Tax Avoidance at Public Corporations Driven by Shareholder Taxes:

Evidence from Changes in Dividend Tax Policy

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Abstract

We exploit exogenous changes in country-level corporate-shareholder tax integration systems to identify the effect of investor-level taxes on corporate tax avoidance. Specifically, we rely on the elimination of imputation systems by European countries in different years, in response to supranational judicial rulings. Under an imputation system, lowering corporate tax payments does not increase the cash flows available to shareholders after dividend taxes, but it does so after their elimination. Using a difference-in-difference model with fixed effects, we find that the average firm affected by the change reduces its cash effective tax rate by 17% relative to the eliminating group's average statutory tax rate. Additional placebo tests provide evidence that supports this effect is present only in the countries and years in which the elimination occurs. Our results are partially driven by shifting income to foreign countries. Lastly, as expected, our results are more pronounced in closely held firms, firms with lower foreign income and firms with higher dividend payout.

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1. Introduction

Public corporations are experiencing heightened criticism for taking actions that lower their tax burdens. However, managers of these firms face competitive global capital markets. Thus, they trade off the operating cash flows generated by corporate tax avoidance with costs related to financial reporting, enforcement, legislative response, and reputation loss, among others. Most policymakers and academics focus on how this trade-off leads managers to optimize the net operating cash flows from tax avoidance at the *corporate level*. In this study, we identify and quantify the extent to which *investor-level* taxes influence the manager's decision to engage in corporate tax avoidance. By exploiting a research setting that isolates corporate tax avoidance driven by investor-level taxes, we estimate that the average firm reduces its cash effective tax rate 17% relative to the average statutory corporate tax rate in response to investor-level taxes.[1]

The effect of investor-level taxes on corporate actions is far from obvious. Graham (2003) acknowledges that an unresolved issue is "whether corporate actions are affected by investor-level taxes". In a recent study, Hanlon and Hoopes (2014) echo this sentiment with their assertion that the mixed results in the extant literature on the corporate payout decision provides limited evidence that managers take actions consistent with the goal of maximizing shareholder after-tax wealth. They find evidence consistent with firms issuing special dividends and shifting regular dividends

[1]Following the common definition in the literature, we define corporate tax avoidance as any action (legal or illegal) taken by management that reduces global corporate tax payments (e.g., Hanlon and Heitzman, 2010; Atwood, Drake, Myers and Myers, 2012). This definition is inherently broad and includes, but is not limited to, utilizing R&D incentives, investing to access accelerated depreciation, engaging in income shifting, as well as exploiting aggressive tax shelters.

in response to impending increases in individual tax rates. These temporary corporate actions, which accelerate the timing of dividends, are most likely to be responsive to taxes (Slemrod 1992). The mixed results from prior research examining regular dividend payout and capital structure decisions (e.g. Gordon and MacKie-Mason, 1990; Bolster and Janjigian, 1991; Graham 1999; Frank 2002; Chetty and Saez, 2005; Blouin, Raedy and Shackelford, 2011), however, suggest the effect of investor-level taxes on more persistent corporate actions remains uncertain.

The prior literature emphasizes the significant challenges in identifying the casual effects of investor-level taxes on corporate actions (Chetty and Saez, 2005; Hanlon and Hoopes, 2014). A key feature of this study is the research setting that exploits a unique quasi-experiment to identify the causality of investor-level taxes on corporate tax avoidance. The setting, which is exogenous to the firm, originated when several European countries eliminated their imputation systems in different years following rulings from a supranational judicial court. Under imputation systems, the corporation pays taxes, but these taxes provide a credit that reduces shareholders' taxes on dividends. Conceptually, corporate tax avoidance in an imputation system simply shifts tax payments from the corporation to its shareholders. As a result, corporate tax avoidance increases the firm's operating cash flows but does not increase the cash flows available to shareholders after considering their dividend taxes. Moreover, cash flows available to shareholders after dividend taxes decreases when tax avoidance is costly. In contrast, non-imputation countries do not provide credits to shareholders for corporate taxes paid, so corporate tax avoidance generates higher operating cash flows to the firm that also increases cash flows available to shareholders after considering their dividend taxes. Therefore, if managers consider investor-level taxes when

making decisions, they would increase corporate tax avoidance after the elimination of an imputation system.[2]

Utilizing this setting, we address our research question using a difference-in-differences design that strengthens causal inferences. Endogeneity related to concerns of reverse causality, simultaneity and unobservable factors complicates the empirical identification of incentives facing managers of public corporations that arise from factors including ownership structure, executive compensation, and corporate governance (Bertrand and Mullainathan, 2003). Studies examining corporate tax avoidance must also contend with these concerns. Relying on a setting of changes in country-level tax policy that are plausibly exogenous to the manager's decision, our research design can better identify whether investor-level taxes influence corporate tax avoidance.

Using our difference-in-differences methodology, we estimate that investor-level taxes incentivized managers of firms in countries that eliminated their imputation systems to increase corporate tax avoidance by 6% of pre-tax corporate income. This estimate translates into a 17% reduction in the cash effective tax rate of the firms relative to their average statutory corporate tax rate or represents 81% of the corporate tax avoidance conducted by firms from other countries. These estimates suggest that investor-level taxes significantly influence corporate tax avoidance in imputation countries. Using a series of "placebo" tests, we confirm that the effect is concentrated in the countries and years of the elimination of the imputation systems suggesting that a simultaneous decrease in statutory corporate tax rates does not drive the result.

To reduce concerns about correlated omitted variables that are not addressed through the difference-in-differences design or placebo tests, we examine the cross-sectional variation in our

[2] As discussed in Section 2, factors present in our empirical setting create uncertainty about the predicted increase in corporate tax avoidance driven by investor-level taxes.

primary result. First, we examine if the elimination of the imputation system has less impact on corporate tax avoidance by firms with foreign relative to domestic earnings. Foreign taxes paid on foreign earnings do not generate imputation credits for shareholders and thus create an incentive for corporate tax avoidance in an imputation system. Consistent with our expectation, we find managers of domestic corporations incorporated in countries that eliminate imputation systems increase corporate tax avoidance relative to domestic corporations of other countries. In contrast, the multinational corporations incorporated in the countries that eliminate imputation systems engage in corporate tax avoidance of a similar magnitude relative to multinational corporations from other countries before and after the elimination of the imputation systems.

Second, we examine if the elimination of the imputation system has less impact on corporate tax avoidance by widely-held versus closely-held corporations. If shareholder alignment is higher in closely-held firms then it is more likely that their managers will take actions that incorporate investor-level taxes. We find that after the elimination of the imputation systems, both closely-held and widely-held firms increase their tax avoidance relative to firms from other countries, but as predicted, the increase is smaller for the widely-held firms than the closely-held firms.

Finally, we examine whether the elimination of the imputation system has less impact on corporate tax avoidance for firms that pay fewer dividends. Low dividend-paying firms are more likely to have unpaid imputation credits available to distribute after the elimination of the system, which would delay their need to engage in corporate tax avoidance relative to high dividend-paying

firms. As predicted, we find that low dividend-paying firms have a smaller increase in tax avoidance after the elimination of the imputation systems relative to high dividend-paying firms.

We also perform several complementary analyses. First, our analysis of country-level tax revenues shows an overall decline in corporate tax revenue for countries after the elimination of their imputation systems but no change in individual country-level tax revenues. Second, we examine an important and timely form of corporate tax avoidance: income shifting. We build on predictions articulated in prior research (Babcock, 2000) and provide empirical evidence that corporations in countries that eliminate imputation systems significantly increase their income shifting to foreign countries after the change in tax policy. Finally, we find a significant decrease in corporate tax avoidance by firms in Australia after a policy change that strengthens its imputation system. This additional quasi-natural experiment provides a similar research design to the primary setting but with the opposite prediction and result.

Our study contributes to several streams of literature. Most importantly, this study builds on prior research that examines the effect of investor-level taxes on corporate actions. We examine the effect of a different form of investor-level tax – corporate-shareholder integration – on a different corporate action, tax avoidance. As a result, this study is the first to show investor-level taxes affect corporate operating cash flows. To the extent that closely-held firms in our supplemental analysis are representative of firms with powerful shareholders, consistent with Chetty and Saez (2005), as well as Hanlon and Hoopes (2014), we find evidence that implies managers take actions that are in the best interest of powerful shareholders.

Regarding research on global corporate tax avoidance, this study expands our understanding of the role of country characteristics on corporate tax avoidance originally explored in Atwood et al. (2012). Atwood et al. (2012) examine if worldwide taxation, tax enforcement,

statutory corporate tax rates and book-tax conformity affect corporate tax avoidance. Their analysis implicitly assumes the effect of investor-level taxes on corporate tax avoidance is constant across countries because they do not examine corporate-shareholder integration. Our study shows the importance of this additional country characteristic and the limitation of the implicit assumption. The difference-in-differences research design also enhances our ability to infer the casual effect that the country's level of corporate-shareholder integration has on corporate tax avoidance compared to the research design employed in Atwood et al. (2012).

At the most basic level, our study extends the prior literature that examines corporate tax avoidance in specific countries with imputation systems. Ikin and Tran (2013) examine whether corporate tax rates, tax authority scrutiny and managers' stock options are associated with corporate tax avoidance of Australian firms between 1999 and 2003. Wilkinson, Cahan and Jones (2001) examine the effect of dividend payout and foreign ownership on corporate tax avoidance for 37 firms from New Zealand in 1993. Several other studies examine specific managerial decisions in imputation countries that would affect corporate tax avoidance, such as the utilization of R&D credits (Smith, 1995), dividend payout (Pattenden and Twite, 2008), tax loss carryforwards (Marsden and Prevost, 2005), and debt (Twite, 2001). In contrast to this prior research, the objective of this study is to identify and quantify the effect of investor-level taxes on the manager's optimization of the net operating cash flows from corporate tax avoidance at the *corporate level*, and we use the elimination of imputation systems as our setting.

