Home Country Taxation and Multinational Investment: Evidence from the UK

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Abstract

In 2009, the United Kingdom changed from a worldwide to a territorial tax system which exempts all foreign active income from taxation at home. This reform decreased the dividend tax imposed on UK multinationals in many low tax countries without changing the dividend tax on foreign repatriations from high tax countries. In this paper I assess the causal effect of dividend exemption on real outbound investment by UK multinationals, using data on multinational affiliates located in 27 European countries and employing the difference-in-differences approach. I find that the tax reform has increased the outbound investment rate of UK multinationals by around 15.7 percentage points in countries with a lower corporate tax rate than the UK. The finding represents an increase in aggregate outbound investment, as there is no evidence on a concurrent decrease in investment by UK multinationals in the high-tax countries or in the UK. The territorial tax reform is estimated to have a strong bang for the buck effect: there is a £9 increase in the outbound investment of UK multinationals for each £1 of domestic tax revenue loss.

Keywords: foreign direct investment, corporate tax policy, multinational firms

JEL Classification: H25, F23, G30

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I Introduction

Many countries have been trying to create a competitive tax system to attract surging outbound investment from multinational firms over the past few decades, given that taxes are important in determining the after-tax profitability of internationally mobile capital in different locations. While there has been considerable debate about taxing inbound foreign direct investment (FDI), much less is discussed on the role of tax policies on outbound investment. One notable exception is the current policy debate on whether the United States should move to a territorial tax system, which calls for evidence on the likely effect of the reform on the allocation of investment between domestic and foreign locations as well as on the pattern of U.S. investment abroad.

In this paper, I provide the first micro-level evidence on the causal effect of home country taxation on the location of investment by multinationals, by exploiting the UK's recent change from worldwide to territorial taxation. The key difference between the two tax systems is in the home taxation of foreign-earned profits. Broadly speaking, the worldwide system aims to tax foreign profits at the same home country rate regardless of where the profits arise. Most countries with a worldwide system allow deferral of tax on active income until repatriation and provide a credit for foreign taxes paid up to the limit of the tax that is due on the income in the home country to avoid double taxation. The territorial system, on the other hand, largely exempts foreign profits from taxation in the home country. The relevant tax on a cross-border investment, therefore, is the higher of the home and host country rate under the worldwide system and the host country rate (plus any withholding taxes due to the host country, if applicable) under the territorial system.[1] Currently 28 out of 34 OECD countries have a territorial system, while the credit-based worldwide system is used by the rest of OECD countries including the United States, and some other large economies such as China and Russia.

[1] It is clear that the two international tax systems can in principle have different effects on the allocation of multinational investment between domestic and foreign activities and the pattern of foreign activities abroad. Since under the worldwide or credit system the home country tax rate is the relevant tax for all income, the firm is indifferent based on tax consideration whether to invest at home or abroad (capital export neutrality). On the other hand, firms in high-tax credit countries face a higher tax when competing in foreign markets with other firms subject only to the same local (host country) tax burdens, which may distort international cross-ownership of assets (Desai and Hines, 2003). In addition, firms under the credit system may strategically invest in the high-tax countries to benefit from cross-crediting, which may also distort international allocation of real investment. Under the territorial or exemption system, the host country tax rate is the relevant tax for multinational income, so a firm's investment is sensitive to the host country tax differences. Devereux, Fuest and Lockwood (2015) synthesizes and extends the literature on the optimal taxation of foreign source income by showing that with a non-zero adjustment cost, the domestic tax on foreign-source income should always be set to ensure the optimal allocation of the mobile factor between domestic and foreign assets. The home country taxation should follow the classical rules in the literature; national optimality requires the deduction rule, and global optimality requires the credit rule.

In 2009, the UK fundamentally changed its taxation of foreign profits by exempting dividends that UK parent companies receive from their foreign subsidiaries from UK taxation altogether. Before the reform, affiliates from countries where the statutory tax rate is lower than the UK faced additional tax on dividend repatriations, where the level of the dividend tax was the difference between the home and host country tax rates. Consequently, the reform decreased the tax burden by the amount of tax differential for affiliates in the low tax countries. On the other hand, as there was no additional tax on dividend repatriations from countries with a higher statutory tax rate than the UK, the dividend tax faced by affiliates in the high tax countries did not change throughout the reform and remained at zero.

I use a simple investment model based on Bond, Devereux and Klemm (2005) and Chetty and Saez (2010) to understand the potential effects of the reform on the level of investment by UK multinationals, which depends critically on the financing of investment. Specifically, dividend exemption would only increase the after-tax return on investment if a foreign affiliate reinvests all the profits in the host country and rely on new equity from the parent company to finance its investment at the margin. This result represents the old view of dividend taxation in the context of cross-border investment.[2] Alternatively, if the foreign affiliate repatriates part of its profits to the parent company by paying a dividend and finances the marginal investment with retained earnings, a dividend tax cut would have no effect on the cost of capital, a result first suggested in Hartman (1985). This is because with a permanent dividend tax in place, the foreign affiliate is indifferent between paying repatriation taxes now and paying repatriation taxes of the same present value later. However, this irrelevance result no longer holds when there are anticipated or temporary dividend tax changes. Anticipating a reduction in the dividend tax in the near future, the affiliate would engage in intertemporal tax planning by postponing repatriations and increasing investment before the reform.

According to the theory, we would only expect a positive effect of the reform on foreign investment by UK multinationals if they exhausted foreign earnings for reinvestment and

[2]Key theoretical studies on the effect of dividend taxes on investments include Poterba and Summers (1984), King (1974, 1977), Auerbach (1979, 1981, 1983), and Bradford (1981). Hartman (1985) extends the analysis to study the effect of dividend taxes on cross-border investment by multinationals. Auerbach (2002) provides an excellent summary of the debate between the new and old theories of dividend taxation. Recent empirical work providing supportive evidence on the effect of dividend tax cut on domestic investment includes Chetty and Saez (2005), Blouin, Raedy and Shackelford (2011), and Campbell et al. (2013), while Yagan (2015) finds no evidence that dividend tax cut increases corporate investment in the U.S. Alstadsæter, Jacob and Michaely (2015) and Mathur et al. (2015) reconcile competing results from the two views by providing empirical evidence on the heterogenous effects of dividend taxes which depends critically on financing. Gourio and Miao (2011) provides similar evidence on the heterogeneous effects of the 2003 dividend tax cut using simulation results from a dynamic general equilibrium model.

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issued new equity as the marginal source of finance. While this might be the case for a small number of UK multinationals, the amount of repatriation taxes in the UK was small but positive prior to the reform. According to HMRC (2008)[3], the estimated foregone revenue as a result of the tax reform was around £660 millions in 2009-2011 and was less than one percent of corporation tax revenues at the time. For the small group of dividend paying multinationals, the reform should not change their cost of capital as they rely on retained earnings as the marginal source of finance. However, given that there was limited amount of tax revenue raised from dividend repatriation, it could also be the case that the majority of UK multinationals managed to bring income home tax free through some complicated schemes under the worldwide tax system. If so, the reform would also make no difference to their cost of capital since they never paid the tax in the first place. Instead, the reform eliminated the costs of tax planning on the bulk of offshore earnings which can be viewed as an implicit tax on dividend repatriation.[4] So for the majority of non-tax paying multinationals, we may also expect a positive effect of the reform on their investment due to the reduction in the implicit tax on dividend repatriation.

By exploiting the 2009 reform as a quasi-experiment, I test for the causal effect of dividend taxation on the level of outbound FDI. The basic idea is that the reform specifically targeted at the UK multinationals and should have no direct impact on the after-tax return to investment by non-UK multinationals, which can be used as a control group in the difference-in-difference analysis. The advantage of the quasi-experiment setting is that it separates the effect of dividend tax cut from other contemporaneous economic shocks including the financial crisis. The identifying assumption underlying the research design is that investment by UK and non-UK multinational affiliates would have trended similarly in the absence of the tax reform. Graphical evidence shows similar trends in the investment series before the reform, and results of the placebo tests suggest that there is no differential change in investment by UK affiliates relative to the control group in any of the three years in the pre-reform period.

The empirical analysis uses unconsolidated financial and ownership data on multinational affiliates in EU27 between 2005 and 2011, complemented by information on country-level corporate tax rates and other economic and governance characteristics. The main sample is an unbalanced panel with annual observations from 131,614 multinational affiliates, of which 30,206 are UK affiliates. I obtain qualitatively similar results in regressions using a balanced

[3]HM Treasury, Pre-Budget Report, November 2008. (https://www.gov.uk/government/publications/hm-treasury-pre-budget-report-november-2008)

[4]In other words, while the effective tax rate on actual repatriation may be small due to expert corporate manipulation of foreign tax liability, the implicit repatriation tax rate on the bulk of offshore retained earning could be much higher due to the implicit costs of tax planning and avoidance (Kleinbard, 2011).

panel and a matched sample of firms with similar turnover, asset, and turnover growth rate.

I find that dividend exemption increased investment by UK affiliates in the low-tax countries. The finding is robust to controlling for a wide range of non-tax determinants of cross-border investment decisions. Qualitatively, the introduction of territorial system increased the gross investment rate by UK affiliates by 15.7 percentage points in the low tax countries, in response to an average decrease of 9 percentage points in dividend tax on profit repatriation. The finding of a significant increase in investment in the low-tax countries is also robust to changes in the sample (unbalanced and balanced panels), changes in the control group (with and without parent companies subjecting to worldwide taxation, and matched panels), inclusion of additional controls (with and without industry- and county-level time trends, and with and without controlling for the euro crisis), investment measures (gross investment and net investment), and outlier winsorization (at the 97.5th and 99th percentiles).

There are considerable heterogeneous effects of dividend exemption on investments by UK multinational affiliates. The observed investment increase is mainly driven by financially constrained firms measured by the availability of free cash flow. At the same time, by analyzing the likelihood of new equity issuance in a similar difference-in-difference approach, I find that the same group of cash constrained firms are also more likely to issue new equity after the reform. The investment increase is concentrated in larger multinational group measured by the total number of related companies and total assets. There is no significant change in employment, labor productivity or profitability in the UK affiliates in the low-tax countries, while there is a moderate increase in the average company wage rate. The evidence suggests that workers may have also benefited from the reform by sharing the tax savings with the company.

Investment increases in the low-tax countries represent an increase in aggregate outward investment by UK multinationals. I find no significant investment response by UK affiliates in the high-tax countries or at home following UK's switch to the territorial system using a similar difference-in-difference approach. The evidence suggests that there is an increase in total investment rather than a reallocation of investment from home to abroad or from the high to low tax countries. In aggregate, the investment increase in low tax countries is estimated to be €5.6 billion, which is approximately 9 times the amount of estimated foregone tax revenue. The tax reform has a strong bang for the buck effect by stimulating £9 of outbound UK investment for every £1 loss in domestic tax revenue.

This paper relates to several strands of literatures in corporate taxation and corporate finance. First, it contributes to the large literature on FDI and taxation by quantifying the

significant role of home country tax.[5] Second, it adds to the literature studying behavioral responses of multinationals to the international tax system (Slemrod, 1990; Hines and Rice, 1994; Hines, 1996; Grubert, 1998; Desai, Foley and Hines, 2001; Foley et al., 2007; Graham, Hanlon and Sheylin, 2010; Dharmapala, Foley and Forbes, 2011; Egger et al., 2015; Hasegawa and Kiyota, 2015). While most of these papers focus on dividend payouts and tax planning activities of multinationals, this paper joins Grubert and Mutti (2000), Altshuler, Grubert and Newlon (2000), Altshuler and Grubert (2003) and Hanlon, Lester and Verdi (2015) by studying their real investment decisions. Third, it provides new evidence on the impact of dividend taxation on cross-border investment and contributes to the debate between the "old view" and the "new view", where recent studies focusing on domestic investment Becker, Jacob and Jacob (2013), Yagan (2015), and Alstadsæter, Jacob and Michaely (2015) provide mixing evidence on this issue. Finally, it joins a small literature on the spillover effect of fiscal policy into other countries including Auerbach and Gorodnichenko (2013), Matheson, Perry and Veung (2014), and IMF (2014).

The paper proceeds as follows. The next section describes the policy reform that provides exogenous changes in the dividend taxes faced by UK multinationals. Section III provides a simple conceptual framework on the effect of dividend exemption on outward multinational investment. Section IV describes the data used in empirical analysis. Section V discusses the empirical strategy and specification. Section VI presents empirical results on the effect of dividend exemption on UK outbound investment in the low tax countries. Section VII presents empirical evidence on investment in the high-tax countries and in the UK. Section VIII discusses the implications of the findings. Section IX briefly concludes.

II The 2009 Territorial Tax Reform

In 2009, the UK switched to the territorial tax system with dividend exemption. Before then, the UK taxed corporate income on a worldwide basis, meaning UK companies are liable to corporation tax in the UK on their worldwide income from activities domestic and abroad. Taxes are levied on foreign-earned income when remitted to the UK parent company as dividends, with a credit for corporate taxes paid in the source country. For example, if a UK multinational has an investment in Ireland, it will pay Irish tax at the rate of 12.5%. When the Irish subsidiary remits profit by paying dividends to the UK parent, the profit is further liable to a UK tax of 28% but net of the Irish tax paid, implying a dividend tax rate

[5] Most of the empirical literature on this topic, as recently surveyed by de Mooij and Ederveen (2003) and Feld and Heckemeyer (2011), is concerned with identifying the influence of host country on FDI, rather than home country effects.

of 15.5%.[6] The foreign tax credit is limited to the amount of corporation tax that would have been paid if the profits were earned in the UK.

There is no additional tax on dividend payments from subsidiaries in countries where the statutory corporate tax rate is higher compared to the UK. For example, foreign earnings in France pay a French tax of 35%, which is higher than the UK rate. So the dividend payment is not liable to any additional UK tax. In general, the additional UK tax on each pound of repatriated dividend ($\tau_{UK,div}$) is the difference between the statutory tax rate in the host country (τ_j) and the UK rate (τ_{UK}).

Given that the additional dividend tax places UK multinationals at a competitive disadvantage compared to firms in countries that exempt foreign earnings,[7] the Treasury and HMRC issued a discussion document in June 2007 proposing for the UK to "go territorial".[8] The territorial tax system was subsequently introduced in the Finance Bill 2009 and became effective on July 1, 2009. Since then, foreign-source dividends paid to the UK parent companies are no longer liable for UK corporation tax.[9] Depending on the level of corporation tax in the host country, this reform brought differential changes in dividend tax rates on repatriation. Specifically, the reform decreased the tax rate on dividends remitted from a low-tax country from τ_{UK} to τ_j but did not directly affect the tax rate on dividends from the high-tax countries:

$$\text{Dividend Tax Reduction} = \begin{cases} \tau_{UK} - \tau_j, & \tau_j \leq \tau_{UK} \\ 0, & \tau_j > \tau_{UK}. \end{cases}$$

The tax differential $\tau_{UK} - \tau_j$ represents the maximum tax savings on £1 dividend repatriated from a low-tax country j. This is because under the worldwide system, the parent company could use excess foreign tax credit arising from low-tax countries–eligible unrelieved foreign tax–to offset against dividend taxes from high-tax countries. While there was restrictions on the maximum amount of excess credits that could be used for offsetting,[10] allowing for cross-crediting effectively lowered the rate of dividend taxes in the low-tax countries.

[6] The corporate tax rate of 28 percent was the main rate on corporate taxable profit above £1.5 million between financial years 2008 and 2010. The main rate was reduced to 26 percent in 2011, 24 percent in 2012, and 20 percent in 2015.

[7] The stated policy objective of this reform is "*to enhance the competitiveness and attractiveness of the UK as a location for multinational business.*" (Parliamental Report, 2009)

[8] HM Treasury and HM Revenue & Customs, Taxation of the Foreign Profits of Companies: A Discussion Document, June 2007 (http://www.hm-treasury.gov.uk/media/E/B/consult_foreign_profits210607.pdf).

[9] Except where the receipt is similar to interest or distributions paid in respect of certain securities.

[10] Specifically, the rate of credit for underlying tax on all foreign dividends paid crossborder is restricted to the main UK rate. Eligible unrelieved foreign tax only arises on the highest level dividend that suffers the 30% and cannot exceed 45%. No relief was available for any capped foreign tax on lower level dividends.

From a practical perspective, the amount of foregone tax revenue related to the territoriality reform was quite small, accounting for about one percent of total corporation taxes in the UK.[11] The small amount of revenue collected on dividend repatriation is consistent with two alternative hypothesis. First, it may suggest that the bulk of foreign earnings are reinvested instead of repatriated home. Alternatively, it may suggest that the bulk of foreign earnings are brought back home, but through some complicated schemes of tax planning so most multinationals avoided paying dividend taxes in the first place. In the latter case, we may still expect a positive effect of the tax reform on foreign investment by reducing the implicit costs of repatriation due to tax planning and avoidance.

III Conceptual Framework

I consider in a simple two-period model the effect of dividend taxation on firm investment, based on Bond, Devereux and Klemm (2005) and Chetty and Saez (2010). At the beginning of period 0, a UK affiliate in the foreign market has an initial level of cash holdings of C. In period 0 it invests an amount of I, which can be financed out of retained earnings, or by receiving new capital injection of $E \geq 0$ from the parent company. At the end of period 0, the foreign affiliate pays to its UK parent a dividend in the amount of $D = C+E-I$. In period 1, the foreign affiliate produces output and earns revenue with the production function $f(I, E)$, where $f(\cdot)$ is strictly concave, strictly increasing, continuous and continuously differentiable. Note that the positive dependence of this production function on the level of new capital reflects possible "control benefits" of subjecting the investment decision to scrutiny and monitoring from the parent company. At the end of period 1, the affiliate repatriates the entire net wealth to the UK parent company by paying a dividend. A tax rate of t_d^0 and t_d^1 is levied on dividend payments in period 0 and 1, respectively.[12] A tax rate of t_c is levied on corporate revenue in the second period.

The foreign affiliate chooses I and E to maximize the present value of net distributions, given by:

$$V = (1 - t_d^0)(C + E - I) - E + (1 - t_d^1)\beta(1 - t_c)f(I, E),$$

where β is the parent company's discount factor, $\beta = \frac{1}{1+r} < 1$, and r is the risk-free interest

[11] In relation to passive income, the controlled foreign companies (CFCs), effective between 2001-02 and 2009-10, restricted the ability of UK-based groups to retain profits overseas without paying a full UK tax charge. Specifically, the retained profits of subsidiaries that are located in countries where the corporation tax is less than three quarters of the rate applicable in the UK can be apportioned back to the UK and taxed as income of the parent. UK parent companies were also liable to UK taxes on interest or royalties income from foreign subsidiaries, with a credit for any withholding taxes paid abroad.

[12] To focus on the implication of dividend taxation for investment and new share issues, I assume that the amount of debt finance is fixed.

rate between the two periods, subject to the non-negativity constraints on dividend payments and new share issues. The foreign affiliate thus maximizes:

$$V = (1 - t_d^0)(C + E - I) - E + \lambda^D(C + E - I) + \lambda^E E + (1 - t_d^1)\beta(1 - t_c)f(I, E),$$

where λ^D and λ^E are shadow values associated with the non-negativity constraints. The first-order conditions for investment and new equity issues are:

$$f_I = \frac{(1+r)}{(1-t_c)}\left[\frac{1-t_d^0}{1-t_d^1} + \frac{\lambda^D}{1-t_d^1}\right],$$

and

$$f_E = \frac{(1+r)}{(1-t_c)}\left[\frac{1-(1-t_d^0)-(\lambda^D+\lambda^E)}{1-t_d^1}\right].$$

There are two financial regimes in this model, which are depicted in Figure 1. The optimal strategy of finance depends on the level of initial cash flow C relative to the firm-specific investment opportunities. Assume for now a constant t_d between the two periods, i.e. $t_d^0 = t_d^1 = t_d$.

A Regime 1: Financed by New Equity

When the marginal investment is financed by issuing new shares, this implies that the dividend payments are zero, i.e. $D = 0$ so that $\lambda^D > 0$, and $E > 0$ so that $\lambda^E = 0$. This occurs when the initial cash flow C is so low relative to investment opportunities that, if the firm issues the optimal level of new shares as suggested by the optimal condition, it cannot finance the optimal level of investment and pay positive dividends in the current period. In this case the first-order conditions are

$$f_I = \frac{(1+r)}{(1-t_c)}\left[1 + \frac{\lambda^D}{1-t_d}\right], \tag{1}$$

and

$$f_E = \frac{(1+r)}{(1-t_c)}\left[\frac{1-\lambda^D}{1-t_d} - 1\right]. \tag{2}$$

In this case, the foreign affiliate invests all the cash it has: $I = C + E$ and finances the marginal investment with new equity. Condition (2), which determines the amount of equity injection, indicates that the repatriation tax also plays a role in this decision.

Implicit differentiating of equation (1) and (2) suggests that $\partial f_I/\partial(1 - t_d) < 0$ and $\partial f_E/\partial(1 - t_d) < 0$. A decrease in t_d implies for firms in this financial regime a decrease in the marginal cost of investment, and in turn an increase in the level of investment. A

decrease in the dividend tax also implies a decrease in the marginal cost of issuing new shares, which leads to an increase in the level of new shares issued by the parent company. In addition, if the cross-derivative $f_{I,E}$ is strictly positive, the increase in new shares issued implies further increase in investment. The firm is considered as financially constrained in this regime, because a windfall increase in cash flow would reduce the shadow value of internal funds λ^D, thus increasing new share issues and invesmtent.

These results are from the standard "old view" models that when marginal investments are financed by funds from outside investors, proceeds from these investments are returned to investors and face the dividend tax rate (Poterba and Summers, 1984). An increase in the dividend tax rate raises the effective tax rate on investment income and discourages investment, with potentially adverse welfare consequences. Conversely, reduction in the dividend tax, as in the case of the 2009 dividend exemption, will potentially encourage investment by UK multinationals in low tax countries.

B Regime 2: Financed by Retained Earnings

In the second regime, the initial cash flow C is sufficiently high relative to investment opportunities, so the marginal investment is financed out of retained earnings. This implies that $D > 0$ so that $\lambda^D = 0$, and $E = 0$ so that $\lambda^E > 0$. The first-order condition (1) thus becomes

$$f_I = (1 + r)\,, \tag{3}$$

implying that the cost of capital and the optimal level of investment does not depend on the dividend tax t_d. This is because provided the tax rate on dividends is constant, a dividend tax lowers both the cost of investment and the return on the investment by the same amount, and thus has no effect on the cost of capital.

This condition reproduces results from "new view", or "trapped equity" view of dividend taxation, which is developed by King (1974), Auerbach (1979) and Hartman (1985), that capital in the mature state does not depend on the dividend tax t_d.

Comparing equations 1 and 3 confirms that standard pecking order in which external finance is not less expensive than internal finance. In the context of international direct investment, the result implies that UK multinationals should finance their investment first by exhausting the internal funds before turning to requiring new capital injection from the parent company. It is more tax efficient for the foreign affiliate to retain the initial earnings and avoid a tax on dividends.

C Anticipation Effect of Changes in Dividend Taxes

The above results hold with a constant dividend tax. The irrelevance result of dividend taxation for marginal investments relying on internal finance no longer applies when there is some change in the rate of dividend tax, or there is expectation of such changes.

Suppose that the parent firm anticipates in period 0 that the rate of dividend tax will decrease in the next period so that $t_d^0 > t_d^1$. In this case, the first-order condition that determines the optimal level of investment for firms in the second financial regime becomes

$$f_I = \left(\frac{1 - t_d^0}{1 - t_d^1}\right)(1 + r)\,. \tag{4}$$

Equation (4) suggests that when the dividend tax rate in period 0 is higher relative to its level in the next period, the marginal cost of investment in period 0 for firms relying on retained earnings is lower than $(1 + r)$. The optimal investment level in period 0 would be higher than the level determined by equation (3) in the absence of anticipating any tax change, even when the marginal source of finance for new investment is retained earnings.

The intuition is straightforward. Anticipating a decrease in the dividend tax, dividend payouts in period 1 becomes more attractive than in period 0. In consequence, the firm would postpone all dividend payouts to the next period and use the retained earnings savings to increase investment in period 0. In the context of the 2009 territoriality reform, the result suggests that UK multinationals would postpone dividend repatriations until post-2009, and would increase their investment in the years immediately before the reform. In the following sections, I empirically examine the responsiveness of investment by UK multinational affiliates to the introduction of the dividend exemption regime, which considerably decreased the dividend tax rates in the low-tax countries.

IV Data

The primary dataset for empirical analysis is an unbalanced panel of 131,614 multinational affiliates in one of the EU-27 countries for the years 2005 to 2011. It is constructed by using unconsolidated financial statements of multinational subsidiaries in the commercial Amadeus database, which is provided by Bureau van Dijk.[13] A company is defined as a multinational subsidiary if it has an ultimate parent company owning at least 50% of its shares and is in a different country than the parent company. The ultimate parent company in the dataset

[13]The Amadeus database includes approximately 8 million public and private companies in 38 European countries. It combines data from over 35 specialist regional information providers and provides information on financial statement and basic ownership structure for medium and large-sized European companies.

locates in one of 158 countries.

The main sample contains all multinational affiliates that: (a) reports non-missing, non-zero turnover and total asset values, and (b) is not a financial company with main productive assets that are typically not tangible capital. I further discard any observation with missing industry or unspecified home country information. Table 1 shows the country distribution of multinational affiliates in the main sample.

The main accounting variables are flows of investment, sales, cash flow, and earnings before interest and tax (EBIT).[14] Investment spending (I_t) is computed as changes in fixed capital assets based on the net book values of tangible and intangible fixed assets plus depreciation, i.e. $K_{t+1} - K_t + depreciation$, where K_t denotes book value of the fixed asset in year t. Gross investment rate, $Investment_t$, is defined as the ratio between current-year gross investment spending and beginning-of-year net fixed capital asset. Similarly, net investment rate, $Investment\_Net_t$, is defined as the ratio between current-year net investment spending and beginning-of-year net fixed capital asset. Sales refers to operating revenue and profit margin is calculated as earnings before interest and tax (EBIT) divided by sales. All ratio variables are winsorized at top and bottom 0.01 percentile to minimize the influence of outliers. Table 3 contains summary statistics for the main variables.

A limitation of the Amadeus data, however, is that information on the ownership structure refers to the last reported date, which is year 2011 for most observations in the sample. I assume that the parent-affiliate ownership structure for 2011 applies to the earlier years and there may be potential misclassification of parent-subsidiary-connections due to change of ownership structure over the sample period.[15] Suppose that UK's moving to an exemption system increases the competitiveness of UK parent company in the international market. As a result they acquire more foreign subsidiaries in low tax jurisdictions.[16] By including these newly acquired subsidiaries in the analysis, the estimation results will capture the overall investment response to dividend exemption by allowing for endogenous investment changes at the extensive margin via merge and acquisition.

I merge data on the statutory corporate tax rate at the affiliate location provided by Oxford Centre for Business Taxation Tax Database.[17] This is a measure of total statutory tax rate including top corporate tax rate at federal level, any surcharge levied, and any local

[14] Unfortunately, there is no information on dividend payment in the affiliate-level financial statement which would allow for a direct test of the effect of dividend exemption on dividend repatriation.

[15] This caveat is acknowledged in previous studies exploring the ownership structure in the AMADEUS data. See, e.g. Budd, Konings and Slaughter (2005), Dischinger and Riedel (2011) and Dharmapala and Riedel (2013).

[16] Feld et al. (2005) estimates that the abolishment of repatriation taxes in the UK in 2009 has increased the number of acquisitions abroad by Bristish firms by 3.9%.

[17] Available at: http://www.sbs.ox.ac.uk/ideas-impact/tax/publications/data

corporate tax rate in a given country-year. Subsidiaries in the main sample face a statutory corporate tax rate that ranges from 0.10 to 0.404 with a mean of 0.285.

To identify low-tax countries, I define an indicator variable *low tax* which takes on value 1 if a country sets its corporate tax rate consistently below the UK rate in 2005-2011 and 0 otherwise. Table 2 lists the low and high tax countries and the corresponding tax rates.[18] I further merge data on host country characteristics including GDP per capita, population and unemployment rate to capture the aggregate market size and demand characteristics, and measures of governance quality and financial stability in the host countries. Home-country characteristics are also included to capture marcoeconomic conditions at the parent location. These variables include the growth rate of GDP per capital, and indicators on governance quality and financial institution stability from the World Development Indicators Database.[19] Table 3 presents the descriptive statistics of the key variables that are used for regression analysis.

V Empirical Strategy

This section describes the empirical strategy designed to identify the causal effect of dividend exemption on investment by UK affiliates. Specifically, I exploit plausibly exogenous time-series variation in the relative cost of equity financing following UK's switch to the exemption system. If dividend exemption has decreased the tax burden of equity financing faced by UK affiliates in low-tax countries, we would expect an increase in investment by UK affiliates after 2009 if new equity is the main marginal source of finance. To explicitly control for variation in the investment due to non-tax factors, I use a control group of non-UK multinational affiliates in the same host country which are exposed to aggregate shocks similar to those experienced by the UK affiliates. Formally, I examine investment by UK affiliates in the standard difference-in-difference (DD) specification:

$$INVESTMENT_{ikt} = a_i + d_t + \beta_{DE} DE_t + \beta_{\mathbf{x}} \mathbf{x}_{ikt} + \beta_{\mathbf{z}} \mathbf{z}_{kt} + \varepsilon_{ikt}, \tag{5}$$

where i indexes firms, k indexes host countries, and t indexes time. The dependent variable $INVESTMENT_{ikt}$ denotes gross investment scaled by book value of fixed capital asset

[18] An alternative indicator of *low tax* is defined to be i if the corporate tax rate in the host country is lower than the UK rate in 2008, the last year before the territorial reform. The group of low-tax countries defined in this way are: XXX.

[19] Subsidiary-level country data is collected from the European Statistical Office (Eurostat), available at http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/. Parent-level country data is collected from the World Development Indicators Database, available at http://data.worldbank.org/data-catalog/world-development-indicators.

in (end of) year $t-1$. The key variable of interest, DE_t, is an indicator equal to one for UK affiliates starting in 2009, and zero otherwise. The coefficient β_{DE} represents the difference-in-difference estimate of the effect of dividend exemption on investment by UK affiliates. Following the theoretical discussions in Section III, I expect β_{DE} to be positive and significant if a non-trivial number of UK affiliates finance their marginal investment by new equity.

A full set of firm fixed effects (a_i) is included to control for unobserved firm-specific productivity differences and the unobserved time-invariant characteristics of the parent company. Firm fixed effects further subsume host-country fixed effects (given that affiliates do not change their location), which control for time-invariant differences across host countries that may affect the location choice of multinationals, which include, for example, perceived average quality of governance during the sample period, common language and/or former colonial ties, and geographical distance between the home and host country. I further include a full set of time dummies (d_t) to capture the effect of aggregate marcoeconomic shocks, including the effect of the great recession, that are common to all multinational affiliates in the same host country. $\mathbf{x}_{ikt}$ denotes a possible empty vector of firm-level controls, and ε_{ikt} is the error term.

Most specifications include the statutory corporate tax rate at source to control for the confounding effects of concurrent tax reforms in the host countries, and a full set of industry by year interactions and country by year interactions to control for industry and country specific macro-economic factors that may affect private investment and would otherwise be captured by the DD estimates. In addition, I control for a set of time-varying country characteristics ($\mathbf{z}_{kt}$) for both host and parent countries, including GDP per capita, population size, unemployment rate, and indices of governance quality and financial institution stability to capture the effect of time-varying local productivity, market size and demand characteristics on investment.

As shown in Table A.1 panel A, there are fewer affiliates in the treated group, but they are significantly larger than the non-UK affiliates in the control group and are also more liquid and profitable. I employ two alternative approaches to address the concern that UK and control affiliates may not be identical in terms of observable characteristics, and that these differences can explain different trends in investment over time. First, I directly control for a set of variables that may capture firm-level investment opportunities ($\mathbf{x}_{ikt}$), which include lagged output, cash flow scaled by lagged asset, lagged profit margin as a measure of profitability, and one-period lagged growth rate of output. Alternatively, I implement a matching DD strategy (Heckman, Ichimura and Todd (1997)). To this end, I replicate the DD tests on a subsample of matched firms based on pre-reform characteristics. As shown in

Table A.1 panel B, the treated and control group in the matched sample are comparable in terms of firm size and cash flow. The key assumption underlying the DD technique is that investment trends in both the treated and control groups would be the same in the absence of dividend exemption. I examine any differences in the trends before the legislation in the next section, both graphically and in a placebo regression test.

VI Investment Responses in Low-Tax Countries

A Graphical Evidence

Figure 2 shows the median investment by UK and non-UK affiliates around the dividend exemption reform in the low tax countries (Panel A) and high tax countries (Panels B), which reveal some distinct patterns in the two panels. In the low tax countries, the reduction in real investment (relative to its 2006 level) of UK affiliates closely tracked that of non-UK affiliates up to 2009, and both group started to increase their investment after the financial crisis. Comparing to their non-UK peers, UK affiliates increased their investment more after 2009, which could potentially be attributed to the territoriality reform. In the high tax countries, while investment of UK affiliates decreased more than that of non-UK affiliates since 2006, changes in investment were quite similar in the years prior to 2009. The investment gap widens in 2009 but was closed within two years as a result of rapid increase in investment by UK affiliates in the high tax countries.

There are at least two threats to identification. The first is that contemporaneous changes that are unrelated to the tax reform, which could have differential impacts on UK and non-UK affiliates. For example, UK affiliates might be more resilient to the financial crisis comparing to their non-UK peers, which could explain the smaller decline in their investment. This highlights the importance of controlling for time-invariant affiliate and parent company characteristics in the regressions, as well as time-varying industry trends which absorbs the differential impact of financial crisis at the industry level. Second, concurrent tax reforms in other countries are likely to confound the effect of dividend exemption that is of primary interest in this paper. For example, Japan also changed to the territorial system in 2009. Given a statutory corporate tax rate of 38% in Japan, the outbound investment of Japanese multinationals may also increase the sample, resulting a downward bias in the estimated effect of dividend exemption for UK companies. This highlights the importance of focusing on non-UK affiliates with headquarters in exemption system throughout the sample period.

To summarize, Figure 2 provides suggestive evidence on the effect of dividend taxation on UK outbound investment. In the following section, I use regression analysis to control for

a large set of confounding factors and provide conclusive evidence of a link between dividend taxation and outbound investment by UK multinationals.

B Baseline results

Table 4 presents regression results from the difference-in-difference estimation of equation (5), focusing on multinational affiliates operating in the EU-27 countries with a lower corporate tax rate compared to the UK. All regressions include a full set of firm fixed effects and year fixed effects. Heteroscedasticity-robust standard errors that are clustered at the firm level are show in brackets below the coefficient estimates.

In column 1, the coefficient estimate for DE_t, which is the interaction between a UK affiliate indicator and an indicator for years post 2009, is positive and highly significant, suggesting that dividend exemption has systematically increased investment undertaken by UK affiliates in the low-tax countries. The empirical evidence is consistent with the theoretical prediction if a non-trivial portion of their marginal investment is financed by new equity. To assess the robustness of this finding, column 2 includes additional controls that capture firm-specific investment opportunities, which include one-period lagged turnover, cash flow scaled by lagged asset, lagged profit margin, and growth rate of lagged turnover. To control for the fact that the sector composition for UK affiliates may be different from that of non-UK affiliates, column 3 adds industry by time fixed effects to control for time-varying shocks to each industry at the 1-digit NACE level. The basic result remains unchanged.

To control for potential confounding effects of concurrent host-country tax reforms on investment, column 4 includes host-country statutory tax rate on corporate income. Column 4 also adds other host-country characteristics including GDP per capita, population size, unemployment rate, and indicators of governance quality and financial institution stability to control for the impact of market condition that would otherwise be captured by the DE_t coefficient estimate. To examine the robustness of the results to differential country-specific shocks, column 5 adds a full set of country by year interactions to control for all country specific macro-economic factors that may affect private investment. The empirical estimates do not appear to be sensitive to the inclusion of this rich set of control variables.

While time-invariant parent company characteristics and time-invariant home country characteristics are already controlled for with affiliate fixed effects, it is possible that the parent companies of UK affiliates were exposed to different shocks at home. To control for these effects column 6 adds additional time-variant marcoeconomic characteristics of the home country including GDP growth rate, GDP per capita and indicators on governance quality and financial stability. The baseline results remain unchanged. Column 7 replaces

the DE_t variable with its interaction with the decrease in dividend taxes in each of the low-tax countries to capture the magnitude of the tax reform. The coefficient estimate of the post-reform tax differential is around 1.59 and highly significant, suggesting that for every one percentage point decrease in the dividend tax rate, there is a 1.59 percentage point increase in real investment per euro of fixed assets by UK affiliates in the low-tax countries. Finally, columns 8 and 9 restrict the treated group to be UK affiliates in a company group which also has an affiliate in the high-tax countries, and the estimated effect of the tax reform slightly increases in this subsample.

C Robustness Checks

In this section, I assess whether the findings are robust to a number of alternative specifications and samples. First, columns 1-4 of Table 5 use the same specification, control variables, and scaling underlying column 6 of Table 4, except that in column 1 the standard errors are clustered by host-home country pair. This is to address the common concern that in tax reform studies, the standard errors are understated by assuming independence across firms within the same tax jurisdiction (Bertrand, Duflo and Mullainathan, 2004). Column 2 excludes non-UK affiliates in the control group with parent companies based in countries with a worldwide system. To the extent that investment decisions by these firms may also be influenced by tax planning consideration under the worldwide system, they may be less comparable to firms under the exemption system. To control for the potential confounding effect of eurozone crisis on investment, column 3 adds an interaction term between an indicator that takes value of 1 for host countries in the eurozone and the post-2009 indicator and identifies the impact of the 2009 reform independent of the exchange rate crisis. To ensure that the identified tax effect is not entirely driven by firm entries and exits, column 4 uses a balanced sample that include firms that are established before 2005 and survived through 2010. The resulting DE_t coefficient estimates from the four regressions are statistically indistinguishable from the main estimate reported in Table 4 column 6.

Column 5 implements a matching DD strategy (Heckman, Ichimura and Todd (1997)) to address the concern that companies in the treated UK and control affiliates may not have similar observable characteristics, and that these differences may explain different trends in investment over time. The regression in column 5 replicates the DD analysis on a subsample of matched firms from a Mahalanobis distance matching procedure based on pre-reform firm-level characteristics in terms of turnover, turnover growth, operating profits, and number of employees. The matching DD analysis further controls time-varying industry shocks and host-country marcoeconomic conditions. The resulting estimate has a wider confidence

interval given the smaller number of observations but remains positive and significant at the 10 percent level.

Finally, to ensure that the identified tax effect is not driven by any outliers in the outcome variables, column 6 in the upper panel uses gross investment rate winsorized at 97.5 percentile as the dependent variable, while columns 1-2 in the lower panel use net investment rate winsorized at 99 and 97.5 percentile as the dependent variable, respectively. The estimated effect of the tax reform remains positive and significant, and is not significantly different from the estimate from the preferred specification in Table 4 column 6.

D Heterogeneous Analysis

To investigate the potential heterogeneity in investment responses by UK affiliates, I use several proxies for ex ante financial constraints including firm size, liquid asset position and profitability to test for a difference in investment responses between constrained and unconstrained firms. If the financing of multinational affiliates represents an important consideration for investment as suggested in Section III, we should expect to find a consistent, systematic difference in investment responses for groups of firms based on these proxies. The proxies are defined based on the pre-2009 firm-level average characteristics, excluding firms that recently entered or did not survive throughout 2010. Firms in the main sample are divided into each of the deciles for each indicator. I then estimate the effect of the tax reform by interacting the DE_t and each of the ten decile indicators in the following specification:

$$INVESTMENT_{ikt} = a_i + d_t + \sum_{j=1}^{10} \beta_{DE,Decile_j} DE_t \times \mathbf{I}\{i \in Decile_j\} + \beta_{\mathbf{x}} \mathbf{x}_{ikt} + \beta_{\mathbf{z}} \mathbf{z}_{kt} + \varepsilon_{ikt}, \quad (6)$$

where $\mathbf{I}\{i \in Decile_j\}$ is the jth decile indicator defined above, and all other variables are previously defined. The coefficient $\beta_{DE,Decile_j}$ represents the quantity of interest: the effect of the 2009 dividends exemption on investment by UK affiliates relative to non-UK affiliates in the jth decile of the distribution of the relevant financial constraints indicator.

Panels A of Figure 3 reports the coefficient estimates β_{DE} and the 90% confidence interval across deciles of pre-2009 firm size. It shows that only large UK-owned affiliates in the upper deciles of the turnover distribution significantly increased their investment in response to the 2009 reform. A similar pattern is shown in panel B which examines heterogenous investment responses based on the distribution of total asset. Following theoretical discussions in Section III, only investment by firms relying on new equity from the parent company would respond to the territoriality reform. Panels C of Figure 3 reports the results based on the distribution of free cash flow. The evidence is consistent with the theoretical prediction and shows a higher

sensitivity of investment in the cash-poor sample. There is no increase in investment by firms in the lowest decile of the cash flow distribution, possibly because these are poorly-performing firms. The investment increase is predominately concentrated in the 2nd-7th decile of the cash flow distribution, as supported by the hypothesis test that the coefficient estimates of $\beta_{DE,Decile_2}$ to $\beta_{DE,Decile_7}$ are jointly significantly different from zero ($p-$value=0.000), while the coefficient estimates of $\beta_{DE,Decile_8}$ to $\beta_{DE,Decile_{10}}$ are jointly indistinguishable from zero ($p-$value=0.639).

Panel D of Figure 3 reports the results based on the distribution of profitability. The investment increase is mainly in firms in the 4th-8th deciles distribution of profitability.[20] The results suggest that firms with extremely low profitability did not increase their investment in response to the tax reform, neither did extremely profitable firms which are more likely to rely on retained earnings to finance their investment.

The theoretical discussion in section III also implies that increase in investment by UK affiliates should be mainly driven by new capital from the parent company. Evidence consistent with this hypothesis would be a more prominent investment response for firms in larger and more liquid company groups.[21] Panel E reports the results based on the distribution of the company group size– the number of related companies in the same company group–and the results suggest a higher sensitivity of investment in larger multinational group. Finally, panel F reports the results based on the distribution of the company group asset. The measure is constructed by summing up the total asset of all affiliates with the same parent company in the main sample.[22] The results are roughly consistent that there is a higher sensitivity of investment in large MNCs measured by the total asset of the company group.

E Timing of the Investment Responses

Consultation on the UK's moving to an exemption system was launched in late 2007, but the draft legislation was not released until more than a year later in February 2009.[23] Within two months, the Financial Bill 2009 formally introduced the exemption system which took

[20] The $p-$value from the joint test under the null hypothesis that the coefficient estimates of $\beta_{DE,Decile_4}$ to $\beta_{DE,Decile_8}$ are jointly zero is 0.0001. