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STOCK MARKET REACTION TO INCREASED TRANSPARENCY: AN ANALYSIS OF COUNTRY-BY-COUNTRY REPORTING IN DEVELOPING COUNTRIES

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IES Working Paper 37/2024



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Stock Market Reaction to Increased Transparency: An Analysis of Country-by-Country Reporting in Developing Countries

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Abstract:

Country-by-country reporting aims to curb tax avoidance by multinational corporations and increase transparency in the tax system. This paper provides the first evidence of the effect of country-by-country in developing countries, focusing on the market response of the African stock market to this regulation. Using an event study design, the results indicate a significant negative market response for firms subject to CbCR requirements. Tax-aggressive firms show a pronounced significant negative response around the event date, suggesting that investors anticipate increased tax liabilities due to heightened scrutiny of their tax planning practices, potentially reducing future profits. Cross-listed firms exhibit a positive significant market response in foreign markets, while the broader domestic market shows a negative reaction, underscoring the variation in how foreign and domestic investors process similar information. This paper sheds light on how regulatory transparency influences investor sentiment across different markets.

JEL: F23, H25, H26, G14

Keywords: country-by-country reporting, developing countries, event study, crosslisted firms, heterogeneous treatment effect, generalised random forest

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1 Introduction

To date, over 120 countries have embraced the country-by-country (CbCR) filing requirement. Despite its widespread implementation, there is no empirical evidence of the effect of CbCR news on the stock market in the global south. In this paper, I explore the responsiveness of the stock market to the announcement of CbCR news in developing countries, focusing on countries that are signatories of the Multilateral Competent Authority Agreement on the Exchange of the Countryby-Country Reports (CbC MCAA), namely South Africa, Nigeria, Kenya, Mauritius, Tunisia, and Morocco. I seek to answer the following research questions: How do multinational firms respond to the implementation of CbCR? What are the differences in the response of local and foreign investors to CbCR announcements for stocks of the same firms listed in local and foreign markets? How do tax-aggressive firms respond to the CbCR news? These questions remain unanswered in the context of developing countries where markets are underdeveloped and weak institutional capacities make them susceptible to the devastating impacts of aggressive tax planning.

Developing countries are heavily dependent on tax revenues from multinational corporations (MNCs), who use aggressive tax planning strategies to avoid paying taxes. In response to the growing challenges of tax avoidance, the Organization for Economic Cooperation and Development (OECD) introduced the Base Erosion and Profit Shifting (BEPS) action plan in 2015. This action plan aims to curb tax avoidance, address international tax rule differences in multiple countries, and increase transparency in the tax system. Under BEPS Action 13, all large MNCs with an annual turnover of EUR750 million must submit country-by-country (CbCR) reports to the tax authorities. These reports cover detailed financial information and economic activity of all party transactions. For this analysis, I identify the affected firms as MNCs required to submit the CbC reports and focus on those listed on the African stock markets and also with dual listings abroad.

To examine the market response to the announcement of CbCR news, I use the event study design focusing on three key events between 2016 and 2022. These include the release of the transfer pricing and country-by-country reporting documentation, the signing of the CbC MCAA and the publication of the CbCR regulations at the national level. Each of these events introduced new information that affected MNCs, with an element of surprise relating to the scope and nature of the disclosures. I use a 3-day event window surrounding these events to measure the Cumulative Average Abnormal Return (CAAR). The results reveal a negative and statistically negative market reaction, with a (CAAR) of -6 per cent on the main event date coinciding with the CbC MCAA signing and -7 per cent following the release of the CbC regulations. These findings suggest that investors anticipate reduced future earnings for firms subject to these new reporting requirements.

Further analysis reveals a notable variation in the market response of investors in the emerging and developed markets. In the presence of global and local information publicly available to both foreign and local investors, I exploit whether there is a difference in market response between these investors. Using the stocks of cross-listed firms in foreign markets across all the events, I find a positive and significant market response for the affected firms cross-listed in the developed foreign markets. The results reveal that foreign investors are sensitive not only to global news but also to domestic news corresponding to the release of CbC regulations at the national level. On this event date, the CAAR is 4 per cent, statistically significant at the 1 per cent level. The contrast between the positive response of foreign investors and the negative market reaction for local investors and a positive market response for foreign investors highlights differing perceptions of the CbCR information. While local investors may anticipate higher costs, foreign investors appear to view the CbCR as a significant stride toward bolstering transparency.

Exploring firm characteristics, the results show that tax-aggressive firms, denoted by their lower effective tax rates, exhibit a pronounced negative market reaction to the transparency regulations. Specifically, the results reveal a negative CAAR of -11.6 per cent and -16.8 per cent on the release of the transfer pricing and country-by-country reporting documentation and the signing of the CbC MCAA, respectively. The release of CbC regulations at the national level exhibits a statistically significant negative CAAR, albeit small. The negative market response across various dates is consistent with the notion that investors anticipate heightened tax authority scrutiny, which could increase tax liabilities and reduce the future profitability of these firms.

With the majority of the firms in the sample originating from South Africa, I utilise this larger sample of South African firms to evaluate the heterogeneous treatment effect and determine the sources of the observed heterogeneity. Employing the Generalised Random Forest method, which is more adept at capturing non-linear relationships, reveals a significantly positive impact on South African firms. The results indicate the existence of a heterogeneous treatment effect, with the size of the firms, leverage and effective tax rates being the most important variables that determine this heterogeneity. Additionally, the findings highlight a pronounced negative impact on the South African tax-aggressive firms.