Our investigation is also important to the recent U.S. and international policy debates aimed at reducing corporate tax avoidance. A report from the Congressional Research Service cites numerous studies offering estimates of corporate tax avoidance by U.S. multinationals that can exceed $100 billion per year (Gravelle, 2015). The impact of corporate tax avoidance on

government revenues is of serious concern to countries around the world. The overwhelming response by individual countries, as well as by international organizations (e.g. Organization for Economic Co-operation and Development (OECD)), to reduce corporate tax avoidance has been to make the manager's trade-off more expensive by increasing the costs to firms. This study provides empirical evidence on an alternate response: decrease the benefit to shareholders from firm-level operating cash flows generated by tax avoidance. One policy that would accomplish this objective is an imputation system (Gergen, 2008). On May 17, 2016, the U.S. Senate Finance Committee held a hearing on the integration the corporate and shareholder tax systems. One potential benefit, noted in testimony of legal scholar Michael Graetz (Graetz, 2016), is the increase in the domestic corporate tax base (Graetz and Warren, 2016) that our income shifting analysis supports.

We note that although our research design provides a unique setting to examine the effect of investor-level taxes on corporate tax avoidance, no research design is perfect. Any change in tax policy may simultaneously affect other factors facing the managers, so we cannot completely rule out alternative explanations. Nevertheless, our identification relying on a plausibly exogenous natural experiment, accompanied by the associated placebo tests, mitigate these concerns.

The remainder of the study is organized as follows: Section 2 discusses the relevant aspects of corporate-shareholder integration. Section 3 describes the research design, sample selection and data. Section 4 presents the results of our analyses. Section 5 concludes.

2. Dividend tax policy: The integration of corporate and shareholder taxes

Countries differ in their method of integration between corporate and shareholder taxes on corporate income. Common choices across countries are classical, inclusion and imputation

systems. For this study, we delineate between full imputation systems and other systems because we are interested in the differential effect that *investor-level* taxes have on managers' decisions to lower taxes at the *corporate-level* across these two classifications.

Full imputation systems integrate corporate and shareholder taxes through credits such that there is only a single layer of taxation on corporate income.[3] A full imputation system imposes an entity-level tax on corporate income, but shareholders receive credits for taxes paid by the corporation. Integrating corporate and shareholder taxes through imputation credits results in shareholders paying only the difference between the corporate tax rate and the shareholder's tax rate on dividends. Conceptually, the combined corporate and investor-level taxes paid on corporate income is equivalent to the shareholder's tax burden; corporate tax avoidance simply shifts the tax payments from the corporation to the shareholder. Hence, corporate tax avoidance under a full imputation system increases corporate cash flows but does not increase the shareholder's cash flows after dividend taxes. Moreover, cash flows available to shareholders after dividend taxes decreases when tax avoidance is costly. Therefore, managers, who consider investor-level taxes in their corporate actions, would not engage in tax avoidance in an imputation system even though it generates additional operating cash flows at the corporate level.

Other countries employ tax systems in which the form of the investor-level taxation on dividends does not discourage corporate tax avoidance. All of these systems impose tax on income at the corporate level but have different methods of taxing dividends at the investor-level. Classical systems have shareholder tax rates on dividends equal to interest. Modified classical systems, as

[3] For our research question, we classify countries with partial imputation systems in our sample as non-imputation countries. We classify these systems as non-imputation because shareholders can receive an imputation credit even if corporate taxes are not paid. In this system, corporate tax avoidance lowers corporate taxes but does not affect shareholders' taxes because the credit is not affected. As a result, managers have incentives to engage in corporate tax avoidance irrespective of investor-level taxes similar to the other non-imputation systems.

in the United States, have preferential shareholder tax rates on dividends relative to interest. Partial inclusion systems only include a portion of dividends paid in a shareholder's taxable income.[4] While some variation in investor-level taxation exists across these systems, managers can increase operating cash flows available to shareholders after dividend taxes through corporate tax avoidance in all of them. A dollar saved through corporate tax avoidance increases corporate operating cash flows, which upon distribution increases cash flows to shareholders after dividend taxes in all of these systems.

Our setting examines a shift in corporate-shareholder tax integration. Germany, Finland, France, Italy and Norway had full imputation systems but between 1999 and 2006 eliminated them in favor of these other systems. If managers of firms incorporated in these countries consider investor-level taxes when making decisions, they would increase corporate tax avoidance after the elimination of an imputation system assuming all else is equal.

We provide a simplified example to illustrate how investor-level taxes affect managerial incentives for corporate tax avoidance under classical and full imputation systems.[5] First, we assume that two identical taxable shareholders from two different countries incorporate identical "all equity" corporations where they are the sole shareholder and manager. One country has a classical (C) system and the other has an imputation (I) system. Second, we assume that corporate and dividend tax rates are identical across countries at 30% and 50%, respectively. Finally, we assume that each firm earns $100 in domestic taxable income annually on which they pay all taxes in cash and from which they distribute all income after corporate taxes as dividends.

[4] A dividend exclusion system can be viewed as a modified classical system where the investor tax rate on dividends is equal to zero or a partial inclusion system where zero percent of the dividend is included in the shareholder's taxable income. For the remainder of the study we refer to partial inclusion, modified classical and classical tax systems as classical systems unless otherwise noted.

[5] The numerical illustration is presented in Appendix A.

In the base case, the firms do not engage in tax avoidance, which leaves $70 in cash after corporate taxes. Shareholder C receives the $70 dividend and pays her taxes of $35, leaving the shareholder with $35 after corporate and investor-level taxes are paid. Government C receives $65 in total taxes. Shareholder I also receives a $70 cash dividend, but under the imputation system reports $100 taxable income equal to the corporate pre-tax income. The $100 also represents the economic benefit that the shareholder receives from the $70 dividend and $30 imputation credit for corporate taxes paid. Shareholder I's taxes on the $100 are $50, but the $30 imputation credit reduces the taxes paid by the shareholder to $20. Shareholder I has $50 after corporate and investor-level taxes ($70 cash dividend - $20 in additional shareholder taxes). Government I receives $50 in total taxes. In the absence of corporate tax avoidance, shareholders in an imputation system avoid double taxation inherent in a classical system.

Extending the illustration, we assume that each firm engages in corporate tax avoidance that costs $10 and yields an additional $90 non-cash deduction for tax purposes. Each firm reports $0 taxable income, and has $90 in after-tax cash flow to distribute as a dividend. Because Firm I no longer pays any corporate tax, no imputation credits are available to Shareholder I. Both Shareholders C and I report $90 of dividend income and pay dividend taxes of $45, leaving each of them with $45. Governments C and I both receive $45 in total taxes. Although Shareholder C's after-dividend tax cash flow is higher relative to the base case ($45 - 35 = $10), Shareholder I's after-dividend tax cash flow is lower ($45 - 50 = -$5) because the tax avoidance is costly.

Assumptions in this stylized illustration, such as a single, domestic manager-shareholder and domestic taxable income, reflect an imputation system that eliminates the manager's incentive to engage in corporate tax avoidance if she considers investor-level taxes. Relaxing these assumptions increases the incentives for managers of firms incorporated in an imputation country

to engage in corporate tax avoidance, which will bias against finding an increase in corporate tax avoidance when countries eliminate their imputation systems.

More specifically, managers may engage in corporate tax avoidance before the elimination of the imputation systems because not all investors receive imputations credits. In our sample, countries that eliminated imputation systems provide non-refundable imputation credits to only domestic shareholders before the policy change. Thus, we expect investor-level taxes to change corporate tax avoidance in our setting only if the investor-level taxes of domestic shareholders affect the managers' decisions. Managers of corporations traded on global capital markets have a variety of shareholders to consider and may not respond to changes in the taxation of dividends for only taxable domestic investors.

Even if the majority of shareholders are domestic and taxable, managers of public corporations may engage in corporate tax avoidance before the elimination of imputations systems. Relative to the single shareholder-manager in our example, the principal-agent relationship in public corporations creates the potential for misalignment between managers' actions and the interests of the majority shareholders. Before the elimination, managers may engage in corporate tax avoidance in response to self-interested empire building or pressure from powerful foreign or non-taxable institutions shareholders (Desai and Dharmapala, 2006; Chetty and Saez, 2005).

In addition, corporations in a global economy operate in a variety of countries. The imputation countries in our sample, which eliminate their systems, only provided imputation credits for taxes paid on domestic earnings. Therefore, managers with profitable operations in foreign markets have incentives to engage in corporate tax avoidance before the elimination to increase cash flows after dividend taxes for all shareholders.

Finally, firm-level operating cash flows are important for new investment if the cost of raising external capital significantly outweighs the costs of using internal resources (Myers and Majluf, 1984). Under these conditions, managers have incentives to engage in corporate tax avoidance before the elimination of the imputation system to increase operating cash flow. However, if external capital constraints do not exist, the firm and shareholders benefit if the managers do not engage in corporate tax avoidance, distribute dividends to shareholders, and raise external capital.

3. Research Design, Data and Sample

3.1 Research design

3.1.1 Empirical Setting

We employ a quasi-natural experimental setting that mimics the random assignment of corporate-shareholder integration tax systems. The exogenous shock in our setting stems from a series of rulings by the European Court of Justice (ECJ) that led several countries to eliminate their imputation systems (Graetz and Warren, 2007, 2014).[6] While we can never completely alleviate concerns that the country-level decision to eliminate the imputation system was endogenous to other national or firm-level decisions, Graetz and Warren (2007, p. 17) reference the ECJ, a supernational judicial court, as "a primary factor leading Member States to abandon their imputation systems". We provide the following details to support the exogenous nature of these eliminations.

First, ECJ rulings are independent of the tax policies of the European Union (EU) and its member countries. The ECJ has no explicit authority to establish tax policy for the EU as a whole

[6] The Court of Justice of the European Union was formerly known as the European Court of Justice.

and has no choice in the cases it hears. Upon receiving a case, the ECJ must rule as to whether a violation occurs of a guaranteed freedom of the EU treaties, and its decisions are only directly applicable to the parties in the case (Graetz and Warren, 2007, p. 2).

Second, in our specific setting, investors, not the countries themselves, filed to have imputation treatment extended to either foreign income or taxes in each case heard by the ECJ (Graetz and Warren, 2007). In these cases, the ECJ ruled on national income tax policies in order to "prohibit discrimination against cross-border investments and to ensure the free movement of capital within the EU" (Graetz and Warren, 2014, 709). These stated objectives mitigate the concern that the subsequent eliminations represent a deliberate focus on corporate tax avoidance.

Third, the EU had seen the *implementation* of imputation systems up until the ECJ's adverse rulings began. With successive rulings that imputation systems would violate treaty principles, "member states began to fear that their imputation systems would be found by the ECJ to violate the EC Treaty freedoms" (Graetz and Warren, 2006, p. 1210). As a result of these ECJ rulings, member states began to abandon their imputation systems, which explains the staggered eliminations across countries. Overall, while changes in imputation systems driven by ECJ rulings appear more exogenous to other national tax policies, lobbying efforts and corporate tax planning than most changes in country tax law used in prior research, there are still potential concerns that we address through the research design and related placebo tests.

