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CONTENTS

- 1 Editorial note
Binh Tran-Nam
- 3 Editorial
Alex Evans, Youngdeok Lim and Yan Xu
- 5 Does inequality impact tax collection? Evidence from ACI
(ASEAN-China-India) economies
Partha Gangopadhyay and Siddharth Jain
- 22 The influence of reciprocity nudges on tax compliance in South
Africa: evidence from an experimental study
Nompumelelo Monageng, Chris Evans and Theuns Steyn
- 48 Identifying the factors impacting upon personal tax compliance:
a study involving tax affairs officers of Malaysian businesses
**Nivakan Sritharan, Sahari Salawati, Cheuk Choy Sheung
Sharon and Mohamed Ahmad Syubaili**
- 72 Tax Officer 2030: the exercise of discretion and artificial
intelligence
Duncan Bentley

eJournal of Tax Research

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eJournal of Tax Research

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The School of Accounting, Auditing & Taxation is part of the UNSW Business School at UNSW Sydney. The tax group in our school brings together a team of expert academic staff with backgrounds in law, tax and economics. At the School of Accounting, Auditing & Taxation, we're working towards building excellence in the tax profession, looking at tax from both a theoretical and practical perspective.

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.

SUBMISSION OF ORIGINAL MATERIAL

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WEBPAGE

Current and past issues of the *eJournal of Tax Research* are available via the journal's website: <https://www.unsw.edu.au/business/our-research/research-environment/ejournal-tax-research>.

Editorial note

Recently Professor Paul Andon, Head of the School of Accounting, Auditing and Taxation at UNSW Sydney, agreed that I would step down as a co-editor of the *eJournal of Tax Research* after the publication of Issue 1, Volume 20 of the journal. In my final editorial note, I would like to reflect on my near two-decade journey as a co-editor and to thank the various people who have made my journey an enjoyable and productive one.

In early 2003, Rodney Fisher and I were approached by then Associate Professor (now Emeritus Professor) Chris Evans, Director of Atax, to start a new tax journal. Unlike existing tax journals in Australia at the time, eg, *Australian Tax Forum*, *Australian Tax Review*, *Revenue Law Journal* and the *Journal of Australian Taxation*, the new journal would be online in format, international in geographical coverage and inclusive in scope, covering tax law, tax policy and tax administration, and studies from both a doctrinal and empirical perspective. With the invaluable assistance of various people, including then Associate Professor (now Emeritus Professor) Neil Warren and then Librarian Colin Fong, the *eJournal of Tax Research* was born. The late Justice Graham Hill, a strong supporter of Atax, launched the inaugural issue of the *eJournal* at a reception held in Atax's Coogee seaside campus on 10 September 2003. A foundation member of the Editorial Board of the *eJournal*, his untimely passing in 2005 was deeply mourned by the tax community. An obituary for Justice Hill was provided by Atax former Deputy Director, Associate Professor Patrick Gallagher in Issue 2, Volume 3 (2005) of the *eJournal*.

Over the past two decades, I have worked with many co-editors, including Mr (later Associate Professor) Rodney Fisher, Associate Professor (now Professor) Michael Walpole, Associate Professor (now Winthrop Professor in the Law School at the University of Western Australia) Nolan Sharkey, Professor (now Emeritus) John Taylor, Dr Alexandra Evans, and most recently, Dr Youngdeok Lim and Scientia Associate Professor Yan Xu. I would like to congratulate Youngdeok for his recent promotion to Associate Professor. I have enjoyed productive working relationships with all my co-editors and would like to thank each of them for their friendship and collaboration. In particular, Michael Walpole and I successfully worked together to improve the ranking of the *eJournal* from the original B level to the current A level in the Journal Quality List of the Australian Business Deans Council (ABDC). There have also been many guest editors of special issues who deserve mention. They include Professors Reuven Avi-Yonah, Duncan Bentley, Chris Evans, Margaret McKerchar, Neil Warren, and Robin Woellner, Ms Kathrin Bain, Ms Mary Ip, Dr Peter Mellor and Mr Grant Wardell-Johnson.

From its inception, the *eJournal* has received tremendous support from an array of eminent multidisciplinary tax scholars and practitioners from around the world. Many of them have agreed to join the Editorial Board of the *eJournal*. Over the years, the Editorial Board has gradually expanded to reflect the changing nature of the tax discipline. Last year, many new appointments were made to diversify and rejuvenate the Board. I note, again with sadness, the passing of Professor John Tiley, another foundation member of the Board, on 30 June 2013. A special issue (number 1, volume 12), edited by Margaret McKerchar, was published in 2014 to honour Professor Tiley's immense and influential contributions to tax law.

The publication of a journal is truly a joint product. It is my duty to thank two sets of people who provide essential inputs to a journal issue, namely, the authors and the production editors. I am very grateful to all authors who have chosen the *eJournal* as an outlet for their tax research. Their continuing support is much needed for the *eJournal* to maintain or improve its ranking as an A journal in the ABDC list.

My thanks also go to all of the *eJournal*'s production editors, past and present, including Darren Massey, Zaid Crouch, Cindy Chan, Kathrin Bain, Edmond Wong, Ashley Cheng, Christa Mobbs, Margaret Connor, Mersina Davidson, Leanne Clarey, Amanda Uppal and Dr Peter Mellor. In particular, I would like to acknowledge Edmond's efforts in successfully applying to have the *eJournal* indexed by Scopus.

As an online journal, the *eJournal of Tax Research* has relied on many people for technical support. In this context, I would like to express my appreciation to Glen Jeffrey, Chris Katselas, Margaret Connor, Lydia McDonnell and Florence Yang. In particular, I would like to thank Glen for designing and launching the inaugural *eJournal* website, and Lydia and Florence for transferring the *eJournal* from its original website to the current website.

Last, but by no means least, I would like to thank the readers of the *eJournal*. It is you who make the *eJournal* what it is. Access to the *eJournal* is free and I would like to encourage you to continue to make the greatest possible use of the journal.

Leaving the journal after almost two decades as co-editor, I cannot help but feel a tinge of sadness. Yet, I also feel excited and optimistic about the future of the *eJournal*. Under the energetic and visionary leadership of the new editorial team of Alexandra, Yan and Youngdeok, I am quietly confident that the *eJournal* will go from strength to strength as it enters its third decade of operation. Please continue to extend your ongoing support to the *eJournal* and the new editorial team.

Best regards,

Binh Tran-Nam
Founding co-editor, *eJournal of Tax Research*

Editorial

Professor Binh Tran-Nam's moving editorial note above shows his long history with the *eJournal of Tax Research* and his care and commitment to the stewardship of the *eJTR* over a nearly 20-year period. This involvement over such a long period of time is a huge accomplishment in itself. We and the School of Accounting, Auditing and Taxation (formerly Atax and then the School of Taxation and Business Law) could not be more grateful for all the time, energy and care that Professor Tran-Nam has invested in the *eJTR*.

As Professor Tran-Nam's editorial note mentioned, the *eJTR* is one of only a very few interdisciplinary journals which publishes articles across the tax law, tax policy, tax administration, economics and accounting disciplines in the Southern hemisphere. Professor Tran-Nam's clarity of vision has enabled the *eJTR* to flourish. In just the past six years, the journal has published articles on topics as diverse as:

- 'Taxation of automation and artificial intelligence as a tool of labour policy' (Vincent Ooi and Glendon Goh, 2022, Volume 19, Number 2)
- 'The effect of family ownership on aggressive tax avoidance in Indonesia' (Astuti Titiek Puji, Rahmawati, Y. Anni Aryani and Doddy Setiawan, 2019 Volume 17, Number 1)
- 'European VAT and the digital economy: recent developments' (Cristina Trenta, 2019, Volume 17, Number 1)
- 'Swimming upstream: leveraging data and analytics for taxpayer engagement – an Australian and international perspective' (Amanda Veit, 2019, Volume 16, Number 3)
- 'Shifting digital currency definitions: current considerations in Australian and US tax law' (Karen Powell and Monica Hope, 2019 Volume 16, Number 3)
- 'New Zealand's 'experience' with capital gains taxation and policy choice lessons from Australia' (Kerrie Sadiq and Adrian Sawyer, 2019, Volume 16, Number 2)
- 'The effect of professional standards on confirmation bias in tax decision-making' (Darius Fatemi, John Hasseldine and Peggy Hite, 2018, Volume 16, Number 1)
- 'Comparison of a lower corporate income tax rate for small and large businesses' (John Freebairn, 2017, Volume 15, Number 1)

- ‘Tax compliance costs in developing countries: evidence from Ethiopia’ (Wollela Abehodie Yesegat, Jacqueline Coolidge and Laurent Olivier Corthay, 2017, Volume 15, Number 1)
- ‘Risks of IFRS-based taxation: the application of section 24JB by authorised users to hedged relationships’ (Pieter van der Zwan, 2017, Volume 15, Number 1)
- ‘Effects of tax reform on average personal income tax burden and tax progressivity in Germany under the particular consideration of bracket creep’ (Chang Woon Nam and Christoph Zeiner, 2016, Volume 14, Number 3)
- ‘The UK general anti abuse rule: lessons for Australia?’ (Benjamin Kujinga, 2016, Volume 14, Number 3)
- ‘The purpose of tax law: a perspective on financial instruments’ fair value adjustments in Portugal’ (António Martins and Daniel Taborda, 2017, Volume 15, Number 3)
- ‘Behavioural insights in tax collection: getting the legal settings right’ (Emily Millane and Miranda Stewart, 2019, Volume 16, Number 3)

Our contributing authors are from a range of countries and disciplines and the jurisdictional coverage is similarly broad. Again, this is something that Professor Tran-Nam has passionately encouraged during his stewardship of the journal and we will continue to develop the vision and strengths.

What is most striking is Professor Tran-Nam’s kindness and generosity in nurturing us as new editors, teaching us what the role of editor involves and instilling in us the responsibility of the role. While the *eJTR* will soon start a new administration journey (moving onto an online professional platform) to make the process more seamless and timely for authors and reviewers, Professor Tran-Nam’s legacy will very much live on in its pages online.

We thank Professor Tran-Nam so much for everything. It was a privilege to work alongside you. You will be greatly missed by everyone who has interacted with you as a co-editor, an author and reviewer in our *eJTR* community.

Alex Evans, Youngdeok Lim and Yan Xu

Does inequality impact tax collection? Evidence from ACI (ASEAN-China-India) economies

Partha Gangopadhyay* and Siddharth Jain**

Abstract

This study examines the short-run and the long-run relationships between inequalities – measured by the (income) Gini coefficient – and taxes, using a panel of ten selected Asian countries from 1993 to 2015. After testing for the applicability of several econometric models of the panel Autoregressive Distributed Lag (ARDL) methodology, we choose the Pooled Mean Group (PMG) estimator to find that an increase in income Gini increases the tax-GDP ratio for the ACI economies in the long run. However, we also note that the income Gini has no (statistically significant) effect on taxes in the short run. The chain of causality is found to run from income inequalities to taxes and not from taxes to inequalities. This study confirms the prediction of the median voter hypothesis on the consequences of income distribution: greater inequality is associated with a larger tax-GDP ratio because of the greater redistribution that is sought by the median voter when income distribution is less equal.

Keywords: Inequality; Taxes; Pooled Mean Group (PMG) Autoregressive Distributed Lag (ARDL)

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1. INTRODUCTION

Over the period 1990-2015 remarkable economic achievements were recorded in Asia – despite the Asian Financial Crisis and the Global Financial Crisis rocking their regional economies – as the region grew at 6% per year (see Jain-Chandra et al., 2016). The poverty rate declined from 55% in 1990 to about 20% in 2015 (Jain-Chandra et al., 2016). Against this backdrop of economic successes, the Asian economies also witnessed rising income inequalities: since 1990 growth in the average Gini coefficient has been higher in Asia than for the rest of the world (see Zhuang, Kanbur & Maligalic, 2014, pp. 32 and 34, Figure 2.8). Further increases in income inequalities over this period impacted Asian inequalities as the population-weighted Gini for Asia rose from 39 to 46 (see Zhuang, Kanbur & Maligalic, 2014, p. 36). The populous countries of ASEAN, along with China and India, have experienced continuing increases in income inequalities in the region, which motivates us to examine the precise impact of inequalities on taxes for the populous nations of ASEAN, China and India (collectively called the ACI economies).

With the unprecedented GDP growth, ACI economies experienced significant technological changes, increases in labour force participation by low-skilled workers, declining top marginal income tax rates, widening inter-regional inequality within their economies and pressures from globalisation and liberalisation of regional factors and product markets. These changes are held responsible for growing inequality (see IMF, 2014). The impacts of inequality on other economic outcomes have been extensively studied in the extant literature.¹ In this article, we seek to establish whether income Gini can drive fiscal (tax) outcomes. Our primary motivation behind this work is predicated upon the possibility that inequality can significantly influence the political outcomes and, thereby, fiscal outcomes in a society. It is an accepted tenet of public finance that governments exist for the provision of public goods in addition to fighting adverse consequences of missing markets, imperfect information and externalities (see Grossman, 1988). Governments also offer growth stimuli by laying down public investment that, in turn, promotes productivity of private investment (Khan & Kumar, 1997). Thus, effective governance calls forth adequate resources at the command of governments, whether in developing or developed countries, ‘to satisfy not only the short-term needs of its population but also its long-term developmental goals’ (Tran-Nam & Le, 2022, p. 194). One of the main development goals is to promote equitable distribution to fight poverty (see Goda, 2017; Galor & Moav, 2004; Rodrik, 1999 among others).

The increasing relevance of governments in modern societies is inexorably linked with Wagner’s Law which posits that government spending, and hence tax revenue, is

¹ Though income inequalities might provide incentives for investment and, thereby, trigger economic growth (Barro, 2000; Forbes, 2000), income inequalities are also held responsible for adversely impacting on macroeconomic stability and sustainable growth (Ostry, Berg & Tsangarides, 2014). Cingano (2014) found that higher inequality fosters aggregate savings which permits capital accumulation because the rich have a lower propensity to consume. Galor and Moav (2004) showed that rising inequality can compromise the health status of the poor and formation of human capital and thereby undermine growth. Alesina and Perotti (1995) and Perotti (1996) argued that political and economic instabilities – caused by rising inequality – reduce investment and, hence, reduce growth. The work of Mah-Hui and Khor (2011) and Goda (2017) showed that rising inequalities can trigger financial shocks. Rodrik (1999) argued that inequalities reduce social harmony that is necessary to maintain resilience by absorbing economic and financial shocks.

endogenous and positively responds to the rising per capita income of a country (Peacock & Scott, 2000). In other words, economic growth paved the way for ‘cultural and economic progress’ such that the public demands larger state activities in lieu of private economic activities (Peacock & Wiseman, 1961, p. 16). Our main goal in this article is to investigate the effect of inequalities on taxes.

Despite a relative scarcity of studies on the impacts of inequalities on taxes, in an interesting recent work, Islam et al. (2018) utilise the panel models to examine the effects of inequalities on income tax-GDP ratios for 21 OECD countries over the period 1870-2011. Since taxes have been used by policy-makers to reduce inequalities (Islam et al., 2018), the reverse causality running from taxes to inequalities can create estimation problems for any model examining the impact of inequality on taxes. This is an important element missing from the work of Islam et al. (2018). In this article, we entertain the possibility of mutual causality, or interdependency, between inequalities and taxes. We will then establish that there is no evidence of reverse causality running from taxes to inequalities for the countries of our choice. Hence, our work will establish unequivocally whether inequalities impact taxes for the ACI economies. It is also imperative to note that increases in within-country income inequalities in the ACI region, during 1990-2015, were the largest in the global economy. The plan of the remainder of the article is as follows: in section 2, we review the relevant literature. Section 3 outlines the analytical foundation, methodology, and data sources. In section 4, we discuss the findings. Finally, in section 5, we conclude.

2. LITERATURE REVIEW

As governments seek to control inequality through fiscal measures, several researchers have studied the determinants of endogenous tax policies and taxes (e.g., Hettich & Winer, 1988; Besley & Case, 1995; Milanovic, 2000; Harms & Zink, 2003; Aidt & Jensen, 2009; Corneo & Neher, 2015). Although only a few studies have explored the impact of inequality on taxes, the findings are mixed (Islam et al., 2018): for instance, in an analysis of 50 countries for the period 2007-2011, Aizenman and Jinjark (2012) note that tax revenues fall as a percentage of GDP as inequality rises. However, analysing data from 75 countries for the year 2004, Adam, Kammass and Lapatinas (2015) show that as inequality increases, (capital) taxes as a percentage of GDP increase, while the share of labour taxes declines. At the regional level, Boustan et al. (2013) show that inequality increases taxes in the US – at the municipality and school district level from 1970 to 2000. By contrast, using a laboratory setting, Agranov and Palfrey (2015) argue that inequality increases tax rates.

Analysing the impact of income inequality on the tax capacities of 96 countries using the tax stochastic frontier model, Pessino and Fenochietto (2010) confirm that a higher Gini coefficient lowers the tax capacities of governments and thus adversely impacts tax efforts. In a subsequent analysis, Fenochietto and Pessino (2013) analysed 113 countries and concluded that (among other factors) income distribution (Gini coefficient) negatively impacted tax revenues as a percentage of GDP. Additionally, the study found that European economies with strong income distribution policies operated near their tax capacity.

According to Bird, Martinez-Vazquez and Torgler (2014), if income inequality results from the unfair distribution of tax burdens, the consequence would be lower levels of

trust in public institutions, eventually lowering tax efforts.² Similarly, treating income inequality as a factor explaining tax inefficiency in a Stochastic Tax Frontier Model, Tran-Nam and Le (2022) find that the taxpayers' perception of a higher inequity increases the tax level non-compliance via several tax-evading and avoidance measures.

In an analysis of the issue in 21 OECD countries, contrary to the predictions of the median voter argument,³ Islam et al. (2018) noted that inequality depresses income tax ratios and suggest that the effect is more significant for more democratic countries.⁴ However, in a subsequent analysis of OECD countries using 'Social Inequality cumulation', Kuhn (2019) argues that voters, perceiving a high level of wage inequality, tend to be more supportive of redistributive policies and progressive taxation.

3. MOTIVATION, METHODOLOGY AND DATA

In what follows in section 3.1 below, we provide the rational foundation of our work and the main motivation behind this study.

3.1 Political transaction costs: inequality *vis-à-vis* taxes

We make a departure from the analysis in previous studies by exploiting the concept of political transaction costs⁵ to understand and uncover the precise relationships between taxes and inequalities. For political markets – being characterised by incomplete political rights, imperfect enforcement agreements, bounded rationality, and imperfect information (as highlighted by the New Institutional Economics: see North, 1990a, 1990b; Nye, 1997; Pierson, 2000; Moe, 2005, among others) – institutions, conventions, and rules of the game become crucial determinants of the political inputs and political outputs due to pervasive transaction costs (see Pierson, 2000). It is well-received in the political transaction cost literature that determinants of political outcomes are often 'opaque' and 'unclear' with limited observability and measurability (Pierson, 2000). As reflected in an earlier work of Dahlman (1979), the relevant political transaction costs of tax policies can assume three forms: first, search and information costs of suitable tax policies. Secondly, bargaining and negotiation costs among political actors. Finally, the enforcement, monitoring and policing costs. If inequalities impinge on the determinants of transaction costs, then inequalities can influence tax outcomes. The primary motivation of this study is to empirically assess the precise relationship between inequalities and tax outcomes.

² Tax effort is defined as the ratio of actual taxes and the potential taxes (Tran-Nam & Le, 2022).

³ The median voter model implies that the political outcomes in a democracy reflect the median voter's preference (Congleton, 2004). The theory predicts that, under political pluralism, political parties compete for the majority of the voters by focusing their attention on the outcome most preferable by an electorate with a median income. Thus, an expected result is that as income inequality expands, there will be an increase in taxes to serve the distributive interest of the median voter.

⁴ These authors claim that a long term decline in market inequality, especially between 1915 and 1980, resulted in historical growth in tax rates; however, since the 1980s, rising inequality has adversely impacted tax revenues, exerting pressure on national budgets and debts.

⁵ The role of transaction costs in the political process has been amply demonstrated in the work of North (1990a) and Dixit (1996, 2003): the transaction cost theory in politics is predicated upon (i) costly information, (ii) subjective models of decision-making by political actors, and (iii) imperfect enforcement of agreements (see North, 1990a; p. 355). Such costs arise for transactions between politicians and citizens (Dixit, 1996, 1998). Political transaction costs are also rampant in interactions between politicians (see Weingast & Marshall, 1988; Epstein & O'Halloran, 1999; Spiller & Tommasi, 2007).

3.2 Methodology

Our methodology is based on a positivist research framework and a quantitative method utilising secondary data. More specifically, we postulate a simple model that taxes are determined by inequalities as applied by Islam et al. (2018) and others:

$$\ln \text{TAX}_{it} = \beta_0 + \beta_1 \ln \text{TAX}_{i,t-1} + \beta_2 \ln \text{GINI}_{it} + \gamma X_{it}' + a_i + \varepsilon_{it}, \quad (1a)$$

where TAX_{it} is the share of tax revenues in GDP for country i in year t , GINI_{it} is the measure of income inequality for country i in year t , X_{it} is a vector of control variables – namely urbanisation ($\ln \text{URBAN}_{it}$), per capita GDP ($\ln \text{PCGDP}_{it}$) and trade openness ($\ln \text{TRADE}_{it}$) – \ln is the natural logarithmic transformation of the variables (not the decimal values). Note that a_i denotes the country fixed effect, and ε_{it} is the error term.

The panel ARDL model, which we will apply, is specified in section 3.3.2. In section 3.3.1, we summarise the panel unit root tests to justify the rationale for using the panel ARDL methodology. Islam et al. (2018), instead of applying the panel ARDL methodology, used panel data analysis, which fails to adequately handle the non-stationarity of variables (like taxes and inequalities) over a long haul with the possibility of spurious statistical significance (see Brückner & Ciccone, 2011; Ciccone, 2011, 2013). The panel ARDL method is robust to handle both autocorrelation, and non-stationarity (see Alsamara et al., 2017; Gangopadhyay & Nilakantan, 2018), and can simultaneously handle both stationary and nonstationary variables, thus bypassing the critique of Ciccone (2013).

3.3 Variables and data

Our panel sample has ten (10) countries, comprising eight (8) populous nations (Myanmar, Cambodia, Indonesia, Laos, Malaysia, the Philippines, Thailand and Vietnam) of the ten countries from the ASEAN grouping and China and India, for the 23 years of the period 1993-2015. We ignored Singapore and Brunei for their small populations.

The ACI economies have a total population of about 3 billion and a combined GDP of USD 4.8 trillion. The average tax to GDP ratio among our sample countries is 12.12%, and the mean of our measure of the distribution of income, the Gini coefficient, is 34.80. Countries analysed in the study have average urbanisation of 36.28%, and trade openness (ratio of total trade to GDP) for the samples stood at 86.64%.

Table 1: Summary Statistics for the ACI Economies from 1993 to 2015

Variable	Mean	Standard Deviation	Minimum	Maximum
Tax to GDP (TAX)	12.12	4.90	1.96	22.46
Gini (GINI)	34.80	6.32	25.65	53.26
Urbanisation (URBAN)	36.28	13.71	16.49	74.21
Trade Openness (TRADE)	86.64	48.31	19.31	220.41
Per Capita GDP (lnPCGDP)	8.95	5	5.41	23.04

Data Source: The Asian Development Bank (ADB) website; inequality dataset also uses the WIID database of UNU-WIDER to have a consistent series.

3.3.1 Panel unit root tests

Prior to conducting any estimations, panel unit root tests were implemented to assess the order of integration. The Levin, Lin and Chu (2002) (LLC) test and the Im, Pesaran and Shin (2003) (IPS) test are the two most extensively employed techniques to determine the stationarity of variables in panel studies. While the LLC test results depend on pooled data, the IPS test results are based on the average of Augmented Dickey-Fuller (ADF) statistics.

The LLC panel unit root test for each variable of interest y_i is based on the following equation:

$$y_{it} = \rho_i y_{i,t-1} + z'_{it} \gamma + u_{it} \quad (1b)$$

$$i = 1, \dots, N; t = 1, T$$

where z_{it} is the deterministic component and u_{it} is a stationary process. One of the assumptions of the LLC test is that residuals are independently and identically distributed with zero mean and variance σ_u^2 and $\rho_i = \rho$ for all values of i . The null hypothesis of the LLC test is, $H_0: \rho = 1$, which means that all series in the panel have a unit root, whereas the alternative is $H_1: \rho < 1$, which means that all series are stationary (Bildirici, 2014).

While the LLC test allows for heterogeneity in the intercept terms, the IPS test allows for heterogeneity in both the slope and the intercept terms for the cross-section units. The IPS unit root test can be specified as:

$$y_{it} = \rho_i y_{i,t-1} + \sum_{j=1}^{p_i} \varphi_{ij} \Delta y_{i,t-j} + z'_{it} \gamma + \varepsilon_{it} \quad (2)$$

Similarly to LLC, IPS tests the null hypothesis $H_0: \rho = 1$, which means that all series in the panel have a unit root. The alternative hypothesis of the test is that part of the series is stationary, i.e. $H_1: \rho < 1$.

