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## Did the Adoption of BEPS Country-by-Country Reporting Affect Multinational Tax Avoidance? Evidence from Canada

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### PRÉCIS

Depuis 2016, les multinationales canadiennes (MNC) dont les revenus consolidés dépassent 750 millions d'euros (1,1 milliard de dollars canadiens) au cours de l'exercice précédent sont tenues de produire une déclaration pays par pays (DPP) en vertu de l'adoption par le Canada de l'action 13 du projet contre l'érosion de la base d'imposition et le transfert de bénéfices (BEPS). L'objectif de cette étude est d'examiner empiriquement si l'adoption de l'obligation de DPP a eu une incidence sur les pratiques d'évitement fiscal des MNC assujetties à cette obligation, c'est-à-dire s'il y a eu une réduction de l'évitement fiscal de la part de ces MNC depuis l'adoption de l'obligation de DPP. L'étude utilise un échantillon qui contient toutes les MNC cotées en bourse pour une période de 10 ans : 5 ans avant l'adoption de la DPP (2011 à 2015) et 5 ans après l'adoption de la DPP (2016 à 2020). L'échantillon est divisé en deux groupes : un échantillon de traitement, qui contient toutes les MNC assujetties à l'obligation de DPP, et un échantillon de contrôle, qui contient toutes les MNC qui n'y sont pas assujetties. Appliquant la méthode des doubles différences, l'étude ne trouve aucune preuve que l'adoption de la DPP dans le cadre de l'action 13 du projet BEPS a eu un effet sur les activités d'évitement fiscal des MNC assujetties à cette obligation. Cependant, des analyses complémentaires par secteur montrent que, contrairement aux attentes, les MNC assujetties à la DPP dans les secteurs de l'énergie et des matériaux ont continué à éviter l'impôt même après l'adoption de la DPP en 2016. En d'autres termes, l'adoption de la DPP ne semble pas avoir eu d'effet dissuasif sur l'évitement fiscal des MNC assujetties à cette obligation dans les secteurs de l'énergie et des matériaux. Depuis 2015, ces deux secteurs sont également assujettis à un autre type de DPP en vertu de la Loi sur les mesures de transparence dans le secteur extractif du Canada. Les résultats de l'étude, qui sont fiables lorsqu'ils sont évalués

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à l'aide de diverses mesures de l'évitement fiscal et de la DPP, fournissent des informations importantes aux autorités fiscales canadiennes et à l'Organisation de coopération et de développement économiques sur l'efficacité ou l'inefficacité de l'action 13 du projet BEPS.

## ABSTRACT

Since 2016, Canadian multinational corporations (MNCs) with consolidated revenues exceeding €750 million (equivalent to Cdn\$1.1 billion) in the preceding fiscal year have been subject to country-by-country reporting (CbCR) under Canada's adoption of action 13 of the base erosion and profit shifting (BEPS) project. The objective of this study is to examine empirically whether the adoption of the CbCR obligation has had an impact on the tax-avoidance practices of Canadian MNCs that are subject to this obligation—that is, whether there has been a reduction in tax avoidance by these MNCs since the adoption of CbCR. The study uses a sample that contains all publicly listed Canadian MNCs for a period of 10 years: 5 years before the adoption of CbCR (2011 to 2015) and 5 years after the adoption of CbCR (2016 to 2020). The sample is split into two groups: a treatment sample, which contains all the MNCs subject to the CbCR obligation, and a control sample, which contains all the MNCs that are not subject to this obligation. Using the difference-in-difference method, the study finds no evidence that the adoption of CbCR under BEPS action 13 has had an effect on tax avoidance by Canadian MNCs subject to this obligation. However, additional analyses by sector show that, contrary to expectations, MNCs subject to CbCR in the energy and materials sectors continued to avoid taxes even after the adoption of CbCR in 2016. In other words, the adoption of CbCR seems to have had no deterrent effect on tax avoidance by MNCs subject to this obligation in the energy and materials sectors. Since 2015, these two sectors have also been subject to another type of CbCR under the Canadian Extractive Sector Transparency Measures Act. The study results, which are robust when tested by various measures of tax avoidance and CbCR, provide important feedback to Canadian tax authorities and the Organisation for Economic Co-operation and Development on the effectiveness/ineffectiveness of BEPS action 13.

**KEYWORDS:** BEPS ■ REPORTING ■ TAX AVOIDANCE ■ MULTINATIONAL CORPORATIONS ■ CANADA REVENUE AGENCY

## CONTENTS

Introduction	1009
Regulatory Framework: CbCR Rules in Canada	1012
Literature Review	1013
Theoretical Explanations and Hypothesis Development	1016
Methodology	1017
Sampling Procedure	1017
Empirical Models and Measurement of Variables	1021
Results	1023
Descriptive Statistics	1023
Correlation Analyses	1025

Regression Analyses	1029
Testing Model 1	1029
Testing Model 2	1035
Robustness Tests	1035
Conclusion	1045
Appendix A	1047
Appendix B	1048
Appendix C	1049

## INTRODUCTION

In the tax accounting literature, corporate tax avoidance<sup>1</sup> is generally measured by the effective tax rate (ETR),<sup>2</sup> which is the ratio of income tax to pre-tax income. In other words, it is the percentage of income that a corporation pays in taxes.<sup>3</sup> Several studies show that corporate ETRs, mainly for multinational corporations (MNCs), have been steadily declining over the last three decades, and they are well below the statutory tax rates (STRs) in several countries, including Canada.<sup>4</sup> The declining ETRs have been explained by the fact that some corporations have implemented, with the help of tax experts, tax-avoidance strategies that take advantage of the lack of international tax harmonization to artificially shift their profits<sup>5</sup> to jurisdictions with

- 1 Tax avoidance generally refers to the use of legal means to minimize one's tax liability. Tax minimization is generally considered to be legal as long as it is done in compliance with the tax laws and regulations in the relevant jurisdiction.
- 2 A declining ETR means that the company avoids taxes. The ETR is the measure applied by the Organisation for Economic Co-operation and Development (OECD) in its report on the measuring and monitoring of base erosion and profit shifting (BEPS): Organisation for Economic Co-operation and Development, *Measuring and Monitoring BEPS, Action 11—2015 Final Report* (Paris: OECD, 2015). See also Cara Thiart, "Investigating the Impact of Country-by-Country Reporting on Effective Tax Rates: Exploratory Evidence from Listed South African Multinational Groups" (2022) 36:1 *South African Journal of Accounting Research* 45-56.
- 3 For an exhaustive review of the literature, see Michelle Hanlon and Shane Heitzman, "A Review of Tax Research" (2010) 50:2-3 *Journal of Accounting and Economics* 127-78.
- 4 Kevin S. Markle and Douglas A. Shackelford, "Cross-Country Comparisons of Corporate Income Taxes" (2012) 65:3 *National Tax Journal* 493-527; Scott D. Dyreng, Michelle Hanlon, Edward L. Maydew, and Jacob R. Thornock, "Changes in Corporate Effective Tax Rates over the Past 25 Years" (2017) 124:3 *Journal of Financial Economics* 441-63; Julien Martin and Cristian Stratica, « Fiscalité des entreprises et paradis fiscaux : une étude sur données canadiennes » (2017) 93:3 *L'Actualité économique* 405-39; Martin Thomsen and Christoph Watrin, "Tax Avoidance over Time: A Comparison of European and US Firms" (2018) 33:C *Journal of International Accounting, Auditing and Taxation* 40-63; and Xikai Chen, Meiting Lu, and Yaowen Shan, "Changes in Corporate Effective Tax Rates During Three Decades in Japan" (2020) 62:1 *Pacific-Basin Finance Journal* 101-367.
- 5 The three most popular methods of profit shifting are transfer-pricing manipulation, intangible asset allocation, and debt manipulation.

very low or zero corporate tax rates<sup>6</sup> in an effort to avoid taxes.<sup>7</sup> For example, in a study done for Canadian Centre for Policy Alternatives, Sanger<sup>8</sup> found that the top 60 Canadian companies collectively held \$353 billion in offshore tax havens, which could be an indication of tax-avoidance strategies.

Tax scandals, such as those revealed in Luxleaks, the Panama Papers, the Paradise Papers, and recently the Pandora Papers, have highlighted the extent of these tax-avoidance strategies. In addition, several investigations have been initiated into the tax-avoidance practices of some MNCs, such as Amazon, Apple, Alphabet (formerly known as Google), and Starbucks, among others.

According to the Organisation for Economic Co-operation and Development (OECD),<sup>9</sup> corporate tax avoidance is detrimental not only to developed countries but also to emerging economies that are dependent on revenues from the taxation of MNCs. In general, tax-avoidance strategies harm public budgets, threaten international tax fairness, distort competition, and can lead to inefficient investments.

To fight against tax avoidance by MNCs, the OECD, in collaboration with the Group of Twenty (G20), launched in 2013 the base erosion and profit shifting (BEPS) project.<sup>10</sup> The objective of the BEPS project is to improve tax transparency and collaboration between countries. One of the fundamental pillars of the BEPS project is country-by-country reporting (CbCR), which provides tax authorities with information on the geographical distribution of profits and taxes paid by an MNC. Since the establishment of the OECD Inclusive Framework on BEPS in 2016, 96 countries, including Canada, have adopted the CbCR, making it the most widely adopted global transparency initiative to date.<sup>11</sup>

Despite this dramatic transformation in the global landscape of tax transparency, the impact of recent BEPS initiatives, such as CbCR, on MNCs' tax avoidance remains relatively unknown. Prior studies that have documented the decline of corporate

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6 Jurisdictions with very low or zero tax rates are generally referred to as tax havens.

7 Gabriel Zucman, "Taxing Across Borders: Tracking Personal Wealth and Corporate Profits" (2014) 28:4 *Journal of Economic Perspectives* 121-48; Dyreng et al., supra note 4; Rodney J. Brown, "The Impact of Increased Tax Transparency via Public Country-by-Country Reporting on Corporate Tax Aggressiveness: Evidence from the European Union" (2020) 35:4 *Australian Tax Forum* 596-637.

8 Toby Sanger, *Time To Step Up for Tax Justice* (Ottawa: Canadian Centre for Policy Alternatives, 2019).

9 Organisation for Economic Co-operation and Development, *OECD/G20 Inclusive Framework on BEPS* (Paris: OECD, 2017) ([www.oecd.org/tax/beps/flyer-inclusive-framework-on-beps.pdf](http://www.oecd.org/tax/beps/flyer-inclusive-framework-on-beps.pdf)).

10 Organisation for Economic Co-operation and Development, *BEPS: Inclusive Framework on Base Erosion and Profit Shifting* (Paris: OCED, 2013).

11 Organisation for Economic Co-operation and Development, *Signatories of the Multilateral Competent Authority Agreement on the Exchange of Country-by-Country Reports (CbC MCAA) and Signing Dates* (Paris: OECD, 2023) ([www.oecd.org/ctp/exchange-of-tax-information/CbC-MCAA-Signatories.pdf](http://www.oecd.org/ctp/exchange-of-tax-information/CbC-MCAA-Signatories.pdf)).

ETRs have focused on periods that preceded the adoption of CbCR under action 13 of the BEPS project.<sup>12</sup>

The objective of this study is therefore to examine empirically whether the adoption of CbCR under the BEPS project has had an impact on the tax-avoidance practices of Canadian MNCs subject to this obligation—that is, whether there has been a reduction in tax avoidance by these MNCs since the adoption of CbCR. The study uses a sample that contains all publicly listed Canadian MNCs for a period of 10 years: 5 years before the adoption of CbCR (2011 to 2015) and 5 years after the adoption of CbCR (2016 to 2020). The sample is split into two groups: a treatment sample, which contains all the MNCs subject to the CbCR obligation, and a control sample, which contains all the MNCs that are not subject to this obligation. Using the difference-in-difference method, the study finds no evidence that CbCR under BEPS action 13 has had an effect on tax avoidance by Canadian MNCs subject to this obligation. However, additional analyses by sector show that, contrary to expectations, MNCs subject to CbCR in the energy and materials sectors continued to avoid taxes even after the adoption of CbCR in 2016. In other words, the adoption of CbCR seems to have had no deterrent effect on tax avoidance by MNCs subject to this obligation in the energy and materials sectors. It is worth noting that since 2015, these two sectors have also been subject to another type of CbCR under the Canadian Extractive Sector Transparency Measures Act<sup>13</sup> (ESTMA). The results, robust when tested against various measures of tax avoidance and CbCR, contribute to the public and academic debate on the effectiveness of BEPS action 13 (CbCR) in combatting MNCs' tax avoidance, and will have several implications for Canadian and foreign tax authorities,<sup>14</sup> the OECD, companies (especially MNCs), and decision makers around the world.

This article is divided into six sections. The first section describes the regulatory framework regarding CbCR rules in Canada. The second section presents a literature review on tax avoidance, while the third section provides the theoretical explanations and develops the hypothesis of this study. The methodological aspects of the study are presented in the fourth section, and the various results and their interpretations are provided in the fifth section. The sixth section discusses the main results of the study, the main implications for different stakeholders, and directions for future research.

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12 See, in particular, the sources cited in note 4, *supra*.

13 SC 2014, c. 39, section 376.

14 According to Hanlon, Hoopes, and Shroff, the government, through its tax authority, is the largest minority shareholder in any company, since it shares both profits and deductible losses with the company: Michelle Hanlon, Jeffrey L. Hoopes, and Nemit Shroff, "The Effect of Tax Authority Monitoring and Enforcement on Financial Reporting Quality" (2014) 36:2 *Journal of the American Taxation Association* 137-70.

## REGULATORY FRAMEWORK: CbCR RULES IN CANADA

Under section 233.8 of the Income Tax Act<sup>15</sup> (ITA), which implemented BEPS action 13, Canadian MNCs with consolidated revenues exceeding €750 million (equivalent to Cdn\$1.1 billion)<sup>16</sup> in the preceding fiscal year are required, for reporting periods that begin after 2015, to provide a country-by-country (CbC) report to the Canada Revenue Agency (CRA). This report includes a complete list of subsidiaries and revenues, pre-tax profits, cash income taxes paid, number of employees, and tangible assets, all aggregated by country on an annual basis. The purpose of the CbC report is to provide tax authorities with more information to assess the risks of BEPS and to target their audits more effectively.

However, the CbCR requirement under section 233.8 of the ITA is not the only one in Canada. Since 2015, Canadian MNCs operating in extractive sectors (energy and materials)<sup>17</sup> have also been required to file a CbC report under the ESTMA. Specifically, the ESTMA requires MNCs engaged in the commercial development of oil, gas, and minerals to report payments made to domestic and foreign governments, including taxes, royalties, fees, and other payments related to the exploration for and the extraction and sale of oil, gas, and minerals. The reporting requirements are intended to promote transparency and accountability in the extractive sector, and to help prevent corruption and other harmful practices by providing more detailed information about the financial and tax activities of MNCs.

