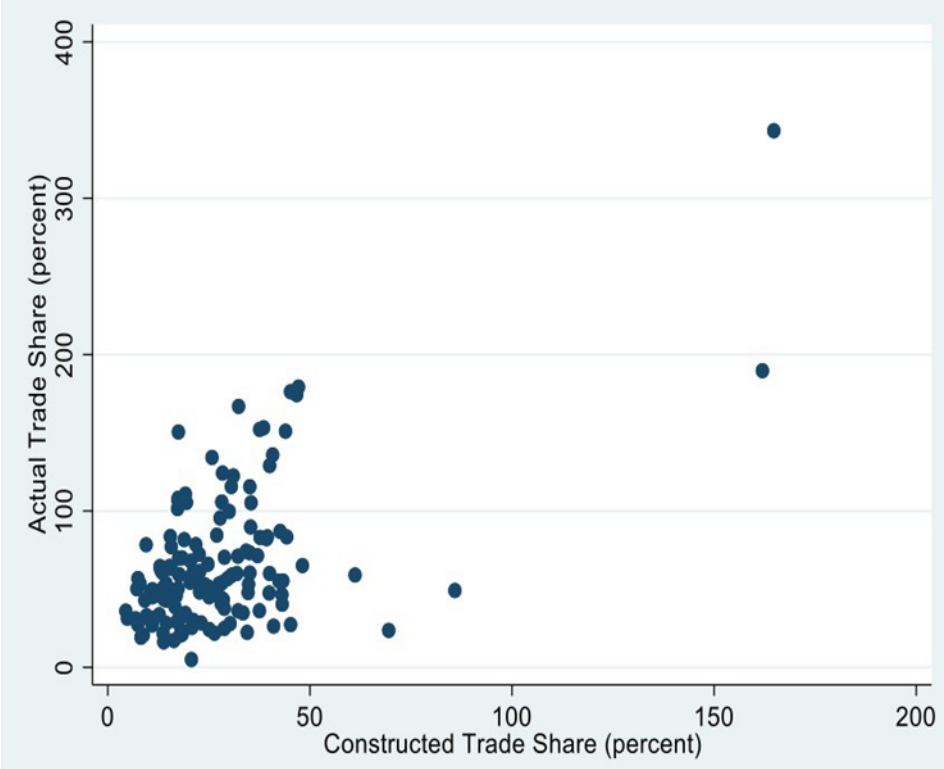

Table 5: The Relation between Actual and Constructed Overall Trade

	(1)	(2)	(3)
Constructed trade share	1.263***		1.554***
	(0.287)		(0.314)
Ln population		1.067	-10.57***
		(4.588)	(2.732)
Ln area		-4.607	7.409***
		(4.363)	(2.023)
Constant	31.00***	109.0***	33.26**
	(6.959)	(22.85)	(16.75)
Observations	147	147	147
R-squared	0.347	0.049	0.410

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6 shows the results of regressions of trade and the tax ratio. For the OLS estimates, a 4% increase in international trade is associated with over 1% increase in the tax ratio. This result holds for specifications controlling for neoclassical factors such as capital investment, labour force, education, size of the agriculture sector and GDP per capita. We also added controls for the tax rate and the tax compliance burden, and a measure of institutional quality, namely, voice and accountability.

Table 6: Tax Ratio and Trade: OLS and IV Estimates

VARIABLES	OLS	IV	OLS	IV	OLS	IV
lnTRADE	0.282**	0.180	0.287***	0.221	0.281***	0.399*
	(0.108)	(0.204)	(0.108)	(0.224)	(0.083)	(0.205)
lnTRate			-0.025	0.044	-0.174	-0.294
			(0.336)	(0.430)	(0.257)	(0.335)
lnTCB			0.116	0.038	0.261	0.397
			(0.383)	(0.496)	(0.301)	(0.388)
lnGDPpc	0.155	0.177	0.154	0.168	0.068	0.044
	(0.118)	(0.120)	(0.119)	(0.122)	(0.108)	(0.110)
lnAGR	0.077	0.075	0.067	0.067	0.080	0.081
	(0.074)	(0.066)	(0.076)	(0.069)	(0.063)	(0.066)
lnK	0.020	0.009	0.013	0.007	0.019	0.030
	(0.025)	(0.029)	(0.025)	(0.027)	(0.026)	(0.027)
lnWKAGE	-2.081***	-2.134***	-1.972***	-2.012***	-1.600**	-1.534**
	(0.683)	(0.671)	(0.676)	(0.661)	(0.615)	(0.613)
lnEDU	1.007***	1.029***	0.996***	1.010***	0.957***	0.933***
	(0.306)	(0.294)	(0.297)	(0.287)	(0.259)	(0.264)
lnVA					0.247***	0.243***
					(0.091)	(0.082)
Constant	8.814***	9.485***	8.184***	8.659***	6.405**	5.584*
	(3.096)	(3.210)	(3.038)	(3.274)	(2.882)	(3.040)
Observations	109	109	109	109	109	109
R-squared	0.492	0.482	0.496	0.492	0.555	0.541

