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Financial distress and tax avoidance: the moderating effect of the COVID-19 pandemic

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Abstract

Purpose – This paper examines whether financial distress is associated with tax avoidance and whether the COVID-19 pandemic moderates such association.

Design/methodology/approach – The sample covers 38,958 firm-year observations from 32 countries during the period 2015–2020. Financial distress is measured using the ZSCORE by Altman (1968), while tax avoidance is based on the book-tax difference.

Findings – Financially distressed firms exhibit low tax avoidance pre- and during the pandemic periods. The authors find higher tax avoidance during the pandemic compared to the pre-pandemic period, but the pandemic enhances the negative relationship between financial distress and tax avoidance.

Research limitations/implications – The study offers evidence on how financial distress drives firms to engage in more tax avoidance when firms globally encountered various levels of financial difficulty sparked by the economic challenges of the COVID-19 pandemic.

Practical implications – The findings provide insights to policymakers on the need to monitor and incentivise financially distressed firms, especially during economic challenges due to pandemic.

Originality/value – This study adds to the limited, albeit important, evidence on the joint effect of the COVID-19 pandemic and financial distress on tax avoidance.

Keywords COVID-19, Financial distress, Corporate tax avoidance, Cross-country

Paper type Research paper

Introduction

Tax avoidance is a rational business strategy involving a real economic decision that offers substantial benefits. For shareholders mainly, there is a need to weigh the benefits from the tax savings against the costs of potential enforcement by tax authorities and reputation loss (Habib *et al.*, 2020; Hanlon and Heitzman, 2010). Concerns about tax avoidance are rising with

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the evidence of the significant decrease in corporate effective tax rates over the past 25 years for both multinational and domestic firms (Dyreng *et al.*, 2017). Tax avoidance is a concern for regulators worldwide as many tax avoidance tools involve cross-national border activities, such as the Panama Papers case.

This paper brings a unique setting in exploring tax avoidance. First, this study considers the economic landscape that has been fragile and unstable for several years, as global economic growth is shown at its slowest pace because of the US-Chinese trade war (World Bank, 2019) and the effects of Brexit. Global economic uncertainty is an external pressure for firms to strategise for the sustainability of their businesses. Second, this study employs the COVID-19 pandemic that has caused unprecedented disruptions to firms from all jurisdictions. The pandemic pressures firms to cope with operational and institutional changes in the market, requiring the deployment of innovative strategies that could be different from those typically favoured. We posit that the strategies taken by firms, which mostly relate to cost efficiency and cash management, may include tax avoidance. Thus, this study is relevant in monitoring corporate behaviour within the current economic challenges that may either motivate tax avoidance strategies that enhance shareholders' wealth, or those that entrench.

When firms face high uncertainties, managers have the discretion and flexibility to develop different business survival strategies (Huang *et al.*, 2017). Tax avoidance is the most preferred strategy because such practice provides a source of internal funds that can stabilise cash flows (Edwards *et al.*, 2016) and benefits the shareholders. This study focuses on financial distress as an incentive for firms to engage in tax avoidance by considering the firm-level and economy-wide distress. Greater financial distress is associated with higher tax avoidance (Edwards *et al.*, 2016; Richardson *et al.*, 2015b), and the relationship is likely magnified during an economic downturn (Edwards *et al.*, 2016). In addition, this study looks at the financial distress exacerbated by the economic uncertainties due to the COVID-19 pandemic. This study examines the association between financial distress and tax avoidance and whether the COVID-19 pandemic moderates the association.

Compared to prior financial crises, the crisis related to the COVID-19 pandemic imposes greater economic challenges as it is truly global, with every region suffering from substantial growth downgrades. While the global economy was set to expand by 5.6% in 2021, the global recovery is uneven, with most emerging markets and developing economies (EMDEs) lagging, with the possibility of further COVID-19 waves and financial distress amid high EMDEs debt levels (World Bank, 2019). The financial crisis due to the pandemic triggers significant pressure on firms to secure and protect their investors from the risk of substantial financial losses. While the COVID-19 pandemic imposes economic challenges on firms worldwide, the impact on tax avoidance may differ as some firms were already in financial difficulties before the pandemic (Habib *et al.*, 2013). Firms that previously experienced financial crises would be in advantageous position than new and inexperienced firms (Ahmed *et al.*, 2019). Hence, there is a need to analyse whether financial distress affects tax avoidance pre- and during the COVID-19 pandemic.