The key difference between these CbCR obligations is that BEPS action 13 CbCR is a tax-related reporting requirement that provides tax authorities with detailed information about the allocation of income among jurisdictions, taxes paid, and economic activity, while CbCR under the ESTMA is focused on transparency in the extractive sector and requires extractive companies to report payments made to governments and other information related to their operations.

Although the reporting requirements and objectives under BEPS action 13 and the ESTMA are different, there is some overlap in the information required for both reports. In particular, the CbCR information required under the ESTMA includes information on taxes paid, which is also required under BEPS action 13.

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15 RSC 1985, c. 1 (5th Supp.), as amended.

16 This criterion applies to all MNCs in all business sectors whether they are listed on a stock exchange or not.

17 Under ESTMA rules, an MNC is subject to this act if it is listed on a stock exchange in Canada. If it is not listed, it will have to meet at least two of the following thresholds in one of its two most recent financial years: (1) have at least Cdn\$20 million in assets, (2) have generated at least Cdn\$40 million in revenue, and/or (3) employ an average of at least 250 employees. See Natural Resources Canada, *Extractive Sector Transparency Measures Act: Guidance*, version 2.1 (Ottawa: Natural Resources Canada, July 2018). Since the sample in this study is made up of MNCs listed on a stock exchange in Canada, all MNCs in the energy and materials sectors in the sample are considered to be subject to the ESTMA.

## LITERATURE REVIEW

The evolution of tax avoidance by companies, mainly MNCs, over the years has been studied by some researchers. In this context, Markle and Shackelford<sup>18</sup> examined corporate ETRs in 82 countries over the period 2005-2009. Their results show a decline in ETRs in several countries, not only for MNCs but also for purely domestic companies. Using a sample of US companies over the period 1988-2012, Dyreng, Hanlon, Maydew, and Thornock<sup>19</sup> confirmed these results, showing that ETRs declined significantly during those years even though STRs in the United States remained relatively constant. This rate decline was similar for MNCs and domestic companies. In another study, Martin and Stratica<sup>20</sup> also observed a downward trend in ETRs in small and large Canadian companies over the period 1990-2015; however, the levels and evolution of ETRs over time were quite heterogeneous between industries. In addition, the Canadian companies' ETRs were lower than the STRs.<sup>21</sup> In a comparative study of countries in the European Union and the United States, Thomsen and Watrin<sup>22</sup> observed a downward trend in ETRs over the period 2005-2016 for both EU and US MNCs and domestic companies; however, they found that the difference between the ETR and the STR for EU companies also declined over the same period.<sup>23</sup> More recently, Chen, Lu, and Shan<sup>24</sup> examined this issue for Japanese companies over the period 1988-2016. After controlling for the decrease in the STR in Japan, Chen et al. found no evidence that ETRs declined in MNCs; however, they found that small and medium-sized domestic companies experienced a significant decline in their ETRs.

The evolution of tax avoidance over the years has led to great public pressure against MNCs that are accused of not paying their fair share of tax, and has led some governments to require companies to disclose their tax positions. For example, in the United Kingdom, sections 409 and 410 of the Companies Act<sup>25</sup> now require listed companies to publicly disclose a list of their subsidiaries along with their locations. Dyreng, Hoopes, and Wilde<sup>26</sup> examined Financial Times Stock Exchange 100 companies that are subject to a concerted campaign of public pressure led by Action-Aid International (AAI) for not complying with this obligation. Their results show

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18 Markle and Shackelford, *supra* note 4.

19 Dyreng et al., *supra* note 4.

20 Martin and Stratica, *supra* note 4.

21 Compared to the United States, the STR declined significantly in Canada between 1990 and 2015, but the ETR also declined at the same rate (Martin and Stratica, *supra* note 4).

22 Thomsen and Watrin, *supra* note 4.

23 According to Thomsen and Watrin, *supra* note 4, and contrary to US companies, this result suggests that tax avoidance in EU companies may, on average, have decreased over time.

24 Chen et al., *supra* note 4.

25 Companies Act, 2006, c. 46.

26 Scott D. Dyreng, Jeffrey L. Hoopes, and Jason H. Wilde, "Public Pressure and Corporate Tax Behavior" (2016) 54:1 *Journal of Accounting Research* 147-86.

that these companies decreased tax avoidance and reduced the number of tax haven subsidiaries relative to companies unaffected by the scrutiny of AAI.

In 2014, the European Union mandated public CbCR for member countries' multinational banks under the capital requirements directive (CRD) IV.<sup>27</sup> Overesch and Wolff<sup>28</sup> used a sample of EU multinational banks recently required to report activities in tax havens that had not been publicly disclosed before the CbCR obligation under CRD IV. Their results show that these banks decreased tax avoidance relative to multinational banks with no activity in tax havens to disclose, as well as relative to domestic banks not affected by the new requirements. However, in concurrent studies, Brown<sup>29</sup> found no evidence that EU multinational banks decreased tax avoidance in response to public CbCR, whereas Joshi, Outslay, and Persson<sup>30</sup> found only a short-term decline in tax avoidance by European multinational banks.

As discussed above, action 13 of the BEPS project, implemented in 2016, requires any MNC with consolidated revenues exceeding €750 million in the preceding fiscal year to provide a CbC report to the tax authorities of each country in which the MNC does business. Using a sample of EU MNCs, De Simone and Olbert<sup>31</sup> found that MNCs subject to the CbCR obligation under BEPS action 13 reallocated capital and labour expenditures across Europe to mitigate increased tax enforcement risk driven by CbCR. In another study, Joshi<sup>32</sup> found a slight decline in tax avoidance by European MNCs in the post-CbCR period. However, Joshi's study has some limitations, and its results should be interpreted with caution. First, Joshi looked at only one year after the adoption of CbCR—2017—thus limiting the interpretation of the study results. In contrast, the present study examines two five-year periods spanning the adoption of CbCR. Second, Joshi's study is restricted to the European Union, limiting the generalization of the results to other jurisdictions, such as Canada. Indeed, although the effect of BEPS action 13 could be similar in other countries, there are some differences in the specific tax-planning strategies used by EU and Canadian MNCs, as well as in the implementation and enforcement of CbCR requirements by different countries. For example, Canadian MNCs are more likely to engage in tax planning that

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27 Under CRD IV, CbCR is public, whereas under BEPS action 13, CbCR is private (that is, the reporting is to tax authorities only).

28 Michael Overesch and Hubertus Wolff, "Financial Transparency to the Rescue: Effects of Public Country-by-Country Reporting in the European Union Banking Sector on Tax Avoidance" (2021) 38:3 *Contemporary Accounting Research* 1616-42.

29 Brown, *supra* note 7.

30 Preetika Joshi, Edmund Outslay, and Anh Persson, "Does Public Country-by-Country Reporting Deter Tax Avoidance and Income Shifting? Evidence from the European Banking Industry" (2020) 37:4 *Contemporary Accounting Research* 2357-97.

31 Lisa De Simone and Marcel Olbert, "Real Effects of Private Country-by-Country Disclosure" (2022) 97:6 *Accounting Review* 201-32.

32 Preetika Joshi, "Does Private Country-by-Country Reporting Deter Tax Avoidance and Income Shifting? Evidence from BEPS Action Item 13" (2020) 58:2 *Journal of Accounting Research* 333-81.



involves shifting profits to the United States,<sup>33</sup> while EU MNCs may be more likely to use intra-EU transfer-pricing arrangements to reduce their tax liabilities.<sup>34</sup> Third, Joshi excluded the energy, materials, and financial sectors from the study sample. However, the vast majority of Canadian MNCs, especially those listed on a Canadian stock exchange, belong to these three sectors. In other words, Joshi's results cannot be generalized to Canada since they do not take into account the major sectors of Canada's economy. In the present study, MNCs in all economic sectors are taken into account. Fourth, and in line with the second limitation, Joshi used the ETR under generally accepted accounting principles (GAAP) as a measure of tax avoidance since she used a sample of European MNCs.<sup>35</sup> However, according to BEPS action 13, the MNC must provide, in its CbC report to the tax authorities, information relating to the cash income taxes paid and not information on the financial accounting tax expenses. Moreover, GAAP ETR, like any accounting measure, has its own imperfections. In particular, income tax expense is designed to assist investors in evaluating the financial performance of the company and not to provide researchers with an ideal measure of actual cash taxes paid.<sup>36</sup> Moreover, the change in GAAP ETR could be due to a change in accounting methods rather than a change in corporate tax avoidance following CbCR. To cope with this measurement limitation in Joshi's study, in this study CASH ETR<sup>37</sup> is used in the main tests, since the focus is on actual cash taxes paid by a sample of Canadian MNCs.

Indeed, the Canadian context is particularly interesting and relevant from an international perspective for a study of the effect of BEPS action 13 (CbCR) on the tax-avoidance practices of MNCs, for several reasons. First, Canada has a significant presence of MNCs, notably in the extractive sector, which is subject to additional reporting requirements under the ESTMA. Second, Canada has been an active participant in the BEPS project and has demonstrated a strong commitment to implementing the recommendations, including action 13 on CbCR. (A former commissioner of the CRA, Bob Hamilton, served as chair of the OECD Forum on Tax Administration and was involved with the development of the handbook on implementation of CbCR). Third, the CRA's reputation for strong enforcement and auditing capabilities

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33 Alexandre Fortier-Labonté and Claire Schaffter, *Indicators of Profit Shifting by Multinational Enterprises Operating in Canada* (Ottawa: Statistics Canada, June 18, 2019); and Statistics Canada, "Foreign Direct Investment, 2021," *The Daily*, April 29, 2022 ([www150.statcan.gc.ca/n1/daily-quotidien/220429/dq220429b-eng.htm](http://www150.statcan.gc.ca/n1/daily-quotidien/220429/dq220429b-eng.htm)).

34 Leon Bettendorf, Michael P. Devereux, Albert van der Horst, Simon Loretz, and Ruud A. de Mooij, "Corporate Tax Harmonization in the EU" (2010) 25:63 *Economic Policy* 537-90.

35 CASH ETR is not available for European companies.

36 Markle and Shackelford, *supra* note 4.

37 CASH ETR has the advantage to be a much broader measure than GAAP ETR since it captures a wide range of tax-avoidance activities, such as income shifting from high-tax to low-tax jurisdictions (for example, through strategic transfer-pricing arrangements, cost-sharing agreements, and use of intra-company debt), tax sheltering, location decisions, tax preferences within the tax code, and exploitation of rule changes.

may help to ensure compliance with CbCR requirements and deter tax avoidance by MNCs. Fourth, because Canada was one of the early adopters of CbCR, implementing the reporting requirements in 2016, several years of data are now available for analysis. This early adoption provides a longer timeline for the observation of changes in the tax-avoidance practices of MNCs than that used in previous studies.

## THEORETICAL EXPLANATIONS AND HYPOTHESIS DEVELOPMENT

Given the novelty of the BEPS project, very few studies have examined the real impact of CbCR on tax avoidance by MNCs, and this impact remains relatively unknown.

According to the economic theory of tax avoidance,<sup>38</sup> a taxpayer's decision to engage in tax-avoidance practices (whether legal or not) depends on a tradeoff between the expected benefits and the related costs to obtain those benefits. Previous literature has demonstrated that the primary benefit of tax avoidance for companies is the tax savings that they can achieve by minimizing their liability for tax.<sup>39</sup> Lack of transparency also plays an essential role in tax avoidance, since the advantage available to a taxpayer when implementing a tax strategy is the information asymmetry between the taxpayer and the relevant tax authority.<sup>40</sup> On the other hand, the costs attributable to tax avoidance generally include tax-planning costs, agency costs necessary to incentivize managers to engage in tax avoidance, and—most importantly—potential penalties/interest incurred in the event of a tax audit, together with reputational costs. A decline in the level of tax avoidance would therefore result from either a reduction in expected tax benefits or an increase in tax costs.<sup>41</sup>

On the basis of the economic theory of tax avoidance, there are several theoretical explanations that suggest that BEPS action 13 (CbCR) should be expected to have an effect on the tax-avoidance practices of Canadian MNCs. First, CbCR requires MNCs to disclose detailed information about their operations, including revenues, profits, taxes paid, and employees, on a country-by-country basis. This increased transparency and accountability may make it more difficult for MNCs to engage in aggressive tax-planning strategies that rely on shifting profits to low-tax jurisdictions.<sup>42</sup> Second, the threat of detection and penalties for non-compliance may deter MNCs from engaging in aggressive tax-planning practices.<sup>43</sup> Third, CbCR information provides tax authorities with valuable data that can be used to identify potential tax-avoidance

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38 Joel Slemrod, "The Economics of Corporate Tax Selfishness" (2004) 57:4 *National Tax Journal* 877-99.

39 Sanjay Gupta and Kaye Newberry, "Determinants of the Variability in Corporate Effective Tax Rates: Evidence from Longitudinal Data" (1997) 16:1 *Journal of Accounting and Public Policy* 1-34.

40 Joshi, supra note 32.

41 Ibid.

42 Organisation for Economic Co-operation and Development, *Action Plan on Base Erosion and Profit Shifting* (Paris: OECD, 2013).

43 Ibid.

practices and to target enforcement efforts. This may lead to increased scrutiny and enforcement actions against MNCs that engage in aggressive tax-planning practices. Fourth, even if CbCR under BEPS action 13 is not in the public domain (since the reporting is made to tax authorities only), audits and enforcement actions initiated by tax authorities against MNCs that have provided unusual or inconsistent information in their CbC reports may lead to reputational damage and increased scrutiny and pressure from various stakeholders (including shareholders, civil society groups, and the media) who want to make sure that MNCs are paying their fair share of taxes.

However, the extent of the effect of BEPS action 13 (CbCR) may also depend on a range of factors, including the implementation and enforcement of CbCR requirements, the behaviour of MNCs, and the broader regulatory and economic context in which MNCs operate. Because Canadian companies operate in a tax environment where the risk of enforcement is high and the consequences of non-compliance are significant,<sup>44</sup> and because Canada has been an active participant in the BEPS project and has demonstrated a strong commitment to implementing the recommendations, including action 13 on CbCR, Canadian MNCs subject to the CbCR obligation may be deterred from engaging in tax avoidance after the adoption of this obligation. Thus, the hypothesis of this study is formulated as follows:

Hypothesis: Canadian MNCs subject to CbCR decreased their level of tax avoidance after the adoption of CbCR.

