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10863
2023

December 2023

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CESifo

Impressum:

CESifo Working Papers
ISSN 2364-1428 (electronic version)
Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH
The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute
Poschingerstr. 5, 81679 Munich, Germany
Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de
Editor: Clemens Fuest
https://www.cesifo.org/en/wp
An electronic version of the paper may be downloaded
· from the SSRN website: www.SSRN.com
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CESifo *Working Paper No. 10863*

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Abstract

We study the relationship between corporate income taxes and mergers and acquisitions (M&As). To this end, we compile and deploy a dataset consisting of all cross-border and domestic M&A deals for 118 source (acquirer) and 122 destination (target) countries and 84 sectors over the period 1995-2019. From a methodological perspective, we implement leading methods from the empirical gravity literature on trade, foreign direct investment, and migration, and we demonstrate their importance for estimating the impact of corporate income taxes on cross-border versus domestic M&A activity. Our main finding is that a one percentage point increase in target country corporate income tax rates decreases the number of cross-border acquisitions by about 0.8 percent relative to domestic M&As. This result is robust to various sensitivity checks and is comparable to previously published estimates. Nevertheless, our stepwise estimation strategy exemplifies the importance of individual empirical refinements. These should serve as the basis for future work investigating the effects of taxation on bilateral flows.

JEL-Codes: F100, F140, F210, F230, H250, H870.

Keywords: corporate income taxes, mergers and acquisitions, gravity methods.

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December 20, 2023
We are grateful to Eric Ohrn and participants at the National Tax Association's annual conference for their helpful comments.

1 Introduction

A wide body of literature at the intersection of economics, finance, and tax accounting has documented the impact of multiple forms of taxation on foreign direct investment (FDI) and the market for corporate control via mergers and acquisitions (M&A).[1] There is no precise consensus regarding the latter effects, however, partly because of wide variability between studies in estimation methods, data coverage, and types of institutional settings examined. Even those studies which implement some form of gravity estimation (e.g., di Giovanni (2005); Huizinga and Voget (2009); Herger et al. (2016)) have not leveraged the full range of recent econometric advancements that have been developed in the empirical trade literature for purposes of causal identification (e.g., Yotov et al. (2016); Larch and Yotov (2023)). These methods have evolved well beyond the mere inclusion of controls for distance between trading partners, as used in the literature that first introduced the concept of "gravity" (e.g., Tinbergen (1962)), and there is a potential for existing estimates to be biased and/or inconsistent wherever current state-of-the-art methods are not employed.

The objective of this paper is to quantify the effect of corporate income tax (CIT) rates on the volume of M&A activity using the latest gravity estimation methods and to narrowly distinguish the distortionary effects of corporate taxation on cross-border versus domestic M&A activity. As a matter of basic theory, M&A activity has traditionally been viewed as a special form of business investment, whereby more productive firms are able to acquire and exploit target firms' assets more profitably than the targets themselves (Jovanovic and Rousseau, 2002). Alternatively, acquisitions may constitute a mechanism

[1] de Mooij and Ederveen (2008) provide a comprehensive overview of the literature on corporate tax distortions to international investment. Focusing on FDI, Feld and Heckemeyer (2011) review over 700 published estimates and report a consensus corporate tax semi-elasticity of -2.5. With respect to M&A activity—the cross-border component of which also represents FDI—various studies examine the effects of corporate taxation, including di Giovanni (2005), Bellak et al. (2009), Overesch and Wamser (2009), Huizinga and Voget (2009), Hebous et al. (2011), Herger et al. (2016), Belz et al. (2017), Merz et al. (2017), Arulampalam et al. (2019), and Erokhin (2023), among others. Huizinga and Voget (2009), Hanlon et al. (2015), Feld et al. (2016), and Bird et al. (2017) also (or instead) consider the consequences of worldwide versus territorial taxation (i.e., domestic corporate taxation of foreign source income versus exemption thereof). Ayers et al. (2007), Ohrn and Seegert (2019), and Todtenhaupt et al. (2020) contemplate the effects of shareholder-level capital gains taxation. Finally, Chen et al. (2018) and Bradley et al. (2021) examine the effects of preferential corporate tax regimes for intellectual property-related income (i.e., "IP boxes") on FDI and M&A activity, respectively.

to redeploy retained earnings among firms that have exhausted internal reinvestment opportunities (Levine, 2017). In either case, corporate income taxes generally discourage investment by reducing the after-tax value of any expected return on assets, as shown, for instance, in Djankov et al. (2010) or Doidge and Dyck (2015). This will tend to reduce the potential gains resulting from productivity-enhancing M&A transactions. What is unique to M&A activity, however, is that part of the potential increase in participating firms' *after-tax* return on investment may be attributable to the adoption of more aggressive or more sophisticated tax minimization strategies. Here, higher statutory corporate tax rates may actually increase the scope for such opportunities, and hence the net effect of CIT rates on M&A activity is ambiguous.[2]

Insofar as taxes distort the relative volume of acquisitions by domestic versus foreign acquirers in either direction, this implies a globally sub-optimal allocation and exploitation of productive assets, in violation of capital ownership neutrality.[3] We also shed light on violations of capital ownership neutrality in the strictly domestic context—an issue which has garnered far less attention under the presumption that tax arbitrage and planning opportunities are far more modest (if not non-existent) in the domestic context.[4] As our work suggests, however, this may neglect the availability of profitable tax planning strategies between domestic entities involving special tax provisions or strategies that exploit foreign subsidiaries of domestic acquirers (e.g., to facilitate income reallocation towards lower tax jurisdictions).

Methodologically, we highlight the importance of three features which have become standard in the trade and FDI gravity literatures for estimating the effects of taxes on M&A activity. First, we apply a Poisson pseudo maximum likelihood (PPML) estima-

[2]See Bradley et al. (2021) for an extended discussion of the theoretical effects of taxation on M&A activity.

[3]See Desai and Hines (2003, 2004) and Weisbach (2014) for a discussion of the importance of capital ownership neutrality in relation to other international tax neutrality norms.

[4]Hanlon et al. (2015) investigate the extent to which taxation of U.S. multinationals' foreign source income and the resulting build-up of "trapped equity" (Foley et al., 2007) held by U.S. multinationals' overseas subsidiaries to avoid repatriation taxes distorted incentives for foreign versus domestic acquisitions prior to reform of the U.S. corporate tax system in 2017. Harris and O'Brien (2018) likewise examine the effects of a particular international tax planning strategy on U.S. multinationals' propensity to acquire U.S. targets. Despite consideration of domestic M&A activity, both papers are nevertheless implicitly about corporate tax effects on cross-border investment (i.e., reinvestment of U.S. multinationals' foreign earnings back in the U.S.).

tor to account for the overdispersion of zeros and heteroskedasticity in bilateral M&A flows (Santos Silva and Tenreyro, 2006, 2021), and we employ a rich set of source-time, destination-time, and directional country pair fixed effects to control for a wide range of country-specific and bilateral economic factors that may otherwise be confounded with tax rates and M&A activity in the target country (Anderson and van Wincoop, 2003; Baldwin and Taglioni, 2006; Hummels, 2001). Two main findings stand out from adopting the PPML estimator. (1) The PPML and OLS estimates differ in terms of magnitude and statistical precision across a range of covariates, including our estimate of the key corporate tax effect. (2) The differences between the OLS and PPML estimates are not driven by zeros, thus highlighting the importance of PPML to account for potential heteroskedasticity in the M&A data.

Second, we utilize data on both domestic and cross-border M&As within the same econometric specification. The use of domestic M&A deals in addition to cross-border M&As has two implications for our analysis. (1) It enables us to obtain CIT estimates on the effects of domestic versus cross-border M&As simultaneously, within the same econometric model. Our estimates reveal that the effects are different—in fact opposing. (2) The use of domestic M&A transactions enables us to identify the *relative* distortionary effects of CIT rates on international M&A activity while employing a fixed effects estimation strategy that fully controls for all time-varying source- and destination-specific factors that might otherwise be confounded with CIT rates, thereby eliminating an important potential source of omitted variable bias.

Third, we introduce in our tax setting a multilateral resistance index (Anderson and van Wincoop, 2003; Baldwin and Taglioni, 2006), which is intended to capture the consequences of multilateral remoteness for bilateral flows. The important role of multilateral resistances in the FDI and trade literatures is well established. In addition, we introduce a novel *Multilateral Tax Resistance* index, which is intended to capture potential general equilibrium effects of corporate income tax rates. In this regard, our empirical analysis shows that both indexes (i.e. the multilateral resistance and the multilateral tax resistance indexes) have a significant role in explaining patterns of M&A activity. These uncover and highlight new general equilibrium channels through which taxes and other frictions may influence bilateral M&As.

Using data from Eikon Thomson Reuters on all M&A transactions between more than 100 source and destination countries over the period 1995-2019, our preferred empirical specification yields a semi-elasticity of cross-border M&A volume with respect to host country corporate tax rates of -0.8 (relative to domestic M&As). Domestic M&A volume, on the other hand, is positively affected by higher corporate income tax rates, consistent with a more pronounced role of tax planning (Bradley et al., 2021), whereby higher statutory rates result in greater scope for sophisticated acquirers to effect reductions in effective tax rates for the merged entities. Comparable estimates using a basic ordinary least squares (OLS) estimator are generally smaller in magnitude and not significantly different from zero. While the former estimate of the semi-elasticity of cross-border M&A deals with respect to corporate tax rates is relatively comparable to other estimates in the literature (e.g., Herger et al. (2016)), the latter effect on domestic deals has been largely ignored. Given the methodological purpose of this paper, we defer further investigation of this finding, but we believe this carries important implications for how the literature should evaluate tax-induced violations of capital ownership neutrality.

Sectoral estimates are broadly similar to the results for the whole sample. Corporate taxes negatively affect cross border M&A activity in all of the broad sectors that we examine: namely, the primary sector, mining and quarrying, manufacturing, utilities, construction, and services. We also find that corporate taxation has heterogeneous effects across countries, and that CIT rates have a more pronounced effect on transactions involving the acquisition of target firms in low-to-middle income countries relative to deals involving exclusively high income countries. Finally, our estimates reveal that corporate taxes have a weaker effect on M&A activity during periods of greater macroeconomic instability, such as the period surrounding the global financial crisis of 2009.

The remainder of the paper proceeds as follows. Section 2 describes the data used for our empirical analysis and highlights key relationships therein, with a special focus on the M&A data. Section 3 develops our estimation strategy by sequentially introducing the key features of our econometric model along with the associated results. This section also presents the results from a series of robustness checks and tests of heterogeneous responses across country groups and sectors. Section 4 concludes with a summary of our main findings and directions for future work.

2 Data and Sources

Our analysis relies primarily on data on M&A activity and statutory corporate income tax rates (CIT), as well as on data for a number of other variables that are used as explicit controls in our model.

Data on M&As. Our M&A data cover 118 source (acquirer) and 122 destination (target) countries, spanning 84 target sectors over the period 1995-2019.[5] Data on domestic and cross-border M&A projects are from Eikon Thomson Reuters. M&A deals are identified using data from banks and legal partners as well as other sources such as news announcements, regulatory filings, and corporate statements. Besides being a data source that has been widely used by previous research on the drivers of cross-border M&As (e.g. Blonigen and Piger, 2014; Huizinga and Voget, 2009),[6] it is also the data source employed by UNCTAD's World Investment Reports (UNCTAD, 2015).

The Eikon Thomson Reuters database identifies M&A projects at the firm level, and identifies the ultimate source (country and firm) of investment. This feature reduces the potential bias present in FDI statistics resulting from multinationals using tax havens to establish holding companies from which to invest in final destination countries.[7] Compared to more general FDI data (e.g., from the OECD or IMF), these data also allow us to consider a larger sample of countries for a long period of time. In addition, it allows identification of acquirer and target firms' sector. Industrial sectors are defined at the NACE Rev. 2 two-digit level. We only consider those M&A transactions which result in

[5] See Appendix Table A.1 for a list of countries.

[6] Notice that this data source has also been cited under the name of Securities Data Company (SDC).

[7] UNCTAD (2016) show that approximately 40% of foreign affiliates are owned indirectly by their multinational parents via at least one intermediate subsidiary located in a different country. Haberly and Wójcik (2015) note that 30% of global FDI stock is held in tax havens.

acquisition of majority control of the target firm. Given the prevalence of transactions involving the acquisition of firms that are not publicly traded, M&A deal values are missing for approximately 60% of the observations in our sample, much as in other databases that track M&A activity. The primary focus of our analysis is therefore on the number—as opposed to the value—of bilateral M&A deals.

Table 1 illustrates the distribution of M&As across six main target sectors. Most M&A transactions involve service-sector targets (61.48%) followed by manufacturing, and together they represent nearly 89% of global acquisitions (both domestic and international). Furthermore, Table 1 shows that there is a certain degree of heterogeneity in terms of the number of cross-border M&As relative to domestic ones. Manufacturing sector targets are thus relatively more likely to be acquired in a cross-border transaction.

Data on CIT rates. Data on statutory CIT rates at the national level are obtained from the Tax Foundation. Figure 1 illustrates the evolution of (unweighted) average CIT rates over the period 1995-2019 and shows that there has been a substantial drop in average tax rates over time (from 34% to 22%). Nonetheless, as can be gathered from Figure 2, CIT rates remain quite heterogeneous between countries, and these reflect wide variation in the magnitude of tax changes that have occurred between 1995 and 2019. Only a small number of countries have raised their CIT rates over this period, and such changes have been limited in size.

Other data. Data on countries' GDP, labor force size, unemployment rate, inflation rate and exports' share over GDP are retrieved from the World Bank's World Development Indicators database. Countries' nominal exchange rates are obtained from the International Monetary Fund, and an index of economic freedom is from the Heritage Foundation. The BIT indicator variable is constructed based on the information available in the United Nations Conference on Trade and Development's (UNCTAD's) Investment Agreements Navigator. The remaining bilateral gravity variables—geographical distance, contiguity, common language, colonial ties, and RTAs—are from CEPPI (Conte et al., 2021). We also use an index from Bailey et al. (2017) which measures diplomatic distance between country pairs. This index is constructed with countries' votes in The United Nations General Assembly, wherein political affinity/distance between countries is based on voting alignment between country pairs. The higher is the value of this index, the higher the diplomatic distance between pairs of countries.[8] Finally, using the information available in the Global Sanctions Database (Felbermayr et al., 2020), we construct a dummy variable that takes a value of one for each country pair and year in which a country imposes some type of economic sanction on the other. Table 2 offers descriptive statistics for each of our key variables at the country level.

