Taxing Away M&A:
The Effect of Corporate Capital Gains
Taxes on Acquisition Activity

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Abstract

Taxing capital gains is an important obstacle to the efficient allocation of resources because it imposes a transaction cost on the vendor which locks in appreciated assets by raising the vendor's reservation price in prospective transactions. For M&As, this effect has been intensively studied with regard to shareholder taxation, whereas empirical evidence on the effect of capital gains taxes paid by corporations is scarce. This paper analyzes how corporate level taxation of capital gains affects inter-corporate M&As. Studying several substantial tax reforms in a panel of 30 countries for the period of 2002-2013, we identify a significant lock-in effect. Results from estimating a Poisson pseudo-maximum-likelihood (PPML) model suggest that a one percentage point decrease in the corporate capital gains tax rate would raise both the number and the total deal value of acquisitions by about 1.1% per year. We use this result to estimate an efficiency loss resulting from corporate capital gains taxation of 3.06 bn USD per year in the United States.

1 Introduction

Capital gains taxation has long been identified as a potential obstacle for the efficient allocation of capital (e.g. Feldstein & Yitzhaki, 1978). Being generally paid upon realization, capital gains taxes impose payments on vendors of stock which these could have deferred otherwise. The resulting lock-in effect raises the vendor's reservation price and makes a sale less attractive (e.g. Holt & Shelton, 1962; Landsman & Shackelford, 1995). These considerations have direct implications for corporate acquisition activity. Capital gains taxation reduces the net gain of an acquisition deal from the perspective of the vendor firm by triggering a high tax liability on accrued capital gains that have been retained in the target firm. To compensate for this, the vendor demands a higher price and, as a consequence, the deal becomes less attractive and may even fail.

Despite the potentially high relevance of the lock-in effect, the empirical literature has, to a large extent, ignored the impact on acquisition activity of capital gains taxes paid by corporations. In this paper we close this gap by providing empirical evidence on how capital gains taxation on the corporate level affects the number and volume of inter-corporate mergers and acquisitions (M&As). An important aspect of estimating the quantity rather than a price effect of capital gains taxation is that we can relate the former to observed synergy gains from M&As and determine the potential of corporate tax reforms to be efficiency enhancing in the market for corporate control. Previous studies have pointed to increased productivity (Devos *et al.*, 2009), knowledge spillovers (Bresman *et al.*, 1999; Bena & Li, 2014) as well as increased management efficiency (Manne, 1965; Wang & Xie, 2009) and discipline (Scharfstein, 1988; Sapra *et al.*, 2014) as important sources of gains that result directly from M&A deals.

The eminent literature has frequently focused on the price effect of capital gains taxes to provide evidence for a lock-in effect of individual shareholder taxation. Landsman & Shackelford (1995) use individual shareholder records from the 1989 RJR Nabisco leveraged buyout to show that shareholders with a higher capital gains tax payment demand higher compensation. Dai *et al.* (2008) disentangle the lock-in and the capitalization effect of capital gains taxes on US stock prices. With regard to M&As, Ayers *et al.* (2003) employ firm-level variation in capital gains tax payments resulting from M&A deals on American stock exchanges and control for institutional ownership to estimate a significantly positive effect of capital gains taxes on acquisition premia. They also find that increasing capital gains tax rates on the shareholder level deplete acquisition activity on the US stock exchange (Ayers *et al.*, 2007).

Most of these studies identify the lock-in effect by exploiting variation at the firm

level.[1] This approach is infeasible when analyzing the quantity effect. Instead, internal validity has to be established by panel estimation methods. In our analysis we rely on several exogenous tax reforms at different points in time which provides a feasible way of identifying a causal relationship. We further exploit that these reforms did not affect M&A deals where the decisive shareholder was not incorporated and utilize these deals as a control group in additional estimations. Our estimations use the Poisson pseudo-maximum-likelihood (PPML) estimator that is particularly suited for our count data sample and also allows us to include fixed effects.

Our empirical results suggest that a one percentage point decrease in the tax rate for the sale of substantial corporate shareholdings raises the number of deals by 1.1% per year. The same result is obtained when measuring acquisition activity in terms of total deal volume. We therefore provide evidence of a significantly negative effect of capital gains taxes on corporate acquisitions which is robust to a range of model specifications. The causal relationship underlying our result is further verified when using deals with unincorporated vendors as a control group. We show that corporate capital gains tax reforms exclusively affect inter-corporate acquisition deals suggesting that our results are unlikely to be driven by confounding variables. Relating our main coefficient estimate to observed synergy gains from M&A deals we estimate the efficiency loss in the market for corporate control resulting from corporate capital gains taxation to amount to 3.06 bn USD per year in the United States.

The paper is structured as follows. In Section 2 we present a simple model to analyze the lock-in effect in the case of inter-corporate acquisitions. Section 3 describes tax and acquisition data and provides the econometric approach. We describe the results in Section 4 and conclude in Section 5.

2   The Lock-in Effect for Corporate Acquisitions

The following model serves to clarify the relationship between capital gains tax rates and inter-corporate acquisition activity via the lock-in effect on the vendor's reservation price.[2] We consider an acquisition deal where some vendor firm owns a target firm and is offered the possibility to sell it to an acquiring firm. To simplify the exposition, we consider all participating entities to be incorporated.

Assume that the vendor company holds shares in the target with a discounted after-tax cash flow per share of $\left(1 - \tau^V\right) D$. τ^V is the effective tax rate from the vendor perspective. If the vendor company sells the target, it receives a deal price of P^S per share. For simplicity, we assume that the vendor bought the target firm at

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[1] The exception in this regard is Ayers *et al.* (2007) who use time-series data for the Unites States.

[2] The setup of the model follows classic approaches to modeling M&A taxation such as the one used in Becker & Fuest (2011).

zero cost, such that P^S is identical to the capital gain per share realized through the deal and taxed at the capital gains tax rate τ^{CG}. The vendor company accepts the deal if the net revenue allows it to buy assets that provide an after-tax cash flow that is larger or equal to the one received from the target such that P^S must satisfy

$$\left(1 - \tau^{CG}\right) P^S \geq \left(1 - \tau^V\right) D.$$

An implicit assumption underlying this condition is that the vendor reinvests the revenue from selling the target into an asset which generates an identical after-tax cash flow which is equivalent to assuming perfect capital markets. Though of simplifying nature, this assumption allows us to isolate the lock-in effect. Assuming a reinvestment in shares, we abstract from any mode of payment effect that occurs if the deal triggers a change in the cash flow received by the vendor which could potentially be related to a difference in tax treatment (e.g. Ohrn & Seegert, 2015). Then, the vendor's reservation price is given by

$$P^S \geq P_V^{Res} = \frac{1 - \tau^V}{1 - \tau^{CG}} D. \tag{1}$$

P_V^{Res} is equal to the expected after-tax cash flows if and only if $\tau^{CG} = 0$. A positive capital gains tax rate raises the reservation price above the value of the after-tax cash flow of the target. More generally, the capital gains tax imposes an additional tax burden on the act of selling the target which *ceteris paribus* makes the deal less attractive from the vendor perspective.

