

Nor Shaipah Abdul Wahab; Tye, Wei Ling; Abdurrahman, Adamu Pantamee;
Ooi Chee Keong; Nik Herda Nik Abdullah

Article

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*Corresponding author: Nor Shaipah Abdul Wahab, School of Accounting and Finance, Taylor's University, Level 2 Block E, No. 1, Jalan Taylor's, Subang Jaya, Selangor 47500, Malaysia
E-mail: NorShaipah.AbdulWahab@taylors.edu.my

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University of Southampton,
Southampton, UK

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Effects of digital economy involvement on book-tax differences in Malaysia

Nor Shaipah Abdul Wahab^{1*}, Tye Wei Ling¹, Adamu Pantamee Abdurrahman¹, Ooi Chee Keong¹ and Nik Herda Nik Abdullah¹

Abstract: Malaysian government provides tax incentives to firms that involve in digital economy to increase digital economy activities in the country. This, however, can enlarge the country's tax gap. This study, therefore, attempts to investigate the effects of firms' digital economy involvement on book-tax differences (BTD), and its components, comprising permanent, temporary and statutory tax rates differences. A total of 846 firm-year data of Malaysian-listed firms from 2013 to 2018 were analysed. The relationships between digital economy involvement and temporary differences, and statutory tax rates differences were found positive and significant. This suggests that firms, through temporary differences, are leveraging on the usage of ICT to enjoy the incentives provided by the Government. The firms are also benefiting from cross-border businesses to secure tax benefits from differences of tax rules between jurisdictions. This study contributes to literature by providing further empirical evidence to support theory of tax incentives within the context of technology acceptance model. This study also contributes to the authority by providing insights on the extent the digital economy-related incentives can affect the country's tax gap. Firms can also be benefited from this study in their attempts to gauge the effects of digital economy activities on their tax position.

ABOUT THE AUTHOR

Nor Shaipah Abdul Wahab is Associate Professor and the Head of Department at School of Accounting and Finance, Taylor's University, Malaysia. Email: NorShaipah.AbdulWahab@taylors.edu.my
Tye Wei Ling is Lecturer and the Accounting Stream Coordinator at School of Accounting and Finance, Taylor's University, Malaysia. Email: WeiLing.Tye@taylors.edu.my
Adamu Pantamee Abdurrahman is Lecturer at School of Accounting and Finance, Taylor's University, Malaysia. Email: Adamu.Abdurrahman@taylors.edu.my
Ooi Chee Keong is Senior Lecturer at School of Accounting and Finance, Taylor's University, Malaysia. Email: Cheekeong.Ooi@taylors.edu.my
Nik Herda Nik Abdullah is Lecturer at School of Accounting and Finance, Taylor's University, Malaysia. Email: NikHerda.NikAbdullah@taylors.edu.my

PUBLIC INTEREST STATEMENT

This study investigates the relationship between firms' digital economy involvement and book-tax differences (BTD), and its components, comprising permanent differences, temporary differences and statutory tax rates differences. The outcome of the research is of public interest following its contribution to literature by providing further empirical evidence to support the relevant theories. This study also can be of interest to the authority through insights on the extent the digital economy-related incentives can affect the country's tax gap. Industry players can also be benefited from this study in gauging the effects of digital economy activities on the firms' tax position.

Subjects: Business, Management and Accounting; Accounting; e- Business

Keywords: book-tax differences; digital economy; permanent differences; temporary differences; statutory tax rates differences; Malaysia

1. Introduction

The economic benefits of information communication technology (ICT) motivate governments around the world to encourage firms to engage in digital economy activities, including through tax incentives (Ernst & Young, 2020; The Edge Markets, 2019). However, to our knowledge, the empirical evidence on the effects of firms' digital economy involvement on their tax position is scarce, in particular, within developing countries. Tax position can be reflected through book-tax differences (BTD) that measures the differences between accounting income and tax income.¹

Literature use BTD as a proxy for tax planning and earnings management as the differences capture firms' tax preferences and accounting choices (Abdul Wahab & Holland, 2015; Graham et al., 2012). The aggregation of firms' BTD contributes to a country's tax gap, which the magnitude captures the deviation of tax actually collected from the tax theoretically due. Large tax gap is often associated with unfair share of tax and, in turn, leads to "the rich pay less" because the gap indicates that there are firms that do not contribute fairly to the country's revenue despite their high level of income (Drennan, 2009; Sommerlad, 2016). Governments, tax lobbyists and public at large around the world have raised their concerns on the upward trend of tax gap due to the gap's detrimental effects on provision of public goods (Fraser Institute, 2019; Independent, 2019; OECD, 2019). The gap causes huge amount of revenue loss to the country, for example, in the UK, the 2017/2018 tax gap was estimated at GBP35 billion while in the US, the annual gap was estimated at USD441 billion (Forbes, 2019; HMRC, 2019). Similarly, developing countries also suffer from significant revenue loss as a consequence of large tax gap, for example, Malaysia's tax gap was reported to have caused revenue loss of RM47 billion to the country since 2015 (Malaymail Online, 2017). Malaysian government has taken serious efforts to combat the activities that contribute to the gap. At the firm level, Malaysian tax authority, Inland Revenue Board Malaysia (IRBM), has increased its provision to fight tax planning activities, particularly within corporate taxpayers, in its 2016 Recalibration Budget (The Star, 2016). IRBM has also recently revised its tax audit framework to allow for the authority's access to business record for unlimited years (IRBM, 2018). The continuous efforts to ensure sustainable tax collection are also evident through the Government's action in establishing a tax reform committee in the country's attempt to reform its tax system which is targeting at reduced tax gap (Malaysian Investment Development Authority, 2018).