## METHODOLOGY

### Sampling Procedure

Since the implementation of BEPS action 13 in 2016, any Canadian company is subject to CbCR if it meets two criteria: (1) the company is an MNC (that is, it has at least one foreign subsidiary); and (2) it has consolidated revenues exceeding €750 million (equivalent to Cdn\$1.1 billion) in the preceding fiscal year (that is, 2015 and after).

In order to track all Canadian MNCs, first the list of all Canadian ultimate parent companies along with their first-level subsidiaries (whether in Canada or abroad) was downloaded from the Bureau van Dijk's ORBIS database.<sup>45</sup> The percentage ownership of subsidiaries, the ISIN, and the ISO country code of each subsidiary were also extracted.<sup>46</sup> Subsequently, the list was refined to remove subsidiaries with missing

44 Oliver Nnamdi Okafor, Akinloye Akindayomi, and Hussein Warsame, "Did the Adoption of IFRS Affect Corporate Tax Avoidance?" (2019) 67:4 *Canadian Tax Journal* 947-79.

45 ORBIS is considered one of the best databases for identifying the ownership link between a parent company and its subsidiaries. Nemit Shroff, Rodrigo S. Verdi, and Gwen Yu, "Information Environment and the Investment Decisions of Multinational Corporations" (2014) 89:2 *Accounting Review* 759-90; Christof Beuselinck, Stefano Cascino, Marc Deloof, and Ann Vanstraelen, "Earnings Management Within Multinational Corporations" (2019) 94:4 *Accounting Review* 45-76; De Simone and Olbert, *supra* note 31; and Joshi, *supra* note 32.

46 ISIN refers to the International Securities Identification Numbering system. ISO refers to the International Organization for Standardization.

percentage ownership information and subsidiaries that were not at least 50 percent owned by the parent company (such that the parent exercised control<sup>47</sup> and the subsidiary was therefore consolidated in the financial statements of the parent company), leaving a list of 2,460 Canadian parent companies having, in aggregate, 21,272 level 1 subsidiaries in 133 countries, including Canada (see panel A of table 1).

From this list of parent companies with level 1 subsidiaries that were at least 50 percent owned, the companies with level 2, 3, 4, and 5 subsidiaries were identified.<sup>48</sup> This was done by looking at level 2 subsidiaries owned by level 1 subsidiaries, and so on, up to level 5 subsidiaries owned by level 4 subsidiaries. Once these ownership links were compiled, the percentage held by the parent company on the five levels was calculated, applying the calculation method of Shroff, Verdi, and Yu,<sup>49</sup> which consists of chain-multiplying the ownership percentages of each level. For example, if a parent company owns a level 1 subsidiary at 100 percent, and that subsidiary owns another (level 2) subsidiary at 90 percent, and that subsidiary owns another (level 3) subsidiary at 80 percent, one can infer that the level 3 subsidiary is owned 72 percent by the parent company (that is,  $100\% \times 90\% \times 80\% = 72\%$ ) (see appendix A). Thus, the only subsidiaries kept in the sample were those owned by the parent company at 50 percent or more.<sup>50</sup> The steps for eliminating level 2 to level 5 subsidiaries are shown in appendix B.

In order to determine whether the parent company was an MNC or not, the chain of ownership of each company was analyzed. If one of the subsidiaries was found to have an ISO code different from the code for Canada, the parent company was considered to be an MNC. This reduced the sample to 1,575 Canadian MNCs having 11,130 subsidiaries on the five levels (see panel B of table 1).

Once this list of Canadian MNCs was compiled, the next step was to source the financial and tax accounting data needed for the analysis. Data to calculate ETRs and other control variables are not available on ORBIS. Thus, the next step of the sampling procedure was conducted using the COMPUSTAT database. For this, a unique identifier for each parent company was needed; however, the identifiers required for COMPUSTAT are not available on ORBIS. So an intermediate database provided by Capital IQ was used. The database's "Identifiers" function made it possible to enter a file with all the ISINs (not available on COMPUSTAT as an input variable) and to

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47 In a robustness test, only the subsidiaries that were not at least 20 percent owned by the parent company (sufficient to have a significant influence on the subsidiary) were removed. It should be noted that the sample of companies with subsidiaries held at 20 percent or more has only two more companies than the sample of companies with subsidiaries held at 50 percent or more.

48 Like previous studies on MNCs (see Shroff et al., *supra* note 45; Beuselinck et al., *supra* note 45; and Joshi, *supra* note 32), this study looked at subsidiaries of a Canadian parent company up to the fifth level, since a parent could hold all of its level 1 subsidiaries in Canada, but it is through its level 2, 3, 4, or 5 subsidiaries that it could have a presence abroad.

49 Shroff et al., *supra* note 45.

50 In a robustness test, the subsidiaries held at 20 percent or more were included; see the discussion below under "Robustness Tests."

**TABLE 1 Sampling Procedure**

Panel A				
	<i>Parent companies</i>	<i>Level 1 subsidiaries</i>	<i>Excluded parent companies</i>	<i>Excluded subsidiaries</i>
Initial database (ORBIS) .....	6,543	51,319 (in 155 countries)		
Subsidiaries with no missing percentage ownership .....	2,578	30,486 (in 140 countries)	(3,965)	(20,833)
Subsidiaries owned at 50% or more .....	2,460	21,272 (in 133 countries)	(118)	(9,214)
Panel B				
	<i>Parent companies</i>	<i>Subsidiaries (5 levels)</i>	<i>Excluded parent companies</i>	<i>Excluded subsidiaries</i>
Ultimate parent companies .....	2,460	21,272		
Ultimate MNCs .....	1,575	11,130	(885)	(10,142)
Panel C				
	<i>Parent companies</i>	<i>Excluded parent companies</i>		
Ultimate MNCs .....	1,575			
Ultimate MNCs with ISIN .....	1,347	(228)		
Ultimate MNCs with gvkey .....	1,283	(64)		
Ultimate MNCs with financial data available on COMPSUTAT between 2011 and 2020 .....	802	(481)		
Ultimate non-loss MNCs .....	528	(274)		
Ultimate MNCs operating during all 10 years of the study period .....	277	(251)		
Panel D				
			<i>Observations (2011-2020)</i>	
Total final sample of MNCs .....	277	× 10 years	2,770	
Treatment sample .....	116	× 10 years	1,160	
Control sample .....	161	× 10 years	1,610	

ISIN = International Securities Identification Number; MNC = multinational corporation.

bring out the “gvkey” (the identification variable for COMPUSTAT). This procedure led to the removal of 228 MNCs that did not have an ISIN,<sup>51</sup> and another 64 MNCs that did not have a gvkey (because COMPUSTAT includes only publicly listed companies). Then a further 481 MNCs were removed because of missing financial and tax accounting data on COMPUSTAT between 2011 and 2020.<sup>52</sup> Also excluded were 274 MNCs with negative pre-tax income, because the use of loss companies in a sample of companies can have an effect on the CASH ETR calculation.<sup>53</sup> Finally, since the focus of the study is tax avoidance by MNCs over a period of 10 years (5 years before the adoption of CbCR and 5 years after), the sample was again refined to include only MNCs that operated throughout this entire period, resulting in a list of 277 Canadian publicly listed MNCs for the period 2011–2020 (see panel C of table 1).

Once the companies meeting the first criterion had been identified (the sample of MNCs), the sample was examined against the second criterion—consolidated revenues exceeding €750 million in the previous year. For this selection procedure, it was necessary to convert the consolidated revenue of each MNC for each previous fiscal year to euros. According to the CRA’s guidance on CbCR,<sup>54</sup> the conversion must be made applying the exchange rates published by the Bank of Canada. The data downloaded for this study included the average monthly Canadian dollar:euro rates since 2010 (the year before 2011) published by the Bank of Canada,<sup>55</sup> and also the US dollar:Canadian dollar rates since 2010, because some Canadian MNCs publish their financial statements in US dollars. For these MNCs, the company’s consolidated revenues were converted first into Canadian dollars, then into euros.

As recommended by the CRA, and in order to use the correct exchange rate for the fiscal year of each MNC, the average rates for the last 12 months were calculated

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- 51 The main reason for the loss of these parent companies is that, on ORBIS, government organizations as well as the pension funds of various workers’ collectives (for example, the Ontario Teachers’ Pension Plan) are considered as companies. These organizations have subsidiaries like any other ordinary company, so they were included in the list of MNCs taken from ORBIS. However, these parent companies do not have ISINs for COMPUSTAT and are therefore excluded from our sample.
- 52 It should be noted that the list of 1,283 multinational parent companies (see panel C of table 1) is taken from ORBIS in 2021. These companies may have operated for only 1 or 2 years; therefore, their financial and tax accounting data on COMPUSTAT may be available for only 1 or 2 years, and not for all 10 years of the study. This accounts for the discrepancy between 1,283 and 802 parent companies.
- 53 If a loss company is included in the sample of companies used to calculate the CASH ETR, it may reduce the overall tax liability of the sample and thus artificially lower the CASH ETR. This is because a loss company has a negative tax liability and would not have paid any cash taxes.
- 54 Canada Revenue Agency, “Guidance on Country-by-Country Reporting in Canada” (Ottawa: CRA, 2020) ([www.canada.ca/en/revenue-agency/services/forms-publications/publications/rc4651/guidance-on-country-reporting-canada.html](http://www.canada.ca/en/revenue-agency/services/forms-publications/publications/rc4651/guidance-on-country-reporting-canada.html)).
- 55 Bank of Canada, “Exchange Rates” ([www.bankofcanada.ca/rates/exchange](http://www.bankofcanada.ca/rates/exchange)); and Bank of Canada, “Historical Noon and Closing Rates” ([www.bankofcanada.ca/rates/exchange/legacy-noon-and-closing-rates](http://www.bankofcanada.ca/rates/exchange/legacy-noon-and-closing-rates)).

using a rolling average. Thus, MNCs that did not publish their financial statements as of December 31 were assigned the average rate for the 12 months preceding the closing date of their fiscal year.

Once these calculations were made, of the 277 Canadian publicly listed MNCs in the final sample, 116 were found to have consolidated revenues that exceeded the threshold of €750 million (constituting the treatment sample), while 161 are below this threshold (constituting the control sample) (see panel D of table 1).

Table 2 describes the distribution of the final sample by sector. This table shows that the total sample of Canadian publicly listed MNCs is dominated by the materials sector (20.65 percent), followed by the financials (18.16 percent), industrials (16.64 percent), and energy sectors (11.48 percent). Thus, the energy and materials sectors, which are subject to additional CbCR requirements under the ESTMA, constitute almost one-third of the total sample.

### Empirical Models and Measurement of Variables

In order to test the hypothesis of this study, the total sample (the treatment sample and the control sample) are initially used to examine the following empirical model according to the difference-in-difference method:

$$CASH\ ETR_{it} = \beta_0 + \beta_1 POST_i + \beta_2 CbCR_i + \beta_3 POST_i * CbCR_i + \beta_n control\ variables + \varepsilon_{it}, \quad (\text{model 1})$$

where

$CASH\ ETR_{it}$  = the cash effective tax rate, measured as cash taxes paid divided by pre-tax income of MNC  $i$  in year  $t$ ;

$POST_i$  = a binary variable equal to 1 for the CbCR post-adoption period (2016-2020) and 0 for the CbCR pre-adoption period (2011-2015);

$CbCR_i$  = a binary variable equal to 1 if the consolidated revenue of MNC  $i$  was at least €750 million in the previous year and otherwise 0; and

$POST_i * CbCR_i$  = an interaction term between  $POST$  and  $CbCR$  for MNC  $i$  in year  $t$ .

As in previous studies,<sup>56</sup> the empirical model also includes the following control variables that may affect the ETRs of MNCs:

$SIZE_{it}$  = size of MNC  $i$  in year  $t$ , measured as the natural logarithm of total assets;

$ROA_{it}$  = the performance of MNC  $i$  in year  $t$ , measured as pre-tax income divided by total assets;

$LEV_{it}$  = the leverage ratio of MNC  $i$  in year  $t$ , measured as total debt divided by total assets;

$INT_{it}$  = the intangible assets intensity of MNC  $i$  in year  $t$ , measured as intangible assets divided by total assets;

56 Dyreng et al., supra note 26; Thomsen and Watrin, supra note 4; Okafor et al., supra note 44; and Chen et al., supra note 4.

**TABLE 2 Sample Distribution by Sector<sup>a</sup>**

Sector	Total sample	%	Treatment sample	%	Control sample	%
<b>ESTMA</b>						
1 Energy .....	318	11.48	153	13.19	165	10.25
2 Materials .....	572	20.65	141	12.16	431	26.77
<b>Non-ESTMA</b>						
3 Industrials .....	461	16.64	180	15.52	281	17.45
4 Consumer discretionary .....	177	6.39	89	7.67	88	5.47
5 Consumer staples .....	122	4.40	85	7.33	37	2.30
6 Health care .....	57	2.06	11	0.95	46	2.86
7 Financials .....	503	18.16	305	26.29	198	12.30
8 Information technology .....	169	6.10	45	3.88	124	7.70
9 Communications services .....	79	2.85	38	3.28	41	2.55
10 Utilities .....	126	4.55	83	7.16	43	2.67
11 Real estate .....	186	6.71	30	2.59	156	9.69
Total observations .....	2,770	100	1,160	100	1,610	100

ESTMA = Extractive Sector Transparency Measures Act.

a Sector classification according to the Global Industry Classification Standard.

- $R\&D_{it}$  = the research and development (R & D) intensity of MNC  $i$  in year  $t$ , measured as R & D expenditure divided by total assets and coded 0 if the MNC had no R & D expenditure;
- $PP\&E_{it}$  = the tangible asset intensity of MNC  $i$  in year  $t$ , measured as net property, plant, and equipment (PP & E) divided by total assets;
- $CAPEX_{it}$  = capital expenditures of MNC  $i$  in year  $t$ , measured as the amount spent on capital assets divided by net PP & E;
- $SPI_{it}$  = special items of MNC  $i$  in year  $t$ , measured as special items in year  $t$  divided by total assets in year  $t$ ;
- $SPI_{it-1}$  = special items of MNC  $i$  in year  $t - 1$ , measured as special items in year  $t - 1$  divided by total assets in year  $t - 1$ ;
- $NOL_{it}$  = a binary variable equal to 1 if COMPUSTAT reports a tax loss carryforward for MNC  $i$  at the end of year  $t - 1$  and otherwise 0;
- $\Delta NOL_{it}$  = the change in net operating losses of MNC  $i$ , measured as the difference between current ( $t$ ) and lagged ( $t - 1$ ) tax loss carryforward divided by total assets in year  $t - 1$ ;
- $YEAR^{57}$  = a time variable that varies between 2011 and 2020; and
- $SECTOR$  = a binary variable equal to 1 if the MNC belongs to sector  $X$  and otherwise 0. The 11 sectors according to the Global Industry Classification Standard

57 This variable will not be included in the same regression equation with the  $POST$  variable since there is a strong correlation between  $YEAR$  and  $POST$  (that is, they both measure the same “time” element).