Table 2 below describes the panel unit root test results for our key variables of interest.

Table 2: Unit Root Test Results for the Variables of Interest

Variables	Levin, Lin & Chu		Im, Pesaran & Shin	
	Level	First Difference	Level	First Difference
lnTAX	-1.692***	-5.325***	-0.7573	-4.577***
lnTRADE	-0.966	-4.663***	1.512	-4.705***
lnURBAN	-4.172***	-1.717**	-1.291*	1.306
lnPCGDP	-2.493***	-3.571***	-0.5527	-2.951***
lnGINI	-4.338***	-1.959**	-2.870***	-2.620***

*** indicates significance at the 1% level, ** indicates significance at the 5% level, and * indicates significance at the 10% level. Lag lengths were determined by the Schwarz Information Criterion (SIC).

The panel unit root results in Table 2 indicate that the variables of interest are stationary at either level or first difference, confirming that the panel ARDL technique is suitable for our study. Precisely, the LLC test shows that lnTAX, lnURBAN, lnPCGDP, and lnGINI are stationary at $I(0)$, while lnTRADE is stationary at $I(1)$. The IPS unit root test indicates that lnURBAN and lnGINI are stationary at level, while all other variables of interest are stationary at first difference.

3.3.2 Panel ARDL models

A major issue in our dataset is that not all our variables of interest are integrated of the same order. To overcome this problem, we have employed the panel ARDL technique, as proposed by Pesaran and Smith (1995) and Pesaran et al. (1999). The Panel ARDL model is a variety of the ARDL (p,q) model, which is estimated as below (Pesaran et al., 1999):⁶

$$y_{it} = \sum_{j=1}^p \lambda_{ij} y_{i,t-j} + \sum_{j=0}^q \delta'_{ij} x_{i,t-j} + \mu_i + \varepsilon_{it} \quad (3)$$

where y_{it} is the dependent variable (Taxes) x_{it} ; ($k \times 1$) is the vector of explanatory variables for group i (Gini and control variables); μ_i represents the fixed effects; the coefficients of the lagged dependent variables, λ_{ij} , are scalars; and δ_{ij} are $k \times 1$ coefficient vectors. $\varepsilon_{i,t}$ represents the error terms, i ($= 1, 2, \dots, N$) labels country i and t ($= 1, 2, \dots, T$) labels year t .

⁶ Panel ARDL is a preferred option if panel cointegration models are not applicable for regressors being $I(0)$ and $I(1)$. Pesaran and Shin (1999) argued that the method of panel ARDL is superior regardless of whether the underlying regressors exhibit $I(0)$, $I(1)$ or a mixture of both and the time span (T) is over 20 years and number of panels (N) is small. It is not appropriate to use the dynamic generalised method of moments (GMM) estimators due to the nature of dataset with $N=10$ and $T=23$. Following the extensive literature on dynamic panel data, we will implement several estimators to assess the postulated relationship between taxes and inequalities, by assessing the suitability of Mean Group (MG), Pooled Mean Group (PMG) and Dynamic Two-Way Fixed Effect (DFE) estimators (see Pesaran & Smith, 1995; Pesaran et al., 1999).

The re-parametrised ARDL (p, q, q, \dots, q) error correction model is specified as:

$$\Delta y_{i,t} = \Phi_i y_{i,t-1} + \beta'_i x_{it} + \sum_{j=1}^{p-1} \lambda^*_{ij} \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \delta^*_{ij} \Delta x_{i,t-j} + \mu_i + \varepsilon_{i,t} \quad (4)$$

Note in (4):

$i = 1, 2, \dots, N$, and $t = 1, 2, \dots, T$,

$$\Phi_i = -(1 - \sum_{j=1}^p \lambda_{ij}),$$

$$\beta_i = \sum_{j=0}^q \delta_{ij},$$

$$\lambda^*_{ij} = -\sum_{m=j+1}^p \lambda_{im}, \quad j = 1, 2, \dots, p-1,$$

$$\delta^*_{ij} = \sum_{m=j+1}^q \delta_{im}, \quad j = 1, 2, \dots, q-1.$$

If we stack the time-series observations for each sample, then (4) can be written as:

$$\Delta Y_i = \Phi_i Y_{i,-1} + X_i \beta_i + \sum_{j=1}^{p-1} \lambda^*_{ij} \Delta Y_{i,-j} + \sum_{j=0}^{q-1} \Delta X_{i,-j} \delta^*_{ij} + \mu_i + \varepsilon_i \quad (5)$$

$i = 1, 2, \dots, N$, where $Y_i = (y_{i1}, \dots, y_{iT})'$ is a $T \times 1$ vector of the observations on the dependent variable of the i th group, $X_i = (x_{i1}, \dots, x_{iT})'$ is a $T \times k$ matrix of observations on the regressors that vary both across groups and time periods, $1 = (1, \dots, 1)'$ is a $T \times 1$ vector of 1s, $Y_{i,-j}$ and $X_{i,-j}$ are j period lagged values of y_i and ΔX_i , and $\Delta Y_i = Y_i - Y_{i,-1}$, $\Delta X_i = X_i - X_{i,-1}$, $\Delta Y_{i,-j}$ and $\Delta X_{i,-j}$ are j period lagged values of ΔY_i and ΔX_i , and $\varepsilon_i = (\varepsilon_{i1}, \dots, \varepsilon_{iT})'$.

3.3.3 Pooled Mean Group (PMG) estimator

When analysing panel data, econometric approaches can be classified into two distinct categories, namely, the Mean Group (M.G.) estimator and the Pooled Mean Group (PMG) estimator. Proposed by Pesaran and Smith (1995), the M.G. estimator accommodates individual heterogeneity by estimating individual equations for each cross-section and averaging the parameter estimates. This might appear to be a consistent estimator, yet it is not necessarily an efficient estimator of the average of the heterogeneous parameters. Alternatively, the cross-sections can be pooled, which allows for different intercepts but requires that the slope parameters are alike, which is regarded as a highly restrictive assumption (Asafu-Adjaye et al., 2016).

The PMG estimator offers a balance between these two competing approaches. It allows short-run coefficients to vary across countries (like the M.G. estimator), while the long-run coefficients are required to be homogeneous for all cross-sections (akin to the fixed effects estimator). Some of the key advantages of the PMG estimator are: first, the PMG estimator can be engaged to analyse the variables regardless of whether the variables are $I(0)$ or $I(1)$ – as is the case in the present study; second, short-run causality inferences

can be drawn even if the presence of cointegration is not formally detected, and finally, if variables are in logarithms, then the long-run coefficients can be interpreted as elasticities (Pesaran et al., 1999).

Consider the following ARDL (1,0,2,0,0) equation for the income Gini Y_{it} for country i at time t :

$$Y_{it} = \lambda_i Y_{i,t-1} + \sum_{j=0}^1 \delta'_{ij} X_{i,t-j} + \mu_i + \varepsilon_{it} \quad (6)$$

where $X_{i,t-j}$ is an $n \times k$ vector of the logarithms of the explanatory variables (lnGINI, lnTRADE, lnURBAN, lnPCGDP), δ_{ij} is a $k \times 1$ coefficient vector and μ_i accounts for country-specific effects. Equation (6) above can be rearranged into an error correction model of the following form:

$$\Delta Y_{it} = \phi_{1,i} (Y_{i,t-1} - \theta'_{1,i} X_{i,t-1}) + \delta_{1,i}^* \Delta X_{it} + \mu_i + \varepsilon_i \quad (7)$$

Similarly, the remaining equations can be expressed – in a panel vector autoregressive (VAR) framework using variable names – as the following:

$$\Delta \ln TAX_{it} = \phi_{1,i} (\ln TAX_{i,t-1} - \theta'_{1,i} X_{i,t-1}) + \delta_{1,i}^* \Delta X_{it} + \mu_i + \varepsilon_i \quad (8.1)$$

$$\Delta \ln GINI_{it} = \phi_{1,i} (\ln GINI_{i,t-1} - \theta'_{1,i} X_{i,t-1}) + \delta_{1,i}^* \Delta X_{it} + \mu_i + \varepsilon_i \quad (8.2)$$

$$\Delta \ln TRADE_{it} = \phi_{1,i} (\ln TRADE_{i,t-1} - \theta'_{1,i} X_{i,t-1}) + \delta_{1,i}^* \Delta X_{it} + \mu_i + \varepsilon_i \quad (8.3)$$

$$\Delta \ln URBAN_{it} = \phi_{1,i} (\ln URBAN_{i,t-1} - \theta'_{1,i} X_{i,t-1}) + \delta_{1,i}^* \Delta X_{it} + \mu_i + \varepsilon_i \quad (8.4)$$

$$\Delta \ln PCGDP_{it} = \phi_{1,i} (\ln PCGDP_{i,t-1} - \theta'_{1,i} X_{i,t-1}) + \delta_{1,i}^* \Delta X_{it} + \mu_i + \varepsilon_i \quad (8.5)$$

where, in each instance, $X_{i,t}$ is an $n \times k$ vector of the remaining explanatory variables; the short-run coefficients are denoted by δ^* s and the θ s denote long-run coefficients; and the ϕ s represent the panel error correction terms (ECTs), which must be both negative and significant to confirm the existence of a long-run relationship between the dependent and explanatory variables (Pesaran et al., 1999).

Table 3: The Pooled Mean Group Results for the ACI Economies

Dependent Variable	Model 1 lnTAX (Eq: 8.1)	Model 2 lnGINI (Eq: 8.2)	Model 3 lnTRADE (Eq: 8.3)	Model 4 lnURBAN (Eq: 8.4)	Model 5 lnPCGDP (Eq: 8.5)
Long-run coefficients					
lnTAX		-0.043	-0.333*	0.084***	-1.297
lnGINI	0.794***		1.564***	-0.074	-4.194
lnTRADE	-0.212**	0.089		0.051***	5.299
lnURBAN	0.913**	-1.525***	1.772***		3.962
lnPCGDP	-0.009	0.959***	-0.676***	-0.054**	
ECT	-0.229***	0.241**	-0.149**	0.135	-0.003
Short-run coefficients					
lnTAX		-0.043	0.282	0.004	0.081**
lnGINI	2.543		0.275	0.047*	0.149
lnTRADE	-0.049	-0.062*		-0.002	0.002
lnURBAN	-112.324	2.247	45.787		-0.232
lnPCGDP	1.319***	0.417**	0.547	-0.067	

4. FINDINGS

On the assumption of long-run homogeneity, we bypassed the restrictive panel cointegration tests. In our case, cointegration has been confirmed by the statistical significance of the long-run coefficients of the PMG estimation and the ECT terms presented in Table 3. The PMG restricts the long-run equilibrium to be homogeneous across countries while allowing for heterogeneity in the short-run relationship (Pesaran et al., 1999). The PMG estimator has been noted to be robust, and we have used the Hausman test to verify the appropriateness of using the PMG estimator for our postulated models. For examining the short and long-run relationships between inequalities (lnGINI) and taxes (lnTAX) and other variables, the panel ARDL – initiated by Pesaran and Smith (1995) and Pesaran et al. (1999) – is capable of handling the underlying regressors that exhibit a mixture of I(0) and I(1) while none of the variables is I(2) (see Pesaran and Shin, 1999) with a time span of over 20 years. From Table 3, our main findings are as follows:

- Model 1 and Model 3 are the only ones that display long-term cointegration since the ECT term is negative and statistically significant, while the long-term coefficients are also statistically significant.
- The results for Model 1 establish that causality runs from inequality (lnGINI) to taxes (lnTAX) as taxes and inequality bear a positive relationship. In the short-run, the per capita income (lnPCGDP) has a positive impact on taxes, but not in the long-run.

- Model 2 shows that taxes do not have a long-term impact on inequality. In other words, there is no evidence of causality running from taxes to inequality.
- Model 3 shows that the internationalisation of the economies of the chosen nations – measured by $\ln\text{TRADE}$ – has been driven by both taxes (-) and inequalities (+), while there seems to be evidence of mutual causality between taxes ($\ln\text{TAX}$) and internationalisation ($\ln\text{TRADE}$). Thus, further empirical development will be necessary to fully unravel the comprehensive interrelationships between taxes ($\ln\text{TAX}$) and internationalisation ($\ln\text{TRADE}$).
- Model 4 and Model 5 show that neither urbanisation nor development (per capita GDP) bears a long-run relationship with income inequality and other control variables.

Model 1 shows that the elasticity of taxes (as a percentage of GDP) with respect to income Gini is 0.8 and statistically significant at the 1% level. In other words, if the income Gini increases (declines) by 1%, tax revenues (as a percentage of GDP) increase (decrease) by 0.8% in the long run. As the ECT term shows, deviations from the equilibrium get corrected by 22.9% (-0.229) annually for the chosen countries. Model 1 confirms the prediction of the median voter hypothesis on the consequences of income distribution: greater inequality is associated with a larger tax-GDP ratio because of the greater redistribution that is sought by the median voter when income distribution is less equal (see Milanovic, 2000, 2003). We did not find an impact of per capita GDP ($\ln\text{PCGDP}$), as a measure of overall development, to exert any influence upon taxes.⁷

Internationalisation ($\ln\text{TRADE}$) is known to have two mutually opposing impacts on taxes, and we find that $\ln\text{TRADE}$ has a negative, statistically significant, long-term effect on $\ln\text{TAX}$ for the countries under consideration.⁸

We also note that urbanisation ($\ln\text{URBAN}$) has a positive – and statistically significant – long-term impact on taxes.⁹ The elasticity of taxes (as a percentage of GDP) to urbanisation is positive and statistically significant at a 5% level. An increase (decrease) in urbanisation by 1% leads to an increase (decrease) in the tax-GDP ratio by 0.913%.

5. CONCLUSION

The existing literature has extensively examined the impacts of taxes on inequalities within and between nations. It is only recently that the empirical consequences of

⁷ In the existing literature, the effect of per capita GDP on taxes has been ambiguous: on the one hand, it is expected to have a positive effect because as a country experiences a higher level of development, the formalisation and the competitiveness of the economy expand with expanding possibilities for taxes. On the other hand, an open economy reduces tariffs and trade barriers and this fact can have negative effects on tax collection (Baungsaard & Keen, 2010). Depending on the relative strengths of these two effects, the overall effect of PCGDP on TAX is determined. So for the ACI economies, the two opposing forces seem to nullify each other.

⁸ Foreign trade and investment are known to boost taxes by improving competitiveness and the formalisation of an economy (see Cassou, 1997; UNCTAD, 2000; Martín-Mayoral & Uribe, 2010; Gugler & Brunner, 2007). With increased international trade, the tax bases also shift from the domestic economies leading to lower taxes, *ceteris paribus* (see Baungsaard & Keen, 2010).

⁹ It is well-recognised in the existing literature that urbanisation is driven by increasing roles for the industrial and services sectors. Not only do the industrial and services sectors have a large tax base – *vis-à-vis* the agricultural sector – it is easier to tax industrial enterprises than agricultural enterprises. Thus increased urbanisation is expected to increase taxes (see Eltony, 2002).

inequalities have been explored for the tax-GDP ratios of the OECD economies: Islam et al. (2018) – contradicting the theoretical predictions of the median voter models – showed that inequalities significantly lowered the income tax to GDP ratios of OECD countries over a very long horizon spanning from 1870 to 2011. One of the apparent weaknesses of the work of Islam et al. (2018) is their neglect of the (potential) reverse causality coming from taxes to inequalities, which has been a well-received doctrine in the extant literature. In this work, we establish that there is no evidence of the reverse causality from taxes to inequalities for the ACI economies. The main methodological weakness in the work of Islam et al. (2018) is the known inadequacy of their panel models to handle non-stationarity and autocorrelation of variables over a long horizon (see Bruckner & Ciconne, 2011; Ciconne, 2011, 2013). Hence we chose the (panel) ARDL methodology, being robust to autocorrelation, non-stationarity and mild endogeneity, that can simultaneously handle both stationary and nonstationary variables (see Gangopadhyay & Nilakantan, 2018).

By applying a robust model based on the panel ARDL methodology – for another set of countries where inequalities and taxes play a significant role – we are able to establish that there is a long-run relationship between income inequalities and taxes with the causality running only from inequalities to taxes. With no evidence of causality from taxes to inequalities for ACI economies, our results are credible. However, contrary to the findings of Islam et al. (2018), our results fully support the theoretical predictions of the median voter models that argue that increases in inequalities will increase taxes. We found that this elasticity of taxes with respect to income Gini is inelastic (0.8).

Our results suggest that growing income inequality can incentivise governments towards favouring populist policies in the ACI economies: for instance, as income inequality rises, lower-income voters demand higher taxes and stricter regulation (see Persson & Tabellini, 1994). Moreover, governments are also aware of a potential erosion of trust, caused by rising inequality, which can increase tax non-compliance among citizens (see Tran-Nam & Le, 2022). A loss of trust can trigger serious political crises, or even political instability, as argued by Keefer and Knack (2002). Hence, rational governments will have an incentive to raise taxes in response to rising inequality to control tax non-compliance (Tran-Nam & Le, 2022). Nonetheless, as Harberger (2003) stressed, any attempt to impose unduly redistributive taxes might backfire.

Thus, our study has the following three policy recommendations for the ACI region. First, as Huang, Morgan and Yoshino (2019, p. 1) note, similarly to the findings of Zhuang, Kanbur and Rhee (2014, pp. 38-39), a large proportion of inequality in Asia stems from barriers to education and problems with human capital formation. Increased taxes can finance public spending for improving access to education, augmenting human capital and skills of the weaker sections of society. Improved access to education can, in turn, help lower long-run income inequality and thereby lower the needs for future taxation. Short-term policy implications might include transfers to low-income families for improving their health and educational outcomes, which can reduce future inequality and, in turn, the burden of taxation. Secondly, classical developmental theories posit urbanisation as a critical means for reshaping emerging economies – burdened with a large stock of surplus labour in the rural sector. Urbanisation can help narrow the urban-rural gap and, thereby, reduce income inequality (Wan & Zhuang,

2015)¹⁰ and, hence, lower the needs for larger taxes. Finally, governments in the ACI region must promote policies that create equal access to public goods and services, alleviate corruption to enhance institutional quality and governance and reduce inequality to lower future taxes for promoting inclusive (economic) growth (Dollard & Miller, 1950, ch. 3).

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¹⁰ However, as hypothesised by Kuznets (1955), it may take a longer timeframe before urbanisation mitigates income inequality. Hence, investments in developing communication and transport infrastructure in rural and inland areas, increasing their connectivity with urban economic hubs, could be a more efficient and immediate remedy.

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The influence of reciprocity nudges on tax compliance in South Africa: evidence from an experimental study

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Abstract

Research on the effects of nudging as a tool to influence tax compliance has provided limited and sometimes inconclusive empirical evidence. Using a mixed methods research design, this study examines the impact of reciprocity nudges (in the form of television advertisements) on taxpayer compliance in South Africa.

Our results show a statistically significant association between exposure to a reciprocity nudge and tax compliance provided that the nudge message contains specified structural and content attributes. It also establishes, *inter alia*, that the timing of the nudge may not be influential. The study extends the current knowledge of how insights from behavioural economics can be incorporated to assist in influencing tax compliance, particularly in a developing country setting.

Key words: tax compliance; nudging; reciprocity; message attributes; South Africa

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1. INTRODUCTION

Taxes are an important component of any economy; they play a vital part in the provision of basic public services and goods for the benefit of all citizens of a country. It is for this reason that tax authorities have been tasked by their governments with administering the tax system which entails, amongst other responsibilities, increasing the overall levels of tax compliance.¹ This has become an increasingly important responsibility in light of the dependence of many economies on tax revenues and the continuous search by some African countries for solutions to the need for reduced dependence on foreign aid, and is likely to become even more important as a result of the impact of COVID-19 on already stretched government resources.

In seeking to increase levels of tax compliance, tax authorities have widely implemented traditional enforcement strategies such as tax audits and penalties (McKerchar & Evans, 2009). These enforcement strategies are, however, both costly and time consuming (Kirchler, Hoelzl & Wahl, 2008). As a result, tax authorities have begun to turn their attention towards identifying and promoting alternative non-enforcement strategies to encourage tax compliance.

These alternative strategies are wide-ranging and include measures which seek to change the behaviour of taxpayers by making them more inclined to comply with their tax obligations. This article explores one of those alternative strategies, namely the effect of communicating reciprocity messages as a ‘nudge’ to encourage tax compliance.

‘Nudging’ (Thaler & Sunstein, 2009) has become a policy tool used by governments across many areas, including healthcare, consumer behaviour, education (Antinyan & Asatryan, 2020) and increasingly taxation, to encourage or discourage certain behaviours amongst citizens. Although the term nudging has been brought to the forefront in recent years through the work of Thaler and Sunstein (2009), earlier tax compliance studies conducted by researchers including Blumenthal, Christian and Slemrod (2001), Hasseldine et al. (2007) and Wenzel (2001) would nowadays be classified as ‘nudging’ studies.

‘Reciprocity’ nudges refer to nudges using beliefs about the use of resources by the government (Castro & Scartascini, 2015, p. 66). They can be contrasted with other forms of nudges used in promoting aspects of tax compliance, such as social norm nudges and deterrence nudges. Social norm nudges refer to nudge messages about tax compliance behaviour of others and deterrence nudges refer to nudge messages which emphasize traditional determinants of compliance, such as audit probabilities and penalty rates. Social norm nudges and deterrence nudges are excluded from this article as most studies on tax nudging have focused on these types of nudge. However, existing studies provide limited and contradictory evidence regarding the effectiveness of reciprocity nudge messages (Mascagni, 2018).

Blumenthal et al. (2001) found that using reciprocity messages as nudges had no significant effect. In contrast, Hasseldine et al. (2007) found a significant effect on tax compliance. Furthermore, the literature appears to lack evidence of the effects of the

¹ In simple terms, tax compliance can be taken to mean compliance by a taxpayer with the obligations imposed by the tax system.

time lag between the communication of a nudge message and the compliance decision. Nudge messages may decay over time if overlaid with distractions prior to making a tax compliance decision. This article, therefore, addresses this problem by testing the effects of time lag, by using the manner in which messages are ordered as a proxy for time lag.

Given the current interest of scholars and governments in nudging and the move by some African revenue authorities (such as the South African Revenue Service (SARS) and the Botswana Unified Revenue Service) towards using advertising campaigns as both an education tool and as a tool to communicate reciprocity messages, this article aims to shed light on the effectiveness of communicating such messages in multicultural developing countries, such as South Africa.

To meet the research objective of this study, a laboratory-based experiment is employed. We also conduct an analysis of structural and content attributes of 12 reciprocity nudge messages (in the form of television advertisements) and select two of those messages for the purpose of designing the laboratory-based experiment.

This study contributes to the literature as it improves the understanding of using reciprocity messages as a nudge to improve tax compliance in a developing country. The study also contributes to the literature as it focuses on the effectiveness of reciprocity nudge messages using audiovisual media (in the form of television advertisements) as a mode of delivery, in contrast to previous studies which have focused on the use of paper letters mailed to taxpayers. The study further contributes by focusing upon the key role played by the structural and content attributes of the message in determining the effectiveness of a nudge. There are also important considerations that were identified in this research that could be useful to revenue authorities or policy-makers, particularly those in developing countries. As choice architects, with reference to the context in which individuals make tax compliance decisions, it is important that revenue authorities and policy-makers give careful thought to how tax nudges are designed to ensure that such messages are successful. This study provides a comprehensive view by using mixed methods to examine the design aspect and also the cause-and-effect aspect of nudge messages. Finally, Behavioural Insights Team (2019) highlighted the importance of timing of nudge messages and noted that the same message conveyed at different times can lead to differences in the success of the message in encouraging tax compliance behaviour. The current study adds to this body of knowledge by considering the time related effects.

Overall, the results provide clear evidence that reciprocity nudge messages can positively influence tax compliance behaviour. A reciprocity nudge message that contains the greatest number of structural and content attributes of effective messages is found to have a statistically significant positive influence on tax compliance. This highlights the importance of designing nudge messages that have the appropriate structural and content attributes which capture the attention of the target audience.

The remainder of this article is organised as follows: section 2 provides a brief review of the literature, focusing upon how reciprocity nudges designed to promote tax compliance have been used and the results which have been obtained. Section 3 details the research method applied in this study. Section 4 provides results and discussion and section 5 sets out the conclusions, implications and limitations of the study.

2. LITERATURE REVIEW

Research has consistently shown that individual behaviour is affected by a wide range of factors, such as those that stem from group considerations such as, for example, social norms, altruism, reciprocity, trust, tax morale, shame and guilt (Alm, 2019). It has also established that people's beliefs can be influenced by providing them with information regarding norms (Castro & Scartascini, 2015). The use of messages, whether delivered through letters, television or other media, to encourage taxpayers to comply with their share of taxes can be seen as nudging taxpayers in the 'right' direction, namely to complying with their tax obligations.