Turning to the acquiring company, we assume that it is able to increase the discounted cash flow from the target by Δ (e.g. through better management or advanced technology). The after-tax return per share of the target from the acquirer's perspective is then given by $\left(1 - \tau^A\right)\left(D + \Delta\right)$ where τ^A is defined as the effective tax rate faced by the acquiring firm. τ^A comprises profit taxes but also the potential deduction of financing costs and taxation arising from the repatriation of profits in the case of a cross-border deal. The acquisition is financed by a reduction of credit market investment or an increase in borrowing. Then, the acquirer's reservation price is given by

$$P^S \leq P_A^{Res} = \left(1 - \tau^A\right)\left(D + \Delta\right). \tag{2}$$

For simplicity, we assume that any deal that generates a positive net gain is completed.[3] More specifically, we assume that acquirer and vendor firm are able to ne-

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[3] A large strand of literature has analyzed how this gain is divided between the deal participants (e.g. Bradley *et al.*, 1988), also referring specifically to the incidence of capital gains taxation (e.g. Huizinga *et al.*, 2012). However, we do not model this process in detail since we are solely interested in whether or not the deal is eventually completed in order to derive the impact of capital gains

gotiate a price that allows them to somehow share the resulting gain and make the deal beneficial for both companies. The deal is therefore completed if and only if $P_V^{Res} \leq P_A^{Res}$ from which we can derive the cutoff level of synergy $\tilde{\Delta}$ above which the deal is always completed

$$P_V^{Res} \leq P_A^{Res} \Longleftrightarrow \frac{1-\tau^V}{1-\tau^{CG}} D \leq \left(1-\tau^A\right)(D+\Delta)$$
$$\Longleftrightarrow \Delta \geq \tilde{\Delta} = \left(\frac{\phi}{1-\tau^{CG}} - 1\right) D, \phi = \frac{1-\tau^V}{1-\tau^A}. \tag{3}$$

For the moment, let us ignore the differences in effective taxation between the acquirer and the vendor (i.e. $\tau^A = \tau^V$) so that $\phi = 1$. It is apparent from (3) that without capital gains taxation we have $\tilde{\Delta} = 0$ so that all acquisitions with a positive economic gain are completed. In contrast, a positive capital gains tax rate requires higher synergy gains to compensate for the tax payment resulting directly from the deal.

In the market for corporate control, there is a finite number of possible targets with synergy gains continuously distributed on the interval $\Delta \in (\underline{\Delta}, \bar{\Delta})$, a cumulative distribution function F and a corresponding probability function f. Under the assumption that $\tilde{\Delta}$ is interior, all deals with $\Delta \geq \tilde{\Delta}$ are completed. We can thus define the number of deals as

$$n = \int_{\tilde{\Delta}}^{\bar{\Delta}} \Delta' d\Delta = 1 - F\left(\tilde{\Delta}\right).$$

As long as F is continuously differentiable and strictly increasing, we have

$$n = n\left(\tau^{CG}, \cdot\right), \frac{\partial n\left(\tau^{CG}, \cdot\right)}{\partial \tau^{CG}} = -f\left(\tilde{\Delta}\right) \frac{\partial \tilde{\Delta}}{\partial \tau^{CG}} < 0 \tag{4}$$

so that an increase in the capital gains tax rate decreases the number of acquisitions. This is commonly referred to as the lock-in effect of capital gains taxation on market activity (e.g. Feldstein & Yitzhaki, 1978). Intuitively, the capital gains tax imposes a transaction cost that reduces the net gain resulting from the inter-corporate acquisition deal.

In our exposition above we have defined n as the number of completed deals. It is, however, straightforward to reformulate the model such that n represents the total volume of all completed deals. As the economic impact of M&As may well depend on the actual size of the deals rather than the absolute number, we measure acquisition activity both as the number and the total volume of deals in our empirical estimation.

taxation on aggregate acquisition activity.

3 Empirical Approach

3.1 Capital Gains Taxation of Corporations

Corporate capital gains are usually taxed proportionally to the general corporate tax rate. Regarding capital gains realized through the sale of shares, the majority of countries tax cash payments and allow for deferral in the case of stock-for-stock deals. In the following analysis we focus on M&A deals that involve some sort of cash payments for two reasons. First, even though there often exists a preferential tax treatment of stock-for-stock deals, the large majority of acquisitions is still paid in cash, mostly for non-tax reasons (see Erickson, 1998), and taxes are probably relevant for the choice of payment only at the margin (Ayers *et al.*, 2004). Second, if lowering capital gains taxes unlocks corporate equity, firms are likely to prefer cash payments because exchanging stock does not allow for immediate reinvestment.

The applicable tax rate differs substantially between countries. Some apply the full corporate tax rate (e.g. Australia, Japan, United States) whereas others allow for partial exemption (e.g. Canada, Portugal) or fully exempt capital gains from taxation (e.g. New Zealand). Many countries provide for a preferential treatment in the form of full exemption for gains realized from substantial holdings (e.g. Netherlands, Ireland) which is particularly relevant for firms holding controlling majorities in other companies. A small number of countries also exempts acquisitions executed on the stock market from taxation (e.g. Malta, Cyprus).

In our empirical estimation we use the tax rate applicable to capital gains that are realized by corporations when selling shares in substantial holdings not listed on the stock market to proxy for the taxation of corporate capital gains. We collect the tax rate for 30 countries listed in Table 2 below where we also present the applicable tax rate in 2013. Since 2002, a significant number of European countries has cut corporate capital gains taxes for substantial holdings. Table 1 provides an overview of these tax reforms. Besides the United Kingdom and Germany, who abolished capital gains taxation for corporations in 2002, the group of reforming countries includes Italy and France as well as several Scandinavian countries.

The reforms occurred in different points in time and the resulting tax cuts differed substantially across reform countries and even more so when compared to non-reform countries where corporate capital gains tax rates sometimes decreased in the course of general corporate tax reductions. Figure 1 displays the changes in corporate capital gains tax rates for all countries in our sample. It becomes apparent that the decrease in capital gains tax strongly exceeds the corporate tax reduction in the reform countries, particularly in those that have introduced a full exemption. Thus, even if controlling for general corporate tax changes, we employ a rich variation in the tax rates to

Table 1: Corporate Capital Gains Tax Reforms

This table summarizes the corporate capital gains tax reforms in our sample. Germany: From 2004 onward, 5% of the gains is added back to the taxable income representing non-deductible business expenses. Sweden: Excluding non-substantial holdings on the stock market. Italy: 95% exemption from 2008 onward. France: 95% exemption for substantial holdings from 2007 onward. Iceland: Restricted to substantial holdings from 2011 onward. Source: IBFD.

	Implementation	Type
Germany	2002	General exemption
Portugal	2002	50% exemption for substantial holdings
United Kingdom	2002	Exemption for substantial holdings
Sweden	2003	General exemption
Italy	2004	91% exemption
Ireland	2004	Exemption for substantial holdings
Finland	2004	Exemption for substantial holdings
Slovenia	2007	50% Exemption for substantial holdings
Norway	2004	Exemption for substantial holdings
France	2006	Reduction of tax rate from 19% to 8%
Turkey	2006	Introduction
Iceland	2009	General Exemption

estimate the effect of capital gains taxation on corporate acquisition activity.