(GICS) are (1) energy, (2) materials, (3) industrials, (4) consumer discretionary, (5) consumer staples, (6) health care, (7) financials, (8) information technology, (9) communication services, (10) utilities, and (11) real estate.

In model 1, the coefficient of interest is  $\beta_3$  (the interaction between *POST* and *CbCR*). This coefficient provides an estimate of the impact of CbCR on tax avoidance (measured by *CASH ETR*) in the post-adoption period compared to the pre-adoption period between MNCs subject to the CbCR obligation (the treatment sample) and MNCs that are not (the control sample). To confirm the hypothesis that the adoption of CbCR has an impact on the tax avoidance of MNCs subject to this obligation, the coefficient  $\beta_3$  is expected to be significantly positive.

In a second step, the focus is on the treatment sample—MNCs subject to the CbCR obligation (those whose consolidated revenues were at least €750 million in the previous year) before and after the adoption of CbCR. Thus, each MNC subject to the CbCR obligation also acts as its own control. This allows the following model to be tested:

$$CASH ETR_{it} = \beta_0 + \beta_1 POST_i + \beta_n control\ variables + \varepsilon_{it} \quad (\text{model 2})$$

In model 2, the coefficient of interest is  $\beta_1$ . This coefficient reflects the difference in the tax avoidance of MNCs subject to the CbCR obligation between the CbCR pre- and post-adoption periods. To confirm the hypothesis that the adoption of CbCR has an impact on the tax avoidance of MNCs subject to this obligation, the coefficient  $\beta_1$  is expected to be significantly positive.

Finally, in robustness tests, the following alternative measures of tax avoidance (instead of *CASH ETR*) are used to test models 1 and 2:

*GAAP ETR<sub>it</sub>* = the GAAP effective tax rate, measured as the total income tax expense divided by pre-tax income of MNC *i* in year *t*; and  
*Lagged CASH ETR<sub>it+1</sub>* = the lagged cash effective tax rate, measured as cash taxes paid by MNC *i* in year *t* + 1 divided by its pre-tax income in year *t* + 1.

## RESULTS

### Descriptive Statistics

The descriptive statistics (mean, standard deviation, minimum, and maximum) for the study variables are reported in table 3. The table shows that the mean *CASH ETR* for the total sample is 17.7 percent,<sup>58</sup> which is in line with prior literature on Canadian firms.<sup>59</sup>

58 By comparison, the mean GAAP ETR is 23.8 percent, which is also consistent with previous literature. See, for example, Joshi, *supra* note 32; and Thomsen and Watrin, *supra* note 4.

59 For example, Martin and Stratica, *supra* note 4, and Okafor et al., *supra* note 44.

**TABLE 3 Descriptive Statistics, Total Sample**

Variables	N	Mean	Standard deviation	Minimum	Maximum
<i>CASH ETR<sub>it</sub></i> .....	2,770	0.177	0.228	0.00	1.00
<i>POST<sub>i</sub></i> .....	2,770	0.50	0.500	0.00	1.00
<i>CbCR<sub>i</sub></i> .....	2,770	0.42	0.493	0.00	1.00
<i>POST<sub>i</sub>*CbCR<sub>i</sub></i> .....	2,770	0.21	0.413	0.00	1.00
Total assets .....	2,770	52,689	187,301	0.100 <sup>a</sup>	1,715,865
<i>SIZE<sub>it</sub></i> .....	2,770	7.369	2.727	-1.000	14.355
<i>ROA<sub>it</sub></i> .....	2,770	0.081	0.118	0.000	0.940
<i>LEV<sub>it</sub></i> .....	2,770	0.256	0.219	0.000	0.987
<i>INT<sub>it</sub></i> .....	2,770	0.141	0.197	0.000	0.902
<i>R&amp;D<sub>it</sub></i> .....	2,770	0.009	0.030	0.000	0.344
<i>PP&amp;E<sub>it</sub></i> .....	2,770	0.321	0.295	0.000	0.992
<i>CAPEX<sub>it</sub></i> .....	2,770	0.186	0.311	0.000	6.820
<i>SPI<sub>it</sub></i> .....	2,770	0.035	0.142	-0.213	0.888
<i>SPI<sub>it-1</sub></i> .....	2,770	0.020	0.120	-0.502	0.890
<i>NOL<sub>it</sub></i> .....	2,770	0.504	0.500	0.00	1.00
$\Delta$ <i>NOL<sub>it</sub></i> .....	2,770	0.386	0.645	-2.929	8.490
<i>YEAR</i> .....	2,770	2015.5	2.924	2011	2020

Notes: See appendix C for the definitions of variables. *CASH ETRs* greater than 1 are reset to 1. All control variables other than binary variables are winsorized at the 1 percent and 99 percent levels.

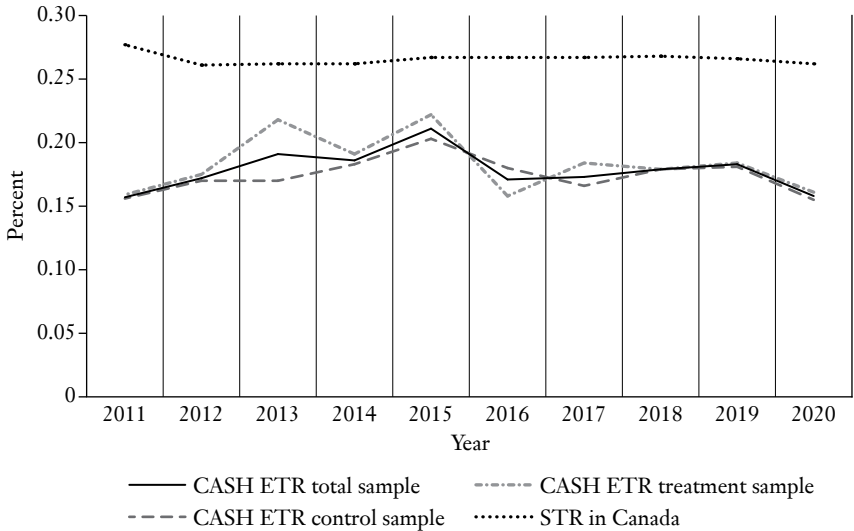
- a In robustness tests, first MNCs with total assets of less than Cdn\$1 million, then MNCs with total assets of less than Cdn\$10 million, and then MNCs with total assets of less than Cdn\$100 million are excluded from the sample, and the results remain quite similar.

In order to compare the *CbCR* pre-adoption period (2011-2015, *POST* = 0) and post-adoption period (2016-2020, *POST* = 1), the trend of the mean *CASH ETR* throughout the study period is charted in figure 1. Mean difference *t*-tests were performed to examine whether the difference is statistically significant or not, and the results are reported in table 4.

Contrary to expectations, figure 1 shows that the mean *CASH ETR* of MNCs subject to the *CbCR* obligation (the treatment sample) did not rise after the adoption of *CbCR* in 2016. Instead, it fell, on average, from 19.3 percent in 2011-2015 (the pre-adoption period) to 17.4 percent in 2016-2020 (the post-adoption period), and this mean difference is statistically significant at the 10 percent level, as shown in table 4.

It is worth noting that the mean *CASH ETR* of Canadian MNCs subject to *CbCR* was close to 15 percent in 2020. Fifteen percent is the rate agreed to by approximately 137 countries (including Canada) at the G20 in 2021 for a minimum tax on the profits of MNCs with consolidated annual revenues exceeding €750 million (the same criterion as that for *CbCR*). This raises the question of the relevance of BEPS action 13 since, from 2023 onward, these MNCs will have to pay a 15 percent minimum tax in all cases.

**FIGURE 1 Trend of Mean CASH ETR, 2011-2020**



CASH ETR = cash effective tax rate; STR = statutory tax rate.

**TABLE 4 Mean Difference t-Test**

Variable: *CASH ETR*

Period	Total sample		Treatment sample (CbCR = 1)		Control sample (CbCR = 0)	
	Mean (standard deviation)	<i>t</i> (significance)	Mean (standard deviation)	<i>t</i> (significance)	Mean (standard deviation)	<i>t</i> (significance)
2016-2020 ( <i>POST</i> = 1) . . . . .	0.173 (0.220)	-0.969 (0.166)	0.174 (0.187)	-1.607 (0.054)*	0.172 (0.244)	-0.136 (0.446)
2011-2015 ( <i>POST</i> = 0) . . . . .	0.181 (0.235)		0.193 (0.221)		0.174 (-0.136)	

Notes: See appendix C for the definitions of *CASH ETR*, *POST*, and *CbCR*. \* denotes significance at the 10 percent level.

**Correlation Analyses**

Before the regression analyses to test models 1 and 2 were carried out, correlation analyses were performed. The Pearson correlation coefficients between the study variables are presented in panel A of table 5 for the total sample (model 1), in panel B for the treatment sample (model 2), and (for comparative purposes) in panel C for the control sample.

**TABLE 5 Correlation Matrixes—Total, Treatment, and Control Samples**

Panel A: Total sample (N = 2,770 observations)

Variable	CASH	ETR <sub><i>t</i></sub>	POST <sub><i>t</i></sub>	CbCR <sub><i>t</i></sub>	POST <sub><i>t</i></sub> *	CbCR <sub><i>t</i></sub>	SIZE <sub><i>t</i></sub>	ROA <sub><i>t</i></sub>	LEV <sub><i>t</i></sub>	INT <sub><i>t</i></sub>	R&D <sub><i>t</i></sub>	PP&E <sub><i>t</i></sub>	CAPEX <sub><i>t</i></sub>	SPI <sub><i>t</i></sub>	SPI <sub><i>t-1</i></sub>	NOL <sub><i>t</i></sub>	ΔNOL <sub><i>t</i></sub>	YEAR	
CASH																			
ETR <sub><i>t</i></sub>	.....	1																	
POST <sub><i>t</i></sub>	.....	-0.018	1																
CbCR <sub><i>t</i></sub>	.....	0.022	0.060***	1															
POST <sub><i>t</i></sub> *					1														
CbCR <sub><i>t</i></sub>	.....	-0.008	0.541***	0.625***	1														
SIZE <sub><i>t</i></sub>	.....	-0.010	0.079***	0.679***	0.454***	1													
ROA <sub><i>t</i></sub>	.....	-0.127***	0.043**	-0.164***	-0.096***	-0.397***	1												
LEV <sub><i>t</i></sub>	.....	-0.159***	0.032*	0.213***	0.161***	0.316***	-0.238***	1											
INT <sub><i>t</i></sub>	.....	0.130***	0.036*	0.102***	0.105***	0.005	-0.069***	0.114***	1										
R&D <sub><i>t</i></sub>	.....	-0.013	-0.025	-0.165***	-0.099***	-0.204***	0.103***	-0.115***	0.090***	1									
PP&E <sub><i>t</i></sub>	.....	0.029	-0.013	0.013	-0.016	-0.027	-0.055***	-0.037**	-0.331***	-0.178***	1								
CAPEX <sub><i>t</i></sub>	.....	0.084***	-0.087***	-0.076***	-0.089***	-0.097***	0.045**	-0.224***	0.090***	0.094***	-0.143***	1							
SPI <sub><i>t</i></sub>	.....	-0.142***	-0.029	-0.133***	-0.073***	-0.254***	0.421***	0.078***	-0.104***	0.115***	-0.023	-0.076***	1						
SPI <sub><i>t-1</i></sub>	.....	-0.077***	-0.090***	-0.081***	-0.056***	-0.093***	-0.025	0.152***	-0.072***	0.097***	0.002	-0.067***	0.489***	1					
NOL <sub><i>t</i></sub>	.....	0.006	0.095***	-0.031	0.011	-0.142***	0.128***	-0.076***	0.121***	0.025	0.137***	0.027	-0.018	-0.118***	1				
ΔNOL <sub><i>t</i></sub>	.....	-0.007	-0.056***	0.055***	0.022	0.184***	-0.208***	0.053***	-0.078***	-0.015	-0.062***	-0.008	0.023	0.059***	-0.643***	1			
YEAR	.....	0.001	0.876***	0.085***	0.487***	0.097***	0.049***	0.030	0.043**	-0.033*	-0.028	-0.081***	-0.067***	-0.133***	0.114***	-0.071***	1		

(Table 5 is continued on the next page.)

**TABLE 5 Continued**

Panel B: Treatment sample (N = 1,160 observations; CbCR = 1)

Variable	CASH	ETR <sub>it</sub>	POST <sub>i</sub>	SIZE <sub>it</sub>	ROA <sub>it</sub>	LEV <sub>it</sub>	INT <sub>it</sub>	R&D <sub>it</sub>	PPE&E <sub>it</sub>	CAPEX <sub>it</sub>	SPI <sub>it</sub>	SPI <sub>it-1</sub>	NOL <sub>it</sub>	ΔNOL <sub>it</sub>	YEAR
CASH	ETR <sub>it</sub>														
POST <sub>i</sub>	1														
SIZE <sub>it</sub>	-0.240***	0.048	1												
ROA <sub>it</sub>	-0.067**	0.028	-0.410***	1											
LEV <sub>it</sub>	-0.239***	0.061**	0.123***	-0.154***	1										
INT <sub>it</sub>	0.127***	0.086***	-0.351***	0.123***	0.092***	1									
R&D <sub>it</sub>	0.065***	0.017	-0.122***	0.123***	-0.055*	0.190***	1								
PPE&E <sub>it</sub>	0.040	-0.047	-0.237***	0.187***	-0.044	-0.258***	-0.097***	1							
CAPEX <sub>it</sub>	0.128***	-0.098***	-0.139***	0.092***	-0.248***	0.208***	0.077***	-0.097***	1						
SPI <sub>it</sub>	-0.055*	0.033	0.121***	0.187***	-0.022	-0.099***	-0.030	0.002	-0.034	1					
SPI <sub>it-1</sub>	-0.070**	-0.014	0.157***	-0.037	0.026	-0.129***	-0.005	-0.027	-0.059**	0.415***	1				
NOL <sub>it</sub>	0.025	0.060**	-0.172***	0.075**	0.161***	0.233***	0.148***	0.103***	0.046	-0.030	-0.066**	1			
ΔNOL <sub>it</sub>	-0.034	-0.030	0.294***	-0.170***	-0.165***	-0.251***	-0.116***	-0.141***	-0.016	0.061**	0.088***	-0.648***	1		
YEAR	-0.019	0.876***	0.056*	-0.013	0.081***	0.090***	0.021	-0.052*	-0.099***	0.017	-0.021	0.067**	-0.029	1	

(Table 5 is concluded on the next page.)