There has been a steady increase in the number of studies that have involved sending taxpayers messages that may have a positive influence on tax compliance (Ariel, 2012; Cyan, Koumpias & Martinez-Vazquez, 2017; Fellner, Sausgruber & Traxler, 2013; Gallego & Ortega, 2022; Koumpias & Martinez-Vazquez, 2019; Ortega & Scartascini, 2015). Studies that have focused specifically on sending reciprocity messages include those of Ariel (2012); Blumenthal et al. (2001); Bott et al. (2020); Castro and Scartascini (2015); Hallsworth et al. (2017), and Mascagni and Nell (2022).

Sending taxpayers reciprocity messages as a nudge might improve compliance behaviour by increasing perceived distributional fairness. As noted by Hofmann, Hoelzl and Kirchler (2008), taxpayers' willingness to comply with tax law is likely to be reduced when taxpayers perceive their contribution towards tax revenue as being unbalanced when compared with the goods received from their government. Increasing perceived distributional fairness may have a positive effect on tax compliance intentions and tax compliance attitudes (Verboon & Goslinga, 2009).

Studies that have focused on communicating reciprocity messages have produced inconclusive results. Some (Bott et al., 2020; Ortega & Sanguinetti, 2013) have found a positive influence whilst others (Ariel, 2012; Blumenthal et al., 2001) have found no effect of reciprocity messages on tax compliance behaviour.

Whilst the studies, despite contrasting outcomes, provide insight into the effect of reciprocity nudging on tax compliance, a very limited number of these studies have been conducted in developing countries, particularly in Africa. Context appears to be important when investigating the effectiveness of nudge messages (Chirico et al., 2019). Some of the known studies conducted in an African developing country context regarding the effect of nudge messages on tax compliance behaviour are those by Mascagni and Nell (2022) in Rwanda, Santoro and Mascagni (2022) in Rwanda and Santoro et al. (2020) in Eswatini. Mascagni and Nell (2022) indicated that reciprocity nudge messages were more effective than deterrence messages, contrasting directly with the outcomes of the study by Castro and Scartascini (2015) in Argentina, which found deterrence messages were more effective compared to reciprocity messages. Furthermore, the use of alternative delivery methods (apart from mail letters) has not been extensively tested.

Structural and content attributes of the messages being communicated, as well as the type of public good or service communicated in reciprocity nudge messages, also have not received much attention in this growing body of literature. These often ignored aspects might be the determining factor of whether the nudge message is successful or not in reaching the targeted audience and changing behaviour.

Research shows that delivering a message irrespective of the mode of delivery does not, however, guarantee that the targeted audience will pay attention to the message (Weiss & Tschirhart, 1994). In order to be effective, messages need to draw the attention of the targeted audience. The structural and content attributes of a message have been found to be linked to great attention, memory and liking of a message, all of which are important aspects of an effective message (Morgan et al., 2003).

The nature of the public good or service communicated in the nudge message matters with regard to whether the reciprocity nudge message is likely to be effective or not. Communication of different types of public goods or services may generate different responses to the nudge for different taxpayers. Ali, Fjeldstad and Sjørusen (2014) found that taxpayers are more likely to have a tax compliant attitude if they are satisfied with specific public goods or services provided by the government. This supports the view of Oberholzer, de Kock and Walker (2008), who examined the routes of persuasion used by SARS in their advertising appeals. In this study, Oberholzer et al. (2008) found that messages which focused on correctional service (safety), education and tourism had a greater impact on participants compared to other public goods or services communicated in the advertising appeals.

Another area that has not been widely explored is the impact of timing between exposure to a nudge message and tax compliance. Previous research has indicated that the timing of a nudge intervention is an important issue to consider (Behavioural Insights Team, 2014). For example, McGraw and Scholz (1991) found no evidence that normative appeals have an effect on tax compliance behaviour. However, in their study there was a 3-month time lag between the participants' exposure to the nudge treatment and making the actual tax compliance decision. Blumenthal et al. (2001) also found that normative appeals have no significant effect on tax compliance behaviour, although the long time lag between participants' exposure to the nudge treatments and making of the tax compliance decision could have influenced the results observed in the study. Wenzel (2001) also highlighted that a long time lag between participants' exposure to a nudge treatment and making their tax compliance decision is likely to have an impact on the effectiveness of the nudge. Finally, Gillitzer and Sinning's (2018) study is one of a small number of studies that have examined the effects regarding timing of payment reminders on tax compliance behaviour. The study found that although taxpayers who received a reminder letter had a higher probability of paying their debt compared to the control group, varying the timing of the reminders did not have an effect on tax compliance behaviour.

Overall, the current literature on the effects of reciprocity nudges on tax compliance is somewhat inconclusive. Some studies report no effect whilst others report a positive effect on tax compliance. Only a very limited number of these studies have been conducted in developing countries. The use of alternative delivery methods (apart from mail letters) has not been extensively tested. Little attention has been paid to the structure and content of the nudge messages as well as the nature of the reciprocal public good or service that is the subject of the message. Although some studies have acknowledged the importance of considering the timing of nudge messages (Behavioural Insights Team, 2014; Wenzel, 2001), limited studies have addressed this issue. The results of this article thus provide insight into these matters.

Based on the literature reviewed, the following hypotheses are tested in the article:

H₁: *Reciprocity nudges have a significant and positive impact on tax compliance behaviour;*

H₂: *The positive impact of reciprocity nudges on tax compliance is reinforced when the reciprocity nudge is framed using structural and content attributes identified as being most effective and also when the nudge communicates a reciprocal public good or service that resonates with the target audience; and*

H₃: *The timing of the reciprocity nudge influences tax compliance behaviour.*

3. RESEARCH METHOD

The study reported in this article adopted a sequential core mixed methods approach, using an experiment preceded by a content analysis to address the research objectives. Therefore, both qualitative and quantitative data were collected and integrated into a quantitative experimental method. The qualitative content analysis was undertaken in order to determine the necessary structural and content attributes of effective messages delivered using audiovisual media as the mode of delivery. The results of the qualitative content analysis were then used to conduct a quantitative content analysis of 12 SARS videos used in a Touching Lives television campaign in 2012-2013, the results of which were used for the purpose of designing a laboratory experiment to address the hypotheses outlined in section 2.

The Touching Lives campaign was selected as it focused on communicating how taxes have contributed to the provision of public goods or services to ordinary South Africans (reciprocity messages) and at the time of conducting this research, the 12 videos related to this campaign were the only publicly available audiovisual reciprocity nudge messages. Although the campaign was broadcast on television in the 2012-2013 period, the videos were still publicly available, and therefore current, on the SARS YouTube channel. At the time of conducting this research, there was no known publicly available evaluation by SARS of the impact of this campaign on tax compliance behaviour.

3.1 Content analysis

Using a quantitative content analysis process, one video was selected on the basis that it was most likely to have a positive effect on tax compliance behaviour as it contained most of the attributes of an effective message; it also focused on a public service or good which resonated with most South African taxpayers. The second video was selected on the basis that it was least likely to have a positive effect on tax compliance behaviour as it contained the fewest attributes of an effective message and focused on a public service or good that was identified as being unlikely to have an impact on tax compliance. Therefore, two criteria were used to select the reciprocity video messages, namely the structural and content attributes of the video message, as well as the type of public good or service communicated in the video message.

The first criterion (structural and content attributes) was determined through a qualitative content analysis of academic literature designed to identify attributes of an effective message aimed at changing behaviour, particularly when using audiovisual media. The literature analysed was not confined to tax-related literature, as there is limited literature in this area, but included literature from other fields such as health and transportation, where audiovisual messages are often used as a nudge to change behaviour. Table 1 lists the literature analysed in order to identify elements of effective structural and content message attributes.

Table 1: Previous Studies Reviewed

Author	Title	Year published, page range	Discipline
Albertson and Busby	Hearts or minds? Identifying persuasive messages on climate change	2015, pp. 1-9	Climate change
Bator and Cialdini	The application of persuasion theory to the development of effective proenvironmental public service announcements	2000, pp. 527-541	Environmental Conservation
Hoekstra and Wegman	Improving the effectiveness of road safety campaigns: current and new practices	2011, pp. 80-86	Transportation
Holler et al.	Framing of information on the use of public finances, regulatory fit of recipients and tax compliance	2008, pp. 597-611	Taxation
Holtzhausen	Content analysis of roles portrayed by women in advertisements in selected South African media	2010	Marketing
Phillips, Ulleberg and Vaa	Meta-analysis of the effect of road safety campaigns on accidents	2011, pp. 1204-1218	Transportation
Skubisz, Miller, Hinsberg, Kaur and Miller	Tips for former smokers: a content analysis of persuasive message features	2016, pp. 13-20	Health
Syme, Nancarrow and Seligman	The evaluation of information campaigns to promote voluntary household water conservation	2000, pp. 539-578	Water Conservation
Weiss and Tschirhart	Public information campaigns as policy instruments	1994, pp. 82-119	Public policy

Based on this analysis, structural and content attributes were identified as shown in Table 2.

Table 2: Structural and Content Attributes of an Effective Message

Attribute	Description per literature	Nature of attribute
Captures attention	The message should capture attention; the use of colour, movement, visuals, information quantity and music can assist with this.	Structural attribute
New information	The message should emphasise information that is new to the target audience and that is essential for behavioural change.	Content attribute
Evokes emotion	The message should evoke emotion.	Content attribute
Credible source	The message should be communicated by credible spokespersons and organisations.	Content attribute
Goal framing	The message should contain goal framing.	Content attribute
Credible message	The message should be truthful.	Content attribute
Message clarity	The message should be simple and clear so that it is easy to understand.	Content attribute
Message sidedness	This relates to how the message is presented to the audience. The message should be two-sided which means that it should present both the supporting and opposing arguments.	Content attribute
Message efficacy	The message should deal with 'when to' and 'how to' knowledge.	Content attribute
Fits with prior knowledge	The message should expand or elaborate on what the target audience already know.	Content attribute
Directs attention	The message should only raise awareness on some issues and not others, to shift the salience of different aspects of problems, which may lead people to think differently.	Content attribute

The contents of the 12 SARS videos were then analysed to determine whether they contained these attributes. Of the 12 SARS videos analysed for the attributes identified, eight of the videos were ranked as containing the greatest number of attributes for an effective message and four of the videos contained the fewest attributes.

The videos were then analysed by reference to the second criterion (the type of good or service communicated in the message), based upon the work of Oberholzer et al. (2008), who found that SARS messages that focused on correctional service (safety), education and tourism had a greater impact on respondents. Of the eight videos identified as possessing the greatest number of attributes of an effective message, none focused on correctional service or tourism but one of the videos focused on education. Therefore, that video was selected for the purpose of designing the experiment in order to address hypothesis H₂. The video containing the fewest attributes for an effective message was selected from the four 'ineffective' videos in a similar fashion.

As a result of this process, two videos were selected. One video was hypothesised as most likely to have a positive impact on tax compliance behaviour (this was the video

titled *Dreaming Big*) and the other was hypothesised as least likely to have a positive impact on tax compliance behaviour (this was the video titled *A Mother's Love*).

3.2 Laboratory experiment

A laboratory experiment using a post-test design was then conducted with 172 student participants, allocated randomly in more or less equal numbers to one control group and four treatment groups. All group participants watched four television advertisements (which were not tax related)² and were then able to earn income, in the form of Laboratory Currency (LC) which could subsequently be converted to Rand, by answering relatively straightforward closed and factual questions based upon the content of those four videos. The participants in the treatment groups were asked 12 questions related to the four videos and one question related to the treatment video.³ The participants in the control groups were asked 13 questions all related to the four television advertisements. Participants earned 8LC for each correctly answered question in the experiment.⁴

After income was earned, participants were required to declare their income for taxes to be paid to the revenue authority, thus simulating the general environment of a tax reporting system. Participants decided how much of their income to declare (if any). The experiment incorporated an announced probability of being audited and a penalty should a participant be audited and found to have underdeclared their earnings. A tax rate of 31% was charged on earnings, an audit rate of 10% was adopted and a penalty rate was charged of 75% of the earnings that were not declared, all broadly reflecting current South African rates and practice. Refer to Appendix A for the experimental instructions.

The participants in the four treatment groups (but not the control group) also watched one of two additional videos containing the reciprocity message. Two of the treatment groups (Group A1 and Group B1) watched the video identified as containing structural and content attributes considered to be the most effective in influencing tax compliance behaviour (*Dreaming Big*), whilst the other two treatment groups (Group A2 and Group B2) watched the video titled *A Mother's Love* which was considered least effective.

The possible impact of the timing of the nudge was measured by varying the order in which the groups watched the advertisement containing the reciprocity nudge.

Hence Groups A1 and A2 watched the reciprocity nudge advertisement *after* watching the four unrelated advertisements and immediately before making their declaration of earning for tax purposes. Groups B1 and B2 watched the reciprocity nudge advertisement *before* the four unrelated advertisements (with associated questions), after which completion of the tax declaration followed. The purpose of rearranging the order in which participants in Groups B1 and B2 watched the videos was for the four videos (excluding the treatment video) and related questions to serve as distractor tasks.

² The first video was a tourism advertisement, promoting South Africa as a holiday destination. The second video was an insurance advertisement. The third video was a video of a former South African president's speech. The last video was an advertisement for an investment management company.

³ In relation to the treatment video, participants were asked 'What emotion did you feel when watching this video?'

⁴ LCs were converted into Rand at a rate of 1LC = 1ZAR.

All videos were watched in the same session. The distractor tasks were incorporated into the experimental design to distract and thus diminish the memorisation of the reciprocity nudge message that participants in treatment Groups B1 and B2 were exposed to at beginning of the experiment. Effectively, therefore, treatment Groups B1 and B2 experienced a time lag, which was proxied by ordering the treatment video before the four unrelated advertisements, between the nudge and the declaration of income in contrast to treatment Groups A1 and A2, who declared their income immediately after watching the nudge message. Given that memory may diminish with passage of time, it was deemed appropriate to use the ordering of messages as distractor tasks that diminish memorisation thus mimicking the effect of time.

Table 3 and Figures 1 and 2 summarise these arrangements.

Table 3: Treatment Groups

Treatment Group A (with no time lag)	Treatment Group B (with time lag)
<i>Dreaming Big</i> (A1)	<i>Dreaming Big</i> (B1)
<i>A Mother's Love</i> (A2)	<i>A Mother's Love</i> (B2)

Fig. 1: Treatment Groups A1 and A2 (No Time Lag)

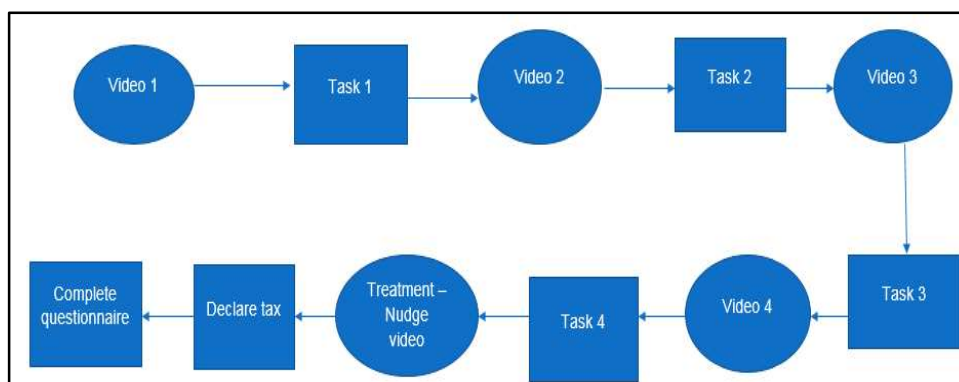
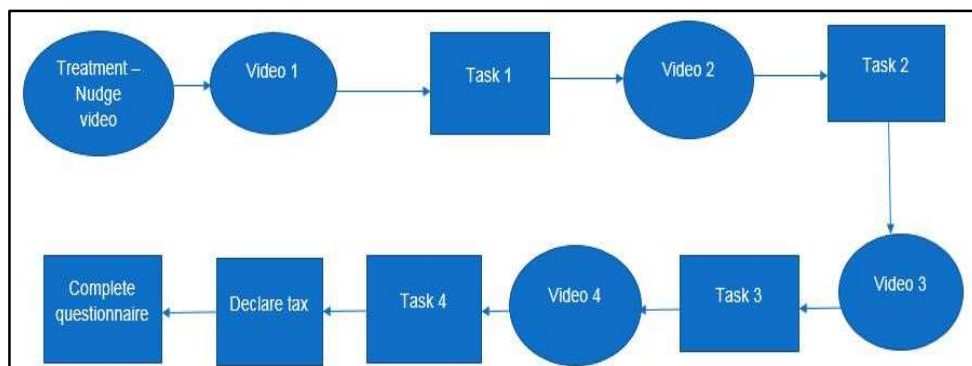


Fig. 2: Treatment Groups B1 and B2 (Time Lag)

The experiment was conducted in computer laboratories using *Qualtrics*. Before commencement with the experimental tasks, participants were informed about the procedures of the experiment. Participants were given assurance about the confidentiality of their responses and that their responses during the experiment would not be observed by the researcher or the assistants. This was communicated in order to limit potential social desirability bias. Participants were not informed that the experiment related to tax compliance, raising the issue of deception. This issue was addressed by debriefing participants on the true nature of the experiment at the completion of the experiment and providing them with an explanation as to why this information was initially withheld (see Appendix B). It was made clear to the participants that their responses would be kept confidential and would be used for research purposes only.

4. RESULTS

In the analysis that follows, descriptive statistics about the participants are summarised followed by presentation, using logistic regressions, of the effect of reciprocity nudge messages on tax compliance behaviour. Results related to timing of reciprocity nudge messages are also considered.

4.1 Descriptive statistics

Table 4 provides a summary of demographic data as well as the income earned by participants in the experiment. Participants were asked to select the age group, out of six categories provided, into which they fell. A majority of the participants (97.7%) were in the 18 to 25 age group, which was to be expected given that university students were targeted for recruitment to the experiment. The remaining 2.3% of the participants fell into the 26 to 35 age group. None of the participants fell into any of the other age group categories. The majority of the participants in the experiment (70.9%) were female compared to males (29.1%). Previous research has found that females tend to be more compliant than males (Bott et al., 2020); however, Ali et al. (2014) found no difference in tax compliance attitudes between South African males and females. Although the results with regard to gender and tax compliance are conflicting, the high representation of females compared to males in our sample may imply a greater prospect of tax compliance. We therefore tested for differences in tax compliance behaviour. Our

results showed no statistically significant differences in tax compliance rates between females and males.

Table 4: Descriptive Statistics

Demographic information	N	Percentage of sample
Age group		
18 to 25	168	97.7
26 to 35	4	2.3
	172	100
Gender		
Female	122	70.9
Male	50	29.1
	172	100
Population group		
Black African	130	75.6
White	33	19.2
Coloured	5	2.9
Indian/Asian	4	2.3
	172	100
Income level		
72LC	4	2.3
80LC	14	8.1
88LC	44	25.6
96LC	69	40.1
104LC	41	23.8
	172	100

Note: LC= laboratory currency

The participants fell into one of four population groups as shown in Table 4. The distribution (in percentages) of the participants across the four population groups broadly corresponds to the characteristics of the South African population group, where the majority of residents are Black African (80.7%), with White, Coloured and Indian/Asian individuals as the minorities (Statistics South Africa, 2019).

The minimum income that a participant could earn from the experiment was zero and the maximum (based upon providing correct answers to 13 questions) was 104LC. Participants earned 8LC for each correctly answered question in the experiment. None of the participants earned less than 72LC and participants were spread over five levels of income (72LC, 80LC, 88LC, 96LC and 104LC).

Participants' attitudes towards tax were measured by asking them to rate their level of agreement or disagreement with the four statements shown in Table 5, measured on a 7-point Likert-type scale. The lowest score (1) indicates that participants strongly agreed with the statement, and the highest score (7) indicates that participants strongly disagreed with the statement.

An exploratory factor analysis with principal axis factoring as an extraction method was conducted to determine whether the participants' responses to these statements could be reduced to one factor described as attitude towards tax. The result of the principal axis factoring was that the attitude towards tax statements could not be reduced to one factor.⁵ Therefore, the four statements were kept as four separate items.

Table 5 shows the minimum, maximum, mean and standard deviation scores related to participants' attitudes towards tax. The wide disparity between the mean score for the first statement and the other three statements was due to the manner in which the statements were phrased. Statement 1 was phrased positively whilst the other statements were phrased negatively.

Table 5: Participants' Attitudes Towards Tax

Number	Statement	Minimum	Maximum	Mean	SD
1	Citizens must pay their taxes to the government in order for our country to develop.	1	5	1.52	0.753
2	Underreporting my income will not hurt society as a whole.	1	7	5.51	1.782
3	The government can find enough resources for development from other sources without having to tax the people.	1	7	5.00	1.522
4	When dissatisfied with the government, it is justifiable to refuse to pay tax to the government.	1	7	5.85	1.474

Table 6 presents the minimum, maximum, mean and standard deviation scores related to participants' perceptions of corruption. This was measured by asking participants to rate their level of agreement with the three statements shown in the second column of Table 6, again measured on a 7-point Likert-type scale where a score of 1 indicates that participants strongly agreed with the statement and a score of 7 indicates strong disagreement.

Principal axis factoring was also conducted to determine whether the participants' responses to these statements could be reduced to one factor, broadly described as the perception of corruption. The result of the principal axis factoring was that the three items could be reduced into one factor.

⁵ Principal axis factoring is an acknowledged exploratory factor analysis extraction method for behavioural constructs such as attitude, while principal component analysis is a technique focused on data reduction (Costello & Osborne, 2005). Principal axis factoring was considered the more appropriate technique to use. The analysis of the statements clearly indicated two factors with two items each. However, as their Cronbach alpha values were lower than 0.6, the four statements were kept as four separate items.

Table 6: Participants' Perceptions of Corruption

Number	Statement	Minimum	Maximum	Mean	SD
1	The level of corruption involving high-level tax officials is high.	1	5	1.76	0.915
2	The level of corruption involving high-level government officials is high.	1	6	1.74	1.001
3	The level of corruption in our country is high.	1	3	1.37	0.572

Tax compliance was measured by conducting a comparative analysis of the income reported by the participants and the income earned in the experiment. The dependent variable, tax compliance, was 0 if a participant reported less than actual income earned and 1 if income was truthfully reported. There were 12 participants whose declared income exceeded the amount earned. These participants were assumed to be compliant.

Table 7 shows the tax compliance rates of participants in the control group versus those in the treatment groups.

The tax compliance rate of participants exposed to the *Dreaming Big* reciprocity nudge message was 88% compared to 78% for participants exposed to the *A Mother's Love* reciprocity nudge message and 71% for participants not exposed to a nudge message. This suggests that those participants who received a reciprocity nudge were more compliant than those who did not.

Table 7: Tax Compliance Rates and Income Declaration Statistics

Control group								
	Tax compliance rates		Income declared			Income that should have been declared		
N	Non-compliant	Compliant	Mean (LC)	Standard Deviation	Sum (LC)	Mean (LC)	Standard Deviation	Sum (LC)
35	28.6%	71.4%	80.31	27.977	2 811	93.26	8.219	3 264
<i>Dreaming Big</i> Treatment Groups (Group A1 and B1)								
	Tax compliance rates		Income declared			Income that should have been declared		
N	Non-compliant	Compliant	Mean (LC)	Standard Deviation	Sum (LC)	Mean (LC)	Standard Deviation	Sum (LC)
67	11.9%	88.1%	90.76	17.369	6 081	93.49	8.025	6 264
<i>A Mother's Love</i> Treatment Groups (Group A2 and B2)								
	Tax compliance rates		Income declared			Income that should have been declared		
N	Non-compliant	Compliant	Mean (LC)	Standard Deviation	Sum (LC)	Mean (LC)	Standard Deviation	Sum (LC)
70	21.4%	78.6%	85.00	27.160	5 950	94.86	7.618	6 640

Table 7 also shows the descriptive statistics for the control group and the treatment groups related to actual versus declared income of participants. The statistics reveal that from a tax revenue collection perspective, exposure to a reciprocity nudge message results in a higher percentage of tax revenue collected compared to non-exposure to a nudge message. Tax revenue collected from participants exposed to a nudge message was 7% higher than that from the control group.⁶ Tax revenue collected from the participants exposed to the reciprocity nudge message containing the greatest number of structural and content attributes of an effective message, which communicated reciprocal public goods or services that resonated with the target audience (*Dreaming Big*), was 11% higher than that from the control group and 7% higher than that from the treatment group exposed to a reciprocity nudge message which was considered least effective. This provides support to our hypotheses.