Although the actions taken by the authority are to address the BTD that is due to the firms' deliberate acts to reduce tax expense and to manage earnings, BTD can also be contributed by the tax system itself. This is termed by tax literature as passive interaction between accounting and tax regulations (Abdul Wahab & Holland, 2015). The interactions include tax incentives and specific provisions to boost national strategic agenda, for example, in encouraging digital economy involvement among firms. This is due to the rise of digital economy around the world that changes the way firms conduct their businesses. Firms that are incapable to embrace the change in the business landscape are debated to be left behind and will eventually no longer relevant to the industry, which the consequences, at the macro perspective, affect the country's economic condition following the change of investors' preference towards digital economy "friendly" jurisdictions (United Nations, 2019). One of the fundamentals of the digital economy development success lies on the technology itself as ICT was established as the main driver to help accelerate the Sustainability Development Goal's (SDG) progression (International Telecommunication Union, 2019). Thus, business communities around the world are urged to be aggressive in coping with the business-related digital revolutions. Governments are also aggressive in their strategies to support businesses in transforming their conservative business models to the digital economy-

based models and to further accelerate the growth of digital economy businesses. For example, in the UK, the Department for Digital, Culture, Media and Sport established Digital Economy Council and Digital Economy Advisory Group in 2017 to ensure conducive digital business environment and to address specific challenges and opportunities relating to the start-up and growth of tech businesses (UK Authority Office, 2017). Similarly, firms in the US are supported by the Government in several ways, including through execution of Digital Economy Agenda to ensure sufficient awareness on digital economy among businesses and customers in advancing business growth and opportunity (U.S. Department of Commerce, 2015).

In Malaysia, through its recent Budget 2020 announcement, digital economy transition was outlined as a major focus of the Government's initiatives to ensure adequate support for businesses to embrace the rapid development of the digital revolutions. With "driving growth and equitable outcomes towards shared prosperity" as the theme, Budget 2020 was reflected as the Government's mechanism to elevate digital transformation to achieve the ultimate aim of *Shared Prosperity Vision (SPV) 2030* of which digital economy was identified as a major catalytic driver (Malaysia Digital Economy Corporation, 2019). The provisions and incentives in relation to the digital economy announced by the Government through 2020 Budget span, among others, establishment of digital hubs and tax incentives (Ministry of Finance Malaysia, 2019). Given that the latter can have a direct implication on firms' provision of tax expense, it can be intuitively inferred that the larger the extent of firms' involvement in digital economy is, the larger the firms' taxable income may deviate from the accounting income. Thus, BTD can be argued to be affected by firms' involvement in digital economy, which the BTD at the aggregated level can explain the country's tax gap.

However, the empirical evidence on effects of firms' digital economy involvement on BTD is generally scarce. We, therefore, question whether firms' digital economy involvement can explain the extent of firms' BTD and its components. We also question which component of BTD is impacted most or otherwise by the involvement. Analysing the relationship between firms' digital economy involvement and firms' BTD level allows a further assessment on whether the Government's tax-strategy to encourage digital economy involvement significantly contributes to the gap between accounting income and tax income, which can then provide empirical evidence to explain the country's current tax gap position.

This study, therefore, aims to investigate the extent firms' involvement in digital economy can affect firms' BTD. In this study's attempt to understand the effects based on sources of BTD, the relationship between digital economy involvement and BTD is also examined in the context of BTD components, i.e. permanent differences, temporary differences and statutory tax rates differences. Overall, there are four specific objectives relating to the relationship between digital economy involvement and BTD, permanent differences, temporary differences and statutory tax rates differences. This study uses Malaysia as the setting given the country's tax gap level and the initiatives taken by the authority to close the gap. The setting is also suitable for this study as the Government is aggressive in providing incentives to encourage firms to be involved in digital economy, suggesting that the involvement among firms is developing and yet to reach the saturated level. This is necessary to allow for sufficient observations for dispersion of digital economy involvement within firm-years while controlling for tax-related incentives.²

The remaining of this paper is organised as follows. Section 2 reviews the relevant literature and discusses the hypothesis development. Section 3 explains the materials and methods. Section 4 discusses the findings and Section 5 provides the discussions and discusses the further tests. Finally, Section 6 concludes the paper.

2. Literature review and hypothesis development

Digital economy affects firms' operation through the attractiveness of customer-firm interface and the use of ICT across business value chain through which firms can secure their competitive

advantage following the benefits of digital economy, for example, reduced staff costs, large span of outreach and increased network (Alraja & Malkawi, 2015). Despite this, firms may be reluctant to adopt digital economy as the technologies involve significant amount of costs and investments, for example, security spending and opportunity costs (Hughes et al., 2017). Given the growth of digital economy around the world and concerns on inability to attract investors by digital economy “unfriendly” countries (United Nations, 2019), Malaysian government provides incentives, including tax-related, to encourage firms to involve in digital economy (IRBM, 2019). The incentives include accelerated capital allowances, specific deductions, exempted statutory income and investment tax allowance. With these incentives, legitimate claimants can then enjoy the reduced tax liability, which the magnitude has a direct positive impact on firms’ BTD. This contradicts the authority’s “closing tax gap” strategy of which firms may manipulate the incentives to effectively manage their tax affairs. However, the evidence on the impacts of digital economy involvement on firm BTD level is limited, hence this study’s objective, i.e. to examine the relationship between firms’ digital economy involvement, BTD and its components.

2.1. Book-tax differences and digital economy involvement

Taxation literature discuss factors that contribute to BTD as span across three sources, firstly, tax planning, secondly, earnings management and thirdly, passive interaction between accounting and tax rules (Abdul Wahab & Holland, 2015; Graham et al., 2012). In positioning digital economy involvement within BTD, theory of tax incentives and technology acceptance model underpin the arguments of the hypothesised relationship (Hemels, 2017; Venkatesh & Bala, 2008). On the ground that tax incentives are tax benefits that firms can potentially secure, governments use the incentives as a tool to encourage or to boost a particular economic activity despite the repercussions of the incentives on the country’s tax revenue, i.e. either by way of reduction or postponement of tax collection (Hemels, 2017). This could be due to the offsets of the incentive-driven costs with non-tax revenues generated from the promoted activities. The activities include digital economy business transactions, which the implementations are highly depending on the managements’ IT acceptance following their perceived usefulness and perceived ease of use (Venkatesh & Bala, 2008).