The dependent variable is a country's tax ratio. Data are for 2021.
Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Results from the instrumental variable regressions are more mixed. In specifications controlling for the neoclassical variables, the tax rate and tax compliance burden, point estimate is similar to that in the OLS estimate but are not statistically significant. But when we include the full set of control variables, the estimate is highly significant and the magnitude larger than the OLS estimate. A 2.5% increase in the trade share causes a 1% increase in the tax ratio.

In Table 7 (Appendix), we show results for the effects of international trade on tax ratio for different country types. We defined a country as 'non-rich' if it has GDP per capita below USD 10,000 in 2021. We define the country as a 'net export' country if the value of its exports exceeds the value of its imports. A country is an 'indirect tax type' country if revenue from indirect taxes exceed that from direct taxes. Inclusion of these dummy

variables and their interactions with the trade share variable does decrease the magnitude of the point estimate of the coefficient on the trade share variable but not by much in the case of the non-rich/rich dichotomy. As seen in the positive coefficients on the interaction term between non-rich and trade in both the OLS and IV results, the effect of trade on the tax ratio is bigger for non-rich countries in the sample though the difference is not statistically significant. We do not find that the effect of trade on tax performance is consistently different for net exporting versus net importing countries. Unlike these results, the effect of trade on tax performance is no longer significant when we include classifications of the countries by indirect versus direct tax type. This could be because the sample reduces to under 100 countries because data are not available.

4.2 Trade and tax inefficiency: stochastic frontiers analysis results

Table 8 (Appendix) presents the results estimating the determinants of tax ratio in Stochastic Frontier models with both half-normal and exponential distributions for the inefficiency term u_i. The explanatory variables include trade openness (lnTRADE), tax rates (lnTRate), tax compliance burden (lnTCB), GDP per capita (lnGDPpc), agriculture's share of GDP (lnAGR), and education levels (lnEDU), along with institutional variables like Voice and Accountability (lnVA). Additionally, models (d), (e), and (f) incorporate predicted trade (lnPredictedTRADE), instrumented from a gravity model to control for potential endogeneity in trade. See also Table 9 (Appendix).

A key finding across all models is that trade openness, both actual and predicted, is significant in increasing the tax ratio. In models (a), (b), and (c), lnTRADE is positively and significantly related to the tax ratio, indicating that greater trade openness is associated with higher ability for a country to collect taxes efficiently. When predicted trade is used in models (d), (e), and (f), the positive relationship remains, albeit with slightly diminished significance, confirming that trade continues to be a crucial factor in improving tax performance, even after accounting for endogeneity.

Institutional quality, captured by Voice and Accountability (lnVA), consistently shows a positive and significant relationship with tax efficiency. Education appears to have the most robust impact across all models, suggesting that better human capital development enhances the efficiency of tax collection. Voice and Accountability also play a role, though its significance diminishes when predicted trade is included, suggesting some overlap in how these factors affect tax performance.

Other variables like GDP per capita and the agriculture share of GDP present more mixed results. The negative and significant relationship between lnAGR and tax efficiency in model (a) suggests that a larger agricultural sector leads to higher inefficiency, but this effect is not consistent across all models. Similarly, the coefficient for GDP per capita fluctuates, being significant in some models but insignificant in others, which may indicate that its impact on tax efficiency is more context dependent.