4.2 Impact of nudge messages

A binomial logistic regression was performed in order to predict the odds of tax compliance behaviour given an individual's exposure to a reciprocity nudge message, gender, income level, population group, attitude towards tax and perception of corruption.

The nature of income in this experiment was such that the income values could only take on 14 certain values (ranging from 0 to 104 in increments of 8), while there were 5 distinct realised values (as shown in Table 4). However, none were excluded based on truncation and none were censored as no set value was used for all values smaller than

⁶ The percentage difference of tax revenue collected between the groups was determined by calculating a percentage of the mean income declared over the mean income that should have been declared. The percentages calculated were then compared to each other.

a certain value or larger than a certain value. Therefore, an ordinary least squares regression or Tobit analysis was not deemed appropriate as the compliance variable could only take on 14 distinct values.

Table 8 shows the results of a hierarchical logistic regression in which the dependent variable is tax compliance, which takes the value of 1 if a participant was compliant and a value of 0 for non-compliant participants. Model 1 indicates the results if the reciprocity nudge messages are used as dummy variables. In Model 2, demographic variables are included and Model 3 takes account of attitudes towards tax and perception of corruption. Age was not included as a predictor in the model as the second age category consisted of only 4 participants (2.3%), with the only other age category comprising the vast bulk of participants (97.7%). Therefore, including the age variable was not deemed to be a scientifically valid predictor.

Table 8: Logistic Regression for Three Models

Variables	Model 1	Model 2	Model 3
<i>A Mother's Love</i> nudge message	.383 (.474) {1.467}	.435 (.487) {1.544}	.493 (.511) {1.639}
<i>Dreaming Big</i> nudge message	1.082** (.531) {2.950}	1.102** (.540) {3.011}	1.136** (.554) {3.115}
Gender		-.569 (.480) {.566}	-.516 (.492) {.597}
Income level		-.016 (.026) {.984}	-.024 (.027) {.976}
Population group: Black African		-.170 (.550) {.844}	-.326 (.595) {.722}
Population group: Coloured		-.312 (1.253) {.732}	-.034 (1.387) {.967}
Population group: Indian/Asian		19.690 (19727.958) ⁷ {331713358.193}	19.859 (19190.900) {421400877.1}
Attitude towards tax (Statement 1)			-.136 (.296) {.873}
Attitude towards tax (Statement 2)			.318*** (.120) {1.374}

⁷ The small group size of this group as well as potential multicollinearity with the reference group (Whites) contributed to the large standard errors.

Variables	Model 1	Model 2	Model 3
Attitude towards tax (Statement 3)			-.163 (.148) {.850}
Attitude towards tax (Statement 4)			-.035 (.149) {.966}
Perception of corruption			.385 (.337) {1.470}

Note: *A Mother's Love* nudge message denotes whether the participant was exposed to this specific nudge message, equal to 1 for participants exposed to this nudge message and 0 for participants who were not. *Dreaming Big* nudge message denotes whether the participant was exposed to this specific nudge message, equal to 1 for participants exposed to this nudge message and 0 for participants who were not. Income level indicates income earned in the experiment; the minimum income that a participant could earn from the experiment was zero and the maximum was 104LC. The four statements related to attitudes towards tax are summarised in Table 5 above. Standard errors in parentheses. Odds ratios in braces. ** Significant at 5%; *** significant at 1%.

A key assumption of using the logistic regression is that of a linear relationship between any continuous independent variables and the logit transformation of the dependent variable. A Box-Tidwell procedure (Box & Tidwell, 1962) was conducted to test whether the continuous independent variables met this assumption. The results of this assessment indicated that none of the interaction terms for the continuous variables were statistically significant at the 5% level; therefore, the linearity assumption was not violated for any of the continuous variables. The Hosmer and Lemeshow test was also conducted for each of the models and showed non-significance (p-value = 1.000 for Model 1; p-value = .888 for Model 2; p-value = .273 for Model 3), indicating that the model fit was adequate. There was no improvement in the cases correctly classified for Model 1 and Model 2. The percentage of cases correctly classified improved from 80.8% to 81.4% for Model 3.

For Model 1, sensitivity was 100%; specificity was .0%; positive predictive value was 80.8%; and negative predictive value was 0%. For Model 2, sensitivity was 100%; specificity was .0%; positive predictive value was 80.8%; and negative predictive value was 0%. For Model 3, sensitivity was 99.3%; specificity was 6.1%; positive predictive value was 81.7%; and negative predictive value was 66.7%.

The analysis therefore shows that exposure to a reciprocity nudge message has a positive effect on tax compliance. However, the association between exposure to a reciprocity nudge message was not found to be statistically significant, thus only partly confirming the first hypothesis (H_1).

In line with the hypothesis, as observed in Model 1 of the regression, there is a statistically significant association between exposure to the reciprocity nudge message containing the greatest number of structural and content attributes of an effective message (*Dreaming Big*) (which communicates a reciprocal public good or services that resonates with the target audience) and tax compliance. The odds ratio indicated that

participants exposed to this reciprocity nudge message were 2.95 times more likely to be compliant than participants in the control group who were not exposed to a reciprocity nudge message.

The inclusion of gender, population group and income level into the model (Model 2) slightly changed the coefficients for both of the reciprocity nudge messages compared to the first model. The positive impact of the reciprocity nudge message containing the greatest number of structural and content attributes of an effective message (*Dreaming Big*) was still statistically significant. The odds ratio indicated that participants exposed to this reciprocity nudge message were roughly three times more likely to be tax compliant than participants in the control group who were not exposed.

Four different statements related to attitudes towards tax and a further variable relating to perceptions of corruption were added for the purposes of Model 3. There was a statistically significant association between Statement 2 of the attitudes towards tax variables and tax compliance. In relation to the statistically significant attitude towards tax variable (Statement 2), compliant participants tended to have positive attitudes towards tax compared to non-compliant participants. Attitude towards tax (Statement 2) indicated that for each unit increase in attitude towards tax, participants were 1.37 times more likely to be tax compliant.

The positive association between the reciprocity nudge message containing the greatest number of structural and content attributes of an effective message (*Dreaming Big*) and tax compliance continued to be statistically significant. The odds ratio indicated that participants exposed to this reciprocity nudge message were just over three times more likely to be tax compliant than participants in the control group who were not exposed to a reciprocity nudge message.

In summary, the results show that exposure to a reciprocity nudge message (whether it contains most of the attributes of an effective message or few of these attributes) has a positive effect on tax compliance behaviour; however, a reciprocity nudge message containing most of the attributes of an effective message is more likely to have a significant effect on tax compliance behaviour compared to one with fewer attributes. These results partly confirm H₁ and confirm H₂.

4.3 Timing of nudge messages

In order to test whether there was a difference in tax compliance behaviour based on the timing of exposure to a nudge message (the third hypothesis identified above), a Fisher's exact test and a Chi-square test for independence were performed. A Fisher's exact test was used to interpret the results for the video selected as containing the greatest number of attributes of an effective message (*Dreaming Big*), as the data did not meet all the requirements for a Chi-square test for independence to be conducted.⁸ There was an 81.8% compliance rate for participants in the treatment group with no time lag compared to 91.2% in the group that had a time lag. The results showed no statistically significant difference exists ($p\text{-value} = 0.305$).

⁸ The expected value counts were not all greater than five. For this reason, the Fisher's exact test was conducted. The Fisher's exact test is a commonly used test when samples are too small for a Chi-square test for homogeneity (Laerd Statistics, 2016).

For the nudge video selected as containing the fewest attributes (*A Mother's Love*), a Chi-square test for independence was conducted to determine whether there was a difference in the tax compliance behaviour of participants who viewed the reciprocity nudge message immediately before making the tax compliance decision versus those who had a time lag between viewing the video and making the tax compliance decision. Although the results showed that 85.7% of the participants in the treatment group with no time lag were compliant compared to 71.4% in the group that had a time lag, no statistically significant difference was found to exist ($p\text{-value} = 0.145$).

In summary, the results indicated that there was no statistically significant difference in tax compliance behaviour between individuals exposed to a reciprocity nudge message immediately before making a tax compliance decision versus those who have a time lag between exposure to the reciprocity nudge message and making the tax compliance decision. Due to the manner in which time lag was tested, using message ordering, these results are important as they also provide evidence that the level of success of audiovisual nudge messages broadcast on television or online, where they are likely to compete for attention with other advertising, does not diminish when overlaid with other potentially distractive messages. Hence, the third hypothesis (H_3) identified in section 2 was not supported.

5. CONCLUSION

This article has reported upon the effect of reciprocity nudges on tax compliance behaviour in a developing country context. It has focused particularly on whether communicating a reciprocity message related to a public good or service which resonates with taxpayers, and which also contains the greatest number of structural and content attributes of effective messages, has a positive effect on tax compliance behaviour. The findings have revealed that compared to the control group, participants in the treatment groups had a higher rate of tax compliance although the association between exposure to a nudge message and tax compliance was not statistically significant. These findings are similar to those from studies such as Castro and Scartascini (2015), who found that reciprocity nudges have heterogeneous effects based on other factors including, *inter alia*, the level of public goods or services provided. Based on the findings of this study, it is evident that the effectiveness of the reciprocity nudge is contingent upon the structural and content attributes of the nudge message, as well as the type of public good or service communicated.

The results also showed that participants exposed to the nudge which was hypothesised as most likely to be effective were more tax compliant than both those exposed to the less effective treatments and the control group, and significantly so for the latter. This finding also highlights the importance of designing nudge messages that have the appropriate structural and content attributes which capture the attention of the target audience.

Hence, the results point to an important aspect of message content related to the type of public good or service communicated in reciprocity nudge messages. As emphasised by Mascagni (2018), the type of public good or service communicated to taxpayers in these nudge messages matters. Different types of public goods or services may generate different responses to the nudge for different taxpayers. This is also linked to the finding by Ali et al. (2014) that taxpayers are more likely to have a tax compliant attitude if they are satisfied with certain public goods or services provided by the government.

The results have also indicated that there is no significant difference in the tax compliance behaviour of individuals exposed to a nudge message closer to the time of making the tax compliance decision and those who have a time lag between exposure to a nudge message and making the tax compliance decision. These findings are similar to those of Gillitzer and Sinning (2018). Note, however, that the results observed in this article may be accounted for by the different way in which the effect of timing was tested for (and particularly the use of distractor tasks). In field experiments, this aspect can be practically tested by varying the time, by days, weeks or even months. In the current study, however, advertisement videos were used as a proxy for time which could be argued to have influenced the effectiveness of this treatment.

Apart from the limitation related to the manner in which the effects of timing were tested, there are other limitations to this study that need to be taken into account. The first limitation relates to the nature of the (student) participants sampled in this study. Although there has been criticism of the use of students as participants in tax experiments (Choo, Fonseca & Myles, 2016), the researchers were satisfied that it was appropriate to use students as participants given previous research supporting the validity of the use of students as participants in tax research. Alm, Bloomquist and McKee (2017) found no significant difference in tax compliance behaviour of student participants and non-student participants. Furthermore, Alm and McKee (1998, p. 266) state that evidence suggests that there is no difference in the responses of students in experiments when compared to non-student participants; that 'there is no reason to believe that the cognitive processes of students are different from those of "real" people'. Nonetheless, the findings cannot readily be generalised to the broader population of individual income taxpayers given that non-student taxpayers may have different demographic and behavioural characteristics which might affect the results observed in this study. Furthermore, our student sample comprises individuals with post-high school education which may not be representative of individual income taxpayers. Future research could, therefore, be conducted with non-student taxpayers.

Secondly, the study focused on the use of reciprocity nudge messages delivered using audiovisual media and the effectiveness of such nudge messages communicated using other modes of delivery was not investigated. Other forms of delivery, such as the use of social media platforms, radio and billboards, need to be explored further.

Notwithstanding these limitations, the research provides further evidence of the critical role that appropriately crafted reciprocity messages can play in securing greater tax compliance in a developing country setting.

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7. APPENDICES

APPENDIX A: EXPERIMENT – INSTRUCTIONS

Introduction

Thank you for your participation in this experiment. This experiment process will take approximately 60 minutes to complete. The experiment is about participants' memory of advertisements. The researcher is [name removed], who is currently a [position and institution removed].

In this experiment you will be expected to view five videos. We want you to pay attention when viewing each of the videos because after viewing each video you will be required to perform a task which entails answering a few questions related to the video. You will earn laboratory credits, which can be converted to rand at the end of the experiment, for each correct answer. After you have viewed all the videos and answered all the related questions you will be told how many laboratory credits (and hence how many rand) you have earned as a result of your participation. You will then be required to declare your earnings as we need to withhold 31% of your earnings for income tax purposes.

Your participation in the experiment will remain anonymous. The responses you give will be treated as strictly confidential, as you cannot be identified in person based on the responses you give. Your participation in this study is very important to us. You may, however, choose not to participate, and you may also stop participating at any time without any negative consequences. At the end of the experiment, a payment will be made to you based on your total income earned as recorded in the reporting decision sheet, after we have deducted the amount of tax based on the declared income.

Procedural details

On the desktop computer in front of you, there is a folder "participant folder", which contains a word document with a web link to the experiment on *Qualtrics*. Open the link.

At the start of the experiment on *Qualtrics*, you will be required to enter your participant number; then you will be required to view videos and answer questions related to the videos. Please press the "next" button on each page on *Qualtrics* in order to continue to the following page. Note that once you click the "next" button, you cannot go back to the previous page, so please pay attention to what is on the screen before pressing "next".

We use laboratory currency in this experiment and you will earn 8 laboratory currencies (LC) for each question answered correctly. The LC will be converted into rand at the conclusion of the experiment. You will also receive an attendance fee of R36 which will be included in the pay-out amount.

Once you are done with viewing the videos and answering the related questions you will be required to declare your income (score) earned from participating in the experiment. The amount should be declared in laboratory currency that you earned in the experiment. It is your decision on how much of the income earned you would like

to declare. After you have declared your income earned participants will be randomly selected for an audit and if unreported income is found a financial penalty of 75% of the undeclared amount will be imposed. There is a 10% probability that you will be selected for an audit. The computer software will randomly select participants to be audited and check their actual income (score) against the declared income for any unreported income. You will be notified on the computer screen if you have been selected for an audit.

Your decision on the amount of income earned to be declared will affect your total income after tax amount. Accordingly, your total income after tax will depend on your decision on how much of your total earnings to declare, and the probability of audit and penalty rate.

Mathematically, your total income after tax can be calculated as follows:

$$\text{Total income earned} - \text{tax on income declared} - \text{undeclared income} * - \text{penalty} *$$

**These will only apply if you have been selected for an audit and tax evasion is found.*

The final page of the survey experiment will indicate whether you have been audited or not. The income after tax amount (converted into rand), plus the R36 attendance fee, will be yours to keep and will be paid out to you in cash at the end of the experiment.

When you reach the payout page, please ensure that the following procedure is followed:

- Raise your hand so that the assistant can come and give you the participation fee.
- Show the assistant your student card.
- The assistant will write down how much he or she has given you (which should correspond to the payout amount on the computer screen).
- Sign the list next to your name to confirm the amount and that you have received the money.
- You will then receive a debriefing letter.

Please leave all materials on your desk.

Thank you

APPENDIX B: EXPERIMENT – DEBRIEF LETTER

Debriefing

I would like to thank you for taking part in this experiment. You have been told that this study relates to memory and advertisements; however, there is more to this study than what we have told you about so far. Sometimes, in behavioural research, it is necessary to not tell people about the true purpose of the study at the beginning. If we did, it may affect how they respond to the questions asked and to the tasks involved, and this would change the results in ways that may make them invalid. In some studies, we want to get an idea of how people respond to certain situations in their day-to-day lives, and

sometimes, the best way to do this is to not give them all of the details about the purpose of the study.

We told you that this experiment relates to memory and advertisements and we asked you to watch a few videos and answer questions related to each of the videos after you had watched them. However, we were in fact interested in the effect of the SARS video (which may have been one of the videos you watched) on your tax compliance behaviour. There is some research that suggests that messages (or “nudges”) that communicate how taxes are spent on public goods or services (“reciprocity”) might have a positive effect on the tax compliance behaviour of taxpayers. The time lag between seeing such a video and making the tax compliance decision might also have an impact on the effectiveness of the message.

In this study, some participants watched a SARS video at the beginning of the experiment; others saw the video at the end of the experiment; and some did not see a SARS video at all. After watching the videos, you were required to declare the income earned from the experiment, for income tax purposes. This was all done so that we could simulate real-life conditions of tax compliance behaviour. We were interested to see whether watching the SARS video, and the timing of when you watched it, had any impact on the amount of income you declared for tax purposes.

Please note that the details of your participation will be kept entirely private. Any information that you have given as part of the experiment, including the amount of income you declared for tax purposes, will not be divulged to SARS or to any other person. All personal data derived from the study will be aggregated with other participants’ data and will only be reported in aggregate and not in any way that could identify you or any other person.

We hope that you found your experience of participating in this study to be interesting. We are happy to answer any questions that you may have.

Identifying the factors impacting upon personal tax compliance: a study involving tax affairs officers of Malaysian businesses

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Abstract

It is assumed from the literature reviews in taxation that a tendency for tax non-compliance exists among the officers who deal with tax matters in their business establishments in Malaysia when they do not comply with their respective tax systems. The hitherto published studies have not yet explored the tax compliance behaviour of tax affairs officers. Given this gap in the literature, this study endeavours to investigate the factors that impact corporate tax affairs officers' personal tax compliance behaviour in Malaysia. Using purposive and snowball sampling techniques, the data was collected from 392 tax affairs officers of businesses in Malaysia. SmartPLS is used to analyse the data and test the hypotheses. The findings of this study reveal that peers' tax compliance, audit probability, service quality of tax authority, and satisfaction with government spending strongly impact upon personal tax compliance behaviour of corporate tax affairs officers. This study opens a gateway to producing extensive and expeditious empirical evidence that could support the relation between tax affairs officers' personal tax compliance and their decision-making on corporate tax compliance.

Keywords: Tax Affairs Officers; Personal Tax Compliance; Corporate Tax Compliance; LHDN.

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1. INTRODUCTION

The economic sustainability of Malaysia is for the most part derived from the collection of direct tax revenue, such as corporate taxes, individual taxes, real property taxes, petroleum taxes, and stamp duties, all of which account for approximately 65% of the national cumulative revenue, as stated in the 2020 annual Budget 2020 (Ministry of Finance Malaysia, 2019). The non-compliance with any of the abovementioned tax systems has been deemed an action that is damaging to society, through failing to contribute to the welfare of the society, challenging the stability of the national revenue and the economic stability of Malaysia, and encouraging cheating and fraud to take place in the country. Taxes are levied on the profits of the corporate sector and on the income of the salaries of personnel in a country. The taxes, thus raised from the above two sources, are used to provide services and benefits to the people of the country, or to use them for fulfilling various other purposes of the government (Sritharan & Salawati, 2019a).

The Malaysian government plays a significant role in raising income from these two sources, employing the mandatory income tax Act (Tax Act No. 47, 1967 and Amendment Act No. 53 of 1971, Section 103)¹ enacted under the Constitution of the country. To provide benefits to the citizens of the country, the Malaysian government uses the accumulated revenue from the treasury, the financial resource of the government, to provide the people of the country with goods and services, or to achieve its other objectives and plans mentioned in the official books of programs and calendars (Sritharan & Salawati, 2019b; Sritharan et al., 2022).

The total gross national income (GNI) of Malaysia has been moving upward steadily over the past two decades.² Meanwhile, the tax revenue of Malaysia as a proportion of GDP has been declining dramatically over the past two decades as well.³ The rise in GNI and the decline in the tax revenue highlight that a severe tax gap exists in Malaysia, indicating a loss in the collection of national revenue, and a real cost being imposed on society (Sritharan et al., 2020). Further, the International Monetary Fund (IMF) (Schneider & Enste, 2002) alerts that severe tax gaps may indicate the prevalence of a shadow economy in the country. Although the corporate tax remains the largest financial contributor to the revenue of all the various taxes, tax planning is nevertheless carried out by corporate tax officer individuals on behalf of corporation taxpayers. There is a tendency for an individual not to comply with the tax system in respect of their own obligations, and there is a possibility for an individual to act similarly with the corporate tax system. In Malaysia, tax non-compliance is considered a behavioural character of the residents of the country, where the residents intentionally, or unintentionally do not

¹ The Income Tax Act is enacted pursuant to the Malaysian Constitution. Section 103 of Income Tax Act 1967 details the payment of tax under part VII, collection and recovery of tax.

² See World Bank, 'Gross National Income, Malaysia. Current International Income Database', <https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD?locations=MY>. GNI is generally the total output of the country, consisting of gross domestic product (GDP) together with the income of residents from abroad: World Bank, 'Gross national income', <https://data.oecd.org/natincome/gross-national-income.htm>.

³ World Bank, 'Malaysia: Tax Revenue. World Tax Database', <https://data.worldbank.org/indicator/GC.TAX.TOTL.GD.ZS?end=2018&locations=MY&start=1996&view=chart>.

comply with the tax system, violating the Income Tax Act No. 53, Section 103 under the Constitution of the country (Sritharan et al., 2021; Salawati et al. 2021).

According to the Inland Revenue Board of Malaysia (IRBM), a tax gap of MYR 13 billion was recorded in the year 2018 (Ministry of Finance Malaysia, 2019). One of the main causes for the existence of the tax gap in the tax system in the country is the non-compliance behaviour of the taxpayers. This issue of tax non-compliance is critical in Malaysia since 40% to 60% of the national revenue depends solely on the income tax.

Malaysia's tax authority confronts difficulties in collecting taxes, and in administrating a tax compliance system. IRBM chief executive officer Dato Sri Sabin Samitah has stated that 'to reach the target, we had a tough row to hoe' (IRBM, 2017). During the announcement of the Budget for the year 2019, then Minister of Finance Mr Lim Guan Eng launched a special voluntary disclosure program, allowing the remaining non-compliant taxpayers, who had not yet complied with the tax system, to disclose and report their income to the tax authority of Malaysia (Lim, 2018). This system eased the burden on the IRBM in collecting taxes.

Evidence shows that business entities in the country evade tax if and when the managers themselves evade their personal taxes (Bernama, 2017). According to the Malaysian government, in 2015 98.5% of the businesses in the country were small and medium-sized enterprises (SMEs).⁴ As such, there is a need to investigate the relationship between personal tax compliance and corporate tax compliance (Bagdad et al., 2017). So far, the impacts of the personal tax system on the corporate tax system have not been widely studied; so the association between the two tax systems remains unclear, resulting in a significant research gap. Therefore, the objective of this study is to find empirical evidence for the impact that the factors affecting personal tax compliance behaviour have on Malaysian tax affairs officers of businesses.

2. OVERVIEW OF STUDY SETTING

Located in South East Asia, Malaysia practises a federal, parliamentary, constitutional, and elective monarchical system of government; and it comprises 13 states and three federal territories. Each of the states has its own respective Constitution, legislative assembly and executive council headed by an elected member of the legislative assembly, the Chief Minister, whereas the federal territories, including the capital and administrative city, Kuala Lumpur, Putrajaya, and the island of Labuan have the same status as states but are headed by the federal state only. All the Peninsular Malaysian states are led by hereditary rulers, while Sabah and Sarawak are led by appointed state rulers. As in other countries, Malaysian states are sub-divided into districts, with districts in Sarawak and Sabah grouped into administrative divisions. More than half of the population are Malays, with minorities of Chinese, Indians, and the indigenous people of the country. The official language of Malaysia is Malay, while English remains an active second language. Even though the established religion of Malaysia is Islam, its Constitution has granted freedom of religion to non-Muslims of the country as well.

⁴ See SME Corporation Malaysia, 'Profile of SMEs', <https://smecorp.gov.my/index.php/en/profile-of-smes>.

According to the International Monetary Fund (IMF), the Malaysian economy in 2020 was the sixth largest economy in South East Asia and the 39th largest in the world (IMF, 2020). Malaysia has recently upgraded its economy to the status of a newly industrialised market economy, which is a social-economic classification employed by political scientists and economists. The term 'Newly Industrialised Market Economy' refers to the economy of a developing country the economic growth of which is much higher and faster than that economy of other developing countries.

The government of Malaysia implemented a goods and services tax (GST) in 2015 at the rate of 6%, which has since been repealed and replaced with the sales and service tax (SST). With a trade-to-GDP ratio, averaging over 130%, the nation has become one of the most open economies globally. About 40% of the jobs in Malaysia are related to export activities, and Malaysia is expected to reach its transition from an upper-middle income economy to a higher-income economy by the year 2024 (World Bank, 2021c).

However, the Covid-19 (Coronavirus) pandemic has affected most of the Malaysian economy, especially the income that is generated by the low-income earning group as defined by the national poverty line. The Malaysian government has been continuously taking appropriate measures to subsidise the low-income earning groups to safeguard them from the economic impact of the crisis including poverty and hunger. Minister in the Prime Minister's Department in charge of the economy Datuk Seri Mustapa Mohamed has stated that 'seizing new growth opportunities and overcoming potentially long-lasting challenges brought on by the COVID-19 crisis will necessitate bold structural reforms in the medium term' (World Bank, 2020).