3.1.2 Difference-in-Differences Model

We implement a difference-in-differences model in our empirical setting to test our prediction. Firms from countries that eliminate their imputation systems represent the treatment group and firms from countries that do not change their method of corporate-shareholder integration represent the control group. As countries eliminate their imputation systems in different

years, our research design mimics the random assignment of the treatment effect in an ideal experiment better than a typical quasi-natural experiment with only one policy change event.

Our model relies on the standard difference-in-differences framework but with full firm and year fixed effects. As discussed in Meyer (1995), Bertrand, Duflo and Mullainathan (2004), and Imbens and Wooldridge (2009), this approach is analogous to the standard approach in which two groups (treatment and control) and two time periods (before and after) are observed. In our design, the firm fixed effects remove any bias resulting from time-invariant differences between any treated and untreated firms, and thus is a stronger and more statistically conservative approach than collapsing the data into a binary variable for treatment and control observations. The year fixed effects reflect the staggered pattern of eliminations in our data and remove any bias resulting from time trends that might be otherwise consistent with our predictions. They also capture common unobservable effects that occur in specific years, rather than only across a binary pre-post period. For example, the year fixed effects control for trends in tax rates and tax enforcement over time. Furthermore, year fixed effects capture the adoption of IFRS by many countries in 2005 and the global financial crisis in 2008, unless the effect of these events varies across countries in a way that correlates with the treatment.

The difference-in-differences estimator from this model, an indicator variable, represents treatment firms after the policy change. It measures the change in corporate tax avoidance by treatment firms after their countries of incorporation eliminate their full imputation systems compared to the change in corporate tax avoidance for control firms incorporated in countries that do not eliminate their systems of corporate-shareholder tax integration.

While our research design is powerful, it does have limitations. The biggest concern is that another event occurs at the same time as the elimination of the imputation system for only

treatment firms and contributes to our results. For example, if a country responds to an ECJ ruling by eliminating its imputation system and changing its corporate tax rate, our model cannot distinguish between the two policy changes. Therefore, in addition to firm fixed effects, we control for additional factors that could plausibly accompany the elimination of an imputation system, including firm-level payout policies and dynamic country characteristics such as tax rates. Finally, we outline several placebo tests in subsequent discussions that mitigate the concern that contemporaneous events explain our results.

We predict that investor-level taxes affect corporate tax avoidance, and we examine the managerial response to a change in investor-level taxation created when a country eliminates its imputation system. To test this prediction, we employ the difference-in-differences model in equation (1) as our primary analysis. Specifically, we examine whether firms incorporated in countries that eliminate their imputation systems increase their corporate tax avoidance after the change relative to firms incorporated in countries that do not change their shareholder dividend tax policies:

$$SPREAD_{it} = \gamma_0 + \gamma_1 IMP\_TREAT_{it} + \gamma_{2\text{-}k} X_{it} + \psi_i + \xi_t + \mu_{it} \quad (1)$$

where

$SPREAD_{it}$ is the amount of corporate tax avoidance measured as the corporate statutory tax rate in country *j* less the annual tax paid in cash relative to pre-tax income for firm *i* in country *j*.[7] IMP_TREAT_{it} , the difference-in-difference estimator and our main variable of interest, is an

[7] In untabulated analyses, we also examine alternative measures of *SPREAD* because of the difficulty in measuring corporate tax avoidance. In one test, we use the median *Cash effective tax rate (Cash ETR)* for each country in place of its statutory rate and in another we substitute a firm's cash taxes divided by pre-tax operating cash flows as a firm's *Cash ETR*. Because not all countries require the disclosure of cash taxes paid, leading to missing values and potential for self-selection issues, we also substitute a firm's GAAP ETR for *Cash ETR*. In all three regressions, inferences do not change when we use these alternative measures. Finally, if we scale any of these effective rates by the statutory rate, which changes the expected sign of the coefficient on *IMP_TREAT*, results continue to hold.

interaction term that is equivalent to one in the years after a country eliminates its imputation system, zero otherwise. X_{it} represents a set of time-variant, firm-year and country-level control variables, and ψ_i and ξ_t represent the firm and year fixed effects, respectively. We expect corporate tax avoidance to increase after countries eliminate their imputation systems ($\gamma_1 > 0$).[8]

3.2 Data and Sample

3.2.1 Data sources

To construct the tax-related variables in our empirical models, we require data on three tax policies of each country: the shareholder dividend tax system (e.g., imputation, classical), the statutory tax rates (e.g., corporate, dividend, capital gains) and the imputation rate. We obtain these data from the OECD and, when necessary, hand collection. We construct the remainder of our firm-level control variables from data available in the Thompson Reuters *Datastream Advance Database* (*Datastream)* and country-level control variables are acquired from various sources based on the prior literature. For brevity, we report the construction and source of these variables in full detail in Appendix B.

3.2.2 Sample

We begin by collecting data available from *Datastream*, specifically accounting data from *Worldscope* (WC). We restrict our selection to securities that contain primary quotes, but we allow for all major security types, equity instruments and American or Global Depository Receipts. Next, we eliminate observations that have missing fiscal year-end dates (WC05350) and thus missing accounting data. Further, we restrict our sample to the fiscal years 1994 through 2008, which is the last year for which we had data available when we initiated the study. In the *Datastream* universe, 463,673 firm-year observations meet these criteria.

[8] Equation (1) represents a standard estimation technique, and we note that the main effects related to *IMP_TREAT* are omitted as they are fully subsumed by the firm and year fixed effects.

Following a match of our country-level tax data from the OECD to our *Datastream* sample of firm-years, we have 349,255 observations remaining. After eliminating observations where country-level factors are missing (e.g., type of tax system, tax rates, book-tax conformity, etc.), we have 304,923 observations. In order to use a consistent sample across our empirical tests, we also eliminate observations where firm control variables are missing, resulting in 137,396 observations. Finally, we eliminate observations with missing values for taxes paid or negative pre-tax income, which is required to estimate our primary dependent variable. Our final, full sample includes 70,518 firm-year observations from 1994 through 2008. We attempt to minimize the undue influence of outlier observations by winsorizing all continuous variables in the 1st and 99th percentiles of their respective distribution.[9]

3.3 Measure of Tax Avoidance

Our primary measure of corporate tax avoidance is based on *Cash ETR* from Dyreng et al. (2008) – cash taxes paid divided by pre-tax income adjusted for special items. *Cash ETRs* are less sensitive to home-country financial accounting standards than other tax avoidance measures such as GAAP effective tax rates or book-tax differences reported in the financial statements. We use an annual measure of *Cash ETR*, instead of the long run measures recommended by Dyreng at al. (2008), because of the changes specification inherent in our research design and data restrictions that substantially reduce the size of the sample.[10] Finally, we winsorize *Cash ETR* to zero and one before we calculate the tax avoidance spread discussed below.

The spread measure, *SPREAD*, subtracts a firm's annual *Cash ETR* from the corporate statutory tax rate (*CSTR*) of the country in which it is incorporated in year *t*. Thus *SPREAD*

[9] In untabulated results, we estimate our main analysis in a base model with only tax rates as control variables. Our inferences are unchanged using this sample of 104,287 observations. Inferences are also unchanged if we do not winsorize any of the continuous control variables.

[10] Our use of annual *Cash ETR* in a changes specification is consistent with Dyreng, Hanlon and Maydew (2010).

represents the difference between the corporate tax rate a benchmark firm would pay in its country of incorporation and what tax rate firm *i* actually pays. We interpret larger spreads as more corporate tax avoidance. We adjust the firm's *Cash ETR* for the country's corporate statutory tax rate because countries, which have imputation systems, could have lower corporate statutory tax rates also creating less incentive to avoid corporate taxes. Thus, our dependent variable implicitly controls for this country-level characteristic and is algebraically similar to Atwood et al. (2012).

3.4 Definition of Control Variables

Although the research design mitigates most concerns about omitted correlated variables, we still include control variables consistent with prior studies in the tax avoidance literature to allay concerns (e.g., Gupta and Newberry, 1997; Mills, Erickson and Maydew, 1998; Rego, 2003; Dyreng et al., 2008; Frank, Lynch and Rego, 2009; Wilson, 2009; Chen, Chen, Cheng and Shevlin, 2010).

We include an extensive list of additional firm-level variables in our models to control for other factors that are positively associated with various types of corporate tax avoidance, including profitability (*ROA*) and leverage (*LEV*), firm size (*SIZE*), foreign operations (*FOROPS*), growth opportunities (*BM*), capital intensity (*PPE*) and R&D intensity (*R&D*). Consistent with Edwards, Schwab and Shevlin (2016) and Bauer (2016), we include a proxy for cash resources (*CASHRES*).[11] We also control for the level of dividends *(DIVS)* and share repurchases *(SHRPS)*. We include these variables in our model to ensure that our variable of interest (i.e., *IMP_TREAT*) does not capture any unidentified influence of shareholder payout policy; therefore, we do not make a directional prediction for these two variables.

[11] To preserve our sample size across countries, we proxy for cash resources (i.e., financial constraints) using cash holdings scaled by lagged total assets. As discussed in Hadlock and Pierce (2010), firms with greater excess cash are more constrained; financially constrained firms hold excess cash for precautionary reasons.

Relatedly, we also control for country-level factors that vary within countries across years; our firm fixed effects ensure that *IMP_TREAT* does not capture static national or firm policies or conditions. We begin by including statutory tax rates for corporate income *(CSTR),* dividends *(PSTR)* and capital gains *(CGTR)*. Consistent with Atwood et al. (2012), we also include measures for book-tax conformity (*BTAXC*) and the presence of a worldwide tax system (*WW*). We also control for changes in a country's population (*POPGRT*) and *GDP*. We provide further details on variable construction in Appendix B.

3.5 Descriptive statistics

Table 1 presents the 23 countries represented in our dataset of 70,518 firm-year observations from 1994-2008. Seven countries have a full imputation system. Of those countries, Finland, France, Germany, Italy and Norway eliminate their imputation system; thus, firm-years from these countries comprise 4,651 observations (7% of the sample). Only Australia and New Zealand (5% of the sample) continue to have full imputations systems. All firm-years from countries that do not change their tax system, including Australia and New Zealand, are the control group.[12] Clearly, firms from the United States, Japan and the United Kingdom dominate the sample. Therefore, we provide additional analysis based on a random sample of observations from each country to address concerns that countries with a disproportionate number of firms drive our results.