Overall, the results highlight the importance of international trade and institutional quality as critical drivers of tax efficiency. While higher tax rates and tax compliance burdens tend to reduce efficiency, the presence of robust trade openness and strong institutional frameworks can mitigate these negative effects. These findings indicate the significance of fostering trade and improving governance structures to enhance tax performance, particularly in developing and emerging markets.

Based on the estimates above, we present in Table 9 (Appendix) the implied Tax Ratio and Tax Effort for various countries based on two different models: model (b), which uses actual trade data, and model (e), which uses predicted trade data obtained from the gravity model.

The Tax Effort columns from model (b) and model (e) measure how much tax a country collects relative to its potential capacity or estimated potential. Following our earlier definition, tax effort serves as an indicator of tax efficiency, with lower tax effort scores implying greater tax inefficiency. However, it is important to distinguish between low tax effort due to structural inefficiencies in tax administration and low tax effort that results from deliberate policy choices.

According to model (b), which is based on actual trade data, several countries, including Brazil (93.99%), France (93.49%), and Denmark (92.05%), demonstrate high tax effort. These rankings indicate that these countries collect close to their estimated tax potential, which may suggest high efficiency in revenue mobilisation. However, tax effort does not necessarily equate to institutional effectiveness or governance quality – it reflects how much tax a country collects relative to its estimated potential, regardless of the underlying reasons.

The tax rate (lnTRate) shows a consistent negative effect on tax ratio in models (a), (b), and (c), implying that higher tax rates reduce efficiency. However, when predicted trade is introduced, this effect becomes insignificant, suggesting that trade may mitigate the negative impact of higher tax rates. Similarly, the tax compliance burden (lnTCB) has a positive relationship with tax inefficiency in models (b) and (c), but this effect becomes insignificant once predicted trade is accounted for, indicating that trade might reduce the burden of inefficiencies arising from complex tax compliance.

When switching to model (e), which incorporates predicted trade to account for trade endogeneity, we observe some shifts in tax effort estimates. For instance, Greece and Albania show reductions in their tax effort, suggesting that incorporating predicted trade data might alter the perceived efficiency of their tax collection systems. Conversely, Belgium's tax effort rises significantly from 75.90% to 86.34%, indicating that its tax capacity may be higher than previously estimated when accounting for trade potential.

The Tax Ratio (TRatio) offers insight into how much tax revenue a country collects relative to the size of its economy. Countries such as Denmark, France, and Finland exhibit high tax ratios, indicating that they collect a significant portion of their GDP as taxes. These countries are typically developed economies with efficient tax collection systems and higher levels of compliance. On the other hand, developing countries like Nigeria, Angola, and Bangladesh tend to have lower tax ratios, which suggests weaker tax systems, lower tax compliance, or less efficient mechanisms for tax collection.

For countries such as Switzerland and the United States, their tax effort remains relatively low across both models (Switzerland: 61.83% in model (b) vs. 66.88% in model (e); the US: 78.98% in model (b) vs. 74.64% in model (e)). However, this does not necessarily reflect tax inefficiency. Instead, these countries have relatively low tax ratios (Switzerland: 28.61%, US: 26.82%) primarily due to policy choices that favour lower taxation rather than an inability to collect more revenue. Model (e)'s slight increase in Switzerland's tax effort suggests that its trade-adjusted tax potential is somewhat higher, but the country still maintains a low-tax policy approach.

Interestingly, some countries maintain high tax effort across both models, such as Lesotho (94.71% in model (b) and 95.02% in model (e)) and Nicaragua (94.20% in model (b) and 93.91% in model (e)). However, a high tax effort does not necessarily indicate an exemplary tax system. Countries like Nicaragua may have high tax effort scores because they collect close to or even above their estimated tax capacity, despite facing significant institutional challenges such as weak administrative efficiency or high levels of informality. This suggests that while these countries are extracting a high share of their potential revenue, it may come at the cost of economic distortions or over-reliance on specific tax sources. On the other hand, countries like Mexico and Indonesia exhibit lower tax effort across both models (Mexico: 41.76% in model (b) vs. 53.23% in model (e); Indonesia: 37.44% in model (b) vs. 37.19% in model (e)). This implies that they are not fully utilising their tax base, and there is room for improvement in their tax systems. However, the increase in Mexico's tax effort under model (e) indicates that its estimated tax potential rises when considering trade endogeneity, potentially implying a structural underperformance rather than an entirely inefficient tax system.

Other studies also report comparable patterns. For example, the World Bank study by Le, Moreno-Dodson and Bayraktar (2012) and the IMF study by Fenochietto and Pessino (2013) both find similar results, with Switzerland exhibiting a low tax effort despite having a highly efficient tax administration. Langford and Ohlenburg (2015) similarly found that countries like Switzerland tend to exhibit low tax effort despite strong institutions, while Zimbabwe shows high tax effort but low tax ratios. Additionally, Mawejje and Sebudde (2019), using a different methodology to estimate tax capacity and effort, arrive at similar rankings – Switzerland consistently exhibits low tax effort, while Zimbabwe ranks high. These findings reinforce that our results are not anomalies but align with established research on tax effort estimation.

Table 10 presents the results from analysis of tax inefficiency (i.e., u_i) using different models and distributional assumptions for the inefficiency term u_i in the first step of the analysis. The explanatory variables include the size of the shadow economy (lnSHADOW), population growth (POPGR), control of corruption (lnCC), and an interaction term between control of corruption and the shadow economy (lnCC × lnSHADOW). The models compare actual trade data (columns a, b, c) and predicted trade data (columns d, e, f), with both half-normal and exponential distributions for the inefficiency term.

Table 10: Explaining Tax Inefficiency

	Model (a)	Model (b)	Model (c)	Model (d)	Model (e)	Model (f)
lnSHADOW	-0.404	-0.406	-0.798	-0.335	-0.343	-0.670
	(0.619)	(0.570)	(0.604)	(0.682)	(0.628)	(0.656)
POPGR	-0.065**	-0.072**	-0.085***	-0.032	-0.041	-0.055*
	(0.031)	(0.028)	(0.030)	(0.034)	(0.031)	(0.033)
lnCC	-0.108	-0.102	0.004	-0.112	-0.105	-0.011
	(0.151)	(0.140)	(0.148)	(0.166)	(0.153)	(0.161)
lnCCxlnSHADOW	0.084	0.077	0.168	0.074	0.068	0.145
	(0.141)	(0.130)	(0.138)	(0.155)	(0.143)	(0.149)
lnTRADE	-0.283***	-0.260***	-0.248***			
	(0.063)	(0.058)	(0.061)			
lnTRADE_h				-0.060	-0.056	-0.045
				(0.075)	(0.069)	(0.073)
Constant	1.995***	1.737***	1.273*	1.072	0.893	0.495
	(0.662)	(0.610)	(0.642)	(0.707)	(0.651)	(0.680)
Observations	102	102	103	102	102	103
R-squared	0.251	0.237	0.203	0.097	0.082	0.069

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The Table highlights significant variation in tax effort across countries, with developed economies typically showing higher tax ratios and tax effort, while developing nations struggle with lower efficiency in tax collection. However, this variation must be interpreted carefully. A lower tax effort does not always indicate tax inefficiency – it can also reflect policy preferences, as seen in Switzerland and the US. Similarly, a high tax effort score does not automatically imply an effective tax administration, as seen in cases where countries mobilise revenues at levels near or exceeding their estimated potential due to external economic pressures. The introduction of predicted trade data in model (e) slightly alters the tax effort estimates for some countries, highlighting the importance of considering trade endogeneity when assessing tax efficiency.

Similarly, while the shadow economy (lnSHADOW) consistently shows a negative coefficient across all models, suggesting that a larger shadow economy might reduce tax inefficiency – this effect remains statistically insignificant. Likewise, control of corruption (lnCC) is negatively associated with tax inefficiency in most models but lacks statistical significance.

Overall, the relatively low R-squared values (ranging from 0.069 to 0.251) indicate that other unobserved factors likely influence tax inefficiency. While this analysis provides some insights, we acknowledge its limitations and suggest that further research could explore additional determinants of tax inefficiency.

One notable finding is the effect of population growth (POPGR). In several models, including columns (a), (b), (c), and (f), population growth is associated with a reduction in tax inefficiency. This suggests that higher population growth may lead to more efficient tax collection, possibly because a growing population increases the need for improved public services, prompting governments to enhance tax administration systems. However, this relationship does not appear in models (d) and (e), likely

reflecting differences in the underlying trade measures rather than a fundamental contradiction. The variation in results suggests that the estimated effect of population growth may be sensitive to econometric assumptions and data sources rather than pointing to a clear theoretical mechanism.