The equality of income in the country remains high, but a gradual decline in equality has been felt and observed by economists in recent years. The Malaysian government has stopped focusing on broad-based subsidies and has started to move toward supporting low-income groups in the form of cash transfers. Malaysia has been ranked 55th of 157 countries in the World Bank's Human Capital Index (World Bank, 2019). Malaysia is in a situation where it is increasingly concerned with furthering the quality of education, health, and nutrition of the people in the country, and about the protection of their social outcomes in the country.

In most countries, small and medium-sized enterprises (SMEs) contribute to their countries, driving their economy towards growth, and thereby solving the unemployment issues of the countries. According to the SME Corporation Malaysia SMEs conduct business in all industries in Malaysia, especially in manufacturing services, agricultural production, construction services, and mining and quarrying services.⁵ The basic criteria set by the government of Malaysia for SMEs relate to sales turnover and the number of employees. The general concept of small-medium enterprise is generally classified into three main categories of 'Micro', 'Small', and 'Medium' sized businesses, depending on the abovementioned sales turnover and number of employees criteria. The Department of Statistics Malaysia (2020) indicates that the contribution made by the Malaysian SMEs is one of the major sources of job creation as well, for the Gross Domestic Product (GDP) of the nation, where as noted in section 1 they represent more than 98.5% of businesses. The government of Malaysia continuously issues special tax updates through the government regulations, including

⁵ SME Corporation Malaysia, 'SME definitions',
<https://www.smecorp.gov.my/index.php/en/policies/2020-02-11-08-01-24/sme-definition>.

regulation numbered 46 and with amendment 23 of 2018 (Supriyono, Utami & Muktiyanto, 2021). From the SMEs in Malaysia, employment has been offered to 7.3 million people in the year 2019, which is relatively a growth when compared with that of the previous year of 2018 (7.1 million) (Department of Statistics, Malaysia, 2020).

Establishment of an SME in Malaysia is notably easy and barrier-free, with financial institutions in the country providing substantial initial financial support. The World Bank (2016) has highlighted that in order to transition from its (present) economic level to a higher income economic condition, Malaysia will need to depend to a significant extent on the contribution to be made by SMEs established in the future. The recent study by Razak, Abdullah and Ersoy (2018) highlights that Chinese entrepreneurs have dominated the SME sectors in Malaysia and that their contribution to the national economy through their SMEs has been extraordinary since the 1990s. Even though Malaysia remains a multi-racial country, the other ethnic groups such as Malays, Indians and Bumiputeras have been observed to be far behind in entrepreneurship and seem disinterested in this endeavour. The SME 'Capability Programme' and the 'Coach and Grow Programme' (CGP) are two of the Malaysian government's initiatives seeking to encourage all Malaysians to take up entrepreneurship in the country. Unfortunately, it has been found that the average life span of Malaysian SMEs is five years, and that most Malaysian entrepreneurs fail to sustain their businesses over a long period of time (Perera & Baker, 2007). Poor strategic planning, lack of management skills, lack of entrepreneurs' personality traits, poor marketing techniques, etc. have been found to be the common factors that impede Malaysian SMEs' sustainability in the market.

The Malaysian tax system was established prior to 1910, during the era of the early Malay rulers (Kasipillai & Shanmugam, 1997). Since then, the tax system in Malaysia has been modified on many occasions time, in line with the many episodes of colonisation that the country has been subjected to in its history. The early settlements of Malaya, which comprised Singapore, Malacca, and Penang, introduced a draft bill imposing a tax on the people which was later withdrawn. As the people of early Malaya were not interested in the contribution of tax to the government, the tax system was replaced with a different funding system to cover the government expenditures. During the time of Japanese rule (1942-1945), a restructuring of the collection of taxes was implemented. Later, in 1947, during the time of British rule, tax expert R B Heasman was appointed as a special officer to investigate the Malaysian tax system (Heasman, 1947). Four years after the formation of Malaysia, the existing income tax system came to be regulated by the *Income Tax Act 1967* (ITA).

Like other Commonwealth countries, before commencement of the self-assessment system (SAS) for collecting taxes, Malaysia practised the official assessment system (OAS), whereby the taxpayers and their tax amounts payable were evaluated by the tax authority of Malaysia (IRBM). The manual practice of the OAS was transformed into the new mechanical and computerised self-assessment system by then Prime Minister Hon. Tun Dr Mahathir Mohamad in 2001 for the corporate sectors, and for the individual taxpayers. Many developed and developing countries had already adopted the self-assessment system before Malaysia started to adopt it. Under self-assessment, taxpayers have the responsibility to perform all the taxation procedures before they are evaluated by the tax authority. As the taxpayers are entrusted with the said responsibility, the tax compliance level in the country depends greatly on the behaviour of every individual taxpayer. The Malaysian self-assessment system must fulfil the objectives of collecting the correct tax amount effectively, upholding the trust and

integrity of Malaysian taxpayers, and encouraging voluntary compliance behaviour. One study conducted immediately after the introduction of SAS measured the perception of the taxpayers towards the self-assessment system, finding that taxpayers were more comfortable with that system than with the official assessment system (Kasipillai, 2002).

3. CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

The term ‘individual in taxation refers to a natural person (Inland Revenue Board of Malaysia, 2018). Self-employed individuals (SE) and salary and wage earners (SW) pay their contribution to the government to secure the economic equilibrium of the nation (Ahmed & Kedir, 2015). Individuals who fall under ‘SE’ or ‘SW’ categories are required to submit their assessment, based on their income during each calendar year. The sources of income include gains and profits from a trade, profession, and business, salaries, remuneration, and gains and profits from employment, dividends, interests or discounts, rents, royalties or premiums, pensions, annuities or other periodic payments and other gains or profits of another income nature; all these sources of income can be taxed as stated in section 4 of the ITA (Inland Revenue Board of Malaysia, 2018). In the year 1974, the basis of taxation was replaced with ‘derived and remittance’, which means that the tax from an individual is charged from the income of the individual that is derived in the country, Malaysia, and also from the income that is remitted to Malaysia from outside the country. The income remitted to Malaysia from outside the country by a non-resident of the country is not subject to taxation. This system has been amended, thereby exempting all the income remitted to the country from outside of Malaysia from taxation, and the current scope of the charge is limited only to the ‘derived basis’. The Malaysian tax system allows married taxpayers to submit their assessments jointly, or separately (Ahmed & Kedir, 2015).

The income earners who are above the chargeable income level of MYR 5,001 are subjected to the payment of tax with interest, increasing from 1% to 30%, based on the income threshold which they fall under. The chargeable income is obtained after deducting the personal reliefs from their total income. Table 1 below clearly explains the chargeable income and the relative tax rate charged by the Inland Revenue Board of Malaysia.

Table 1: Chargeable Income and Tax Rate

Chargeable Income	Calculation (RM)	Rate %	Tax (MYR)
0 - 5,000	On the first 5,000	0	0
5,001 - 20,000	On the first 5,000		0
	Next 15,000	1	150
20,001 - 35,000	On the first 20,000		150
	Next 15,000	3	450
35,001 - 50,000	On the first 35,000		600
	Next 15,000	8	1,200

50,001 - 70,000	On the first 50,000		1,800
	Next 20,000	14	2,800
70,001 - 100,000	On the first 70,000		4,600
	Next 30,000	21	6,300
100,001 - 250,000	On the first 100,000		10,900
	Next 150,000	24	36,000
250,001 - 400,000	On the first 250,000		46,900
	Next 150,000	24.5	36,750
400,001 - 600,000	On the first 400,000		83,650
	Next 200,000	25	50,000
600,001 - 1,000,000	On the first 600,000		133,650
	Next 400,000	26	104,000
1,000,001 - 2,000,000	On the first 1,000,000		237,650
	Next 1,000,000	28	280,000
Exceeding 2,000,000	On the first 2,000,000		517,650
	Next ringgit	30

Tax compliance with the tax law means true and honest reporting of tax with correct calculation of liability, timely filing of the tax return, and timely payment of the amount that is due to be settled to the tax authority (Kiow, Salleh & Kassim, 2017). Most of the individual and corporate taxpayers in Malaysia are hesitant to pay their taxes to the tax authority; and to cut down their tax liabilities, they engage in various strategies and actions (Ahmed & Kadir, 2015). Corporate tax compliance is an action that is performed by a corporate taxpayer, fulfilling the obligation of a taxpayer to the corporate sector and adhering to the rules and regulations of the corporate sector. Governments around the world certainly maintain an immense focus on collecting taxes. However, they experience difficulties when collecting taxes from the taxpayers.

McBarnet's model explains that compulsion in tax compliance creates capitulated compliance that occurs without the taxpayers' willingness, whereas committed compliance refers to the taxpayers' voluntary tax compliance (McBarnet, 2019). Tax avoidance takes place where individuals, while remaining taxpayers, seek ways to reduce their tax payments owed to the government. By contrast, tax evasion refers to intentional non-compliance with the tax system, where the taxpayers understand and realise the obligation that they have to the government but evade those obligations (Slemrod & Yitzhaki, 2002).

3.1 Peers' tax compliance

In taxation, the term 'peers' refers to those who are in association with a taxpayer, especially the individual taxpayer's relatives, friends, co-workers, and colleagues

(Lefebvre et al., 2015). The individual taxpayer's behaviour is affected, and influenced by the behaviour of his neighbours, or by the behaviour of those with whom the individual frequently interacts (Alm, Bloomquist & McKee, 2017; Inasius, 2019). This study has employed an experimental method to test the role of the peers on the tax compliance behaviour, and it has found that there is a positive relationship between the neighbours' tax compliance behaviour and the individual's tax compliance behaviour. However, the study further concludes that this information, regarding neighbours' compliance behaviour, does not always improve an individual's tax compliance behaviour. In addition, Alm et al. (2017) explain that tax compliance behaviour is so wide that it cannot be narrowed down to information about neighbours' behaviour.

The study by Ho, Loo and Lim (2006) found that taxpayers in China use relationship-based reasoning to make judgments on tax compliance issues. The study further highlighted that people are always ready to react to the social norms and behaviour of their neighbours and their peers. Conversely, however, the study by Alshira'h, Abdul-Jabbar and Samsudin (2019) found that peer influence does not have any significant effect on tax compliance among Jordanian taxpayers. Their findings have been supported by Bornman (2004), who explained that taxpayers have been found to be complying with the tax system while their peers were not.

Referring to the decision-making of an individual on tax compliance, Alshira'h et al. (2019) discovered that the influence exerted by the peers of an individual may be the determinant of tax compliance in other regions apart from Jordan, given that the culture of Jordanians is highly individualism-oriented and resistant to the social interaction among the people of the country, providing an explanation for the insignificance of their relationship on tax compliance. Interestingly, another study, by Obaid, Ibrahim and Udin (2020), in the same study setting of the Middle East found that the influence of peers strongly determines the tax compliance behaviour of individuals in Yemen. This finding highlights the relationship between the social grouping and an individual in the decision-making. A similar outcome has been reported by an Indonesian study that explained that the reference group has the most significant influence on tax non-compliance behaviour among small and medium enterprises (Inasius, 2019).

The mixed conclusions reached by researchers do not provide a clear understanding of the relationship between the peer tax compliance behaviour and individual tax compliance behaviour. Also, studies focusing on the tax compliance behaviour of an individual impacted by reference to his peers in developing countries are lacking. Lutfi, Idris and Mohamad (2017) suggest that peer tax compliance is not an easily observable variable, as it is involved with social pressure; an anonymous method of data collection, in this regard, should be employed to obtain a truthful and honest reflection of perceptions from the individuals concerned.

3.2 Probability of tax audit

According to Allingham and Sandmo (1972), taxpayers comply to a high level with the tax system if they find that the probability of their non-compliance being detected is high. Some studies have found that there is a positive relationship between tax audit and tax compliance (Ayers, Seidman & Towery, 2019; Modugu & Anyaduba, 2014). A supplemental analysis carried out by Ayers et al. (2019) reported that the probability of audit alters the expectation of managers on future tax submissions. Previous studies have reported mixed results on the association between the probability of audit and the level of tax compliance. For example, DeBacker et al. (2013), using US revenue

authority data and financial statement data, explained that legal enforcement, like an audit, may increase subsequent corporate misbehaviour.

At the same time, the recent study by D'Agosto et al. (2018) found a positive relationship between tax audit and tax compliance behaviour in terms of deterrence theory. The study collected data from the tax return registry and audit database of the Italian Revenue Agency between 2004 and 2009, focusing on the self-employed and sole proprietors of businesses. The study found that the rate of Italian tax compliance had been increased relatively by three types of audits, namely on-site audit (soft audit), desk audit (deep audit), and mixed audit (a mixture of on-site and desk audit). However, this study suggested that the data used in the research related to a period a decade earlier, and that there was a need for a further study using more recent data and with a wider geographical setting, or in a different region.

In relation to deterrence theory, the literature provides mixed conclusions on the relationship between the two variables. For example, while other researchers have discovered that even though a high rate of audits normally increases the level of tax compliance among the taxpayers, or the reporting of their income to the tax authority, the results are not statistically significant (Evans, Carlon & Massey, 2005). In a study conducted in Australia, a possible explanation for the above fact has been put forward that the respondents who participated in the study might have had a lack of audit experience and that 63% of the respondents had not been subjected to any audits carried out by the Australian Taxation Office (ATO). Of the participants of the study, only around one-third had undergone audits in the prior three years. The lack of statistical significance of the results of the study reveals that mere threats of audit may not be enough to encourage an individual to comply with the tax system, and thereby change the individual's behaviour. However, once a business has been audited, the importance of tax compliance is felt by the individuals involved in that business, and a change in the behaviour of the individuals can also be noticed.

3.3 Service quality of tax authority

The study by Supriyono et al. (2021) collected data from various business entrepreneurs and learned that the individuals involved in businesses in Indonesia are motivated to report their income to the tax authority, being influenced by the level of service quality of the authority. If the tax policies adopted by the government seem to be unfair to the people, they tend to form a negative perception of the tax system, and the role played by the tax authority in collecting tax for the country; the cause for the formation of such perception among the people is that 'tax socialisation' theory (arousal of awareness on tax compliance) does not apply among the people (Chong & Arunachalam, 2019; Richardson, 2008). The lessening of complexities in the tax system and maintaining leniency in the administration of tax collection by the tax authority could lead taxpayers to become more tax compliant (Alm et al., 2017). Nevertheless, the adoption of mixed self-assessment (e-filing) and official assessment (manual submission) systems around the world has not led to any standard finding as to the relationship between the service quality of tax authority and taxpayers' compliance behaviour (Palil, Hamid & Hanafiah, 2013). Further, the relationship between tax compliance by small and medium-sized businesses and their perception of the tax authority remains unclear. Supriyono et al. (2021) suggest testing this variable on a large-scale study of respondent, for example, by survey and direct interview since this issue has been solely studied from a qualitative approach. In view of the above fact, this study further explores the service quality of the Malaysian tax authority, which adopts the self-assessment system of taxation.

In the above context, Kasipillai and Baldry (1998) have found that better interactions between the Inland Revenue Board (IRBM) and taxpayers cause better tax compliance. It has also been suggested that the Malaysian tax compliance level may increase if the tax collection authority upgrades the relevant technology for the benefit of taxpayers (Abdul-Jabbar & Pope, 2008). Experiments reveal that people who are treated fairly with good acknowledgment by the authorities tend to comply more with the tax system (Braithwaite, 2009). The Organisation for Economic Co-operation and Development (OECD) (2010) explains that among the three types of fairness in taxation, two, namely procedural fairness – the perception that the tax authority is just and fair in dealing with clients – and retributive fairness – the perception that the tax authority is fair in applying penalties – are relevant to how the tax authority deals with taxpayers.

If this study finds a significant relationship between the tax authority dealings and the compliance behaviour of the taxpayers, the modern risk treatment model termed ‘Right from the Start’ adopted by the Swedish Tax Agency could also be recommended to the Inland Revenue Board of Malaysia for adaptation. The Swedish Tax Agency introduced ‘Right from the Start’ as a compliance method based on the principle that the tax authority has a role to play in creating an environment which encourages compliance. Skatteverket (2005) introduced the ‘Right from the Start’ model⁶ to be used in taxation to prevent errors that can occur when seeking to achieve and improve tax compliance among taxpayers, based on the principle that the tax authority has a role to play in creating an environment in which tax compliance can be lifted to a higher level.

3.4 Satisfaction with government spending

Studies that have focused on the relationship between government spending and the tax compliance behaviour among taxpayers in developing countries are very scarce. Due to the unavailability of empirical evidence to explain the relationship between government spending and tax compliance, it is assumed that taxpayers are concerned to ensure that the government spends their tax contributions justly and reasonably in keeping with its needs and requirements (Palil et al., 2013).

Doerrenberg (2015) explains that taxpayers, especially those who pay high levels of taxes to the government, carefully and vigilantly observe the activities of the government with regard to its spending of their money, their contribution of tax, so as to know how much of money is withdrawn from the government budget to be spent, what the money is spent for, and so forth (Mohani, 2001). Similar findings have been obtained by Alasfour, Samy and Bampton (2016) in the case of Jordan, where the non-compliance of citizens with the tax system is morally acceptable since the people of Jordan have formed a negative impression of the government and its spending due to perceptions of its engagement in corruption and misuse of the taxpayers’ money. The purpose of that study, using a survey questionnaire with a multivariate test procedure, was to investigate how the individuals in Jordan determine their tax morale level and their tax compliance level. The findings revealed that if the expenditures made by the government with the taxpayers’ contribution had been considered worthwhile, taxpayers’ thoughts for non-compliance would be negated. It is also assumed that taxpayers tend to avoid paying taxes to the tax authority if they predict that the

⁶ The ‘Right from the Start’ model investigates the issues in taxation that cause tax non-compliance; analyses the root cause of the issues; and addresses the issues at an early stage before they become problematic to the tax authority.

expenditures made by the government are not as fruitful and beneficial as they should be (Braithwaite, 2009).

To minimise the impact of tax compliance on individual taxpayers who work in organisations, institutions, business entities, etc. in developed Western countries and to discourage any bad intention of tax evasion, the tax paying method termed 'Pay As You Earn' (PAYE) has been adopted whereby the taxes due to be paid to the government by the individuals concerned are deducted from their salary by their employers and are sent to the tax authority. The adoption of the PAYE system negates the concept of the relationship between perception of government spending and tax behaviour, as the taxpayers are deprived of the opportunity to take their decision on tax compliance based on their perception towards the government (Roberts & Hite, 1994). Very few studies have focused their attention on the perception that the people have towards government spending.

Allingham and Sandmo (1972) have modelled an individual taxpayer's compliance behaviour, and this model also suggests that taxpayers' compliance with the tax laws is based on a simple expected utility function, which is an individual's preference towards goods or services, beyond the monetary value. According to the model, the level of tax evasion can be measured either by the penalty rate imposed on the taxpayer or by the increased probability of the taxpayer being caught for tax evading (Yitzhaki, 1974). Further, this theory also explains the relationship between the level of legal action, taken and the level of tax evasion (Jugurnath et al., 2017). This theory would fit into the study since this research studies the perception of penalty rate and the probability of audit.

3.5 Hypothesis development

According to Alm et al. (2017), the tax compliance behaviour of an individual is strongly affected by the tax compliance behaviour of the individual's neighbours, or by the people with whom the individual frequently interacts. It is possible for individuals to become compliant with the tax system, disclosing and reporting their income to the IRBM, when they come to know or believe that the other people around them who are in association with the individuals also take the same action. Conversely, when the neighbours of an individual avoid taxes, there will be a high degree of possibility for the individual to follow suit. For the participation of two groups of respondents in an experiment, a 'two-treatment setting' was established for this study. In one treatment setting of the experiment, a group of respondents was informed that their neighbours had complied with the tax system, and in the other setting, another group of respondents was informed that their neighbours had been audited and that they had paid their taxes with penalties. The results of the experiment indicated that the behaviour of an individual is subject to significant changes and impacts made by the behaviour of other people concerning tax compliance. Obaid et al. (2020) note that there are individuals who do not associate with other people so as to be influenced by them on tax compliance, and for such people, peer influence cannot be a factor to determine their tax compliance behaviour.

Therefore we postulate:

H1: *There is a positive association between peer tax compliance and personal tax compliance.*

According to Ayers et al. (2019), in business, managers' decisions to comply with the tax system are determined by the probability of audit. The study by DeBacker et al. (2013) put forward a different view, claiming that legal enforcement increases tax aggressiveness, which prompts the corporate sectors to take action to reduce tax payments after an audit. Businesses comply with the tax system more when they have the probability of their businesses being audited by the tax authority; and soon after the audit, they become non-compliant with the tax system. Such a pattern of behaviour in businesses is termed a U-shaped impact. Subsequently, D'Agosto et al. (2018) stated that there is a positive, and significant relationship between tax audit and tax compliance. Different types of audits are carried out by the tax authority in Italy, relating to the types of cases of tax non-compliance they handle, which improves the level of tax compliance significantly in the country. However, the adoption of on-site and desk audits has shown a great effect on tax compliance.

Therefore we postulate:

H2: *There is a positive association between probability of tax audit and personal tax compliance.*

Having a strong influence on tax compliance behaviour, tax socialisation relates to the service quality of the tax authority (Supriyono et al., 2021). Service quality must be upheld by the tax authority because taxpayers frequently face difficulties in calculating, paying, and reporting their taxes. The tax authority is obliged to improve its service quality in terms of knowledge, skills, and other facilities so that it can facilitate the taxpayers in fulfilling their tax compliance requirements. Indonesian taxpayers have revealed that they fail to comply with the tax system because they cannot acquire the required regulatory information that they are looking for from the tax authority, and also that they do not understand what the tax authority demands and expects from them. A similar argument was presented by Alm et al. (2017), that the service paradigm for tax administration, where tax officers act as facilitators and share their services, increases the level of tax compliance.

Therefore we postulate:

H3: *There is a positive association between service quality of tax authority and personal tax compliance.*

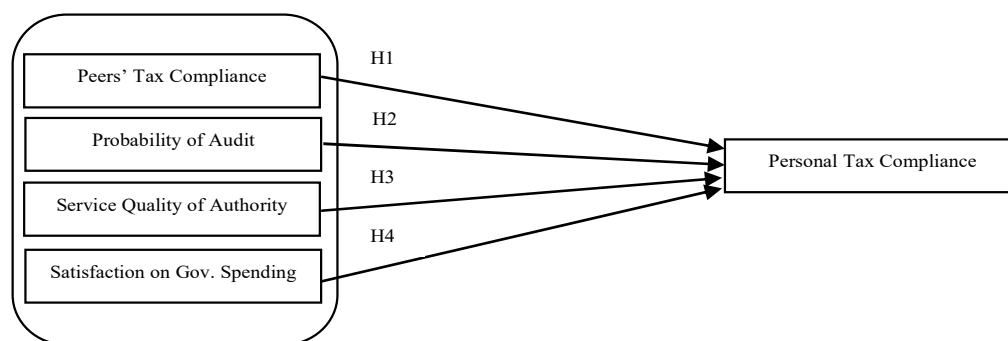
The collected tax is directed to the treasury of the federal government, and the flow of funds is expected to be transparent to the public (Doerrenberg, 2015). Further, being taxpayers, the citizens of the country take note of the money that is handled and spent by the government. If the taxpayers perceive that the expenditures made by the government are not worthwhile and fruitful, the resulting perception negatively impacts upon their tax compliance behaviour (Braithwaite, 2009). With a similar argument, Mohani (2001) rationalises that the people who pay higher levels of tax to the government monitor the government diligently when it handles taxpayers' money. An empirical study by Alasfour et al. (2016) reveals that the people of Jordan have the tendency not to comply with the tax system in the country due to the negative perception that they have formed of the government as having been hit heavily by corruption. Having developed the corruption perception index, Transparency International (2018) has highlighted that Jordan continues to be ranked 59th out of the 180 countries in terms of perceptions of corruption. Meanwhile, Transparency International (2021) has ranked Malaysia 57th out of the 180 countries in the same index, allowing the variable

‘satisfaction with government spending’ to be an important determinant for personal tax compliance.

Therefore we postulate:

H4: *There is a positive association between satisfaction with government spending and personal tax compliance.*

Fig. 1: The research model



4. RESEARCH METHOD

The various websites displaying information, such as names, contact details, nature of businesses, etc. of public and private business establishments based in Malaysia were of immense assistance to the researchers in the distribution of the questionnaire, via email, to individuals who deal with the tax affairs of Malaysian business entities. This study has chosen the purposive sampling method, which is an appropriate sampling method for determining the general degree of importance of a phenomenon, in this case the variables of interest of the responding individuals (Sekaran, 2016), together with snowballing to increase the response rate. The sample size is 400 (Sekaran, 2016). The ‘Smart PLS’ system is used to test all the hypotheses.