This study examines the interplay between financial distress and tax avoidance by analysing 38,958 firm-year observations from 32 countries during the period 2015–2020, covering the periods before and during the COVID-19 pandemic. Our results show that financially distressed firms exhibit low tax avoidance in both pre-pandemic and during the pandemic periods. Further, we find high tax avoidance in the pandemic sample compared to the pre-pandemic sample. Finally, we find that COVID-19 moderates the relationship between financial distress and tax avoidance. During the pandemic, financial distress has a stronger negative impact on tax avoidance than in the pre-pandemic period. Our results remain consistent under a battery of robustness analyses.

This study offers the following contributions. First, using an international data set extends prior studies on financial distress and tax avoidance (e.g. Edwards *et al.*, 2016) and macroeconomic distress and tax avoidance (e.g. Richardson *et al.*, 2015a, b) that have tended

to focus on a single-country setting. By utilising firms in various market and institutional infrastructures, we corroborate evidence on how financial distress influences firms to engage in tax avoidance in an institutional context. The finding is significant since anecdotal evidence raises concerns about increased financial distress and tax avoidance (Dyreng *et al.*, 2017) globally. Second, we use the setting where firms worldwide are perceived to be in financial distress triggered by the economic challenges from the COVID-19 pandemic. Adding to prior studies that have utilised the setting of the financial crisis on tax avoidance (e.g. Richardson *et al.*, 2015a, b), the COVID-19 pandemic offers a level field to test the tax avoidance strategies because it has negatively impacted all economies around the world in a way that no other financial crisis has done before. Our approach is relevant in understanding how firms strategise through tax avoidance when pressured by the need to prevail during periods characterised by high uncertainty and volatility by considering the firm-level and macroeconomic forces that affect tax behaviour. Thirdly, our findings on greater tax avoidance behaviour when firms are plagued with financial challenges are noteworthy for the policymakers, especially in devising policies to balance between mitigating tax avoidance and assisting business to survive. In severe economic conditions, especially in countries with high corporate tax, policymakers may need to strategise innovative mechanisms through relief and rebates that would increase tax revenue and, at the same time, enable firms to sustain and grow in challenging markets.

Literature review and hypothesis development

Tax avoidance refers to all transactions and arrangements that could reduce corporate tax expenses, ranging from perfectly legal activities, such as through tax strategies that comply with the tax law, to "aggressive" strategies that fall into ambiguous areas, such as through aggressive interpretations of legal technicalities within the tax law (Hanlon and Heitzman, 2010). As tax avoidance enhances shareholders' wealth by reducing the outflow of resources to the government, it justifies opportunistic managerial behaviours (Desai and Dharmapala, 2006). From the agency theory perspective, tax avoidance can (1) be used by managers to engage in self-serving behaviour, (2) cause obfuscation that reduces transparency to shareholders, (3) involve long-term reputation losses and (4) be inconsistent with socially responsible behaviour that is unfavourable to shareholders (Wang *et al.*, 2020). Though tax avoidance can be considered rational business planning, it may increase the non-compliant risk that could be detrimental.

The need to understand the trade-off between the cost and benefit of tax avoidance has triggered studies that have identified various firm-specific and institutional factors that determine the practice (Edwards *et al.*, 2016; Khan *et al.*, 2017) as well as the incentives arising from internal and external factors that have led towards the likelihood of engaging in greater levels of tax avoidance (see Wang *et al.*, 2020). In addition, this study considers the perspective of tax avoidance in a setting where firms are financially pressured to perform and sustain their businesses. Firms commonly face various uncertainties in their operations, including internal risk from financial constraints and external risk from the financial crisis. Firms would deploy innovative coping mechanisms to survive and remain viable in the market. Considering those financial pressures, the benefit from the tax avoidance can be perceived to increase, whereas the costs remain the same because of the risk-shifting behaviour of shareholders and management of the financially distressed firms (Edwards *et al.*, 2016; Richardson *et al.*, 2015b), especially when the potential costs of bankruptcy are large enough to motivate them.

Financial distress and tax avoidance

There are three aspects by which tax avoidance can serve as synergy-motivated tools for financially distressed firms. First, minimising tax expenses allows firms to enjoy higher

profit margins and the likelihood of meeting or beating analyst expectations (Khan *et al.*, 2017). Graham *et al.* (2014) indicated that 57% of public firms say that increasing earnings per share is an essential outcome of a tax planning strategy. Second, the cash savings from lower payment of tax is a source of financing from an internal fund that can be used to finance operations, especially in circumstances where the debt and equity financing sources are costlier or more difficult for them (Edwards *et al.*, 2016). Cash savings from tax strategy can be derived from reducing current reported taxable income or increasing tax credits to decrease the taxes paid or increase the tax refund. Third, since firms in financial distress have limited options to survive, the managers have greater incentives for taking greater risks, particularly risk-shifting behaviour (Eberhart and Senbet, 1993). For example, firms avoid tax more aggressively after a reduction in analyst coverage (Chen and Lin, 2017). The improvement in profit and liquidity from tax avoidance strategies serves as a buffer in lowering the cost of debt and minimising bankruptcy risk.