3 Econometric Specifications, Results, and Analysis

This section presents our econometric model, along with our main findings and a series of robustness results. To clearly highlight the importance of each of our three main methodological arguments, we implement the analysis sequentially. Specifically, we start with a benchmark specification based on the existing literature, to which we add each of three new elements (i.e., (i) the PPML estimator, (ii) multilateral resistances, and (iii) domestic M&As) one at a time, until we reach our main/preferred specification. The section is structured in two subsections. First, in Subsection 3.1, we gradually develop our main econometric specification and we describe the corresponding findings. Then, in Subsection 3.2, we present the results from a battery of robustness checks and sensitivity experiments, and we explore potential heterogeneity of the effects of corporate taxes across several dimensions, e.g., industrial sector and tax system characteristics of acquirer and target countries.

3.1 Estimation strategy and main findings

The objective of this section is to motivate and implement three methods or techniques that have become established in the gravity literature on trade, migration, and FDI, and to

[8] Countries' votes in the United Nations General Assembly have been widely used by the political science literature to measure countries' political affinity, and also has been considered a relevant driver of cross-border investment (Bertrand et al., 2016; Damioli and Gregori, 2023; Knill et al., 2012).

demonstrate their potential importance for quantifying the impact of the key determinants of M&A activity. While we focus on corporate income taxes to establish a parallel to the broadest portion of the literature, we believe that our estimation recommendations and the conclusions that we draw from our analysis apply more broadly to specifications that aim to estimate the effects of various tax policies on all types of bilateral flows that are subject to 'gravity' forces. In the next section, we capitalize on the sectoral dimension of our data and obtain results for individual sectors as well as estimates from a sample that is pooled across all sectors. However, in order to more clearly present our key methodological arguments, we perform our main analyses at the national level by aggregating the number of M&A transactions across all sectors.

Benchmark Specification. To highlight our key methodological arguments, we develop the econometric model sequentially, starting with the following, most simple (i.e., naïve) specification, and then we gradually introduce several components whose importance has not been emphasized in the existing tax literature.

$$\ln(MA_{ijt}) = \alpha CIT_{jt} + GRAV_{ij}\beta_1 + BIPOL_{ijt}\beta_2 + DESTN_{jt}\beta_3 + \pi_{it} + \varepsilon_{ijt}, \quad \forall i \neq j. \tag{1}$$

The dependent variable in equation (1), $\ln(MA_{ijt})$, is the logarithm of the total number of international M&As between acquirer (source) country i and target (destination) country j in year t, and we estimate this initial specification using Ordinary Least Squares (OLS). The main variable of interest in equation (1) is the corporate income tax rate in destination j at time t, CIT_{jt}, and our specification includes four additional vectors of covariates. Specifically, $GRAV_{ij}$ is a vector that includes several time-invariant variables that are considered standard in the gravity literatures on trade, migration, and FDI. These variables include (the log of) bilateral distance between the source and the destination ($Distance_{ij}$) and indicator variables for the presence of contiguous borders ($Contiguity_{ij}$), common official language ($Language_{ij}$), and colonial relationships of any type ($Colonial\ ties_{ij}$) between the source and the destination country.

In principle, it is possible to add other variables to the list of time-invariant covariates or to look at sub-categories within the set of variables that we already include in equation (1), e.g., to allow for the effects of distance to vary by short versus long intervals (as in Eaton and Kortum (2002)). We do not do this because all observable and unobservable time-invariant bilateral M&A determinants will be fully accounted for in our preferred specification, which absorbs all such effects with a rich set of directional pair fixed effects. Thus, the main purpose for initially including this set of standard gravity variables is to benchmark their effects in our estimation sample against the corresponding estimates from the related literature and establish their similarity across applications and samples.

The next term in equation (1), $BIPOL_{ijt}$, is a vector of time-varying bilateral covariates. Here, we include two variables that are intuitive, and which appear most often in the related literature (Blonigen and Piger, 2014). Specifically, these are indicators for the presence of regional trade agreements (RTAs) or bilateral investment treaties (BITs) between countries i and j at time t. In addition, we include a bilateral and time-varying index that serves as a proxy for diplomatic distance. It is expected that the greater the political distance, the greater the investment risk, and thus the lower the expected level of bilateral FDI. On the other hand, lack of political affinity may promote M&A activity as multinational enterprises seek to overcome inferior access to local technological competencies (Damioli and Gregori, 2023). In a similar vein, we include an indicator for the application of economic sanctions in the target country. Previous literature has shown that sanctions have negative effects on FDI (Le and Bach, 2022; Mirkina, 2018) and that sanctions have become particularly important in shaping cross-border economic activities (Morgan et al., 2023).

The vector $DESTN_{jt}$ includes a series of country-specific covariates other than CIT rates which may independently affect the volume of cross-border M&A activity. Following the existing tax literature (e.g., Arulampalam et al. (2019); Bradley et al. (2021); Herger et al. (2016)), the main emphasis is on the determinants of M&As in the destination country, including natural logs of GDP, the size of the labor force, the real exchange rate, and an index of Economic Freedom (as a proxy for institutional quality), along with controls for the unemployment rate, inflation, and exports as a percent of GDP (as a proxy for trade openness). Countries' labor availability, macroeconomic stability, and institutional quality are expected to be drivers of inward M&As (di Giovanni, 2005; Rossi and Volpin, 2004) by reducing the costs of doing business in the target country. Furthermore, countries' economic size will promote FDI that seeks to serve the domestic market. Likewise, countries' participation in international trade is also expected to foster inward FDI for purposes of establishing export platforms and promoting vertical integration (Aizenman and Noy, 2006; Ekholm et al., 2007). The exchange rate can have an ambiguous effect. On one hand, a depreciation of the currency may foster M&As driven by the possibility of acquiring assets and raw materials, or hiring labor at a lower cost. On the other hand, currency depreciation adversely affects the repatriation of multinational profits (di Giovanni, 2005). In addition to these covariates on the destination side, we comprehensively account for all possible source-time specific determinants of M&A activity by incorporating π_{it} as a vector of source-time fixed effects.[9]

Finally, to obtain our main results, we cluster standard errors by country pair, i.e., such that $Cov[\varepsilon_{ijt}, \varepsilon_{ijd}] \neq 0$, for all $t \neq d$, and zero otherwise. However, motivated by Egger and Tarlea (2015), Pfaffermayr (2019), and Pfaffermayr (2022), in the robustness analysis we also experiment with three-way clustering by source, destination, and year. In addition, we also implement recent methods from Weidner and Zylkin (2021) to correct for the potential bias that arises from the incidental parameter problem in PPML regressions with three-way fixed effects. Methodologically, our starting specification is very similar to Herger et al. (2016)—albeit with a broader array of gravity variables than in the latter paper—and our analysis features a broader set of acquirer and target countries over a longer time period.[10]

Column (1) of Table 3 presents our benchmark estimates from specification (1). The results are largely as expected. Specifically, and most important for our purposes, we obtain a negative and statistically significant estimate of the impact of CIT rates on the

[9]Consistent with the existing literature, replacing these fixed effects with time-varying source country-specific control variables does not lead to substantial changes in our results (see Section 3.2.1).

[10]Herger et al. (2016) use SDC Platinum data to construct cross-border deal counts for 32 source and 31 destination countries for the period 1999-2010 and apply a Poisson estimator with source-time fixed effects throughout.

total number of cross-border M&A deals. In terms of magnitude, our estimate implies that a one percentage point increase in the corporate income tax rate leads to a 0.4 percent drop in the number of cross-border M&A transactions. This lies at the upper end of the range of Poisson semi-elasticities reported in Herger et al. (2016), yet falls well below the comparable Poisson estimate reported in Bradley et al. (2021) (focusing exclusively on the effects of narrowly-targeted preferential tax rates in certain EU member states) or on the consensus FDI semi-elasticity reported in Feld and Heckemeyer (2011).

With respect to the time-invariant bilateral 'gravity' covariates, we find that distance is an important impediment to M&As, while the presence of contiguous borders and common language are associated with more M&A deals. The estimates on these three variables are statistically significant and have the expected signs. The estimate on common colonial ties is positive, which is also intuitive; however, it is economically small and it is not statistically significant. Overall, based on the signs and magnitude of these standard gravity estimates, we conclude that they are comparable to the corresponding estimates from the existing literatures on trade and FDI. This corroborates the representativeness of our estimation sample and the applicability of the gravity approach to cross-border M&A activity.

Turning to the estimates on the bilateral policy variables (i.e., RTAs, BITs, diplomatic distance, and sanctions), we see that all of them are negative and statistically significant. While the negative estimates of the impact of diplomatic distance and economic sanctions are intuitive and expected, the negative estimates on RTAs and BITs are counter-intuitive. With respect to those estimates, we note that similar puzzling findings for the impact of BITs are present in the existing FDI literature (Egger et al., 2023), and we offer possible explanations for these results in our next specifications from Table 3.

With respect to the country-specific destination variables, we obtain three positive and statistically significant estimates of the effects of GDP, labor force, and exports as percent of GDP. In line with the related literature, these results support the view that larger countries—measured in terms of economic output or size of the labor force—as well as those that are well connected to international trade and global value chains attract greater cross-border M&A activity (Bradley et al., 2021; Cipollina et al., 2021; di Giovanni, 2005).[11] As in Bradley et al. (2021), we also obtain three insignificant effects on the unemployment rate, inflation rate, and exchange rate. This lack of significance is likely the result of factors that counteract each other.[12] We also note that some of the estimates on these variables change when we implement our most preferred specification. Finally, we obtain a negative and significant estimate on the impact of economic freedom. This result is interesting, but not uncommon in the literature. In this regard, Rossi and Volpin (2004) and Erel et al. (2012) show that M&As are directed to target firms located in countries with weaker investor protections than those in the acquirer's home country. The authors argue that this may reflect the potential for M&As to act as a channel for worldwide convergence in corporate governance.

The PPML Estimator. Two intuitive (and somewhat obvious) arguments for applying the Poisson estimator in our setting are that (i) it is appropriate for count data applications, and (ii) due to its multiplicative form, it can take advantage of the information that is contained in the zero M&A flows in our data. Despite this motivation, some related papers still rely on the OLS estimator. More importantly, many or even most papers that study the impact of taxes on other bilateral flows—especially when the dependent variables in these studies are continuous—rely on the OLS estimator despite a crucial deficiency of OLS in this setting.

Specifically, as argued by Santos Silva and Tenreyro (2006), the standard log-linear OLS estimates of the determinants of bilateral trade flows may be inconsistent due to Jensen's inequality. Intuitively, consistency of the OLS estimator requires that the expected value of the log of the error is constant. However, the expected value of a non-linear

[11] Insofar as GDP or exports (among other macroeconomic covariates) may themselves be affected by CIT rates, our estimates should be best understood as measuring the distortionary effects of CIT rates on corporate control, *independent of the general equilibrium macroeconomic effects of tax policy*. Consistent with the broader literature, this amounts to taking target firm performance as given and considering only the extent to which CIT rates further modify acquirers' valuation of potential after-tax gains from acquisition (i.e., due to deal synergies or new tax planning opportunities).

[12] Unemployment is associated with labor availability and lower labor costs, but it is also linked to low economic growth and demand, which makes target firms less attractive. Similarly, high inflation or negative inflation is linked to a country's weak economic performance. However, low inflation is also likely to occur in the context of low economic growth. As explained above, exchange rates also have an ambiguous effect on a country's capacity to attract M&As.

transformation of a random variable depends on its mean and on higher-order moments of the distribution (e.g., its variance). Thus, if the error is heteroskedastic, which is plausibly the case with trade and other bilateral flow data, then OLS estimates will be inconsistent.[13] Santos Silva and Tenreyro (2006) demonstrate that the Poisson Pseudo Maximum Likelihood (PPML) estimator effectively addresses the issue of heteroskedasticity of trade flows, and we extend this argument to the analysis of the impact of CIT rates on M&A activity, while also arguing that PPML should be applied more broadly to study the impact of taxes on various bilateral flows. Our PPML estimating model becomes:

$$MA_{ijt} = \exp[\alpha CIT_{jt} + GRAV_{ij}\beta_1 + BIPOL_{ijt}\beta_2 + DESTN_{jt}\beta_3 + \pi_{it}] \times \varepsilon_{ijt}, \quad \forall i \neq j. \quad (2)$$

Our PPML estimates appear in Column (2) of Table 3, and we draw the following conclusions based on a comparison between these new estimates and the OLS results from column (1). First, the point estimate on CIT is no longer statistically significant, and it is half the magnitude of the corresponding OLS estimate. Second, we see differences in the magnitude (e.g., on Distance), statistical significance (e.g., on Colonial ties), and even the signs (e.g., on Unemployment rate) of some of our bilateral and country-specific estimates.[14] The significant differences that we obtain between the OLS and PPML results suggest that thinking carefully about estimator selection could be crucial for obtaining sound policy estimates. Based on the main heteroskedasticity argument from Santos Silva and Tenreyro (2006), along with the other attractive properties of PPML, PPML is our preferred estimator. We hence use PPML in all subsequent tests unless otherwise explicitly stated.

In Column (3) of Table 3, we next introduce *country-pair fixed effects*. The motivation for the use of pair fixed effects in our setting is twofold. First, they will control for all possible (observable and unobservable) time-invariant bilateral factors that may affect

[13] We refer the interested reader to Santos Silva and Tenreyro (2021) for a recent summary and discussion of the benefits of PPML for gravity regressions, including, e.g., the fact that PPML can be implemented not only with count data.