With surveys a frequently used method to collect data for tax-related studies (Richardson & Sawyer, 2001), Saunders et al. (2003) explain that questionnaires can be classified into the self-administered and interviewer administered forms. The survey method is also subject to both ‘pros’ and ‘cons’, and Kleven et al. (2011) note that survey approaches may be subject to unreliable data. Therefore, it was seen as necessary for respondents to act honestly and responsibly in completion of the survey in this study. To improve the freedom of the respondents to answer the questionnaire honestly, the researchers considered that providing an anonymous questionnaire would be the best choice. This survey questionnaire was of the self-administered questionnaire type, using an online platform such as Google E-forms. Further, this questionnaire also collected the respondent’s profile, in terms of the individual demographic information, as well as

their represented business profiles. The sample chosen for this study involved individuals who manage/handle their/others' tax affairs in business – so this survey was required to be completed by an individual who handles tax affairs in business. The survey questionnaire consisted of two major sections: the first about personal tax compliance and factors that impact personal tax compliance and the second relating to the respondents' information about themselves as well as about the businesses they work in. The items under each dimension were anchored on a seven-point Likert scale, i.e., Completely Disagree = 1, Mostly Disagree = 2, Somewhat Disagree = 3, Neither Agree nor Disagree = 4, Somewhat Agree = 5, Mostly Agree = 6, and Completely Agree = 7. Specific details of the survey questions as related to the model constructs are set out in the Appendix.

The purposive sampling method was adopted to perform the sampling in the first instance. Related research studies suggest performing snowballing sampling to increase the responses from the respondents, with both methods representing non-probability sampling techniques. Thus the respondents chosen to participate under purposive sampling were requested to forward the invitation to the survey to their known individual contacts who also manage/handle some tax affairs in their businesses.

Structural equation models are often used to assess unobservable 'latent' constructs. The use of SEM is commonly justified in the social sciences because of its ability to impute relationships between unobserved constructs (latent variables) and observable variables. SEM, therefore, allows the researcher to diagnose which observed variables are good indicators of the latent variables. To avoid the social desirability bias in this study, the researchers adopted a combination of two approaches to record the responses among officers of tax affairs. The questions in the questionnaire consisted of positive and negative questions, which recorded the tax compliance and non-compliance decision-making among officers of tax affairs. The positive questions were measured in direct mode, and the negative questions were measured in reversal mode.

5. RESEARCH RESULTS

The actual population of respondents for this study are the tax affairs officers of Malaysian businesses. The tax affairs officers in Malaysia can be the owner of a business, or an appointed qualified officer, depending on the size and the nature of the business. There is no specific statistical report to disclose specifically the population of tax affairs officers in Malaysia. In the case of respondents to the survey in this study, 72.2% of the respondents were males, and 27.3% females. In terms of ethnic background, the largest group of the respondents, the tax affairs officers of businesses, were Chinese, representing 47%, followed by Malays, Indians, and other Bumiputras representing 33.16%, 16.07%, and 3.06%, respectively. The majority of respondents were also between the ages of 31 and 40, representing 62.24% of the sample. Among them, 45.66% worked in the food and beverage industry, followed by the retail and manufacturing industries at 18.62% and 11.99% respectively. The next section examines the validity and reliability of the constructs.

5.1 The measurement model

Table 2: Measurement Model

Constructs	Loading	Weight	AVE	CR
<i>Satisfaction with government spending</i>				
SATS1	0.745			
SATS2	0.871		0.596	0.854
SATS3	0.702			
SATS4	0.762			
<i>Service Quality of Tax Authority</i>				
SERV1	0.661			
SERV2	0.731			
SERV3	0.712		0.711	0.843
SERV4	0.705			
SERV5	0.664			
SERV6	0.656			
<i>Peers' Compliance</i>				
PEER1		0.616		
PEER 2		0.512		
PEER 3		0.645		
PEER 4		0.629	0.719	0.817
PEER 5		0.618		
PEER 6		0.525		
PEER 7		0.621		
PEER 8		0.617		
<i>Personal Compliance</i>				
PTAX1		0.628		
PTAX 2		0.623		
PTAX 3		0.523		
PTAX 4		0.638		
PTAX 5		0.615	0.680	0.816
PTAX 6		0.515		
PTAX 7		0.615		
PTAX 8		0.619		
PTAX 9		0.512		
PTAX 10		0.627		
<i>Audit Probability</i>				
PROB1		0.793		
PROB2		0.849	0.747	0.922
PROB3		0.867		
PROB4		0.848		

The SmartPLS application was used to analyse the collected data. The fundamental appeal of PLS-SEM is allowing the researcher to estimate complex models with many constructs and indicators, and complicated structural paths without imposing distributional assumptions on the data (Hair et al., 2019). The first step in the measurement model is to check the fitness between the constructs and the latent variables. The PLS algorithm reveals the outer loading values for reflective constructs and outer weight for the formative constructs. In this study, satisfaction with government spending, and service quality of tax authority are the reflective construct models and the rest are formative constructs. Table 2 shows the factor loading of reflective constructs as well as the factor weight of the formative constructs. Factor loading and factor weight reveal values above the benchmark value of 0.6, except for indicators of peer tax compliance and individual tax compliance.

The second step in the measurement model is to assess the internal consistency reliability, most often using composite reliability (CR) (Hair et al., 2019). Composite reliability (CR) shows the indication of indicators on the latent variables ranges between 0.816 and 0.922, reporting the values above the benchmark, 0.7.

The third step is assessing the convergent validity (Hair et al., 2019). This explains the extent to which the constructs converge to explain the variance of the items. The average variance extracted (AVE) is reported between the range of 0.596 and 0.747, exceeding the recommended benchmark level of 0.5.

Finally, the researcher is required to assess the discriminant validity, representing the extent to which a construct is empirically distinct from other constructs in the structural model (Hair et al., 2019). Discriminant validity is examined by looking at the correlation between constructs and the square root of the variance extracted for a construct. The top values presented in Table 3 show the square root of the construct's average variance extracted and the rest of the values show the correlation between the construct and are less than the square root of the average variance extracted. In summary, the measurement model confirms the goodness of the measurement. Generally, formative constructs are exempted from discriminant validity.

5.2 The structural model

The structural model was estimated using SmartPLS 3 software. Based on the analysis, the R² value for the relationship between independent variables, the factors, and the dependent variable, tax compliance among tax affairs officers of Malaysian businesses was 0.839. Thus, it can be summarised that 83.9% of the variance in the tax compliance level among tax affairs officers of Malaysian businesses are explained by the selected variables (refer to Table 4).

Table 3: Discriminant Validity

	Individual Tax Compliance	Satisfaction with Government Support
Satisfaction with Government Spending	0.772	
Service Quality of Authority	0.347	0.843

Table 4: Path Coefficient

Path	Description	Hypothesis	Path Coefficient	t-value	p- value	Results
PEER→PTAX	Peers' Tax Compliance → Personal Tax Compliance	H1	0.975	1.685**	0.041	Supported
PROB→PTAX	Probability of Audit → Personal Tax Compliance	H2	0.683	3.251**	0.000	Supported
SERV→PTAX	Service Quality of Tax Authority → Personal Tax Compliance	H3	0.584	1.990**	0.023	Supported
SATS→PTAX	Satisfaction with Government Spending → Personal Tax Compliance	H4	0.114	1.691 **	0.043	Supported
				R ² =0.839 F ² =0.330		

The pathway analysis shows that a significant positive ($\beta=0.975$, $p<0.05$) relationship exists between peers' tax compliance and personal tax compliance, a positive and significant ($\beta=0.683$, $p<0.05$) relationship between the probability of audit and personal tax compliance, and a positive and significant ($\beta=0.584$, $p<0.05$) relationship between service quality of tax authority and personal tax compliance. Satisfaction with government spending is also found to be a significant predictor ($\beta=0.114$, $p<0.05$) of personal tax compliance among tax affairs officers of Malaysian businesses.

6. DISCUSSION AND CONCLUSION

The outcome of the analysis highlights that the structural model drawn in this study indicates a good model fit with an R-Square value of 0.839, and F-Size of 0.330. The interpretation is that the relationship between the factors of personal tax compliance (independent variables) among the tax affairs of Malaysian businesses and the personal tax compliance behaviour (dependent variable) can be explained to an extent of 83.9% by the variables studied. Moreover, the effect size (f-square) of more than 0.2 is an indication of a significant effect on the construct and validity of the model.

Interpretation of the hypothesis test, path coefficient, clearly articulates that hypothesis H1, a positive association between peer tax compliance and personal tax compliance, is supported. This correlates with previous studies by Alm et al. (2017), and Obaid et al. (2020) by confirming the impact of peers on personal tax compliance decision-making. The decision-making of associates around an individual leads to application of a similar decision of the individual's own. At the same time, as mentioned earlier, the converse of this association may also occur, in which unfavourable decisions by associates causes non-compliance with personal taxes.

Testing indicates that hypothesis H2, a positive association between the probability of tax audit and personal tax compliance, is also supported. This outcome parallels Ayers et al. (2019) and D'Agosto et al. (2018) and contradicts DeBacker et al. (2013) which studied corporate tax compliance in the United States and revealed that audit probabilities increase the tax aggressiveness of corporate businesses.

This study further highlighted that hypothesis H3, a positive association between service quality of the tax authority and personal tax compliance, is supported. Previous studies have reached consistent conclusions on this issue, and Alm et al. (2017) and Supriyono et al. (2021) in particular stated the same conclusion and confirmed that the service paradigm for tax administration, where the tax officers act as facilitators and share their services, will increase the level of tax compliance.

Finally, hypothesis H4, is a positive association between satisfaction with government spending and personal tax compliance, was also supported. Studies by Alasfour et al. (2016), Braithwaite (2009), and Mohani (2001) made a similar finding and share the insight that the citizens of the country take note of the money that is handled and spent by the government.

In conclusion, this study investigated the influencing factors on personal tax compliance behaviour among tax affairs officers in Malaysian business. According to Bagdad et al. (2017), as referred to in section 1, an assumption is presumed that there is a tendency for personal tax non-complying taxpayers also to exhibit non-compliance with corporate tax obligations. Since this study predicted that four variables, peers' tax compliance, probability of audit, service quality of tax authority, and satisfaction with government spending would have an influence upon the personal tax compliance behaviour of tax affairs officers, future researchers should measure the corporate tax compliance intentions of these officers to investigate whether their personal decision-making has an influence upon their corporate tax compliance decision-making. To produce an extensive and effective exploration of the said nexus, the selection of one type of data collection approach would not be sufficient, and the researchers should implement supplementary data collection methods in addition to the primary data collection method in order to strengthen the robustness of their findings.

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8. APPENDIX

Code	Indicator	Code	Indicator
PTAX1	I would feel guilty if I under-report my actual income in my annual tax return.	PEER1	Most taxpayers expect me to report all my income on the annual tax return.
PTAX2	To feel guilty for under-reporting income tax is good.	PEER2	Generally, I would do what most taxpayers expect me to do.
PTAX3	Under-reporting my income tax makes me better off.	PEER3	Most people who are important to me (e.g. family, friends, and business partners) expect me to report all my income on the annual tax return.
PTAX4	There are a number of government services, infrastructures and facilities for which I am thankful.	PEER4	Generally, I would do what people who are important to me would expect me to do.
PTAX5	Under-reporting income is acceptable if any portion of the money collected is wasted by government.	PEER5	Most taxpayers under-report their actual income on their annual tax returns.
PTAX6	Paying as little tax as possible is important.	PEER6	Generally, I would do what most other taxpayers do.
PTAX7	Government has spent the money collected from tax efficiently.	PEER7	The people who are important to me (e.g. family, friends, and business partners) under-report their actual income on their annual tax return.
PTAX8	Under-reporting my income will not hurt the society as a whole.	PEER8	Generally, I would do what people who are important to me do.

PTAX9	I feel that I have made a positive contribution to my country by fully reporting all of my income.	SATS1	I believe the government utilizes a realistic amount of tax revenue to achieve social goals.
PTAX10	Scenario question.	SATS2	I think the government spends too much tax revenue on unnecessary welfare assistance.
SERV1	The revenue authority has extensive means to force corporations to be honest about income tax.	SATS3	We receive fair value of services from the government in return for our corporate tax paid.
SERV2	Income tax compliance is much higher when the tax authority has the capacity to match tax returns and third-party reports in a systematic way.	SATS4	We pay high corporate taxes when compared to the services we get from the government.
SERV3	If we evaded taxes and got caught, the penalties would be very high for my company.	PROB1	If there was a discrepancy in the annual tax return, how likely is that it would be audited?
SERV4	Inland revenue board treats me fairly in my dealings with them.	PROB2	If my company were to be chosen for a compulsory audit, how likely would a discrepancy be identified?
SERV5	Inland revenue board treats us respectfully in our dealings with them.	PROB3	The penalties are severe if my discrepancy were discovered in audit.
SERV6	We trust IRMB and government when dealing with them on corporate tax matters.	PROB4	The chances of being audited are so low that it is worthwhile trying to economize a little on corporate income taxes for various reasons.

Tax Officer 2030: the exercise of discretion and artificial intelligence

Duncan Bentley*

Abstract

This article examines the principles underpinning effective decision-making and the exercise of discretion in Australian taxation law in the context of the development of digital government and the increasing use of artificial intelligence. The article proposes a framework for the exercise of discretion by the Australian Taxation Office (ATO) in decision-making involving expert systems and emerging supervised machine learning and deep learning, consistent with administrative law. The framework is of wider relevance to public sector delegated decision-making and it draws on relevant principles and case law. It identifies the capabilities the ATO requires to implement this framework and maintain public trust in the new systems.

Keywords: Tax administration, discretion, decision-making, public trust, digital government, AI

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1. INTRODUCTION

The Organisation for Economic Co-operation and Development (OECD) has highlighted two dimensions facing post-COVID governments: a trust deficit and exponential digital change (OECD 2020, p. 5; OECD, 2022). Bentley (2020, p. 376) analysed the changing nature of tax administration and its workforce in a literature review across multiple disciplines. That article demonstrated the importance of building and developing the necessary skills and capabilities of tax officers, which will achieve the dual result of increasing citizen trust and well-being, and protecting the revenue base.

Building digital government with the requisite skills and capabilities to ensure its efficacy and maintain public trust remains a major policy plank of Australian governments through the Commonwealth Digital Transformation Agency, which in turn supports State governments and agencies (Digital Transformation Agency, 2022, pp. 5, 9). Important for this article is that the two aspirations of the Australian Taxation Office (ATO) embrace both digital transformation and building public trust and confidence in the tax system (ATO, 2021, p. 12).

However, the efficacy and public trust impacts of several major digital government initiatives have been brought into question, as seen in submissions to the 2021 Senate Standing Committee on Finance and Public Administration References Committee Inquiry into the current capability of the Australian Public Service (APS), for example that of the influential independent Centre for Policy Development, which was scathing in its assessment of ongoing critical delivery failures across Australia (2021).

These difficulties are not surprising as evidenced by the Australian Public Service Commission (APS) submission. The APS as the body responsible for oversight of the Commonwealth public service noted that in 2021, '[t]he APS Workforce Strategy is being finalised' to 'set a whole-of-enterprise direction' and 'is likely to focus on ... action areas' including '[e]mbracing data and technology' (APS, 2021, pp. 13-14). It is clear from the submission from government agencies that while capability is critical, the work to deliver it is in its very formative stages and will take some years to deliver.

For tax administration, public trust is fundamental to engaging with taxpayers, ensuring voluntary participation, and building and maintaining high levels of compliance, as has been established by decades of research nationally and internationally in a context of technological change (Kirchler, Hoelzl & Wahl, 2008; Gangl, Hofmann & Kirchler, 2015; Bentley, 2016; ATO, 2022).

The OECD argues that the incorporation of digital technologies 'into the design of policies and services from the outset can help generate improved human and organisational capacities for information and knowledge management, especially for service design, and favour more convenient and tailored delivery' (OECD, 2020, pp. 9-10). Achieving this effectively reinforces the necessity to develop the digital knowledge, mindset and skills among all public officials (OECD, 2020, p. 10; OECD, 2021a). In an earlier framework setting out the facets of a data-driven public sector, the OECD identifies that a core requirement to maintain public trust is to adopt an ethical approach to guide decision-making using data and digital capabilities (OECD, 2019, p. 130). These characteristics are fundamental to the effective operation of the future tax system.

As digital government and tax administration expands and creates multiple dimensions of interaction with citizens across platforms and ecosystems, the nature of decision-making and the exercise of discretion will remain critical to maintain public trust (Gavaghan et al., 2019). Australian tax administration has faced this challenge many times over the years during its development. One of the most significant examples was the introduction in 1992 of the binding tax ruling system in Part IV of the *Taxation Administration Act 1953* (Cth) in conjunction with the introduction of self-assessment. The ATO had to build public trust in the new system over a period of years, while transforming its own capabilities.

The challenge is set out in the joint *Automated decision-making better practice guide* (Commonwealth Ombudsman, Office of the Australian Information Commissioner & Attorney-General's Department, 2019) (2019 Cth Guide) by a cross-agency collaboration between the Commonwealth Ombudsman, the Office of the Australian Information Commissioner and the Commonwealth Attorney-General's Department. It emphasises the complexity of applying rapidly emerging technologies to the web of legislation, delegations and internal guidelines in administrative decision-making. For tax administration, it requires framing any tax decision using a principle-based approach by tax decision-makers, who are appropriately trained to make such decisions with the support of those technologies.

This article examines the principles underpinning effective decision-making and the exercise of discretion in Australian taxation law in the context of the development of digital government and the increasing use of artificial intelligence (AI). The scope of this article is limited to the exercise of discretion by tax officers exercising delegated authority in fulfilling the functions of the tax administration. It further narrows this scope to the exercise of discretion by delegated decision-makers using expert systems, emerging supervised machine learning and deep learning. It uses the term 'expert and emerging systems' broadly to cover expert and advanced systems. While the 2019 Cth Guide still uses the term 'automated', the focus of this article is on AI-driven systems rather than basic automation (Commonwealth Ombudsman et al., 2019, p. 5).¹

The article proposes a framework for the exercise of discretion by the Australian Taxation Office (ATO) in decision-making involving expert and emerging systems that remains consistent with existing administrative law and tax administration. The framework is adaptable to and consistent with the development and implementation of supervised machine learning and deep learning as these become predominant over time (Zalnieriute et al., 2019).

The framework is of wider relevance as these decisions are analogous to much public sector delegated decision-making and it draws on relevant principles and case law currently applied. It identifies the capabilities the ATO requires to implement this framework and maintain trust in the new systems (ATO, 2022).

The article, in section 2, considers the principles set out by the Administrative Review Council (ARC) in its report to the Attorney-General in 2004 and their subsequent application through relevant recent cases and administrative developments including the 2019 Cth Guide (Commonwealth Ombudsman et al., 2019). Section 3 re-examines the

¹ This article does not explore general ethical challenges of AI or taxation. For these see Department of Industry, Science and Resources (2019) and van Brederode (2019).

legal theories from which the current law is derived to determine whether recent approaches will allow legal reasoning and judicial interpretation to remain internally consistent as digital technologies emerge. In doing so, it identifies the importance of moving the view of the exercise of discretion as occurring at a single point in time, to one that reflects its reality as a process.

In view of the clear direction of digital government and decision-making (Gavaghan et al., 2019; ATO, 2022), section 4 takes this argument and recommends an updated framework for the exercise of discretion using expert and emerging systems in decision-making, which is particularly important for the ATO. While judicial review of decisions involving the administration of the tax system is significantly constrained or excluded by the *Administrative Decisions (Judicial Review) Act 1977* (Cth) and privative clauses such as section 175 *Income Tax Assessment Act 1936* (Cth), and Division 350 of Schedule 1, *Taxation Administration Act 1953* (Cth), the framework and principles remain applicable to both internal and external reviews of tax decisions and how they can be made in a way that best ensures public trust.

The recommended framework for tax officers to make decisions therefore builds on the ARC principles, addresses the issues raised in national and international reports, particularly the 2019 Cth Guide (Commonwealth Ombudsman et al., 2019), and provides a strong basis for delivery of the objectives of the ATO Corporate Plan (ATO, 2022). Section 5 identifies the capabilities required to implement the framework, particularly for tax officers as they use expert and emerging systems. The framework and capabilities are relevant to delegated decision-making by public servants more generally and support public trust in digital government as it develops and matures.

While the article is framed around the particular question of administrative decision-making, it is important to note the broader context. AI itself is developing rapidly. Legislative and regulatory frameworks are struggling to catch up. The Australian Human Rights Commission released a discussion paper in 2019 and a Final Report in 2021 (Australian Human Rights Commission, 2019, 2021), discussed in detail below, which canvass many of the issues facing society and the need for an effective response. Internationally, developments vary between jurisdictions, with limited consistency of approach (Walters & Novak, 2021, pp. 39-70; OECD, 2021a). However, analysis of solutions to particular issues of regulation and administration, such as those considered in this article, involves deepening understanding of how to extend appropriately the particular to the general (Walters & Coghlan, 2019).

2. ADMINISTRATIVE LAW REVIEW PRINCIPLES

2.1 The Administrative Review Council report (2004)

In 2004, the Administrative Review Council, one of the most expert groups in Australia on administrative law, considered a range of submissions to develop its seminal report to the Commonwealth Attorney-General, 'Automated assistance in administrative decision making' (ARC, 2004). It noted that its functions under section 51 of the *Administrative Appeals Tribunal Act 1975* (Cth) (AAT Act) included recommending improvements to the system of administrative law and to advise on ensuring under section 51(ab) that 'discretions are exercised, or the decisions are made, in a just and equitable manner' (ARC, 2004, para. 1.1). The report therefore provides a baseline position as at 2004, and sets out principles, which remain largely applicable, but now require improvements and some changes to reflect the nature and use of current expert

and emerging systems. The report remained the baseline position in the 2019 Cth Guide (Commonwealth Ombudsman et al., 2019, p. 3).

The use of artificial intelligence (AI) in expert and emerging systems is developing rapidly. Reviews and cases have focused, as a foundational issue, on whether final application of the exercise of discretion is primarily determined by the system and not personally by the human decision-maker or whether the human decision-maker genuinely exercises a discretion. In 2004, the ARC put it that the question to ask was whether the system ‘fettered any discretionary power of the decision maker’ (ARC, 2004, para. 2.6). The ARC distinguished this situation from decisions where expert and emerging systems ‘guide a decision maker through relevant facts, legislation and policy, closing off irrelevant paths as they go’ or act ‘as a decision-support system, providing useful commentary – including about relevant legislation, case law and policy – for the decision maker’ (ARC, 2004, para. 2.6).

The ARC recommendations provide a systematic structure for ongoing review of decisions made and supported by AI, which still holds and is built on in the 2019 Cth Guide (Commonwealth Ombudsman et al., 2019).

As a starting point, the ARC recommended that decision-making done by or with the assistance of expert systems should follow the principles that underlie administrative decision-making; principles developed to ensure that decision-making is ‘consistent with the administrative law values of lawfulness, fairness, rationality, openness (or transparency) and efficiency’ (ARC, 2004, vii and para. 1.4, citing French, 2001, p. 30). The principles that follow, flow from, and give meaning to these values in the context of AI, consistent also with the ongoing requirement to build public trust.²

However, the development of AI means that earlier distinctions are not as easily drawn. In 2004 it was appropriate to note that neural networks that learn from large data sets are not generally suitable for administrative decision-making, as they ‘do not easily provide reasons for their decisions’ (ARC, 2004, para. 2.5). This is the ‘black box’ argument, discussed later in the article. The focus of the ARC was therefore on the extent to which rule-based systems should be used and how they should be used and maintained to ensure that the system did not fetter discretion and supported administrative law values (ARC, 2004, para. 2.6). The ARC developed principles applicable to this distinction drawn from the broader framework of administrative law, which provide a valuable guide to the extension of the law as it responds to emerging technologies. These were used in the 2019 Cth Guide, which ensured that their extension encompassed Australia’s international obligations (Commonwealth Ombudsman et al., 2019, p. 6).

² This concept of public trust in the administration of Government has a rich history. It owes much to Roman Law classification, which gave rise to concepts of rights and obligations between state and citizen that has influenced both European and English Law. This was seen in Magna Carta in 1215 and the six statutes that followed. They formed the basis for the Petition of Right of 1628 preceding the trial and execution of Charles I and the subsequent Bill of Rights and the Act of Settlement adopted during the Glorious Revolution of William and Mary in 1689. However, the 19th century saw judges and writers develop the current theoretical basis underpinning the application and therefore the extension of English law as initially adopted in Australia, including that of administrative law and the principles that underpin public trust in its administration. While subsequent international legal developments, including constitutional development and human rights instruments, have proven influential, their influence is in the context of the extant law and procedure.