Malaysia has various incentives for firms to grab in their attempts to reduce tax liability while involving in digital economy activities. Under *Promotion Investment Act 1986* for example, firms under Multimedia Super Corridor (MSC) category may enjoy up to 100% tax exemption for 5-years PIA 1986, (1986).³ In addition, firms that involve in digital economy activities can enjoy tax incentives under *Income Tax Act 1967* ITA 1967, (2019), including accelerated capital allowance and double deduction. These incentives enlarge the gap between firms’ accounting income and tax income, which the magnitude of the gap can be measured by BTD (Abdul Wahab & Holland, 2015; Sundvik, 2017).

In the context of digital economy involvement and incentives, firms with large BTD can be inferred as firms that involve in digital economy activities with the intention to pursue tax planning and earnings management activities by utilising the stimulus incentives provided by the Government. Although carrying out tax planning in this way can be considered legitimate, the detrimental effects on tax revenue at the macro level can be excruciating (Oats & Tuck, 2019). Similarly, in line with theory of tax incentives, attempts to manage earnings through accruals can result in delayed tax revenue inflow (Hemels, 2017). Thus, with their perceived usefulness, perceived ease of use and perceived benefits from the incentives, firms that are involved more in digital economy are expected to have a larger extent of BTD (Hemels, 2017; Venkatesh & Bala, 2008). Therefore, it is hypothesised that:

H₁: Firms’ involvement in digital economy is significantly and positively related to the extent of firm book-tax differences.

2.2. Components of book-tax differences and digital economy involvement

To understand the digital economy involvement implications on different nature of BTB, i.e. permanent differences, temporary differences and statutory tax rates differences, this study also examines the relationship between digital economy involvement and each of the above-mentioned BTB components. Previous taxation studies associate a firm's aggressiveness in tax planning with the extent of permanent differences between accounting and taxable income as the differences capture activities that reduce taxable income permanently, i.e. more than a mere postponement of a tax liability, and are linked to effective tax management and managerial aggressiveness in reaping tax benefits (Allen et al., 2016; Frank et al., 2009; Halioui et al., 2016; Hanlon & Slemrod, 2009; Wilson, 2009).

In the context of digital economy, firms that are aggressive in their involvement are expected to enjoy permanent tax saving as a result of the utilisation of tax incentives offered by the Government. This is particularly relevant to the incentives that reduce taxable income by way of exemptions, for example, MSC tax incentives and investment tax allowance PIA 1986 (1986). Firms' strategies to involve in digital economy activities in their attempts to secure relevant tax incentives are in line with technology acceptance model (Venkatesh & Bala, 2008) where firms that possess the leading factors of perceived usefulness and perceived ease of ICT use, including result demonstrability factor such as tax benefits, may exhibit more involvement in digital economy activities. As the activities are prescribed by the Government as a strategic policy related through which provisions of tax incentives are used as a tool to encourage the particular activities, the firms can subsequently secure the permanent tax benefits within the spirit of tax legislation (Hemels, 2017). Thus, it can be argued that the resulting tax benefits from digital economy involvement following the Government's strategic initiatives will induce permanent differences between accounting and tax income. It is, therefore, hypothesised that:

H_{2a}: Firms' involvement in digital economy is significantly and positively related to the extent of firm permanent differences.

In addition, reaping tax benefits through tax deferral method is also found as a tax strategy that can generate cash flow timing benefit arising from temporary differences (Moore & Xu, 2018; Tye & Abdul Wahab, 2019). This is often referred to as reversal method of tax planning as the benefits from the differences between the book and tax income are expected to reverse in future tax periods (Gaertner et al., 2016). Temporary differences are disclosed as deferred tax in firms' tax disclosures in financial reporting which, at the total tax expense level, has an ultimate effect on the current year's tax expense proportion. In addition to tax planning, previous studies also use temporary differences as a proxy of accrual earnings management (Holland & Jackson, 2004; Phillips et al., 2003; Zhou, 2016).

From the perspective of digital economy, firms that involve in the earnings management activities are expected to demonstrate an extent of temporary differences, especially upon successfully utilising the accelerated capital allowance incentive ITA 1967, (2019). The temporary differences can be more significant within capital expenditure-intensive firms as large magnitude between accounting and tax depreciations will be generated following the large amount of capital expenditure where tax depreciations are argued to be more aggressive than the accounting depreciation and hence, able to generate large temporary differences (Bilicka, 2019). Although the impact of the differences between accounting and tax income caused by the tax saving through temporary differences will be reversed in the future, the digital economy firms' current year temporary differences do, in fact, affect the firms' current year tax expense (Ikin & Tran, 2013; Watson, 1979). Therefore, in line with theory of tax incentives in which firms are posited to also secure tax benefits through tax deferrals (Hemels, 2017), large involvement in digital economy is expected to drive large temporary differences. Thus, it is hypothesised that:

H_{2b}: Firms' involvement in digital economy is significantly and positively related to the extent of firm temporary differences.

The third component of BTD, statutory tax rates differences, captures the differences between domestic and foreign statutory corporate tax rates. This component represents strategic tax planning as tax benefits arising from operations in multiple jurisdictions imply a permanent tax saving (Abdul Wahab & Holland, 2012; Wang et al., 2019). Although permanent differences and statutory tax rates differences generate similar permanent tax benefits, they entail different levels of tax-motivated and earnings-motivated BTD of which the differences are depending on the countries' international tax and accounting policies or standards (Thomsen & Watrin, 2018; Zeng, 2019). Multinational firms secure tax benefits through various methods, including transfer pricing and income shifting (Richardson & Taylor, 2015; Taylor et al., 2015).