Table 2 provides the descriptive statistics for our sample. In Panel A, we observe that the average (median) spread between a firm's statutory tax rate and its cash effective tax rate in our sample is 6.7% (8.7%). Panels B and C report the statutory tax rates on corporate and dividend

[12] Four countries are exceptions to this description of the control sample, but our empirical results are not affected if the firm-years (1% of the sample) are excluded from the analysis. Mexico implemented a full imputation system, but the observations are too few to examine separately. South Korea, Ireland and Spain changed a *partial* imputation system.

income, respectively, for the five treatment countries that eliminate an imputation system. Each tax rate is provided for year *t-3* to *t+3* surrounding the elimination. Panel B reports that changes in corporate statutory tax rates vary from a 16.3% decrease (Italy) to no change (Norway). A reduction in the corporate statutory tax induces a mechanical and behavioral effect on a firm's cash ETR that decreases *SPREAD* and biases against our predictions. First, a firm pays less domestic cash taxes on the same income when its corporate statutory tax rate decreases, leading to a mechanical decrease in the firm's worldwide cash ETR. However, this mechanical decrease of the firm's cash ETR will be less than or equal to the reduction in the corporate statutory tax rate because the firm's foreign cash taxes, which also comprise the firms' worldwide cash ETR, will not be affected. Because the decrease in the corporate statutory tax rate will be greater than or equal to the decrease in the firm's worldwide cash ETR, *SPREAD* will decrease. The behavioral effect arises because management has less incentive to avoid taxes when corporate statutory tax rates are lower, which increases a firm's worldwide cash ETR and thus decreases *SPREAD* (Clausing, 2009).

As shown in Panel C, personal tax rates have small changes over this period, ranging from a 1% decrease (Finland) to 0.4% increase (France). Italy is the exception with a 38.5% reduction in its personal statutory tax rate on dividend income. We note that our subsequent results are robust to the exclusion of Italy.[13]

[13] Changes in capital gains tax rates for these countries show no pattern. Finland and Italy decreased the capital gains tax rate by 1% and 12.5%, respectively, while France and Norway increased the capital gains tax rate by 1% and 28% respectively. Germany did not change its capital gains tax rate.

4. Results

4.1 Primary Analyses

4.1.1 Firm-level corporate tax avoidance following the elimination of an imputation system

Table 3 reports the results of the difference-in-differences estimation represented by equation (1). In the first column, we use our full sample of 70,518 firm-year observations. In the second column, we report results after we take 2,300 random draws from the full sample (100 draws for 23 countries). We use a maximum of 100 observations per country, so this process results in 1,705 firm-year observations to estimate equation (1) and mitigates concerns that our results could stem from an imbalance of observations across countries.[14]

The coefficient on *IMP_TREAT* represents our variable of interest – the change in corporate tax avoidance by firms after the country eliminates its imputation system incremental to the change in corporate tax avoidance by firms from other countries. Results in the first column of Table 3 show that, as predicted, the coefficient is positive and statistically significant at a 1% level. This evidence is consistent with investor-level taxes influencing managers to engage in more corporate tax avoidance following the elimination of the imputation system. The coefficient on *IMP_TREAT* is economically significant and accounts for 5.5 percent of corporate pre-tax earnings. This estimate represents 17 percent of the average statutory corporate tax rate for countries that eliminate imputation systems before the change (31.7%, untabulated) or 81 percent of the corporate tax avoidance by firms from other countries (6.8%, untabulated). Evidence from our random sample in the second column of Table 3 corroborates the results for the full sample. We continue to find a positive coefficient on *IMP_TREAT*, but of larger magnitude, significant at the 5% level. This analysis strongly supports that investor-level taxation has a significant economic

[14] The United States represents over 40% of the firm-year observations in our data. We note that our results are robust to the exclusion of the United States.

and statistical effect on the tax avoidance behavior of managers of public corporations. Control variables in these regressions are generally statistically significant at varying conventional levels and in the predicted directions.[15]

To further illustrate our main result, Figure 1 provides a plot of average *SPREAD* during the window from *t-3* to *t+3*, where $t = 0$ is the year a country changes its imputation system. We match, on fiscal year, firms from countries that eliminate imputation systems (treatment firms) to a random sample of up to 100 firms from countries that never change their tax system (control firms). Figure 1 shows that the average treatment firm's corporate tax avoidance (*SPREAD*) increases sharply in the year that a country eliminates its imputation system (e.g., at $t = 0$) and continues to increase gradually over the next three years. More convincing is that the average control firm's corporate tax avoidance does not vary substantially over the same period. While the treatment firms have substantially less corporate tax avoidance relative to the control firms before the elimination of the imputations systems, the average corporate tax avoidance converges after the elimination of imputation. This evidence is consistent with conclusions from Table 3 that tax avoidance increases for firms from countries that eliminate an imputation system.

4.1.2 Placebo tests

We address concerns that the primary results are due to events other than the elimination of the imputation systems with several placebo tests. For the first test, we follow Bertrand et al. (2004) and assign random "placebo policy" changes to countries, which simulates the underlying data-generating process. Specifically, we randomly assign the "elimination" treatment to a year between 1996 and 2006 for five countries, consistent with the five imputation eliminations

[15] We have examined several time trends, and neither a linear, nor log, nor cubic time trend has an effect on our main result. Results are also robust to a linear trend plus squared trend (i.e., quadratic) plus cubic trend, and the inclusion of all variables from our main model or just firm-level variables. Finally, full sample results are robust to controlling for serial correlation under an AR(1) process; serial correlation is not present in the random sample.

scattered across our actual sample. Using the full sample, we estimate equation (1) with this placebo policy change. We repeat the random assignment and estimation 1,000 times. The result is a placebo test of 1,000 random trials, and we construct an average coefficient for "*IMP_TREAT*" and calculate a t-statistic using the standard deviation of the 1,000 coefficients. In untabulated results, we fail to reject the null of no association with *SPREAD*, supporting our interpretation of the results from Table 3.

Similarly, in a second placebo test, we change the year of the elimination of the imputation system for the five actual countries, which comprise the treatment sample, to a randomly assigned year. For each country, we restrict the random assignment to be a year in which an elimination does not actually occur and repeat the process 1,000 times. The untabulated results show that we fail to reject the null of no association, again supporting our interpretation of Table 3.

Relatedly, in a third placebo test we change the years of the "elimination" to be all years in which a 1% or greater decrease in the country's corporate statutory tax rate occurs. With the exception of Norway, Switzerland and the United States, all other countries in our dataset meet this condition at least once. Thus, our treatment group in this placebo test includes both firms incorporated in countries that eliminate imputation and in countries that do not. The untabulated results show that we fail to reject the null of no association, supporting that a decrease in corporate tax rates does not drive our main results.

In a fourth and final placebo test, we randomly assign an "elimination" year to all countries that do not change their shareholder dividend tax policy. As a result, all firms have an elimination year in which *POST* equals one after the "elimination" year, zero otherwise; the treatment firms have their actual elimination year while the control firms have a random "elimination" year. We substitute *POST* for the year fixed effects, so we can compare the effect for treatment and control

groups. We estimate the equation and repeat this entire procedure 1,000 times. The untabulated results report that firms from countries that do not change tax systems have a statistically insignificant change in *SPREAD* in their placebo post period (i.e., the coefficient on *POST* is insignificant). In contrast, the firms from countries that eliminate imputation systems have a statistically significant increase in *SPREAD* of 5% after the change, relative to firms in the control group period (i.e., the coefficient on *IMP_TREAT* is significant). Inferences are identical if we estimate this model with firm and year fixed effects. This test corroborates visual evidence in Figure 1, supporting that our core results derive from countries that eliminate their imputation system.

4.1.3 Cross-sectional differences in response to the elimination of an imputation system

Our simplified illustration in Section 2 demonstrates that after-tax cash flows to shareholders of firms incorporated in classical countries increases because shareholders, who are also managers, engage in corporate tax avoidance related to domestic earnings. As an extension of the primary difference-in-differences analysis, we consider the effect of relaxing the assumptions of domestic earnings, complete ownership concentration, and 100% dividend payout policy by examining the cross-sectional variation in the results from Table 3.[16]

First, our previous illustration in Section 2 demonstrates that the shareholder of a firm in an imputation country receives higher after-tax cash flow from domestic earnings relative to a classical country. As firms incorporated in imputation countries earn more income taxed abroad, investor-level taxation provides a more equivalent management incentive for corporate tax avoidance relative to firms in non-imputation countries because foreign corporate taxes do not

[16] We acknowledge that the change from an imputation system to a classical system provides a shock to firms that may affect multinational operations, ownership concentration and dividend policy. However, we do not believe these simultaneous changes have significant effect on the direction of our results.

generate imputation credits. In other words, a country with an imputation system for domestic earnings is in essence a classical system for foreign earnings (Babcock, 2000). The foreign country taxes earnings at the corporate level and shareholders pay taxes to the imputation country on dividends paid out of foreign earnings. Therefore, the more a firm's earnings are foreign-sourced, the less impact a change from an imputation system to a non-imputation system will have on managers' incentive to engage in corporate tax avoidance. To test this prediction, we examine the change in corporate tax avoidance after the elimination of the imputation systems for firms based on multinational operations.