Those principles set out in Part 1 of the ARC Report, directly pertaining to automation that forms part of, or affects decisions requiring the exercise of discretion, can be summarised as follows (ARC, 2004), and apply equally to emerging systems. Required amendment of the principles to take account of technological development since 2004 are included in this summary, although the operational implementation to support the principles has transformed since 2004 and the 2019 Cth Guide provides a more recent, although already incomplete guide, given technological development, to how agencies should apply the principles in practice.

- Expert systems should not automate the exercise of discretion: they should not make a decision requiring that exercise unless it is submitted, with in principle support from the 2019 Cth Guide, it applies beneficially to the person affected, or it appropriately involves the person affected who either consents or requests the decision to be made (this could increasingly become the case with advanced ruling, transfer pricing or international exchange of information requests, for example) (Commonwealth Ombudsman et al., 2019, p. 9).
- Expert systems can be used as an administrative tool to assist an officer in exercising discretion. The original principle was based on current technologies and provided the automation should not recommend or guide the decision-maker to a particular outcome. This is a principle which the 2019 Cth Guide has appropriately updated (Commonwealth Ombudsman et al., 2019, p. 10) and is discussed below.
- Expert systems so used must accurately and consistently reflect government law and policy (Commonwealth Ombudsman et al., 2019, p. 10).
- If an expert system is used to make, rather than assist in making a decision, it should be legislatively sanctioned to maintain the legal principles of authorised decision-making, preferably including where the authority to override the system rests.
- Both the system's construction and the decisions made must comply with administrative law to be legally valid (Commonwealth Ombudsman et al., 2019, p. 9).
- Expert systems must comply with relevant requirements governing, in particular, privacy, disclosure, freedom of information and statements of reasons (Commonwealth Ombudsman et al., 2019).
- To comply with these principles, there should be a team which designs, constructs, maintains, monitors and tests the expert systems, which combines technical and legal and policy experts (Commonwealth Ombudsman et al., 2019, p. 18).
- This team should use the most advanced techniques to allow expert system self-evaluation and error detection (including human manipulation) and ensure that there exist comprehensive audit trails which can be reviewed (Commonwealth Ombudsman et al., 2019, pp. 19-27).
- Expert systems should be appropriately funded to support the decision-making and this extends to ensuring continuous data quality and storage, training for decision-makers, and regular updating, including contingencies to ensure decisions remain accurate pending upgrades for changes (Commonwealth Ombudsman et al., 2019, pp. 19-27).

- Expert systems must be capable of both internal review and external scrutiny (Commonwealth Ombudsman et al., 2019, pp. 19-27).
- Expert systems should take account of equity, access and service requirements of administration (Commonwealth Ombudsman et al., 2019, pp. 19-27).

In reaching its conclusions in 2004, the ARC reviewed the intelligent systems then available, including legal expert systems capable of self-learning and using neural networks that ‘try to replicate the processes of the human brain’ (ARC, 2004, para. 2.1).

In applying the system to administrative decision-making processes it identified the importance of applying legislation and policy to an individual’s circumstances, noting that expert systems form part of the knowledge management framework whereby agencies can improve their capacity to apply a consistent interpretation of complex legal rules and policy. In the context of 2004, the ARC concluded that ‘[T]he main dangers associated with the introduction of expert systems for decision making will come from how the systems are used, rather than from the systems themselves’ (ARC, 2004, para. 3.0 citing Fremont, 1994, p. 829) At the time it was felt that it was too difficult to construct ‘an expert system that is capable of making a decision based on interpretation and representation of the law’ (ARC, 2004, para. 3.1).

Now, the opposite is the case. The 2019 Cth Guide re-emphasises the importance of how systems are used and cautions agencies to ‘pay particular attention ... to ensure that elements of decision-making involving the use of discretion or judgement uphold the administrative law values of legality and fairness’ (Commonwealth Ombudsman et al., 2019, p. 9). However, even in 2019 that meant enhancing the exercise of discretion by constraining the human element of that exercise to what humans are best at and leaving the other elements to the system.

Specifically, the 2019 Cth Guide advocated using systems: to limit discretion to where it is relevant; providing the decision-maker with the factors they should consider when making their judgment; providing the relevant evidence for the decision; and requiring clear statement and recording of reasons before the decision can be finalised (Commonwealth Ombudsman 2019, et al., p. 10). This recognises how we use systems today, for example, pre-populating tax returns and strictly enforcing the rules on how a taxpayer may or may not change or add information to ensure that they do not inadvertently exercise their discretion to break the law.

Evident through the ARC report is the tension between the increasing use of expert systems and agencies arguing that where decisions were made by those expert systems, they were not intended to require the exercise of discretion. In part, it is this ever-evolving dance down the discretionary continuum reflected in the 2019 Cth Guide, which has remained the focus of cases and commentary since. However, the fundamental issue addressed in this article, is that ‘expert systems’ are increasingly important components of the legal process and that the ARC Report principles now need to be applied explicitly to the whole process of administrative decision-making from the design of the AI to its use and the final decision as set out in the 2019 Cth Guide and not as evidenced in past judicial decision-making. This is a fundamental issue for tax administration as the ATO adopts the latest expert and emerging systems.

2.2 Developments applicable to the use of expert and emerging systems in tax-related decision-making

The nature of expert and emerging systems and the focus on user experience, has seen multiple digital solutions applied across government. Practical case studies can be seen across the OECD both generally (OECD, 2021a) and specifically to taxation (OECD, 2021b, chs 5 and 6; Bevacqua, 2021). The ATO has invested significantly and is among global leaders in the implementation and usage of several innovative technologies, including AI, machine learning and robotics process automation (OECD, 2021b, p. 346). Governments and the ATO are simply responding to similar advances in society, a response self-evidently essential to their effective operation and continuing legitimacy (OECD, 2021a; Executive Order 13859 of February 11, 2019³; ATO, 2022). The COVID-19 pandemic illustrates this.

AI comprises a wide range of sub-disciplines, including deep learning, machine learning and neural networks. It has advanced significantly from ‘expert systems’ considered by the ARC in 2004, and which largely comprised different levels of automation, requiring human intervention to learn. Internationally, one of the most influential legislative definitions is Section 238(g) of the United States John S. McCain National Defense Authorization Act for Fiscal Year 2019.⁴ It defined AI to include the following:

- (1) Any artificial system that performs tasks under varying and unpredictable circumstances without significant human oversight, or that can learn from experience and improve performance when exposed to data sets.
- (2) An artificial system developed in computer software, physical hardware, or other context that solves tasks requiring human-like perception, cognition, planning, learning, communication, or physical action.
- (3) An artificial system designed to think or act like a human, including cognitive architectures and neural networks.
- (4) A set of techniques, including machine learning, that is designed to approximate a cognitive task.
- (5) An artificial system designed to act rationally, including an intelligent software agent or embodied robot that achieves goals using perception, planning, reasoning, learning, communicating, decision-making, and acting.

AI systems learn in ways ranging from those requiring human intervention, to scalable learning using large datasets that can be structured or unstructured, with little human oversight and tested with techniques such as generative adversarial networks. Datasets can include sensory, oral and visual content seen in autonomous vehicles, speech recognition and facial recognition. Artificial neural networks are programmed in software to simulate the human brain.

³ US Presidential Documents, ‘Maintaining American leadership in artificial intelligence’, Executive Order 13859 of February 11, 2019, Document 2019–02544, Federal Register, vol. 84, no. 13, pp 3967–3972 (14 February 2019), <https://www.govinfo.gov/content/pkg/FR-2019-02-14/pdf/2019-02544.pdf>.

⁴ Pub. L. No. 115-232, 132 Stat. 1636, 1695 (Aug. 13, 2018) (codified at 10 U.S.C. § 2358, note). This definition is more comprehensive and therefore helpful than most, including the OECD definition (OECD, 2019a).

Coglianesi and Lehr (2017, p. 1167) suggest that there are three principal properties of machine learning of most concern in considering legislation. The first is machine learning's self-learning property, as 'the results of algorithms do not depend on humans specifying in advance how each variable is to be factored into the predictions'. The second is its 'black box' nature as 'results of machine learning analysis are not intuitively explainable and cannot support causal explanations of the kind that underlie the reasons traditionally offered to justify governmental action'. The third is the speed and complexity of machine learning that supports 'uses in which the algorithm produces results that can shorten or potentially bypass human deliberation and decision making' (Coglianese & Lehr, 2017, p. 1167).

However, as implicitly identified in the Section 238(g) definition, these systems are designed, developed and implemented by humans. In two recent examples, the Federal Court of Australia considered issues with relatively straightforward automation that failed in achieving the desired outcome. They supplement the ARC Report (2004) and 2019 Cth Guide with observations that inform the application of administrative principles to decisions involving the exercise of discretion and artificial intelligence. In both examples, which do not involve complex systems of the kind defined by Section 238(g) of the United States John S. McCain National Defense Authorization Act it could be concluded that human error and capability was the fundamental issue.

The first example is referred to as Robo-debt, which from a precedent perspective was unfortunately settled before the Federal Court could hear the matter. By way of brief background, the Federal government, through its agency, Centrelink, and with the direct involvement of the ATO, designed an automated online compliance program that identified debtors using a data matching and averaging system applied to fortnightly earnings provided by the ATO (not modelled for over-calculation of debts) rather than using actual earnings as required under the application of the law. It went further and, in addition to its extra-legal computational short-cut, sought to place the onus on the purported debtors to disprove their debt if they disagreed, that is reversing the onus of proof (Victoria Legal Aid, 2019; Carney, 2018). It was at best an example of poor administration (Commonwealth Ombudsman, 2017) and the government added to its own pain by arguing it was not – which led to legal action, although the government then settled out of court before a hearing.

How did it happen? Carney (2019, p. 4) argues that there were 'serious structural deficiencies and oversights in the design and operation of accountability and remedial avenues'. Those relevant to the automation and delegated decision-making rather than the review process were, he argues the absence of standards governing the design and implementation, and a failure of oversight and review (Carney, 2019, pp. 5-6). Had the approach recommended by the ARC (2004) been taken by the ATO and Centrelink, 'Robo-debt' would not have occurred, as the system and its application did not accurately reflect government law and policy, let alone the other requirements of the ARC framework. It is a salutary lesson that focuses attention on the requirement for the ATO and other government departments and agencies to develop systems and process that do reflect law and policy, using staff capable of designing, implementing and operating such systems. This is particularly important for the ATO, as it leads many areas of digital transformation for the Federal Government.

*Pintarich v Deputy Commissioner of Taxation*⁵ provides another example of poor design and implementation. A comprehensive legal and ethical analysis is provided by Datt and Woellner (2021). In this case an automated system generated letters for authorised tax officers, who keyed into the computer system the relevant information. The letter provided on a chosen template the outcome of their decisions made on tax payable and, if applicable, interest and penalty charges.

The technology in question used by the ATO appears rudimentary and seemed on the evidence⁶ to use a number of set templates into which data were input to generate the letters. In this case, the authorised decision-maker asserted that the system generated a document, which the decision-maker did not see or sign, that did not reflect what he thought he had put into the system. He asserted that despite the apparent decision conveyed in the letter, such a decision had not been made and the system had applied the data entered in the wrong template. Accordingly, the Commissioner of Taxation argued that the actual decision on remission of the general interest charge in question was made subsequently and resulted in a different result from the automated letter, which was then conveyed to the taxpayer.

Interestingly, the issue of the effect of admitted human error in keying information into the system was not directly considered. On appeal to the Full Federal Court, Kerr J, in a minority decision, accepted that a decision had been made during the creation of the initial letter. His Honour noted that automated decisions are unexceptional in their use ‘by Australian government departments for bulk decision making. Only on administrative (internal or external) and judicial review are humans involved’.⁷

The facts portrayed by the Commissioner were framed to suggest ‘the system’ had made an automated decision. The description of the rudimentary nature of the system suggests that it automatically printed the information keyed into it in the chosen template. The automation seems related to the template chosen, albeit unwittingly by a hurried or less well-trained user. Care must be taken not to fall into the trap of assuming that simply using a machine means that the operator is no longer responsible. If a truck reverses into a building because the driver put it into reverse by mistake, it does not mean the truck and not the driver is responsible.

Although their Honours did not directly consider this point it was the crux of majority and minority judgments. Kerr J, focusing on the decision, held that:

It would undermine fundamental principles of administrative law if a decision maker could renounce as ‘not a decision’ (and not even a purported decision) something he or she has manifested by an overt act taking the form of a decision simply by asserting there was a distinction between their mental processes and the expression of those mental processes in the overt act. There is no requirement that to be a decision the overt manifestation of the decision must align with the subjective intention of, or the conclusion intended by, the decision maker. It does not cease to be a decision for such a reason.⁸

⁵ [2018] FCAFC 79; 108 ATR 31.

⁶ Ibid [18]-[19].

⁷ Ibid [47].

⁸ Ibid [55].

Moshinsky and Derrington JJ in a majority decision found, following *Semunigus v Minister for Immigration and Multicultural Affairs*⁹ that the authorised officer had not reached a conclusion on the remission of the general interest charge, and therefore no decision was made. The requirements for the exercise of discretion in reaching a decision were met only subsequently. Their Honours held:

In order for there to be a decision to remit GIC under s 8AAG of the [*Taxation Administration Act 1953* (Cth)], we consider that there needs to be both a mental process of reaching a conclusion and an objective manifestation of that conclusion. In the present case, on the basis of the findings of the primary judge (which are not challenged on appeal) there was no mental process of reaching a conclusion.¹⁰

A further factor on which the majority differed from Kerr J was in accepting that this might lead to unfairness, while noting that it is ‘unlikely to arise very often’.¹¹

The position of the majority in *Pintarich* is consistent with the ARC (2004) principle, discussed above, that expert and emerging systems should not automate the exercise of discretion: they should not effectively ‘make’ a decision requiring that exercise. That was the effect of the automated letter sent in *Pintarich* to the taxpayer (even if the level of automation claimed by the Commissioner does not seem credible). While one can have sympathy with the minority view that automated decisions are unexceptional and not to accept them could lead to unfairness, this position conflicts with the ARC (2004) principle that both the system’s construction and the decisions made must comply with administrative law to be legally valid.

Hong and Hui (2019, p. 892) argue that the pragmatic approach of Kerr J ‘recognises that the legal conception of what constitutes a decision should evolve to reflect the reality of how decisions are made in the age of digitalisation’. This is ‘clearly preferable’, they state, ‘to the rigid approach of the majority in *Pintarich* that suggests discretion can only be exercised by a human decision-maker’ (Hong & Hui, 2019, p. 892). This argument seems to miss the point that the legal requirements for the exercise of discretion were not met.

The courts should not be put into the position of their Honours in *Pintarich* that they must second guess or reconstruct processes to compensate for poorly designed or improperly used systems. The implications of automation, as artificial intelligence becomes more generally applicable, simply place the responsibility on those using these systems to assist in or make decisions, to ensure that the systems meet the requisite design and implementation that allows for the making of a valid decision and that those using them are properly trained. Nonetheless, the changing nature of systems means that the approach to recognising the valid exercise of discretion does need to change.

Before examining the nature of the exercise of discretion, it is important to determine whether administrative law principles themselves have changed since the 2004 ARC Report. Ng et al. (2020, pp. 1045-1048) review the principles recognised as underlying Australian administrative law and conclude that commentators remain in broad

⁹ [2000] FCA 940; 96 FCR 533.

¹⁰ *Pintarich v Deputy Commissioner of Taxation* [2018] FCAFC 79, [140].

¹¹ *Ibid* [151]-[152].

agreement both before and after the ARC (2004). They review the implications of the principles as they are applicable to different examples of administrative automation and related areas of the law such as privacy, access to information, and freedom of information (Ng et al., 2020, pp. 1048-1055).

Gaps they identify focus largely on application of the traditional principles and how they might adapt or vary to apply to automated administration rather than questioning the substance of the principles. Ng et al. (2020, pp. 1061ff.) draw on international principles, human rights legislation and case studies to derive recommendations for reform in Australia. These are useful and those that are relevant to automation and the exercise of discretion in delegated decision making by the ATO are incorporated into the discussion below.

Earlier decisions rely on the existing administrative principles. There is nothing coming out of the cases which suggests that they should change. However, what needs further analysis is the nature of a decision. The roll-out of digital government creates some urgency. However, it does not require subversion of administrative law principles. Rather, it requires a better understanding of how those apply where it involves systems using AI.

This is because, as argued by Ng et al. (2020, p. 1042), system-wide automation of government decisions means that ‘deficiencies in the design, implementation or operation of automated systems have the potential to violate the rights of a large number of individuals. Therefore, public law should ideally adopt an approach that is also capable of addressing systemic issues’. This was evident in both Robo-debt and *Pintarich*.

How then to address the design of decision-making requiring the exercise of discretion in the context of AI: particularly, in the context of developments in AI and machine learning described above but not present in the two cases considered? It is logical to take account of all elements of the making of a decision, leading to the exercise of discretion. As argued by Ng et al. (2020, p. 1043), decision-making in the age of artificial intelligence has become a continuum given the nature of the systems that are increasingly embedded at different stages of the decision-making process. If different aspects of the process along that continuum are integral to the exercise of discretion, implicitly or explicitly, the administrative law governing that exercise cannot ignore it.

Analysis to date suggests that instead of examining where and how discretion is *actually* exercised (as a process), administrative decision-making is judged in its construction, exercise and review on traditional conceptions of where it *should* be exercised (as a single event). Using traditional concepts to understand decision-making in a digital context may in fact limit the application of administrative law values and principles. It precludes judicial consideration of the complete decision-making process.

It is critical to understand the processes of decision-making as they apply in a world of AI, rather than trying to force AI into existing concepts. The former protects the integrity of administrative law principles as the law responds to digital government. The latter disconnects administration from digital reality with a potential consequent loss of public trust. This is important for administrative law as it goes to the heart of why we have underlying principles.

Albu and Flyverbom (2019) note the limited evidence supporting transparency or openness in themselves as a driver of public trust. Rather, confidence in the system is driven by recipient perception of what and when information is disclosed, their perception of its clarity, accuracy and relevance (Ananny & Crawford, 2018, p. 980; Schnackenberg & Tomlinson, 2016) and their experience (Gangl et al., 2015). Administrative law principles must therefore evolve to meet public expectation and experience if they are to maintain their relevance.

A practical dilemma, therefore is whether the principle of delegation requiring the exercise of discretion can include a component of automated decision-making. Neither the majority nor the minority in *Pintarich* suggested this was an issue. The ARC (2004, paras. 4.1.3-4.1.5) concluded that the *Administrative Decisions (Judicial Review) Act 1977* (Cth), AAT Act and *Acts Interpretation Act 1901* (Cth) provide that the power of delegation is to a specified person or person holding, occupying or performing the duties of a specified office or position and the case law then extant did not provide any guidance as to the use of automated decision-making. Therefore, the ARC recommended that the use of an expert system should be legislatively sanctioned.

This will become semantic as AI becomes ubiquitous, although a legislative solution is discussed and included in the recommendations below. The pressing question is what constitutes a decision and how is it exercised where AI is part of the process.

3. LAW IN CONTEXT

3.1 Coping with change

Ananny and Crawford (2018) identify the different typologies of transparency, which provide useful definition to both legal decisions and the concept of transparent legal decision-making. Particularly important to transparent legal decision making that requires the exercise of discretion is the associated requirement to provide reasons for the decision, reviewable under the *Administrative Decisions (Judicial Review) Act 1977* (Cth).

Ananny and Crawford (2018, p. 976, citing Fox, 2007) classify this as transparency creating hard accountability with the power to sanction. It is also both upward and inward transparency in the sense that those subject to the rules and external to the system can observe the process of decision-making by those given the power to make the decisions. The transparency sought is both transparency as event, where there is a specific outcome, and transparency as a process, comprising the legal rules and procedures ‘that define the conditions of visibility’ (Ananny & Crawford, 2018, p. 976, citing Heald, 2006, pp. 29-32). It also comprises transparency in retrospect, as each decision is reviewable, and transparency in real-time, as the accountability is ongoing and subject to continuous surveillance by interested internal and external actors.

This analysis demonstrates the complexity of legal decisions and why changes to the application of administrative law principles have such broad effect. They are also supported by and support both legislation and case law and are subject to the mechanisms by which change is given effect in the legal system. Therefore, considered below are the theoretical underpinnings to reinforce the importance of change to ensure that the law remains a living reflection of the society that it regulates.

The points at issue in this article are the nature of a decision, the meaning of the making of a decision and the exercise of a discretion. The brief analysis that follows focuses on the application of elements of legal theory to how artificial intelligence interacts with decision and decision-maker as a process.

The approach from the analysis thus far suggests that decisions requiring the exercise of discretion in a world where AI will form part of almost any administrative process, must move from a consideration of the end decision-making event to a consideration of the process as a whole, from design to implementation. This does not require legislative intervention. The ARC suggests that legislative sanction should authorise such decisions as AI becomes more than a useful tool in decision-making. That was true in 2004 but should no longer be necessary, for every administrative process will soon require such sanction. Arguably, it is simply the role of judges to understand and draw this distinction in applying proven administrative law principles.

Where there remains a significant gap, as illustrated by Robo-debt and *Pintarich* and reinforced in the APS submission to the review of its workforce (2021), is workforce capability in the transition to the application of digital government. The ATO must be held accountable on the Ananny and Crawford analysis (2018), across the whole process. Judges will also require training and expert support. Otherwise, it is likely to reinforce a myth of 'Black-Box Government' (Coglianese & Lehr, 2019, p. 6)

Legal reasoning and its role in the development of the law is fundamental to the operation of the common law. There has been much debate over the scope of judicial discretion, whether, as Dworkin (1997, p. 24) argues, principle-based decision making ensures there are no gaps in the law and there is one right answer, or as MacCormick (1978, p. 246) suggests, gaps are continually being filled 'by extrapolation from what is already there'. From either perspective, it is legitimate for judges to embrace the use of technology as part of the world we live in and interrogate and determine how it should be applied across the decision-making continuum.

Arguments for justice across the theoretical spectrum from Rawls (1971), who argued for distributive justice to counter discrimination and inequality, to Nozick (1974), who argued for a minimalist state constrained only by the non-violation of individual rights, require the exercise of human decision to ensure an intrinsic morality, which provides legitimacy to the system and maintains public trust. Yet that human decision stands within and is integral to the legal system.

Therefore, justice arguments, whether in the context of redistribution of property, proper recognition of human rights, or human interaction with and use of technology, require an understanding of and engagement with the formalism of law to effect any change. It goes beyond simple case-by-case judicial reasoning and 'gap-filling' to a proper engagement with existing legal structures and narratives.

Ackerman argued in 1984 (p. 67) that it was vital to understand the formalism of law with the development of information technology, in order to 'engage in meaningful dialogue with the model builders concerning the basic assumptions that guided them in their construction of the social reality with which the law will have to deal'. The constructivist arguments have strongly influenced the development of tax law. Legislation and case law demonstrate the need to reflect a broad temporal frame (Kelman, 1981) in considering the activities of taxpayers (in determining intent in the

ordering of their affairs). This approach is consistent with the application of administrative law decision-making embedding AI.

Lyotard, in *The Postmodern Condition* (1984), explores the intersection of science and justice. While his arguments are contested (Jameson, 1984), he focuses on the concept of narrative as a context and legitimation for the scientific method (Lyotard, 1984, p. 35). This starting point is therefore useful where he argues that science or laws must satisfy a certain set of conditions to exist (Lyotard, 1984, p. 8) – the formalism of law – but where these conditions are themselves valid, just or ethical because they are consistent with the contextual and particular metanarrative and validation surrounding their exercise and interpretation.

Applying it to AI or automation, to be scientifically legitimate to meet that definition, for example in Section 238(g) of the United States John S. McCain National Defense Authorization Act, the AI or automation must be designed in accordance with the required formulation for those purposes. So too must the legal rule governing the subsequent exercise of discretion where that engages with AI or automation. Nonetheless, the scientific legitimation, the legal rule and the exercise of discretion are subject to a metanarrative to provide context, rationale and completeness.

As Davies (1994, p. 226) argues, ‘the ideal of scientific completeness is logically unattainable. Thought which is systematised necessarily relies upon assumptions which cannot be demonstrated in the terms of the system itself’. This metanarrative is not discernible as a grand narrative that is universally consistent and ubiquitously applied. Rather it recognises that each person’s interaction with the law and each decision exercising the adjudication or discretions permitted or required by the law, is influenced by the multiple complexities of the individuals and influences at that point of time in their particular situation (Commonwealth Ombudsman, 2017, pp. 19-22). Administrative law recognises this by delegating discretion.

The metanarrative does require for legitimacy a communitarian overlay of justice on any decision, even when taken within the appropriate legal framework. Hence the ongoing relevance of Ackerman’s call (1984) to understand the basic assumptions used in the construction of any model of decision-making. Only thus can the metanarrative be satisfied against the claim to rights by citizens, whether constitutional or inherent, in the context of societal issues dealt with in Royal Commissions such as the Royal Commission into Aged Care Quality and Safety (2021) and the Royal Commission into Institutional Responses to Child Sexual Abuse (2017) or systemic issues such as legal and administrative rights of taxpayers (Bentley, 2007, ch. 2).