[14] In the robustness analysis presented in Table 5, we demonstrate that the differences between PPML and OLS estimates are preserved even when we restrict our PPML analysis to the same subsample of observations involving non-zero M&A activity.

M&As. Thus, they will fully absorb the time-invariant bilateral covariates (e.g., distance, contiguity, etc.) from the specification in column (1). To reinforce the use of pair fixed effects in gravity settings, Egger and Nigai (2015) and Agnosteva et al. (2019) demonstrate that the standard gravity variables (e.g., distance, etc.) do well in predicting *relative* bilateral trade costs; however, they fail to capture the *level* of bilateral trade costs (e.g., they underpredict bilateral trade costs for poor countries and overpredict trade costs for more developed countries).

Second, on a related note, and consistent with the average treatment effects methods of Wooldridge (2010), Baier and Bergstrand (2007) propose the use of pair fixed effects to mitigate endogeneity concerns with respect to trade agreements in gravity regressions (i.e., by controlling for most of the unobserved correlation between the endogenous agreements and the error term in gravity models). A similar argument is presented by Bergstrand and Egger (2007) for addressing the impact of bilateral investment treaties on FDI. Finally, following the recommendation of Baier et al. (2019), we allow for the pair fixed effects in our model to vary depending on the direction of the M&As. Baier et al. (2019) demonstrate that this has significant implications for the estimates of free trade agreements, which can be very asymmetric. Applied to our setting, this could be important for the estimation of our destination-specific variables—including corporate tax rates—as it diminishes the potential for omitted variable bias and improves the extent to which our model accounts for bilateral trade and financial frictions whose influence is not changing over our sample period. From an identification standpoint, the inclusion of country-pair fixed effects implies that our estimates of CIT effects are henceforth identified from *within country-pair* changes over time in M&A activity and CIT rates. Our estimating model becomes:

$$MA_{ijt} = \exp[\alpha CIT_{jt} + BIPOL_{ijt}\beta_2 + DESTN_{jt}\beta_3 + \pi_{it} + \overrightarrow{\gamma}_{ij}] \times \varepsilon_{ijt}, \quad \forall i \neq j. \tag{3}$$

Before we present our findings, we discuss two potential caveats related to the use of country-pair fixed effects, $\overrightarrow{\gamma}_{ij}$, in our setting. First, by construction, the country-pair fixed effects absorb and control for the effects of all time-invariant bilateral determinants of M&As. Thus, due to perfect collinearity, we can no longer obtain estimates of the effects of distance, contiguity, colonial ties and common language, which were included in the vector $GRAV_{ij}$ in our previous specification and which no longer appears in equation (3). Second, when implemented with a large number of fixed effects, the PPML estimator has been criticized in terms of convergence and computation speed. To overcome both of these issues, we rely on the fast and robust estimation command 'ppmlhdfe' of Correia et al. (2020).[15]

Several findings stand out from the PPML estimates with country-pair fixed effects in Column (3) of Table 3. First, the point estimate of the CIT effect is further reduced and remains imprecisely estimated. Second, as expected, we can no longer obtain estimates of the effects of the standard time-invariant bilateral gravity variables. Third, with respect to the time-varying bilateral variables, the estimates on RTA and BIT are both statistically insignificant, while the estimate on sanctions is negative and it regains statistical significance. Interestingly, the estimate on diplomatic distance becomes positive and statistically significant. A mechanical explanation for this result, which is consistent with the estimates from columns (1) and (2), is that this estimate should be interpreted as a deviation from the negative impact of (physical) distance and international borders, which are absorbed by the country pair fixed effects. The result that an increase in political distance favours cross-border M&As also aligns with the notion that the extension of corporate control may compensate for weak diplomatic ties and access to local know-how, as argued in Damioli and Gregori (2023). Finally, the only substantial difference between the estimates of the country-specific variables between columns (2) and (3) is that the estimate on the unemployment rate becomes positive and marginally significant.

Multilateral Resistances. One of the most influential contributions to the theoretical and empirical trade gravity literature is the concept of multilateral resistance. Owing to the seminal work of Anderson and van Wincoop (2003), trade multilateral resistances are theoretical constructs that are designed to capture the intuitive observation that trade between two countries should not only depend on their sizes and the bilateral costs between them, but also on how remote (geographically and economically) these countries

[15]On a related note, we used the 'reghdfe' command of Correia (2016) for our OLS regressions.

are from the rest of the world. Proper controls for multilateral resistances have become a standard in the trade literature. In fact, Baldwin and Taglioni (2006) dub the omission of multilateral resistances 'the gold medal mistake' in gravity model applications.

While we do not offer a structural foundation for multilateral resistances (MR) in the context of M&A activity, we believe that there may be significant benefits from introducing MR equivalents in this setting. First, similar to the trade literature, the MRs in our model reflect the intuitive argument that the number of M&A deals between two partners may be influenced by their multilateral remoteness, i.e., the more isolated two countries are from the rest of the world, the higher the probability of M&As between them. Second, the MRs should capture 'general equilibrium' diversion effects, e.g., a BIT between two countries could divert or decrease M&A activity vis-à-vis non-members. A potentially important implication of this is that the partial estimates of the effects of bilateral policies on M&As may significantly overstate their true effects.[16] Similar 'general equilibrium' intuition applies to the effects of country-specific policies—including corporate income tax rates.

Despite the intuitive appeal of MRs and the additional potential benefits of including them in econometric models like ours, the 'gold medal mistake' of not controlling for multilateral resistances has not attracted any attention in the M&A or tax literature, and MRs are absent from all such studies, even those that estimate some form of gravity model (e.g., Huizinga and Voget (2009); Benzarti and Tazhitdinova (2021)). Against this backdrop, we proceed in two steps. First, we introduce to our specification a multilateral resistance (MR_{jt}) index that is in the spirit of the trade literature. Then, inspired by the MR concept, we propose a novel *Multilateral Tax Resistance, (MTR_{jt})* index. We describe the construction of these two MR indexes and we discuss our findings sequentially.

To obtain the results in column (4) of Table 3, we introduce a multilateral resistance index in the spirit of the trade literature. Specifically, we construct the multilateral

[16]To see this, consider the impact of BITs. *Ceteris paribus*, the direct effect of a BIT between two countries ought to be to increase M&As between them. However, this effect is likely to be mitigated by diversion of M&A activity from other countries. Intuitively, when (through a BIT) two countries become closer to each other, they also become more remote from everyone else. Such diversion effects are very sizable in the trade literature (Yotov et al., 2016) and, if not taken into account, they may lead to significant biases (e.g., of more than 70 percent) in the evaluation of the effects of various bilateral and country-specific policies. Ignoring MRs is thus tantamount to paying insufficient attention to the stable unit treatment value assumption (SUTVA) and non-interference.

resistance faced by each destination country and year in our sample, as a GDP-weighted average bilateral distance:

$$MR_{j,t} = \sum_{i \neq j} Distance_{ij} \times \frac{GDP_{i,t}}{\sum_i GDP_{i,t}}, \quad \forall j, t,$$

where, $Distance_{ij}$ is the bilateral distance between source i and destination j, which is intended to proxy for bilateral (geographical) frictions between i and j. In the robustness analysis, we employ a more sophisticated vector of bilateral frictions, which also includes other time-invariant and time-varying bilateral variables, and our conclusions remain qualitatively unchanged. Therefore, for simplicity and clarity of exposition, we use distance as the single proxy for bilateral frictions in our main analysis. $GDP_{i,t}$ is the gross domestic product of source i at time t, which captures the relative size of the source market, and it enters our expression as a fraction of world GDP, $\sum_i GDP_{i,t}$.

Two main findings stand out from the results in column (4) of Table 3, where we add the first proxy for multilateral resistance to our econometric model. First, the estimate on the MR variable is statistically significant, sizable, and positive. Consistent with our expectations, this implies that, all else equal, the more remote a destination is from all other sources—especially those that represent larger economies—the greater the number of target firms in the destination country that will be acquired by firms located in source i. Second, the introduction of the MRs to our model does not lead to any significant changes to the rest of the estimates, including the coefficient on CIT rates. This result is encouraging insofar as it points to a modest role of omitted variable bias (at worst) in models that fail to account for these MRs. Importantly, however, even if the partial estimates of the other variables in our model remain largely unchanged, the significant MR estimate that we obtain implies that these partial estimates may only capture part of the true policy effects and that there may be further important GE forces that need to be taken into account when evaluating the impact of specific policies.

Next, we propose and introduce to our model the *Multilateral Tax Resistance*:

$$MTR_{j,t} = \sum_{i \neq j} Distance_{ij} \times \frac{CIT_{i,t}}{\sum_i CIT_{i,t}}, \quad \forall j, t,$$

which combines physical remoteness and the influence of CIT rates in a multilateral framework. Similar to the standard MR index, the MTR is designed to capture the intuition that the further other source countries are and the higher their taxes are relative to tax rates around the world, the larger ought to be the volume of cross-border acquisitions originating from a particular source. Consistent with this intuition, in column (5) of Table 3, we obtain a large, positive, and statistically significant estimate on our new multilateral tax resistance index. While the CIT estimate from the same specification is unchanged, the broader message from this analysis and from the significant MTR effect is that changes in corporate income taxes in other countries may have significant GE effects that should be taken into account when evaluating the effects of such policies.

Domestic M&As. Despite the significant effects of globalization and the remarkable increase in international integration in the world across various dimensions, most economic activity remains domestic, e.g., domestic trade is significantly larger than international trade. This so-called 'home bias' is even stronger in more disaggregated data, and it is especially pronounced for services trade. Accordingly, all contemporary theoretical papers from the trade gravity literature (e.g., Anderson (1979), Eaton and Kortum (2002), Anderson and van Wincoop (2003), and Arkolakis et al. (2012)) implicitly or explicitly model domestic trade flows together with international trade flows. However, only recently has the trade literature recognized the benefits of using domestic trade flows in gravity estimations.[17] Stimulated by the developments in the trade gravity literature, the use of domestic versus international flows has also recently found motivation and implications for gravity regressions on migration (Beverelli, 2021), FDI (Kox and Rojas-Romagosa, 2020),

[17]See Yotov (2012) for an early use of domestic trade flows to resolve the 'distance puzzle' in trade. More recently, Beverelli et al. (2023) use domestic trade flows to analyze the impact of country-specific institutional quality on trade within a structural gravity model with a full set of exporter-time and importer-time fixed effects. In terms of methods, this paper is the closest to our specification. Yotov (2022) offers a recent survey highlighting the benefits of using domestic trade flows for trade gravity estimation.

greenfield investment (Carril-Caccia et al., 2023), and patents (LaBelle et al., 2023).

Against this backdrop, we (i) build a dataset of international and domestic M&A deals using a common underlying data source and deal definitions, and (ii) we capitalize on these data to demonstrate the advantage of including domestic M&A transactions for identifying the distortionary impact of corporate income taxes and country-specific taxes more broadly. To highlight three separate benefits of using domestic M&As in our setting, we proceed in three steps. First, we show that the use of domestic M&As will enable us to obtain estimates of the impact of globalization, measured as the evolution of international relative to domestic M&A frictions. Such frictions imply violations of capital ownership neutrality from an international perspective—meaning that corporate taxes interfere with the efficient exploitation of productive assets across borders. A long-standing critique of the trade gravity model has been that it cannot properly capture the effects of globalization. "*Globalization is everywhere but in estimated gravity models. [T]he failure of declining trade costs to be reflected in estimates of the standard gravity model might be called the 'missing globalization puzzle'.*" (Bhavnani et al., 2002). More recently, Bergstrand et al. (2015) show that once the gravity model is estimated with domestic trade flows, it is possible to identify the effects of globalization and that they are in fact quite strong. To identify the impact of globalization on M&As, we make two simple adjustments to our model:

$$\begin{aligned} MA_{ijt} = & \exp[\alpha CIT_{jt} + BIPOL_{ijt}\beta_2 + DESTN_{jt}\beta_3] \times \\ & \exp[\sum_t \beta_t INTL_{ijt} + \pi_{it} + \overrightarrow{\gamma}_{ij}] \times \varepsilon_{ijt}, \quad \forall i, j. \end{aligned} \tag{4}$$

The first adjustment to our specification is that the dependent variable now not only includes observations for cross-border M&As ($\forall i \neq j$) but also observations for domestic M&As ($\forall i, j$). The second adjustment is the introduction of a set of time-varying border indicators, $\sum_t INTL_{ijt}$, which take a value of one to denote cross-border M&A deals and are equal to zero $\forall i = j$ for each year in our sample. By construction, the estimates of these variables capture the evolution of the international border effects, conditional on the policy variables that are already included in our model.[18]

[18]Given the use of country-pair fixed effects in our model, we need to drop one of the time-varying

Three main findings stand out from the estimates of equation (4), which we report in column (6) of of Table 3. First, the estimated CIT effect becomes positive but it remains statistically insignificant. Second, we note that the estimates on the indicators for the existence of RTAs and the BITs (both of which are necessarily zero for $i = j$) are now both positive and statistically significant, suggesting that the two types of agreements have had positive impacts on cross-border M&As relative to domestic activity. The stronger impact of the bilateral liberalization variables that we obtain for M&As once we introduce domestic flows is consistent with similar results for the impact of FTAs in the trade literature (e.g., Dai et al. (2014) and Bergstrand et al. (2015)), the intuition being that international liberalization may promote cross-border M&As at the expense of domestic deals (Bjorvatn, 2004; Horn and Persson, 2001). Finally, we find evidence for globalization effects for M&As. This is captured in Figure 3, where we present the evolution of our border estimates over time.[19] According to the estimates presented in Figure 3, cross-border M&A deal volume grew by 29.7% relative to domestic activity between 1995 and 2019, after accounting for a wide range of other time-varying country-specific factors. Despite fluctuations over time, the pattern of border effect estimates is broadly consistent with the growing importance of cross-border M&A activity.