Consistent with Dyreng, Hanlon, Maydew and Thornock (2016), we split our sample into two groups: (1) domestic observations with non-positive foreign income, zero foreign tax expense, or missing values of either metric (*Low MNC*) and (2) multinational observations with positive foreign income or non-zero foreign tax expense (*High MNC*). We estimate regressions of equation (1) on each subsample. Columns 1 and 2 of Table 4 report that the *Low MNC* subsample has a significant coefficient on *IMP_TREAT* of 0.068; the coefficient for the *High MNC* subsample is 0.021 but insignificant. Furthermore, using a non-parametric Monte-Carlo simulation test of the *IMP_TREAT* coefficients, we find the difference across the two subsamples is significant at the 5% level (two-tailed). We conclude that firms with domestic operations increase corporate tax avoidance after the elimination of the country's imputation system, consistent with expectations. Our estimates suggest that this change results in an economically significant aggregate, annual loss of $8B in corporate tax revenue for governments of the countries eliminating imputation systems.[17]

[17] We note that the average pre-tax income of a domestic firm in the eliminating countries is $523M (in USD) and the average pre-tax income of an MNC in eliminating countries is $834M (in USD). The coefficient on the interaction term in the domestic subsample is 0.068 from Table 4. This result implies a decrease in the effective tax rate of 6.8 percent. Multiplying this decrease by the average pre-tax income of domestic firms in eliminating countries implies an average, annual decrease in taxes paid of $36M. As we have 3,152 "domestic" firms in our

Second, we consider the effect of ownership concentration on the influence of investor-level taxes on managers' engagement in corporate tax avoidance. Managers of firms that are closely-held by shareholders arguably have better alignment between managers and shareholders. Therefore, we expect the increases in corporate tax avoidance reported in Table 3 will be greater for firms with a higher proportion of closely-held shares compared to widely-held shares. To test this prediction, we examine the change in the association between corporate tax avoidance after the elimination of imputation systems for firms based on the proportion of closely-held shares.

Similar to our MNC analysis, we split our sample into two groups: (1) a below-median proportion of closely-held shares (*Low CLSHLD*) and (2) above-median proportion of closely-held shares (*High CLSHLD*). If shareholders of closely-held firms have more power to influence managers' actions than in a diffuse ownership structure, we would expect managers of closely–held firms to engage in more corporate tax avoidance after the elimination of the imputation system compared to the control sample, consistent with findings in Chetty and Saez (2005) and Hanlon and Hoopes (2014). We estimate equation (1) separately for each subsample. In columns 3 and 4 of Table 4, as predicted, the coefficient on *IMP_TREAT* for the *High CLSHLD* subsample (0.131) is positive and significantly larger than the positive coefficient for the *Low CLSHLD* subsample (0.050) at the 1% level (two-tailed) using a Monte Carlo test. The evidence suggests that closely-held firms have a larger increase in corporate tax avoidance following the elimination. We conclude that ownership concentration accentuates the influence of investor-level taxes on managers' engagement in corporate tax avoidance.

"eliminating" sample, or an average of approximately 210 such firms per year from 1994-2008, a lower bound estimate of the aggregate, annual economic loss for countries eliminating imputation systems is $8B.

Third, we recognize that firms do not pay out all after-tax earnings as dividends for a variety of reasons, including the re-investment of after-tax corporate cash flows into internal projects. In addition, domestic earnings taxed at the corporate level under an imputation policy, but undistributed to shareholders as dividends by the date of elimination, can be paid subsequently to shareholders with the imputation credit still attached. Therefore, the elimination will have a smaller immediate impact on a manager's incentive to engage in corporate tax avoidance for a firm with a lower dividend payout ratio. To test this prediction, we examine the change in corporate tax avoidance after the elimination of the imputation systems for firms based on the ratio of dividends paid to pre-tax income.

As with our other analyses, we split our sample into two groups: (1) a null or below-median ratio of dividends to income (*Low DIV*) and (2) above-median ratio of dividends to income (*High DIV*). If the elimination of the imputation system has less impact on managers' actions in low dividend-paying firms, we would expect managers of low dividend-paying firms to engage in less corporate tax avoidance after the elimination of the imputation system compared to the high dividend-paying firms. We estimate equation (1) separately for each subsample. In columns 5 and 6 of Table 4, we report that the coefficient on *IMP_TREAT* for the *Low DIV* subsample is statistically insignificant and the coefficient for the *High DIV* subsample is positive (0.071) and significant at the 1% level (two-tailed). The difference is statistically significant at the 1% level (two-tailed) using a Monte Carlo test. This evidence supports that low dividend-paying firms have less incentive to respond to the elimination of an imputation system, at least until they have exhausted accumulated and unpaid imputation credits.

4.2 Complementary Analyses

4.2.1 Macro-level corporate tax avoidance following the elimination of an imputation system

To corroborate the findings of our firm-level difference-in-differences analyses, we use an alternative dataset relying on macro-level changes resulting from the elimination of the imputation systems. Specifically, we examine if corporate tax revenue decreases as a percentage of GDP (*CORP TAX REVENUE / GDP*) after the elimination of imputation systems. We also estimate the effect of the elimination of the imputation systems on country-level individual tax revenue, divided by GDP (*INDIV TAX REVENUE / GDP*). Tax revenue from individual taxpayers may increase following the elimination of imputation credits available to shareholders, which would mitigate potential shortfalls in corporate tax revenues. Finally, we examine if statutory tax rates – corporate (*CSTR*), personal rate on dividend income (*PSTR*) and capital gains (*CGTR*) – are associated with the elimination of imputation systems to mitigate lingering concerns that differences in statutory tax rates could explain the results from the preceding analysis.

Our empirical models for these analyses follow a similar difference-in-differences design as equation (1), but due to the small sample size and lack of variation with country-level data, we replace the firm fixed effects with an indicator variable that splits countries into one treatment group and one control group (*IMP*). In addition, we substitute firm-level control variables with additional country-level control variables. Specifically, we include an index of tax enforcement (*TAXENF*) from Atwood et al. (2012) and, consistent with La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998), we control for the presence of common law legal systems (*COMLAW*) and an index of ownership concentration (*OWNCON*). Following La Porta, Lopez-de-Silanes and Shleifer (2006) and Djankov, McLiesh and Shleifer (2006) we control for indices of investor rights (*INV_RIGHTS*) and creditor rights (*CRED_RIGHTS*), respectively.

Evidence that eliminating an imputation system has a negative effect on corporate tax revenue and no effect on statutory tax rates supports our conclusion from Table 3 that investor-level taxes influence managers to engage in more corporate tax avoidance after the elimination of the imputation systems. Table 5 presents the results for the macro-level difference-in-differences regressions. The first column of Table 5 provides evidence that supports our primary firm-level analysis. The coefficient on *IMP_TREAT* is negative and significant at the 5% level. This evidence implies that corporate tax revenues as a percentage of GDP decrease after countries eliminate their imputation systems, consistent with higher levels of corporate tax avoidance leading to lower corporate tax revenues in those countries. In the second column of Table 5, individual tax revenues are not significantly related to the elimination of the imputation systems at conventional levels, implying that any mitigation of the decrease in corporate tax revenue is not evident in this alternative revenue source. In the third through fifth columns, the coefficients on *IMP_TREAT* are not statistically significant when *CSTR, PSTR* and *CGTR* are the dependent variables. This additional evidence, consistent with our placebo analyses, provides support that changes in statutory tax rates that may occur simultaneously with changes in imputation systems do not drive the results in our primary, firm-year analysis.

4.2.2 Income shifting

Our measure of corporate tax avoidance captures a broad range of managerial actions that reduce the corporate tax burden. Therefore, we extend our analysis by examining a particular managerial action that the prior literature has examined: income shifting. Slemrod (1992) would classify income shifting as an "accounting" action. He concludes that evidence in the prior literature suggests that this type of action is less likely than a timing action, but more likely than a real action, to respond to tax planning incentives. Following Babcock (2000), we predict firms

incorporated in imputation countries have incentives to report income domestically, and thus, less incentive to shift income to foreign jurisdictions with lower tax rates relative to firms from other countries. Conversely, those incentives to report domestic income dissipate after the elimination of the imputation system; therefore, more income is shifted to foreign countries.

To examine income shifting, we adapt a conventional model from the prior tax literature (e.g., Collins, Kemsley and Lang, 1998; Klassen and Laplante, 2012; Lester, 2015; Dyreng and Markle, 2016) to our empirical setting. We use foreign return on sales (*FROS*) as our dependent variable, which represents foreign income shifting. The use of foreign sales in the denominator of *FROS* reduces our sample to 32,309. In our first model, we control for firm-level, independent variables and statutory tax rates. In a second expanded model, we add *DIVS, SHRPS* and our four country-level factors from equation (1) to control for a firm's payout policy and macro-economic factors not subsumed by our firm fixed effects. In Table 6, we report a positive and significant coefficient on *IMP_TREAT* including or excluding the expanded control variables. The positive *IMP_TREAT* coefficient of 1.1% in column (2) represents 14.5% of the average income shifted by firms from other countries (7.6%, untabulated), and implies that after the elimination of the imputation systems, firms increase their foreign income shifting relative to control firms. Consistent with Babcock (2000), the evidence supports that firms engage in less foreign income shifting when imputation credits are available for domestic income, and when the credits are eliminated they revert to income shifting patterns similar to firms from non-imputation countries.

4.2.3 Corporate tax avoidance following a decrease in managerial incentives in Australia

One concern with our research design is that it captures only increases in managers' incentives to engage in corporate tax avoidance because of investor-level taxes. Therefore, we conduct a second, untabulated difference-in-differences analysis of legislation enacted in Australia

as a counterfactual. During the fiscal years 2001 to 2003, Australia passed legislation to enhance and simplify the availability of imputation credits for shareholders. The most significant change came in 2001, which allows for refundable imputation credits when a shareholder does not have a tax liability. The changes that followed in 2002 and 2003 simplify the corporate reporting of franked dividends to the Australian government and have a less direct influence on investors. The increased availability of the benefits from credits to more taxpayers in 2001 potentially reduces managers' incentive for corporate tax avoidance. However, the change may not reduce managers' engagement in corporate tax avoidance if existing investments in corporate tax avoidance are more costly to unwind than keep in place.

We implement a similar difference-in-differences model as shown in equation (1) to examine corporate tax avoidance after Australia passed the first enhancement of the imputation credits in 2001. We expect a decrease in tax avoidance beginning in 2001 for firms incorporated in Australia relative to firms from other countries during the same period, which is captured by the difference-in-differences estimator *(IMP_TREAT).* The untabulated results return a coefficient on *IMP_TREAT* of -0.082, statistically significant (at the 1% level), as predicted. Overall, the evidence is consistent with managers' reducing corporate tax avoidance when the incentive driven by investor-level taxes strengthens, despite the existence of prior tax planning structures. We caveat that this research design is weaker than our primary setting because endogenous political forces in Australia are likely a factor in the change in policy and because the related changes in legislation unfold from 2001 and 2003.