To put it simplistically, the Australian legal system is arguably rights-based under the *Commonwealth of Australia Constitution Act 1900*, but those rights are limited and human decision-making is an inherent component of any limitation. Such limits are imposed by law under the inherent rules of recognition of the right to limit. Adjudication rights of some kind (which are more limited in administrative law under the *Administrative Decisions (Judicial Review) Act 1977* (Cth)) prevent the arbitrary exercise of state power against rights claims.

3.2 Decisions as process – changing how administrative law principles are applied

As noted above, legal change is messy, particularly in a common law jurisdiction and even messier in a federation like Australia. Nonetheless, the common law provides for change.

My hypothesis is that the administrative law provides for judges to move from traditional concepts of exercise of discretion as a single event to how discretion is actually exercised where decisions embed advanced automation or AI, that is to recognise exercise of discretion as a process. To do so will not only address a gap in the effective oversight of decision-making, but also provide the basis for more effective administrative law by design, that understands the embedding of AI rather than seeing it as simply an add-on or tool.

It is generally accepted that the rules governing change in law do not preclude the concept of law as process. Much of the debate over the logic of legal systems and how they change focuses on exactly this tension found in the duality of law as both a point in time subject to, for example, the instance of judicial adjudication and the creation of precedent, and its continuity as a constituted system of rules, doctrines, principles and policies (Dworkin, 1997; MacCormick, 1978; George, 1999). This is particularly important in the context of administrative law (French, 2001).

In formal adjudication in the common law, change requires application of the principle of derogation, that is, the framing should normally be subject to precedent (Harris, 1979, pp. 34-35). Under the principle of subsumption judges try to connect the rules deriving from superior and inferior sources such that they do not contradict. As Raz (1970, p. 34) points out, we are concerned with a ‘momentary’ legal system, that is one based in the current time, but drawing together both historical and current decisions into a consistent narrative.

In the same way with AI, the formulation of the rules that shape the model, for example, the construction of the algorithms and the assumptions on which they are based, form part of decisions subsequently based on that model. The rules need to be sufficiently explicit so that the process of the decision from human intervention in the design to the human adoption of the output from the model can be assessed. This then allows for adjudication or decision-making to act in a current moment of the legal system, yet drawing on the application of legal rules, principles and policies throughout the process to retain the integrity of the system and give effect to the duality of law. It does not preclude change, for the decision-maker can exercise discretion to contradict or annul in a decision today, a process which was accepted yesterday, or given a different interpretation.

If we accept the legal system as process, with a metanarrative to give it context,¹² each decision may well be momentary as Raz suggests, however the decision depends on all its constituent elements over time. Derrida argues in the context of law’s structures, that we should understand them and their parts through both actively undoing, decomposing and desedimenting or through recognising its own deconstruction (Derrida, 1983). This

¹² Understanding that the concept of metanarrative is contested and may be viewed as a symbol of structural artifice (discussed in Deflem, 2008, p. 205).

is a useful approach to understanding algorithms and how we might assess them in the context of legal decision-making.

We can examine the ensemble of the construct of the algorithm as process, to see whether and how it should be reconstructed to suit the current moment and metanarrative, recognising that that too will change over time. The infusion of judicial and legislative interpretation ensures that our metanarrative providing context for the exercise of discretion on each individual decision remains fluid and broadly consistent with the changing law and community ideals.

If therefore, where the discretion or decision is exercised using a model, framework or system that applies to a scientific method supporting the exercise of discretion, it can be deconstructed to understand the components of the process. This is consistent with the logic applied to computational or scientific theory, where each element must be tested and found error-free for the system to work. In a decision-making model this validation, testing and articulation of the logic is equally important and should include the principles or rules governing the construction of the model just as much as it applies to the internal consistency and valid operation of the model.

The decision or discretion can then be assessed as a whole and found to be valid, even where human decision or intervention is not required at certain points. The important criterion is that the human mind was involved in the creation, testing and validation of the model leading to the decision. As the overarching metanarrative changes, whether through changes to legislation, regulation or community norms that must form part of any decision, the process must be capable of change to reflect this, so that the discretion or decision can continue to be valid in the current moment of the legal system (the law as an unfolding narrative aligned to community and public expectations).

The latter importantly then supports changing linguistic, sociological and anthropological constructs, for example, which reflect the changing societal metanarrative as it is infused into the legal system. Without the facility to change, the inherent biases that may emerge over time in the construction of the original model will otherwise go unchallenged, simply because the scientific method of the model and automation, including artificial intelligence used in that automation, is not open to review.

This approach counters an argument that every step in an intelligent system and how the artificial intelligence derives changing approaches from data lakes available to it should be available for review and consideration. While attractive at certain levels, it presupposes deconstruction of those very elements which the model provides that are beyond human capacity to comprehend. Rather, in the same way as the legal system itself is seen as valid, provided its governing rules, consequent design, architecture and operation is clear, so an algorithmic model must reflect not only validity through human design but also through valid scientific construction and application for those aspects operating at a level of sophistication beyond human capability.

The mind is exercised in those parts where it is needed to define and apply the metanarrative as applicable to the rules in question, while recognising the relevant individual contexts and associated competing rights and obligations which it is in part the purpose of the exercise of discretion to consider. At another level it is exercised in the design, construction, testing, validation and ongoing monitoring of the model. Provided these human dimensions are properly exercised, then the model should be

deemed valid without trying to reconstruct every step in a computational exercise that is now beyond segmentation at that level of detail. To take an oppositional view is to revert to a literal, positivistic view of the law not seen since before the industrial revolution.

To take an example, the valuation of trading stock at year end requires specific measurement each income year under Division 70 of the *Income Tax Assessment Act 1997* (Cth). In an aluminium smelter process no judge or delegated decision-maker has held that the exercise of discretion in valuing the liquid metal in the smelter at year end needs to be tested by disassembling the smelter to ensure the machinery is working as designed and assessing each component at each stage of the smelting process to calculate its value in its molten state. It could not be done as the value would immediately be lost.

There is no impediment in theory or practice to the administrative law changing to reflect the reality that the exercise of discretion that includes use of AI or advanced automation is necessarily a process rather than event. The process reflects the principles outlined by the ARC Report of 2004 and as updated in the 2019 Cth Guide (Commonwealth Ombudsman et al., 2019). It also recognises all elements of the exercise of discretion from the human decisions required in the design, building, validation, operation and monitoring of the model to those required in using its outputs.

Legislative or regulatory changes or judicial decisions that significantly alter the law can alter the basis for the exercise of discretion. This will impact directly on AI and advanced automation as the model will no longer be consistent with the law unless those updates are capable of automatic integration. Even where they are, the principle for monitoring, validation and quality assurance would necessarily apply and, in the same way as written materials are updated for use by decision-makers exercising a discretion where the law changes, so too should all elements of a process that incorporates AI or advanced automation.

4. THE EXERCISE OF DISCRETION IN THE CONTEXT OF AI

Bentley's (2007, ch. 8) analysis of the requirements for the appropriate exercise of discretion in taxation, both reviewable and non-reviewable, still stands. The essence is that decisions in tax administration should be reasonable, based on criteria or standards, and fair (Bentley, 2007, p. 296; French, 2001, p. 33). Note that this formulation goes to how decision-makers should exercise discretion and come to a decision and does not go to the far narrower conditions for review. Chief Justice French (2001, p. 36) points out that the High Court in *Minister for Immigration and Ethnic Affairs v Wu Shan Liang* approved the articulation of the court's role by Brennan J in *Attorney-General (NSW) v Quin*:

The duty and jurisdiction of the court to review administrative action do not go beyond the declaration and enforcing of the law which determines the limits and governs the exercise of the repository's power. If, in so doing, the court avoids administrative injustice or error, so be it; but the court has no jurisdiction simply to cure administrative injustice or error. The merits of administrative action, to the extent that they can be distinguished from

legality, are for the repository of the relevant power and, subject to political control, for the repository alone.¹³

Galligan (1986, p. 4) examines a theoretical formulation of the minimum requirements for an administrative law decision, which is equally applicable to both reviewable and non-reviewable tax administration decisions (Bentley, 2007, ch. 8), and concludes:

(a) that any exercise of powers be based on reasons, and that the reasons be applied consistently, fairly, and impartially; (b) that the reasons be intelligibly related to a framework of equally intelligible purposes, policies, principles, and rules (in general, standards) which can be seen fairly to fall within and be the basis of delegated authority; (c) that in matters of procedure and substance there be compliance with general, critical considerations of morality. Around these foundations more detailed and specific principles can be created. Their significance is that they go towards regulating the relationship between citizens and the state by stipulating the processes and principles that must be satisfied if the exercise of official powers is to be considered justifiable and legitimate. In particular they eliminate decision-making by whim, caprice, chance, or ritual; they provide the basis for identifying and eliminating arbitrariness, for developing general standards in making decisions, and for extending the requirements of fair procedures; and they open the processes of decision-making to external public scrutiny. There is then a focal point from which the decision-maker can have a critical view of [their] own decisions, and there is a basis for legal and judicial controls.

The importance of these elements to effective administrative decision-making is highlighted by French (2001, pp. 34-35) in light of high volumes of decision-making, constrained resources and the experience and capability of lower-level decision-makers who are not necessarily given appropriate training.

The Australian Human Rights Commission (AHRC) in 2021 released its Final Report *Human rights and technology*, which analyses how AI can be used effectively in Australian society while protecting human rights. Going directly to the discussion above on process, the Report sets out the individual steps in an AI-informed decision-making process as follows (AHRC, 2021, p. 39):

1. Humans procure artificial intelligence systems and define their intentions.
2. Humans define the input and design the algorithm.
3. Humans clean and label the input data.
4. In some cases, humans define the outputs of artificial intelligence systems.
5. Artificial intelligence systems define the model used and algorithms learn and adapt independently.
6. Humans decide how to apply and use the outputs.

¹³ Brennan CJ, Toohey, McHugh and Gummow JJ in *Minister for Immigration and Ethnic Affairs v Wu Shan Liang* (1996) 185 CLR 259, 272 quoting with approval Brennan J in *Attorney-General (NSW) v Quin* (1990) 170 CLR 1, 35-36.

Five of the six steps identified are undertaken by humans so that the outputs are appropriate. Yet, the focus thus far on the single event in step 6 of how the outputs are used by the end decision-maker effectively ignores the other four human elements in the decision-making process. Yet with the increasing use of AI in step 5, it is the first four steps that are of most importance to the recipient of the decision. Most of the legally focused submissions to the AHRC (2021, pp. 201-210¹⁴) failed to consider adequately, if at all, these vital earlier steps. Yet they were fundamental to the 2019 Cth Guide (Commonwealth Ombudsman et al., 2019).

Within the first five steps the AHRC identifies the complex lifecycle of an AI system. It notes that before a use case is approved, it should include safeguards throughout training and testing the data sets, building the application, testing the system, monitoring the system and developing problem analysis, improvement and further testing and validation (AHRC, 2021, p. 46).

For all 'decision making that affects people's human rights' the AHRC sets out three key principles: international human rights should be observed; AI-informed decision making should be used in ways that minimise harm; and AI-informed decision making should be accountable in how it is used (AHRC, 2021, p. 48). The AHRC identifies those legal issues particularly relevant to the exercise of discretion in decision-making (as distinct from the numerous legal issues affecting human rights more generally) (AHRC, 2021, p. 51):

1. Does the AI-informed decision-making system produce lawful decisions?
2. Is the decision making transparent?
3. Can reasons or an explanation be provided for the decisions?
4. Is it clear who is legally responsible for a decision?
5. Is there appropriate human oversight and review?

These principles reflect the ARC Report (2004) and Galligan's (1986) minimum requirements for an administrative law decision. However, the answer to the five questions cannot be given exclusively on the basis of the single end point exercise of discretion and reinforces the necessity to consider the decision-making process to include the different human interventions leading to the decision. This is effectively the conclusion the AHRC reaches in requiring that where AI is used it should be covered by extensive and comprehensive regulation to ensure all such issues are addressed (AHRC, 2021, pp. 55-72). Somewhat illogically, it justified this approach as applicable to genuine AI, using the two examples of basic automation discussed above, Robo-debt and *Pintarich* to demonstrate how dangerous AI could be to human rights if used in decision-making.

There are significant public concerns about the use of AI that give rise to fear, pressure to regulate and a preference to avoid the use of AI in decision-making unless it can be proven to be completely robust. It is likely that this view will continue until the obvious advantages that AI can bring over the current state gain sufficient public support for

¹⁴ Available at: AHRC, 'Human rights and technology', <https://humanrights.gov.au/have-your-say/human-rights-and-technology>.

public trust in an AI supported system (Gavaghan et al., 2019). Unfortunately, private companies globally have misused AI sufficiently to reinforce these fears (AHRC, 2021). Concerns about due process, bias, discrimination, inequality, access, confidentiality, privacy, blatant misuse or theft of data and intellectual property, and general lack of consideration of ethical and human rights issues in AI design are well-founded and evidenced throughout the AHRC Report and in the submissions made to it.¹⁵

The principles of administrative law are sufficiently robust to support embedded AI in decision-making, and specifically for the purposes of this article, tax decision-making, where discretion is exercised, provided it focuses on the whole process and not simply a single human end point. However, at this early stage of AI, it is likely that regulation should support the exercise of discretion as a process and focus on all of the human interventions in the six steps of an AI supported system outlined above. This is the approach taken in the 2019 Cth Guide (Commonwealth Ombudsman et al., 2019, p. 8).

McGregor, Murray and Ng (2019, p. 342) argue that an International Human Rights Law Framework provides the appropriate basis to:

take advantage of both current and future approaches to prevention, safeguards, monitoring and oversight, and remedy; incorporate broadly accepted understandings as to the conduct that constitutes ‘harm’; and provide guidance with respect to the circumstances in which algorithmic decision-making may be employed.

In the AI context this can be described as ‘human rights by design’ (Yeung, Howes & Pogrebna, 2020) and is adopted by the AHRC (2021, p. 91). The approach is consistent with those developed over many years for technical, mechanical, biological, health and other high risk systems involving regulation ranging from environmental protection to occupational health and safety. Bentley (2007, ch. 5) used the approach to analyse the enforcement of taxpayer rights, where the optimal solution incorporates the full range of legal, administrative, and social interventions, with the latter supported by effective quality assurance processes.

Regulation goes some way to ensuring design meets requirements that allocate responsibility, accountability and liability. It can also stipulate design standards and require certification (AHRC, 2021, p. 93). It does not necessarily result in good design (Gavaghan et al., 2019, pp. 49-73; Bevacqua, 2021) as is clear from the detailed requirements now set out in the 2019 Cth Guide (Commonwealth Ombudsman et al., 2019).

Reviewing again the principles of the ARC Report (2004), expert and emerging systems are increasingly embedded in decision-making, and particularly by the ATO in delivering on its Corporate Plan (ATO, 2022). The process and steps identified in the AHRC Report (2021) where humans are involved in designing, building, implementing and monitoring the system that aids outputs leading to the exercise of discretion, demonstrate how important the earlier steps are to determining the value and robustness of the outputs (Commonwealth Ombudsman et al., 2019; Bevacqua, 2021). It can no longer be left to a single end point decision-maker to comprehend whether an AI process

¹⁵ These concerns are reflected internationally (Council of Europe, Committee of Experts on Human Rights Dimensions of Automated Data Processing and Different Forms of Artificial Intelligence, 2019).

is a valid support for that end point decision, including whether the process accurately and consistently reflects government law and policy. Neither does legislation or regulation ensure that all elements of the system protect those relying on the law and the system.

Therefore, in recognising that the exercise of discretion is a process with multiple inputs and several significant steps, the ARC Report (2004, Part B) principles focused on system design and implementation remain broadly relevant, current and appropriate in embedding AI into effective ‘administration by design’ (Commonwealth Ombudsman et al., 2019):

- Both the system’s construction and the decisions made must comply with administrative law to be legally valid and will sometimes require express legislative validation (Zalnieriute et al., 2020).
- Expert and emerging systems must comply with relevant requirements governing, in particular, privacy, disclosure, freedom of information and statements of reasons.
- To comply with these principles, there should be a team which designs, constructs, maintains, monitors and tests the expert or emerging systems, which combines technical and legal and policy experts.
- This team should use the most advanced techniques to allow expert and emerging system self-evaluation and error detection (including human manipulation) and ensure that there exist comprehensive audit trails, appropriate to the system, which can be reviewed.
- Expert and emerging systems should be appropriately funded to support the decision-making and this extends to ensuring continuous data quality and storage, training for decision-makers, and regular updating, including contingencies to ensure decisions remain accurate pending upgrades for changes.
- Expert and emerging systems must be capable of both internal review and external scrutiny appropriate to the system.
- Expert and emerging systems should take account of equity, access and service requirements of administration (Bevacqua, 2021).

In tax administration in particular, there may need to be specific legislation, as referred to in the ARC Report (2004, Part B), to validate AI-assisted decisions, particularly as they are seen as part of an overall process of decision-making. For example, while the Commissioner of Taxation may delegate functions under section 8(1) of the *Taxation Administration Act 1953* (Cth), such delegation is to ‘persons’. Intentional legislative validation may be seen as necessary to support the use of AI-assisted decision-making with the development of supervised machine learning and deep learning (Commonwealth Ombudsman et al., 2019, p. 9).

To these should be added a requirement to comply with service standards, industry standards and certification (Commonwealth Ombudsman et al., 2019, p. 18). The importance of responding appropriately to advances in both AI and its misuse (Council of Europe, Committee of Experts on Human Rights Dimensions of Automated Data Processing and Different Forms of Artificial Intelligence, 2019) will require continued expansion of the ‘relevant requirements’ principle to encompass the latest developments

in issues such as discrimination, bias and fairness, to ensure that the fundamental administrative law principles are upheld (French, 2001). In tax administration, continuing responsiveness to such developments is essential to maintain the public trust identified as critical to compliance and continuing public participation in and engagement with the tax system (Bevacqua, 2021; ATO, 2022, p. 13).

5. ADMINISTRATIVE LAW BY DESIGN: THE HUMAN DIMENSION

In the context of digital government, Bentley (2020) analysed human decision-making and capabilities required for the proper exercise of decision-making identified by the OECD, national governments and other commentators. The aim is to reinforce and build trust and public value (Scott, DeLone & Golden, 2016). However, as identified by French (2001, p. 35) and the Australian Public Service Commission (2021, p. 13) one of the fundamental challenges is that the Public Service and, in relation to tax administration, the ATO has limited capability to fully deliver on the ARC Report (2004) principles.

As a basis for the design, development, implementation and monitoring of any expert and emerging system, it is fundamental to the decision-making process that certain capabilities are present and demonstrable to any process of review and validation (Bentley, 2020, p. 369). While Bentley (2020) draws together the skills and capabilities required for digital tax administration, there is a sub-set specifically relevant to the design and implementation of a valid and effective automated decision-making process. These are consistent with the ATO Corporate Plan (ATO, 2022, p. 17) and the 2019 Cth Guide (Commonwealth Ombudsman et al., 2019) and can be articulated as follows (Bentley, 2020, pp. 369-370):

- relevant taxation domain specialisation bringing deep technical knowledge to the decision-making process. Those exhibiting such specialisation would generally be the delegated decision-maker or would be referred to by lower-level tax officers for complex decisions;
- legal domain specialisation as required to ensure compliance with both internal and external regulatory and administrative law requirements;
- audit, risk and quality assurance domain specialisation to allow effective validation, testing and monitoring of systems with effective articulation of risks and appropriate mitigation;
- expertise in human-centred design, which can include the behavioural psychologists, ethnographers, analysts and programmers who are already mapping the tax ‘experiences’ within the tax administration to inform the decision-making models at each stage of that experience. This allows appropriate automation of components of the decision-making process to streamline services, build trust and public value without removing the requirements for valid decision-making;
- expertise in transdisciplinary integration of innovative techniques and methodologies to ensure valid models for automated decision-making. These capabilities are particularly important in ensuring that human-centred design delivers the technological solutions required at each stage of an automated decision-making process that meet the requirements of the tax experts for a valid decision; and

- these roles must be supported by the requisite digital technology specialisation and quantitative and qualitative data analysis, which are fundamental not only to ensure the human-centred design is delivered through the automated experience, including the artificial intelligence and other technological elements of the decision-making process, but also constructing the technical model to meet the legal requirements for a valid decision.

Without this collective capability it is unlikely that the construction of a decision-making model would meet the composite requirements of a valid human decision supported by an intelligent system capable of giving effect to that decision as intended. In addition, as noted in several reports and papers, to maintain capability requires ongoing education and training.

More importantly, the effective administration of the tax system by the ATO depends on public trust in the system. It is a symbiotic relationship: effective capability in the ATO workforce builds public trust, which is needed for an effective tax system.

6. CONCLUSION

The ARC principles developed in 2004 for the use of expert systems are remarkably relevant to the debate today. While AI is developing rapidly with the increasingly ubiquitous use of technologies, the principles underpin how both national and international reports continue to see the operation of regulatory and administrative law constraints on the use of AI in decision-making.

Where AI has overtaken previous conceptions of the exercise of discretion, is that if the discretion is seen as a single point in time, a momentary articulation of the law, it fails to take account of the complex nature of discretion as exercised with the support of embedded AI. Even the basic automation and design errors identified through *Robodebt* and *Pintarich* require a more sophisticated legal analysis of decision-making in such circumstances. Otherwise, the adjudicators or reviewers are forced into convoluted and potentially illogical rationales for their decisions. This is clearly articulated in the 2019 Cth Guide (Commonwealth Ombudsman et al., 2019).

As the analysis shows, legal theory expects continuous change to the rules applied in any system and modern legal theories have focused on deconstructing the law to identify the very issues such as bias, inequity and discrimination that are now mainstream and critical elements in the regulation of AI. The rules of recognition and change envisage that the law will adapt to the context of the societies in which the law operates. It is therefore logical that, as AI elongates administration decision-making, from a moment in time to a process, the law should adapt to recognise this. It was foreshadowed in any event by the principles adopted by the ARC in 2004 to administer the design, implementation, monitoring and review of expert systems.

While administrative law can demonstrably adapt to provide a regulatory framework for AI in administration, the concerns of the public suggest that it should be supported as part of a more comprehensive framework as envisaged in the 2019 Cth Guide (Commonwealth Ombudsman et al., 2019). This framework includes regulation, administrative law, voluntary codes, certification of standards and a comprehensive formal and informal review structure. In this way, AI as it develops, embedded within digital government, administration and tax administration, is more likely to satisfy the requirements for public trust.

The important additional component for the operation of an effective regulatory framework, digital government and digital tax administration, is the human capability to deliver it. The article outlines the primary specialist capabilities needed to design, build, test, implement, monitor and review AI systems in tax administration. As digital government goes to scale, the APS has already identified the significant skills gaps in its workforce (APS, 2021). A failure to remedy the position risks erosion of public trust in the tax administration specifically and digital government more generally (Gangl et al., 2015).

Interestingly, the two examples of basic automation discussed in this article go directly to two of the fundamental issues, which demand a far more rigorous consideration of the complete decision-making process, and one of the most obvious and challenging consequences. In both Robo-debt and *Pintarich* the programming of the basic systems was imprecise. Computers are precise and literal in their execution of the algorithms with which they are programmed. There is no room for fuzzy thinking or intuition. The second issue illustrated is that humans tend to be lazy, particularly where they think a system can do their work for them. It was pointed out as a flaw in the design of the Robo-debt system (Commonwealth Ombudsman, 2017) and was clear from the evidence in *Pintarich*.¹⁶

The consequence is inequity in decision-making, highlighted as a particular challenge in the 2019 Cth Guide (Commonwealth Ombudsman et al., 2019). Human discretion at an artificial, momentary point in time, can conceal this. The advantage of seeing decision-making as a process requires administration by design with precision of thinking and monitoring of outputs to call out laziness. It requires the designers and implementers to consider in advance the consequences and the human capacity available at the time of implementation. Administration by design considers the process of decision-making to ensure implementation ‘consistent with the administrative law values of lawfulness, fairness, rationality, openness (or transparency) and efficiency’ (ARC, 2004, vii; French, 2001, p. 33), which in turn provides experiences for citizens that engender public trust.

AI in tax administration provides both challenges and opportunities. The legal system allows relatively seamless development of new regulatory frameworks, with multiple analogous frameworks both successful and unsuccessful from which to draw and learn, both nationally and internationally. The global nature of digital development provides a significant resource as Australia adapts to its context as envisaged in the 2019 Cth Guide (Commonwealth Ombudsman et al., 2019). The greatest challenges are the twin elements of human capability to deliver an effective regulatory framework and public trust that stems from capable implementation.

¹⁶ *Pintarich v Deputy Commissioner of Taxation* [2018] FCAFC 79, [18]-[19].

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