Detecting tax avoidance: Do existing measures consistent with the tax authority's assessment?

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BREAKING | 3,307 views | Jul 15, 2020, 11:22am EDT

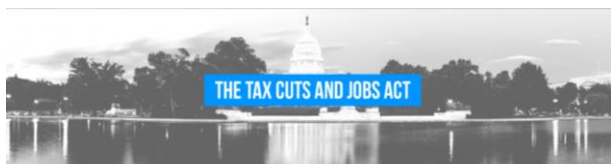# Apple Wins €13 Billion Tax Avoidance Case Against EU Antitrust Regulator

Siladitya Ray Forbes Staff

Business

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TOPLINE Apple won a major legal battle against the European Union as the region's second-highest court ruled in favor of the company, dismissing a €13 billion ($14.8 billion) tax bill issued by the bloc's antitrust regulator.

Tax Policy Reforms 2020
OECD AND SELECTED PARTNER ECONOMIES

JUST TAXES BLOG

Tax Avoidance: Nike "Just Did It" Again, Moving $1.5 Billion Offshore Last Year

July 21, 2017

Matthew Gardner
Senior Fellow

The Nike Corporation's annual financial disclosure of income tax payments is always notable for two recurring trends: the Oregon-based company's steady shifting of profits into offshore tax havens, and Nike's apparent effort to conceal how it's achieving this tax avoidance. This year's report, released earlier this week, is no exception.

Nike now holds $12.2 billion of its profits offshore as "permanently reinvested earnings," up from $10.7 billion last year. Designating its profits this way allows the company to avoid paying even a dime of U.S. income taxes on these profits until they are repatriated to the U.S.

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TAX HAVENS

DON'T DO IT.

THE TAX CUTS AND JOBS ACT

Everything You Need To Know About The Tax Cuts And Jobs Act

Google, Amazon, Starbucks: The rise of 'tax shaming'

By Vanessa Barford & Gerry Holt
BBC News Magazine

21 May 2013   Share

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Mauritius Leaks

Multinational companies use the tiny tax haven Mauritius to avoid paying taxes to countries in Africa, Asia, the Middle

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Action Plan on Base Erosion and Profit Shifting

Philip Green PAY YOUR TAXES
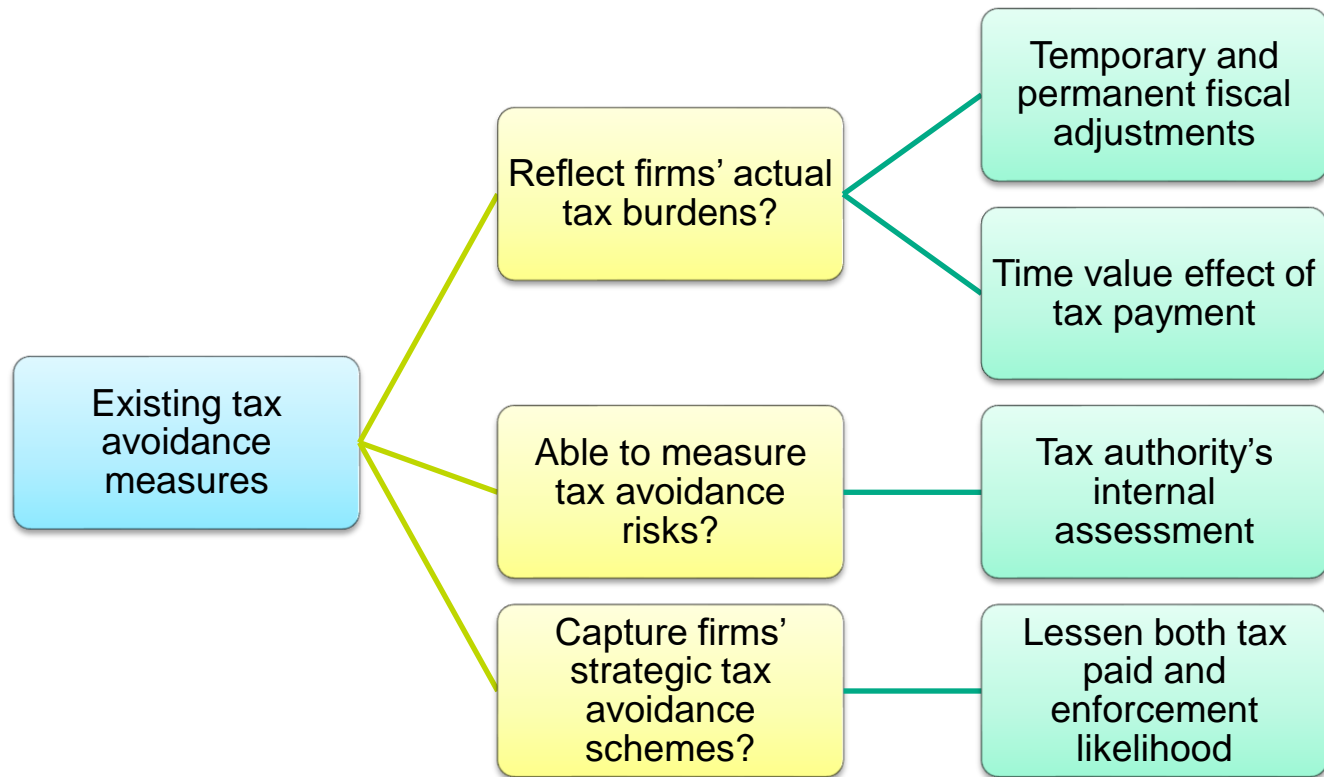
amazon.co.uk

tax dodger

Global firms such as Starbucks, Google and Amazon have come under fire for avoiding paying tax on their British sales. There seems to be a growing culture of naming and shaming