3.2 Aggregate M&A Activity

Data on corporate acquisitions is obtained from the Zephyr database provided by Bureau van Dijk. An important advantage of Zephyr which is relevant for the purposes of this analysis is that it contains detailed vendor characteristics for each deal. Such information is critical to identify the deals associated with corporate capital gains tax payments and to exclude deals with individual shareholders as vendors.[4]

In the analysis, we consider cash paid acquisitions of shares in the period 2002-2013 where a corporation sells one of its domestic affiliates.[5] We use the vendor's legal form and name to establish whether the vendor entity is liable for corporation tax according to the regulations of the country it is registered in.[6] The majority of deals

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[4]Moreover, as pointed out by Erel *et al.* (2015), Zephyr's coverage of acquisitions outside the stock market is superior to alternative databases. This is convenient as, for reasons explained below, we expect acquisitions of non-listed targets to be particularly affected by corporate capital gains taxes.

[5]We do not consider vendors selling their holdings in foreign firms since these deals are taxed differently in some countries (e.g. Australia). In a robustness check we also include deals where vendor and target reside in different countries and obtain qualitatively similar results.

[6]For some deals no vendor information is available. It is reasonable to assume that in this case the vendors comprise mainly individual shareholders and we therefore exclude these deals.

Figure 1: Tax Rate Changes

This figure displays the cumulated tax rate changes in the sample period. Changes in the corporate capital gains tax rate refer to changes in the rate charged on capital gains realized by corporations when selling shares in substantial holdings not listed on the stock market. Changes in the corporate tax rate refer to changes in the standard rate on corporate profits.
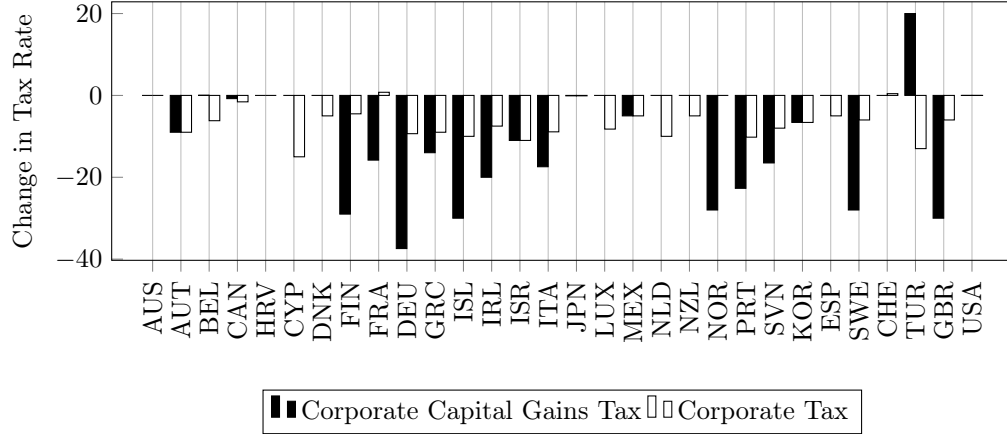
in our sample (>95%) involve an unlisted target. In the rare case where the target is listed, various mechanisms that cannot be controlled for in an aggregated panel may affect the deal completion (see Faccio *et al.*, 2006; Officer, 2007) and these deals are therefore not included in the analysis.[7] The number and total value of deals is aggregated by country and year according to the residence of the selling firm and the completion date of each deal. Using the completion date avoids a bias of our estimate caused by timing issues in case corporations anticipate tax changes and announce deals in advance. Where the completion date is not available in Zephyr, we compute it by taking the median number of days between announcement and completion across the deals with available data in the same year and country and adding this duration to the announcement date provided.[8]

Table 2 provides an overview of the deals included in our estimation. It reports the number and volume of deals by residence country of the vendor company. In total, we consider 30,545 acquisitions with a combined volume of 1,106.08 bn USD. In most of these deals, the vendor resided in one of the largest economies (i.e. United States, the United Kingdom, Japan and Germany) but the completion of deals is also substantial in number and volume in several smaller countries such as Finland and Sweden, where corporate capital gains tax reforms may have affected acquisition activity.

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[7]To ensure robustness, we re-estimated our model including listed targets and obtain similar results.

[8]We conduct a robustness check by computing the time between announcement and completion using nearest neighbor matching. In particular, we take the power-distance weighted average over the five closest deals regarding announcement within the same country. Results are displayed in Table A.2.

Table 2: Corporate M&As, 2002-2013

This table presents the number and volume of deals with cash payment and corporate vendors per country from 2002-2013 as recorded in the Zephyr database. Listed targets and targets not residing in the country of the vendor are excluded. The deals are assigned to the country of residence of the vendor company. Deal volume is the sum of reported deal values. Data is trimmed at the 1st and 99th percentile according to deal value.

	Number of deals	Deal volume in bn USD	Corporate capital gains tax rate, 2013
Australia	1,056	44.95	30.00
Austria	330	7.17	25.00
Belgium	486	10.80	0.04
Canada	753	30.20	20.27
Croatia	69	0.32	20.00
Cyprus	56	3.08	20.00
Denmark	765	17.34	0.00
Finland	1,169	8.74	0.00
France	1,744	60.54	4.33
Germany	2,359	65.74	1.48
Greece	168	3.72	26.00
Iceland	46	0.71	0.00
Ireland	123	7.07	0.00
Israel	114	4.85	25.00
Italy	1,208	62.90	1.57
Japan	2,263	40.24	42.00
Luxembourg	32	2.70	0.00
Mexico	63	6.27	30.00
Netherlands	1,744	40.75	0.00
New Zealand	180	4.80	0.00
Norway	901	17.49	0.00
Portugal	218	10.91	12.50
Slovenia	50	0.78	8.50
South Korea	238	16.05	24.20
Spain	1,277	46.81	0.00
Sweden	1,550	24.36	0.00
Switzerland	665	12.02	0.00
Turkey	266	22.98	20.00
United Kingdom	4,617	172.19	0.00
United States	6,035	359.58	39.28
Total	30,545	1,106.08	

3.3 Estimation

In our empirical analysis, we estimate a reduced form of expression (4). We model the number and volume of acquisitions as a non-linear function of the corporate capital gains tax rate and a range of control variables:

$$n_{it} = \exp\left(\gamma \tau_{it}^{CG} + \boldsymbol{\beta} \boldsymbol{X}_{it} + \phi_i + \phi_t\right) + \epsilon_{it} \tag{5}$$

where n_{it} denotes the number or total value of acquisitions, τ_{it}^{CG} is the corporate capital gains tax rate, $\boldsymbol{X}_{it}$ denotes a vector of control variables and ϕ_i and ϕ_t are country- and year-fixed effects, respectively. The model is estimated using the Poisson pseudo-maximum-likelihood (PPML) estimator. Besides being widely used in the analysis of count data, Silva & Tenreyro (2011) have shown that PPML is also well suited for (but not restricted to) analyzing data with a substantial number of zeros. The PPML specification includes time and country fixed effects to account for time trends and unobserved variables that are constant over time but differ across countries.[9]

As we have noted above, the corporate capital gains tax rate is usually closely linked to the standard tax rate (CT) for corporations. We thus also include the latter in the estimation to capture any changes in acquisition activity related to corporate tax changes. Furthermore, we include a set of control variables that may influence acquisition activity on the aggregate level. These include GDP, the annual growth rate of GDP (see Erel *et al.*, 2012; Rossi & Volpin, 2004), inflation, the trade ratio[10], as well as the size of the stock market (Di Giovanni, 2005) and credit available for corporate acquisitions. In addition, we control for the size of the service sector and institutional quality on the country level measured by the Corruption Perception Index (Hebous *et al.*, 2011). The latter also serves as a proxy for the level of shareholder protection. In line with previous research, we lag the macroeconomic variables by one period to reflect that the decision makers' information set is based on completed rather than contemporaneous periods and to mitigate potential endogeneity problems. Table 3 provides summary statistics of all variables. A detailed description of all controls and their sources can be found in Table A.1 in the Appendix.

4 Results

In Table 4 we present the results of our estimation with regard to the number of M&A deals. Column (1) depicts our main specification. We obtain a coefficient of

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[9]See Fally (2015) for a feasible implementation of fixed effects in the PPML model.
[10]The trade ratio is defined as the share of total exports and imports in GDP.

Table 3: Summary Statistics

	Number of Observations	Mean	Standard Deviation	Min	Max
Number of deals	390	78.32	109.42	0	667.00
Value of deals in bn USD	390	2.84	5.63	0	41.99
CGT	390	12.99	13.76	0	42.10
CT	390	28.16	7.29	10.00	42.10
GDP	390	26.70	1.59	23.38	30.30
$GROWTH$	390	1.76	2.86	-8.86	9.72
$INFL$	390	2.72	3.98	-5.39	52.85
$TRADE$	387	4.31	0.50	3.01	5.92
$STOCK$	360	0.73	0.49	0.09	3.38
$CREDIT$	373	1.15	0.53	0.12	3.11
$SERVICE$	340	68.13	13.86	0.56	87.47
CI	359	7.18	1.82	2.97	9.70

-0.011 with respect to the corporate capital gains tax rate which is significant at the one percent level. This suggests that a one percentage point decrease in the corporate capital gains tax rate is expected to increase the number of acquisitions by 1.1% per year.

Regarding control variables, more output growth, international trade, a higher level of governance quality and a better access to credit significantly increase the number of M&As. As in Di Giovanni (2005), larger financial markets are positively correlated with the number of acquisitions. Similarly, larger service sectors indicate higher M&A activity. In contrast, inflation is negatively related to acquisition activity as the economic insecurity related to high inflation rates potentially discourages M&As.

The coefficient for GDP is insignificant, perhaps reflecting that both high and low levels of GDP may increase acquisition activity[11] within one country since M&As are used for expansion in economically favorable environments and to consolidate sectors in times of economic contraction. In our estimation the corporate tax rate does not significantly affect corporate acquisition activity. This suggests that from the vendor perspective the impact of corporate taxation is mainly related to the lock-in effect resulting from capital gains taxation.

Table 4 also contains several sensitivity checks. First, we check whether our results are driven by jurisdictions that position themselves as preferable location for holding companies. Potential candidates in our sample are Cyprus, Ireland, Luxembourg, Malta, the Netherlands and Switzerland because of their lack of substantial Controlled Foreign Company (CFC) rules and the dividend and capital gains tax

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[11]See Grave et al. (2012) for an account of M&As during the financial crisis.

Table 4: Corporate Capital Gains Tax and Acquisition Activity

Estimation with PPML. The dependent variable is the number of M&A deals per year and country in which a corporate vendor sells shares in a target firm residing in the same country and receives a consideration that involves a cash payment. Regression (1) contains the main specification. In regressions (2) countries which are referred to as preferred holding locations are excluded. Regression (3) excludes all country-year pairs with zero acquisitions. Regression (4) extends the main specification by controlling for industry specific shocks whereas in regression (5) the interest rate on government securities is included as an additional control. Regression (6) controls for the lagged share of deals with foreign acquirers. All regressions include country- and year-fixed effects. Cluster robust standard errors (clustered at the country level) are provided in parentheses. Stars behind coefficients indicate the significance level, ∗ 10%, ∗∗ 5%, ∗∗∗ 1%.

	(1)	(2)	(3)	(4)	(5)	(6)
τ^{CG}	-0.011***	-0.012***	-0.011***	-0.010**	-0.011***	-0.011***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.004)
CT	0.001	0.006	0.002	0.007	0.002	-0.000
	(0.015)	(0.017)	(0.015)	(0.021)	(0.015)	(0.014)
GDP	-0.580	-0.559	-0.592	-0.704	-0.636	-0.435
	(1.277)	(1.261)	(1.277)	(1.683)	(1.339)	(1.148)
$GROWTH$	0.043***	0.041***	0.043***	0.049**	0.039***	0.038***
	(0.013)	(0.13)	(0.13)	(0.020)	(0.013)	(0.013)
$INFL$	-0.007	-0.007	-0.006	-0.003	-0.006	-0.003
	(0.011)	(0.012)	(0.011)	(0.011)	(0.011)	(0.010)
$TRADE$	1.039**	1.032**	1.004**	1.485***	0.957**	0.928**
	(0.451)	(0.480)	(0.451)	(0.541)	(0.442)	(0.385)
$STOCK$	0.170	0.262	0.179	0.216	0.208	0.156
	(0.206)	(0.284)	(0.205)	(0.274)	(0.207)	(0.191)
$CREDIT$	0.420**	0.409**	0.419**	0.076	0.415**	0.353*
	(0.192)	(0.200)	(0.190)	(0.207)	(0.185)	(0.181)
$SERVICE$	0.002	0.002	0.002	0.021	0.001	0.003
	(0.002)	(0.003)	(0.002)	(0.026)	(0.002)	(0.002)
CI	0.232**	0.247**	0.233**	0.203	0.242**	0.191*
	(0.118)	(0.125)	(0.118)	(0.126)	(0.120)	(0.103)
$INDSHCK$				0.277		
				(0.956)		
$INTEREST$					-0.011	
					(0.030)	
$FOREIGN$						-0.649***
						(0.226)
Holding locations	Yes	No	Yes	Yes	Yes	Yes
Including zeros	Yes	Yes	No	Yes	Yes	Yes
n	332	278	320	184	325	332
Number of countries	30	25	30	24	30	30
Pseudo Log-likelihood	-1507.793	-1320.748	-1461.025	-780.161	-1471.617	-1479.224

exemption granted.[12] While these countries have low tax rates for corporate capital gains, the factors that actually raise acquisition activity there may be unrelated to taxation. This could induce a downward bias in our estimate. In column (2) we thus re-estimate the model excluding the countries cited above. The coefficient for τ^{CG} remains significantly negative with very similar point estimates.

Second, for a number of country-year pairs we have no M&A deals. Even though this could simply imply that in these years there were no corporate acquisitions according to our definition, the observations could also result from a measurement error, perhaps caused by lower reporting quality in certain countries. To check whether this drives our results we re-estimate the model including only observations with strictly positive values for the dependent variable. Again, the coefficient for our variable of interest remains significantly negative with almost identical point estimates.

Finally, to verify that our results are not driven by some spurious correlation we include additional control variables in columns (4) to (6). Following Ayers *et al.* (2007), we first include the standard deviation in value added growth across eight sectors within a country to account for sector specific shocks that may increase acquisition activity by triggering sector specific consolidation. In a second exercise, we use the interest rate on government securities as a proxy for country-specific financing costs that might drive M&As. In both cases, the coefficient for the variable of interest remains unchanged and significant.