The second benefit of using domestic M&As is that this allows us to identify the differential impact of CIT rates on cross-border versus domestic M&As. Insofar as any such differential effects exist, these imply additional tax-induced distortions to capital ownership (and hence departures from the principle of capital ownership neutrality in an international context). Differences in the scale of domestic versus cross-border distortions may moreover point to differences in the importance of different margins along which acquisition incentives may be affected by tax considerations. Formally,

$$
\begin{aligned}
MA_{ijt} = &\exp[\alpha_1 CIT_{jt} + \alpha_2 CIT_{jt} \times INTL_{ij} + BIPOL_{ijt}\beta_2 + DESTN_{jt}\beta_3] \times \\
&\exp[DESTN_{jt} \times INTL_{ij}\beta_4 + \sum_t \beta_t INTL_{ijt} + \pi_{it} + \vec{\gamma}_{ij}] \times \varepsilon_{ijt}, \quad \forall i, j. \qquad (5)
\end{aligned}
$$

border dummies to avoid perfect collinearity. Estimates of the remaining border indicator variables should therefore be interpreted as deviations from this reference category. Specifically, we omit the border variable for the first year in our sample, 1995. This choice is inconsequential for the estimates of all other variables in our model, except for the interpretation of border effects.

[19] These are suppressed from Table 3 for brevity.

There are two new terms in specification (5). $CIT_{jt} \times INTL_{ij}$ is an interaction between CIT and an indicator that takes a value of one for cross-border M&A observations. Thus, by construction, the estimate on this interaction will capture the potential distortionary effects of CIT rates on international versus domestic M&As, while the coefficient on the uninteracted CIT term will capture the baseline effect of taxation on (domestic) M&As. The second new term is $DESTN_{jt} \times INTL_{ij}$, which represents a vector of interactions between all other destination country-specific variables in our setting and the border dummy.

The estimates from specification (5) appear in column (7) of Table 3, and we draw three main conclusions based on them. First, from a methodological perspective, the use of domestic M&As allows identification of two separate tax effects. Second, from a policy perspective, we obtain a negative and statistically significant estimate on $CIT_{jt} \times INTL_{ij}$, which, consistent with the existing literature, confirms the negative impact of CIT rates on cross-border M&As. Third, we obtain a positive and statistically significant estimate of the impact of CIT rates on the number of domestic M&A deals. A potential explanation for this juxtaposition of results is that higher statutory CIT rates may be associated with greater variation in effective rates between domestic firms, thereby introducing opportunities for more tax sophisticated firms to acquire their less sophisticated domestic counterparts as a means of increasing after-tax profits for the merged entities. Similar motives are presumed to apply to cross-border transactions, yet such tax-planning motives may be dominated by other considerations related to market access and the after-tax value of *real* (i.e., non-tax) returns to acquisitions. Further work investigating this relationship is warranted and is left to future work.

Given our focus on the link between CIT rates and cross-border M&As, we proceed to introduce our main and final econometric specification:

$$\begin{aligned} MA_{ijt} &= \exp(\alpha_2 CIT_{jt} \times INTL_{ij} + BIPOL_{ijt}\beta_2 + DESTN_{jt} \times INTL_{ij}\beta_3) \times \\ &\quad \exp[\sum_t \beta_t INTL_{ijt} + \pi_{it} + \psi_{jt} + \overrightarrow{\gamma}_{ij}] \times \varepsilon_{ijt}, \quad \forall i, j, \end{aligned} \tag{6}$$

where we have included a set of destination-time fixed effects. These will absorb all destination-time varying covariates, including CIT_{jt}. This specification demonstrates how the use of domestic M&As enables us to identify the distortionary effects of corporate income taxation even in the presence of a full set of source-time and destination-time fixed effects. Mechanically, the reason is that, once interacted with the international border dummy variable, the CIT term, $CIT_{jt} \times INTL_{ij}$, becomes bilateral and time-varying as well. Thus, its estimate can be identified in the presence of all fixed effects in our model. The same argument applies to any other tax or, more broadly, any other country-specific policy or characteristic that may impact M&As, and this is reflected by the inclusion of the vector $DESTN_{jt} \times INTL_{ij}$ in our model.

Before we present our findings, we discuss an additional benefit of the use of domestic M&As in our setting. Nizalova and Murtazashvili (2016) show that if an endogenous treatment is interacted with an exogenous variable, the estimate of the interaction is consistent. This is relevant and important for our setting, where the potentially endogenous treatment (i.e., variation in CIT rates) is interacted with a dummy variable for international borders. The latter are plausibly exogenous and do not vary systematically with our country-specific variables, including corporate taxes. Thus, in addition to allowing us to include the rich set of source-time and destination-time fixed effects in our model, the introduction of domestic M&As helps mitigate possible endogeneity concerns with respect to the impact of corporate taxes in a world of international tax competition.

The estimates from specification (6), which we consider to be our main findings, appear in column (8) of Table 3. Based on these results, we conclude that higher CIT rates lead to a smaller number of cross-border M&As relative to domestic deals. Specifically, our preferred estimate implies that a one percentage point increase in CIT rates decreases the number of cross-border M&As by about 0.8 percent relative to domestic M&As. With respect to the other covariates, overall, we find their estimates to be mostly intuitive in terms of sign/direction and plausible in terms of magnitude. Finally, and most important from a methodological perspective, the significant changes in the estimates that we observe across the different columns in Table 3 point to the importance of the various approaches and techniques that we implemented, culminating in the most narrowly identified specification shown in column (8).

3.2 Robustness analysis and heterogeneous effects

This section provides estimates from a series of robustness experiments (Subsection 3.2.1), followed by an investigation of heterogeneous CIT effects depending on source and destination country characteristics and across sectors (Subsection 3.2.2).

3.2.1 Robustness Analysis

To ease exposition, we focus the following robustness analysis and interpretation mostly on the key CIT variable in our model and on the main specification from column (8) of Table 3. However, we also discuss the estimates on some of the other covariates in our model and the results from some other specifications.

The OLS Estimator. In our first experiment, we employ the OLS estimator to reproduce the results from the different specifications in Table 3. In this case, the dependent variable is always the logarithm of the number of M&As between the source and host country. The OLS results are reported in Table 4, where we see that none of the CIT estimates (except for the benchmark results in column (1)) are statistically significant. We also document several other notable differences between the OLS and the PPML estimates. For example, focusing on the main specification from column (7), we see that the estimates of the effects of RTAs, exports over GDP, and the Economic Freedom index are no longer statistically significant. In addition, Figure 4, which reports the evolution of the border effect retrieved from estimates in column (5) from Table 4, suggests that from 1995 to 2019 there has been a reduction of the number of cross-border M&As relative to the domestic ones, which is in sharp contrast to the PPML estimates.[20] The main message from our first robustness experiment is that the OLS and the PPML estimates can be very different from each other. In combination with the properties of PPML that we discussed earlier,

[20] We also investigated the possibility that the negative trend in Figure 4 is driven by the exclusion of the zeroes. Specifically, in our next experiment, we estimated the model with OLS but using as dependent variable the logarithm of projects plus one. The estimates of the evolution of the border effects from this specification appear in Figure A.1 in the appendix and they are consistent with the results in Figure 4.

this reinforces our decision to use PPML as our preferred estimator.

OLS with zeros. The results from the next three experiments that we perform correspond to the main specification from column (8) of Table 3 and are also obtained with the OLS estimator. Specifically, to obtain the results from column (1) of Table 5, we take the logarithm of the number of M&As projects after adding one, thus retaining the zeros from the raw data in our OLS estimating sample. Alternatively, in column (2), we apply the inverse hyperbolic sine (IHS) transformation to the number of M&A projects.[21] In column (3), we instead use the number of M&A deals without any transformation. In all three cases, the estimates of the CIT effect are not statistically significant, and in two cases they are positive. These results are consistent with the findings from Cohn et al. (2022), who argue that employing the OLS estimator with the transformation of count-like variables with the log of one plus the dependent variable or the IHS transformation leads to biased results. Thus, once again, these analyses reinforce our decision to rely on the PPML estimator to obtain our main results.

PPML with positive values only. The results in column (4) of Table 5 replicate the results from column (8) from Table 3. They are obtained with the PPML estimator, however, without any zeros in the estimating sample. Focusing on the key effect of interest, we see that the impact of corporate taxes is very similar to our main estimate. This result is consistent with PPML estimates without zeroes from the trade literature, and it suggests that the differences between the OLS and the PPML estimates that we documented in our first experiment are due to heteroskedasticity, which is accounted for by the PPML estimator.

Alternative clustering The estimates in columns (5) and (6) of Table 5 reproduce our main results from column (8) from Table 3 but they are obtained with two-way and three-way clustering of the standard errors, respectively (i.e., by source and destination, and by source, destination, and year). As expected, the magnitudes of the estimates are unchanged, however, when employing the most conservative three-way clustering, the

[21]The IHS transformation is the $log(project + \sqrt{(project^2 + 1)})$.

estimate on the coefficient on corporate taxes loses statistical significance.

Incidental parameter problem (IPP) The estimates in column (7) of Table 5 are obtained after correcting for possible bias in our estimated coefficients and standard errors due the IPP, which may be present in PPML estimations with three-way fixed effects such as ours. To this end, we employ the IPP bias correction Stata package from Weidner and Zylkin (2021). After the bias correction, the estimated coefficient of CIT remains being negative and significant. The size of the coefficient increases slightly (albeit invisible at three decimal places). Other coefficient estimates and standard errors also change modestly after bias correction. In particular, the coefficient associated with the MR index becomes larger and statistically significant.

Alternative multilateral resistances. One of our main contributions is the introduction of multilateral resistances. For simplicity and clarity of exposition, in the main analysis, we constructed the multilateral resistances only based on distance as a single proxy for bilateral costs/frictions. Following the trade literature, in our next robustness experiment we construct alternative MR and MTR indexes, which are based on more comprehensive measures of bilateral costs. To this end, we take a two-step approach. First, we estimate the following specification using PPML:

$$MA_{ijt} = exp[GRAV_{ij}\beta_1 + BIPOL_{ijt}\beta_2 + log(GDP)_{it}\beta_3 + log(GDP)_{jt}\beta_4] \times \varepsilon_{ijt}, \quad \forall i \neq j.$$

Then, using the estimated coefficients β_1 and β_2 from the previous specification, we construct the following vector of bilateral costs (BC):

$$BC_{ij,t} = exp[GRAV_{ij}\hat{\beta}_1 + BIPOL_{ijt}\hat{\beta}_2], \quad \forall i \neq j.$$

Finally, we calculate the MR index:

$$MR_{j,t} = \sum_{j \neq i} [BC_{ijt}]^{-1} \times \frac{GDP_{i,t}}{\sum_i GDP_{i,t}}, \quad \forall i \neq j.$$

Using the new bilateral trade cost vector (BC_{ijt}), we also construct a corresponding MTR index, and we employ the new MR and MTR indices to obtain the results in Table 6. The estimates on MR remain positive and statistically significant in the model without domestic M&As. In addition, unlike our main results, the estimate on MR is also statistically significant in the preferred specification with domestic M&As, revealing disproportionately larger impacts on cross-border M&As than domestic ones (column (5)). The new estimates of the effects of MTR are insignificant.

Source country control variables. In our last experiment, we test the sensitivity of the estimates from specifications 1 to 4 (columns (1)-(6) in Table 3) by replacing the source-year fixed effects with source-country-specific observable variables, including the logarithm of GDP and of GDP per capita. The results are presented in Table 7 and are qualitatively and quantitatively similar to those in Table 3.

3.2.2 Heterogeneous CIT Effects

In this section, we explore potential heterogeneity in the effects of CIT rates on M&As over time, across countries, and across sectors.

Heterogeneity over time and across countries. We start the analysis by gauging the heterogeneity in CIT effects over time and across countries. To this end, we estimate two different extensions of specification (6). First, we interact $CIT_{jt} \times INTL_{ij}$ by a set of indicator variables that take the value of one for each year in our sample. To conserve space, these year-specific estimates are reported in Figure 5. From this analysis it can be gathered that the negative effect of CIT rates on cross-border versus domestic M&As is not homogeneous and persistent over time. It is beyond the present paper's scope to shed light on the drivers of these changes on the effect of CIT. However, it appears that tax considerations lose importance during periods of financial turmoil. These include the East Asian economic crisis (1997-98), the bursting of the dot-com bubble (2001), and the global financial crisis (2008-2010). The weaker effect of CIT rates on cross-border M&As in times of economic uncertainty is likely to be driven by at least two factors. First, in times of crisis, fire-sale M&As (i.e., opportunistic M&As) become more common (Krugman, 2000). Second, the strength of tax incentives for tax planning and disincentives for investment are mechanically weakened in an environment where pre-tax profits are smaller and/or more uncertain.

The second test of heterogeneity that we perform aims to gauge the impact of CIT rates across countries. We extend specification (6) by interacting $CIT_{jt} \times INTL_{ij}$ by a set of indicator variables that take a value of one for each country in our sample. To conserve space, estimates of only the significant estimated coefficients are reported in Figure 6. These estimates illustrate which countries are the most sensitive to changes in CIT rates (in either direction) and speak to the balance of tax planning versus benign investment considerations facing firms in different countries. In the following set of tests we attempt to shed further light on the heterogeneous effect of CIT on M&As depending on broad characteristics of the source and destination countries.