In today's Magazine

'Could I have stopped my

THE RESEARCH IDEA

BACKGROUND AND MOTIVATIONS

- The sole focus of voluminous tax studies in explaining determinants and consequences of corporate tax avoidance yet overlooked the relative ability of their financial statement based-tax measures in delineating tax avoidance risks and actual income tax burdens (Plesko, 1999; Blouin, 2014);

- Extending existing literature which seeks to validate the reliability of alternative tax avoidance measures using tax return data and resolving mixed evidence around their reliability (e.g., Zimmerman, 1983; Plesko, 1999; Plesko, 2003; Lisowsky, 2010; Lisowsky et al., 2013);

- The availability of a large sample of Indonesian firms' confidential tax return data and tax authority's audit selection index which provides a unique venue for rigorous examination on existing tax avoidance measures in a developing country setting (UNCTAD, 2015);

- The escalating concerns of tax administrators and policymakers in inferring the nature of corporate tax compliance especially after Covid-19 pandemic.

RESEARCH QUESTIONS AND CONSTRUCTS

Tax avoidance measures:
- Effective tax rates
- Book-tax differences
- Abnormal book-tax gap
- Tax arbitrage
- Tax shelter
- DTAX
- Tax subsidy on equity
- Conform tax
- Delta

Tax authority's assessment:
- Audit case selection index

- Actual income tax burdens:
  - Effective fiscal rate
  - Under-over rate

HYPOTHESES

H-1: Existing tax avoidance measures have partial abilities in explaining variations of actual income tax burdens

- Some tax avoidance measures are, theoretically, proxies of income tax burdens (i.e., Effective tax rates, Conform tax).

H-2: Existing tax avoidance measures yield different corporate tax avoidance risks' ranking compared with the tax authority's audit case selection index

- Tax authority's assessment capture more revealed tax avoidance schemes compared to the existing tax avoidance measures.

H-3: The tax authority's audit case selection index are inversely associated with the existing tax avoidance measures

- The existing measures are capable of revealing firms' strategic tax avoidance schemes in lowering both tax paid and the probability of detections.

ESTIMATION METHODS

- Wilcoxon signed-rank tests (*Hypothesis 2*)
- Univariate and multivariate OLS and fixed effect-panel data regressions ($i = firms\ 1 - 4,422\ and\ t = 2010 - 2017$, *Hypothesis 1 & 3*)

$$TAX_{it} = \alpha + \beta TAM_{it} + \Sigma \delta_k CONTROLS_{it} + \Sigma \theta_l INDUSTRY_{lt} + \Sigma \gamma_m YEAR_{mt} + \varepsilon_{it}\ (1)$$

$$Audit_{it} = \alpha + \beta TAM_{it} + \Sigma \delta_k CONTROLS_{it} + \Sigma \theta_l INDUSTRY_{lt} + \Sigma \gamma_m YEAR_{mt} + \varepsilon_{it}\ (3)$$

$$Audit_{it} = \alpha + \beta_{1-20} TAM_{it} + \Sigma \delta_k CONTROLS_{it} + \Sigma \theta_l INDUSTRY_{lt} + \Sigma \gamma_m YEAR_{mt} + \varepsilon_{it}\ (4)$$

DEPENDENT VARIABLE: ACTUAL INCOME TAX BURDENS

Table 3 Corporate income tax calculation in Indonesia

Items	Descriptions	Value (IDR/US$)
1	Domestic commercial net income (h)	XXXX
	a. Gross revenues	
	b. Cost of goods sold	
	c. Other operating expenses	
	d. Net income from main business (a-b-c-d)	
	e. Other income	
	f. Other expenses	
	g. Net other income (e-f)	
	h. Total commercial net income (d+g)	
2	Foreign commercial net income	XXXX
3	Total commercial net income (1+2)	XXXX
4	Non-taxable income and income subject to final income tax	(XXXX)
5	Positive fiscal adjustments:	XXXX
	a. expenses charged for the personal benefit of shareholders, partners, or members.	
	b. excessive compensation paid to shareholders or other associated parties for service rendered.	
	c. formation or accumulation of accounting allowances.	
	d. remuneration related to employment in the form of a benefit in kind.	
	e. gifts, aid, and donations.	
	f. income taxes.	
	g. administration penalties.	
	h. commercial depreciation over fiscal depreciation.	
	i. commercial amortisation over fiscal amortisation.	
	j. deferred expenses.	
	k. other positive fiscal adjustments.	
6	Negative fiscal adjustments:	(XXXX)
	a. commercial depreciation under fiscal depreciation.	
	b. commercial amortisation under fiscal amortisation.	
	c. deferred income.	
	d. other negative fiscal adjustments.	
7	Investment allowance for capital-intensive pioneering industries	(XXXX)
8	Fiscal net income (3-4+5-6-7)	XXXX
9	Fiscal loss carried forward	(XXXX)
10	Taxable income (8-9)	XXXX
11	Income tax payable (taxable income x applicable statutory corporate income tax rate)	XXXX
12	Income tax borne by the government (i.e., foreign aid projects)	(XXXX)
13	Domestic tax credits (i.e., domestic withholding income taxes)	(XXXX)
14	Foreign tax credits (i.e., individual country limitation is applied)	(XXXX)
15	Monthly instalment income taxes	(XXXX)
16	Income tax under/over payment (11-12-13-14-15)	XXXX

$$Effective\ fiscal\ rate = \frac{Income\ tax\ payable\ (11)}{Fiscal\ net\ income\ (8)}$$

$$Under-over\ rate = \frac{Income\ tax\ under/over\ payment\ (16)}{Fiscal\ net\ income\ (8)}$$