Firms that involve in digital economy are expected to be more "international" friendly as they can leverage on borderless scope of business or cross-border transactions, in particular, when the trade-offs between the risk and challenges, and the benefits have been identified (Banalieva & Dhanaraj, 2019; Sturgeon, 2019). This is in line with the debates among management scholars that multinational firms able to outperform others following their dynamic ability to secure competitive advantages, including those that are of non-location bound firm-specific, location bound firm-specific and country-specific (Matysiak et al., 2018). With this, multinational digital economy firms may have the opportunity to utilise the differences in statutory tax rates and tax policies to manage their tax affairs, which can then lead to an increase in statutory tax rates differences (Abdul Wahab & Holland, 2015; Singh, 2017; Ting & Gray, 2019). It is, therefore, hypothesised that the higher the digital economy involvement, the higher the statutory tax rates differences is, as in H_{2c}:

H_{2c}: Firms' involvement in digital economy is significantly and positively related to the extent of firm statutory tax rates differences.

3. Materials and methods

3.1. Measurement of book-tax differences, permanent differences, temporary differences and statutory tax rates differences

We measure BTD following Abdul Wahab and Holland (2015) in which BTD is defined as the differences between profit before tax (*PBT*) and taxable income (*TI*). *TI* is estimated by firstly grossing up the current tax expense with Malaysian statutory tax rates, and secondly, deducting the statutory tax rates from the grossed current tax expense. The calculation is illustrated by Equation (1):

$$TI = (CTE/STR_m) - (STRD) \quad (1)$$

Where *CTE* is current tax expense, *STR_m* is Malaysian statutory tax rates and *STRD* is statutory tax rates differences disclosed by firms in footnotes of financial statements. In line with Abdul Wahab and Holland (2015), we then deduct (1) from *PBT* to calculate *BTD* as in Equation (2):

$$BT D = P B T - T I \quad (2)$$

In calculating the components of BTD, we firstly calculate temporary differences (*TD*) by grossing up current deferred tax expense (*CDTE*) with Malaysian statutory tax rates (*STR_m*). Following this, we then calculate permanent differences (*PD*) by deducting *TD* from *BT D* as in Equation (3):

$$P D = B T D - T D \quad (3)$$

3.2. Measurement of digital economy involvement

Following a content-analysis tax literature, we construct our digital economy involvement data collection procedure with an attempt to allow for thematic content disclosure analysis (Holland et al., 2016).⁴ As listed in Table 1, the focused themes for the data collection consist 20 digital

Table 1. Digital economy themes

No.		No.	
1.	ICT manufacturing	11.	ICT equipment
2.	Software publishing	12.	E-commerce or e-business
3.	Telecommunications	13.	E-payment or online payment
4.	Computer programming	14.	Automation
5.	IT consultancy	15.	Digital
6.	ICT wholesale	16.	Portal
7.	ICT retail trade	17.	Internet
8.	Content and media activities	18.	Cloud computing
9.	ICT services	19.	Big data
10.	ICT industrial machinery	20.	Fintech

economy-related constructs extracted from *Malaysia's Digital Economy: A New Driver of Development* (World Bank Group & Ministry of Finance Malaysia, 2018). To ensure systematic and reliable data across firm-years, we collect the data from firm annual reports.

The data collection involves three authors, between whom the number of firms was divided equally. We firstly assigned unique id numbers to all firms that were arranged according to industry and subsequently based on alphabetical order. The allocation of firms to the authors comprises three rounds, i.e. 30 each for the first and the second, and the remaining for the third round to minimise industry-related bias. To ensure the reliability and validity of the data collection across authors, the authors discussed and reconciled any differences in word search and interpretation among them after the first round. After the reconciliation, the data collected for the first 30 firms was independently checked by another author who coordinated the data collection but did not involve in data collection to control for bias in interpretation and to control for consistency with the constructs extracted from *Malaysia's Digital Economy: A New Driver of Development* (World Bank Group & Ministry of Finance Malaysia, 2018). This task aims to align with what had been agreed and concluded prior to the commencement of the data collection. After the second round of the data collection, the authors further reconciled the interpretation of the themes to remove incidental references where digital economy involvement is not reflected, for example, items related to firm acquisition and training.

Upon completing the third round, we conducted independent data recollection to ensure the reliability and consistency of the data. The process involves a sample of 10% of firms from each author which was selected based on systematic random sampling following four steps. First, unique numbers were re-assigned to each firm based on each author's firm list. Second, we generated random numbers to the list of firms using Microsoft Excel based on each author's list. Third, we grouped the firms by 10 firms and finally, we selected every 5th firm from the 10 firms to form the 10% sample for each author. Following this, the authors were assigned 10 percent sampled firms, which the data was previously collected by another author, for them to independently recollect the data. To ensure the comprehensiveness of the reliability check across authors, each sampled firm had undergone two independent recollections, i.e. each by the remaining two authors. Upon completing the rechecking, the coordinator author checked the frequency data of each theme to gauge abnormalities. This exercise detected two themes, i.e. theme 8 and 9, which the occurrence indicated inconsistencies between the initial data collector and the remaining two authors. The data of the two themes was then recollected by the initial data collector and, subsequently and independently recollected again by the remaining two authors following the above-mentioned four steps of the sampling reliability procedure, i.e. after excluding the sample

that had been rechecked during the first round. Following this, the coordinator author conducted the second round scrutiny to reconfirm the consistency and reliability of the data.