Heterogeneity across groups of countries. We perform four sets of tests wherein we classify source and destination countries by (i) their level of income (high vs. low-middle income), (ii) their level of CIT rates relative to the sample median (high vs. low), (iii) whether they are a tax haven or not, and (iv) their type of tax system (territorial vs. worldwide). The following is our econometric model for the analysis of the CIT effects for high vs. low-middle income countries, and we follow the same format for the other three analyses:

$$\begin{aligned}
MA_{ijt} = \ & \exp[\alpha_2 CIT_{jt} \times INTL_{ij} + \alpha_3 CIT_{jt} \times INTL_{ij} \times IncH_{it} \times IncLM_{jt}] \times \\
& \exp[\alpha_4 CIT_{jt} \times INTL_{ij} \times IncLM_{it} \times IncH_{jt}] \times \\
& \exp[\alpha_5 CIT_{jt} \times INTL_{ij} \times IncLM_{it} \times IncLM_{jt}] \times \\
& \exp[BIPOL_{ijt}\beta_2 + DESTN_{jt} \times INTL_{ij}\beta_3] \times \\
& \exp[\sum_t \beta_t INTL_{ijt} + \pi_{it} + \psi_{jt} + \overrightarrow{\gamma}_{ij}] \times \varepsilon_{ijt}, \quad \forall i, j, \qquad (7)
\end{aligned}$$

where, the CIT variable is interacted with different indicator variables that equal one when the source country is high income ($IncH_{it}$) or middle-low income ($IncLM_{it}$), and likewise for the destination country.[22] Based on the definitions of our variables, the base estimate (α_2) refers to the effect of corporate taxes on M&As between high income countries. Estimates of α_3, α_4, and α_5 represent deviations from the base category for investments from high to low-middle income countries, from low-middle to high income countries and between low-middle income countries, respectively. Specification (7) is adapted in an analogous manner to estimate CIT effects between source and destination countries that are classified according to groups (ii)-(iv) above.

The results from these four analyses are presented in Table 8. The estimates in column (1) reveal that CIT rates have a negative effect on M&As between high income countries (the reference category), and this effect is significantly larger in statistical terms for acquisitions between high income acquirer counties and low-middle income target countries, as well as between low-middle income countries. In combination, our estimates imply that M&A deals are more sensitive to CIT rate changes in low-middle income countries. This finding is consistent with the hypothesis that a larger share of M&As (and FDI in general) into low-middle income countries is aimed at reducing production costs. In this case, FDI is expected to be more sensitive to factor-price differences, and thus more sensitive to CIT rates, which accentuate the after-tax returns to cross-border investment. Similarly, previous literature finds that vertical FDI—which also seeks to reduce production costs—is more sensitive to CIT rates than horizontal FDI (Herger and McCorriston, 2016; Overesch and Wamser, 2009). In our sectoral level analysis, we confirm that horizontal (same-sector) M&As are less sensitive to CIT rates.

In column (2) of Table 8, we split countries into groups with relatively high- vs. low tax CIT rates relative to the global median on an annual basis. Countries that have a corporate income tax greater than or equal to the median are classified as high tax countries, while the rest are classified as low tax. By construction, these indicator variables are also time-varying. The estimates in column (2) confirm our negative and statistically significant effect of CIT rates for deals involving countries in the reference

[22]The indicator variables that classify source and destination countries by income level are constructed using the World Bank's classification: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519. Notice that this classification varies over time, and so do our indicator variables.

group (i.e., M&A deals between countries with high tax rates). None of the estimates of the coefficients on the other CIT interactions are statistically significant, indicating that the effects of CIT on M&As are homogeneous across the four categories delineated by median tax rates in this specification.

Next, we classify acquirer and target countries as tax havens, following the classification in Hines (2010). Tax havens in our sample include the Bahamas, Bahrain, Barbados, Belize, Costa Rica, Cyprus, Ireland, Jordan, Lebanon, Luxembourg, Malta, Mauritius, Panama, Samoa, Seychelles, Singapore, and Switzerland. As shown in column (3) of Table 8, the impact of CIT rates is negative and significant for the reference category: M&As between non- tax haven countries. The only other significant estimate is the one on the interaction that captures the effect of CIT rates on M&A deals between tax havens. This points to more extreme sensitivity of cross-border M&A activity to (necessarily small) tax differences between tax haven countries, consistent with taxation playing a pivotal role in attracting FDI to tax havens.

Finally, we classify countries by their type of tax system using a combination of information from E&Y's Worldwide Corporate Tax Guide (2020), PwC's online Worldwide Tax Summaries, and the Tax Foundation, along with miscellaneous country-specific legal and legislative sources. Contrary to prior findings (e.g., Bird et al. (2017); Hanlon et al. (2015); Huizinga and Voget (2009)), we find no evidence that cross-border versus domestic M&A volume is differentially sensitive to worldwide versus territorial taxation. Admittedly, statistical power for these and all of our other tests of heterogeneity may limit our ability to reach definitive conclusions given the narrowness of our identification strategy and the large number of parameter estimates required.

Heterogeneity across sectors. Next, we explore the effect of corporate income taxes on M&As at the sectoral level. This experiment highlights the sectoral dimension of our M&A database, which covers bilateral transactions for 84 sectors at the NACE Rev. 2 two-digit level. We thus adapt our main specification to account for acquirers' and targets' sectoral classification:

$$MA_{isjkt} = \exp(\alpha_2 CIT_{jt} \times INTL_{ij} + BIPOL_{ijt}\beta_2 + DESTN_{jt} \times INTL_{ij}\beta_3) \times \exp[\sum_t \beta_t INTL_{ijkt} + \pi_{ist} + \psi_{jkt} + \overrightarrow{\gamma}_{isjk}] \times \varepsilon_{isjkt}, \quad \forall i, j, \tag{8}$$

where MA_{isjkt} denotes the number of acquisitions by firms in country i's industry s in country j's industry k in year t. Unlike in the standard sectoral gravity setting in the trade literature, where the sectoral dimension is usually the same between the source and the destination, acquirer and target sectors in M&A deals may or may not differ, reflecting horizontal vs. conglomerate or vertical FDI. Naturally, this requires careful attention to the definitions of some of the covariates and the fixed effects in specification (8). Thus, for example, we define the time-varying border covariates at the level of the target sectors (k).

Turning to the fixed effects from specification (8), we see that, similar to our main specification (6), the model includes three sets of fixed effects. The important difference, however, is that the fixed effects in our sectoral econometric model also account for the sectors of source (s) and destination (k). Accordingly, π_{ist} and ψ_{jkt}, respectively, refer to source-sector-year and destination-sector-year fixed effects. Besides the theoretical reasons described in Section 3.1, these fixed effects are quite convenient from a practical perspective as there is a limited availability of country- and sector-level variables. Finally, γ_{isjk} denotes the set of country-pair-sector fixed effects, which would control for and absorb any country-pair and sector-pair determinants of M&As that are time-invariant. Allowing for variation across sector pairs is consistent with Coeurdacier et al. (2009) and Damioli and Gregori (2023), who show that time-invariant determinants of M&A activity vary across sectors. In addition, these fixed effects control for whether M&As are horizontal, vertical or conglomerate.[23]

Our sectoral estimates are presented in Table 9. Column (1) reports results that are based on a sample that pools together all sectors. In this column, we estimate speci-

[23]Identifying this characteristic of FDI is otherwise challenging due to data limitations. According to Ahn and Park (2022), correctly identifying vertical FDI, for instance, requires using data on firms' sales and purchases of goods and services.

fication (8) without the destination-sector-year fixed effects (ψ_{jkt}) and with destination time varying variables which are not interacted by the international dummy. As in the country-level analysis (Column (7) from Table 3), the estimates confirm that CIT rates have a positive effect on domestic M&As and a negative effect on cross-border M&As. Column (2) reports the results from our preferred specification. The CIT estimate is negative and statistically significant, and it is virtually identical to the one obtained in our main specification at the country level (Column (8) from Table 3). The estimates for the rest of the coefficients in column (2) are also similar to our main results at the aggregate level. A notable difference is that the estimate on BIT becomes positive and statistically significant.

In column (3) we extend specification (8) by interacting the CIT variable with an indicator variable that takes a value of one to denote horizontal M&A transactions. The coefficient on this interaction term is positive and significant, indicating that horizontal M&As are *less* sensitive to changes in the CIT than vertical and conglomerate M&As. A similar conclusion is reached by Herger and McCorriston (2016) and Overesch and Wamser (2009).

Finally, in column (4) of Table 9, we gauge the effect of CIT rates in different broad sectors. To this end, we interact the CIT variable with a set of indicator variables that respectively equal one for acquisitions of target firms in the primary sector, mining and quarrying, manufacturing, utilities, and construction. Service sector targets represent the base category. From these estimates, we can observe that there is almost no heterogeneity in the effect of CIT rates across broad sectors in our data. Only M&As into the primary sector seem to be more responsive to changes in CIT.

4 Conclusion

Motivated by the increased interest in the effects of country-specific tax policies on cross-border flows (e.g., trade, migration, FDI, patents, etc.), in this paper we quantify the effects of corporate income taxes on M&A activity and we highlight the importance of three methods that have established themselves in the gravity literature on trade, migration, and FDI, but have not been fully utilized and integrated in the related tax literature.

First, we apply a PPML estimator with high-dimensional fixed effects, which enables us to take advantage of the information that is contained in the zero flows in our sample and, more importantly, to account for potential heteroskedasticity in our data, which may render OLS estimates inconsistent. Second, we account for multilateral remoteness using a standard multilateral resistance index from the trade literature and we introduce a novel 'multilateral tax resistance' index, which is intended to account for general equilibrium tax effects in our partial equilibrium econometric model. Finally, our sample includes cross-border as well as domestic M&As, which enables us to simultaneously identify uniform (domestic) and relative cross-border CIT effects in the same econometric model.

Based on our findings and analysis, we draw the following conclusions. From a policy perspective, we find that corporate income taxes have a significant negative impact on the number of cross-border M&As *relative to domestic deals*. Specifically, our preferred empirical specification yields a semi-elasticity of cross-border M&A volume with respect to host country corporate tax rates of -0.8. Where separately estimated, distortions to domestic deal volume are of a comparable magnitude, albeit of an opposing sign, such that the *net* distortion to cross-border M&A activity may be nearly negligible. Investigation of this distinction between CIT rate effects on domestic and cross-border M&As—and the associated implications for differences in relevant M&A motives—is left for future work. In addition, we document significant heterogeneity in CIT effects across countries, with some logical extensions to broad country characteristics. Sectoral heterogeneity is largely absent, though horizontal M&A transactions appear to be less sensitive to tax considerations.

From a methodological perspective, even though our preferred estimate is not very different from our benchmark estimate, we demonstrate that each of the three methodological steps that we implement have tangible implications for our estimates. Moreover, it is quite possible that the application of our proposed methods could reveal even more significant policy implications in different tax settings, and we encourage their widespread adoption.

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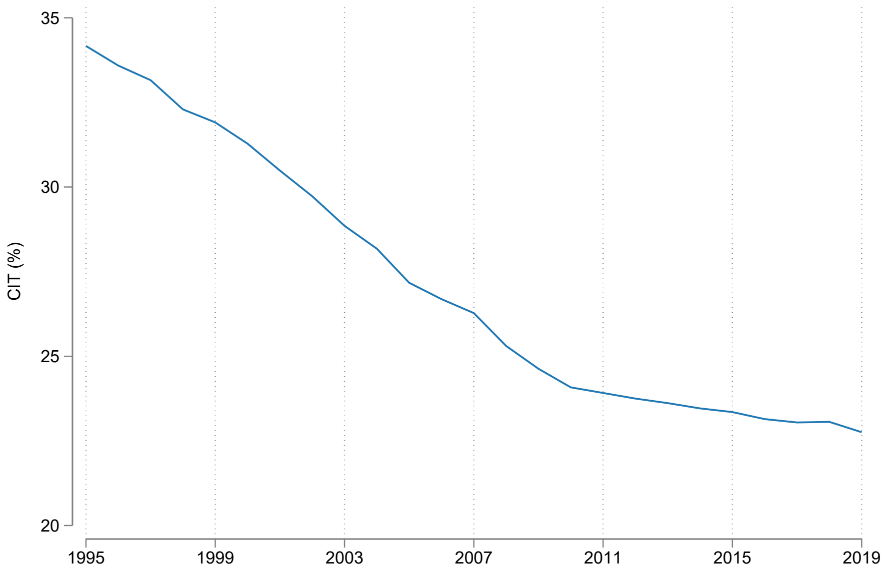
Table 1: Global M&As at the sector level

Sector	**NACE Rev. 2 two digits**	**Share over global M&As**	**International-domestic ratio**
Agriculture, forestry and fishing	01-03	0.97%	0.30
Mining and quarrying	05-09	4.09%	0.42
Manufacturing	10-33	27.40%	0.50
Utilities	35-39	2.71%	0.38
Construction	41-43	3.36%	0.24
Services	45-99	61.48%	0.32

Note: Author's own calculations based on M&As transactions present in the sample.

Figure 1: Evolution of global average CIT



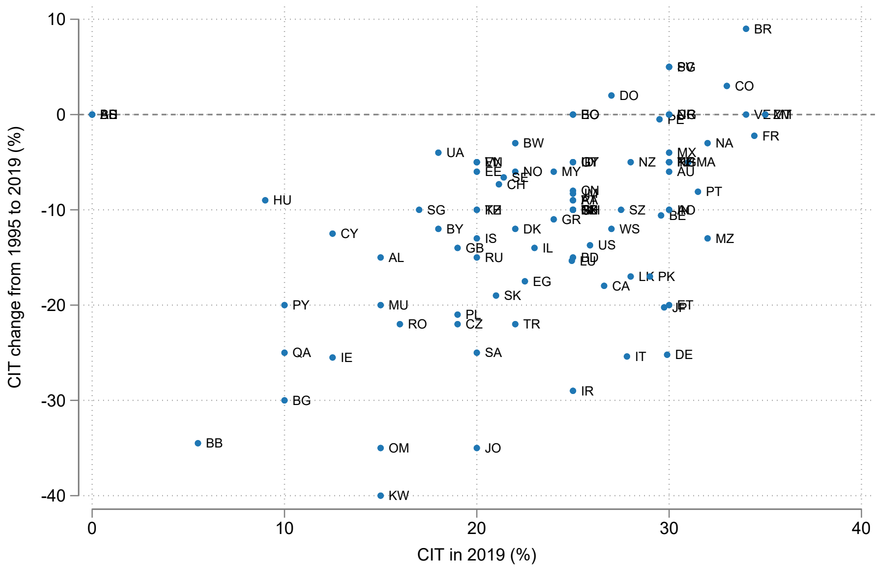
Authors' own elaboration based on countries present in the sample. Unweighted average.

Table 2: Descriptive statistics

Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
No. Projects	77084	6.79	126.93	0	8700
CIT dest (%)	77084	26.79	9.35	0	56.80
Distance (log)	77084	8.28	1.09	2.13	9.88
Contiguity	77084	0.05	0.23	0	1
Language	77084	0.15	0.36	0	1
Colonial ties	77084	0.03	0.18	0	1
GDP (log)	77084	25.43	4.23	0	30.70
Labor force (log)	77084	15.64	2.87	0	20.48
Unemployment rate	77084	7.47	5.15	0	37.25
Inflation rate	77084	5.91	27.59	-7.11	1058.37
Exchange rate (log)	77084	1.94	2.48	-5.38	10.62
Exports (%GDP)	77084	42.69	31.9	0	228.99
Eco. Freedom (log)	77084	4.08	0.63	0	4.49
RTA	77084	0.4	0.49	0	1
BIT	77084	0.42	0.49	0	1
Diplomatic distance (log)	77084	0.6	0.42	0	1.75
Any sanction	77084	0.07	0.25	0	1
MR	77084	8.7	1.33	0	9.53
MTR	77084	8.48	1.32	0	9.60

Note: Author's own calculations. As a result of interacting country level variables with the international dummy, strictly positive valued variables (e.g. labor force) have a minimum value of 0.

Figure 2: Change in countries' CIT from 1995 to 2019 vs. 2019 CIT



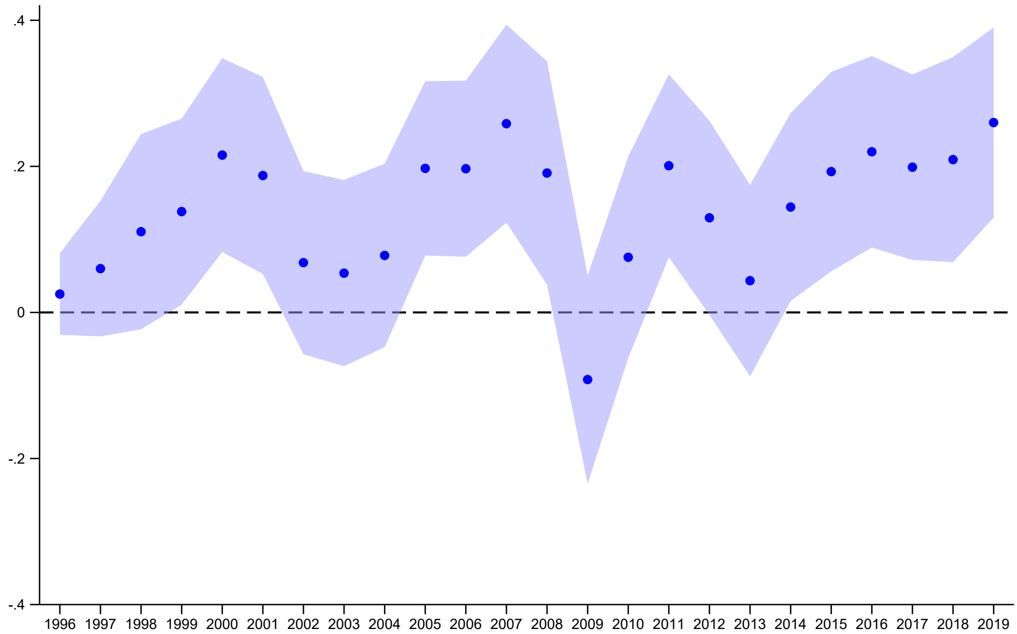
Authors' own elaboration based on countries present in the sample. The change in CIT is calculated as the difference between the CIT in 1995 and in 2019.

Table 3: The Effects of CIT and Other Determinants of Cross-border M&As

	Benchmark	PPML & Fixed Effects		Multilateral Resistance		Domestic M&As		
	OLS	PPML	Pair FEs	MRs	Tax MRs	Domestic	$X_{jt} \times INT$	Main
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CIT dest (%)	-0.004**	-0.002	-0.001	-0.001	-0.001	0.001	0.005*	
	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	
CIT dest (%) x INT							-0.007*	-0.008**
							(0.004)	(0.003)
Distance (log)	-0.403***	-0.753***						
	(0.027)	(0.050)						
Contiguity	0.359***	0.150						
	(0.071)	(0.093)						
Language	0.420***	0.727***						
	(0.058)	(0.074)						
Colonial ties	0.103	0.180**						
	(0.089)	(0.076)						
RTA	-0.102**	-0.257***	-0.013	-0.002	0.005	0.097**	0.065	0.107***
	(0.043)	(0.073)	(0.040)	(0.039)	(0.038)	(0.041)	(0.040)	(0.034)
BIT	-0.156***	-0.084	0.090	0.083	0.083	0.126**	0.119**	0.065
	(0.034)	(0.093)	(0.059)	(0.059)	(0.059)	(0.056)	(0.057)	(0.055)
Diplomatic distance (log)	-0.252***	-0.490***	0.140***	0.153***	0.149***	0.129**	0.134**	0.124***
	(0.057)	(0.067)	(0.048)	(0.050)	(0.049)	(0.057)	(0.057)	(0.043)
Any sanction	-0.189***	-0.092	-0.169***	-0.161***	-0.160***	-0.151***	-0.150***	-0.094***
	(0.052)	(0.093)	(0.061)	(0.060)	(0.060)	(0.038)	(0.037)	(0.031)
GDP (log)	0.122***	0.412***	0.326***	0.358***	0.362***	0.337***	0.219***	
	(0.031)	(0.082)	(0.050)	(0.053)	(0.055)	(0.044)	(0.079)	
GDP (log) x INT							0.161	0.037
							(0.101)	(0.084)
Labor force (log)	0.262***	0.551***	0.506***	0.541***	0.591***	0.186	-0.580**	
	(0.092)	(0.201)	(0.160)	(0.165)	(0.165)	(0.147)	(0.231)	
Labor force (log) x INT							1.121***	1.857***
							(0.299)	(0.264)
Unemployment rate	-0.002	0.002	0.007*	0.007*	0.007*	0.003	-0.003	
	(0.003)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	
Unemployment rate x INT							0.008	-0.001
							(0.007)	(0.006)
Inflation rate	0.000	-0.001	-0.000	-0.000	-0.000	-0.001	-0.021***	
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	
Inflation rate x INT							0.021***	0.006*
							(0.003)	(0.003)
Exchange rate (log)	0.011	0.002	-0.006	-0.007	-0.004	-0.004	-0.007	
	(0.007)	(0.014)	(0.011)	(0.011)	(0.011)	(0.014)	(0.014)	
Exchange rate (log) x INT							0.000	0.016
							(.)	(0.016)
Exports (%GDP)	0.003***	0.008***	0.007***	0.007***	0.007***	0.005***	0.004**	
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	
Exports (%GDP) x INT							0.002	0.004*
							(0.002)	(0.002)
Eco. Freedom (log)	-0.202*	-0.287	0.055	0.069	0.035	0.089	0.463	
	(0.116)	(0.249)	(0.154)	(0.151)	(0.147)	(0.160)	(0.337)	
Eco. Freedom (log) x INT							-0.467	-0.651**
							(0.395)	(0.291)
MR				0.678***	0.730***	0.708***	0.694**	
				(0.226)	(0.232)	(0.221)	(0.305)	
MR x INT							0.106	0.417
							(0.376)	(0.294)
MTR					0.554*	0.593**	0.997*	
					(0.307)	(0.299)	(0.588)	
MTR x INT							-0.473	0.000
							(0.686)	(.)
Observations	22707	75374	75374	75374	75374	77084	77084	77084
Source-year	X	X	X	X	X	X	X	X
Destination	X	X						
Destination-year								X
Country Pair			X	X	X	X	X	X
International-year						X	X	X
Domestic M&As	No	No	No	No	No	Yes	Yes	Yes

Note: This table reports our main estimates of the impact of CIT on M&As. The dependent variable in column (1) is the log of M&As, and the estimates in this column are obtained with the OLS estimator. The estimates in all columns are obtained with source time fixed effects. Column (2) replicates the results from column (1), but with the PPML estimator, and we use PPML for all remaining specifications. Column (3) introduces directional country-pair fixed effects. Columns (4) and (5) add proxies for the standard multilateral resistance and for the multilateral tax resistance, respectively. The results in column (6) are obtained with domestic M&As and we have added a full set of time-varying border indicators, whose estimates appear in Figure 3. Column (7) adds interactions between all country-specific variables in our model and a dummy variable for international borders. Finally, in column (8), we also introduce destination-time fixed effects. Standard errors clustered at the country pair. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See text for further details.

Figure 3: Evolution of the border effect, 1995-2019



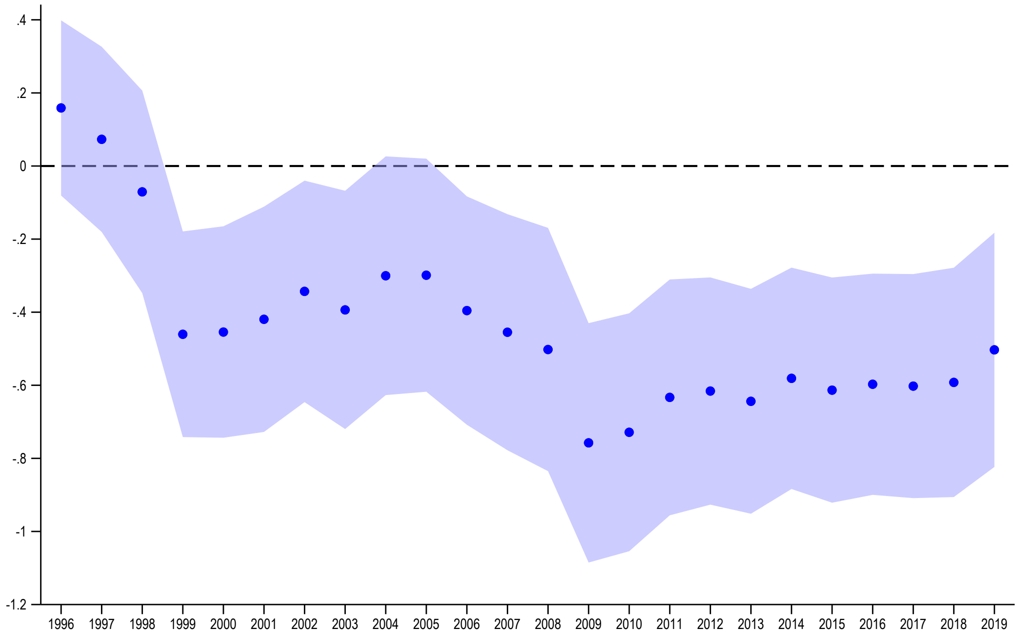
Authors' own elaboration based on specification 4 and estimates in column (6) in Table 3. Change in the border effect relative to the border effect in 1995.

Table 4: The Effects of CIT and Other determinants of Cross-border M&As, with OLS and log(No. M&As projects)

	Benchmark	Fixed Effects	Multilateral Resistance		Domestic M&As		
		Pair FEs	MRs	Tax MRs	Domestic	$X_{jt} \times INT$	Main
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CIT dest (%)	-0.004**	-0.002	-0.002	-0.001	-0.001	-0.003	
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.006)	
CIT dest (%) x INT						0.001	-0.006
						(0.006)	(0.006)
Distance (log)	-0.403***						
	(0.027)						
Contiguity	0.359***						
	(0.071)						
Language	0.420***						
	(0.058)						
Colonial ties	0.103						
	(0.089)						
RTA	-0.102**	-0.029	-0.026	-0.021	-0.012	-0.011	0.028
	(0.043)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.031)
BIT	-0.156***	-0.017	-0.023	-0.022	-0.028	-0.025	-0.019
	(0.034)	(0.032)	(0.033)	(0.032)	(0.032)	(0.032)	(0.034)
Diplomatic distance (log)	-0.252***	0.059	0.042	0.046	0.064	0.064	0.100**
	(0.057)	(0.047)	(0.047)	(0.047)	(0.048)	(0.047)	(0.050)
Any sanction	-0.189***	-0.149***	-0.145***	-0.144***	-0.147***	-0.146***	-0.113***
	(0.052)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.037)
GDP (log)	0.122***	0.064**	0.091***	0.094***	0.135***	0.636***	
	(0.031)	(0.030)	(0.031)	(0.031)	(0.033)	(0.160)	
GDP (log) x INT						-0.537***	-0.461***
						(0.163)	(0.150)
Labor force (log)	0.262***	0.078	0.108	0.150*	0.084	-0.499	
	(0.092)	(0.085)	(0.086)	(0.086)	(0.087)	(0.326)	
Labor force (log) x INT						0.620*	1.012***
						(0.335)	(0.368)
Unemployment rate	-0.002	-0.001	-0.001	-0.001	-0.001	-0.015	
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.010)	
Unemployment rate x INT						0.014	0.016*
						(0.010)	(0.010)
Inflation rate	0.000	0.000	0.000	0.000	0.000	-0.017***	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	
Inflation rate x INT						0.017***	0.013***
						(0.003)	(0.003)
Exchange rate (log)	0.011	0.011*	0.010	0.013*	0.012*	0.013**	
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	
Exchange rate (log) x INT						0.000	-0.063**
						(.)	(0.031)
Exports (%GDP)	0.003***	0.000	-0.000	-0.000	-0.000	0.000	
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	
Exports (%GDP) x INT						-0.000	0.001
						(0.003)	(0.003)
Eco. Freedom (log)	-0.202*	-0.197*	-0.171	-0.222*	-0.245**	-0.850	
	(0.116)	(0.112)	(0.112)	(0.113)	(0.113)	(0.542)	
Eco. Freedom (log) x INT						0.660	0.840
						(0.555)	(0.543)
MR			0.586***	0.608***	0.572***	0.450	
			(0.175)	(0.175)	(0.173)	(0.861)	
MR x INT						0.092	0.221
						(0.876)	(0.775)
MTR				0.518**	0.544***	0.889	
				(0.204)	(0.199)	(0.896)	
MTR x INT						-0.365	-0.452
						(0.916)	(0.934)
Observations	22707	21477	21477	21477	23211	23211	22728
Source-year	X	X	X	X	X	X	X
Destination	X						
Destination-year							X
Country Pair		X	X	X	X	X	X
International-year					X	X	X
Domestic M&As	No	No	No	No	Yes	Yes	Yes

Note: This table reports our OLS estimates of the impact of CIT on the log of M&As. The estimates in all columns are obtained with source time fixed effects. Column (2) introduces directional country-pair fixed effects. Columns (3) and (4) add proxies for the standard multilateral resistance and for the multilateral tax resistance, respectively. The results in column (5) are obtained with domestic M&As and we have added a full set of time-varying border indicators, whose estimates appear in Figure 4 in the appendix. Column (6) adds interactions between all country-specific variables in our model and a dummy variable for international borders. Finally, in column (7), we also introduce destination-time fixed effects. Standard errors clustered at the country pair. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See text for further details.

Figure 4: OLS estimate of the evolution of the border effect, 1995-2019



Authors' own elaboration based on specification 4 and estimates in column (5) in Table 4 in which the dependent variable is the log of the number of M&A projects and the OLS estimator is used. Change in the border effect is relative to the border effect in 1995.

Table 5: Gravity model with OLS and alternative transformations of the dependent variable, alternative standard error clustering and IPP bias correction

	(1) OLS log(proj.+1)	(2) IHS	(3) OLS level	(4) PPML no 0s	(5) Two way clustering	(6) Three way clustering	(7) IPP
CIT dest (%) x INT	0.003	-0.004	1.621	-0.006**	-0.008*	-0.008	-0.008***
	(0.006)	(0.004)	(1.657)	(0.003)	(0.005)	(0.006)	(0.003)
RTA	0.029**	0.034	0.673	0.094***	0.107***	0.107***	0.119***
	(0.012)	(0.032)	(0.586)	(0.037)	(0.036)	(0.032)	(0.030)
BIT	-0.016	0.090**	-0.453	-0.001	0.065	0.065	0.072
	(0.010)	(0.041)	(0.472)	(0.054)	(0.088)	(0.083)	(0.064)
Diplomatic distance (log)	0.067***	0.023	1.777	0.118***	0.124**	0.124**	0.119***
	(0.020)	(0.051)	(2.455)	(0.042)	(0.055)	(0.051)	(0.042)
Any sanction	-0.066***	-0.058*	0.960	-0.101***	-0.094*	-0.094*	-0.094***
	(0.017)	(0.034)	(1.830)	(0.029)	(0.051)	(0.050)	(0.036)
GDP (log) x INT	-0.724***	0.741***	-162.011	-0.268***	0.037	0.037	0.067
	(0.195)	(0.100)	(165.415)	(0.084)	(0.109)	(0.118)	(0.111)
Labor force (log) x INT	0.507	0.000	375.248*	1.777***	1.857***	1.857***	1.768***
	(0.321)	(.)	(196.140)	(0.253)	(0.349)	(0.408)	(0.263)
Unemployment rate x INT	0.014	-0.011	1.475	0.003	-0.001	-0.001	0.000
	(0.009)	(0.008)	(6.369)	(0.005)	(0.007)	(0.008)	(0.004)
Inflation rate x INT	0.006	-0.007*	-1.227	0.021***	0.006	0.006	0.006
	(0.003)	(0.003)	(1.814)	(0.003)	(0.005)	(0.006)	(0.004)
Exchange rate (log) x INT	-0.083**	-0.007	-0.878	0.030*	0.016	0.016	0.017
	(0.034)	(0.017)	(7.135)	(0.016)	(0.019)	(0.021)	(0.033)
Exports (%GDP) x INT	-0.001	0.010***	1.233*	-0.002	0.004	0.004	0.003***
	(0.003)	(0.002)	(0.726)	(0.002)	(0.002)	(0.002)	(0.002)
Eco. Freedom (log) x INT	0.568	-0.475	277.086	-0.766***	-0.651*	-0.651*	-0.713***
	(0.547)	(0.382)	(196.655)	(0.273)	(0.371)	(0.395)	(0.111)
MR x INT	-0.210	0.000	-262.229	0.798***	0.417	0.417	0.614***
	(0.813)	(.)	(437.632)	(0.228)	(0.542)	(0.572)	(0.297)
MTR x INT	-0.908	0.000	0.299	0.000	0.000	0.000	-0.279
	(0.683)	(.)	(255.430)	(.)	(.)	(.)	(1.061)
Observations	77084	77084	77084	22728	77084	77084	77084
Source-year	X	X	X	X	X	X	X
Destination-year	X	X	X	X	X	X	X
Country Pair	X	X	X	X	X	X	X
International-year	X	X	X	X	X	X	X
Domestic M&As	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table reports different sensitivity tests in our preferred specification (6). In columns (1), (2) and (3) the estimator is OLS, and the dependent variable is respectively the log of M&A projects plus one, the number of M&As after the IHS transformation, and the number of M&As projects. In column (4) the dependent variable is the number of M&As excluding 0s with the PPML estimator. In column (5) we cluster the standard errors by source and destination, and in column (6) we employ for the standard errors the three-way clustering by source, destination, and year. Column (7) presents the estimates after the IPP bias correction. With the exception of estimates in columns (5) and (6), the standard errors are clustered at the country pair. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See text for further details.

Table 6: Multilateral resistance term

	(1) MR	(2) MR & MTR	(3) Domestic	(4) $Xjt \times INT$	(5) Main
CIT dest (%)	-0.001	-0.001	0.000	0.004	
	(0.002)	(0.002)	(0.002)	(0.003)	
CIT dest (%) x INT				-0.006	-0.007**
				(0.004)	(0.003)
RTA	-0.020	-0.019	0.092**	0.061	0.100***
	(0.040)	(0.041)	(0.046)	(0.045)	(0.033)
BIT	0.057	0.080	0.132**	0.103*	0.052
	(0.060)	(0.063)	(0.057)	(0.062)	(0.056)
Diplomatic distance (log)	0.130***	0.128***	0.131**	0.124**	0.104**
	(0.048)	(0.048)	(0.064)	(0.062)	(0.043)
Any sanction	-0.159***	-0.156***	-0.150***	-0.145***	-0.094***
	(0.060)	(0.059)	(0.038)	(0.037)	(0.031)
GDP (log)	0.364***	0.376***	0.328***	0.199***	
	(0.054)	(0.054)	(0.043)	(0.070)	
GDP (log) x INT				0.191**	0.091
				(0.093)	(0.084)
Labor force (log)	0.451***	0.475***	0.113	-0.613***	
	(0.159)	(0.162)	(0.144)	(0.221)	
Labor force (log) x INT				1.066***	1.758***
				(0.288)	(0.264)
Unemployment rate	0.008*	0.008*	0.003	-0.004	
	(0.004)	(0.004)	(0.004)	(0.006)	
Unemployment rate x INT				0.010	0.001
				(0.007)	(0.006)
Inflation rate	-0.000	-0.000	-0.001	-0.022***	
	(0.001)	(0.001)	(0.001)	(0.003)	
Inflation rate x INT				0.021***	0.005
				(0.003)	(0.003)
Exchange rate (log)	-0.004	-0.006	-0.007	-0.008	
	(0.011)	(0.011)	(0.014)	(0.014)	
Exchange rate (log) x INT				0.000	0.018
				(.)	(0.016)
Exports (%GDP)	0.007***	0.007***	0.006***	0.005**	
	(0.001)	(0.001)	(0.001)	(0.002)	
Exports (%GDP) x INT				0.001	0.003*
				(0.002)	(0.002)
Eco. Freedom (log)	0.006	0.035	0.088	0.482	
	(0.149)	(0.148)	(0.164)	(0.353)	
Eco. Freedom (log) x INT				-0.501	-0.673**
				(0.415)	(0.284)
Dest MR, w. GDP	0.240***	0.340***	0.108	-0.032	
	(0.090)	(0.119)	(0.108)	(0.183)	
Dest MR, w. GDP x INT				0.313	0.480***
				(0.228)	(0.172)
Dest MTR, w. tax		-0.244	-0.154	-0.194	
		(0.178)	(0.146)	(0.236)	
Dest MTR, w. tax x INT				-0.039	-0.253
				(0.308)	(0.211)
Observations	75374	75374	77084	77084	77084
Source-year	X	X	X	X	X
Destination-year					X
Pair	X	X	X	X	X
International-year			X	X	X
Domestic M&As	No	No	Yes	Yes	Yes

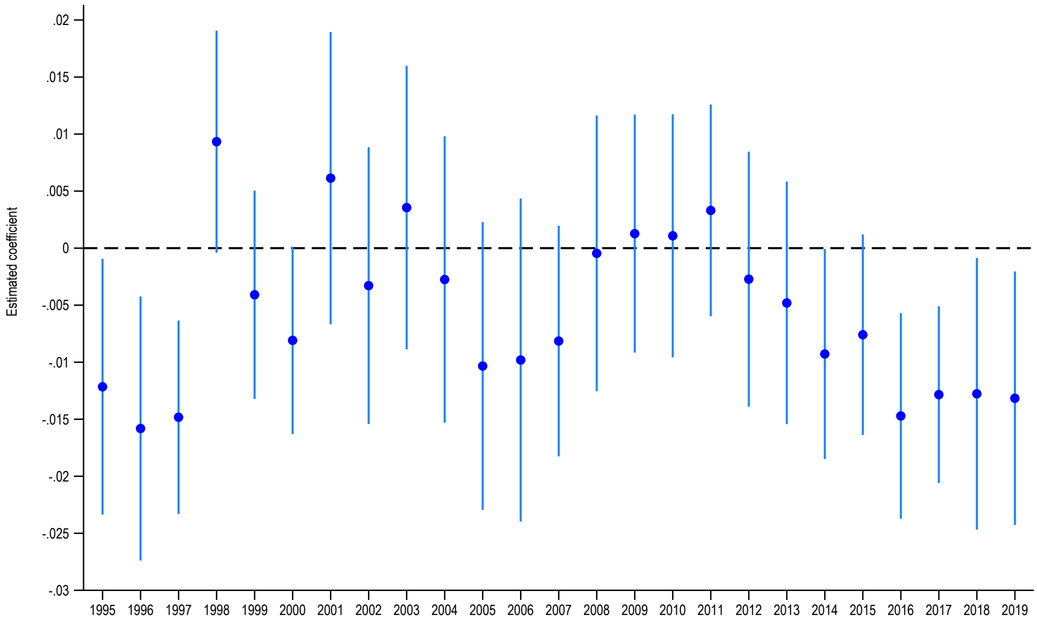
Note: This table reproduces estimates present in columns (4) to (8) in Table 3 with the MR and the MTR calculated differently. Both are calculated as weighted averages (using GDP and CIT rates, respectively) of the estimates of geographic distance, contiguity, common language, colonial ties, RTA, BIT, diplomatic distance and sanctions. Standard errors are clustered at the country pair. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See text for further details.

Table 7: With source country variables

	(1) Benchmark ols	(2) PPML	(3) PPML pair FE	(4) MR	(5) MTR	(6) Domestic
CIT dest (%)	-0.003*	-0.001	-0.001	-0.001	-0.001	-0.005
	(0.002)	(0.004)	(0.003)	(0.003)	(0.003)	(0.007)
Distance (log)	-0.382***	-0.738***				
	(0.026)	(0.049)				
Contiguity	0.360***	0.148				
	(0.068)	(0.093)				
Language	0.401***	0.728***				
	(0.056)	(0.074)				
Colonial ties	0.096	0.182**				
	(0.087)	(0.075)				
RTA	-0.085**	-0.209***	0.108*	0.122**	0.130**	0.137**
	(0.040)	(0.071)	(0.057)	(0.056)	(0.053)	(0.065)
BIT	-0.163***	-0.042	0.227***	0.218***	0.218***	0.283***
	(0.032)	(0.091)	(0.058)	(0.058)	(0.058)	(0.065)
Diplomatic distance (log)	-0.252***	-0.494***	0.132**	0.146**	0.140**	0.082
	(0.053)	(0.067)	(0.067)	(0.068)	(0.067)	(0.086)
Any sanction	-0.170***	-0.066	-0.100**	-0.095**	-0.094**	-0.097**
	(0.044)	(0.059)	(0.040)	(0.040)	(0.041)	(0.043)
GDP scr (log)	0.142	0.737***	0.671***	0.679***	0.682***	-0.628
	(0.089)	(0.233)	(0.230)	(0.230)	(0.231)	(0.432)
GDP pc scr (log)	0.061	-0.146	-0.115	-0.106	-0.108	1.323***
	(0.099)	(0.233)	(0.236)	(0.236)	(0.237)	(0.481)
GDP (log)	0.098***	0.452***	0.398***	0.442***	0.445***	0.361**
	(0.034)	(0.092)	(0.084)	(0.087)	(0.088)	(0.155)
Labor force (log)	0.222**	0.417*	0.198	0.247	0.294	-0.822
	(0.095)	(0.241)	(0.238)	(0.240)	(0.231)	(0.656)
Unemployment rate	-0.002	0.003	0.006	0.005	0.006	-0.009
	(0.003)	(0.005)	(0.005)	(0.005)	(0.005)	(0.010)
Inflation rate	0.000	-0.001	-0.001	-0.001	-0.001	-0.005
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)
Exchange rate (log)	0.008	-0.002	-0.005	-0.006	-0.003	-0.005
	(0.007)	(0.013)	(0.012)	(0.012)	(0.013)	(0.018)
Exports (%GDP)	0.002**	0.009***	0.007***	0.006***	0.006***	0.009**
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)
Eco. Freedom (log)	-0.190*	-0.339	-0.306	-0.279	-0.312	-0.562
	(0.114)	(0.272)	(0.240)	(0.241)	(0.246)	(0.549)
MR				0.841***	0.893***	-0.875
				(0.307)	(0.310)	(0.936)
MTR					0.419	-1.314
					(0.487)	(1.391)
Observations	22701	75311	75267	75267	75267	76977
Source	X	X				
Destination	X	X				
Country Pair			X	X	X	X
Year	X	X	X	X	X	X
International-year						X
Domestic M&As	No	No	No	No	No	Yes