Results also remain similar when including the lagged share of foreign acquirers as a control variable ($FOREIGN$).[13] This should ensure that the findings are not due to some other omitted variable which changes a country's appeal to foreign acquirers such as reductions in withholding taxes[14], reductions in tariffs, or closer economic integration via custom or currency unions. If such changes coincide with a cut in corporate capital gains taxes, the resulting inflow of foreign acquirers may bias the coefficient estimates downwards.[15] However, results indicate that the evidence presented is not explained by changes in the relevance of foreign acquisitions.

If our results capture a quantity effect of corporate capital gains taxes, this should be observable not only in the number but also in the volume of M&A deals. To verify that this is indeed the case, we reestimate our results using aggregated deal values as the dependent variable. The results are presented in Table 5. Again the coefficient for the capital gains tax rate is significantly negative. With a magnitude of -0.011 in

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[12]Smith (2011) reviews the relevant rules in these countries in more detail.

[13]Similar results are obtained when including the contemporary share of foreign acquirers, the number and the volume of deals with foreign acquirers.

[14]For the effect of cross-border tax differentials on the reservation price of foreign acquirers see Huizinga & Voget (2009).

[15]For example, the legislative proposal for abolishing the taxation of corporate capital gains in Sweden in 2003 also contained a participation exemption for withholding taxes on dividends paid to non-residential companies.

our main specification in column (1) it suggests that decreasing the corporate capital gains tax rate by one percentage point should increase the total volume of acquisitions by 1.1% per year. Thus, our results regarding the quantity of the lock-in effect caused by corporate capital gains taxes cannot simply be explained by a change in the size of M&A deals but reflect a decrease in real acquisition activity.

The corporate tax reforms that provide the main source of variance in our estimation should generally not affect acquisitions where the vendor is not incorporated which makes these deals a useful comparison group to verify the causality of our estimates. This allows us to test whether it is the change in the corporate capital gains tax rate that affects acquisition activity or some coinciding regulatory measure that provides incentives for corporate investment. Whereas the latter should affect all acquisitions independent of the vendor's tax status, the former is only relevant for corporate vendors.

In a first step, we conduct a simple acid test using the number of acquisitions with non-corporate vendors[16] as the dependent variable. Results are presented in column (1) of Table 6. As expected, changing the corporate capital gains tax rate has no effect on the number and volume of these deals corroborating that the coefficient of capital gains tax in the benchmark regression indeed captures a causal effect.

An alternative approach to verify the causality underlying our estimation results is to use the number of deals that involve an unincorporated vendor as a control group in a pooled regression. In a triple difference-in-difference approach, this allows us to estimate the effect of a change in the corporate capital gains tax rate on acquisition activity involving only corporate vendors relative to acquisition activity involving unincorporated vendors. The latter should be less affected by capital gains taxation on the corporate level. Thus, we estimate a model of the following form

$$n_{jit} = \exp\left(\gamma_0 VEN_{jit} + \gamma_1 VEN_{jit} \times POST_{it} + \boldsymbol{\beta X}_{it} + \phi_i + \phi_t\right) + \epsilon_{it} \qquad (6)$$

where n_{ijt} indicates the number of deals in country i at time t for vendor type j. With regard to the vendor type we sort deals into two groups. $VEN_{jit} = 1$ indicates deals with vendors that are fully affected by corporate capital gains taxes (type-C deals) and $VEN_{jit} = 0$ indicates those deals that are mainly affected by individual taxation (type-I deals).[17] $POST_{it}$ is a dummy variable that indicates whether at some point $t - s$, $s > 0$, there was a substantial reduction in the corporate capital gains tax rate

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[16]We show that our results carry over to the total deal value by reestimating the following regressions with the aggregated deal value of acquisitions with non-corporate vendors as dependent variable. Results are presented in Table A.3 in the Appendix.

[17]This comprises all deals where at least part of the vendors do not pay corporation taxes but are taxed on the individual level.

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Table 5: Corporate Capital Gains Tax and Total Deal Value

Estimation with PPML. The dependent variable is the sum of all values of M&A deals per year and country in which a corporate vendor sells shares in a target firm residing in the same country and receives a consideration that involves a cash payment. Regression (1) contains the main specification. In regression (2) countries which are referred to as preferred holding locations are excluded. Regression (3) excludes all country-year pairs with zero acquisitions. Regression (4) extends the main specification by controlling for industry specific shocks whereas in regression (5) the interest rate on government securities is included as an additional control. Regression (6) controls for the lagged share of deals with foreign acquirers. All regressions include country- and year-fixed effects. Cluster robust standard errors (clustered at the country level) are provided in parentheses. Stars behind coefficients indicate the significance level, $*$ 10%, $**$ 5%, $***$ 1%.

	(1)	(2)	(3)	(4)	(5)	(6)
τ^{CG}	-0.011**	-0.011**	-0.011**	-0.011***	-0.011**	-0.012***
	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)
CT	-0.000	-0.008	-0.001	0.005	-0.001	-0.003
	(0.024)	(0.023)	(0.023)	(0.031)	(0.024)	(0.024)
GDP	2.069*	2.467	1.971	0.351	2.181*	2.206*
	(1.233)	(1.324)	(1.201)	(1.629)	(1.305)	(1.220)
$GROWTH$	0.040*	0.035	0.037	0.053	0.041*	0.040
	(0.024)	(0.026)	(0.024)	(0.039)	(0.024)	(0.025)
$INFL$	-0.053***	-0.048**	-0.054**	-0.047***	-0.053***	-0.053***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
$TRADE$	-0.018	-0.137	0.022	1.494	-0.032	0.041
	(0.947)	(0.991)	(0.950)	(1.060)	(0.955)	(0.897)
$STOCK$	0.219	0.351	0.199	0.210	0.220	0.147
	(0.208)	(0.243)	(0.199)	(0.273)	(0.206)	(0.200)
$CREDIT$	-0.062	-0.222	-0.043	0.844**	-0.074	-0.083
	(0.276)	(0.298)	(0.268)	(0.362)	(0.279)	(0.271)
$SERVICE$	0.012***	0.012**	0.012**	-0.008	0.012***	0.012***
	(0.004)	(0.004)	(0.004)	(0.055)	(0.004)	(0.003)
CI	0.234**	0.186	0.246*	0.358**	0.237**	0.218
	(0.116)	(0.118)	(0.121)	(0.150)	(0.115)	(0.112)
$INDSHCK$				-3.004		
				(4.652)		
$INTEREST$					0.010	
					(0.035)	
$FOREIGN$						-0.307*
						(0.162)
Holding locations	Yes	No	Yes	Yes	Yes	Yes
Including zeros	Yes	Yes	No	Yes	Yes	Yes
n	332	278	308	184	325	332
Number of countries	30	25	30	24	30	30
Pseudo Log-likelihood	-71060217	-59870868	-66478786	-40562846	-70920574	-69858363

in country i. In this case $POST_{it}$ is equal to 1, otherwise it is zero. We identify the relevant tax cuts according to the reforms listed in Table 1 (e.g. in the case of Italy, $POST_{it} = 1$ from 2004 onward and zero before).

In equation (6), γ_1 measures the expected additional rise in the number of type-C deals relative to the number of type-I deals that is caused by the existence of a substantial corporate capital gains tax exemption. Column (2) in Table 6 displays the estimation results. As expected, the coefficient of $VEN_{jit} \times POST_{it}$ is positive and highly significant. The estimated coefficients suggest that the presence of a corporate capital gains tax reduction increases the ratio of the number of type-C and type-I deals by a factor of 2.05. One explanation for this result is that a lower corporate capital gains tax rate makes firms with corporate shareholders only a more attractive target for acquisition relative to firms where potential deal participants include individual shareholders that do not benefit from the corporate capital gains exemption. This further supports the causal inference of our results and also provides a tax-related reasoning for the observed dominance of inter-corporate acquisitions.