**TABLE 5 Concluded**

Panel C: Control sample (N = 1,160 observations;  $CbCR = 0$ )

Variable	CASH	ETR <sub>it</sub>	POST <sub>i</sub>	SIZE <sub>it</sub>	ROA <sub>it</sub>	LEV <sub>it</sub>	INT <sub>it</sub>	R&D <sub>it</sub>	PPE <sub>it</sub>	CAPEX <sub>it</sub>	SPI <sub>it</sub>	SPI <sub>it-1</sub>	NOL <sub>it</sub>	ΔNOL <sub>it</sub>	YEAR
CASH ETR <sub>it</sub>	1														
POST <sub>i</sub>	-0.003	1													
SIZE <sub>it</sub>	0.101***	0.056**	1												
ROA <sub>it</sub>	-0.145***	0.066***	-0.488***	1											
LEV <sub>it</sub>	-0.130***	-0.007	0.323***	-0.238***	1										
INT <sub>it</sub>	0.130***	-0.007	0.099***	-0.105***	0.097***	1									
R&D <sub>it</sub>	-0.027	-0.026	-0.144***	0.073***	-0.095***	0.095***	1								
PPE <sub>it</sub>	0.022	0.011	0.099***	-0.128***	-0.039	-0.386***	-0.218***	1							
CAPEX <sub>it</sub>	0.067***	-0.076***	-0.015	0.022	-0.197***	0.042*	0.088***	-0.168***	1						
SPI <sub>it</sub>	-0.170***	-0.042*	-0.389***	0.441***	0.156***	-0.094***	0.113***	-0.031	-0.104***	1					
SPI <sub>it-1</sub>	-0.079***	-0.118***	-0.149***	-0.039	0.231***	-0.042*	0.100***	0.015	-0.079***	0.499***	1				
NOL <sub>it</sub>	-0.005	0.123***	-0.165***	0.151***	-0.216***	0.054**	-0.014	0.161***	0.013	-0.020	-0.148***	1			
ΔNOL <sub>it</sub>	0.003	-0.077***	0.154***	-0.217***	0.141***	0.001	0.017	-0.021	0.002	0.024	0.057**	-0.575***	1		
YEAR	0.009	0.876***	0.050	0.091***	-0.030	-0.002	-0.032	-0.013	-0.062**	-0.085***	-0.174***	0.153***	-0.102***	1	

Notes: See appendix C for the definitions of variables. CASH ETRs greater than 1 are reset to 1. All control variables other than binary variables are winsorized at the 1 percent and 99 percent levels. \*\*\*, \*\*, and \* denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Panel A of table 5 shows that the correlation between *CASH ETR* and *POST*\**CbCR* is not significant, refuting the hypothesis of this study, according to which it was expected that *CASH ETRs* of Canadian MNCs that were subject to CbCR would have increased after the adoption of CbCR compared to the *CASH ETRs* of MNCs that were not subject to this obligation. Therefore, there is no evidence that Canadian MNCs that were subject to CbCR practised less tax avoidance after the adoption of CbCR in 2016.

For the treatment sample, panel B<sup>60</sup> of table 5 also shows that the correlation between *CASH ETR* and *POST* is not significant, again refuting the study hypothesis, according to which it was expected that *CASH ETRs* of Canadian MNCs that were subject to CbCR would have increased after the adoption of CbCR in 2016.

Regarding correlation coefficients, panels A, B, and C of table 5 show that, except for the correlation between *POST* and *YEAR* variables (which will not be included in the same regression equation<sup>61</sup> since they measure the same “time” variable), all the coefficients between the explanatory variables are below the critical threshold of 0.7, indicating that there is no multicollinearity problem. It should be noted that the correlation between *CbCR* and *SIZE*<sup>62</sup> is also strong, but it remains below the conventional threshold of 0.7. This strong correlation is due to the fact that MNCs subject to CbCR are large corporations (with consolidated revenues exceeding €750 million). However, it is not necessary that corporations with high revenues also have high asset values (as measured by the variable *SIZE*), as is particularly the case, for example, in the information technology and health-care sectors.

Finally, the regression analyses presented in the next section show that the variance inflation factor values are all lower than 3 (results not tabulated), thus confirming the absence of symptoms of multicollinearity.<sup>63</sup>

## Regression Analyses

### Testing Model 1

Given the longitudinal (panel) nature of the data, clustering of standard errors at the firm level was carried out to correct for bias in results, and a general linear model for complex samples was carried out. Table 6 presents the general linear model regression coefficients for model 1 according to the difference-in-difference method. In order to test the effect of CbCR year by year since its adoption in 2016, this table

60 Panels B and C of table 5 do not present correlation coefficients between *CASH ETR* and *CbCR*, since the *CbCR* variable is a constant in these two subsamples (*CbCR* = 1 in panel B, and *CbCR* = 0 in panel C).

61 In robustness tests, *POST* was replaced by *YEAR* in all the regression equations, and the results were quite similar. See below under “Robustness Tests.”

62 In robustness tests, the regression equations were tested without the *SIZE* variable, and the results were quite similar. See the discussion below.

63 Joseph F. Hair, William C. Black, Barry J. Babin, and Rolph E. Anderson, *Multivariate Data Analysis*, 7th ed. (New York: Pearson Education, 2009).

shows the effect of CbCR from the first year after its adoption (column 1) to the fifth year after its adoption (column 5).

In accordance with the correlation results but contrary to expectations, the regression results show that the coefficient of interest  $\beta_3$  ( $POST * CbCR$ ) is negative and not significant in columns 1 through 5. This result, which leads to the rejection of the study hypothesis, implies that CbCR under BEPS action 13 had no effect on Canadian MNCs that were subject to this obligation since their level of tax avoidance did not change significantly compared to that of other MNCs after the adoption of CbCR in 2016.

In order to take into account the CbCR requirement under the ESTMA, to which almost one-third of the sample was subject, the total sample was divided into two subsamples: MNCs that were subject to CbCR under the ESTMA (those in the energy and materials sectors), and MNCs that were not subject to this obligation. The results are reported in columns 6 and 7 of table 6, respectively. They show that the coefficient of interest  $\beta_3$  ( $POST * CbCR$ ) is significantly negative in the subsample of MNCs subject to CbCR under the ESTMA (column 6). These results imply that Canadian MNCs that were subject to both CbCR under BEPS action 13 and CbCR under the ESTMA continued to avoid tax even after the adoption of these obligations. In the subsample of MNCs that were not subject to CbCR under the ESTMA (column 7), the results show that the coefficient of interest  $\beta_3$  ( $POST * CbCR$ ) is positive, as expected, but not significant.

The results may be explained by the presence of some factors that may contribute to the likelihood that MNCs in the ESTMA (energy and materials) sectors will engage in tax avoidance. First, companies in the energy and materials sectors are often capital-intensive, meaning that they require significant investment in assets and infrastructure. These companies may be more likely to engage in tax-planning strategies to maximize deductions for capital investments, which can reduce their taxable income. Second, companies in the energy and materials sectors are engaged in resource extraction activities, which can involve complex tax issues related to royalties, transfer pricing, and other factors. Third, many companies in these sectors have significant international operations and may be subject to tax laws and regulations in multiple jurisdictions. Operating in a complex tax landscape can create the need for careful planning to minimize tax liabilities.

To examine whether the results differ from one sector to another, the regression equations from model 1 were re-estimated for each sector using the difference-in-difference method. These results are reported in table 7.

Table 7 shows that the coefficient of interest  $\beta_3$  ( $POST * CbCR$ ) is positive, as expected, in several sectors—consumer discretionary, consumer staples, financials, communication services, utilities, and real estate—but it is not significant at conventional thresholds. In the industrials, health-care, and information technology sectors also,  $\beta_3$  ( $POST * CbCR$ ) is not significant, although it is negative. Finally, and in accordance with the results presented in column 6 of table 6, table 7 shows that  $\beta_3$  ( $POST * CbCR$ ) is significantly negative in the energy and materials sectors.



**TABLE 6 Model 1 Regression Results, Total Sample**

Dependent variable: *CASH ETR*

Variables	Expected sign	All sectors					ESTMA		Non-ESTMA	
		2011-2016 (1)	2011-2017 (2)	2011-2018 (3)	2011-2019 (4)	2011-2020 (5)	2011-2020 (6)	2011-2020 (7)		
Intercept	?	0.211 (3.853)***	0.213 (4.109)***	0.208 (4.163)***	0.194 (4.092)***	0.186 (4.006)***	0.186 (3.384)***	0.284 (5.482)***		
<i>POST<sub>i</sub></i>	+/-	0.011 (0.555)	0.003 (0.190)	0.008 (0.576)	0.011 (0.817)	0.008 (0.617)	0.013 (0.506)	-0.002 (-0.001)		
<i>CbCR<sub>i</sub></i>	+/-	0.022 (0.937)	0.025 (1.095)	0.028 (1.282)	0.029 (1.359)	0.025 (1.246)	0.036 (0.930)	0.027 (1.241)		
<i>POST<sub>i</sub>*CbCR<sub>i</sub></i>	+	-0.043 (-1.488)	-0.025 (-1.153)	-0.028 (-1.424)	-0.027 (-1.406)	-0.026 (-1.383)	-0.109 (-2.579)**	0.009 (0.462)		
<i>SIZE<sub>it</sub></i>	+	0.001 (0.189)	0.006 (0.012)	0.001 (0.032)	-0.003 (-0.007)	0.001 (0.170)	0.020 (2.807)***	-0.009 (-1.898)*		
<i>ROA<sub>it</sub></i>	-	-0.303 (-4.013)***	-0.318 (-4.535)***	-0.320 (-5.171)***	-0.323 (-5.584)***	-0.311 (-5.860)***	-0.173 (-2.833)***	-0.539 (-5.305)***		
<i>LEV<sub>it</sub></i>	-	-0.186 (-4.157)***	-0.191 (-4.472)***	-0.193 (-4.839)***	-0.177 (-4.754)***	-0.167 (-4.841)***	-0.056 (-0.690)	-0.204 (-5.709)***		
<i>INT<sub>it</sub></i>	+	0.174 (3.307)***	0.172 (3.183)***	0.156 (3.111)***	0.154 (3.352)***	0.160 (3.364)***	-0.035 (-0.256)	0.180 (3.842)***		
<i>R&amp;D<sub>it</sub></i>	-	-0.006 (-0.022)	0.067 (0.241)	0.046 (0.170)	0.183 (0.710)	0.142 (0.579)	0.542 (1.041)	-0.038 (-0.139)		
<i>PP&amp;E<sub>it</sub></i>	-	-0.002 (-0.041)	-0.001 (-0.018)	-0.009 (-0.239)	-0.007 (-0.212)	-0.005 (-0.130)	-0.135 (-2.259)**	0.044 (1.008)		
<i>CAPEX<sub>it</sub></i>	-	0.014 (0.623)	0.017 (0.849)	0.025 (1.236)	0.027 (1.350)	0.029 (1.423)	-0.041 (-2.325)**	0.050 (2.360)**		

(Table 6 is concluded on the next page.)

**TABLE 6 Concluded**

Dependent variable: *CASH ETR*

Variables	All sectors							ESTMA		Non-ESTMA
	Expected sign	2011-2016 (1)	2011-2017 (2)	2011-2018 (3)	2011-2019 (4)	2011-2020 (5)	2011-2020 (6)	2011-2020 (7)		
$SPI_{it}$	-/+	-0.076 (-1.443)	-0.064 (-1.329)	-0.065 (-1.475)	-0.061 (-1.438)	-0.059 (-1.542)	-0.119 (-2.096)**	0.027 (0.469)		
$SPI_{it-1}$	+	-0.042 (-0.841)	-0.042 (-0.980)	-0.029 (-0.742)	-0.049 (-1.245)	-0.054 (-1.526)	-0.077 (-1.393)	-0.061 (-1.242)		
$NOL_{it}$	-	-0.026 (-1.341)	-0.029 (-1.585)	-0.023 (-1.412)	-0.022 (-1.498)	-0.021 (-1.516)	0.009 (0.372)	-0.041 (-2.187)**		
$\Delta NOL_{it}$	+	-0.010 (-0.635)	-0.014 (-0.865)	-0.013 (-1.058)	-0.009 (-0.888)	-0.009 (-0.890)	-0.006 (-0.603)	-0.021 (-1.235)		
<i>Sector</i>		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Adj. $R^2$		0.100	0.101	0.103	0.106	0.105	0.093	0.156		
Wald's F		6.842***	7.184***	7.992***	9.260***	10.149***	9.147***	8.275***		
N		1,662	1,939	2,216	2,493	2,770	890	1,880		

ESTMA = Extractive Sector Transparency Measures Act.