Using a different market index for robustness checks, the results remain the same for the stocks in African markets: a significant negative market response for firms subject to CbCR requirements and a stronger market response for tax-aggressive firms with a CAAR of 45.6 per cent around the MCAA signing event date. The results align with prior literature that shows transparency rules can lead to significant shifts in investor sentiment. The consistency of these results highlights the robustness of these results, suggesting that while regulations like CbCR are aimed at improving transparency, they may have immediate implications for firm valuation and investor confidence, especially for MNCs with complex tax planning arrangements.

I contribute to several streams of literature on the impact of BEPS regulations, particularly CbCR. For instance, (Hugger 2019; Joshi et al. 2020; Overesch & Wolff 2021) investigates whether CbCR has been successful in addressing corporate tax avoidance, its impact on firm structure (Eberhartinger et al. 2020) and real activity (Nessa et al. 2022; Olbert & De Simone 2021). A less explored stream of literature, to which the present paper belongs, focuses on how CbCR news affects the value of firms. Johannesen & Larsen (2016), focusing on the extractive industry, find that stock prices decline significantly around the event dates of the release of the CbCR news. According to the authors,

this legislation improves the detection capacity of the tax authorities; thus, it may reduce the rents accrued through tax evasion. The negative response by these industries might suggest that investors perceive the transparency rules as a tool that would lower their level of tax aggressiveness. Müller et al. (2021) find that the EU stock market declined by EUR 48-65 billion due to the announcement of the introduction of country-by-country reporting. Further, they find that firms with higher reputational risk and proprietary costs react more to this news. However, Dutt et al. (2018), focusing on European financial institutions, do not find a significant effect of CbCR news on the capital market. In contrast to these studies focusing on public CbCR, this paper examines the market response to private CbCR, which involves exchanging this financial information with partner tax authorities. This offers invaluable insights on investor reactions to heightened transparency measures.

Another contribution to the literature relates to cross-listing literature, specifically examining the market response of firms with cross-listings in various markets to transparency news. By analysing the responsiveness of these firms to both global and local regulatory requirements, I assess whether investors in different markets react differently to the same information. This sheds light on potential variations in market responses between foreign and local investors, offering valuable insights into how global and local news impacts the firm value across markets. Furthermore, it underscores the broader implications of CbCR on market dynamics, particularly in shaping investor behaviour and expectations in response to enhanced tax transparency.

Finally, I contribute to the literature which uses the Generalised Random Forest (GRF) pioneered by (Athey et al. 2019) and adopted by various studies. Wang & Yang (2022) uses the GRF to assess the heterogeneous treatment effect of the low-carbon city pilot program on the Chinese stock market. They find that the GRF algorithm is effective in capturing the heterogeneous treatment effect, and it performs better than the t-statistics in capturing the impact of the policy. Wang & Yang (2022) indicates that this non-parametric method, unlike the linear regression, which has been used in cross-sectional analysis, does not require anticipating how the effect varies, but it splits the sample based on the treatment effect variation. Therefore, this effectively indicates how treatment varies across divergent subgroups. Adopting this machine learning technique, I assess whether there is a heterogeneous treatment effect on the market response of South African firms to the CbCR news.

The remainder of the paper is organised as follows: Section 2 provides an overview of Country by Country reporting. Section 3 reviews the literature and formulates testable hypotheses. Section 4 discusses the data. Section 5 outlines the empirical strategy. Section 6 presents findings along with robustness checks. Finally, Section 7 concludes with an overall summary of the key findings.

2 Country by Country Reporting Requirement

MNEs often engage in aggressive tax avoidance, leading to concerns about their fair contribution to taxes. This concern prompted the OECD to introduce BEPS action plans, of which BEPS Action Plan 13 covers a transfer pricing three-level approach. This approach includes the transfer pricing

documentation and CbCR, which requires large MNEs to provide tax authorities with comprehensive and relevant financial information. This initiative aims to enhance global efforts against tax avoidance by mandating the disclosure of key financial information containing the location of their subsidiaries, number of employees, revenue, profits and taxes paid as part of their annual reports.

The OECD and G20 countries adopted the BEPS action plans in 2015. In recognition of the potential benefits of CbCR, the emerging economies have followed suit, adopting these action plans. These reports contain confidential information for internal use by the local tax authority and are shared with foreign tax authorities in terms of the Multilateral Competent Authority Agreement (MCAA). Developing countries signed the MCAA on various dates: Nigeria and South Africa on 27 January 2016, Mauritius on 26 January 2017, and Morocco and Tunisia in 2019, with varying months, June 25 and November 26, respectively. Kenya, the most recent signatory, joined on September 9, 2022. In all these countries, MNEs with a turnover of 750 million EURO and more, which is equivalent to 10 billion South African rands, 160 billion Nigerian naira, 30 billion Mauritian Rupees, 8.12 billion Moroccan Dirham, 1,6 Billion Tunisian Dinar and 95 billion Kenya Shillings are required to submit these reports.

Following the signing of the CbC MCAA, each of these countries enacted this policy into their national laws and released CbCR regulations suited to their countries' context. For instance, South Africa released draft CbCR regulations in April 2016, soliciting comments from the general stake-holders. It then introduced the CbCR regulations as part of its 2011 Tax Administration Act on December 23, 2016, and Morocco as part of their Finance Law 2020, effective from 1 January 2021. In each country, CbCR regulations are aligned with the guidelines stipulated in the BEPS Action 13 (2015) Final Report. The CbCR are submitted to each country's respective tax authority within 12 months after the end of the relevant fiscal year. In South Africa, the first filing obligation for these reports applies to reporting fiscal years commencing on or after January 1, 2016 (dates for other countries; see Annex 12).