To gain additional insights, we modify equation (6) to allow for heterogeneity in the effect of the tax reform with regard to the induced tax cuts. This is achieved by replacing $POST_{it}$ with the tax rate change caused by the corporate capital gains tax reduction, $\Delta\tau_{Reform}^{CG}$, in post-reform years. In such an adjustment, γ_1 measures the expected additional rise in the number of type-C deals relative to the number of type-I deals that is caused by a reduction in the corporate capital gains tax rate by 1 percentage point. To account for potentially coinciding tax reforms on the individual shareholder level, we also estimate the equation using the change in the difference in corporate and individual capital gains tax rates caused by the corporate capital gains tax reform, $\tilde{\Delta}\tau_{Reform}^{CG} = \left(\tau_t^{CG} - \tau_t^{IND}\right) - \left(\tau_{t-1}^{CG} - \tau_{t-1}^{IND}\right)$.[18]

Estimation results are displayed in columns (3) and (4) of Table 6. Again, the coefficients are positive and highly significant. Quantitatively, these results indicate that the presence of a corporate capital gains tax exemption increases the ratio of the number of type-C and type-I deals by a factor of 1.03 (or 2.9%) per percentage point of tax rate reduction. An almost identical coefficient in column (4) shows that these findings are robust to accounting for coinciding reductions in the capital gains tax rate on the individual shareholder level. Thus, inter-corporate acquisition activity does not only react to the mere presence of a capital gains tax reduction but is also determined by the magnitude of such an exemption.

Finally, we can use our estimates to compute the potential efficiency loss resulting from the taxation of capital gains in inter-corporate M&As. The efficiency loss is defined as the foregone gain from a failed M&A deal. We use acquisition premia

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[18]Note that $\tilde{\Delta}\tau_{Reform}^{CG} = \Delta\tau_{Reform}^{CG}$ if $\Delta\tau^{IND} = 0$.

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Table 6: Triple Difference-in-Difference Approach

Estimation with PPML. In regressions (1) the dependent variable is the number of M&A deals per year and country in which an non-corporate vendor sells shares in a target firm residing in the same country and receives a consideration that involves a cash payment. Otherwise the specification is identical to column (1) in Table 4. In regressions (2)-(4) the dependent variable is the number of M&A deals per year, country and vendor type in which the vendor sells shares in a target firm residing in the same country and receives a consideration that involves a cash payment. Regression (2) includes a country-specific dummy variable $POST$. Regression (3) repeats this regression using the absolute change in the corporate capital gains income tax generated by the reform instead of a post-reform dummy. Regression (4) replicates the results using the absolute change in the difference between corporate capital gains income taxes and individual capital gains taxes generated by the reform. All regression include country- and year-fixed effects as well as year-vendor-type-fixed effects. Cluster robust standard (clustered at the country-vendor-type level) errors are provided in parentheses. Stars behind coefficients indicate the significance level, , $*$ 10%, $**$ 5%, $***$ 1%.

	(1)	(2)	(3)	(4)
τ^{CG}	0.004			
	(0.007)			
$VEN \times POST$		0.717***		
		(0.266)		
$VEN \times \Delta\tau^{CG}_{Reform}$			0.029***	
			(0.009)	
$VEN \times \tilde{\Delta}\tau^{CG}_{Reform}$				0.029***
				(0.009)
VEN		1.255***	1.238***	1.254***
		(0.228)	(0.213)	(0.214)
CT	-0.016	0.008	0.011	0.010
	(0.020)	(0.014)	(0.013)	(0.014)
GDP	0.054	-0.057	-0.409	-0.521
	(0.038)	(1.324)	(1.199)	(1.178)
$GROWTH$	0.054	0.034**	0.036***	0.036***
	(0.038)	(0.014)	(0.013)	(0.013)
$INFL$	-0.004	-0.004	-0.005	-0.006
	(0.023)	(0.011)	(0.011)	(0.011)
$TRADE$	0.110	1.319***	1.115***	1.089***
	(0.848)	(0.464)	(0.399)	(0.397)
$STOCK$	0.192	0.182	0.159	0.152
	(0.475)	(0.207)	(0.207)	(0.209)
$CREDIT$	0.059	0.231	0.262	0.262
	(0.590)	(0.194)	(0.177)	(0.176)
$SERVICE$	-0.002	0.003	0.002	0.002
	(0.004)	(0.003)	(0.002)	(0.002)
CI	0.621***	0.150	0.168	0.163
	(0.161)	(0.129)	(0.118)	(0.119)
n	297	663	663	663
Number of countries	27	30	30	30
Pseudo Log-likelihood	-699.615	-3952.9	-3894.3	-3913.7

Table 7: Efficiency Loss (in mio USD)

This table displays the yearly efficiency loss in million USD caused by corporate capital gains taxation of the transfer of shares in inter-corporate M&A. The efficiency loss is defined as the foregone gain from all failed M&A deals. Details regarding the computation can be found in the Appendix.

	Australia	Canada	Japan	United States
Corporate Capital Gains Tax Rate, 2013	30.00	20.27	42.00	39.28
Finance, Insurance and Real Estate	13.17	22.04	49.29	304.46
Manufacturing	21.54	27.16	107.97	843.73
Mining and Construction	40.80	22.15	3.60	140.90
Services	31.25	18.24	85.82	828.17
Other	33.90	35.34	59.24	946.99
Total	140.67	124.92	305.92	3,064.24

reported in Zephyr as a market-related measure of this gain and compute country- and sector-specific acquisition premia for the sample period. We then consider a decrease in the corporate capital gains rate to zero in 2013 and use our coefficient estimate from Table 5 to evaluate the effect at the yearly mean of the deal volume. This provides us with a country- and sector specific estimate of the yearly deal volume foregone due to capital gains taxation from which we back out the efficiency loss using the previously computed acquisition premia.

Table 7 presents our results for Australia, Canada, Japan and the United States. All of these economies still levied capital gains taxation on corporate acquisitions in 2013. The computed efficiency losses are substantial, most notably in Japan and the United States where corporate vendors face particularly high tax rates. Our estimates suggest that a full exemption of capital gains from corporate M&A deals would generate a yearly efficiency gain in the market for corporate control of 0.31 bn USD in Japan and 3.06 bn USD in the United States.

5   Conclusion

The estimation results presented above suggest a significant lock-in effect for corporate capital gains taxes. Using a panel-data in a PPML model, we arrive at a coefficient for the corporate capital gains tax of -0.011 for both the total deal value and the number of acquisitions. This translates into an increase of acquisition activity by 1.1% for a decrease of the tax rate by one percentage point which result allows us to estimate the potential efficiency loss caused by corporate capital gains taxation in terms of foregone gains from M&A deals. For example, we consider a decrease of the United

States tax rate on corporate capital gains (39.28% in 2013[19]) to zero. Evaluated at the country mean for 2002-2013, this would imply an increase in efficiency on the market for corporate control by 3.06 bn USD per year.

These findings have several important implications. First, lowering the capital gains tax on the corporate level appears to be an effective instrument to foster acquisition activity. In light of potentially high efficiency gains resulting from M&A deals, tax cuts are thus worth considering, in particular in several large economies where capital gains tax rates are still high (e.g. United States, Australia, Canada, Japan).

Second, using international data our results suggest a lock-in effect on intercorporate acquisitions that is smaller than previously estimated in time-series studies for individual shareholder taxation (e.g. Ayers *et al.*, 2007). This may partly reflect the use of different samples but also indicates that, on the global scale, corporations are less reactive to capital gains taxes in their acquisition behavior than individuals. One reason for this may be that capital gains taxation affects individual shareholders' income directly whereas managers who take decisions at the corporate level are only indirectly affected via the impact of annual firm yields on their reputation and can take a more long-term view on acquisitions.

Third, our results imply that corporate tax reforms that reduce capital gains taxes may be revenue neutral in a similar way as has been previously suggested for the case of shareholder taxation (e.g. Feldstein *et al.*, 1980). Although the increase in acquisition activity may not fully compensate the revenue loss, in particular if capital gains are fully exempt, the resulting efficiency gains would still raise government revenue from taxing higher corporate profits.

Our estimate of the efficiency loss of corporate capital gains taxation in M&A takes the shareholder perspective. The overall economic effect of increased M&A activity caused by lower corporate capital gains taxation depends on a range of factors not included in this measure. These include externalities such as the potentially inefficient use of production factors in transition periods and market distortion resulting from reduced competition after mergers. Therefore, it remains an interesting question for future research whether and under what circumstances lower corporate capital gains taxation triggers acquisitions related to particularly strong improvements in corporate performance, in particular with regard to productivity. Besides broadening the understanding of the market for corporate control, this would provide further insights into the welfare implications of corporate capital gains taxes.

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[19]Including state taxes.

References

Ayers, Benjamin C, Lefanowicz, Craig E, & Robinson, John R. 2003. Shareholder taxes in acquisition premiums: The effect of capital gains taxation. *The Journal of Finance*, **58**(6), 2783–2801.

Ayers, Benjamin C, Lefanowicz, Craig E, & Robinson, John R. 2004. The effect of shareholder-level capital gains taxes on acquisition structure. *The Accounting Review*, **79**(4), 859–887.

Ayers, Benjamin C, Lefanowicz, Craig E, & Robinson, John R. 2007. Capital gains taxes and acquisition activity: evidence of the lock-in effect. *Contemporary Accounting Research*, **24**(2), 315–344.

Becker, Johannes, & Fuest, Clemens. 2011. Source versus residence based taxation with international mergers and acquisitions. *Journal of Public Economics*, **95**(1), 28–40.

Bena, Jan, & Li, Kai. 2014. Corporate innovations and mergers and acquisitions. *The Journal of Finance*, **69**(5), 1923–1960.

Bradley, Michael, Desai, Anand, & Kim, E Han. 1988. Synergistic gains from corporate acquisitions and their division between the stockholders of target and acquiring firms. *Journal of Financial Economics*, **21**(1), 3–40.

Bresman, Henrik, Birkinshaw, Julian, & Nobel, Robert. 1999. Knowledge transfer in international acquisitions. *Journal of International Business Studies*, **30**(3), 439–462.

Dai, Zhonglan, Maydew, Edward, Shackelford, Douglas A, & Zhang, Harold H. 2008. Capital gains taxes and asset prices: capitalization or lock-in? *The Journal of Finance*, **63**(2), 709–742.

Devos, Erik, Kadapakkam, Palani-Rajan, & Krishnamurthy, Srinivasan. 2009. How do mergers create value? A comparison of taxes, market power, and efficiency improvements as explanations for synergies. *Review of Financial Studies*, **22**(3), 1179–1211.

Di Giovanni, Julian. 2005. What drives capital flows? The case of cross-border M&A activity and financial deepening. *Journal of international Economics*, **65**(1), 127–149.

Erel, Isil, Liao, Rose C, & Weisbach, Michael S. 2012. Determinants of cross-border mergers and acquisitions. *The Journal of Finance*, **67**(3), 1045–1082.

Erel, Isil, Jang, Yeejin, & Weisbach, Michael S. 2015. Do acquisitions relieve target firms' financial constraints? *The Journal of Finance*, **70**(1), 289–328.

Erickson, Merle. 1998. The effect of taxes on the structure of corporate acquisitions. *Journal of Accounting Research*, **36**(2), 279–298.

Faccio, Mara, McConnell, John J, & Stolin, David. 2006. Returns to acquirers of listed and unlisted targets. *Journal of Financial and Quantitative Analysis*, **41**(01), 197–220.

Fally, Thibault. 2015. Structural gravity and fixed effects. *Journal of International Economics*, **97**(1), 76 – 85.

Feldstein, Martin, & Yitzhaki, Shlomo. 1978. The effects of the capital gains tax on the selling and switching of common stock. *Journal of Public Economics*, **9**(1), 17–36.

Feldstein, Martin, Slemrod, Joel, & Yitzhaki, Shlomo. 1980. The effects of taxation on the selling of corporate stock and the realization of capital gains. *The Quarterly Journal of Economics*, **94**(4), 777–791.

Grave, Kathleen, Vardiabasis, Demos, & Yavas, Burhan. 2012. The global financial crisis and M&A. *International Journal of Business and Management*, **7**(11), p56.

Hebous, Shafik, Ruf, Martin, & Weichenrieder, Alfons J. 2011. The effects of taxation on the location decision of multinational firms: M&A versus greenfield investments. *National Tax Journal*, **64**(3), 817–38.

Holt, Charles C, & Shelton, John P. 1962. The lock-in effect of the capital gains tax. *National Tax Journal*, **15**(4), 337–352.

Huizinga, Harry, Voget, Johannes, & Wagner, Wolf. 2012. Who bears the burden of international taxation? Evidence from cross-border M&As. *Journal of International Economics*, **88**(1), 186–197.

Huizinga, Harry P, & Voget, Johannes. 2009. International taxation and the direction and volume of cross-border M&As. *The Journal of Finance*, **64**(3), 1217–1249.

Landsman, Wayne R, & Shackelford, Douglas A. 1995. The lock-in effect of capital gains taxes: Evidence from the RJR Nabisco leveraged buyout. *National Tax Journal*, **48**(2), 245–259.

Manne, Henry G. 1965. Mergers and the market for corporate control. *The Journal of Political Economy*, **73**(2), 110–120.

Officer, Micah S. 2007. The price of corporate liquidity: Acquisition discounts for unlisted targets. *Journal of Financial Economics*, **83**(3), 571–598.

Ohrn, Eric, & Seegert, Nathan. 2015. The Impact of Shareholder Taxation on Mergers and Acquisitions. *Available at SSRN 2562965*.

Rossi, Stefano, & Volpin, Paolo F. 2004. Cross-country determinants of mergers and acquisitions. *Journal of Financial Economics*, **74**(2), 277–304.

Sapra, Haresh, Subramanian, Ajay, & Subramanian, Krishnamurthy V. 2014. Corporate governance and innovation: Theory and evidence. *Journal of Financial and Quantitative Analysis*, **49**(4), 957–1003.

Scharfstein, David. 1988. The disciplinary role of takeovers. *The Review of Economic Studies*, **55**(2), 185–199.

Silva, JMC Santos, & Tenreyro, Silvana. 2011. Further simulation evidence on the performance of the Poisson pseudo-maximum likelihood estimator. *Economics Letters*, **112**(2), 220–222.

Smith, Paul. 2011. Comparative analysis of European holding company jurisdictions. *Tax Journal*, March.

Wang, Cong, & Xie, Fei. 2009. Corporate governance transfer and synergistic gains from mergers and acquisitions. *Review of Financial Studies*, **22**(2), 829–858.

Appendix

Table A.1: Control Variables

Variable	Definition	Source
GDP	Logarithm of GDP in constant (2005) USD	WDI
$GROWTH$	Annual GDP growth in %	WDI
$CREDIT$	Domestic credit to private sector as a share of GDP	WDI
$STOCK$	Market capitalization of listed firms as a share of GDP	WDI
CT	Top statutory corporate income tax rate	IBFD
$TRADE$	Logarithm of the trade ratio	WDI
CI	Corruption perception index	TI
$INFL$	Inflation	WDI
$SERVICE$	Value added of services in % of GDP	WDI
$INTEREST$	Interest rate on national government securities	Central Banks
$INDSK$	Standard deviation in value added growth across 8 sectors	WDI

Table A.2: Robustness: Nearest-Neighbor Matching

This table replicates Table 4 using weighted nearest neighbor interpolation to compute the time between deal announcement and completion. Distance d_{ij} is measured in absolute number of days between the announcement dates of two deals i and j. We include the five nearest neighbors, use power distance weights with an exponent $\alpha = 3$ and row-normalize weights so that the weight for observation j within the 5 nearest neighbors is given by $w_{ij} = d_{ij}^{-\alpha} / \sum_{j=1}^{5} d_{ij}^{-\alpha}$. Estimation with PPML. The dependent variable is the number of M&A deals per year and country in which a corporate vendor sells shares in a target firm residing in the same country and receives a consideration that involves a cash payment. Regression (1) contains the main specification. In regression (2), countries which are referred to as preferred holding locations are excluded. Regression (3) excludes all country-year pairs with zero acquisitions. Cluster robust standard (clustered at the country level) errors are provided in parentheses. Stars behind coefficients indicate the significance level, $*$ 10%, $**$ 5%, $***$ 1%.

	(1)	(2)	(3)
τ^{CG}	-0.010**	-0.011**	-0.011**
	(0.005)	(0.005)	(0.005)
CT	-0.002	-0.002	-0.004
	(0.014)	(0.014)	(0.016)
GDP	-0.617	-0.578	-0.612
	(1.306)	(1.300)	(1.297)
$GROWTH$	0.042***	0.043***	0.041***
	(0.012)	(0.012)	(0.012)
$INFL$	-0.005	-0.005	-0.006
	(0.010)	(0.010)	(0.011)
$TRADE$	0.797*	0.803*	0.816*
	(0.430)	(0.428)	(0.459)
$STOCK$	0.160	0.162	0.259
	(0.430)	(0.188)	(0.263)
$CREDIT$	0.354*	0.359*	0.345*
	(0.191)	(0.190)	(0.204)
$SERVICE$	0.001	0.001	0.001
	(0.002)	(0.003)	(0.003)
CI	0.262**	0.264**	0.273**
	(0.119)	(0.119)	(0.128)
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Holding locations	Yes	Yes	No
Including zeros	Yes	No	Yes
n	332	330	278
Number of countries	30	30	25
Pseudo Log-likelihood	-1519.531	-1509.402	-1337.557

Table A.3: Triple Difference-in-Difference Approach: Total Deal Value

Estimation with PPML. In regressions (1) the dependent variable is the sum of all values of M&A deals per year and country in which a non-corporate vendor sells shares in a target firm residing in the same country and receives a consideration that involves a cash payment. Otherwise the specification is identical to column (1) in Table 4. In regressions (2)-(4) the dependent variable is the sum of all values of M&A deals per year, country and vendor type in which the vendor sells shares in a target firm residing in the same country and receives a consideration that involves a cash payment. Regression (2) includes a country-specific dummy variable $POST$. Regression (3) repeats this regression using the absolute change in the corporate capital gains income tax generated by the reform instead of a post-reform dummy. Regression (4) replicates the results using the absolute change in the difference between corporate capital gains income taxes and individual capital gains taxes generated by the reform. All regression include country- and year-fixed effects as well as year-vendor-type-fixed effects. Cluster robust standard (clustered at the country-vendor-type level) errors are provided in parentheses. Stars behind coefficients indicate the significance level, , $*$ 10%, $**$ 5%, $***$ 1%.

	(1)	(2)	(3)	(4)
τ^{CG}	0.004			
	(0.007)			
$VEN \times POST$		1.269***		
		(0.325)		
$VEN \times \Delta\tau^{CG}_{Reform}$			0.053***	
			(0.010)	
$VEN \times \tilde{\Delta}\tau^{CG}_{Reform}$				0.054***
				(0.010)
VEN		0.184	0.167	0.187
		(0.295)	(0.299)	(0.300)
CT	-0.033	0.019	0.019	0.018
	(0.091)	(0.021)	(0.021)	(0.021)
GDP	1.352	3.233**	2.865**	2.724**
	(4.145)	(1.418)	(1.180)	(1.179)
$GROWTH$	-0.037	0.039	0.040	0.040
	(0.070)	(0.029)	(0.028)	(0.028)
$INFL$	0.024	-0.039***	-0.037***	-0.039***
	(0.052)	(0.014)	(0.014)	(0.014)
$TRADE$	-1.122	0.939	0.692	0.654
	(1.173)	(0.972)	(0.851)	(0.848)
$STOCK$	0.765	-0.207	-0.239	-0.249
	(0.801)	(0.289)	(0.280)	(0.280)
$CREDIT$	-1.340	0.151	0.180	0.184
	(1.359)	(0.270)	(0.253)	(0.251)
$SERVICE$	-0.005	0.012**	0.011**	0.011**
	(0.007)	(0.005)	(0.005)	(0.005)
CI	0.002	0.026	0.056	0.051
	(0.472)	(0.156)	(0.126)	(0.128)
n	297	663	663.	663
Number of countries	27	30	30	30
Pseudo Log-likelihood	-699.615	-2.3e+08	-2.2e+08	-2.2e+08

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Computing the Efficiency Loss

In the following we describe the computation of the country- and sector-specific yearly efficiency loss in USD displayed in Table 7. The four main sectors are defined according to SIC codes: Mining and Construction (1000-1799), Manufacturing (2000-3999), Finance, Insurance and Real Estate (6000-6799) and Services (7000-8999). We first compute country- and sector specific gains from M&A deals for the period 2002-2013. For this purpose we use acquisition premia reported in the Zephyr data base. The acquisition premium of a deal is defined as the deal value less the market price of the target one day prior to the announcement divided by the latter. For each country and sector, we compute the mean of all premia in percent. Noting that our estimates in Table 5 suggest that a decrease of the corporate capital gains rate by 1 percentage points raises acquisition activity in terms of total deal volume by 1.1%, the yearly efficiency loss Γ_{is} in country i and sector s is then given by $\Gamma_{is} = \tau_{is}^{CG} \times 0.011 \times n_{is} \times \frac{\pi_{is}}{100+\pi_{is}}$, where τ_{is}^{CG} is the corporate capital gains tax rate used in the main regression, n_{is} is the average deal volume per year and π_{is} is the average acquisition premium.