Notes: See appendix C for the definitions of variables. CASH ETRs greater than 1 are reset to 1. All control variables other than binary variables are winsorized at the 1 percent and 99 percent levels. General linear model regression coefficients with *t*-statistics in parentheses. \*\*\*, \*\*, and \* denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

**TABLE 7 Model 1 Regression Results, Total Sample, by Sector**

Dependent variable: *CASH ETR*

Variables	Expected sign	Energy	Materials	Industrials	Consumer discretionary	Consumer staples	Health care	Financials	Information technology	Communication services	Utilities	Real estate
Intercept	?	0.312 (2.633)**	0.058 (0.956)	0.348 (4.328)**	0.197 (1.251)	0.339 (2.019)*	0.475 (5.218)**	0.316 (3.551)**	-0.109 (-0.783)	0.275 (1.790)*	0.226 (2.211)**	0.880 (4.828)**
<i>POST<sub>it</sub></i>	+/-	-0.043 (-0.877)	0.013 (0.429)	0.009 (0.320)	-0.027 (-0.434)	-0.040 (-0.539)	-0.034 (-0.724)	-0.024 (-0.537)	0.087 (3.093)**	0.014 (0.137)	-0.067 (-1.159)	-0.020 (-1.136)
<i>ChCR<sub>it</sub></i>	+/-	0.354 (3.066)**	0.028 (0.463)	-0.047 (-0.940)	-0.006 (-0.081)	-0.070 (-0.989)	0.077 (1.466)	0.013 (0.297)	0.032 (0.549)	-0.174 (-1.903)*	-0.015 (-0.203)	0.043 (1.294)
<i>POST<sub>it</sub>*ChCR<sub>it</sub></i>	+	-0.549 (-5.777)**	-0.109 (-2.577)**	-0.011 (-0.243)	0.141 (1.459)	0.013 (0.178)	-0.067 (-1.202)	0.040 (0.826)	-0.073 (-1.175)	0.036 (0.280)	0.031 (0.470)	0.008 (0.168)
<i>SIZE<sub>it</sub></i>	+	-0.036 (-1.110)	0.037 (3.951)**	0.025 (2.107)**	0.004 (0.002)	0.021 (1.193)	-0.009 (-1.017)	-0.008 (-1.114)	0.026 (1.596)	0.006 (0.569)	-0.005 (-0.710)	-0.046 (-2.770)**
<i>ROA<sub>it</sub></i>	-	-0.496 (-2.423)**	-0.187 (-2.350)**	-1.077 (-3.213)**	-0.888 (-1.803)*	-0.361 (-1.576)	-0.144 (-1.219)	-0.512 (-2.846)**	-0.150 (-0.799)	-0.660 (-0.717)	-0.282 (-1.305)	-1.797 (-2.711)**
<i>LEV<sub>it</sub></i>	-	-0.123 (-0.688)	0.022 (0.169)	-0.136 (-1.290)	-0.246 (-1.785)*	0.129 (1.052)	-0.063 (-0.545)	-0.224 (-6.171)**	0.064 (0.549)	0.119 (0.513)	0.047 (0.351)	-0.675 (-4.119)**
<i>INT<sub>it</sub></i>	+	0.252 (0.799)	-0.145 (-0.862)	-0.085 (-1.006)	0.183 (1.404)	-0.231 (-0.966)	-0.112 (-0.488)	0.338 (2.448)**	0.042 (0.508)	0.065 (0.827)	0.117 (0.525)	0.311 (3.928)**
<i>R&amp;D<sub>it</sub></i>	-	-0.031 (-0.106)	-0.345 (-1.360)	0.599 (0.536)	1.083 (1.224)	-1.012 (-1.050)	0.160 (0.507)	2.967 (0.264)	0.022 (0.065)	0.184 (0.240)	-2.990 (-0.656)	-0.638 (-0.924)
<i>PP&amp;E<sub>it</sub></i>	-	-0.885 (-2.763)**	-0.095 (-1.342)	-0.258 (-3.249)**	0.197 (1.113)	-0.325 (-1.863)	-0.230 (-2.342)**	0.208 (1.633)	0.309 (1.281)	0.053 (0.356)	-0.093 (-1.100)	0.011 (0.204)
<i>CAPEX<sub>it</sub></i>	-	0.071 (3.622)**	-0.032 (-2.145)**	-0.028 (-1.219)	0.364 (2.190)**	-0.057 (-0.157)	-0.187 (-1.385)	0.090 (4.023)**	0.152 (1.153)	-0.011 (-0.179)	-0.062 (-0.400)	0.001 (0.010)

(Table 7 is concluded on the next page.)

**TABLE 7 Concluded**

Dependent variable: *CASH ETR*

Variables	Expected sign	Energy	Materials	Industrials	Consumer discretionary	Consumer staples	Health care	Financials	Information technology	Communication services	Utilities	Real estate
$SP_{it}$	-/+	0.245 (1.679)	0.023 (0.282)	-0.285 (-1.644)	0.111 (1.125)	-0.057 (-0.361)	-0.322 (-3.656)***	0.107 (1.275)	-0.288 (-2.520)**	-0.983 (-2.179)**	0.051 (0.421)	0.084 (0.111)
$SP_{it-1}$	+	-0.051 (-0.544)	-0.028 (-0.396)	-0.092 (-0.698)	-0.227 (-1.428)	-0.007 (-0.028)	-0.035 (-0.514)	-0.071 (-0.971)	-0.001 (-0.004)	0.327 (1.525)	-0.139 (-0.705)	0.317 (1.398)
$NOI_{it}$	-	-0.133 (-3.609)***	-0.001 (-0.048)	-0.073 (-2.326)**	-0.045 (-1.710)	-0.022 (-0.406)	0.008 (0.242)	-0.118 (-2.438)**	0.001 (0.020)	-0.076 (-2.149)*	-0.028 (-0.533)	-0.061 (-1.443)
$\Delta NOI_{it}$	+	-0.120 (-2.925)**	-0.009 (-0.731)	-0.045 (-1.197)	-0.099 (-2.232)**	-0.015 (-0.460)	0.001 (0.073)	-0.067 (-1.523)	0.010 (0.333)	-0.084 (-1.475)	0.032 (1.088)	-0.054 (-1.756)*
Adj. $R^2$		0.102	0.133	0.125	0.149	0.091	0.103	0.165	0.132	0.136	0.102	0.193
Wald's F		5.725**	7.977***	2.394*	8.497***	13.197**	9.620***	12.009***	4.180***	3.904*	3.459*	15.806*
N		318	572	461	177	122	57	503	169	79	126	186

Notes: See appendix C for the definitions of variables. CASH ETRs greater than 1 are reset to 1. All control variables other than binary variables are winsorized at the 1 percent and 99 percent levels. General linear model regression coefficients with *t*-statistics in parentheses. \*\*\*, \*\*, and \* denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

### *Testing Model 2*

Table 8 presents the general linear model regression results for model 2. As explained in the methodology section, in these tests only the treatment sample before and after the adoption of CbCR is used. Thus, each MNC subject to the CbCR obligation also acts as its own control. The table shows the results for all sectors, for MNCs that are subject to CbCR under the ESTMA, and for MNCs that are not subject to CbCR under the ESTMA. In each case, *POST* is the coefficient of interest  $\beta_1$  in column 1, and *YEAR* is the coefficient of interest  $\beta_1$  in column 2.

The results for all sectors show no evidence that the adoption of CbCR under BEPS action 13 had an effect on the tax avoidance of Canadian MNCs subject to this obligation, since the coefficient of interest  $\beta_1$  (*POST* and *YEAR*) is not significant. However, contrary to expectations, Canadian MNCs that were subject to both CbCR under BEPS action 13 and CbCR under the ESTMA continued to avoid tax after the adoption of these obligations, since the coefficient of interest  $\beta_1$  (*POST* and *YEAR*) is significantly negative. In other words, the adoption of BEPS CbCR seems to have had no deterrent effect on tax avoidance by MNCs subject to this obligation in the energy and materials sectors.

In broad terms, these results support the model 1 regression results presented in table 6, as well as the descriptive analyses (graphical representation and mean difference *t*-test) reported in figure 1 and table 4.

### **Robustness Tests**

As mentioned in the methodology section, in the robustness tests alternative measures of tax avoidance are used, in order to ensure the reliability of the estimates.

Table 9 presents the results for the estimates of model 1 (the total sample) and model 2 (the treatment sample only), using *GAAP ETR* instead of *CASH ETR* as the dependent variable. For each model, column 1 reports the results for all sectors, while columns 2 and 3 report the results for the ESTMA and non-ESTMA sectors, respectively.

Contrary to expectations, the results still show that the coefficients of interest  $\beta_3$  (*POST*\**CbCR*) and  $\beta_1$  (*POST*) remain significantly negative in models 1 and 2, respectively, even when *GAAP ETR* is used as a measure of tax avoidance. These results are basically driven by sectors that are subject to the ESTMA (column 2), since the coefficients of interest  $\beta_3$  (*POST*\**CbCR*) and  $\beta_1$  (*POST*) are not significant in sectors that are not subject to the ESTMA (column 3).

*Lagged CASH ETR* was also used as the dependent variable in order to correct for any deviations from the long-run equilibrium relationship. The results for models 1 and 2 are presented in columns 1, 2, and 3 of table 10 for all sectors, the ESTMA sectors, and the non-ESTMA sectors, respectively.

The results reported in table 10 confirm those presented in tables 6, 8, and 9. This indicates that the results are not sensitive to the measure of tax avoidance, since they are similar regardless of whether *CASH ETR*, *GAAP ETR*, or *Lagged CASH ETR* is used as the dependent variable.

**TABLE 8 Model 2 Regression Results, Treatment Sample (CbCR = 1)**

Dependent variable: CASH ETR

Variables	Expected sign	All sectors				ESTMA		Non-ESTMA	
		(1)		(2)		(1)	(2)	(1)	(2)
Intercept	?	0.417 (6.103)***	0.369 (0.080)	0.362 (2.668)***	3.273 (2.246)**	0.447 (6.068)***	-7.026 (-1.492)		
POST <sub><i>i</i></sub>	+	-0.013 (-0.951)		-0.105 (-3.369)***		0.016 (1.284)			
YEAR <sub><i>i</i></sub>	+		-0.002 (-0.010)	-0.011 (-2.211)**			0.003 (1.587)		
SIZE <sub><i>it</i></sub>	+	-0.013 (-2.002)**	-0.014 (-2.143)**	0.008 (0.613)	0.007 (0.497)	-0.018 (-2.740)***	-0.019 (-2.810)***		
ROA <sub><i>it</i></sub>	-	-0.922 (-4.136)***	-0.927 (-4.174)***	-1.225 (-3.211)***	-1.279 (-3.313)***	-0.765 (-3.545)***	-0.765 (-3.567)***		
LEV <sub><i>it</i></sub>	-	-0.188 (-3.811)***	-0.189 (-3.858)***	0.159 (1.394)	0.159 (1.336)	-0.257 (-6.522)***	-0.258 (-6.634)***		
INT <sub><i>it</i></sub>	+	0.052 (0.813)	0.049 (0.763)	-0.208 (-1.116)	-0.204 (-1.112)	0.088 (1.418)	0.088 (1.441)		
R&D <sub><i>it</i></sub>	-	0.568 (1.596)	0.564 (1.582)	0.269 (0.877)	1.102 (1.103)	0.266 (0.849)	0.247 (0.800)		
PP&E <sub><i>it</i></sub>	-	-0.039 (-0.684)	-0.037 (-0.642)	-0.260 (-2.187)**	-0.247 (-2.053)**	0.040 (0.790)	0.042 (0.814)		
CAPEX <sub><i>it</i></sub>	-	0.034 (0.865)	0.037 (0.937)	0.269 (1.277)	0.388 (1.957)*	0.026 (0.746)	0.027 (0.765)		

(Table 8 is concluded on the next page.)

**TABLE 8 Concluded**

Dependent variable: *CASH ETR*

Variables	Expected sign	All sectors		ESTMA		Non-ESTMA	
		(1)	(2)	(1)	(2)	(1)	(2)
$SPI_{it}$ .....	-/+	0.122 (1.350)	0.119 (1.323)	0.374 (2.043)**	0.355 (1.976)*	0.071 (0.635)	0.070 (0.628)
$SPI_{it-1}$ .....	+	-0.098 (-1.431)	-0.095 (-1.390)	-0.131 (-1.122)	-0.127 (-1.100)	-0.085 (-0.980)	-0.082 (-0.950)
$NOL_{it}$ .....	-	-0.006 (-0.242)	-0.006 (-0.277)	0.076 (1.828)*	0.073 (1.669)	-0.014 (-0.517)	-0.014 (-0.540)
$\Delta NOL_{it}$ .....	+	0.004 (0.176)	0.003 (0.139)	0.079 (2.069)**	0.079 (2.028)**	-0.003 (-0.100)	-0.003 (-1.115)
<i>Sector</i> .....		Yes	Yes	Yes	Yes	Yes	Yes
Adj. $R^2$ .....		0.180	0.179	0.213	0.189	0.228	0.229
Wald's F .....		7.690***	8.024***	6.135***	5.089***	10.850***	10.704***
N .....		1,160	1,160	294	294	866	866

ESTMA = Extractive Sector Transparency Measures Act.

Notes: See appendix C for the definitions of variables. CASH ETRs greater than 1 are reset to 1. All control variables other than binary variables are winsorized at the 1 percent and 99 percent levels. General linear model regression coefficients with *t*-statistics in parentheses. \*\*\*, \*\*, and \* denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

**TABLE 9 Results for Models 1 and 2 Using GAAP ETR as an Alternative Measure of Tax Avoidance**

Dependent variable: *GAAP ETR*

Variables	Expected sign	Model 1			Model 2 ( <i>CbCR</i> = 1)		
		All sectors	ESTMA	Non-ESTMA	All sectors	ESTMA	Non-ESTMA
		(1)	(2)	(3)	(1)	(2)	(3)
Intercept	?	0.142 (3.044)***	0.168 (3.213)***	0.227 (4.722)***	0.364 (5.630)***	0.210 (1.958)*	0.425 (5.866)***
<i>POST<sub>t</sub></i>	+/-	0.005 (0.455)	0.007 (0.319)	0.001 (0.048)	-0.022 (-1.949)*	-0.059 (-2.417)**	-0.008 (-0.676)
<i>CbCR<sub>t</sub></i>	+/-	-0.010 (-0.522)	-0.052 (-1.695)*	0.020 (0.922)	-0.012 (-0.651)		
<i>POST<sub>t</sub>*CbCR<sub>t</sub></i>	+	-0.028 (-1.666)*	-0.059 (-1.704)*	-0.012 (-0.651)			
<i>SIZE<sub>t</sub></i>	+	0.001 (0.176)	0.015 (2.076)**	-0.008 (-2.015)**	-0.015 (-2.690)***	-0.006 (-0.525)	-0.019 (-2.858)***
<i>ROA<sub>t</sub></i>	-	-0.194 (-4.547)***	-0.082 (-1.355)	-0.298 (-4.124)***	-0.361 (-3.309)***	-0.217 (-1.195)	-0.422 (-3.747)***
<i>LEV<sub>t</sub></i>	-	-0.008 (-0.382)	0.047 (0.659)	-0.008 (-0.396)	-0.006 (-0.278)	0.132 (1.330)	-0.032 (-1.594)
<i>INT<sub>t</sub></i>	+	0.078 (2.213)**	-0.025 (-0.200)	0.084 (2.465)**	0.023 (0.441)	0.107 (0.741)	0.019 (0.350)
<i>R&amp;D<sub>t</sub></i>	-	0.576 (2.124)**	0.322 (1.161)	0.640 (1.752)**	0.783 (2.188)**	0.495 (1.152)	0.771 (2.093)**
<i>PP&amp;E<sub>t</sub></i>	-	0.084 (3.293)***	0.104 (1.644)	0.042 (1.469)	0.059 (1.366)	0.139 (1.572)	0.046 (0.972)
<i>CAPEX<sub>t</sub></i>	-	0.009 (0.658)	-0.007 (-0.262)	0.012 (0.879)	-0.006 (-0.522)	0.139 (0.778)	-0.009 (-0.844)

(Table 9 is concluded on the next page.)