Upon completing the data extraction, we assigned points, i.e. “1”, to each theme that the firms had disclosed in the annual report. Following this, we then converted the total of the points into percentage of maximum possible themes as in equation (4):

$$DEI = \left(\frac{\sum_{p=1}^{20} THEME_p}{20} \right) * 100 \quad (4)$$

Where *DEI* is digital economy involvement score and *THEME* is the 20 digital economy themes listed in Table 1.

3.3. Regression model

We develop our regression model based on Abdul Wahab et al. (2018) as in Equation (5) of which *DEI* is regressed on *BTD* while controlling for firm-specific variables:

$$BTD_{it} = \alpha_0 + \alpha_1 DEI_{it} + \alpha_{1+p} CONTROL_{it}^p + \varepsilon_{it} \quad (5)$$

Where *BTD* is book-tax differences measured using equation (2) and *DEI* is digital economy involvement measured using equation (4). *CONTROL* is a series of control variables discussed by literature as can affect firm *BTD* level (Abdul Wahab et al., 2018). The variables are capital intensity (*CAPINT*), measured by scaling gross machinery and equipment with total assets, earnings management (*EM*), measured using total accruals, leverage (*LEV*), measured by deflating long-term debt with total assets, auditor quality (*AUD*), a dichotomous variable of big-4 or otherwise, foreign sales (*FS*) measured using proportion of foreign sales from total sales, and industry (*IND*), a series of dichotomous industry variables for each category of industry. Table 2 summarises the variable measurements.

Table 2. Variable measurement

Variable	Description	Measurement
BTD	Book-tax differences	Book-tax differences (equation 2) divided by total assets
PD	Permanent differences	Permanent differences (equation 3) divided by total assets
TD	Temporary differences	Current deferred tax expense divided by statutory tax rates
STRD	Statutory tax rates differences	Statutory tax rates differences disclosed in tax reconciliation
DEI	Digital economy involvement	Equation 4
CAPINT	Capital intensity	Gross machinery and equipment divided by total assets
EM	Earnings management	PBT minus cash flow from operation, and divided by total assets
LEV	Leverage	Long-term debts divided by total assets
AUD	Auditor	Coded as 1 for big-4 or 0 otherwise
FS	Foreign sales	Percentage of foreign sales over total sales
IND	Industry	Coded as 1 for each industry category, 0 otherwise

To investigate the effects of firms' involvement on components of *BTD*, the data is further estimated using seemingly unrelated regression (*SUR*).⁵ All RHS variables in Equation (5) are regressed using *SUR* on each *BTD* component, i.e. permanent differences (*PD*), temporary differences (*TD*) and statutory tax rates differences (*STRD*) as in Equation (6).

$$COMP_i^q = \alpha_0 + \alpha_1 DEI_i + \alpha_{1+p} CONTROL_i^p + \varepsilon_{it} \quad (6)$$

Where *COMP* is components of *BTD*, comprised of *PD*, measured using equation (3), *TD*, measured by grossing up *CDTE* with statutory tax rates and *STRD*, as disclosed by firms in the footnotes of financial statements.

3.4. Sample and data source

We begin our sample selection process with non-financial firms listed on Bursa Malaysia throughout 2013 to 2018, i.e. 683 firms. Year 2013 is to control for bias of financial reporting due to the transition of financial reporting regulation from *International Accounting Standard* and *International Financial Reporting Standard* to *Malaysian Financial Reporting Standard* which the reported financial figures are based on full compliance of the latter standard from 2013 onwards. Year 2018 is to reflect the most current available data. Non-financial firms are excluded to control for bias of variations in reporting regulation. To ensure strongly balanced panel data, we filtered out firms with missing annual report, i.e. 44 firms. Further, we exclude firms with inconsistencies in accounting year-end (62 firms) to control for bias of reporting period, resulting in 577 firms. We also exclude nine firms with zero and negative book-value of equity to avoid complication in interpreting the results due to limited economic meaning and abandonment value of data of such firms (Collins et al., 1999). To control for complication in currency translation, we also exclude six firms which the financial statements are reported in foreign currencies. The next filter is related to extreme value of effective tax rates (*ETR*), i.e. $ETR \leq -1$ and $ETR \geq 1$ to control for bias of non-recurring items (Abdul Wahab & Holland, 2015), which involves 117 firms. To ensure strong engagement in digital economy, we trim the sample to control for firms with persistent *DEI* throughout 2013 to 2018. These processes result in the final sample of 141 firms (846 firm-years).

The *DEI* and *BTD* data is hand-collected from firm annual report due to the unavailability of the data in machine-readable format. Other financial data is collected from *Refinitiv Eikon Datastream*. The industry classification data is collected based on Bursa Malaysia industrial category.

3.5. Descriptive statistics

Table 3 presents the descriptive statistics of the sample. The sampled firms are from 11 industries with the highest number of firms from consumer product industry, and industrial product and services industry, i.e. 26% of firms from each industry. The next three largest industries are (in descending order) technology, property and telecommunication with 10, 8, 6%, respectively. This is followed by construction, transportation and logistics, and plantation with 5-% composition for each industry. The remaining industries are energy, healthcare and utilities with 3-% composition for each industry.