I classify events into two categories: domestic and global news. The global news category includes releasing the transfer pricing and CbCR documentation by the OECD and signing the CbC MCAA by these African countries. On the other hand, the domestic news category encompasses the publication of national CbCR regulations. By classifying these events into those categories, I determine the market response of investors to both domestic and global news and also whether there is a variation in the market reaction of investors across markets.

3 Hypothesis development

The semi-strong efficient market hypothesis posits that as new public information becomes available, the stock market prices quickly adjust to reflect that information. Investors' response to new information, particularly policy implementation, depends on whether the policy will benefit or cost them. This section reviews the literature and generates a hypothesis.

3.1 Large multinational corporations

Stakeholders are more interested in profit maximisation, and managers engage in tax avoidance behaviour on their behalf. Profit shifting reduces the tax burden of MNEs and, in turn, increases their profits. Blaufus et al. (2019) examines the response of the stock market in relation to tax planning news and shows that firms respond positively to the news on tax avoidance. This could be due to investors anticipating higher future earnings arising from tax savings. On the other hand, managers often employ complex tax planning structures to maximise their personal wealth through rent-seeking behaviour. This behaviour is prevalent in firms with poor corporate governance (Desai & Dharmapala 2006). In cases involving managerial diversion, stakeholders may lack comprehensive information about their firm's tax planning strategies, leading to information asymmetry. Consequently, stakeholders would reasonably anticipate that the implementation of CbCR would mitigate this information asymmetry by providing them with a more transparent and comprehensive view of the firm's tax plancial health.

While corporate disclosures in MNEs financial accounts provide some insights into their tax positions, CbCR offers a more comprehensive understanding of their tax planning strategies and economic activities (Overesch & Wolff 2021). Therefore, CbCR reduces information asymmetry between firms and tax authorities. Tax authorities would then use this information to detect firms that are not fulfilling their tax obligations, leading to penalties. Depending on the level of fines or overall costs of tax planning, this could be higher than the benefits. Firms may anticipate higher costs associated with submitting these reports. Thus, I hypothesise that;

Hypothesis: Following the announcement of CbCR, there will be a negative market response for firms that are required to submit CbCR.

3.2 Tax aggressive multinational corporations

By requiring MNEs to report on their operations in every country they operate in, CbCR aims to provide tax authorities with valuable insights to assess transfer pricing risks or tax planning strategies, ultimately contributing to a more equitable and transparent international tax framework. Prior literature indicates that MNEs strategically relocate their proprietary trading operations from high-tax jurisdictions to low-tax regions for tax purposes. For instance, (Clausing 2009; Grubert 2003) provide evidence that MNEs in the US shift larger volumes of their intangible assets to tax havens. Taylor & Richardson (2013) has reached the same conclusion about the MNEs in Australia. MNEs employ this relocation strategy with the intention of reducing their overall tax burden by taking advantage of more favourable tax environments. Such actions indicate the complex tax planning strategies that CbCR aims to shed light on, offering insights into the mechanisms employed by MNEs to manage their tax obligations.

By leveraging the comprehensive CbCR information, tax authorities can determine the effective tax rate and gauge the extent of intra-group profit shifting within these firms. Evidence of lower to zero effective tax rates or the presence of subsidiaries in tax havens is often treated as an indication of profit shifting. Tax havens are important to MNEs as they are used for tax planning strategies. Implementing CbCR may prompt MNEs to reduce their proportion of subsidiaries in tax havens to avoid higher tax costs. Dyreng et al. (2016) finds that the UK transparency rule that required firms to reveal their subsidiaries had a significant negative impact on the firms that did not comply. Due to the rule, those non-compliant firms reduced the proportion of their subsidiaries in tax havens and paid higher effective tax rates. Following the adoption of public CbCR, Eberhartinger et al. (2020) finds a substantial reduction of EU banks in small offshore financial centres, which offers both tax and regulatory advantages.

Blaufus et al. (2019) examines the stock market response relating to tax planning news and documents a stronger negative market response for tax-aggressive firms. CbCR can ultimately change the behaviour of tax-aggressive firms by altering their tax planning practices. Joshi et al. (2020) finds that firms required to submit CbCR in the EU reported higher effective tax rates. If a firm engages in aggressive tax planning, it would anticipate that the tax authority will have more information about its tax planning strategies. It would alter its behaviour to avoid being scrutinised by the tax authorities by adjusting its effective tax rates. Shareholders would suffer from the penalties imposed by the government and the potential loss of future tax benefits. This could have a negative impact on the firm's cash flow, reputation and firm value. I expect:

Hypothesis: A stronger negative investor reaction for tax-aggressive firms.

3.3 Cross-listed firms

As the capital markets become more integrated, some firms take advantage of this opportunity to access a broader pool of investors, enhance visibility and raise capital abroad. Thus, even firms from emerging markets may list their equities in better-developed markets like the US or EU. However, cross-listing subjects firms to stringent listing requirements. Only firms that meet these set reporting standards would be allowed to list in stock exchanges abroad. For those firms that have successfully listed their stocks on other stock exchanges, their stocks become accessible to investors in different markets. For simplicity, I employ the terms 'domestic' and 'foreign' investors to delineate between stocks listed in the domestic market, representing the African market, and those listed in capital markets abroad ¹.

The manner in which investors process news about regulatory changes, such as the implementation of CbCR, depends on several factors, including market experience, information transmission efficiency and broader market environments. Dvořák (2005) shows that there is information disparity by highlighting that domestic investors possess better information than their foreign counterparts, evidenced by foreign investors reporting lower profits. While domestic investors may benefit from

¹Even though the stocks listed in African markets are accessible by both foreign and domestic investors, domestic investors account for the majority of equity trading on the Nigerian stock exchange, with foreign investors contributing only 4 per cent (Newlands 2023). Note that I use these terms to describe market participants abroad vs in African markets.

closer proximity and familiarity with local firms and policies, (Kim & Yi 2015) indicates that foreign investors bring a wealth of experience from more regulated and transparent markets. This experience allows foreign investors to leverage global information networks and advanced technologies for real-time access to news, enabling them to form more globally informed investment strategies.

Foreign and domestic investors may interpret the same transparency regulations differently. Foreign investors owing to their presence in well-developed and highly transparent markets, are likely to view the implementation of CbCR as a significant stride toward bolstering transparency. These investors may warmly embrace this news, anticipating that it would bring more advantages in terms of heightened transparency and improving corporate governance within firms. Based on this information, I hypothesise that:

Hypothesis: Foreign investors, owing to their access to global policy changes, will exhibit a positive market reaction to the news regarding CbCR.



4 Data

Figure 1: Google Trends Index

Note: The graph shows the normalised percentages of searches relating to CbCR over various times, with the highest recorded on 05/10/2015.

Figure 1 shows real-time news trending, indexed on a scale from 1-100. This examines the

percentage of searches for BEPS CbCR relative to all searches conducted at that time and location. These are Google searches that were made between September 2015 and March 2016. It shows that most searches were made when the transfer pricing and country-by-country reporting documentation was released on the 5th of October, 2015. All searches made during that period emanated from developed countries. For the developing countries under review, Google Trends did not yield any results. I then rely on the sample of news from different sources such as the OECD website, each country's tax authority, and tax auditing companies websites such as KPMG and Deloitte. I also obtain news from online articles (e.g., Bloomberg and Financial Times). Chen (2017) emphasises the significance of incorporating various time points in analysing the impact of legislative policies. Therefore, I consider various dates from the country's adoption of the policy to the publication of its CbCR reporting requirements.

In the case of confounding events, the event will be discarded to avoid biases. The rationale is that confounding events could be responsible for the stock price change. If included in the news list, it may bias the reliability of the results. To identify these concurrent significant events corresponding to the key event dates, I conducted a web scraping exercise using relevant keywords such as "monetary" and "elections" to ascertain any impactful news in each country that might influence the market beyond the specified event. I also confirm the absence of significant news within the affected companies using keywords like "mergers" and "acquisitions". However, this search did not yield any notable events coinciding with the identified vital dates. Thus, I retained all identified key events and all associated companies without exclusion.

To measure the market response to the CbCR news, I restrict the sample to publicly listed companies on the stock exchange of the six signatory countries of the CbC MCAA: South Africa, Nigeria, Kenya, Mauritius, Morocco, and Tunisia. South Africa has the largest stock market by market value and the number of listed companies in Africa, with 473 firms listed on the Johannesburg Stock Exchange, followed by Nigeria with 156 and Morocco with 75 firms. Kenya, Mauritius and Tunisia have fewer listed companies, with 71, 65 and 70, respectively.

I obtain financial information from the audited financial statements published on each company's website. Using this financial data, I identify multinational corporations, which are firms with operations in multiple countries. Furthermore, I determine firms that qualify to submit CbCR and those that are exempted. In this case, the affected firms are multinationals with an annual consolidated group turnover of 750 million EUR and above. I discard all the firms listed in those markets that do not have information available. Financial statements also provide information on the taxes paid and reported profits, which is critical in calculating the effective tax rates. They further provide information on the location of subsidiaries, which I use to identify whether a firm has international connections, particularly whether it has some operations in developed countries.

I source each country's daily stock prices, leading market indices, and exchange rates from REFINITIV Eikon. This database also provides information on where the stocks are listed, enabling the identification of the cross-listed stocks in developed markets. There are only 109 multinational corporations that are listed on European markets, and of those firms, 48 are required to submit CbCR. I then convert financial data to a common currency, specifically USD, as this information is initially in each country's exchange rate. Additionally, I standardise the returns for consistency and comparability across different markets using the same currency. I remove those stocks with missing values and large stock returns from the sample. Table 1 shows detailed descriptive statistics of all key variables I use, including the stock returns and market indexes. Even though there are more than 700 firms listed on these stock markets, the majority of them are local firms. Of the 294 multinational corporations identified, only 76 are large firms required to submit CbCR, which represents a small sample. This means that approximately 26 per cent of these firms meet the threshold for CbCR submission.

	Stock Return	Market Index	SP Index	Turnover	ETR
Obs	58,183	58,183	58,183	294	294
Mean	-0.004	-0.001	0.000	34.554	0.129
Std	0.846	0.296	0.103	185.827	0.244
Min	-20.725	-6.791	-0.841	0.000	0.000
Max	67.677	5.495	0.802	$2,\!295.174$	1.353

Table 1: This table presents the summary statistics. The stock return is the daily stock return for all firms. The Market Index is the leading market indices, the SP Index is the SP 40 Index, and the ETR is the effective tax rate for each firm. The turnover of each firm is in USD million.

5 Empirical strategy

5.1 Event study

Various studies in finance, economics and law have adopted the event study methodology to analyse the effects of a specific policy on the capital market. The notion of this model is that the announcement of a future policy or a shock has the power to change the behaviour of investors, spurring negative or positive responses depending on how they perceive the news. I use the event study methodology to analyse the market response of various African countries to the announcement of CbCR. I use the abovementioned three events to investigate whether the CbCR announcement affects the stock market. These events contain an element of surprise, particularly regarding the information required to be submitted to the tax authorities and firms that would be required to submit these reports. The signing of the CbC MCAA signifies the commitment by the governments of those countries, and the publication of the regulations stipulating the required information by each country solidifies this commitment, further indicating buy-in by the policymakers in respective countries. Policy buy-in, especially in developing countries with limited capacity to implement policies, is imperative as it shows commitment to implement. Studies use various estimation windows ranging from 100 to 250 days. In this paper, I use the estimation window of 120 days in order to obtain precise results in the estimation window. A longer estimation window may lead to biases in the results due to confounding events. The same applies to the event window; I select a shorter event window of 3 days, which is t - 1, denoting the day before the event, 0, which is the event day and t + 1, representing the day after the event. I include the day before and the day after the event day as investors may acquire information related to this policy before its announcement and also to allow for incorporation of this event into the stock price. I then use the following market model, showing the relationship between the daily returns of security and the market index (MacKinlay 1997);

$$R_{it} = \alpha_i + \beta_i \cdot R_{mt} + \epsilon_{it} \tag{1}$$

where R_{it} is the actual return, and R_{mt} denotes the return of the leading stock market index of each country at time t. I use the estimation window data to estimate equation 1. This will then calculate $\hat{\alpha}$ and $\hat{\beta}$, providing expected returns in the absence of the event. I then compute the abnormal returns by deducting the expected returns from the actual returns:

$$AR_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}i \cdot R_{mt}) \tag{2}$$

 AR_{it} represent the abnormal return for company *i* at time *t*. In equation 3, I sum the abnormal returns over a three-day window to obtain cumulative abnormal returns (CAR). I then compute the AAR as the average of the CAR across a sample of companies, and the CAAR as the sum of the AAR. The CAAR helps to assess the overall impact of the event by providing the average market response within a three-day event window.

$$CAR_{it} = \sum_{i}^{T} AR_{it} \tag{3}$$

5.2 Heterogeneous treatment effect

I narrow down the scope to analyse the heterogeneous treatment effect on the South Africans only. This is because 74 per cent of the firms required to submit come from South Africa. I use the multinational firms that are not required to submit as the control group, while those that are required to submit are the treated group. Subsequently, I employ the generalised random forest (GRF), pioneered by (Athey et al. 2019) and adopted by various studies, including (Wang & Yang 2022), to assess the heterogeneous treatment effect. The GRF is a non-parametric method that builds upon the classic random forest, and its main advantage lies in its ability to capture non-linear relationships. Wang & Yang 2022 indicates that the GRF method, unlike the linear regression,

which has been used in cross-sectional analysis, does not require anticipating how the effect varies, but it splits the sample based on the treatment effect variation. Thus effectively indicating how treatment varies across divergent subgroups.

First, I calculate the average treatment effect (ATE) as $\alpha_{ATE} = \mathbf{E}[Y_i(1) - Y_i(0)]$ and the average treatment effect on the treated (ATT) as $\alpha_{ATT} = \mathbf{E}[Y_i(1) - Y_i(0)|W_i = 1]$. $Y_i(1)$ and $Y_i(0)$ correspond to the potential outcomes of the treated and control groups, respectively. On the one hand, W_i denotes the binary treatment variable with $W_i = 1$ for the treated group. I define the conditional average treatment effect (CATE) as follows:

$$\tau(x) = \mathbf{E}[Y_i(1) - Y_i(0)|X_i = x]$$
(4)

where X_i denotes a set of covariates for individual *i*. To estimate this heterogeneous treatment effect $\tau(x)$ using the GRF yields reliable and unbiased estimates, which allow us to better understand complex relationships and interactions. In the equation 5, $\alpha_i(x)$ measures how similar the *ith* firm is to a firm with characteristics x. For each tree b in the forest, the indicator functions check whether the training example X_i falls into the same leaf $L_b(x)$ as the test example x. If it does, the function returns 1; otherwise, it returns 0. The term $i : X_i \in L_b(x)$ normalizes this indicator by the total number of training examples in the leaf, ensuring that each tree's contribution is weighted according to the number of examples it considers similar to x. The average of these weighted indicators across all B trees in the forest creates a weighted list of neighbouring training examples weighted by how many times they share the same leaf as the test example across all trees. The final prediction is made using a weighted list of neighbours, and the treatment effects are based on the outcomes and the treatment status of the neighbour examples.

$$\alpha_i(x) = \frac{1}{B} \sum_{b=1}^{B} \frac{\mathbf{1}\{X_i \in L_b(x)\}}{|\{i : X_i \in L_b(x)\}|}$$
(5)

During the construction of each individual decision tree in a random forest, a subset of data is randomly selected for training that tree, leaving some data points out of this subset. These left-out data points, represented as $(\hat{m}^{-i}(X_i) \text{ and } \hat{e}^{-i}(X_i)$ are predictions of m(x) and $e(x)^2$ and they are called out-of-bag (OOB) samples. These OOB samples are not used to train the specific tree; instead, they serve as a holdout set for assessing the performance of the tree without explicitly setting aside a validation set.

$$\tau_{i}(x) = \frac{\sum \alpha_{i}(x)(Y_{i} - \hat{m}^{-i}(X_{i}))(W_{i} - \hat{e}^{-i}(X_{i}))}{\sum \alpha_{i}(x)(W_{i} - \hat{e}^{-i}(X_{i}))^{2}}$$
(6)

 $^{{}^{2}}m(x)$ and e(x) for evaluating conditional expectations and the probability of receiving treatment given a specific set of observed characteristics, respectively