DEPENDENT VARIABLE: AUDIT CASE SELECTION INDEX (DGT, 2018)

$Audit$

$= 0.05 * profit + 0.15 * int.shift + 0.1 * dom.shift + 0.1 * loss.shift + 0.1 * thin.cap$

$+ 0.15 * trans.price + 0.10 * speci.tp + 0.10 * routine.tp + 0.15 * loss$

- **5% Profitability**: high risk (1) if a firm's net or gross profit margin ratio is more than 10 per cent below its industry's average or 0 otherwise.
- **15% International profit shifting**: high risk (1) if a firm reports related-party transactions with entities located in tax haven or country with a lower statutory income tax rate compared to Indonesia or 0 otherwise.
- **10% Domestic profit shifting**: high risk (1) if more than 50 per cent of a firm's total domestic revenue comes from related-party transactions or 0 otherwise.
- **10% Fiscal loss shifting**: high risk (1) if a firm reports related-party transactions with domestic entities that have fiscal loss compensation or 0 otherwise.
- **10% Thin capitalisation**: high risk (1) if a firm's debt to equity ratio is greater than 4 or 0 otherwise.
- **15% Magnitude of related-party transactions**: high risk (1) if a firm's total related-party transaction is greater than 30 per cent of its total revenues or 0 otherwise.
- **10% Specific related-party transactions**: high risk (1) if a firm reports specific related-party transaction(s) (e.g., intra-group services, royalties, cost contribution arrangement) or 0 otherwise.
- **10% Non-routine related party transactions**: high risk (1) if a firm reports non-routine related-party transaction(s) (e.g., transfer of fixed assets, transfer of intangible properties, transfer of shares, mergers and acquisitions) or 0 otherwise.
- **15% Sustained fiscal loss**: high risk (1) if a firm reports fiscal loss for three years or more within five-year periods or 0 otherwise.

<=20% Low Risk
21-50% Medium Risk
>50% High Risk

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INDEPENDENT VARIABLE: EXISTING TAX AVOIDANCE MEASURES

Table 1 Alternative measures of corporate tax avoidance

Measure	Description	Reference(s)	Inclusion in the analysis*
Cash ETR	$\dfrac{Worldwide\ cash\ income\ tax\ paid}{Worldwide\ total\ pretax\ accounting\ income}$	Gupta and Newberry (1997); Dyreng et al. (2008); Dyreng et al. (2010); Chen (2010); Hanlon and Heitzman (2010); McGuire et al. (2012); Badertscher et al. (2013); Kubick et al. (2015); Higgins et al. (2015); Huang et al. (2016); Dyreng et al. (2017); Gallemore and Labro (2015).	Yes
Cash ETR3	$\dfrac{\sum_{i=1}^{3} Worldwide\ cash\ income\ tax\ paid}{\sum_{i=1}^{3} Worldwide\ total\ pretax\ accounting\ income}$	Hoopes et al. (2012); Blouin (2014); Brown and Drake (2014).	Yes
Cash ETR5	$\dfrac{\sum_{i=1}^{5} Worldwide\ cash\ income\ tax\ paid}{\sum_{i=1}^{5} Worldwide\ total\ pretax\ accounting\ income}$	Dyreng et al. (2008); Rego and Wilson (2012); Huang et al. (2016); Kubick et al. (2015); Gallemore and Labro (2015).	Yes
Cash ETR10 (Long-run ETR)	$\dfrac{\sum_{i=1}^{10} Worldwide\ cash\ income\ tax\ paid}{\sum_{i=1}^{10} Worldwide\ total\ pretax\ accounting\ income}$	Dyreng et al. (2008); Hanlon and Heitzman (2010).	Excluded from the analysis because of insufficient data to construct the variable.
Lagged cash ETR	$\dfrac{Worldwide\ cash\ income\ tax\ paid_{t-1}}{Worldwide\ total\ pretax\ accounting\ income_{t-1}}$	Lisowsky (2010); Lisowsky (2013).	Yes
Current ETR	$\dfrac{Worldwide\ current\ income\ tax\ expense}{Worldwide\ total\ pretax\ accounting\ income}$	Gupta and Newberry (1997); Hanlon and Heitzman (2010); Huang et al. (2016).	Excluded from the analysis because the measure provides similar inference with Cash ETR.
GAAP ETR	$\dfrac{Worldwide\ total\ income\ tax\ expense}{Worldwide\ total\ pretax\ accounting\ income}$	Dyreng et al. (2008); Dyreng et al. (2010); Hanlon and Heitzman (2010); Hoopes et al. (2012); McGuire et al. (2012); Badertscher et al. (2013); Kubick et al. (2015); Higgins et al. (2015); Dyreng et al. (2017).	Yes

Tax avoidance measures (Table 1):
- 33 measures are identified from reviewing prior studies;
- 13 measures are excluded from the analysis due to duplication and data unavailability;
- 20 individual measure is assigned as the independent variable in the regression analysis.