The average *BTD* of the *DEI* firms are negative (mean = -0.0035), suggesting that the firms have higher estimated taxable income than the accounting income. The largest variance of the differences are denoted by firstly *BTD* (SD = 0.0749), secondly, *PD* (SD = 0.0813) and thirdly, *TD* (SD = 0.0367). *STRD* (mean = 0.0005), on the other hand, indicates that digital economy firms, which the income is subject to tax in foreign jurisdictions, averagely enjoy tax saving at 0.05% of their total assets. In terms of digital economy involvement, with an average point of 14 percent (mean = 13.5461) within the range from 5 to 60%, the firms' involvement in digital economy is towards the lower end of the continuum. From the firm-specific characteristics context, the 48% average of machinery and equipment (mean = 0.4804) implies that the firms are at the medium range of assets intensive category. With negative average of total

Table 3. Descriptive statistics

n = 846	Mean	Minimum	Maximum	Standard deviation (SD)
BTD	-0.0035	-0.4891	0.3566	0.0749
PD	-0.0028	-0.5511	0.5033	0.0813
TD	-0.0006	-0.3336	0.4516	0.0367
STRD	0.0005	-0.0160	0.0256	0.0025
DEI	13.5461	5.0000	60.0000	8.9086
CAPINT	0.4804	0.0000	3.4549	0.4200
EM	-0.0080	-0.4559	0.3980	0.0864
LEV	0.0976	0.0000	0.7537	0.1293
FS	23.9748	0.0000	100.0000	29.8795

BTD = Book-tax differences, PD = Permanent differences, TD = Temporary differences, STRD = Statutory tax rates differences, DEI = Digital economy involvement, CAPINT = Capital intensity, EM = Earnings management, LEV = Leverage, FS = Foreign sales

accruals (mean = -0.0080), the firms can be concluded as to be involved in downward earnings management through the accounting policy choice. From the financing aspect, the firms on average finance their activities using long-term debt at the rate of 10% of their total assets (mean = 0.0976). In line with *STRD*, the firms generate sales from foreign jurisdiction at the average rate of 24% of the total sales (mean = 23.9748).

4. Results

Prior to estimating the regression models, we winsor the continuous variables at the 1st and 99th percentiles to control for outliers. Following this, we check the data for multicollinearity using Pearson correlation coefficients, VIF and condition indices (Belsley et al., 1980; Hair et al., 2006). **Table 4** presents the Pearson correlation coefficients between the continuous variables. With the highest coefficient of -0.2039 between the independent variables of the regression models, i.e. *CAPINT* and *EM*, the initial multicollinearity is insignificant as the coefficient is below the threshold level of 10 (Hair et al., 2006). This is in line with the low level of VIF mean, i.e. 3.28, for all models. Similarly, the condition indices (CI) for all models are below the threshold of 30, i.e. CI = 22.30, indicating insignificant multicollinearity of the regression models (Belsley et al., 1980). Next, we run the Breusch-Pagan/Cook-Weisberg and White tests to examine potential heteroscedasticity

Table 4. Pearson correlation coefficients

n = 846	BTD	PD	TD	STRD	DEI	CAPINT	EM	LEV	FS
BTD	1.0000								
PD	0.8893***	1.0000							
TD	0.1292***	-0.2672***	1.0000						
STRD	0.1209***	0.1222***	-0.0323	1.0000					
DEI	0.0126	-0.0119	0.0551	0.0595*	1.0000				
CAPINT	0.0758**	0.0634*	-0.0121	0.0981***	-0.0074	1.0000			
EM	0.3927***	0.3647***	0.0209	-0.0129	-0.0572*	-0.2039***	1.0000		
LEV	-0.0674*	-0.0492	-0.0440	0.0304	0.1831***	0.0045	-0.0365	1.0000	
FS	0.1027***	0.1268***	-0.0924***	0.2217***	0.0264	0.1280***	-0.0136	-0.0565	1.0000

BTD = Book-tax differences, PD = Permanent differences, TD = Temporary differences, STRD = Statutory tax rates differences, DEI = Digital economy involvement, CAPINT = Capital intensity, EM = Earnings management, LEV = Leverage, FS = Foreign sales

***, ** and * denote significant at 0.01, 0.05, 0.10, respectively.

of the data (Breusch & Pagan, 1979; White, 1980). All models indicate significant heteroscedasticity.⁶ We therefore run the multivariate analyses using Huber-White adjusted t-statistics (Huber, 1967).

In addition to the outliers, multicollinearity and heteroscedasticity, we also diagnose the models for serial correlation using Wooldridge test (Wooldridge, 2002). All models indicate insignificant serial correlation ($p > 0.05$), i.e. F-stat of 1.422, 0.002, 2.040 and 3.269 for *BTD*, *PD*, *TD* and *STRD* models, respectively. Following this, we then test the stationary of *BTD*, *PD*, *TD* and *STRD* using Harris-Tzavalis unit-root test to confirm the time-invariance of the variables (Stata, 2020a). All tests indicate the variables meet the time-invariant assumption at $p < 0.01$, i.e. HT-stat of -0.0178, -0.1556, -0.0500 and 0.0765 for *BTD*, *PD*, *TD* and *STRD*, respectively.

Results of the multivariate analyses are presented in Table 5. In specific, results of the estimations on the relationship between *DEI* and *BTD*, *PD*, *TD* and *STRD* are, respectively, presented in columns 2, 3, 4 and 5. *DEI* is found significantly related to *TD* ($\alpha = 0.0002$ $p < 0.10$) and *STRD* ($\alpha = 0.0001$ $p < 0.10$) in a positive direction. This, thus, supports H_{2b} and H_{2c} in hypothesising significant and positive relationships between a firm's digital economy involvement and its temporary differences and statutory tax rates differences, respectively. The insignificant results of the relationships between *DEI* and *BTD* ($\alpha = 0.0001$ $p > 0.10$), and *PD* ($\alpha = -0.0001$ $p > 0.10$) indicate that H_1 and H_{2a} are not supported. Thus, at the aggregated *BTD* level, *PD* is more prominent in its effects on the relationship between *DEI* and *BTD*. This also indicates the necessity to understand the variations of *DEI* implications on disaggregated *BTD* measures.