6 Results

This section presents the findings on the impact of CbCR news on the African stock market. Table 2 shows a negative and significant CAAR for all MNCs. The CAAR for the affected firms is negative, but it is not statistically significant. Surrounding the key event, the signing of the MCCA, the results reveal a statistically significant negative CAAR of -6.3 per cent at the 1 per cent level for firms required to submit these reports. These results suggest that the signing of the CbC MCAA has a negative impact on these firms. I examine the market reaction to the local announcements of the CbCR regulations in each respective country. While the markets were already aware of CbCR implementation, as the countries had adopted the policy, the local regulations provided more information on firm obligations, penalties and the CbCR modalities. I find that the CAAR is -7.6 per cent, which is negative and statistically different from zero. The negative market response suggests that investors anticipate higher costs linked to the submission of the CbCR to tax authorities. These costs encompass a reduction in the firm's future profitability, attributed to heightened compliancerelated expenses, increased scrutiny and potential penalties. They may also perceive that submitting these reports to local tax authorities and sharing them with partner tax authorities may exert pressure on firms to contribute a fair share of taxes. Consequently, this could also have financial implications for these firms, such as dampening earnings prospects. These results are consistent with Johannesen et al. (2016) and Müller et al. (2021), who document a negative market response to the introduction of public CbCR.

Firms	TP and CbCR Report	Signatory	Regulations
All MNCs	-0.032***		
Required to submit	(-2.685) -0.015 (-0.896)	-0.063^{***} (-3.035)	-0.076^{***} (-4.085)

Table 2: CAAR following the market model. t-test statistics in parenthesis, with *, **, and ***, indicating statistical significance at 10%, 5% and 1% level, respectively. 294 All MNCs and 76 firms required to submit.

6.1 Cross-listed firms

To deepen the discussion on the effect of this regulation, I examine the market reaction of crosslisted firms, especially those listed in developed markets like Germany and the UK. As previously mentioned, the release of transfer pricing and country-by-country reporting documentation affects all MNCs in countries that are signatories of BEPS action 13. The results exhibit a positive CAAR of 3.4 per cent at the 1 per cent level for these firms. Furthermore, the results reveal a positive and significant market response for larger firms required to submit CbCR. On the event date of the CbC MCAA signing, firms required to submit CbC reports exhibit a statistically significant positive CAAR of 2.4 per cent, suggesting that the market views this regulation favourably in developed markets. Similarly, the release of CbC regulations is associated with a positive market reaction, with a CAAR of 4.3 per cent, also statistically significant at the 1 per cent level. These results show a differential market response between local and foreign investors. This is evident through the negative market response in table 2 for local investors, while cross-listed stocks exhibit a positive market response. This divergence may reflect differences in how foreign and local investors process both local and global information. Local investors might anticipate higher costs and reduced profitability, whereas foreign investors may perceive the CbCR as a significant stride toward bolstering transparency and improved governance standards.

Firms	TP and CbCR Report	Signatory	Regulations
all cross-listed firms	0.034***		
	(35.451)		
Required to submit	0.040***	0.024^{***}	0.043^{***}
	(30.522)	(18.736)	(37.384)

Table 3: CAAR following the market model. t-test statistics in parenthesis, with *, **, and ***, indicating statistical significance at 10%, 5% and 1% level, respectively. 109 all cross-listed firms and 48 cross-listed firms required to submit.

6.2 Tax-aggressive firms

Examining the behaviour of investors, Table 4 shows a stronger effect on tax-aggressive firms that are affected by this regulation. I calculate the effective tax rate (etr) for each firm as the ratio of pre-tax profits to taxable income. I compute two sets of etr, a one-year etr, corresponding to the announcement year of the event and the three-year etr (t-1 to t+1), capturing the average of etr over a span of three years to capture varying tax behaviour. I classify firms with lower etr as tax-aggressive firms and higher etr otherwise. Following the release of the transfer pricing and country-by-country documentation, the market response is negative, with a CAAR of -11.6 per cent, statistically significant at a 1 per cent level. The market reaction is even more pronounced on the signing date of this regulation. A statistically significant CAAR of -16.8 per cent implies that investors anticipate that the submission of the reports will provide information that will enhance the auditing capacity of the tax authorities and expose aggressive tax practices. The release of the CbCR regulations also triggers a significant negative response. When employing the three-year average etr, the results are consistent with the one-year etr, particularly around the MCAA signing. While the CAAR is -4.9 per cent during the release of transfer pricing and country-by-country reporting documentation, this is not statistically significant. The release of the CbCR regulations exhibits a small positive CAAR, statistically significant at the 1 per cent level.

Firms	TP and CbCR Report	Signatory	Regulations
tax aggressive firms	-0.116***	-0.168***	-0.001***
	(-4.321)	(-3.160)	(-2.296)
tax aggressive 3-year-average	-0.049	-0.191^{***}	0.001^{***}
	(-1.400)	(-2.779)	(4.421)

Table 4: CAAR following the market model. t-test statistics in parenthesis, with *, **, and ***, indicating statistical significance at 10%, 5% and 1% level, respectively. 36 tax aggressive firms and 28 tax aggressive 3-year-average.

6.3 Abnormal shareholder losses

Overall, the results indicate a negative market response for firms required to submit CbC reports on the signing date of the CbC MCAA. I use the market value from EIKON REFINITIV to calculate the shareholder value loss:

$$VL_{it} = CAR_{it} * MV_{it} \tag{7}$$

where I multiply each large firm's market value by its corresponding cumulative abnormal return over two-day and three-day event windows. The total market loss arising from the announcement of this event is the aggregate of market value losses for all firms affected by this regulation. The results reveal a substantial equity depreciation of US\$1,170 million during [-1,0] and a slightly lower market value loss of US\$900,634 over the period [-1,+1]. These results underscore the financial losses incurred by the affected firms in response to this transparency regulation.

7 Robustness checks

I first use a different market index, the S&P Africa 40 Index for robustness checks. This index includes a maximum of eight firms from any individual African country, resulting in a total of 40 largest firms operating in Africa. Using this index, I find that on the release of the transfer pricing and country-by-country documentation, the CAAR for firms that are required to submit changes is negative and statistically significant. The same applies to tax-aggressive firms with a CAAR of -10.8 per cent, which is also statistically significant. These results affirm that the release of the transfer pricing and country-by-country documentation has a significant market reaction. The results in table 5 further show a negative and significant market response for the affected firms. The tax-aggressive firms exhibit a stronger negative response of -45.6 per cent, statistically significant at 1 per cent. These results are consistent with the results above, showing that these events have a negative effect on the affected firms and a stronger negative response for the tax-aggressive firms for the stocks listed on the African stock market.

Firms	TP and CbCR Report	Signatory	Regulations
Required to submit	-0.108***	-0.183***	-0.059***
	(-5.863)	(-3.035)	(-4.031)
aggressive firms	-0.169	-0.456***	-0.006***
	(-1.253)	(-8.168)	(-4.837)

Table 5: CAAR following the market model. t-test statistics in parenthesis, with *, **, and ***, indicating statistical significance at 10%, 5% and 1% level, respectively. 76 firms required to submit and 36 aggressive firms.

7.1 Additional tests - connection abroad

Could firms with international operations or connections respond differently? I broaden the scope by assessing whether firms with an international presence through subsidiaries in developed markets like Europe and the USA would react differently to the release of the transfer pricing and countrycountry documentation. Using the leading stock market index and SP 40 Index in table 6 panel (a) and (b), respectively, I find a small positive market response, statistically significant at a 1 per cent level. One plausible explanation for the significant response could be the perception of greater transparency. Investors might view transparency rules as an opportunity to enhance corporate governance practices.

Firms	TP CbCR Report	TP CbCR Report
	(a)	(b)
connected to developed countries	0.001***	0.001***
	(3.121)	(4.385)
number of firms	47	47

Table 6: CAAR following the market model. t-test statistics in parenthesis, with *, **, and ***, indicating statistical significance at 10%, 5% and 1% level, respectively.

I further focus on the stocks of firms that have cross-listings in the European markets. I use their stocks in African markets and assess their responsiveness to the release of the transfer pricing and country-country documentation ³. In table 7 panel (a) uses the leading stock market index and (b) the SP 40 index. The results in both panels (a) and (b) are similar to the firms with connections abroad, with a small positive and statistically significant CAAR. Narrowing the analysis to the subset of these firms indicates a shift in the results compared to the broader domestic market in table 2. Interestingly, these cross-listed firms exhibit a positive market response in the domestic market, similar to their counterparts in foreign markets. This shift suggests that the market dynamics for these firms differ significantly from those in the broader domestic market.

 $^{^{3}}$ Note the distinction between this analysis and table 6 above. In this section, I analyse the stocks listed in African markets but with cross-listings in European markets. In contrast, table 7 focuses on firms with international connections, mainly in the form of subsidiaries in developed countries like the USA, Australia and others in Europe

Firms	TP CbCR Report	TP CbCR Report
	(a)	(b)
domestic stocks for firms with		
cross_listings abroad	0.002^{***}	0.004^{***}
	(25.559)	(49.619)
number of firms	48	48

Table 7: CAAR following the market model. t-test statistics in parenthesis, with *, **, and ***, indicating statistical significance at 10%, 5% and 1% level, respectively.

7.2 Heterogeneous treatment effect

To examine the heterogeneous treatment effect of the market reaction on the South African firms, I employ the three-day event window (-1, 1) CAR as the dependent variable and a set of specific firm-level characteristics, including the effective tax rate, return on equity, capital, market capitalisation, leverage and firm age (see descriptive statistics in table 13 in Appendix. Table 8 present the treatment effects on the ATE, ATT and ATC using the GRF method. The results indicate that the treatment effects on the ATE, ATT, and ATC are positive and statistically significant at a 1 per cent level, with estimates of 0.0015, 0016 and 0016, respectively. These findings indicate that the event date corresponding to the signing of the MCAA CbC has a positive effect on South African firms.

	ATE	ATT	ATC
CAR for the South African firms	0.0015^{***}	0.0016^{***}	0.0016^{***}
	(0.00063)	(0.00059)	(0.00059)

Table 8: standard errors in parenthesis, with *, **, and ***, indicating statistical significance at 10%, 5% and 1% level, respectively.

7.2.1 Heterogeneity of the CATE

The results of the best linear predictor indicate that the etr has a significant negative effect, highlighting that tax-aggressive firms were largely impacted by this event. This underscores the sensitivity of tax-aggressive firms to heightened transparency rules. While other covariates are not statistically significant, this does not preclude the presence of heterogeneity in the treatment effects. I then assess the distribution of the CATE in 3 in the Appendix. The results exhibit that the CATE is spread around, thus indicating that there is evidence of heterogeneity across subgroups. Exploring the source of heterogeneity, findings in 5 in the Appendix indicate that the size of the firms, capital, leverage and effective tax rates are the most important variables that determine this heterogeneity.

	Dependent variable: CAR
leverage	-0.006
Ũ	(0.006)
return_on_equity	0.00001
	(0.00004)
average_etr	-0.007^{*}
-	(0.004)
tangible_assets	-0.0001
-	(0.0002)
firm_age	0.00001
	(0.00002)
marketcap	0.0001
-	(0.0004)
Constant	0.003
	(0.006)
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 9: Regression Results

7.2.2 Further heterogeneity test

To assess whether the GRF captures the heterogeneous treatment effect, I use the BLP test. The coefficient of β_1 evaluates how well the average prediction made by the GRF aligns with the actual outcomes. If this coefficient is closer to 1, then the overall predictions are reliable. β_2 assesses whether the GRF effectively captures heterogeneity. The results in table 10 exhibit that the β_1 is positive and statistically significant, indicating that the average treatment effect prediction is accurate. β_2 is above 1, and it is statistically significant, showing that the GRF captures the differences in treatment effects across different groups.

	Best Linear Fit (BLP)
β_1	$\frac{1.001^{***}}{(0.094)}$
B_{2}	1.529^{***} (0.226)

Note: p < 0.1; p < 0.05; p < 0.01

Table 10: Best linear fit using forest predictions

8 Conclusion

The introduction of the CbCR represents a significant effort to enhance transparency and curb tax avoidance. Despite widespread adoption, empirical evidence regarding its impact in developing countries remains scarce. This study addresses this gap by analysing the effect of the CbCR regulation, specifically focusing on the market response in African countries that are signatories of the CbC-MCAA. By focusing on this region, this study provides new insights into the dynamics of tax avoidance and the effects of transparency rules in the context of developing economies. It contributes to a comprehensive understanding of the behavioural response of firms in developing markets, particularly these countries with limited policy implementation, making them more susceptible to tax avoidance and its debilitating impacts.

Using the event study design, the results reveal a negative market response for firms required to submit CbCR. By splitting the sample further, I find a pronounced negative market reaction for tax-aggressive firms. Robustness checks also reveal a strong negative response for these firms. This suggests that the tax-aggressive firms anticipate that the CbCR would reveal their tax planning strategies, thereby enhancing the auditing capacity of the tax authorities. The adoption of this regulation may exert pressure on firms to pay fair taxes. Thus, investors might anticipate a reduction in the company's future earnings due to increased tax liabilities. Furthermore, the results illuminate a distinction in the market response of different markets to various CbCR-related news. Firms crosslisted abroad in developed countries show a positive and significant response, whilst the domestic market response is negative and significant. This could be attributed to variations in information flow and processing by local and foreign investors. Local investors might anticipate higher costs and reduced profitability, whereas foreign investors may perceive the CbCR as a significant stride toward bolstering transparency and improved governance standards.

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A Appendix

Country	no of firms affected
Nigeria	4
South Africa	56
Kenya	4
Morocco	5
Tunisia	5
Mauritius	2
Total	76

Table 11: Note: A significant portion of the firms listed on these stock exchanges are local firms which are not affected by this regulation. Among the multinationals listed, only a handful qualify to submit CbC reports. To identify firms required to submit, I review the financial statements of these firms with data available during the period under review.

Country	TPCbCR Report	Signatory	Regulations
	(a)	(b)	(c)
Nigeria	05/10/2015	27/01/2016	3/07/2018
South Africa	05/10/2015	27/01/2016	11/04/2016
Mauritius	05/10/2015	26/01/2017	22/02/2018
Morocco	05/10/2015	25/06/2019	
Tunisia	05/10/2015	26/11/2019	
Kenya	05/10/2015	9/09/2022	19/11/2021

Table 12: Note: TPCbCR denotes the publication of transfer pricing and CbCR documentation. Signatory: corresponds to the signing of the MCAA CbC. Integration: infusion of this legislation into their national laws, specifically into their finance acts or tax administration acts. Regulation: when governments publish CbCR regulations/guidelines aligned with TPCbCR documentation. Nigeria released the CbCR guidelines on 3/07/2018, and Mauritius officially announced them in February 2018. For those countries where it is difficult to determine the event date, I omit firms listed on that country's stock exchange in the analysis. For instance, I do not include firms listed on the Tunisia and Morocco Stock Exchange when analysing event (c).



Figure 2: Distribution of the CATE

Figure 3: This shows the distribution of the CATE. The y-axis shows the CATE and the x-axis is the proportion in each bin. Note: CATE is heterogeneous if it shows variation across different sub-groups



Figure 4: Feature importance for heterogeneous treatment effect

Figure 5: This highlights the key features in explaining heterogeneity, particularly emphasising the significance of the size, capital, leverage and etr which exhibit high feature importance.

	car	$firm_age$	leverage	etr	ROE	capital	size
Min.	-0.022721	1.000	0.000	0.000	-85.450	1.600e + 01	2.149e + 07
Mean	0.000297	45.899	0.187	0.173	15.141	8.859e + 07	2.149e + 07
Max	0.016489	179.000	0.864	0.862	372.150	4.786e + 09	2.432e + 08
std	0.004029	39.906	0.170	0.167	39.704	4.890e + 08	4.352e + 07
obs	153	148	135	148	105	120	108

Table 13: This table presents the summary statistics for South African firms only. In total, there are 155 firms, which are all multinationals. Of these firms, 55 are treated. Firm age is the number of years from the time of the listing of the firm to the event date. Leverage is the ratio of long-term debt to lagged total assets. etr is the effective tax rate. ROE (return on equity) is the profitability ratio of the average stockholder equity by net income. I proxy capital by tangible assets. marketcap is the market capitalisation of the firm. For all these variables, I use the 2016 data, which is the event year, which I obtain from both the financial statements complemented with the REFINITIV EIKON data.

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