5. Conclusions

This study exploits the unique setting created by the eliminations of imputation systems to identify and quantify managements' engagement in corporate tax avoidance driven by investor-level taxes. The study is the first to provide evidence that shareholder dividend tax policy, which has been the focus of extensive research for its effects on firm value and investment, significantly relates to corporate-level tax planning. The setting, in combination with the difference-in-differences model employed, creates a research design that mitigates many identification concerns inherent in studies on the determinants of corporate tax avoidance. The results suggest that public corporations in countries that eliminate an imputation system increase corporate tax avoidance by at least 5.5 percent of pre-tax income, which is consistent with investor-level taxes incentivizing managers to engage in corporate tax avoidance. This increase in corporate tax avoidance is 17 percent of the average statutory corporate tax rate for countries that eliminate imputation systems or 81 percent of the corporate tax avoidance conducted by firms from other countries.

The results also inform policy by highlighting an unintended consequence, increases in corporate tax avoidance, of the rulings made by the ECJ to encourage tax harmonization among its members. This evidence speaks directly to concerns over the ECJ's attempts to harmonize tax policy through its rulings at the expense of its member states by estimating the negative impact on members' tax revenues (Graetz and Warren, 2006). An alternative policy implication from the primary results and the supplemental test based on Australia is the implementation of an imputation system could lead to less corporate tax avoidance (Graetz and Warren, 2014). While the results suggest lower corporate tax avoidance is a benefit in an imputation system and could have important policy implications, this study is silent on the other benefits and costs of

implementing an imputation system (Amiram and Frank, 2016) and leaves future research to assess the optimal trade-off to implement an imputation tax system.

Appendix A
Illustrative Example of Cash Flows for Different Shareholder Dividend Tax Policies
Imputation vs. Classical

For purposes of the illustrative example, we assume two identical "all equity" firms exist in two identical countries except for their shareholder dividend tax policies. One country operates under an imputation system and the other under a classical system. Both countries have a corporate tax rate of 30% and the shareholder of each firm faces a dividend tax rate of 50%. Annually, each firm earns $100 in pre-tax income, pays all taxes in cash and fully distributes any after-tax income as dividends. In Panel A, we assume that neither firm engages in a tax avoidance strategy. In Panel B, we extend the example and assume that both firms purchase the same tax avoidance strategy. A tax promoter will sell the strategy at a cost of $10 and the strategy will generate a non-cash tax deduction of $90.

Panel A: The Baseline Case

Corporate Level		**Imputation**	**Classical**
Pre-tax corporate-level income (before tax planning)		100	100
Less: Tax planning cost		-	-
Pre-tax corporate-level income		100	100
Less: Company tax (see tax return)		30	30
After-tax income		***70***	***70***
Corporate Tax Return			
Pre-tax corporate-level income		100	100
Less: Tax deduction bought		-	-
Taxable income		100	100
Company tax	30%	***30***	***30***
Individual/Shareholder Level			
Dividend received by individual		70	70
Gross-up for corporate tax		30	-
Individual taxable income		100	70
Individual tax before credit	50%	50	35
Less: Imputation credit		30	-
Net shareholder-level tax		*20*	*35*
Total tax: corporate and shareholder		*50*	*65*
Net shareholder income after-tax		***50***	***35***
Comparison			
Statutory tax rate		30%	30%
Corporate tax rate paid		30%	30%
Corporate tax minimization		***0%***	***0%***

Appendix A – *continued*

Panel B: The Tax Minimization Strategy Case

Corporate Level		**Imputation**	**Classical**
Pre-tax corporate-level income (before tax planning)		100	100
Less: Tax planning cost		10	10
Pre-tax corporate-level income		90	90
Less: Company tax (see tax return)		0	0
After-tax income		***90***	***90***
Corporate Tax Return			
Pre-tax corporate-level income		90	90
Less: Tax deduction bought		90	90
Taxable income		0	0
Company tax	30%	***0***	***0***
Individual/Shareholder Level			
Dividend received by individual		90	90
Gross-up for corporate tax		0	-
Individual taxable income		90	90
Individual tax before credit	50%	45	45
Less: Imputation credit		0	-
Net shareholder-level tax		*45*	*45*
Total tax: corporate and shareholder		*45*	*45*
Net shareholder income after-tax		***45***	***45***
Comparison			
Statutory rate		30%	30%
Corporate tax rate paid		0%	0%
Corporate tax minimization		***30%***	***30%***
Net income available to shareholder: Baseline		*50*	*35*
Net income available to shareholder: Tax strategy		*45*	*45*
Net benefit to shareholder: tax strategy vs. no tax strategy		***-5***	***10***

Appendix B
Definition of Variables

Tax Avoidance Variables	***Description and/or Data***	***Details and Source***
SPREAD	$CSTR_{jt}$ - $CASH\_ETR_{it}$	Annual tax avoidance spread, calculated as the corporate statutory tax rate in country *j* less the annual *Cash ETR* value of firm *i* in country *j*.
CASH_ETR	$TXPD_{it} / (PINC_{it} – DOPSCF_{it} – XITEMS_{it})$	Annual *Cash ETR*, calculated as taxes paid (WC01451) divided by [pre-tax income (WC01401) less discontinued operations (WC04054) & extraordinary items (WC04225)]. Set to missing if denominator <= 0. Source: Datastream (DS) / Worldscope (WC)
FROS	$FINC_{it} / ISALES_{it}$	Annual foreign return on sales, calculated as foreign income (WC07126) divided by foreign sales (WC07101). Set to zero if foreign income is missing and foreign sales are non-missing. Source: Datastream (DS) / Worldscope (WC)
Tax System Variables	***Description and/or Data***	***Details and Source***
IMP_TREAT	Indicator variable for a country that eliminated imputation during the period after the change	Equal to 1 if year *t* is the year of elimination or after for country *j*, 0 otherwise. Source: OECD and hand collection
CSTR	Corporate statutory tax rate	Collected as reported by source for country *j*. Source: OECD and hand collection
PSTR	Personal statutory tax rate on dividends	Collected as reported by source for country *j*. Source: OECD and hand collection
CGTR	Capital gain tax rate	Collected as reported by source for country *j*. Source: OECD and hand collection
IMP	Indicator variable for a country that eliminated its imputation system	Macro-level indicator, equal to 1 if country *j* had an imputation system and eliminates it during the sample period, 0 otherwise. Source: OECD and hand collection
CORP TAX REVENUE / GDP	Corporate Tax Revenue as a % of GDP	Macro-level corporate income tax revenue divided by GDP for country *j* in year *t*. Collected as reported by source for country *j*. Source: OECD
INDIV TAX REVENUE / GDP	Individual Tax Revenue as a % of GDP	Macro-level individual income tax revenue divided by GDP for country *j* in year *t*. Collected as reported by source for country *j*. Source: OECD

Firm-Level Control Variables	***Description and/or Data***	***Details and Source***
ROA	$(PINC_{it} - XITEMS_{it}) / TA_{it-1}$	Return on Assets, calculated as pre-tax income less extraordinary income divided by lagged assets (WC02999). Source: Datastream (DS) / Worldscope (WC)
LEV	LTD_{it} / TA_{it-1}	Leverage, calculated as long-term debt (WC03251) divided by lagged assets. Source: Datastream (DS) / Worldscope (WC)
SIZE	Natural log (TA_{it})	Firm size, calculated as the natural logarithm of total assets. Source: Datastream (DS) / Worldscope (WC)
FOROPS	Indicator variable for foreign operations for firm *i*	Equals 1 if foreign income is non-missing and non-zero, 0 if missing or zero. Source: Datastream (DS) / Worldscope (WC)
BM	$CEQ_{it-1} / MKTCAP_{it-1}$	Book-market ratio, calculated as opening common equity (WC03501) at *t* divided by opening market capitalization (WC08002) at *t*. Source: Datastream (DS) / Worldscope (WC)
PPE	$PPEN_{it} / TA_{it-1}$	Capital intensity, calculated as capital assets (WC02501) divided by lagged assets. Source: Datastream (DS) / Worldscope (WC)
R&D	RD_{it} / TA_{it-1}	R&D intensity, calculated as R&D expense (WC01201) divided by lagged assets. Source: Datastream (DS) / Worldscope (WC)
CASHRES	$CASH_{it} / TA_{it-1}$	Cash resources, calculated as cash and equivalents (WC02001) divided by lagged assets. Source: Datastream (DS) / Worldscope (WC)
DIVS	$DIV_{it} / PINC_{it}$	Dividend to income ratio, calculated as dividends paid (WC04551) divided by pre-tax income. Source: Datastream (DS) / Worldscope (WC)
SHRPS	$SHRP_{it} / TA_{it-1}$	Share repurchases, calculated as share redeemed, retired, repurchased, etc. (WC04751) divided by lagged assets. Source: Datastream (DS) / Worldscope (WC)
MNC (Low vs. High)	Relative level of multinational operations per firm *i*	*Low MNC* equals 1 if foreign income is non-positive, foreign tax expense is zero, or either value is missing, 0 otherwise. *High MNC* equals 1 if foreign income is positive or foreign tax expense is non-zero, 0 otherwise. Source: Datastream (DS) / Worldscope (WC)
CLSHLD (Low vs. High)	Relative ratio of closely-held shares per firm *i*	*Low CLSHLD* equals 1 if a firm has a below-median ratio of closely-held shares (WC05475) to shares outstanding (WC05301), 0 otherwise. *High CLSHLD* equals 1 if a firm has an above-median ratio

		of closely-held shares to shares outstanding, 0 otherwise. Source: Datastream (DS) / Worldscope (WC)
DIV (Low vs. High)	Relative level of dividends paid per firm *i*	*Low DIV* equals 1 if a firm has a below-median, or null, ratio of dividends to income, 0 otherwise. *High DIV* 1 if a firm has an above-median ratio of dividends to income, 0 otherwise. Source: Datastream (DS) / Worldscope (WC)
ROS	$PINC_{it} / SALES_{it}$	Annual worldwide return on sales, calculated as pre-tax income divided by total sales (WC01001). Source: Datastream (DS) / Worldscope (WC)
PCT_FOR	$ISALES_{it} / TA_{it}$	Percentage of foreign sales, calculated as foreign sales divided by assets. Source: Datastream (DS) / Worldscope (WC)
Country-Level Control Variables	***Description and/or Data***	***Details and Source***
BTAXC	Country-level book-tax conformity index for country *j*	A proxy for the level of required book-tax conformity measured at the country-level. Source: Calculated based on Atwood et al. (2012)
WW	Indicator variable for the presence of a worldwide tax system for country *j*	Equals 1 if country *j* has a worldwide tax system, 0 otherwise. Collected as reported by source. Source: PwC (2013) and OECD
POPGRT	Annual percentage change in country population for country *j*	Population growth, calculated as the year-to-year percentage change in the population of country *j*. Source: OECD
GDP	Ln(*GDP* per capita) for country *j*	Natural logarithm of Gross Domestic Product, per capita, of country *j* in year *t* in constant 2005 US dollars. Source: OECD
Additional Macro Control Variables	***Description and/or Data***	***Details and Source***
TAXENF	Country-level tax enforcement index for country *j*	A proxy for the level of tax enforcement measured at the country-level. Source: World Economic Forum (2001; Table 6.11)
COMLAW	Indicator variable if a common law legal system exist in country *j*	Equals 1 if country *j* has a common law legal system, 0 otherwise. Source: La Porta et al. (1998)
OWNCON	Country-level ownership concentration index for country *j*	A proxy for the country-level ownership concentration. Source: La Porta et al. (1998)
INV_RIGHTS	Country-level strength of investor rights index for country *j*	A proxy for the strength of investor rights (anti-self dealing strength) measured at the country-level. Source: La Porta et al. (2006)

CRED_RIGHTS	Country-level strength of creditor rights index for country *j*	A proxy for the strength of creditor rights measured at the country-level. Source: Djankov et al. (2006)

* To mitigate the influence of outliers, *Cash ETR* (before the spread is formed) is winsorized over the range [0, 1], *FROS* and *ROS* are non-negative and winsorized at the 99th percentile, and all continuous firm-level variables are winsorized at the 1st and 99th percentile.