DATA AND SAMPLE SELECTIONS

Table 5 Sample composition

Sample selection criteria	Firm-years (2010-2017)
Panel A: Sample selection summary	
All firms administered at Large Taxpayers Office One, Large Taxpayers Office Two, and Jakarta Special Regional Tax Office	48,564
Less:	
Loss-making firms (Cash ETR<0)	2,608
Firms with excessive income tax payments (Cash ETR>1)	1,199
Small and medium firms	8,845
Coal and mineral mining firms which sign their contract of works before 2010	145
Oil and gas firms which sign their production sharing contracts before 2010	757
Geothermal firms	174
Firms that subject to final income tax (e.g. construction services, real estates, shipping, financial brokerages, travel agents)	7,541
Financial services firms	714
Firms which apply incorrect statutory income tax rates	141
Final sample	26,440

Industry description*	Frequency (%)	Number of firms	Firm-years (2010-2017)
Panel B: Industry classification			
Agriculture	2.35	96	622
Automotive manufacturing	2.92	110	773
Basic chemicals manufacturing	6.54	248	1,728
Clothing and apparels	2.96	139	782
Electronic and optical parts manufacturing	2.59	109	686
Foods manufacturing	5.47	208	1,447
Management services	3.75	176	992
Metal products manufacturing	2.60	104	687
Non-automotive wholesale trading	13.70	599	3,622
Oil and gas	11.21	610	2,965
Oil and gas services	3.26	171	861
Operating leases	2.03	99	537
Rubber and plastic products manufacturing	4.07	166	1,077
Textile manufacturing	2.97	123	784
Warehouse and transportation services	2.30	109	608
Other**	31.28	1,355	8,269
Total	100.00	4,422	26,440

* according to standard industry classification developed by the Indonesia's Central Bureau of Statistics (2015).

** Other industries are manufacturing, mining, trading, and services with less than two percent frequency.

DESCRIPTIVE STATISTICS

Table 6 Descriptive statistics

Variable	N	Mean	Standard deviation	Min.	p.25	Median	p.75	Max.
Effect. fiscal rate	22,338	0.1589	0.1152	0.0000	0.0000	0.2499	0.2500	0.2547
Under-over rate	21,616	0.0097	0.1639	-0.9994	0.0000	0.0002	0.0483	0.9994
Audit select index	26,440	0.4259	0.1530	0.0000	0.3500	0.4500	0.5500	0.8500
Size	16,928	25.4294	2.3484	10.5372	24.2053	25.5276	26.9609	32.7391
Return on assets	15,335	0.0712	0.1783	-0.9997	0.0058	0.0584	0.1466	0.9990
Leverage	16,333	0.1224	0.1928	0.0000	0.0000	0.0341	0.1539	1.0000
Capital intensity	16,824	0.2544	0.2322	0.0000	0.0508	0.2001	0.3989	1.0000
Inventory intensity	16,919	0.1611	0.1702	0.0000	0.0087	0.1180	0.2541	1.0000
Foreign operate	16,924	0.0001	0.0018	0.0000	0.0000	0.0000	0.0000	0.0868
Fiscal loss	26,440	0.0752	0.2638	0.0000	0.0000	0.0000	0.0000	1.0000
Delta loss	15,899	-0.0004	0.0423	-0.9782	0.0000	0.0000	0.0000	0.9796
Cash ETR	26,440	0.1674	0.1840	0.0000	0.0000	0.1665	0.2761	1.0000
Lagged cash ETR	23,252	0.1698	0.1784	0.0000	0.0000	0.1878	0.2794	1.0000
Cash ETR3	16,764	0.2070	0.1741	0.0000	0.0000	0.2447	0.2950	0.9957
Cash ETR5	10,227	0.2303	0.1737	0.0000	0.0781	0.2532	0.3057	0.9979
GAAP ETR	15,792	0.1689	0.1743	0.0000	0.0000	0.1912	0.2678	1.0000
Cash flow ETR	9,799	0.1672	0.2314	0.0000	0.0000	0.0389	0.2797	0.9987
EBIT ETR	10,766	0.1153	0.1259	0.0000	0.0000	0.0931	0.1846	0.9976
Deferred ETR	11,478	0.2070	0.1621	0.0000	0.0713	0.2439	0.2659	0.9963
BTD	15,630	-0.0280	0.1246	-1.0000	-0.0414	-0.0090	0.0053	0.9622
Total BTD	15,297	-0.0520	0.1364	-1.0000	-0.0654	-0.0124	0.0000	0.9622
Temporary BTD	15,405	-0.0219	0.0952	-0.9972	-0.0207	-0.0000	-0.0000	0.8717
BTG	15,310	-0.0304	0.1473	-1.0000	-0.0457	-0.0033	0.0062	0.9630
SPREAD	15,621	-0.0549	0.1289	-1.0000	-0.0859	-0.0354	-0.0039	0.9603
Tax arbitrage	346	-0.1229	0.0706	-0.2500	-0.1500	-0.1499	-0.0980	0.2511
TSE	16,561	-0.0035	0.1158	-0.9921	-0.0152	-0.0018	0.0077	0.9761
Tax shelter	14,620	14.0398	1.8732	0.3122	13.0914	14.1081	15.2039	24.5307
Abnormal BTG	7,695	0.0000	0.0618	-0.8289	-0.0173	0.0000	0.0120	0.9395
DTAX	11,608	-0.0074	0.1007	-0.9792	-0.0303	-0.0009	0.0184	1.0489
Delta	16,775	0.0098	0.0613	-0.8492	-0.0014	0.0020	0.0096	0.9685
Conform tax	13,528	-0.0000	0.0351	-0.6173	-0.0167	-0.0035	0.0095	0.6347