Hence, from the perspective of the agency theory, tax avoidance is a rational strategy to reduce agency costs of financially distressed firms. This is because managers are taking initiatives to increase the wealth of the shareholders by employing strategies to minimise expenses and reserve cash. Therefore, when firms are financially distressed, tax avoidance is perceived as one of the most viable solutions to survive, as the potential costs may be lower than the potential benefits (Richardson *et al.*, 2015b). Further, tax strategies have a lesser adverse effect on operations than other cost-saving techniques, such as reducing capital expenditures (Edwards *et al.*, 2016) and laying off employees. Firms use tax avoidance strategies to remain in business, especially financially distressed firms (Sadjiarto *et al.*, 2020). In Australian setting, Richardson *et al.* (2015a) indicated that financially distressed firms engage in greater tax avoidance because the tax savings provide them with the much-needed cash for survival. The same scenario is evidenced in analysis using the US setting, where financial distress is positively associated with tax aggressiveness (Richardson *et al.*, 2015b), in line with the view that distressed firms use tax strategies to divert cash from the government to the firms.

According to Edwards *et al.* (2016), financially constrained firms, that are firms with low cash reserves, tend to pursue cash tax planning to increase internally generated funds. The tax savings are achieved via deferral-based tax planning strategies, despite lacking a financial statement benefit. Huang *et al.* (2017) found that firms in more volatile environments are likely to engage in more tax avoidance activities and much higher likelihood for small, highly leveraged and innovation-efficient firms. Further, Alm *et al.* (2019) found that firms in financial difficulty are more likely to engage in tax evasion activities, with possible channels including a decrease in information disclosure through the banking system, an increase in the use of cash for transactions and an increase in bribe activities in exchange for tax evasion opportunities.

While tax avoidance imposes benefits and costs to the firms and the shareholders, there is a likelihood that financially distressed firms would employ it. Due to the pressures, coupled with the few options available, the need to survive becomes a great incentive to engage in tax avoidance. Firms in financial distress are willing to undertake greater risk upon which tax avoidance strategies that would be viewed as too costly in normal circumstances would be more appealing within the setting of the financial difficulties. Tax avoidance that provides firms with the much-needed cash would be a viable option that offers a marginal benefit that exceeds the marginal cost, especially when they perceive that the reputational risk becomes less significant during financial distress.

Nevertheless, the arguments above may not hold or may vary considering the circumstances involving the setting of our study. First, we use the setting of the COVID-19 pandemic that, generally, has caused economic challenges to all firms worldwide. There is a possibility that firms would opt for other non-tax cost-cutting strategies, including reducing

their capital expenditure since their operations are halted or made impossible due to disruptions in trade and supply linkages. Second, we use samples of firms from various countries upon which the firm-level and national policy responses in dealing with the pandemic vary, allowing some firms/countries to cope and recover their condition quicker than other firms/countries. For example, some firms might be already in a difficult financial situation, while other firms can still handle the crisis better due to their prior experiences dealing with financial crises (Ahmed *et al.*, 2019; Habib *et al.*, 2013). Hasan *et al.* (2017) suggested that the motivation for tax avoidance varies according to a firm's life cycle, in line with the differences in economic fundamentals and resource allocation or opportunities across the life cycle. Further, from another perspective of the agency theory, tax avoidance strategy is very much at the discretion of managers; hence, the use of sophisticated and complex tax avoidance strategies may aggravate information asymmetry between management and shareholders and exacerbate the risk of managerial rent extraction. In the challenging economic conditions, there would be greater governance in place that would restrict the use of tax avoidance strategies. Therefore, we set the following hypothesis:

H1. Corporate financial distress is associated with tax avoidance.

COVID-19, financial distress and tax avoidance

The COVID-19 pandemic brings about a global financial crisis from disruptions to supply chains, demand and the financial markets. The bankruptcy risk is more prevalent for firms with high leverage and lack of collateral to bridge the shortfall with additional debt (OECD, 2020). The financial crisis that started in the year 2020 is truly global, with severe socio-economic impacts that have caused uncertainties in the ability of the countries to recover their economies quickly. This study utilises the setting of the global financial crisis arising from the COVID-19 pandemic as a level field to examine the tax avoidance strategies of firms experiencing a financial and economic shock.