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Figure 1
Average Corporate Tax Avoidance

Figure 1 shows the average level of corporate tax avoidance in our sample around the year that a country eliminates its imputation system (*t=0*). We match firms in our treatment sample (countries that eliminate an imputation system) with a maximum of 100 random firms from our control sample (countries that do not eliminate an imputation system) at *t=0* based on fiscal year. For each year in the *t-3* to *t+3* window, we report the average corporate tax avoidance (*SPREAD*) for these two matched groups.

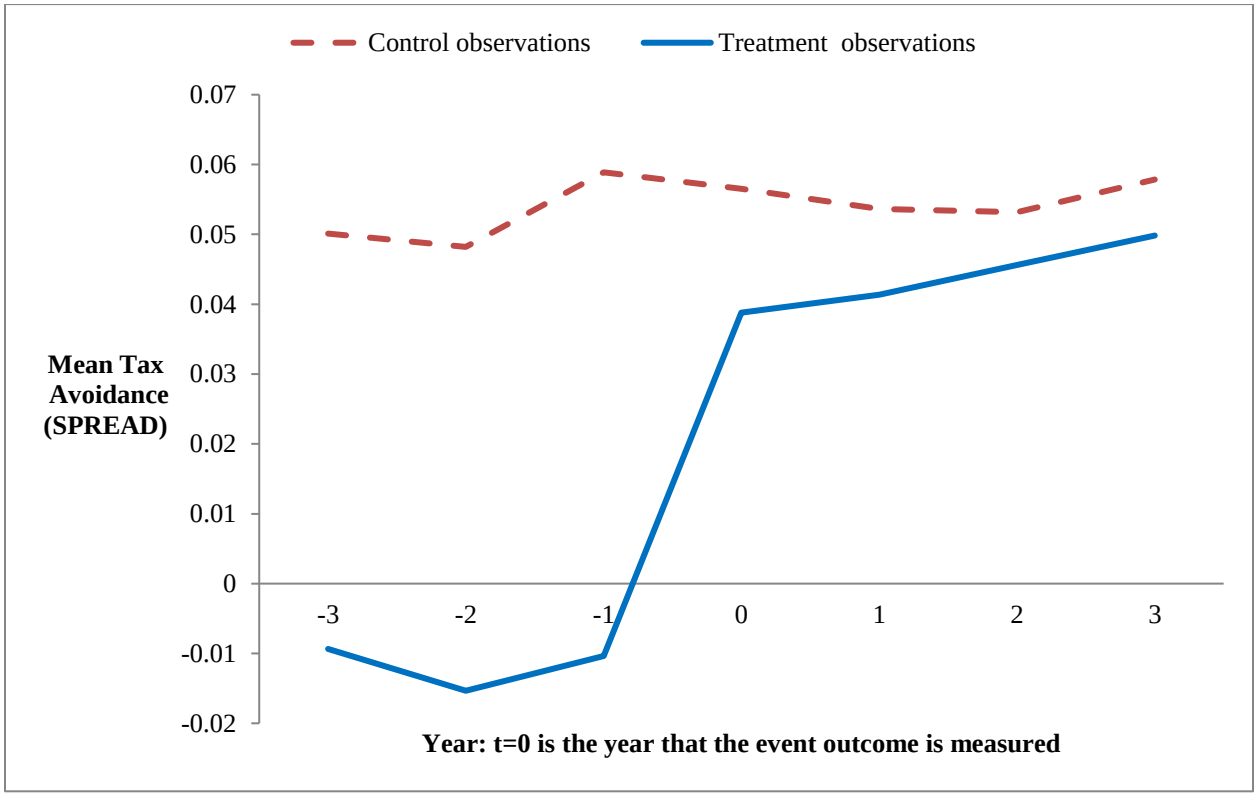

Table 1
Country Composition

The table presents the 70,518 firm-year observations used in our primary analyses, by country. Observations span the years 1994 through 2008 and are limited to the OECD countries for which tax data is available. Superscripts [a, b, c] label countries according to the following categories: full imputation, eliminated full imputation or non-full-imputation, respectively.

COUNTRY	TOTAL FIRM-YEARS
Australia [a]	2,987
Austria [c]	278
Belgium [c]	346
Canada [c]	3,011
Denmark [c]	946
Finland [b]	801
France [b]	1,173
Germany [b]	1,552
Greece [c]	485
Ireland [c]	434
Italy [b]	439
Japan [c]	12,219
Korea (South) [c]	18
Mexico [a]	41
Netherlands [c]	707
New Zealand [a]	526
Norway [b]	686
Portugal [c]	193
Spain [c]	226
Sweden [c]	1,450
Switzerland [c]	1,496
United Kingdom [c]	10,480
United States [c]	30,024
TOTAL	70,518

Table 2
Descriptive Statistics

Panel A presents descriptive statistics for the variables used in the primary difference-in-differences analysis for the entire pooled sample of firm-year observations from 1994 to 2008. Panels B and C presents the statutory corporate and dividend tax rates, respectively, for countries that eliminate imputation from *t-3* to *t+3* relative to the elimination year (*t*). See Appendix B for detailed variable definitions.

Panel A: Full Sample

N = 70,518	Mean	Std. Dev.	25th %	Median	75th %
Dependent Variable					
SPREAD	0.067	0.240	-0.030	0.087	0.240
Independent Variables					
*IMP**	0.066	0.248	0	0	0
ROA	0.116	0.105	0.045	0.087	0.152
LEV	0.183	0.220	0.008	0.123	0.275
SIZE	13.514	2.497	11.805	13.238	14.931
FOROPS	0.309	0.462	0	0	1
BM	5.902	20.171	0.312	0.549	0.973
PPE	0.349	0.296	0.127	0.280	0.484
RND	0.022	0.051	0.000	0.000	0.019
CASHRES	0.178	0.263	0.033	0.096	0.224
CSTR	0.362	0.050	0.310	0.393	0.395
PSTR	0.286	0.130	0.210	0.250	0.436
CGTR	0.220	0.115	0.150	0.200	0.280
DIVS	0.419	8.862	0.000	0.115	0.286
SHRPS	0.014	0.052	0.000	0.000	0.003
BTAXC	0.150	0.203	0.000	0.071	0.231
WW	0.778	0.416	1	1	1
POPGRT	0.007	0.005	0.003	0.009	0.010
GDP	10.463	0.174	10.327	10.450	10.620

**IMP* captures firm-years before and after a country eliminates its full imputation system. (i.e. It represents all observations for our treatment group.)*

Table 2 (continued)

Panel B: Corporate Tax Rates from years *t-3* through t+3 for countries eliminating imputation

	t-3	*t-2*	*t-1*	*t*	*t+1*	*t+2*	*t+3*
Country							
Finland	29.0	29.0	29.0	26.0	26.0	26.0	26.0
France	35.4	35.4	35.4	34.9	34.4	34.4	34.4
Germany	42.8	43.3	43.3	38.9	38.9	40.2	38.9
Italy	53.2	53.2	53.2	37.0	37.0	37.0	36.0
Norway	28.0	28.0	28.0	28.0	28.0	28.0	28.0

Panel C: Personal Tax Rates on Dividend Income from years t-3 through t+3 for countries eliminating imputation

	t-3	*t-2*	*t-1*	*t*	*t+1*	*t+2*	*t+3*
Country							
Finland	29.0	29.0	29.0	28.0	28.0	28.0	28.0
France	57.1	55.6	55.9	56.3	48.7	48.7	48.7
Germany	55.9	55.9	51.0	51.2	51.2	51.2	47.5
Italy	51.0	51.0	51.0	12.5	12.5	12.5	12.5
Norway	28.0	28.0	28.0	28.0	28.0	28.0	28.0

Table 3
Tax Avoidance Following Changes from an Imputation to a Non-Imputation System

This table presents the results from estimating the following equation:

$$SPREAD_{it} = \gamma_0 + \gamma_1 IMP\_TREAT_{it} + \gamma_{2\text{-}k} X_{it} + \psi_i + \xi_t + \mu_{it}.$$

The dependent variable $SPREAD_{it}$, is larger the more a firm avoids taxes. IMP_TREAT_{it} equals 1 for firms in a country in any year after that country eliminates its full imputation system, 0 otherwise. X_{it} represents a set of control variables included in the model and ψ_i and ξ_t represent a full set of untabulated firm and year fixed effects. Further variable descriptions are reported in Appendix B. The *FULL SAMPLE* in column (1) is based on the entire set of observations reported in Table 1 and the *RANDOM SAMPLE* in column (2) is based on a randomly-selected sample of a maximum of 100 firms per country. Standard errors have been adjusted for clustering within firm (column 1) or country (column 2) and the related t-statistics are reported in parentheses. *, **, *** refer to significance at the 10%, 5% and 1% levels, respectively. Significance for all variables is calculated using two-tailed tests.