RESULTS: HYPOTHESIS-1

Existing tax avoidance measures have partial abilities in explaining variations of actual income tax burdens

Control variables:
- Size
- Return on assets
- Leverage
- Foreign operation
- Capital intensity
- Inventory intensity
- Fiscal loss dummy
- Changes in fiscal loss
- Year fixed effect (OLS)
- Industry fixed effect (OLS)
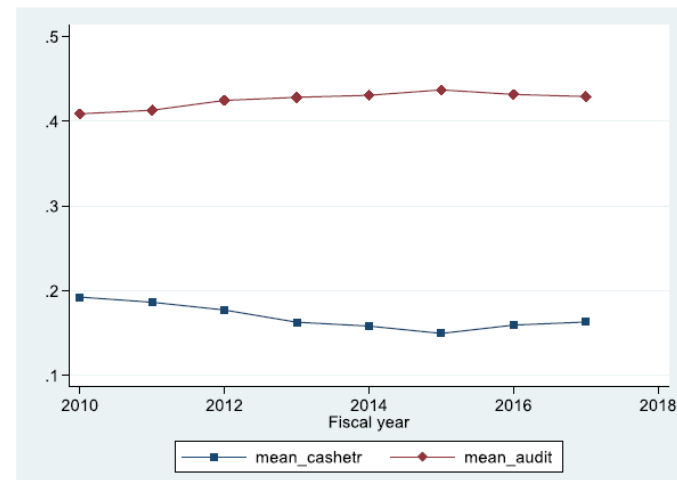
Table 8 Comparative ability of the existing tax avoidance measures in explaining actual income tax burdens

Tax measures (1)	Predicted sign (2)	Ordinary least squares regressions		Fixed effects-panel data regressions	
		Univariate (3)	Multivariate (4)	Univariate (5)	Multivariate (6)
Panel A Tax liability measure: Effective fiscal rate (income tax paid/fiscal net income)					
Cash ETR	+	0.4829	0.3464	0.3679	0.3119
		(72.73)***	(52.62)***	(130.70)***	(94.38)***
		N=22,338	N=13,958	N=22,338 (3,861)	N=13,958 (2,732)
		R^2=59.75	R^2=73.03	R^2=59.75	R^2=71.28
Cash ETR3	+	0.4026	0.2418	0.1451	0.1074
		(44.09)***	(27.90)***	(27.91)***	(18.64)***
		N=15,494	N=10,849	N=15,494 (3,480)	N=10,849 (2,540)
		R^2=39.22	R^2=58.33	R^2=39.22	R^2=51.65
Cash ETR5	+	0.2888	0.1466	-0.0463	-0.0452
		(23.89)***	(14.51)***	(-5.31)***	(-4.79)***
		N=9,421	N=6,952	N=9,421 (2,857)	N=6,952 (2,118)
		R^2=20.54	R^2=48.90	R^2=20.54	R^2=21.76
Lagged cash ETR	+	0.4016	0.2288	0.1549	0.0929
		(56.64)***	(32.21)***	(37.05)***	(19.26)***
		N=19,891	N=13,285	N=19,891 (3,734)	N=13,285 (2,690)
		R^2=38.85	R^2=56.91	R^2=38.85	R^2=50.98
GAAP ETR	+	0.2462	0.1446	0.1389	0.1249
		(31.35)***	(26.45)***	(32.15)***	(30.55)***
		N=15,221	N=13,061	N=15,221 (2,957)	N=13,061 (2,702)
		R^2=16.13	R^2=51.19	R^2=16.13	R^2=46.99
Cash flow ETR	+	0.3317	0.1807	0.1717	0.1221
		(61.55)***	(36.05)***	(38.30)***	(27.79)***
		N=9,321	N=8,664	N=9,321 (2,620)	N=8,664 (2,531)
		R^2=41.85	R^2=60.35	R^2=41.85	R^2=56.53
EBIT ETR	+	0.5198	0.3351	0.4322	0.3286
		(32.60)***	(27.42)***	(53.93)***	(42.45)***
		N=10,397	N=9,477	N=10,397 (2,470)	N=9,477 (2,316)
		R^2=35.54	R^2=59.65	R^2=35.54	R^2=52.96
Deferred ETR	+	0.2780	0.1738	0.1487	0.1252
		(29.01)***	(26.60)***	(27.59)***	(25.82)***
		N=11,081	N=10,414	N=11,081 (2,679)	N=10,414 (2,568)
		R^2=16.92	R^2=53.15	R^2=16.92	R^2=47.81
Conform tax	+	0.9717	-0.1326	0.5011	-0.0372
		(11.19)***	(-2.82)***	(19.14)***	(-1.28)
		N=12,952	N=12,106	N=12,952 (2,543)	N=12,106 (2,442)
		R^2=9.57	R^2=46.19	R^2=9.57	R^2=41.35

Tax measures	Predicted sign	Ordinary least squares regressions		Fixed effects-panel data regressions	
		Univariate	Multivariate	Univariate	Multivariate
Panel B Tax liability measure: Under-over rate (income tax underpaid or overpaid/fiscal net income)					
Cash ETR	-	-0.1129	-0.1734	-0.1860	-0.2315
		(-14.43)***	(-15.20)***	(-20.54)***	(-20.50)***
		N=21,616	N=13,547	N=21,616 (3,858)	N=13,547 (2,724)
		R^2=1,60	R^2=6.56	R^2=1.60	R^2=4.43
Cash ETR3	-	0.0088	-0.0101	0.1089	0.0959
		(0.98)	(-0.80)	(7.65)***	(5.64)***
		N=15,014	N=10,556	N=15,014 (3,463)	N=10,556 (2,526)
		R^2=0.01	R^2=3.30	R^2=0.01	R^2=1.17
Cash ETR5	-	0.0218	0.0169	0.1009	0.0883
		(2.05)**	(1.19)	(3.98)***	(3.13)***
		N=9,138	N=6,773	N=9,138 (2,838)	N=6,773 (2,108)
		R^2=0.05	R^2=2.56	R^2=0.05	R^2=0.63
Lagged cash ETR	-	-0.0131	-0.0669	0.0440	-0.0349
		(-1.79)*	(-6.44)***	(4.26)***	(-2.73)***
		N=19,254	N=12,912	N=19,254 (3,729)	N=12,912 (2,682)
		R^2=0.02	R^2=15.45	R^2=0.02	R^2=1.80
GAAP ETR	-	-0.0706	-0.0866	-0.0859	-0.1114
		(-8.94)***	(-9.69)***	(-8.59)***	(-10.02)***
		N=14,849	N=12,725	N=14,849 (2,946)	N=12,725 (2,691)
		R^2=0.69	R^2=4.06	R^2=0.69	R^2=2.18
Cash flow ETR	-	-0.0468	-0.0866	-0.0333	-0.0579
		(-7.29)***	(-10.52)***	(-2.97)***	(-4.97)***
		N=8,976	N=8,332	N=8,976 (2,601)	N=8,332 (2,513)
		R^2=0.46	R^2=7.60	R^2=0.46	R^2=5.40
EBIT ETR	-	-0.1092	-0.1854	-0.1122	-0.2046
		(-7.69)***	(-9.77)***	(-5.19)***	(-8.70)***
		N=10,100	N=9,201	N=10,100 (2,445)	N=9,201 (2,295)
		R^2=0.74	R^2=5.96	R^2=0.74	R^2=2.98
Deferred ETR	-	-0.0680	-0.0894	-0.0702	-0.0943
		(-6.44)***	(-7.85)***	(-5.36)***	(-6.97)***
		N=10,751	N=10,098	N=10,751 (2,662)	N=10,098 (2,552)
		R^2=0.47	R^2=4.36	R^2=0.47	R^2=1.73
Conform tax	-	0.1309	0.3117	0.5019	0.6435
		(3.47)***	(5.29)***	(8.35)***	(8.50)***
		N=12,563	N=11,740	N=12,563 (2,534)	N=11,740 (2,434)
		R^2=0.08	R^2=3.73	R^2=0.08	R^2=1.60

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Table 9 Comparative corporate tax avoidance risk's ranking by the existing tax avoidance measures

Tax measures	N	Wilcoxon-signed rank z-score	Effect size
Cash ETR	26,440	-110.932***	0.6822
Cash ETR3	16,764	-76.441***	0.5904
Cash ETR5	10,227	-52.379***	0.5179
Lagged cash ETR	23,252	-103.161***	0.6765
GAAP ETR	15,792	-75.420***	0.6002
Cash flow ETR	9,799	-52.907***	0.5345
EBIT ETR	10,766	-77.102***	0.7431
Deferred ETR	11,478	-56.918***	0.5313
Book-tax differences	15,630	-107.543***	0.8602
Total BTD	15,297	-106.761***	0.8632
Temporary BTD	15,405	-107.222***	0.8639
Book-tax gap	15,130	-105.662***	0.8590
SPREAD	15,621	-107.701***	0.8617
Tax arbitrage	346	-16.120***	0.8666
Tax subsidy on equity	16,561	-110.327***	0.8573
Tax shelter	14,620	104.716***	0.8660
Abnormal BTG	7,695	-85.649***	0.8610
DTAX	11,608	-92.552***	0.8590
Delta	16,775	-111.650***	0.8620
Conform tax	13,522	-100.572***	0.8649

This table reports Wilcoxon sign-rank test outcomes of whether each existing tax avoidance measure yields identical corporate tax avoidance risk's ranking with the tax authority's audit case selection index. Tax avoidance measures' definitions are provided in Table 1. Effect size is calculated by scaling absolute value of z-score with square root of matched observations as suggested by Cohen (1988) also Corder and Foreman (2014). TSE, BTD, Total BTD, Temporary BTD, BTG, SPREAD, and Delta are censored to -1 and 1. Similarly, all ETRs are censored to 0 and 1. The asterisk (*) indicates the statistical significance of the coefficients at 1 per cent (***), 5 per cent (**), and 10 per cent (*) significance level, respectively.