Table 5. Multivariate results

Variable	DV = <i>BTD</i>	DV = <i>PD</i>	DV = <i>TD</i>	DV = <i>STRD</i>
<i>DEI</i>	0.0001	-0.0001	0.0002*	0.0001*
	<i>0.38</i>	<i>-0.20</i>	<i>1.92</i>	<i>1.65</i>
<i>CAPINT</i>	-0.0024	0.0204***	0.0004	0.0003*
	<i>-0.30</i>	<i>3.00</i>	<i>0.17</i>	<i>1.91</i>
<i>EM</i>	0.3092***	0.3765***	0.0042	-0.0001
	<i>5.90</i>	<i>12.47</i>	<i>0.40</i>	<i>-0.15</i>
<i>LEV</i>	-0.0341	-0.0302	-0.0113	0.0008
	<i>-0.96</i>	<i>-1.37</i>	<i>-1.46</i>	<i>1.31</i>
<i>AUD</i>	0.0082	0.0181***	0.0006	-0.0002
	<i>0.87</i>	<i>3.39</i>	<i>0.30</i>	<i>-1.28</i>
<i>FS</i>	0.0001	0.0003***	-0.0001**	0.0001***
	<i>0.80</i>	<i>3.47</i>	<i>-2.96</i>	<i>5.36</i>
Constant	0.0293	-0.0095	0.0013	0.0008
	<i>1.41</i>	<i>-0.53</i>	<i>0.20</i>	<i>0.17</i>
Industry dummy	Yes	Yes	Yes	Yes
R-squared	20.26%	19.76%	3.47%	10.87%
Wald	56.04***	-	-	-
χ^2 (SUR)	-	208.30***	30.42**	103.18***
Breusch-pagan	18.84***	18.83***	0.01	51.37***
White	302.21***	303.47**	227.88***	190.41***
n	846	846	846	846

BTD = Book-tax differences, *PD* = Permanent differences, *TD* = Temporary differences, *STRD* = Statutory tax rates differences, *DEI* = Digital economy involvement, *CAPINT* = Capital intensity, *EM* = Earnings management, *LEV* = Leverage, *AUD* = Auditor, *FS* = Foreign sales

Italicised figures are Huber-White adjusted t-statistics.

***, ** and * denote significant at 0.01, 0.05, 0.10, respectively.

In terms of control variables, capital intensity (*CAPINT*) is significantly and positively related to *PD* ($\alpha = 0.0204$ $p < 0.01$) and *STRD* ($\alpha = 0.0003$ $p < 0.10$). This suggests that Malaysian digital economy firms that are capital intensive manage to save their tax strategically (Tye & Abdul Wahab, 2019). Earnings management (*EM*) is also found significantly and positively related to *BTD* ($\alpha = 0.3092$ $p < 0.01$) and *PD* ($\alpha = 0.3765$ $p < 0.01$). The results are consistent with previous literature's arguments that earnings management is used by firms to secure tax saving effectively (Prihandini, 2017; Sundvik, 2016). Further, this study finds that auditor (*AUD*) is explaining *PD* positively ($\alpha = 0.0181$ $p < 0.01$), implying that firms pursue permanent tax planning strategies when the auditors are from large audit firms. This could be due to the confidence instilled by the big-4 auditors, which then motivates the firms to conduct tax planning activities that can generate permanent nature of tax saving as auditors do provide advices on tax saving (Lim et al., 2018). Similarly, foreign sales (*FS*) is positively related to *PD* ($\alpha = 0.0003$ $p < 0.01$) and *STRD* ($\alpha = 0.0001$ $p < 0.01$) but in contrast, negatively related to *TD* ($\alpha = -0.0001$ $p < 0.05$). This suggests that multinational firms secure tax saving through permanent differences and differences in statutory tax rates across jurisdictions more than temporary method of tax planning (Abdul Wahab, 2016; Ghardallou & Ftouhi, 2020).

5. Discussions and further tests

The positive relationship between *DEI* and *TD* implies that digital economy firms are utilising capital allowances-related incentives, which the tax saving that is derived from the temporary differences will be reversed in the future tax period (Gaertner et al., 2016). The results also indicate that firms with higher digital economy involvement may be engaging in accrual earnings management as the tax incentives that are related to capital expenditure can result in differences between accounting income, i.e. within the context of depreciation-related accounting policy, and taxable income, i.e. within the context of capital allowance ruling, which the magnitude of the differences are captured by deferred tax, i.e. a measure for temporary differences (Phillips et al., 2003; Zhou, 2016). This provides further empirical evidence to support theory of tax incentives in its stance that tax incentives can result in postponement of tax revenue to the government (Hemels, 2017)

Similarly, the positive relationship between *DEI* and *STRD* implies large statutory tax rates differences when the firms' involvement in digital economy activities is high. This indicates that digital economy firms are leveraging on borderless business scope to help them secure tax saving through operations in multiple jurisdictions (Abdul Wahab & Holland, 2012; Wang et al., 2019). The results also indicate that firms which involve in borderless digital economy business are managing their tax affairs through differences in taxation policies, including statutory tax rates across jurisdictions (Abdul Wahab & Holland, 2015; Singh, 2017; Ting & Gray, 2019). The acceptance of the multinational firms towards the use of ICT for their cross-border transactions support the contention of technology acceptance model on perceived usefulness and perceived ease of use (Venkatesh & Bala, 2008) within the perceived benefits of tax incentives (Hemels, 2017).

We run three further tests to examine the sensitivity of the results presented in Table 5. The tests are firm-fixed effect estimation, annual estimation and regressions by industry.⁷ We re-estimated all models using firm-fixed effect specification to control for bias of individual firm effect. The results indicate qualitatively similar results with the initial results of the relationship between *DEI* and *BTD*, *PD* and *TD*, suggesting that the results presented in Table 5 columns 2, 3, and 4 are robust across estimation specifications. The relationship between *DEI* and *STRD*, however, does no longer hold upon the fixed-effect estimation, indicating the sensitivity of the relationship upon the re-estimation. Next, we examine the sensitivity of the initial results across the sample period, i.e. 2013 to 2018, to identify variations of the relationships between years. The results indicate qualitatively similar results with the initial results presented in Table 5, except for the relationship between *DEI* and *TD* of which the significance of *DEI* does no longer hold when it is annually regressed on *TD*. The relationship between *DEI* and *STRD* is found significant and positive only in 2014. This suggests that the interpretation of the results is to be exercised with cautious on time variance.