**TABLE 9 Concluded**

Dependent variable: *GAAP ETR*

Variables	Expected sign	Model 1			Model 2 ( <i>CbCR</i> = 1)		
		All sectors	ESTMA	Non-ESTMA	All sectors	ESTMA	Non-ESTMA
		(1)	(2)	(3)	(1)	(2)	(3)
$SPI_{it}$ .....	-/+	-0.200 (-6.629)***	-0.219 (-3.908)***	-0.144 (-3.667)***	-0.076 (-2.088)**	-0.055 (-0.720)	-0.079 (-1.980)*
$SPI_{it-1}$ .....	+	-0.073 (-2.245)**	-0.084 (-1.502)	-0.068 (-1.675)*	-0.094 (-1.771)*	0.015 (0.127)	-0.107 (-1.792)*
$NOL_{it}$ .....	-	-0.010 (-0.866)	-0.006 (-0.287)	-0.021 (-1.491)	0.026 (1.833)*	0.053 (1.503)	0.016 (1.044)
$\Delta NOL_{it}$ .....	+	-0.004 (-0.591)	-0.001 (-0.070)	-0.010 (-0.871)	0.008 (0.593)	0.069 (1.922)*	-0.015 (-1.029)
<i>Sector</i> .....		Yes	Yes	Yes	Yes	Yes	Yes
Adj. $R^2$ .....		0.115	0.120	0.114	0.112	0.093	0.124
Wald's F .....		13.149***	13.939***	6.916***	5.951***	2.845***	5.247***
N .....		2,770	890	1,880	1,160	294	866

ESTMA = Extractive Sector Transparency Measures Act.

Notes: See appendix C for the definitions of variables. GAAP ETRs greater than 1 are reset to 1. All control variables other than binary variables are winsorized at the 1 percent and 99 percent levels. General linear model regression coefficients with *t*-statistics in parentheses. \*\*\*, \*\*, and \* denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

**TABLE 10 Results for Models 1 and 2 Using Lagged CASH ETR as an Alternative Measure of Tax Avoidance**

Dependent variable: *Lagged CASH ETR*

Variables	Expected sign	Model 1			Model 2 ( <i>CbCR</i> = 1)		
		All sectors	ESTMA	Non-ESTMA	All sectors	ESTMA	Non-ESTMA
		(1)	(2)	(3)	(1)	(2)	(3)
Intercept	?	0.054 (1.066)	0.100 (2.126)**	0.118 (2.229)**	0.131 (1.954)*	0.215 (1.504)	0.131 (1.820)*
<i>POST<sub>t</sub></i>	+/-	-0.011 (-0.852)	0.016 (0.646)	-0.028 (-2.008)**	-0.022 (-1.699)*	-0.085 (-2.289)**	0.001 (0.070)
<i>CbCR<sub>t</sub></i>	+/-	0.007 (0.375)	0.023 (0.583)	0.008 (0.378)			
<i>POST*CbCR<sub>t</sub></i>	+	-0.015 (-0.828)	-0.098 (-2.246)**	0.023 (1.308)			
<i>SIZE<sub>t</sub></i>	+	0.005 (1.280)	0.024 (3.407)***	-0.004 (-0.921)	0.002 (0.315)	0.029 (2.058)**	-0.002 (-0.389)
<i>ROA<sub>t</sub></i>	+/-	0.134 (2.884)***	0.147 (2.499)**	0.050 (0.642)	0.027 (0.199)	-0.004 (-0.013)	-0.020 (-0.133)
<i>LEV<sub>t</sub></i>	-	0.049 (1.472)	-0.024 (-0.334)	0.071 (2.002)**	0.167 (4.090)***	0.181 (1.452)	0.155 (4.084)***
<i>INT<sub>t</sub></i>	+	0.089 (1.855)*	-0.015 (-0.114)	0.098 (1.972)***	-0.075 (-1.171)	-0.251 (-1.189)	-0.054 (-0.813)
<i>R&amp;D<sub>t</sub></i>	-	-0.183 (-0.867)	0.399 (1.776)*	-0.436 (-1.965)**	-0.100 (-0.338)	5.410 (0.838)	-0.202 (-0.648)
<i>PP&amp;E<sub>t</sub></i>	-	-0.027 (-0.708)	-0.137 (-2.274)**	-0.014 (-0.275)	-0.148 (-2.615)***	-0.386 (-2.851)**	-0.084 (-1.416)
<i>CAPEX<sub>t</sub></i>	-	0.011 (0.608)	-0.033 (-2.215)**	0.027 (1.164)	0.043 (1.896)*	0.269 (0.973)	0.042 (1.715)*

(Table 10 is concluded on the next page.)

**TABLE 10 Concluded**

Dependent variable: *Lagged CASH ETR*

Variables	Expected sign	Model 1			Model 2 ( <i>CbCR</i> = 1)		
		All sectors	ESTMA	Non-ESTMA	All sectors	ESTMA	Non-ESTMA
		(1)	(2)	(3)	(1)	(2)	(3)
$SPI_{it}$ .....	-/+	-0.228 (-6.228)***	-0.231 (-3.841)***	-0.127 (-2.757)***	-0.069 (-1.056)	-0.122 (-0.653)	-0.037 (-0.508)
$SPI_{it-1}$ .....	+	-0.006 (-0.146)	-0.063 (-1.123)	0.034 (0.592)	0.050 (0.518)	-0.174 (-1.096)	0.068 (0.601)
$NOL_{it}$ .....	-	-0.016 (-1.194)	0.004 (0.180)	-0.025 (-1.234)	-0.016 (-0.618)	-0.026 (-0.525)	-0.008 (-0.275)
$\Delta NOL_{it}$ .....	+	-0.015 (-1.705)*	-0.008 (-1.119)	-0.016 (-0.858)	-0.026 (-1.103)	-0.046 (-0.978)	-0.010 (-0.356)
<i>Sector</i> .....		Yes	Yes	Yes	Yes	Yes	Yes
Adj. $R^2$ .....		0.095	0.091	0.082	0.137	0.124	0.173
Wald's F .....		6.949***	25.782***	5.918***	7.567***	2.551**	7.523***
N .....		2,510	810	1,700	1,040	270	770

ESTMA = Extractive Sector Transparency Measures Act.

Notes: See appendix C for the definitions of variables. Lagged CASH ETRs greater than 1 are reset to 1. All control variables other than binary variables are winsorized at the 1 percent and 99 percent levels. General linear model regression coefficients with *t*-statistics in parentheses. \*\*\*, \*\*, and \* denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Since MNCs subject to CbCR under BEPS action 13 may adapt to this new obligation before the year of its implementation, the regression equations are re-estimated using 2015<sup>64</sup> instead of 2016 as the implementation date of CbCR under BEPS action 13. (As previously noted, 2015 was also the implementation year of CbCR under the ESTMA.) The results for models 1 and 2 are presented in column 1 of table 11. Column 2 reports the results using 2018<sup>65</sup> as the implementation date of CbCR under BEPS action 13. Indeed, since CbC reports under BEPS action 13 are not due until 12 months after the fiscal year-end, it is possible that the CRA would not receive any data until late 2018. Since 2016 is the transition year for the implementation of CbCR under BEPS action 13, 2016<sup>66</sup> is excluded from the sample, and the results are presented in column 3 of table 11. Finally, 2020<sup>67</sup> is also excluded. In that year, owing to the COVID-19 pandemic, the Canadian economy, like the vast majority of the world's economies, was placed in lockdown. The results excluding 2020 are presented in column 4 of table 11.

In broad terms, there is no evidence that the adoption of CbCR under BEPS action 13 affected the tax avoidance of Canadian MNCs compared to other MNCs, using these different robustness tests for model 1. Using the treatment sample only, the robustness test results for model 2 in table 11 show that the *CASH ETR* of MNCs subject to CbCR under BEPS action 13 even fell slightly after the adoption of this obligation. These results therefore indicate that the adoption of CbCR under BEPS action 13 has not prevented Canadian MNCs subject to this obligation from engaging in tax avoidance.

Additional robustness tests were also performed. Given the size effect in the CbCR measure, falsification tests were carried out to demonstrate the validity of the results. For these tests, the sample was limited to MNCs with consolidated annual revenues under €750 million (the control sample), but a cutoff of first €600 million and then €500 million was used as the measure of CbCR. Since these MNCs were not subject to the CbCR rules, the results (not tabulated) show no significant effect, indicating that the CbCR measure is not size-sensitive. Instead of identifying MNCs as being subject to CbCR if they had consolidated revenues that exceeded €750 million in each previous year, 2015 only (a fixed date) was used to identify whether or not the MNC was subject to CbCR for the entire sample period, and all of the regression equations were re-estimated. The results (not tabulated) remain almost the same regardless of whether the first or second CbCR measure is used.

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64 In this test, the post-adoption period is 2015-2018 and the pre-adoption period is 2011-2014. Similar results are found when 2015-2017 is used as the post-adoption period and 2012-2014 as the pre-adoption period.

65 In this test, the post-adoption period is 2018-2020 and the pre-adoption period is 2013-2015. Similar results are found when 2018-2020 is used as the post-adoption period and 2013-2017 as the pre-adoption period.

66 In this test, the post-adoption period is 2017-2020 and the pre-adoption period is 2012-2015.

67 In this test, the post-adoption period is 2016-2019 and the pre-adoption period is 2012-2015. Similar results are found when 2017-2019 is used as the post-adoption period and 2013-2015 as the pre-adoption period.

**TABLE 11 Results for Additional Robustness Tests, Models 1 and 2**

Dependent variable: *CASHETR*

Variables	Expected sign	Model 1				Model 2 ( <i>CbCR</i> = 1)			
		CbCR 2015	CbCR 2018	2016 excluded	2020 excluded	CbCR 2015	CbCR 2018	2016 excluded	2020 excluded
		(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Intercept	?	0.208 (4.163) <sup>***</sup>	0.198 (3.499) <sup>***</sup>	0.195 (3.848) <sup>***</sup>	0.185 (3.605) <sup>***</sup>	0.319 (4.253) <sup>***</sup>	0.259 (3.212) <sup>***</sup>	0.281 (3.837) <sup>***</sup>	0.281 (3.821) <sup>***</sup>
<i>POST<sub>i</sub></i>	+/-	0.008 (0.576)	0.001 (0.039)	0.002 (0.121)	0.006 (0.407)	-0.022 (-1.711) <sup>*</sup>	-0.028 (-1.690) <sup>*</sup>	-0.020 (-1.408)	-0.023 (-1.783) <sup>*</sup>
<i>CbCR<sub>i</sub></i>	+/-	0.028 (1.282)	0.035 (1.522)	0.031 (1.452)	0.031 (1.375)				
<i>POST<sub>i</sub>*CbCR<sub>i</sub></i>	+	-0.028 (-1.424)	-0.031 (-1.252)	-0.023 (-1.119)	-0.028 (-1.446)				
<i>SIZE<sub>it</sub></i>	+	0.001 (0.032)	-0.001 (-0.296)	-0.001 (-0.281)	-0.001 (-0.187)	-0.004 (-0.606)	-0.002 (-0.243)	-0.002 (-0.337)	-0.001 (-0.186)
<i>ROA<sub>it</sub></i>	+/-	-0.320 (-5.171) <sup>***</sup>	-0.377 (-5.420) <sup>***</sup>	-0.356 (-5.804) <sup>***</sup>	-0.364 (-5.452) <sup>***</sup>	0.154 (2.183) <sup>**</sup>	0.229 (4.233) <sup>***</sup>	0.186 (3.328) <sup>***</sup>	0.159 (2.348) <sup>**</sup>
<i>LEV<sub>it</sub></i>	-	-0.193 (-4.839) <sup>***</sup>	-0.132 (-3.431) <sup>***</sup>	-0.151 (-4.267) <sup>***</sup>	-0.145 (-3.745) <sup>***</sup>	-0.205 (-3.463) <sup>***</sup>	-0.167 (-3.308) <sup>***</sup>	-0.183 (-3.970) <sup>***</sup>	-0.158 (-3.067) <sup>***</sup>
<i>INT<sub>it</sub></i>	+	0.156 (3.111) <sup>***</sup>	0.145 (3.191) <sup>***</sup>	0.161 (3.423) <sup>***</sup>	0.139 (2.721) <sup>***</sup>	0.003 (0.046)	0.005 (0.072)	0.006 (0.100)	-0.025 (-0.388)
<i>R&amp;D<sub>it</sub></i>	-	0.046 (0.170)	0.157 (0.543)	0.217 (0.835)	0.189 (0.674)	0.388 (0.763)	0.597 (0.972)	0.570 (1.204)	0.241 (0.597)
<i>PP&amp;E<sub>it</sub></i>	-	-0.009 (-0.239)	0.012 (0.286)	0.010 (0.255)	0.002 (0.040)	-0.077 (-1.308)	-0.082 (-1.517)	-0.070 (-1.397)	-0.081 (-1.445)
<i>CAPEX<sub>it</sub></i>	-	0.025 (1.236)	0.025 (0.971)	0.025 (1.232)	0.032 (1.497)	0.007 (0.322)	0.001 (0.062)	-0.004 (-0.229)	0.015 (0.606)

(Table 11 is concluded on the next page.)

**TABLE 11 Concluded**

Dependent variable: *CASH ETR*

Variables	Expected sign	Model 1				Model 2 ( <i>CbCR</i> = 1)			
		CbCR 2015 (1)	CbCR 2018 (2)	CbCR 2016 (3)	2020 excluded (4)	CbCR 2015 (1)	CbCR 2018 (2)	CbCR 2016 (3)	2020 excluded (4)
<i>SPI<sub>it</sub></i> .....	-/+	-0.065 (-1.475)	0.006 (0.117)	-0.025 (-0.580)	-0.029 (-0.588)	0.113 (1.151)	0.103 (1.089)	0.121 (1.364)	0.101 (1.013)
<i>SPI<sub>it-1</sub></i> .....	+	-0.029 (-0.742)	-0.053 (-0.998)	-0.033 (-0.858)	0.003 (0.062)	-0.078 (-1.099)	-0.234 (-2.463)**	-0.162 (-2.164)**	-0.113 (-1.440)
<i>NOL<sub>it</sub></i> .....	-	-0.023 (-1.412)	-0.024 (-1.386)	-0.026 (-1.687)*	-0.024 (-1.518)	-0.009 (-0.392)	-0.013 (-0.545)	-0.018 (-0.780)	-0.019 (-0.822)
$\Delta NOL_{it}$ .....	+	-0.013 (-1.058)	-0.007 (-0.753)	-0.008 (-0.873)	-0.006 (-0.635)	-0.001 (-0.050)	0.001 (0.018)	-0.005 (-0.212)	-0.004 (-0.178)
<i>Sector<sub>it</sub></i> .....		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R <sup>2</sup> .....		0.103	0.115	0.105	0.105	0.110	0.132	0.119	0.117
Wald's F .....		7.992***	8.869***	8.659***	7.957***	9.392***	10.059***	12.000***	8.164***
N .....		2,770	2,770	2,493	2,493	1,160	1,160	1,044	1,044

*CbCR* = country-by-country reporting.

Notes: See appendix C for the definitions of variables. *CASH ETRs* greater than 1 are reset to 1. All control variables other than binary variables are winsorized at the 1 percent and 99 percent levels. General linear model regression coefficients with *t*-statistics in parentheses. \*\*\*, \*\*, and \* denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Since the *POST* and *YEAR* variables were not included in the same regression equation owing to the strong correlation between these two variables, *POST* was replaced by *YEAR* and all of the regression equations were re-estimated. The results (not tabulated) remain quite similar regardless of whether *POST* or *YEAR* is used as the time variable. Also, given the high correlation between *CbCR* and *SIZE*, the regression equations were re-estimated without the *SIZE* variable, and again the results (not tabulated) remain quite similar. In order to ensure that the results are not sensitive to an MNC's size, first MNCs with total assets of less than Cdn\$1 million, and then MNCs with total assets of less than Cdn\$10 million, and finally MNCs with total assets with less than Cdn\$100 million were excluded from the sample, and all of the regression equations were re-estimated. The results (not tabulated) remain quite similar. In order to ensure that the results are not sensitive to the percentage ownership of subsidiaries (levels 1 to 5), the subsidiaries held at 20 percent ownership or more (indicating a parent's significant influence over the subsidiary) were included, rather than limiting the sample to 50 percent minimum ownership (indicating control of the subsidiary), and all of the regression equations were re-estimated. The results (not tabulated) remain almost the same, regardless of the subsidiary's minimum ownership percentage (20 percent or 50 percent). Finally, instead of excluding loss MNCs from the sample, these MNCs were included after winsorizing their negative ETRs to zero, and all of the regression equations were re-estimated. The results (not tabulated) remain quite similar regardless of whether the loss MNCs were excluded from or included in the sample.

## CONCLUSION

The aim of this study was to examine empirically whether the adoption of CbCR under BEPS action 13 had an impact on the tax-avoidance practices of Canadian MNCs subject to this obligation. In other words, the study examined whether these MNCs practised less tax avoidance after the adoption of CbCR.

Using a rigorous sampling procedure, several measures of tax avoidance and MNCs' CbCR obligations, and several statistical methods (mainly the difference-in-difference method), the study found no evidence that CbCR under BEPS action 13 has had an effect on tax avoidance by Canadian MNCs subject to this obligation. However, additional analyses by sector show that, contrary to expectations, MNCs subject to CbCR in the energy and materials sectors continued to avoid taxes even after the adoption of BEPS CbCR in 2016. In other words, the adoption of BEPS CbCR seems to have had no deterrent effect on tax avoidance by MNCs subject to this obligation in the energy and materials sectors.

These results may be explained by the presence of certain factors that may contribute to the likelihood that MNCs in the energy and materials sectors will engage in tax avoidance. First, companies in the energy and materials sectors are often capital-intensive, meaning that they require significant investment in assets and infrastructure. These companies may be more likely to engage in tax-planning strategies to maximize deductions for capital investments, which can reduce their taxable income. Second, companies in the energy and materials sectors are engaged

in resource extraction activities, which can involve complex tax issues related to royalties, transfer pricing, and other factors. Third, many companies in these sectors have significant international operations and may be subject to tax laws and regulations in multiple jurisdictions. Operating in a complex tax landscape can create the need for careful planning to minimize tax liabilities. Although the results of this study are somewhat different from those of Joshi, who used a sample of EU MNCs, it should be noted that Joshi excluded MNCs in the energy and materials sectors from her sample, and it is therefore difficult to compare the results of the two studies.

The results of this study also show that the mean *CASH ETR* of Canadian MNCs subject to CbCR is close to 15 percent (the minimum tax rate on the profits of large MNCs agreed to at the G20 in 2021). This brings into question the relevance of CbCR under BEPS action 13, since these MNCs will be required to pay a 15 percent minimum tax from 2023 onward.

The results of this study have several implications for different stakeholders. First, they provide important feedback to Canadian tax authorities and the OECD on the effectiveness/ineffectiveness of BEPS action 13 (CbCR). Second, the results also give the tax authorities an idea of the *CASH ETR* of Canadian MNCs with annual consolidated revenues exceeding €750 million before the implementation of the minimum 15 percent tax rate in 2023. Third, the results may draw the attention of tax authorities to MNCs in the energy and materials sectors, which appear to be the most active in tax avoidance.

Like any research, this study is not without its limitations. The main limitation is that the final sample may not include all Canadian MNCs that have produced a CbCR report. Indeed, the aggregate CbCR figures provided by the OECD in 2017 show 210 (anonymous) ultimate parent entities located in Canada.<sup>68</sup> In other words, the final sample seems to consist of approximately 56 percent (116 out of 210 ultimate parent entities) of the total number of entities that produced a CbCR report. However, there are several reasons for this discrepancy, including the exclusion from the sample of (1) government organizations and pension funds of various workers' collectives (such as the Ontario Teachers' Pension Plan); (2) private (not publicly listed) MNCs, since it is not possible to access their financial and tax accounting data; (3) MNCs with missing data in ORBIS or COMPUSTAT; (4) MNCs with negative pre-tax income; and (5) MNCs that did not operate throughout the entire period of the study (2011-2020). The other limitation of this study is that only data from Canadian MNCs were used. The results may therefore not be generalizable to MNCs from other countries. Future research may examine the effectiveness of BEPS action 13 (CbCR) in other participating countries. Future research should also put the spotlight on Canadian MNCs in the energy and materials sectors to understand why they continued to avoid tax after the adoption of BEPS CbCR.

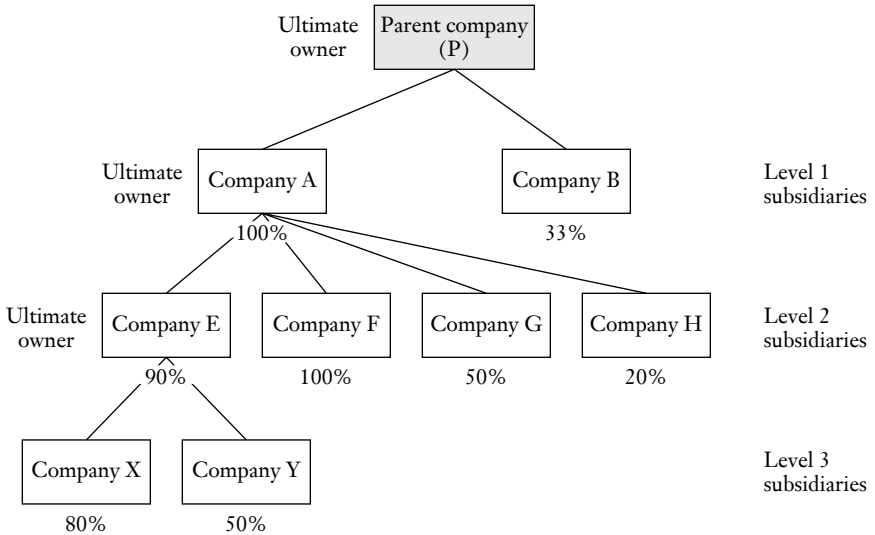
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68 OECD.Stat, "Table 1.1A: Aggregate Totals of Reported Financial and Business Activities for MNEs with Fiscal Year End Date in 2017, Grouped by Profit or Loss and Tax Jurisdiction" ([https://stats.oecd.org/index.aspx?DataSetCode=CBCR\\_TABLE1](https://stats.oecd.org/index.aspx?DataSetCode=CBCR_TABLE1)).



**APPENDIX A**

**FIGURE A1 Linking Parent Companies and Subsidiaries in the ORBIS Database**



*Parent-subsidiary dataset structure*

<i>Parent</i>	<i>Subsidiary</i>	<i>Levels</i>	<i>Ownership (%)</i>
P	A	1	100
P	B	1	33
P	E	2	90 (100 × 90)
P	F	2	100 (100 × 100)
P	G	2	50 (100 × 50)
P	H	2	20 (100 × 20)
P	X	3	72 (100 × 90 × 80)
P	Y	3	45 (100 × 90 × 50)

Step 1: Identify parent companies from the ultimate owner<sup>69</sup> dataset in ORBIS.

Step 2: Link level 1 subsidiaries to the parent companies. Subsidiaries are defined as companies that are 50 percent or more directly owned.<sup>70</sup> Indirectly owned<sup>71</sup> companies are excluded.

Step 3: Link level 2 subsidiaries to the level 1 subsidiaries. Repeat this process for level 3, 4, and 5 subsidiaries.

Source: Adapted from Nemit Shroff, Rodrigo S. Verdi, and Gwen Yu, “Information Environment and the Investment Decisions of Multinational Corporations” (2014) 89:2 *Accounting Review* 759-90.

69 The ultimate owner is the company in which the shareholder with the highest direct ownership is an independent entity. To be an independent entity, the shareholder must be an individual or an entity with no shareholder holding more than 25 percent ownership.

70 Direct ownership is ownership representing voting shares that are directly held.

71 Indirect ownership is ownership representing voting shares that are held through an unknown entity.

**APPENDIX B****TABLE B1 Level 2, 3, 4, and 5 Subsidiaries**

Panel A: Level 2 subsidiaries held by level 1 subsidiaries

	<i>Level 1 subsidiaries</i>	<i>Level 2 subsidiaries</i>	<i>Excluded level 1 subsidiaries</i>	<i>Excluded level 2 subsidiaries</i>
Initial database (ORBIS) . . . . .	811 <sup>a</sup>	8,060 (123 countries)		
Subsidiaries with no missing percentage ownership . . . . .	593	3,637 (110 countries)	(218)	(4,423)
Subsidiaries owned at 50% or more . . . . .	571	2,789 (107 countries)	(22)	(848)

Panel B: Level 3 subsidiaries held by level 2 subsidiaries

	<i>Level 2 subsidiaries</i>	<i>Level 3 subsidiaries</i>	<i>Excluded level 2 subsidiaries</i>	<i>Excluded level 3 subsidiaries</i>
Initial database (ORBIS) . . . . .	345	2,181		
Subsidiaries with no missing percentage ownership . . . . .	252	1,231 (34 countries)	(93)	(950)
Subsidiaries owned at 50% or more . . . . .	247	1,118 (33 countries)	(5)	(113)

Panel C: Level 4 subsidiaries held by level 3 subsidiaries

	<i>Level 3 subsidiaries</i>	<i>Level 4 subsidiaries</i>	<i>Excluded level 3 subsidiaries</i>	<i>Excluded level 4 subsidiaries</i>
Initial database (ORBIS) . . . . .	160	622 (31 countries)		
Subsidiaries with no missing percentage ownership . . . . .	114	378 (27 countries)	(46)	(244)
Subsidiaries owned at 50% or more . . . . .	112	367 (27 countries)	(2)	(11)

Panel D: Level 5 subsidiaries held by level 4 subsidiaries

	<i>Level 4 subsidiaries</i>	<i>Level 5 subsidiaries</i>	<i>Excluded level 4 subsidiaries</i>	<i>Excluded level 5 subsidiaries</i>
Initial database (ORBIS) . . . . .	70	303 (21 countries)		
Subsidiaries with no missing percentage ownership . . . . .	56	182 (19 countries)	(14)	(121)
Subsidiaries owned at 50% or more . . . . .	55	173 (19 countries)	(1)	(9)

- a Only 811 out of 21,272 level 1 subsidiaries (see panel A of table 1) have level 2 subsidiaries. Similarly, in panel B of this table, only 345 out of 2,789 level 2 subsidiaries (see panel A) have level 3 subsidiaries, and so on for panels C and D.

## APPENDIX C

TABLE C1 Definitions of Variables

Dependent variables (tax avoidance)	
$CASH\ ETR_{it}$ . . . . .	Cash taxes paid (txpd) divided by pre-tax income (pi).
$GAAP\ ETR_{it}$ . . . . .	Total income tax expense (txt) divided by pre-tax income (pi).
$Lagged\ CASH\ ETR_{it+1}$ . . . . .	Cash taxes paid (txpd) in year $t + 1$ divided by pre-tax income (pi) in year $t + 1$ .
Independent variables	
$POST_i$ . . . . .	Binary variable equal to 1 for the CbCR post-adoption period (2016-2020), otherwise 0 for the CbCR pre-adoption period (2011-2015).
$CbCR_i$ . . . . .	Binary variable equal to 1 if the consolidated revenue of MNC $i$ was at least €750 million in the previous year; otherwise 0.
Control variables	
$SIZE_{it}$ . . . . .	Natural logarithm of total assets (at).
$ROA_{it}$ . . . . .	Pre-tax income (pi) divided by total assets (at).
$LEV_{it}$ . . . . .	Total debt (dt) divided by total assets (at).
$INT_{it}$ . . . . .	Intangible assets (intan) divided by total assets (at).
$R\&D_{it}$ . . . . .	R & D expenditure (xrd) divided by total assets (at). If the MNC has no R & D expenditure, this variable is coded 0.
$PP\&E_{it}$ . . . . .	Net property, plant, and equipment (ppent) divided by total assets (at).
$CAPEX_{it}$ . . . . .	Capital expenditures (the amount spent on capital assets) (capx) divided by net property, plant, and equipment (ppent).
$SPI_{it}$ . . . . .	Special items (spi) divided by total assets (at).
$SPI_{it-1}$ . . . . .	Lagged special items (spi) divided by lagged total assets (at).
$NOL_{it}$ . . . . .	Binary variable equal to 1 if COMPUSTAT reports a tax loss carryforward (tlcf) at the end of year $t - 1$ ; otherwise 0.
$\Delta NOL_{it}$ . . . . .	The change in net operating losses, measured as the difference between current and lagged tax loss carryforward (tlcf) divided by lagged total assets (at).
$YEAR$ . . . . .	Time variable that varies between 2011 and 2020.
$SECTOR$ . . . . .	Binary variable equal to 1 if the MNC belongs to sector X; otherwise 0. The 11 sectors according to the GICS classification are (1) energy, (2) materials, (3) industrials, (4) consumer discretionary, (5) consumer staples, (6) health care, (7) financials, (8) information technology, (9) communication services, (10) utilities, and (11) real estate.

CbCR = country-by-country reporting; GICS = Global Industry Classification Standard; MNC = multinational corporation; R & D = research and development.

Note: COMPUSTAT data item mnemonics are shown in parentheses.