Existing tax avoidance measures yield different corporate tax avoidance risks' ranking compared with the tax authority's audit case selection index

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Table 10 Comparative associations of the existing tax avoidance measures with the tax authority's audit case selection index

Tax avoidance measures (1)	Predicted sign (2)	Ordinary least squares regressions		Fixed effects-panel data regressions	
		Univariate (3)	Multivariate (4)	Univariate (5)	Multivariate (6)
Cash ETR	-	-0.3271	-0.1113	-0.0218	-0.0087
		(-36.64)***	(-12.93)***	(-5.79)***	(-1.60)
		N=26,440	N=14,558	N=26,440 (4,422)	N=14,558 (2,816)
		R^2=15.49	R^2=27.34	R^2=15.49	R^2=3.86
Cash ETR3	-	-0.2886	-0.1206	-0.0001	0.0013
		(-25.20)***	(-10.97)***	(-0.35)	(0.16)
		N=16,764	N=11,219	N=18,672 (3,871)	N=11,219 (2,600)
		R^2=11.11	R^2=25.66	R^2=0.03	R^2=9.06
Cash ETR5	-	-0.2433	-0.0924	0.0001	0.0192
		(-17.31)***	(-6.80)***	(0.67)	(1.46)
		N=10,227	N=7,227	N=12,028 (3,352)	N=7,227 (2,177)
		R^2=8.01	R^2=23.68	R^2=0.00	R^2=11.55
Lagged cash ETR	-	-0.3422	-0.1208	-0.005	-0.0016
		(-35.21)***	(-12.74)***	(-1.20)	(-0.25)
		N=23,252	N=13,871	N=23,252 (4,305)	N=13,871 (2,782)
		R^2=15.69	R^2=27.39	R^2=15.69	R^2=3.48
GAAP ETR	-	-0.1860	-0.0706	-0.0149	-0.0069
		(-18.95)***	(-8.22)***	(-2.94)***	(-1.24)
		N=15,792	N=13,415	N=15,792 (3,027)	N=13,415 (2,747)
		R^2=5.46	R^2=25.35	R^2=5.46	R^2=3.35
Cash flow ETR	-	-0.2368	-0.1131	-0.0237	-0.0122
		(-28.75)***	(-14.33)***	(-4.44)***	(-2.15)**
		N=9,799	N=9,076	N=9,799 (2,683)	N=9,076 (2,589)
		R^2=14.61	R^2=30.09	R^2=14.61	R^2=5.58
EBIT ETR	-	-0.2942	-0.1076	-0.0334	-0.0118
		(-16.99)***	(-7.31)***	(-3.23)***	(-1.05)
		N=10,776	N=9,747	N=10,766 (2,606)	N=9,747 (2,412)
		R^2=7.03	R^2=23.70	R^2=7.03	R^2=1.39
Deferred ETR	-	-0.1618	-0.0772	-0.0085	-0.0075
		(-15.20)***	(-8.39)***	(-1.38)	(-1.17)
		N=11,478	N=10,708	N=11,478 (2,766)	N=10,708 (2,625)
		R^2=3.53	R^2=25.45	R^2=3.53	R^2=4.51
BTD	-	-0.1899	0.0634	-0.0261	0.0129
		(-15.99)***	(3.63)***	(-3.68)***	(1.10)
		N=15,630	N=14,510	N=15,630 (2,937)	N=14,510 (2,807)
		R^2=2.82	R^2=25.77	R^2=2.82	R^2=3.51

The tax authority's audit case selection index are inversely associated with the existing tax avoidance measures

Control variables:
- Size
- Return on assets
- Leverage
- Foreign operation
- Capital intensity
- Inventory intensity
- Fiscal loss dummy
- Changes in fiscal loss
- Year fixed effect (OLS)
- Industry fixed effect (OLS)

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RESULTS: HYPOTHESIS-3

Tax measures	Predicted sign	Ordinary least squares regressions		Fixed effects-panel data regressions	
		Univariate	Multivariate	Univariate	Multivariate
Temporary BTD	-	0.1031	0.0193	0.0015	-0.0053
		(6.76)***	(1.33)	(0.18)	(-0.61)
		N=15,405	N=14,509	N=15,405 (2,915)	N=14,509 (2,811)
		R^2=0.50	R^2=25.68	R^2=0.50	R^2=3.50
BTG	-	-0.0739	-0.0039	-0.0107	-0.0044
		(-6.22)***	(-0.37)	(-1.90)*	(-0.72)
		N=15,310	N=14,488	N=15,310 (2,908)	N=14,488 (2,807)
		R^2=0.61	R^2=25.67	R^2=0.61	R^2=3.21
SPREAD	-	-0.0877	0.0504	-0.0128	0.0076
		(-7.50)***	(3.51)***	(-1.85)*	(0.79)
		N=15,621	N=14,503	N=15,621 (2,936)	N=14,503 (2,807)
		R^2=0.64	R^2=25.77	R^2=0.64	R^2=3.83
Tax arbitrage	-	0.0193	-0.1737	0.0423	0.1161
		(0.16)	(-0.79)	(0.45)	(0.66)
		N=346	N=184	N=346 (152)	N=184 (86)
		R^2=0.01	R^2=30.82	R^2=0.01	R^2=0.02
Tax subsidy on equity	-	-0.0023	-0.0123	**-0.0251**	**-0.0225**
		(0.19)	(-1.04)	**(-4.13)***	**(-3.18)***
		N=16,561	N=14,325	N=16,561 (3,016)	N=14,325 (2,802)
		R^2=0.00	R^2=25.20	R^2=0.00	R^2=0.70
Tax shelter	-	-0.0276	0.0095	-0.0058	0.0019
		(-28.15)***	(3.63)***	(-7.33)***	(1.08)
		N=14,620	N=14,507	N=14,620 (2,815)	N=14,507 (2,807)
		R^2=14.01	R^2=25.76	R^2=14.01	R^2=3.54
Abnormal BTG	-	0.0469	0.1207	0.0026	0.0131
		(1.84)*	(4.83)***	(0.14)	(0.64)
		N=9,895	N=9,740	N=9,895 (2,283)	N=9,740 (2,257)
		R^2=0.06	R^2=17.48	R^2=0.06	R^2=1.56
DTAX	-	-0.0981	0.0065	-0.0156	-0.0021
		(-7.60)***	(0.51)	(-1.91)*	(-0.23)
		N=11,608	N=11,040	N=11,608 (2,619)	N=11,040 (2,532)
		R^2=0.51	R^2=25.56	R^2=0.51	R^2=8.23
Delta	-	0.3158	-0.2848	0.0691	-0.0304
		(12.84)***	(-4.55)***	(4.61)***	(-0.72)
		N=16,755	N=14,547	N=16,755 (3,022)	N=14,547 (2,815)
		R^2=1.94	R^2=25.83	R^2=1.94	R^2=1.63
Conform tax	-	-0.7401	-0.0181	-0.1187	0.0826
		(-7.67)***	(-0.31)	(-4.01)***	(2.33)**
		N=13,522	N=12,600	N=13,528 (2,622)	N=12,600 (2,516)
		R^2=3.41	R^2=24.57	R^2=3.41	R^2=6.58