5. CONCLUSION

This article examines the relationship between international trade and tax performance using cross-country data. Our analysis, which addresses the endogeneity of trade and taxation outcomes through an instrumental variable constructed using geographical determinants, provides strong evidence that trade openness positively affects both tax revenue and tax efficiency. These findings are robust across different model specifications and remain significant after controlling for various economic, institutional, and policy factors.

We do acknowledge that unobserved institutional factors, such as federalism, governance structures, and the size of the informal economy, may influence tax effort estimates in ways not fully captured by our models. While we control for key structural determinants, tax effort remains an estimation subject to data constraints. Future research could explore these dimensions further to refine our understanding of cross-country variations in tax performance.

Looking forward, several questions deserve further research attention. How might different types of trade relationships (e.g., regional trade agreements versus broader multilateral engagement) affect tax performance? How might the interaction between trade and tax performance change as countries move away from rules-based multilateral arrangements toward more fragmented bilateral trading relationships? How might countries address fiscal constraints if tax performance is adversely affected in a less-integrated world?

Our findings and these questions have important implications given current trends toward de-globalisation and economic fragmentation. The retreat from global trade integration could pose significant fiscal challenges, particularly for developing economies that rely heavily on trade-related revenue and benefit from trade's institutional spillovers. Our results suggest that the impact may extend beyond the direct effect of reduced trade volumes to include broader consequences for tax administration efficiency and institutional development.

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7. APPENDIX

Table 1: Variables, Descriptions, and Sources

Variable	Description	Data source
International Trade, *Trade*	Exports + Imports (% of GDP)	IMF
Distance, *D*	Distance between two countries	Centre d'Études Prospectives et d'Informations Internationales
Area, *A*	Land Area of a country (km^2)	World Development Indicators
Size of shadow economy, *SHADOW*	as % of GDP	Medina and Schneider (2018)
Common Language, *L*	Dummy with value equal 1 for Country Pairs with common language	Centre d'Études Prospectives et d'Informations Internationales
Common Border, *B*	Dummy with value equal 1 for Country Pairs with common border	Centre d'Études Prospectives et d'Informations Internationales
Tax ratio, *T*	Tax revenue as % of GDP	OECD Data
Tax compliance burden, *TCB*	Time to prepare and pay taxes (hours)	Paying Taxes (PwC)
Tax rate, *Trate*	Total tax and contribution rate (% of profit)	Paying Taxes (PwC)
GDP Per capita. *GDPpc*	GDP per capita, PPP (current international $)	OECD Data

Agriculture, *AGR*	Agriculture, forestry, and fishing, value added (% of GDP)	OECD Data
Population, *N*	Population	World Development Indicators
Population growth, *POPGR*	Population growth (annual %)	World Development Indicators
Working age population, *WKAGE*	% of total population	OECD Data
Inflation, *INF*	Consumer price inflation (annual %)	World Development Indicators
Institutional quality, *VA*	Voice and Accountability: Percentile rank, with higher scores corresponding to better outcomes	World Governance Indicators
Corruption, *CC*	Control of Corruption: higher scores correspond to better outcomes	World Governance Indicators
Education, *EDU*	Education Index: Measures adult literacy and combined gross enrolment	UNDP Human Development Reports
Capital Investment, *K*	Gross fixed capital formation (million US dollars)	OECD Data

Table 7: Tax Ratio and Trade: Results for Different Types of Countries

	OLS (1)	IV (2)	OLS (3)	IV (4)	OLS (5)	IV (6)	OLS (7)	IV (8)
lnTRADE	0.367***	0.338	0.248*	0.299*	0.393***	0.121	0.158	0.250
	(0.084)	(0.211)	(0.126)	(0.179)	(0.093)	(0.489)	(0.204)	(0.410)
nonRich			-1.342**	-0.756				
			(0.630)	(2.317)				
TradenonRich			0.257	0.107				
			(0.156)	(0.606)				
NET_ex					0.227	-1.097		
					(0.663)	(2.170)		
TradeNetEx					-0.047	0.284		
					(0.161)	(0.547)		
IndirectTaxType							-1.016	-0.219
							(0.929)	(2.053)
TradeIndirectTaxType							0.256	0.062
							(0.222)	(0.502)
Constant	1.553***	1.673**	2.142***	1.932***	1.435***	2.516	2.438***	2.057
	(0.341)	(0.841)	(0.528)	(0.727)	(0.376)	(1.930)	(0.847)	(1.685)
Observations	120	120	120	120	120	120	97	97
R-squared	0.176	0.175	0.282	0.277	0.178	0.138	0.141	0.130

The dependent variable is a country's tax ratio. Data are for 2021.
Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 8: Tax Ratio and Trade: Stochastic Frontier Model Results

Variables	(a) Half-normal distribution u_i	(b) Exponential distribution u_i	(c) Half-normal distribution u_i	(d) Half-normal distribution u_i	(e) Exponential distribution u_i	(f) Half-normal distribution u_i
lnTRate	-0.948***	-0.416**	-0.345*	-0.185	-0.173	-0.137
	(0.000)	(0.181)	(0.181)	(0.370)	(0.142)	(0.167)
lnTCB	1.082	0.480**	0.401*	0.219	0.244	0.200
	(0.000)	(0.222)	(0.225)	(0.341)	(0.204)	(0.231)
lnGDPpc	-0.058***	0.057	0.488	0.021	0.076	0.868
	(0.000)	(0.103)	(0.481)	(0.223)	(0.121)	(0.647)
lnGDPpc2			-0.015			-0.034
			(0.024)			(0.032)
lnAGR	-0.035***	-0.009	-0.019	-0.006	0.001	-0.034
	(0.000)	(0.071)	(0.062)	(0.149)	(0.089)	(0.073)
lnTRADE	0.297***	0.240***	0.224***			
	(0.000)	(0.074)	(0.077)			
lnPredictedTRADE				0.048	0.091	0.101
				(0.152)	(0.107)	(0.075)
lnK	0.015***	0.017	0.004	-0.000	-0.005	-0.016
	(0.000)	(0.020)	(0.019)	(0.020)	(0.019)	(0.021)
lnWKAGE	-0.404***	-0.613	-0.111	-0.671	-0.735	-0.277
	(0.000)	(0.610)	(0.656)	(0.919)	(0.657)	(0.750)
lnEDU	1.085***	0.685***		0.849***	0.767***	
	(0.000)	(0.209)		(0.253)	(0.260)	
lnVA	0.132***	0.113*	0.094*	0.138	0.134	0.118
	(0.000)	(0.062)	(0.057)	(0.107)	(0.097)	(0.081)
USigma Constant	-0.927***	-2.031***	-1.895***	-0.993*	-2.034***	-1.905***

	(0.132)	(0.306)	(0.286)	(0.574)	(0.463)	(0.308)
VSigma Constant	-23.356***	-3.877***	-3.793***	-4.321*	-3.543***	-3.524***
	(0.252)	(0.565)	(0.514)	(2.518)	(0.759)	(0.482)
Observations	109	109	110	109	109	110
Sigma(u)	0.629	0.362	0.388	0.609	0.362	0.386
Sigma(v)	8.48e-06	0.144	0.150	0.115	0.170	0.172
Lambda	74220	2.516	2.583	5.279	2.127	2.246
Log-Likelihood	-28.61	-34.16	-41.14	-41.25	-40.08	-

The dependent variable is a country's tax ratio. Data are for 2021.
Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 9: Average Tax Ratios and Tax Effort

Country	Tax Ratio (%)	Tax Effort (%) using Model (b)	Tax Effort (%) using Model (e)
Albania	24.74	81.75	78.01
Angola	22.65	87.09	88.78
Argentina	29.08	85.31	81.04
Armenia	22.54	81.64	76.36
Austria	43.71	88.64	89.02
Azerbaijan	13.47	58.49	60.35
Bahamas	14.38	59.86	50.87
Bangladesh	7.64	41.82	34.11
Barbados	28.38	90.17	84.76
Belgium	44.90	75.90	86.34
Belize	20.13	75.59	72.78
Bolivia	20.30	71.52	72.95
Bosnia and Herzegovina	36.52	93.92	93.47
Brazil	32.63	93.99	93.06
Brunei	9.29	31.83	38.44
Burkina Faso	15.91	89.97	88.58
Central African Republic	8.17	69.64	54.65

Chile	20.77	60.62	69.05
China	22.33	92.12	91.57
Colombia	21.30	81.77	79.63
Congo, Dem. Rep.	8.08	40.69	43.79
Congo, Rep.	8.31	41.65	37.76
Costa Rica	14.22	45.76	46.55
Cote d'Ivoire	13.19	59.84	63.90
Czech Republic	33.91	67.19	79.27
Denmark	47.97	92.05	90.14
Dominican Republic	14.41	50.50	50.87
Ecuador	13.88	51.98	55.35
El Salvador	19.90	77.56	81.27
Estonia	33.83	84.13	82.68
Eswatini	24.67	91.99	91.04
Finland	43.23	88.97	86.93
France	47.27	93.49	91.38
Georgia	22.58	71.53	71.28
Germany	40.90	82.43	84.94
Ghana	13.29	53.57	49.36

Greece	39.24	89.11	85.79
Guatemala	12.23	60.93	62.62
Guinea	12.06	76.07	77.44
Honduras	19.20	85.63	88.02
Hungary	34.09	76.35	85.74
Iceland	35.13	84.06	83.58
India	17.65	82.97	76.03
Indonesia	9.12	37.44	37.19
Ireland	21.85	51.16	52.99
Israel	32.79	88.74	77.66
Italy	43.28	91.95	90.72
Jordan	17.33	72.36	73.16
Kazakhstan	15.88	52.37	52.59
Kenya	14.63	81.29	70.56
Kyrgyzstan	24.87	83.29	83.14
Latvia	30.92	69.53	75.17
Lebanon	5.78	22.47	23.34
Lesotho	30.00	94.72	95.02
Lithuania	32.68	69.28	76.28

Luxembourg	39.89	91.94	85.67
Madagascar	10.67	60.86	64.10
Malaysia	11.24	31.83	40.68
Mali	15.06	89.05	90.42
Malta	30.33	81.15	74.17
Mauritania	10.76	50.61	57.26
Mauritius	19.46	68.61	66.93
Mexico	13.87	41.76	53.23
Moldova	29.45	86.82	85.23
Mongolia	27.74	81.30	84.95
Montenegro	36.77	93.68	89.77
Morocco	19.55	77.85	83.97
Namibia	28.17	89.59	91.36
Nepal	23.01	92.43	89.35
Netherlands	40.16	72.76	83.22
Nicaragua	27.12	94.20	93.91
Niger	10.05	85.05	75.52
North Macedonia	27.25	82.32	87.05
Norway	41.59	87.90	86.61

Oman	3.79	25.02	14.83
Pakistan	11.31	77.17	69.06
Panama	12.50	50.93	43.06
Paraguay	10.79	39.79	43.34
Peru	15.68	54.95	58.13
Philippines	14.13	54.74	54.33
Poland	37.81	83.88	87.85
Portugal	37.42	88.95	89.18
Romania	27.11	78.25	80.64
Rwanda	14.82	86.18	79.34
Senegal	16.93	88.10	88.27
Serbia	39.34	92.80	92.43
Seychelles	27.31	76.48	84.87
Sierra Leone	12.57	81.43	73.47
Singapore	13.12	28.46	34.65
Slovakia	35.65	74.87	85.02
Slovenia	37.75	74.88	83.77
South Africa	27.85	86.16	86.85
South Korea	29.88	76.73	78.30

Spain	38.95	89.85	89.38
Sri Lanka	7.54	27.83	25.31
Sweden	42.98	86.90	86.94
Switzerland	28.61	61.83	66.88
Tajikistan	19.46	87.29	85.57
Tanzania	10.71	63.89	55.33
Thailand	16.23	53.24	63.93
Trinidad and Tobago	16.42	50.67	54.60
Turkey	24.95	81.27	82.77
Ukraine	31.40	88.70	88.35
United Kingdom	34.26	85.15	79.27
United States of America	26.82	78.98	74.64
Uruguay	26.51	86.52	77.36
Uzbekistan	22.31	88.33	86.35
Zambia	16.05	67.33	76.64
Zimbabwe	14.89	75.72	68.86