Variables	(1) *FULL SAMPLE*	(2) *RANDOM SAMPLE*
IMP_TREAT	**0.055*** **	**0.091** **
	(4.45)	**(2.60)**
ROA	0.715***	1.485***
	(39.13)	(4.39)
LEV	-0.002	-0.021
	(-0.25)	(-0.19)
SIZE	-0.014***	0.036
	(-5.45)	(0.94)
FOROPS	-0.006	-0.024
	(-1.58)	(-0.61)
BM	0.001***	-0.005***
	(5.69)	(-3.06)
PPE	-0.025***	-0.119
	(-2.76)	(-1.19)
RND	-0.158***	-2.704*
	(-2.96)	(-2.03)
CASHRES	-0.028***	0.036
	(-4.36)	(0.64)
CSTR	0.914***	0.252
	(12.20)	(0.73)
PSTR	-0.106***	-0.142
	(-5.92)	(-0.75)
CGTR	-0.126***	0.041
	(-5.23)	(0.36)
DIVS	-0.001	-0.012***
	(-1.45)	(-3.17)
SHRPS	-0.125***	-0.013
	(-6.69)	(-0.03)

BTAXC	0.017*	0.079
	(1.74)	(1.43)
WW	0.006	-0.020
	(0.55)	(-0.24)
POPGRT	-1.657***	-2.476
	(-3.33)	(-0.78)
GDP	-0.077	-0.445*
	(-1.25)	(-1.86)
Observations	70,518	1,705
Fixed effects	Firm, Year	Firm, Year
Adjusted R^2	0.082	0.334

Table 4
Cross-Sectional Differences in the Reaction to the Elimination of an Imputation System

This table presents the results from several unpooled regression estimates of the following equation:

$$SPREAD_{it} = \gamma_0 + \boldsymbol{\gamma_1} IMP\_TREAT_{it} + \gamma_{2\text{-}k} X_{it} + \psi_i + \xi_t + \mu_{it}.$$

Columns (1) and (2) contain estimates for *Low MNC* and *High MNC*. Firms with non-positive values of foreign income, zero values of foreign tax expense, or missing values of either metric are labeled as *Low MNC;* firms with positive values of foreign income or non-zero values of foreign tax expense are labeled as *High MNC*. Columns (3) and (4) contain estimates for *Low CLSHLD* and *High CLSHLD*. Firms with a below-median ratio of closely-held shares are labeled as *Low CLSHLD;* firms with an above-median ratio of closely-held shares are labeled as *High CLSHLD*. Columns (5) and (6) contain estimates for *Low DIV* and *High DIV*. Firms with a below-median ratio of dividends to income, or a ratio of zero, are labeled as *Low DIV;* firms with an above-median ratio of dividends to income are labeled as *High DIV*. The dependent variable $SPREAD_{it}$, is larger the more a firm avoids taxes. IMP_TREAT_{it} equals 1 for firms in a country in any year after that country eliminates its full imputation system, 0 otherwise. X_{it} represents a set of control variables included in the model and ψ_i and ξ_t represent a full set of untabulated firm and year fixed effects. Further variable descriptions are reported in Appendix B. Standard errors have been adjusted for clustering within firm and the related t-statistics are reported in parentheses. *, **, *** refer to significance at the 10%, 5% and 1% levels, respectively. Significance for all variables is calculated using two-tailed tests. The significance levels from non-parametric, Monte Carlo simulation tests of the difference between IMP_TREAT_{it} in low and high subsamples are reported at the bottom of the table.

Variables	*(1) Low MNC*	*(2) High MNC*	*(3) Low CLSHLD*	*(4) High CLSHLD*	*(5) Low DIV*	*(6) High DIV*
IMP_TREAT	**0.068*** **	0.021	**0.050*** **	**0.131*** **	0.012	**0.071*** **
	(4.34)	(0.74)	**(3.36)**	**(4.16)**	(0.57)	**(4.13)**
Observations	41,254	29,264	30,754	39,559	47,763	22,755
Fixed effects	Firm, Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year
Adjusted R^2	0.074	0.104	0.128	0.066	0.061	0.100
Significance of difference: Low v High		**		***		***

Table 5
Macro-Level Tax Analysis Following Changes from an Imputation to a Non-Imputation System

This table presents the results of the estimation of the following macro-level equation:

$$COUNTRY\ TAX_{jt} = \gamma_0 + \gamma_1 IMP_j + \gamma_2 IMP\_TREAT_{jt} + \gamma_{3\text{-}k} Z_{jt} + \xi_t + \mu_{jt}.$$

Country-year observations are used to estimate this regression. In Panel A, several dependent variables are used for *COUNTRY_TAX*. Column (1) presents *CORP TAX REVENUE/GDP*$_{jt}$, which is a country's corporate tax revenue divided by its level of gross domestic product for the year, which is lower the more the country's firms avoid taxes. The dependent variables in Column (2), (3), (4) and (5) are a country's individual (*INDIV*) tax revenues divided by GDP and the country statutory corporate (*CSTR*), personal dividend (*PSTR*) and capital gains (*CGTR*) tax rates, respectively. *IMP*$_j$ equals 1 if a country had a full imputation system and eliminates it during the sample period, 0 otherwise. *IMP_TREAT*$_{jt}$ equals 1 for in a country that eliminates its imputation system in any year after imputation is eliminated, 0 otherwise. Z_{it} represents a set of country-level control variables included in the model and ξ_t represents untabulated year fixed effects. Further variable descriptions are reported in Appendix B. Standard errors have been adjusted for clustering within country and the related t-statistics are reported in parentheses. *, **, *** refer to significance at the 10%, 5% and 1% levels, respectively. Significance for all variables is calculated using two-tailed tests.

Variables	(1) *CORP TAX REVENUE / GDP*	(2) *INDIV TAX REVENUE / GDP*	(3) *CSTR*	(4) *PSTR*	(5) *CGTR*
IMP	0.012**	-0.013	0.012	-0.057	-0.101*
	(2.29)	(-0.87)	(0.38)	(-0.64)	(-1.87)
IMP_TREAT	**-0.011****	-0.006	-0.007	0.034	0.064
	(-2.69)	(-0.43)	(-0.27)	(0.43)	(1.18)
CSTR	-0.006	0.012		0.465	-0.559**
	(-0.19)	(0.13)		(1.15)	(-2.28)
PSTR	-0.038***	-0.024	0.094		0.465***
	(-3.25)	(-0.54)	(1.17)		(2.95)
CGTR	0.015*	0.105*	-0.103*	0.424***	
	(1.79)	(1.96)	(-2.04)	(3.50)	
BTAXC	-0.003	0.018	-0.087***	0.077	-0.045
	(-0.33)	(1.49)	(-3.39)	(1.37)	(-0.90)
WW	-0.007*	-0.034**	-0.028	0.012	-0.125***
	(-2.01)	(-2.53)	(-1.34)	(0.21)	(-2.99)
POPGRT	1.094***	-1.524	-4.507**	6.500	-10.406**
	(3.15)	(-1.19)	(-2.11)	(1.52)	(-2.41)
GDP	0.018	0.075*	-0.041	0.063	0.115
	(1.52)	(2.06)	(-0.80)	(0.48)	(1.02)
TAXENF	-0.006*	-0.013	-0.001	0.014	-0.016
	(-2.02)	(-1.18)	(-0.15)	(0.52)	(-0.56)

COMLAW	0.004	0.045**	-0.037*	0.017	-0.047
	(0.73)	(2.30)	(-1.78)	(0.32)	(-0.98)
OWNCON	-0.035*	0.095	-0.010	-0.209	-0.350*
	(-2.04)	(1.27)	(-0.10)	(-0.86)	(-1.94)
INV_RIGHTS	0.002	0.044	0.065	-0.264**	0.290***
	(0.17)	(1.12)	(1.05)	(-2.15)	(3.11)
CRED_RIGHTS	0.003*	0.007	-0.003	-0.005	-0.027
	(1.73)	(0.91)	(-0.36)	(-0.27)	(-1.65)
Observations	274	274	274	274	274
Fixed Effects	Year	Year	Year	Year	Year
Adjusted R^2	0.430	0.480	0.412	0.392	0.496

Table 6
Income Shifting following Changes from an Imputation to a Non-Imputation System

This table presents the results of the estimation of the following equation:

$$FROS_{it} = \gamma_0 + \boldsymbol{\gamma_1} IMP\_TREAT_{it} + Controls_{it} + \psi_i + \xi_t + \mu_{it}.$$

The dependent variable $FROS_{it}$, is a measure of cross-border income shifting as per Collins et al. (1998). It equals total pre-tax foreign income divided by total foreign sales, and is larger the greater a firm's incentives to shift income to foreign jurisdictions. $FROS_{it}$ is non-missing for firms from the *FULL SAMPLE* with some degree of international sales reported. IMP_TREAT_{it} equals 1 for firms in a country in any year after that country eliminates its imputation system, 0 otherwise. $Controls_{it}$ represents a set of control variables, which includes firm-level measures for both columns, as well as country-level variables in the second column. A full set of untabulated firm and year fixed effects are represented by ψ_i and ξ_t, respectively. Further variable descriptions are reported in Appendix B. Standard errors have been adjusted for clustering within firm and the related t-statistics are reported in parentheses. *, **, *** refer to significance at the 10%, 5% and 1% levels, respectively. Significance for all variables is calculated using two-tailed tests.

Variables	(1) Firm-level controls only	(2) With Country-level controls
IMP_TREAT	**0.015****	**0.011***
	(2.48)	**(1.80)**
ROS	0.211***	0.210***
	(9.93)	(9.80)
LEV	0.001	0.001
	(0.14)	(0.13)
SIZE	0.010***	0.010***
	(3.94)	(4.03)
RND	0.041	0.041
	(0.78)	(0.79)
CASHRES	-0.000	-0.000
	(-0.05)	(-0.06)
PCT_FOR	-0.076***	-0.075***
	(-8.92)	(-8.85)
CSTR	-0.035	-0.066
	(-0.83)	(-1.45)
PSTR	-0.083***	-0.074***
	(-6.64)	(-6.06)
CGTR	0.069***	0.065***
	(5.03)	(4.71)
DIVS		<0.001**
		(2.24)
SHRPS		0.007
		(0.35)
BTAXC		-0.001
		(-0.14)

WW		-0.004
		(-0.85)
POPGRT		0.211
		(0.63)
GDP		-0.110***
		(-2.66)
Observations	32,309	32,309
Fixed effects	Firm, Year	Firm, Year
Adjusted R^2	0.046	0.047