The tax authority's audit case selection index are inversely associated with the existing tax avoidance measures

Control variables:
- Size
- Return on assets
- Leverage
- Foreign operation
- Capital intensity
- Inventory intensity
- Fiscal loss dummy
- Changes in fiscal loss
- Year fixed effect (OLS)
- Industry fixed effect (OLS)

RESULTS: HYPOTHESIS-3

Table 11 Multivariate regression analysis on associations of the existing tax avoidance measures with the tax authority's audit case selection index

Variable	Predicted sign	Ordinary least squares		Fixed effect-panel data	
		Coefficient	t-statistic	Coefficient	t-statistic
Cash ETR	-	0.0826	2.47**		
Cash ETR3	-	-0.0565	-1.13		
Cash ETR5	-	0.1093	2.36**		
Lagged cash ETR	-	-0.0454	-1.50		
GAAP ETR	-	0.0353	1.03		
Cash flow ETR	-	-0.0656	-3.99***	-0.0054	-0.88
EBIT ETR	-	0.0028	0.10		
Deferred ETR	-	-0.0495	-1.42		
BTD	-	0.2012	2.41**		
SPREAD_residual	-	-0.5171	-1.55		
Tax subsidy on equity	-			-0.0260	-3.08***
Tax shelter_residual	-	-0.0099	-0.60		
Abnormal BTG_residual	-	4.3743	1.18		
Delta_residual	-	-0.3644	-0.98		
Conform tax	-			0.0736	1.54
Size	±	-0.0131	-5.86***	0.0037	1.51
Foreign	+	1.4545	1.51	0.8858	0.80
Capital intensity	+	-0.0213	-1.07	0.0014	0.13
Inventory intensity	-	-0.0016	-0.06	-0.0211	-1.41
Return on assets	+	0.0143	0.27	-0.0530	-5.84***
Fiscal loss	+	-0.0161	-0.58	-0.0097	-2.35**
Changes in loss	+	-0.0565	-0.41	0.0551	2.37**
Constant		0.6254	9.92***	0.2702	4.25***
Industry fixed effect		Yes		No	
Year fixed effect		Yes		No	
N (groups)		1,912		8,038 (2,336)	
R^2		17.07		1.64	

The tax authority's audit case selection index are inversely associated with the existing tax avoidance measures

SENSITIVITY ANALYSIS

Sensitivities

The existing tax avoidance measures are capable of controlling variations of Effective fiscal rate and Under-over rate.

Cash ETR is the most informative proxy in explaining both Effective fiscal rate and Under-over rate.

Applying lead-lag specifications reveal a significant relationship between the subsequent year's Audit case selection index with the individual tax avoidance measure. Additionally, Cash ETR5 and Cash flow ETR are the most informative proxies in explaining between firm's variations of subsequent year's tax authority's assessment.

Employing quantile regression shows Cash flow ETR is the most informative proxy in reflecting tax authority's enforcement for firms with a low level of tax avoidance (i.e., the left tail of the audit case selection's distribution) while Cash ETR5 and EBIT ETR are more meaningful for those in the extreme level of tax authority's assessments.

CONCLUSIONS

- This study finds evidence of the existing tax avoidance measures' reliability in describing cross-sectional variations of firms' actual income tax burdens. However, these measures are unable to yield similar tax avoidance's risk ranking with the tax authority's internal assessment indicating different tax avoidance constructs are being predicted by these proxies contrary to the tax authority's focus;

- Relative to other measures, **Cash flow ETR** presents the most concordance with the tax authority's assessment in detecting corporate tax avoidance. Additionally, **Tax subsidy on equity** is able to capture firm's strategic tax minimisation methods that, simultaneously, lessen both income tax paid and the likelihood of tax authority's enforcement over time;

- Supplementing the internal risk assessments with the existing public measures may provide added value to tax authorities when firms, strategically, 'game' the tax and financial reporting processes.

COMMENT & QUESTIONS..??

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