In relation to tax avoidance strategies arising from microeconomic distress, Alm *et al.* (2019) assert that firms tend to avoid tax obligations when they face financial constraints. In an assessment of tax collection during the financial crisis, the International Monetary Fund asserted that financially constrained firms engage in greater levels of tax aggressiveness as they need to conserve capital or meet the minimum capital needs, which have become more critical in the financial crisis periods. Edwards *et al.* (2016) examined firm-specific and macroeconomic financial constraints in exploring tax planning activities. They find that firms facing increases in firm-specific and macroeconomic financial constraints exhibit increasing deferral-based tax planning.

Prior research has used financial crisis periods to evaluate managerial tactics, such as financial reporting quality during the 2007–2009 recession (Filip and Raffournier, 2014). Economic uncertainties trigger managerial responses, incentives and behaviours that vary across firms to influence them to undertake different managerial strategies to sustain their businesses. Notable findings on the dynamics between financial distress and tax avoidance during the financial crisis are reported in studies employing the global financial crisis of 2008. For example, the findings of Richardson *et al.* (2015a) showed that the association between financial distress and tax avoidance among publicly listed firms in Australia was high due to the global financial crisis. Similarly, Richardson *et al.* (2015b) found that the positive association between financial distress and tax aggressiveness is magnified by the global financial crisis in their analysis involving the samples of firms from the US.

In general, the economic downturn would have magnified the effect of financial distress on tax avoidance practices because firms need to compensate for their multiplying losses in the economy. However, in the setting of this study, several considerations must be considered in predicting the joint effect of firm-level and economic-level distress on tax avoidance.

First, there is a need to consider the fact that variations in the country-level institutional environment may have resulted in variations in the impact of the pandemic on tax avoidance behaviours. This conjecture is supported by evidence of the cross-national differences in tax avoidance that can be explained by institutional, demographic and attitudinal factors (Atwood *et al.*, 2012). For example, Beck *et al.* (2014) showed that firms with poorer credit information-sharing systems and lower branch penetration among banks evade taxes to a greater degree. Hence, country-level institutional factors may influence how firms behave despite being plagued by financial distress. Second, there is a view that there would be greater scrutiny by the regulators during the economic crisis period, as they predict that the risk of expropriation would be higher. Institutions tend to play a greater role in restraining tax evasion during the economic downturn because the policymakers would have improved the mechanisms to enhance control over potential tax evasions. Examples include promulgating strong enforcement mechanisms through audits, fines and penalties that would restrict the tendency to expropriate through tax strategies. Further, the likelihood of higher tax-related reputational costs could prevent financially distressed firms from engaging in tax avoidance when their constraints arise from macroeconomic contractions (Edwards *et al.*, 2016). From the view of the institutional theory, the various aspects of institutional quality have implications on corporate tax (Ariff and Kamarudin, 2019) since legal systems, regulations of the capital market, as well as cultural and social norms influence the practices, incentives and behaviours related to tax strategies. Given the diversity in the institutional features of the countries, the question of whether and how the COVID-19 pandemic affects the way financially distressed firms strategise their tax becomes an area of potential research.

Extending the above studies, this study sheds further light on the macroeconomic shock arising from the COVID-19 pandemic as a source of economy-wide distress to firms. Based on the above arguments and the evidence that financial distress puts greater pressure towards tax avoidance during an economic downturn (Richardson *et al.*, 2015a, b), we set the following hypothesis:

H2. COVID-19 pandemic moderates the association between corporate financial distress and tax avoidance.

Research methodology

Data and sample

Our sample covers global data for the period 2015–2020. We collected the financial data from the Refinitiv database, and country-level data from the World Bank database. The final sample, which comprises 38,958 firm-year observations from 32 countries, is based on the following procedures performed on the data set derived from the databases. First, following earlier studies (Kamarudin *et al.*, 2020), we excluded financial firms (SIC code between 6000 and 6999), such as banks, insurance firms and other financial institutions, because of their different financial structure. Second, we removed utility firms (SIC code between 4900 and 4999) because they are highly regulated and are likely to differ from other firms' operations (Houqe *et al.*, 2012). Third, we deleted firm-year observations from 2019 since the preparation of the financial statements fell under the grey period [1]. Finally, we removed observations with missing or incomplete data and winsorised all continuous variables that fell in the top and bottom 1% to mitigate the influence of outliers.

Measurement of variables

For financial distress, we measure it using the *ZSCORE* by Altman (1968). We also introduce two additional measures. Using the Fama and French (1997) 10 industry classifications, we

sort the *ZSCORE* and create quantiles (*QRT*), in which the fourth quartile is for firms with the lowest *ZCORE*, while the first quartile is for firms with the highest *ZSCORE*. We also create *DEC,* which consists of nine data points that divide a data set into 10 equal parts where the tenth decile is for firms with the lowest *ZCORE*, while the first decile is for firms with the highest *ZSCORE*. By sorting the *ZSCORE* by industries, we control the distress levels, which vary between industries. For the COVID-19 pandemic measure, we use two measures: (1) the long horizon, where we compare the pre-pandemic period (the year 2015–2018) with the pandemic period (the year 2020), that is, by using the variable *COVID* that takes the value of 1 for the year 2020 and 0 for the year prior to 2019; and (2) the short horizon, which is a comparison between the years 2018 and 2020 only. We measure tax avoidance based on the book-tax difference (Desai and Dharmapala, 2006) since the large differences between accounting and taxable income exhibit tax avoidance behaviour (Lisowsky, 2010; Mills, 1998). Compared to other measures, such as the effective tax rate and cash effective tax rate, this study measures tax avoidance as the residual value of book-tax difference in which the model controls for the component of the book-tax difference attributable to earnings management (Desai and Dharmapala, 2006; Frank *et al.*, 2009).

Regression model

Our basic specification for testing the hypotheses is as follows:

$$\begin{aligned} CTA = {} & \alpha_0 + \beta_1 ZDUM + \beta_2 COVID + \beta_3 COVID * ZDUM + \beta_4 FSIZE + \beta_5 LEV \\ & + \beta_6 GROWTH + \beta_7 BIG4 + \beta_8 CINT + \beta_9 INVINT + \beta_{10} RDINT + \beta_{11} MKTBK \\ & + \beta_{12} INF + \beta_{13} LGDP + \beta_{14-17} LIFECYLE_t + \theta_{1-n} Fixed\_Effects_t + \varepsilon_{it} \end{aligned} \quad (1)$$

where *CTA* is the residual value of book-tax difference as in Desai and Dharmapala (2006); *ZDUM* takes the value of 1 if the Altman (1968) *ZSCORE* is below 1.8, and 0 otherwise; *COVID* takes the value of 1 for the year 2020, and 0 for the year prior to 2019; *FSIZE* is the natural logarithm of total assets; *LEV* is the ratio of total debts divided by total assets; *GROWTH* is the change of annual net sales over last year sales; *BIG4* takes a value of 1 if the firm was audited by one of the Big Four auditors, and 0 otherwise; *CINT* is the ratio of net book value of property, plant and equipment to total assets; *INVINT* is the ratio of total inventories to total sales; *RDINT* is the ratio of research and development expenditure to total assets; *MKTBK* is the market to book ratio; *INF* is the annual growth rate of the GDP implicit deflator showing the rate of price change in the economy as a whole; *LGDP* is the natural logarithm of gross domestic product per capita in US dollar; *LIFECYLE* is a vector for different life cycle stages based on Dickinson (2011); and *fixed effects* are controls for industry and year effects.

Results

Descriptive statistics

Table 1 reports descriptive statistics for all the variables for the two groups of samples. The sample of the pre-pandemic period shows stronger financial health (*ZSCORE*), mostly audited by big audit firms (*BIG4*), higher inflation (*INF*) and higher natural logarithm of GDP (*LGDP*), than during the pandemic period. However, compared to the pre-pandemic period, the sample of the pandemic period, on average, has a bigger firm size (*FSIZE*), and higher leverage (*LEV*), growth (*GROWTH*), capital intensity (*CINT*), research and development intensity (*RDINT*), market-to-book ratio (*MKTBK*), sales variability (*SVAR*) and operating cash flows (*CFO*). The untabulated results, for a brevity purpose, show that most of the

Variable	Pre-pandemic (N = 31,118) Mean	SD	Pandemic (N = 7,840) Mean	SD	p values for differences Diff	t-value
CTA	0.169	7.133	0.345	7.652	−0.176	(−1.844)
ZSCORE	4.626	5.402	4.083	5.345	0.543***	(8.028)
ZDUM	0.230	0.421	0.325	0.468	−0.094***	(−16.236)
QRT	2.499	1.118	2.500	1.118	−0.001	(−0.080)
DEC	5.496	2.872	5.498	2.873	−0.002	(−0.065)
FSIZE	19.892	1.885	20.116	2.012	−0.224***	(−8.902)
LEV	0.209	0.177	0.234	0.176	−0.026***	(−11.608)
GROWTH	0.181	0.795	0.291	1.522	−0.110***	(−6.195)
BIG4	0.496	0.500	0.405	0.491	0.091***	(14.647)
CINT	0.266	0.214	0.288	0.219	−0.022***	(−7.989)
INVINT	0.121	0.123	0.120	0.123	0.001	(0.486)
RDINT	0.013	0.033	0.013	0.032	−0.001*	(−2.244)
MKTBK	3.002	3.923	3.218	4.694	−0.216***	(−3.755)
INF	2.013	1.648	1.700	1.993	0.313***	(12.843)
LGDP	9.830	1.149	9.652	1.233	0.178***	(11.560)
|DACC|	0.291	0.659	0.308	0.693	−0.018	(−1.891)
SVAR	0.154	0.170	0.172	0.178	−0.018***	(−8.093)
CFO	0.063	0.088	0.074	0.090	−0.011***	(−9.595)

Table 1.
Descriptive statistics

Source(s): Authors' own work

samples come from the mature life cycle stage, with 19,495 firm-year observations (50.04%), followed by the growth life cycle with 9,080 firm-year observations (23.31%). The introduction, decline and shake-out life cycles constitute 8.28, 5.26 and 13.11% of the samples, respectively. The statistics show that Chinese firms are most heavily represented in the sample (N = 8,418), followed by firms in Japan (N = 6,518), the US (N = 6,015) and India (N = 4,395). Meanwhile, Brazil (N = 43), Ireland (N = 85) and Belgium (N = 89) have the lowest number of observations.

We perform pairwise correlation analysis among the dependent and independent variables. The untabulated results, for a brevity purpose, indicate no concern for multicollinearity.

Main empirical results

Table 2 presents the results in relation to the effect of financial distress on tax avoidance for various subsamples. The coefficients for *ZDUM* in columns (1) to (4) are negative and statistically significant, indicating that financially distressed firms exhibit a lower tendency to tax avoidance in both pre- and during pandemic periods. The results in columns (3) and (4), where the estimation is on the pooled sample, show that the coefficients for *COVID* are positive and statistically significant, suggesting high tax avoidance in the pandemic sample compared to the pre-pandemic sample.

The results in column (4) show that the coefficient for COVID*ZDUM is negative and significant, implying that in COVID-19 pandemic environments, financial distress has a greater negative impact on tax avoidance compared to the pre-pandemic period. Our findings suggest that firms with financial distress have less opportunity to avoid tax, despite the arguments that tax avoidance can serve as synergy-motivated tools to have high-profit margins and the likelihood of meeting or beating analyst expectations (Khan *et al.*, 2017), cash savings (Edwards *et al.*, 2016; Richardson *et al.*, 2015b) and tendency to take greater risks (Eberhart and Senbet, 1993). Although Richardson *et al.* (2015a, b) argued that financially

Variable	Pre-pandemic (1)	During (2)	Pooled (3)	Pooled (4)
Intercept	−11.938***	−11.503***	−11.976***	−11.947***
	(−19.646)	(−7.399)	(−21.730)	(−21.689)
ZDUM	−2.709***	−3.280***	−2.866***	−2.572***
	(−26.824)	(−16.871)	(−32.018)	(−25.922)
COVID			0.187**	0.553***
			(2.255)	(5.607)
*COVID*ZDUM*				−1.215***
				(−6.837)
CONTROLS	Included	Included	Included	Included
Fixed effects	Included	Included	Included	Included
Adj.R^2	0.21	0.24	0.21	0.22
N	31,118	7,840	38,958	38,958
F-stat	319.775	95.993	395.457	383.451

Note(s): *, ** and *** represent significance at $p < 0.10$, < 0.05 and < 0.01, respectively. The *t*-values are reported in parentheses
Source(s): Authors' own work

Table 2. Regression estimates for financial distress, COVID-19 pandemic and tax avoidance

distressed firms engage in greater tax avoidance because the tax savings provide them with the much-needed cash for survival, our study offers a different explanation. The plausible explanation of the negative link between financial distress and tax avoidance is that they are subject to greater regulatory scrutiny and fewer financial resources to avoid tax. As these firms are in financial distress, they might already manage the tax in the early stage of financial distress. As the pandemic appeared without warning, this gave little room for the financially distressed firms to avoid tax.

Endogeneity issue: propensity score matching

In our main analysis, the endogeneity problem could arise from the differences in firm characteristics between the treatment group (COVID-19 pandemic) and the control group (pre-pandemic). To alleviate such a concern, we examine whether our results hold if we use a matched sample based on a propensity score matching method, as developed by Rosenbaum and Rubin (1983). To evaluate treatment effects, we matched observations during the COVID-19 pandemic that could be systematically different from observations before the pandemic by using characteristics with the closest propensity score [2]. We estimate equation (2), a logistic propensity score model based on a number of observable firm-specific variables, and apply a condition on the highest propensity caliper to remove dissimilar matched pairs if the difference in the propensity scores (probabilities) is greater than 0.001 [3]. In equation (2), we incorporated *FSIZE*, *LEV*, *GROWTH*, *CFO*, *CINT*, *INVINT*, *RDINT* and *SVAR*, as well as the industry and year fixed effects, as presented below:

$$Pr[COVID = 1] = \beta_1 FSIZE + \beta_2 LEV + \beta_3 GROWTH + \beta_4 CFO + \beta_5 CINT + \beta_6 INVINT + \beta_7 RDINT + \beta_8 SVAR + \theta_{1-n} Fixed\_Effects_t + e_{it} \quad (2)$$

where *SVAR* is the standard deviation of the sales revenue per total assets over a lag of a six-year period; *CFO* is the ratio of cash flow from the operations divided by total assets; and other variables are as previously defined.

The results in column (1) of Table 3 present the logit regression estimates, where we find all seven out of eight predictors, namely *FSIZE*, *LEV*, *GROWTH*, *CFO*, *CINT*, *RDINT* and

First stage		Second stage			
	(1)		(2)	(3)	(4)
Intercept	−2.906***	*Intercept*	−11.145***	−9.001***	−9.144***
	(−19.907)		(−12.281)	(−9.849)	(−10.100)
FSIZE	0.050***	*ZDUM*	−2.406***		
	(7.040)		(−12.666)		
LEV	0.697***	*QRT*		−1.279***	
	(8.958)			(−16.570)	
GROWTH	0.082***	*DEC*			−0.561***
	(7.234)				(−18.475)
CFO	1.447***	*COVID*	0.273**	1.246***	1.086***
	(9.483)		(2.142)	(4.773)	(4.727)
CINT	0.344***	*COVID*ZDUM*	−1.194***		
	(5.438)		(−5.064)		
INVINT	0.056	*COVID*QRT*		−0.639***	
	(0.526)			(−6.801)	
RDINT	2.403***	*COVID*DEC*			−0.263***
	(6.124)				(−7.210)
SVAR	0.689***				
	(9.405)				
		CONTROLS	Included	Included	Included
Fixed *Effects*	Included	*Fixed Effects*	Included	Included	Included
Pseudo R^2	0.0123	Adj.R^2	0.21	0.23	0.23
N	38,958	*N*	15,524	15,524	15,524
LR χ^2	479.28	*F*-stat	151.989	162.955	169.396

Note(s): *, ** and *** represent significance at $p < 0.10$, < 0.05 and < 0.01, respectively. The *t*-values are reported in parentheses
Source(s): Authors' own work

Table 3. Regression estimates for financial distress, COVID-19 pandemic and tax avoidance: propensity score matching procedure

SVAR, have positive and significant coefficients, while *INVINT* is insignificant. In columns (2) to (4), the regression estimates on the reduced sample, comprising 15,524 observations which consist of 7,762 firm-year observations during the COVID-19 pandemic and 7,762 firm-year observations from the pre-pandemic sample, show that our inferences remain unchanged. We find significant negative coefficients for *ZDUM*, *QRT* and *DEC* in columns (2), (3) and (4), consistent with our main findings. We find that the treatment effect continues to hold for all financial distress proxies. The coefficients for COVID**ZDUM, COVID*QRT* and *COVID*DEC* are negative and significant. These results provide supporting evidence that financial distress has a greater negative impact on tax avoidance in pandemic environments compared to the pre-pandemic period.

Robustness tests

We perform tests to ensure our findings are robust to various specifications. For brevity purpose, the results are untabulated. First, we use alternative measures for *ZDUM* by using *QRT* and *DEC*. We perform this procedure to minimise biases that the earlier results are driven by highly financially distressed firms. By sorting the *ZSCORE* by industries, we control the distress levels between industries. Second, we restrict our observation to a short sample period. We compare one year before the pandemic (the year 2018) and one year in the pandemic (the year 2020). Third, as prior studies found that earnings management is associated with tax avoidance (Sánchez-Ballesta and Yagüe, 2021), we included additional control variable, namely, the absolute values from the modified Jones model by Dechow *et al.*'s (1995) discretionary accruals. We estimate the residuals from 10 industries' classifications by Fama and French (1997) with a minimum of six observations per industry and year.

The procedures result in a reduction of the number of observations to 33,723 firm-year observations. Fourth, following Dyreng *et al.* (2008), we remove loss-making firms from the analysis with the argument that an increase in tax avoidance is likely to be less valuable to loss-making firms with no current tax liability. We re-estimate equation (2) on the profitable sample, which was reduced to 31,302 firm-year observations. Fifth, as our number of observations varies substantially across countries, we employ a series of weighted least squares (WLS) on equation (2), using the inverse of the number of observations in each country as a weight so that each country receives an equal weight in the estimation. The WLS regression ensures that the results are not biased by countries that are more heavily represented. This method has been used in earlier studies (e.g., Jaggi and Low, 2011). From the five robustness tests, the results show the earlier results hold where there is high tax avoidance during the COVID-19 pandemic, but the pandemic enhances the negative relationship between financial distress and tax avoidance.

Finally, we address the issue of the non-linear effects of financial distress on tax avoidance. We included the vectors for *DEC* and *QRT* in separate equations and used *DEC* and *QRT* as base variables to test whether the relationship between tax avoidance and financial distress is non-linear with a U-shaped curve. If this prediction is true, the coefficient for *QRT4* is positive, while the coefficients for *QRT2* and *QRT3* are negative. A similar prediction was made for *DEC,* where tax avoidance continues to decrease with the financial distress until it reaches the optimal (lowest) level, and the tax avoidance would increase with the increase of *DEC* thereafter. The untabulated results show that the coefficients for all *DECs* and *QRTs* are significantly negative, hence providing no evidence of reversal after reaching the lowest optimal level. In short, we find no evidence to associate that our earlier findings might be distorted by the non-linear U-shaped curve relationship.

Conclusion

This study examines the variations in the impact of financial distress on tax avoidance across firms pre-pandemic and during the COVID-19 pandemic. We find a negative link between financial distress and tax avoidance, supporting the arguments that financially distressed firms have less opportunity to avoid tax, despite the prior arguments that distressed firms engage in greater tax avoidance (Edwards *et al.*, 2016; Richardson *et al.*, 2015b). We put forward a new explanation that the greater regulatory scrutiny and lower financial resources lead to a higher incentive to avoid tax, exhibited by the negative link between financial distress and tax avoidance. The COVID-19, which appeared without warning, gives fewer opportunities for financially distressed firms to pursue tax avoidance strategies.

This study has implications for regulators and professionals on the strategies that would be needed to curb tax avoidance strategies and effectively monitor financially distressed firms. First, this study could potentially provide policy input in setting rules and regulations related to tax avoidance, especially during the crisis period. Understanding the underlying determinants of tax avoidance is essential to governments and policymakers as they devise and implement policies to reduce these damaging effects (Ariff and Kamarudin, 2019; Atwood *et al.*, 2012). Second, the findings from this study would provide valuable insights to fund managers and investors in assessing the threats relating to the COVID-19 pandemic on the behaviour of managers in devising tax-optimal strategic decisions. Our findings eliminate over-concern that financially distressed firms would aggressively pursue tax avoidance strategies during the pandemic.

This study has limitations, commonly associated with empirical studies using data across countries. First, the study covers various regimes with variations in tax systems. Second, we are not able to measure whether the impact of COVID-19 and financial distress on tax avoidance is temporary or permanent due to the limited time frame available. Future research can invest in refinement related to methodology, especially expanding to a longer time

horizon and applying in-depth analysis of tax avoidance strategies. Future work can focus on the sale of redeployable assets in financially distressed firms as part of tax avoidance strategies to conserve cash. Future research can also evaluate how different stages of financial distress affect tax avoidance strategies.

Notes

1. For financial statements that ended on 31 December 2019, the accounting and auditing processes were conducted during the COVID-19 period. The earlier financial statement might fall under the same situation but subject to date and country, as this pandemic started in China in November 2019.
2. Compared to other methods of controlling for endogeneity, the benefit of propensity score matching is that it does not rely on a clear source of identification of exogenous variables (Roberts and Whited, 2013).
3. We compare the means between variables to describe the sample characteristics before and after the propensity score matching. In the untabulated results, we find the propensity score matching procedure has eliminated dissimilar matched pairs. After performing the propensity score matching procedures, none of the variables shows any significant mean difference between the matched pairs.

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