To further understand the relationship between *DEI* and *BTD*, and its components across industries, we re-estimate the models by each industry classification. The results indicate qualitatively similar results with the initial results on the relationship between *DEI* and *TD*, and *STRD* for firms in industrial product and services. Similarly, *DEI* of firms in construction and property industries is also significant and positive in its relationship with *STRD* and *PD*, respectively. In contrast, a significant negative relationship between *DEI* and *BTD* is found for firms under health-care and energy. The negative relationship is also found for energy industry when *DEI* is regressed on *PD* and *STRD*. In addition, *DEI* is found to negatively affect *TD* and *STRD* for property and plantation industries, respectively. The results indicate that the relationships between *DEI* and, *BTD*, *PD*, *TD* and *STRD* differ across industry categories. This could be due to different opportunities to secure tax saving between industries (Derashid & Zhang, 2003; Minnick & Noga, 2017).

6. Conclusion

This study investigates the relationship between firms' digital economy involvement and *BTD*, and its components, comprising permanent differences, temporary differences and statutory tax rates differences. The relationships between digital economy involvement and temporary differences, and statutory tax rates differences were found significant and positive. However, the evidence to support the relationships between digital economy involvement and *BTD*, and permanent differences was found insignificant. In line with theory of tax incentives and technology acceptance model, digital economy firms do leverage on the usage of ICT to enjoy the incentives provided by the Government. The firms are also benefiting from cross-border businesses to secure tax benefits from differences in tax rules across multiple jurisdictions. At the aggregated *BTD* level, the insignificant effect of digital economy involvement on *BTD* suggests that permanent differences component is dominant in its effect on the relationship between digital economy involvement, and the differences between accounting and tax income.

This study contributes to the literature by providing further evidence to support theory of tax incentives within the context of technology acceptance model. This study also contributes to the authority by providing insights on the extent the digital economy-related incentives can affect the country's tax gap. In specific, within Malaysian setting, the Government's efforts in encouraging digital economy involvement among firms affect the country's tax gap only within temporary differences and multinational settings. Firms can also be benefited from this study in their attempts to gauge the effects of digital economy activities on their tax position.

The limitation of this study is related to its focus on public-listed firms, which limits the generalisation of its results to other settings. Future research, therefore, can be conducted using different settings, for example, SMEs, to confirm whether the results can be replicated. Future research should also be conducted by replicating this study on different country and economic settings, for example, across economic classes, to confirm whether the relationships between digital economy involvement and *BTD*, and its components are robust across jurisdictions.

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Author details

Nor Shaipah Abdul Wahab¹
E-mail: NorShaipah.AbdulWahab@taylors.edu.my
Tye Wei Ling¹
E-mail: weiling.tye@taylors.edu.my
Adamu Pantamee Abdurrahman¹
E-mail: adamu.abdurrahman@taylors.edu.my
Ooi Chee Keong¹
E-mail: cheekeong.ooi@taylors.edu.my
Nik Herda Nik Abdullah¹
E-mail: nikherda.nikabdullah@taylors.edu.my

¹ School of Accounting and Finance, Taylor's University, Subang Jaya, Malaysia.

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Notes

1. In line with World Bank Group & Ministry of Finance Malaysia (2018) and United Nations (2019), we define digital economy as economic activities that are ICT-reliant, including using digital platforms, digital intelligence and e-commerce.
2. Further information on the tax incentives is discussed in literature review section.

3. Firms under MSC status are firms that involve in ICT-related businesses (Malaysian Digital Economy Corporation, 2020).
4. The themes and the data collection related to digital economy involvement variable are respectively determined and performed manually rather than using a qualitative data management tool, e.g., Nvivo, as the themes were defined based on the established publication by World Bank Group & Ministry of Finance Malaysia (2018) and hence the in-depth interpretation is not required. In terms of data collection, as the data is collected at the firm-year level instead of at the overall research project level, using the qualitative data management tool can result in complications as the output, i.e. frameworks and nodes, by the qualitative data management tool will be established for each 846 firm-years, which will not match with the intended data format to perform the multivariate analyses.
5. Seemingly unrelated estimation simultaneously estimates parameters for different components with robust standard errors, which use covariance matrix to correct standard errors across estimation models (Weesie 1999). SUR procedure is applied given restrictions of OLS to efficiently estimate parameters in different equations for unrelated regressors (Zellner, 1962). In our BTD component cases, seemingly unrelated procedure is efficient in estimating unrelated regressors with similar sets of predictors by applying weighted estimate approach and controlling for residual covariance for each PD, TD and STRD models (Greene, 2012). This is in line with the differing nature and influence of BTD components (Abdul Wahab & Holland, 2012; Raedy et al., 2011). We conduct Hausman tests to examine the assumption of correlated error terms prior to SUR estimation and the outcomes indicate that, despite the components' deferring nature, there are insignificant differences of coefficients between the component models ($\chi^2 = 241.60$ p < 0.01 for PD and TD, $\chi^2 = 203.50$ p < 0.01 for PD and STRD, $\chi^2 = 30.85$ p < 0.05 for TD and STRD) while there are variations of RMSEs and standard errors between OLS and SUR estimations as a result of correlated error terms across models (Stata, 2020b; UCLA, 2020).
6. χ^2 at p < 0.01 for all estimations.
7. For economical reason, the results are not tabulated but are available from authors upon request.

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