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Country-by-country reporting and corporate tax avoidance: evidence from China

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ABSTRACT

In 2016, China implemented the country-by-country reporting (CbCR) rule established by the Organization for Economic Cooperation and Development. This study investigates whether and how CbCR affects corporate tax outcomes. Employing difference-in-difference models to analyse data from Chinese listed companies during 2011–2019, we document an about 1.7 percentage points increase in effective tax rates among affected firms. We further find that CbCR discourages tax avoidance caused by related party transactions, and its effects vary among different types of related party transactions. Additional analysis shows that CbCR has a greater influence on firms with lower information transparency and higher tax risk. Finally, CbCR changes the profit distribution of multinational companies, leading to a reduction in the proportion of headquarters profits. The results are robust to various measurements of tax avoidance, placebo test, and parallel trends test. To the best of our knowledge, this study is one of the first to examine the association between CbCR and corporate tax avoidance in China. Overall, the findings enrich the theoretical mechanism of CbCR and provide implications for China's participation in global tax governance.

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1. Introduction

In the process of globalisation, multinational corporations (MNCs) may take advantage of the cross-country differences in tax policies and tax loopholes to reduce their tax burden. The base erosion and profit shifting (BEPS) resulting from such behaviour have become an international topic of concern. To curb aggressive tax planning by improving tax transparency, China implemented country-by-country reporting (CbCR) in 2016. However, since CbCR only discloses the income and tax payments of MNCs in each tax jurisdiction and does not address specific transfer pricing methods, some scholars are concerned that its anti-avoidance effect may be limited (Evers et al., 2016;

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Hanlon, 2018). Although CbCR is widely implemented worldwide, evidence from developing countries on whether CbCR inhibits tax avoidance is lacking. This paper examines the impact of CbCR on the tax avoidance behaviour of Chinese MNCs.

Tax transparency initiatives can be achieved by mandating the disclosure of tax information to the public (public disclosure) or only to the tax authorities (private disclosure). Even though there are many studies on the impact of public disclosure on corporate taxation (Brown et al., 2019; Dyreng et al., 2016; Joshi et al., 2020), limited research has been done on the influence of private disclosure. CbCR developed by the Organization for Economic Cooperation and Development (OECD) has been gradually implemented since 2016. During the period covered by this study (2016–2019), the content of OECD CbCR remains private and only available to the tax authorities. Therefore, studies on CbCR can provide empirical evidence for the effectiveness of private disclosure.

CbCR can provide tax authorities with new information about the location of economic activities of MNCs, thus reducing information asymmetry and managerial opportunism. Agency theory suggests that the separation of ownership and operation may allow self-interested managers to seek private benefits through tax avoidance (Hanlon & Heitzman, 2010). CbCR contains information that tax authorities cannot obtain from existing tax returns (OECD, 2017), and studies find that private disclosures can enhance tax enforcement when they provide new information to tax authorities (Bozanic et al., 2017; Xu et al., 2011). As a result, the costs of opportunistic behaviour increase, and agency conflicts reduce. Considering the positive correlation between agency conflict and the likelihood of tax avoidance (Chyz & White, 2014), we argue that CbCR can deter tax avoidance by increasing tax enforcement and reducing agency conflict.

Reduced information asymmetry due to CbCR also increases the legal and reputational risks faced by MNCs, thereby discouraging tax avoidance. CbCR contains information that increases the risk of aggressive tax planning practices being detected and adversely assessed by tax authorities (OECD, 2017). As a result, back taxes, fines, late fees, and administrative penalties may increase. What's more, once the information in CbCR is leaked or published, the company will experience unwanted scrutiny and may even suffer from reputation loss (Joshi, 2020). For these reasons, we expect that CbCR can deter MNCs from engaging in tax avoidance activities by increasing the costs of aggressive tax planning.

Based on the above analysis, we start by verifying the overall impact of CbCR on corporate tax avoidance. Since studies show that tax avoidance activities are mainly carried out through related party transactions (Gumpert et al., 2016; Johannesen, 2014), we further examine CbCR's effect on tax-motivated related party transactions. Moreover, previous studies suggest that firms with lower information transparency and higher tax risk have higher levels of tax avoidance (Drake et al., 2019; Kerr, 2019; Stiglingh et al., 2022). The stated purpose of CbCR is to improve transparency and assess tax risk (OECD, 2017), so we also look into how information transparency and tax risk influence the relationship between CbCR and corporate tax avoidance. Finally, we try to explore the effect of CbCR on the distribution of profits and tax bases of MNCs by testing whether CbCR can reduce headquarters bias, a phenomenon described by Dischinger et al. (2014).

This paper has several contributions to the theory and practice of CbCR. First, this article is one of the first to examine the impact of CbCR requirements on Chinese companies using detailed company data. Existing studies focus primarily on MNCs from the European Union (EU). Empirical evidence from developing countries, especially China, is lacking. Since the effectiveness of anti-avoidance policies depends on the characteristics of corporate behaviour and the capacity of tax collection, challenges and lessons learned from CbCR's implementation in developed countries do not apply to developing countries. This paper examines the impact of CbCR on tax avoidance and tax-motivated related party transactions of Chinese MNCs and forms a good complement to the existing literature.

Second, based on the Chinese institutional context, this paper investigates and explains the intermediary channels through which CbCR requirements affect corporate tax avoidance, thus further enriching the theoretical mechanism of CbCR. Unlike Joshi (2020), who finds that the effectiveness of CbCR in Europe is mainly affected by tax enforcement, we find that corporate transparency and tax risk moderate the impact of CbCR on the tax avoidance behaviour of Chinese MNCs.

Third, our study also has some practical contributions. Since the implementation of CbCR, there has been an ongoing debate about whether to publish the contents of CbCR. We find that private CbCR can combat tax avoidance, providing empirical proof of the effectiveness of private CbCR. Using CbCR for BEPS assessment, our research suggests that tax authorities should pay more attention to companies with larger amounts of related party transactions, lower information transparency, and more volatile effective tax rates. Furthermore, we demonstrate that CbCR reduces the profit share and tax share of corporate headquarters, and the government needs to notice the impact of CbCR on the tax contribution from building a headquarters economy.

The structure of this paper is as follows: the second section introduces the CbCR institutional background and research hypotheses, the third section contains sample selection and model construction, the fourth section shows the empirical results, and the last section summarises.

2. Institutional framework and hypothesis development

2.1. Country-by-country reporting

In October 2015, the OECD released BEPS Action 13, establishing the annual CbCR guidelines for MNCs. These guidelines require the ultimate holding companies of large MNCs to send annually CbCR to local tax offices. While the content in CbCR is not publicly available, countries automatically exchange CbC reports with relevant foreign tax authorities under bilateral agreements. As of December 2021, over 90 countries have legislated to mandate a CbCR obligation.

The State Taxation Administration of China issued Public Notice 42/2016 and formally introduced the requirements for CbCR in 2016. The regulation stipulates that MNCs with combined revenue of more than RMB 5.5 billion in the previous accounting period should prepare CbC reports. Starting with the fiscal year beginning after January 1, 2016, CbC reports shall be submitted to the competent tax authority

5 months after the fiscal year has ended. CbC reports consist of a geographic breakdown of the key elements of the consolidated financial statements, and a list of all the subsidiaries, along with their tax jurisdictions and primary business operations.

As the most important and widely implemented measure in the BEPS actions, CbCR is used by tax authorities to assess BEPS-related risks and make determinations on how they allocate tax audit resources. It helps improve tax transparency, promotes international cooperation in tax administration, and has a profound impact on multinational corporations.

2.2. Theory and hypothesis development

Our analysis of CbCR's influence on tax avoidance behaviour is based on information asymmetry theory, principal-agent theory, and economic man assumption. We believe that CbCR can reduce agency conflicts and the net benefits of tax planning by increasing information transparency, thus changing tax avoidance behaviour.

CbCR contains new information on global operations and tax payments of MNCs, mitigating the information asymmetry between MNCs and tax authorities. Before implementing CbCR, the content of tax declarations was limited to activities in specific countries/regions. The differences in tax rules and accounting standards across countries resulted in a fragmented portrayal of a company's operating activities and tax payments worldwide (Joshi, 2020). CbC reports contain key indicators of MNCs' main operational, financial, and tax information in all countries, providing more clues for tax authorities to combat tax avoidance (OECD, 2017). In addition, limited information was shared between tax authorities in different countries before 2016. CbCR allows all participating countries to automatically exchange detailed CbCR information, thereby improving the transparency of global tax information and reducing the risk of tax base erosion caused by information asymmetry (Evers et al., 2016).

More transparency means better monitoring of managerial behaviour. Papers examining corporate tax avoidance from a principal-agent perspective suggest that managers may seek private gain through corporate tax planning. For example, self-interested executives may avoid taxes through complex shareholder structures, hidden related party transactions, and misappropriate company property for personal use (Hanlon & Heitzman, 2010). The valuable information contained in CbCR makes it easier to monitor agents' behaviour and therefore reduces agency conflicts (Bozanic et al., 2017). Previous research shows that firms are less likely to engage in tax avoidance activities when agency costs are low (Chyz & White, 2014). Thus, CbCR enhances the monitoring of agents' behaviour by promoting information transparency, which in turn improves tax compliance.

Higher information transparency also means lower actual or perceived net benefits of tax planning. Economic theory assumes that economic man always seeks to obtain the maximum economic benefits at the minimum costs, so corporate tax avoidance decisions depend on a trade-off between costs and benefits. The new information provided by CbCR has aroused widespread attention from the tax authority and the public. The fact that multinational enterprises shift a huge amount of profit to low-tax countries or tax havens will trigger transfer pricing audits and threaten their

reputation. They may even be boycotted by the public, government, and investors. Therefore, the legal and reputational risks increase and the costs of tax non-compliance may exceed its benefits. Furthermore, discussions continue on whether to publish CbCR, and private disclosure may be leaked to the public (e.g., the Swiss Leaks). Expectations of future public CbCR and concerns about leakage risks may change the tax avoidance behaviour of rational managers (Evers et al., 2014).

To summarise, the incremental information in CbCR is helpful for tax authorities and the public to monitor and combat cross-border tax avoidance, reducing managerial opportunism and making profit shifting less lucrative to MNCs. Based on this, we hypothesise that:

Hypothesis 1. CbCR can deter MNCs from engaging in tax avoidance activities.

One of the main goals for CbCR is to detect MNCs' tax non-compliance, such as shifting income to tax havens. Many studies have shown that tax-motivated profit shifting by MNCs is mainly carried out through complex and risky related party transactions (Gumpert et al., 2016; Johannesen, 2014; Zucman, 2013). Related party transactions are classified into different types, such as the sale of goods, provision and receipt of services, and the provision of funds. Studies show that certain types of related party transactions have a higher chance of being utilised to shift profit (Chen et al., 2011; Marchini et al., 2018).

In CbC reports, MNCs are required to disclose their revenues, profits, and tax payments in all countries. What's more, revenues from each country need to be classified into related party revenues and unrelated party revenues. This makes it possible for the tax authorities to focus on the related party revenues, profits, and tax payments in the low-tax jurisdiction. Based on this, they can determine whether there exists tax-motivated profit shifting and audit high-risk companies (OECD, 2017). Thus, we hypothesise that:

Hypothesis 2. CbCR can deter tax avoidance caused by related party transactions, and its anti-avoidance effects vary across different types of related party transactions.

Information transparency is the access and proper disclosure of all relevant and necessary information, including financial and non-financial information. Studies show that less transparent companies are more likely to avoid taxes (Kerr, 2019; Stiglingh et al., 2022) because the public's lack of knowledge about their overseas operations and economic presence in tax havens makes tax avoidance easier. According to the previous analysis, one of the main channels through which CbCR reduces tax avoidance is to improve information transparency, so that the effectiveness of CbCR decreases in high transparency companies. Therefore, we propose the third hypothesis:

Hypothesis 3. The negative effect of CbCR on tax avoidance is stronger for less transparent companies.

Tax risk refers to the risk of loss due to tax non-compliance. As mentioned earlier, another channel through which CbCR reduces tax avoidance is to increase detection risk. To help tax authorities better understand and use CbCR information, OECD (2017) released the CbCR handbook, which includes nineteen risk indicators, such as entities with significant profits but little substantial activity, changes in a group's structure, and a high proportion of related party revenues. The effective tax risk

assessment may trigger more transfer pricing queries and tax audits on companies that adopted aggressive tax planning strategies before the implementation of the CbCR, so rational managers may change their tax strategy after weighing the costs and benefits. This brings about the following hypothesis:

Hypothesis 4. The negative effect of CbCR on tax avoidance is stronger for companies with higher tax risk in the pre-implementation period.

To strengthen their control over assets, companies prefer to leave an overly large share of profits in their headquarters entities, a phenomenon known as 'headquarters bias' (Dischinger et al., 2014; Riedel, 2018). In order to build a 'headquarters economy' and boost tax revenue, several major Chinese cities have competed to attract MNC headquarters by offering various incentives (Zhao, 2013).

CbC reports are primarily to be filed where the corporate headquarters are located. Through a bilateral agreement, information is also available to countries where the subsidiaries are located. As of December 2021, China has activated bilateral exchange relationships with more than 60 countries. If a Chinese MNC leaves a relatively large share of income in its home country, countries that get a small share of profits may try to use the information in CbCR to obtain a larger share of tax payments. Such an effect could force the MNC to align profit taxation with value creation. Therefore, we develop the last hypothesis:

Hypothesis 5. CbCR leads to a reduction in the headquarters bias among affected firms.

3. Research design

3.1. Data and sample

Our initial sample included all A-share listed companies on Shanghai and Shenzhen stock exchanges from 2011 to 2019. The China Stock Market and Accounting Research Database (CSMAR) contained most of the company information and financial statistics in our research. The statutory tax rates were taken from Wind-Economic Database. Information on foreign subsidiaries was taken from Bureau van Dijk's Orbis Database. We used stock code to match observations from three databases.

As in previous studies (Leung et al., 2019), we use the following criteria to drop firm-year observations: (1) financial institutions; (2) special treatment companies (ST and PT); (3) missing data for key variables; (4) effective tax rate observations are truncated at 1 and 0. Though China formally adopted the CbCR rule in 2016, the threshold for CbCR was published in State Tax Administration's consultation paper in 2015 and MNCs were conscious of the reporting obligations in 2015. Thus, we exclude the year 2015 to account for potential announcement effects. The final sample consists of 13069 observations on 2269 companies, and most variables are winsorised at 1%.

The sample is split into a treatment group and a control group. Companies in the treatment group have CbCR obligations while those in the control group do not. Public Notice 42/2016 stipulates that MNCs with combined revenue of more than RMB 5.5 billion in the previous accounting period need to file CbC reports. A company is allocated to the treatment group, if (1) its combined revenue is above RMB 5.5 billion, (2) it has at least one foreign affiliate. The rest are the control group.

3.2. Model and variable measurement

This paper uses the following difference-in-difference model to test hypothesis 1:

$$\begin{aligned} ETR_{it} = {} & \alpha_0 + \alpha_1 TREAT_i + \alpha_2 POST_t + \alpha_3 TREAT_i \times POST_t \\ & + \alpha X_{it} + \Sigma Ind + \Sigma Year + \varepsilon_{it} \end{aligned} \tag{1}$$

where the effective tax rate (ETR) is the measurement of tax avoidance (Hanlon & Heitzman, 2010; Tang, 2020). Higher ETR indicates lower tax avoidance. ETR is computed as follows:

$$ETR = \text{Tax expense}/\text{pretax income} \tag{2}$$

TREAT equals 1 (0) in 2011–2019 if the company is (not) in the treatment group. And POST takes the value of 1 for 2016–2019 and 0 for 2011–2014. X represents control variables. Based on prior studies (Higgins et al., 2015; Park et al., 2016), we add these control variables: return on asset (Roa), period cost rate (Perf), and the indicator for the high-technology companies (Tech). The definitions of variables are in the Appendix.

We use the following model to test Hypothesis 2.

$$\begin{aligned} ETR_{it=} {} & \beta_0 + \beta_1 TREAT_i + \beta_2 POST_t + \beta_3 DEAL_{it} + \beta_4 TREAT_i \times POST_t \\ & + \beta_5 TREAT_i \times DEAL_{it} + \beta_6 POST_t \times DEAL_{it} + \beta_7 TREAT_i \times POST_t \times DEAL_{it} \\ & + \beta X_{it} + \Sigma Ind + \Sigma Year + \varepsilon_{it} \end{aligned} \tag{3}$$

where DEAL = the amount of related party transactions/the amount of total assets. To test CbCR's influence on different types of related party transactions, we further categorise related party transactions into three types: related party transactions about business operation (DEAL_OB), related party transactions about capital (DEAL_TC), and other related party transactions (DEAL_O). DEAL_OB includes commodity transaction, asset transaction, service, and entrusted operation. DEAL_TC includes fund transaction, guarantee, mortgage, lease, and debt transaction. Other related party transactions, such as equity transaction and licence agreement, belong to DEAL_O.

We test the moderating effect of information transparency and tax risk based on the following model:

$$\begin{aligned} ETR_{it=} {} & \beta_0 + \beta_1 TREAT_i + \beta_2 POST_t + \beta MOD_{it} + \beta_4 TREAT_i \times POST_t + \beta_5 TREAT_i \\ & \times MOD_{it} + \beta_6 POST_t \times MOD_{it} + \beta_7 TREAT_i \times POST_t \times MOD_{it} + \beta X_{it} + \Sigma Ind \\ & + \Sigma Year + \varepsilon_{it} \end{aligned} \tag{4}$$

where MOD represents the moderator, that is information transparency and tax risk.

Following prior studies (Han et al., 2021), we use analyst attention (ANA), analyst research (REPORT), and the quality of information disclosure (INFO) to measure information transparency. ANA represents the number of analysts who track and

analyse the companies in that year, and REPORT measures the number of analysts research about the companies in that year. INFO shows the annual rating of information disclosure quality by the stock exchanges. The higher the ANA, REPORT, and INFO are, the more transparent the company is.

Studies show that fluctuations in effective tax rates over time can reflect the tax risk faced by an enterprise. The higher the fluctuation, the higher the tax risk (Drake et al., 2019; Saragih & Ali, 2021). We use the standard deviation of a company's ETR (2011–2015) as the measurement of tax risk. The dummy variable RISK takes the value of 1 (0) if the company's tax risk is (not) above the median.

The regression model to test headquarter bias can be specified as follows:

$$SHARE_{it} = \alpha_0 + \alpha_1 TREAT_i + \alpha_2 POST_t + \alpha_3 TREAT_i \times POST_t + \alpha X_{it} + \Sigma Ind + \Sigma Year + \varepsilon_{it} \quad (5)$$

where SHARE represents measures of headquarter bias: headquarters profit share (PROFITSHARE) and tax share (TAXSHARE).

4. Empirical approach

4.1. Descriptive statistics

Table 1 shows the descriptive statistics. The mean value of ETR is 18.5%, being consistent with prior studies on Chinese companies (e.g., Chen et al., 2014; Majeed & Yan, 2019). The mean value of TREAT is 18.9%, which means that less than 20% of the listed companies in China need to submit CbC reports. Descriptive statistics for the control variables are similar to those reported by other studies in the same background (e.g., Li et al., 2020; Richardson et al., 2016).

Table 1. Descriptive statistics.

Variables	N	Mean	SD	Q1	Median	Q3
ETR	13069	0.185	0.116	0.121	0.160	0.240
RATE	12979	−0.006	0.111	−0.056	−0.007	0.027
PROFITSHARE	8502	0.586	0.287	0.349	0.620	0.839
TAXSHARE	9885	0.427	0.358	0.043	0.393	0.766
TREAT	13069	0.189	0.391	0	0	0
POST	13069	0.571	0.495	0	1	1
DEAL	13069	0.303	0.328	0.043	0.186	0.448
ANA	12938	1.369	1.172	0	1.386	2.303
REPORT	12938	1.672	1.450	0	1.609	2.890
INFO	7227	3.043	0.610	3	3	3
RISK	11126	0.486	0.500	0	0	1
Roa	13069	0.046	0.048	0.019	0.040	0.070
Perf	13069	0.186	0.138	0.100	0.149	0.222
Tech	13069	0.613	0.487	0	1	1

Note: Definitions of variables are in the Appendix.
Source: Author's formation.

4.2. Empirical results

4.2.1. Country-by-country reporting and tax avoidance

Table 2 shows CbCR's impact on tax avoidance. The coefficient of interest is that of TREAT × POST because it shows the change in tax avoidance behaviour in the treatment group compared to the control group following the implementation of CbCR. Throughout columns (1) to (3), the coefficients of TREAT × POST are positive and highly significant. The ETRs of MNCs with CbCR requirements increase by about 1.7%-2.4% compared to companies out of scope. In other words, companies in the treatment group have reduced their tax avoidance activities compared to companies in the control group, so hypothesis 1 is verified. A possible reason is that CbCR can reduce information asymmetry, lower agency costs, and highlight risks, thereby reducing tax avoidance. The coefficients of control variables are in line with previous studies (e.g., Allen et al., 2016; Majeed & Yan, 2019).

4.2.2. Country-by-country reporting and related party transaction

Table 3 presents CbCR's effect on tax avoidance caused by related party transactions. The coefficient of TREAT × POST × DEAL in Column (1) is positive and significant, suggesting that OECD has achieved the goal of reducing tax avoidance caused by related party transactions (OECD, 2015). Columns (2)–(4) show CbCR's effect on different types of related party transactions. The coefficient of TREAT × POST × DEAL is positive and significant in Column (4), and it is insignificant in Column (2) and Column (3). The results show that CbCR has the most significant effect on DEAL_O, followed by DEAL_TC. However, it has no significant effect on DEAL_OB because the coefficient in Column (2) is insignificant and close to zero. Hypothesis 2 is validated. The possible reason is that tax avoidance techniques have become increasingly sophisticated and insidious. Traditional tax avoidance methods through commodity

Table 2. Country-by-country reporting and tax avoidance.

Variables	(1) ETR	(2) ETR	(3) ETR
TREAT	0.013**	0.010**	0.007
	(2.54)	(2.19)	(1.46)
POST	−0.016***	−0.009**	−0.010***
	(−5.87)	(−2.17)	(−2.62)
TREAT × POST	0.024***	0.019***	0.017***
	(4.65)	(3.81)	(3.45)
Roa			−0.283***
			(−9.55)
Perf			−0.107***
			(−7.77)
Tech			−0.028***
			(−8.51)
Year	No	Yes	Yes
Ind	No	Yes	Yes
_Cons	0.189***	0.074***	0.113***
	(68.62)	(4.31)	(6.93)
N	13069	13069	13069
R^2	0.012	0.126	0.156

Note: T-values are in parentheses.
***$p < 1\%$, **$p < 5\%$.
Source: Author's formation.

Table 3. Country-by-country reporting, related party transactions, and tax avoidance.

Variables	(1) DEAL ETR	(2) DEAL_OB ETR	(3) DEAL_TC ETR	(4) DEAL_O ETR
DEAL	0.013***	0.028	0.019***	−0.001
	(2.83)	(0.93)	(3.26)	(−0.05)
TREAT × DEAL	−0.019**	−0.030*	−0.017	−0.062***
	(−2.36)	(−1.82)	(−1.45)	(−4.14)
TREAT × POST × DEAL	0.020**	−0.004	0.018	0.043**
	(2.37)	(−0.15)	(1.56)	(2.27)
Roa	−0.269***	−0.282***	−0.263***	−0.283***
	(−8.92)	(−9.51)	(−8.70)	(−9.53)
Perf	−0.106***	−0.105***	−0.106***	−0.107***
	(−7.72)	(−7.67)	(−7.75)	(−7.75)
Tech	−0.027***	−0.027***	−0.027***	−0.028***
	(−8.36)	(−8.45)	(−8.44)	(−8.53)
Year	Yes	Yes	Yes	Yes
Ind	Yes	Yes	Yes	Yes
_Cons	0.108***	0.112***	0.107***	0.113***
	(6.63)	(6.88)	(6.60)	(6.94)
N	13069	13069	13069	13069
R^2	0.158	0.157	0.158	0.157

Note: T-values are in parentheses.
***$p < 1\%$, **$p < 5\%$, *$p < 10\%$.
Source: Author's formation.

trading and thin capitalisation have become less effective with the reform of international taxation rules. Currently, MNCs most commonly use other types of related party transactions (e.g., equity transaction, licencing agreement, transfer of R&D achievement) to avoid tax.

4.2.3. Moderating effect of information transparency and tax risk

Table 4 provides information about the moderating effect of information transparency and tax risk. Throughout Columns (1)–(3), the coefficients of the interaction terms are significantly negative, suggesting that the negative effect of CbCR on tax avoidance is stronger for less transparent companies, thus supporting hypothesis 3. The following are some possible explanations for this result. CbCR contains only financial and tax information, while analyst reports and company disclosures contain all information relevant to investment decisions. Companies with high analyst attention and sound disclosures are more transparent, and the impact of CbCR on these companies is limited.

In Column (4), the coefficient of the interaction term is positive and highly significant, suggesting that the negative effect of CbCR on tax avoidance is stronger for companies with aggressive tax strategies and higher tax risk, thus supporting hypothesis 4. These findings corroborate with previous studies, which show that CbCR can increase the risk of aggressive tax planning being detected and adversely assessed by tax authorities, thus reducing tax avoidance (OECD, 2017).

4.2.4. Country-by-country reporting and headquarter bias

Table 5 shows information about CbCR's impact on the headquarter bias. The coefficients of the interaction term are significantly negative, suggesting that the

Table 4. Moderating effect of information transparency and tax risk.

Variables	(1) ANA ETR	(2) REPORT ETR	(3) INFO ETR	(4) RISK ETR
TREAT × POST × ANA	−0.013***			
	(−2.61)			
TREAT × POST × REPORT		−0.011***		
		(−2.66)		
TREAT × POST × INFO			−0.029**	
			(−2.27)	
TREAT × POST × RISK				0.027**
				(2.51)
Roa	−0.232***	−0.230***	−0.228***	−0.179***
	(−7.51)	(−7.45)	(−5.92)	(−5.51)
Perf	−0.105***	−0.105***	−0.100***	−0.119***
	(−7.52)	(−7.50)	(−5.74)	(−8.66)
Tech	−0.026***	−0.026***	−0.034***	−0.023***
	(−8.02)	(−8.03)	(−8.11)	(−6.63)
Year	Yes	Yes	Yes	Yes
Ind	Yes	Yes	Yes	Yes
_Cons	0.121***	0.122***	0.137***	0.088***
	(7.28)	(7.37)	(4.24)	(5.53)
N	12938	12938	7227	11126
R^2	0.160	0.160	0.149	0.174

Note: T-values are in parentheses.
***$p < 1\%$, **$p < 5\%$.
Source: Author's formation.

Table 5. Country-by-country reporting and headquarter bias.

Variables	(1) TAXSHARE	(2) PROFITSHARE
TREAT	−0.140***	−0.100***
	(−6.55)	(−6.04)
POST	−0.102***	−0.092***
	(−7.75)	(−7.42)
TREAT × POST	−0.070***	−0.037**
	(−3.98)	(−2.19)
Grouptax	0.013***	
	(3.06)	
Groupprofit		0.002
		(0.50)
Year	Yes	Yes
Ind	Yes	Yes
_Cons	−0.055	0.468***
	(−0.81)	(4.33)
N	9885	8502
R^2	0.141	0.101

Note: T-values are in parentheses.
***$p < 1\%$, **$p < 5\%$.
Source: Author's formation.

headquarter bias reduces following the implementation of CbCR. Hypothesis 5 is proved. Such a result may have a negative effect on the headquarters economy but will lead to an allocation of profits in line with value creation. The findings lend support to Hanlon (2018) who argues that CbCR may influence the international allocation of taxing rights and lead to destination-based taxation.

4.3. Robustness checks

4.3.1. Alternative measurement of tax avoidance

The statutory tax rate (*STR*) is the tax rate set by law on taxable income. Since Chinese companies are subject to heterogeneous corporate income tax rates, we create a variable RATE which equals the difference between ETR and STR. A higher RATE represents a lower tax avoidance and vice versa (Tang, 2019; Zeng, 2019). The results reported in Table 6 offer consistent results by showing positive coefficients on the interaction variables in Column (1), Column (2), and Column (5), and indicating negative coefficients on the interaction variables in Column (3) and Column (4). These findings support hypotheses 1–4.

4.3.2. Placebo test

4.3.2.1. Using fake treatment dates. The empirical outcomes in the preceding section show that the research hypotheses cannot be rejected from a statistical point of view. But is it possible that changes in tax avoidance are not caused by CbCR requirements, but by other policies or events? This paper uses the placebo test to rule out this possibility. The placebo test is done as follows. Assuming that a policy was implemented or an event occurred in the year prior to the implementation of CbCR, we test whether the policy or event has an actual impact on corporate tax avoidance. A new variable POST14 is created, replacing the original dummy variable POST. POST14 equals 1 for 2014 and 0 for 2011–2013. To exclude the effect of the CbCR, this paper uses data from the pre-implementation period for the placebo test. That is, data from 2011 to 2014. The results are shown in Table 7. Table 7 indicates that the coefficients

Table 6. Robustness checks: alternative measurement for tax avoidance.

Variables	(1) RATE	(2) RATE	(3) RATE	(4) RATE	(5) RATE
TREAT × POST	0.012**				
	(2.36)				
TREAT × POST × DEAL		0.016*			
		(1.67)			
TREAT × POST × ANA			−0.010**		
			(−1.97)		
TREAT × POST × REPORT				−0.008*	
				(−1.90)	
TREAT × POST × RISK					0.029***
					(2.64)
Roa	−0.195***	−0.204***	−0.179***	−0.175***	−0.131***
	(−6.47)	(−6.61)	(−5.61)	(−5.51)	(−3.87)
Perf	−0.102***	−0.100***	−0.099***	−0.099***	−0.108***
	(−7.20)	(−6.97)	(−6.83)	(−6.81)	(−7.33)
Tech	0.034***	0.034***	0.035***	0.035***	0.037***
	(10.41)	(10.33)	(10.71)	(10.72)	(10.34)
Year	Yes	Yes	Yes	Yes	Yes
Ind	Yes	Yes	Yes	Yes	Yes
_Cons	−0.084***	−0.085***	−0.084***	−0.084***	−0.116***
	(−3.37)	(−3.42)	(−3.34)	(−3.32)	(−4.63)
N	12979	12996	12867	12867	11054
R^2	0.078	0.077	0.079	0.079	0.096

Note: T-values are in parentheses.
***$p < 1\%$, **$p < 5\%$, *$p < 10\%$.
Source: Author's formation.

Table 7. Robustness checks: using fake treatment dates.

Variables	(1) ETR	(2) ETR	(3) ETR	(4) ETR	(5) TAXSHARE
TREAT × POST	0.005				0.002
	(0.88)				(0.12)
TREAT × POST × DEAL		0.015			
		(1.21)			
TREAT × POST × ANA			0.001		
			(0.12)		
TREAT × POST × RISK				0.004	
				(0.27)	
Roa	−0.400***	−0.375***	−0.371***	−0.249***	
	(−8.70)	(−8.07)	(−7.50)	(−5.49)	
Perf	−0.146***	−0.144***	−0.146***	−0.148***	
	(−8.00)	(−7.94)	(−7.98)	(−8.46)	
Tech	−0.036***	−0.035***	−0.034***	−0.033***	
	(−7.00)	(−6.84)	(−6.60)	(−6.58)	
Grouptax					0.021***
					(3.72)
Year	Yes	Yes	Yes	Yes	Yes
Ind	Yes	Yes	Yes	Yes	Yes
_Cons	0.135***	0.123***	0.140***	0.105***	−0.152
	(5.16)	(4.86)	(5.28)	(4.61)	(−1.62)
N	5607	5607	5560	5587	4291
R^2	0.162	0.166	0.161	0.194	0.162

Note: T-values are in parentheses.
***$p < 1\%$.
Source: Author's formation.

on all the interaction terms are insignificant. Therefore, the differences between the treatment group and control group were not caused by policies in 2014. The conclusions for all the hypothesis tests remain robust. We also conduct placebo tests for year 2012 and year 2013, and the results are the same.

4.3.2.2. Using a fake treatment group. According to the previous analysis, the changes in tax avoidance behaviour were not caused by the 2011–2014 policies. To rule out that the changes in ETR were influenced by 2016 tax policies other than CbCR for companies of a particular size, we replace the treatment group with companies that meet the following criteria: (1) the combined revenue is above RMB 5.5 billion, (2) it has no overseas subsidiaries, in other words, the company's entire business is in China and it does not need to file CbCR. The results are reported in Table 8. Table 8 indicates that the coefficients on all the interaction terms are insignificant. The results show that no other 2016 policies caused the changes in tax avoidance, and all the conclusions remain robust.

4.3.3. Parallel trends test

To test whether the differences between the treatment and control group existed before the implementation of CbCR, we perform the difference-in-difference parallel trends tests using Model (6) and Model (7). In Model (6) and Model (7), 2011–2019 are dummy variables representing each year. The results are shown in Figure 1. In Figure 1, the x-axis represents year, and the y-axis represents the coefficient of the interaction term. On the left is the parallel trends test for Model (6) and on the right is the parallel trends test for Model (7). The results on both sides show that the

Table 8. Robustness checks: using a fake treatment group.

Variables	(1) ETR	(2) ETR	(3) ETR	(4) ETR	(5) TAXSHARE
TREAT × POST	0.009				−0.021
	(1.65)				(−1.23)
TREAT × POST × DEAL		−0.001			
		(−0.14)			
TREAT × POST × ANA			−0.002		
			(−0.41)		
TREAT × POST × RISK				0.007	
				(0.59)	
Roa	−0.338***	−0.331***	−0.287***	−0.223***	
	(−11.40)	(−10.98)	(−9.30)	(−6.89)	
Perf	−0.104***	−0.104***	−0.104***	−0.116***	
	(−7.70)	(−7.72)	(−7.57)	(−8.35)	
Tech	−0.029***	−0.029***	−0.028***	−0.025***	
	(−9.11)	(−9.02)	(−8.82)	(−7.24)	
Grouptax					0.008*
					(1.96)
Year	Yes	Yes	Yes	Yes	Yes
Ind	Yes	Yes	Yes	Yes	Yes
_Cons	0.122***	0.119***	0.129***	0.095***	0.033
	(7.55)	(7.38)	(7.83)	(6.31)	(0.47)
N	14030	14014	13886	11866	10554
R^2	0.175	0.176	0.177	0.190	0.134

Note: T-values are in parentheses.
***$p < 1\%$, *$p < 10\%$.
Source: Author's formation.

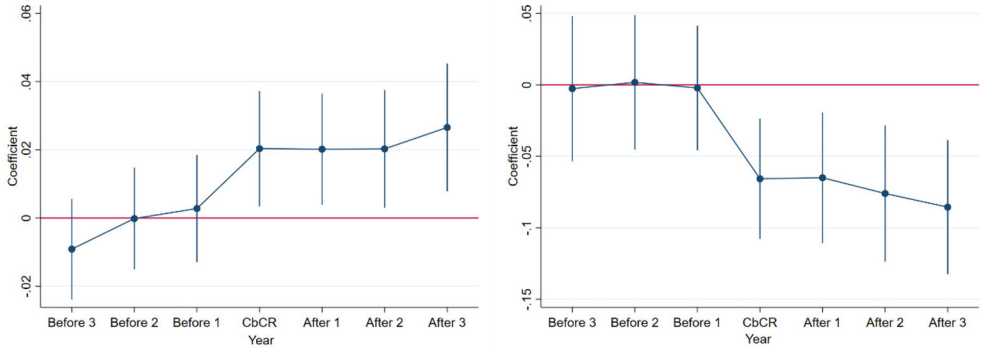

Figure 1. Robustness checks: parallel trends test.
Source: Author's formation.

coefficients of the interaction terms are not significant before the implementation of CbCR, while they are significantly different from zero (95% confidence interval) after the implementation of CbCR. Therefore, the difference-in-difference models satisfy the parallel trends assumption.

$$\begin{aligned} ETR_{it} = {} & \alpha_0 + \alpha_1 TREAT_i + \alpha_2 2011 + \alpha_3 2012 + \alpha_4 2013 + \alpha_5 2014 \\ & + \alpha_6 2016 + \alpha_7 2017 + \alpha_8 2018 + \alpha_9 2019 + \alpha_{10} TREAT_i \times 2011 \\ & + \alpha_{11} TREAT_i \times 2012 + \alpha_{12} TREAT_i \times 2013 + \alpha_{13} TREAT_i \times 2014 \\ & + \alpha_{14} TREAT_i \times 2016 + \alpha_{15} TREAT_i \times 2017 + \alpha_{16} TREAT_i \times 2018 \\ & + \alpha_{17} TREAT_i \times 2019 + \alpha X_{it} + \Sigma Ind + \Sigma Year + \varepsilon_{it} \end{aligned} \quad (6)$$

$$\begin{aligned} SHARE_{it} = {} & \alpha_0 + \alpha_1 TREAT_i + \alpha_2 2011 + \alpha_3 2012 + \alpha_4 2013 + \alpha_5 2014 \\ & + \alpha_6 2016 + \alpha_7 2017 + \alpha_8 2018 + \alpha_9 2019 + \alpha_{10} \\ & TREAT_i \times 2011 + \alpha_{11} TREAT_i \times 2012 + \alpha_{12} TREAT_i \times 2013 \\ & + \alpha_{13} TREAT_i \times 2014 + \alpha_{14} TREAT_i \times 2016 + \alpha_{15} \\ & TREAT_i \times 2017 + \alpha_{16} TREAT_i \times 2018 + \alpha_{17} TREAT_i \times 2019 \\ & + \alpha X_{it} + \Sigma Ind + \Sigma Year + \varepsilon_{it} \end{aligned} \tag{7}$$

5. Conclusions

CbC report is an important measure for international cooperation to combat cross-border tax avoidance and to jointly reform international taxation rules within OECD Inclusive Framework on BEPS. Since the implementation of CbCR in 2016, some scholars have examined its impact on EU companies. However, evidence from developing countries, especially China, is lacking. Based on data from China A-share listed companies, we test the impact of CbCR requirements on the tax avoidance behaviour of Chinese MNCs. The conclusions are as follows. First, in the four-year post-adoption period, the ETRs of multinational companies with CbCR requirements have increased significantly by about 1.7 percentage points. Second, CbCR can deter tax avoidance caused by related party transactions, its anti-avoidance effect is strongest for related party transactions that are not about business operation or capital. Third, corporate information transparency and tax risk can moderate CbCR's effect on tax avoidance. The lower the information transparency, the greater the effect of CbCR; the higher the corporate tax risk, the stronger the effect of CbCR. Finally, CbCR can discourage companies from keeping an excessive amount of profit at their headquarters and promote international tax justice. This study contributes empirical evidence on the corporate tax outcomes of private country-level disclosures and shows the practical impacts of the current BEPS work on anti-avoidance efforts in emerging economies.

This paper has several implications for BEPS actions in China and other countries. First, we demonstrate that CbCR can improve tax transparency and reduce tax avoidance. The findings respond to the debate on the effectiveness of private CbCR and suggest that private CbCR can change corporate behaviour, thus providing decision support on whether to publish CbCR. Second, the impacts of CbCR on different types of related party transactions vary, indicating that tax-motivated related party transactions through business activities and thin capitalisation have gradually lost their effectiveness and tax authorities need to pay more attention to other types of related party transactions, such as equity transactions and licencing agreements. Third, the influence of CbCR is smaller when information transparency is higher, suggesting that CbCR, analyst reports, and company information disclosures are partial substitutes. Tax authorities cannot determine whether a transfer pricing arrangement satisfies the arm's length principle based on CbC reports alone. They also need to refer to other financial information (OECD, 2015). Finally, we find that CbCR reduces the tendency of MNCs to retain excessive profits at their headquarters. The government needs to be aware that CbCR may influence the international allocation of taxing rights and reduce fiscal revenue from the development of the headquarters economy.

We acknowledge two limitations. First, we only examine the impact of CbCR on listed companies. Future research may focus on exploring the remaining companies and undertaking comparative studies between public and private companies. Second, we concentrate on the changes in tax payment and profit allocation following CbCR. The exact effects of CbCR on corporate real activities and organisational structures remain to be investigated in future research.

Disclosure statement

The author declares no competing interest.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Appendix: Definitions of variables

Variables	Definitions
Dependent variables	
ETR	Tax expense/Pretax income
RATE	ETR-STR
PROFITSHARE	Headquarters Profit/Total Profit
TAXSHARE	Headquarters Income tax/Total Income tax
Independent variables	
TREAT	Treat equals 1 (0) in 2011–2019, if the firm is (not) in the treatment group.
POST	POST takes the value of 1 for 2016–2019 and 0 for 2011–2014.
DEAL	Related Party Transaction Amount/Total Assets
ANA	The natural logarithm of one plus number of analysts who track and analyse the companies in that year.
REPORT	The natural logarithm of one plus number of analyst research about the companies in that year.
INFO	4= excellent, 3 =good, 2 =acceptable,1 =unacceptable
RISK	Risk takes the value of 1 if the standard deviation of ETR is above the median, and 0 otherwise.
Control variables	
Roa	Net Income / Total Asset
Perf	Period Expenses /Total Revenue
Tech	Tech takes the value of 1 for high technology enterprises and 0 otherwise.
Ind	A dummy variable for industries.
Year	A dummy variable for years.