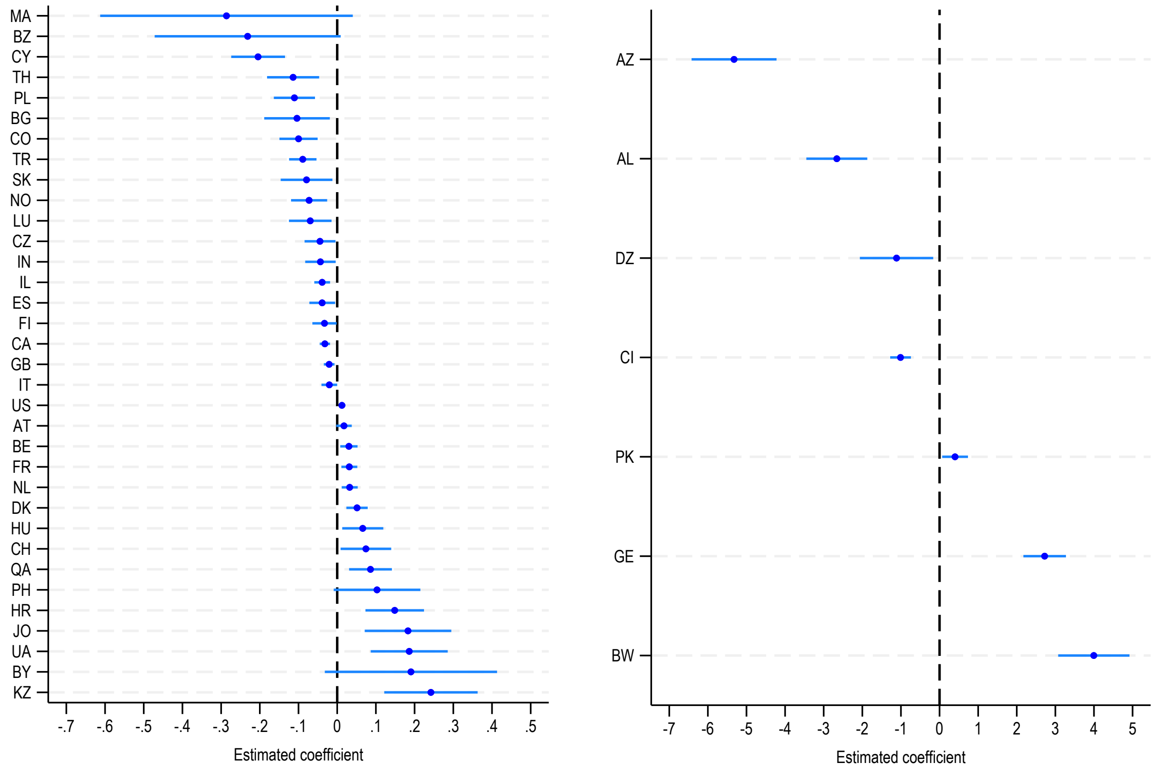
Note: This table reproduces estimates present in columns (1) to (6) of Table 3. Source-year fixed effects are replaced with GDP and GDP per capita in the source country. Standard errors are clustered at the country pair. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See text for further details.

Figure 5: Evolution of the effect of CIT



Authors' own elaboration based on yearly estimates of the effect of CIT on cross-border M&As relative to domestic M&As with 95% confidence interval.

Figure 6: Country specific estimates on the impact of CIT on M&As



(a) (b)

Authors' own elaboration based on country level estimates of the effect of CIT on cross-border M&As relative to domestic M&As with 95% confidence interval. Only statistically significant coefficients are reported.

Table 8: CIT impact on bilateral M&As

	(1) Income level	(2) CIT level	(3) Tax havens	(4) Tax system
CIT dest (%) x INT	-0.007**	-0.008**	-0.007**	-0.006
	(0.003)	(0.003)	(0.003)	(0.004)
x High to low-middle	-0.019***			
	(0.006)			
x Low-middle to High	0.007			
	(0.004)			
x Low-middle to low-middle	-0.010**			
	(0.004)			
High tax to low tax		-0.001		
		(0.003)		
Low tax to high tax		0.000		
		(0.002)		
Low tax to low tax		0.001		
		(0.001)		
x No tx hv to Tx. Hv.			-0.008	
			(0.013)	
x Tx. Hv. to no Tx. Hv.			0.003	
			(0.005)	
x Tx. Hv. to Tx. Hv.			-0.053*	
			(0.032)	
x Territ. Tx. Sys. to World Tx. Sys.				-0.000
				(0.002)
x World Tx. Sys. to Territ. Tx. Sys.				0.000
				(0.002)
x World Tx. Sys. to World Tx. Sys.				-0.002
				(0.001)
Observations	77084	77084	77084	77084
Source-year	X	X	X	X
Destination-year	X	X	X	X
Country Pair	X	X	X	X
International-year	X	X	X	X
Domestic M&As	Yes	Yes	Yes	Yes

Note: This table reports different applications tested at the country level using our preferred specification (6) adapted to each case. To conserve space, we only report CIT estimates. In Column (1) we report the estimates of CIT interacted with a set of indicator variables which take the value of one when investment is (1) from high income countries to low or middle income countries, (2) from low or middle income countries to high income countries, and (3) between low or middle income countries. Accordingly, the baseline effect is the effect of CIT rates on M&As between high income countries. Column (2) reports a similar test in which countries are grouped according to whether their CIT is lower than the median worldwide rate in each year. In this case, the set of indicator variables take the value of one when M&As are (1) from high tax to low tax countries, (2) from low tax to high tax countries, or (3) between low tax countries. In this case, the base group includes countries with high CIT (only). Column (3) distinguishes the effect of CIT depending on whether the source or destination country is a tax haven. The CIT variable is interacted with an indicator variable for investments (1) from non-tax havens to tax havens, (2) from tax havens to non-tax havens, and (3) between tax havens. The base group captures investments between non-tax haven countries. Column (4) gauges the effect of CIT depending on the tax system in the source and destination country. The CIT variable is interacted with indicator variables for acquisitions between countries (1) with territorial and worldwide tax systems, (2) with worldwide and territorial tax systems, and (3) between countries that each have worldwide tax systems. The base group captures investments between countries that each have territorial tax systems. Standard errors are clustered at the country pair. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See text for further details.

Table 9: The effect of CIT rates on M&A deal volume at the sectoral level, large sectors

	(1) Domestic	(2) Main	(3) Horizontal	(4) Sectoral level effect
CIT dest (%)	0.006***			
	(0.002)			
CIT dest (%) x INT	-0.007***	-0.007***	-0.009***	-0.010***
	(0.002)	(0.002)	(0.002)	(0.003)
x Horizontal			0.004***	
			(0.002)	
x Primary sector				-0.026*
				(0.015)
x Mining and quarrying				0.013
				(0.009)
x Manufacturing				0.004
				(0.003)
x Utilities				0.009
				(0.010)
x Construction				0.002
				(0.009)
RTA	0.062**	0.103***	0.103***	0.103***
	(0.026)	(0.028)	(0.028)	(0.028)
BIT	0.054	0.104***	0.104***	0.105***
	(0.039)	(0.040)	(0.040)	(0.040)
Diplomatic distance (log)	0.133***	0.089**	0.089**	0.089**
	(0.038)	(0.039)	(0.039)	(0.039)
Any sanction	-0.139***	-0.069***	-0.069***	-0.069***
	(0.018)	(0.021)	(0.021)	(0.021)
GDP (log)	0.162***			
	(0.040)			
GDP (log) x INT	0.043	0.042	0.041	0.042
	(0.048)	(0.051)	(0.051)	(0.051)
Labor force (log)	-0.597***			
	(0.164)			
Labor force (log) x INT	1.131***	1.964***	1.961***	1.964***
	(0.186)	(0.193)	(0.193)	(0.193)
Unemployment rate	0.000			
	(0.003)			
Unemployment rate x INT	0.009**	-0.001	-0.001	-0.001
	(0.004)	(0.004)	(0.004)	(0.004)
Inflation rate	-0.013***			
	(0.003)			
Inflation rate x INT	0.013***	0.003	0.003	0.003
	(0.003)	(0.003)	(0.003)	(0.003)
Exchange rate (log)	-0.011*			
	(0.006)			
Exchange rate (log) x INT	0.000	-0.001	-0.001	-0.001
	(.)	(0.013)	(0.013)	(0.013)
Exports (%GDP)	0.002			
	(0.001)			
Exports (%GDP) x INT	-0.000	0.005***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
Eco. Freedom (log)	0.169			
	(0.182)			
Eco. Freedom (log) x INT	-0.211	-0.448**	-0.445**	-0.437*
	(0.212)	(0.225)	(0.225)	(0.225)
MR	0.929***			
	(0.174)			
MR x INT	0.170	0.421*	0.423*	0.425*
	(0.219)	(0.239)	(0.239)	(0.240)
MTR	1.070***			
	(0.293)			
MTR x INT	-0.557*	-0.854**	-0.850**	-0.855**
	(0.326)	(0.332)	(0.332)	(0.332)
Observations	1901819	1901819	1901819	1901819
Source-sector-year	X	X	X	X
Destination-sector-year	X	X	X	X
Pair-country-sector	X	X	X	X
International-year	X	X	X	X
Domestic M&As	Yes	Yes	Yes	Yes

Note: This table reports the estimates of specification (8) Standard errors clustered at the country and sector pair. Pair fixed effects are specified at the sectoral level (i.e., Source × Acquirer Sector × Destination × Target Sector).
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

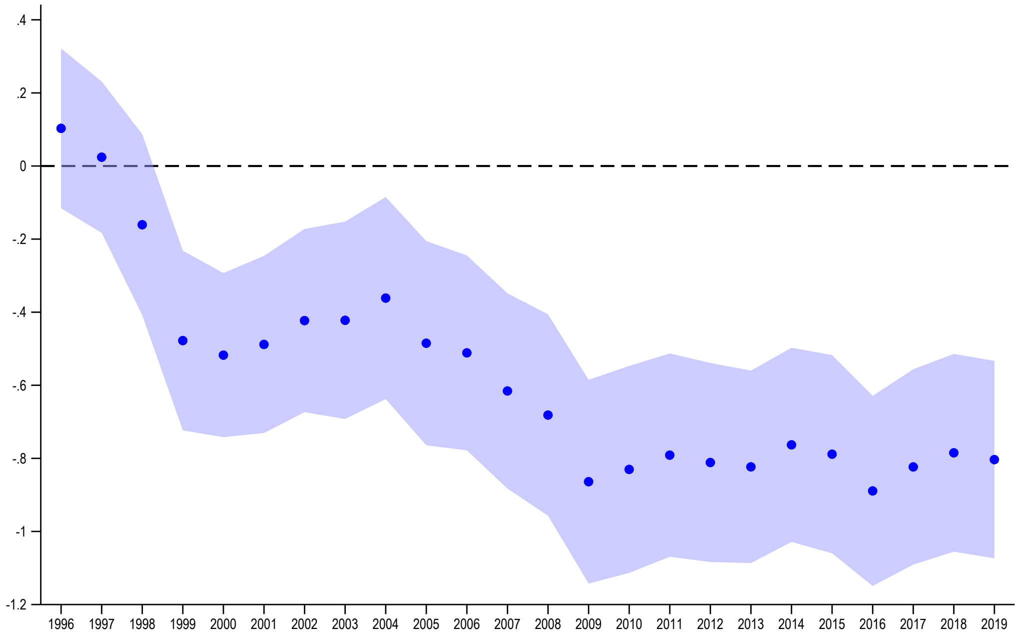
A Appendix

Table A.1: Country sample

Albania	Denmark	Latvia	Samoa
Algeria	Dominican Republic	Lebanon	Saudi Arabia
Angola	Ecuador	Libya	*Seychelles*
Argentina	Egypt	Luxembourg	Singapore
Armenia	El Salvador	**Madagascar**	Slovakia
Australia	Estonia	Malaysia	Slovenia
Austria	**Eswatini**	Malta	South Africa
Azerbaijan	**Ethiopia**	Mauritius	*South Korea*
Bahamas	Finland	Mexico	Spain
Bahrain	France	Moldova	Sri Lanka
Bangladesh	Georgia	Mongolia	*Swaziland*
Barbados	Germany	Morocco	Sweden
Belarus	Ghana	**Mozambique**	Switzerland
Belgium	Greece	Namibia	**Tajikistan**
Belize	Guatemala	Netherlands	Tanzania
Bolivia	Hungary	New Zealand	Thailand
Bosnia and Herzegovina	Iceland	Nicaragua	*Trinidad and Tobago*
Botswana	India	Nigeria	Tunisia
Brazil	Indonesia	**North Macedonia**	Turkey
Brunei Darussalam	Iran	Norway	Uganda
Bulgaria	*Iraq*	Oman	Ukraine
Burkina Faso	Ireland	Pakistan	United Arab Emirates
Cambodia	Israel	Panama	United Kingdom
Canada	Italy	Papua New Guinea	United States
Chad	Jamaica	Paraguay	Uruguay
Chile	Japan	Peru	**Uzbekistan**
China	Jordan	Philippines	Venezuela, RB
Colombia	Kazakhstan	Poland	Vietnam
Costa Rica	Kenya	Portugal	Zambia
Cote d'Ivoire	**Korea, Rep.**	Qatar	*Zimbabwe*
Croatia	Kuwait	Romania	
Cyprus	Kyrgyzstan	Russia	
Czechia	**Lao PDR**	**Rwanda**	

Note: Countries present in the sample of analysis. The countries in italics are the ones that are only present as a source country, and countries in bold are the ones that are only present as a destination country.

Figure A.1: Evolution of the border effect, 1995-2019



Authors' own elaboration based on specification 4 and estimates in column (5) in Table 4 in which the dependent variable is the log of the number of M&A projects and the OLS estimator is used. Change in the border effect is relative to the border effect in 1995.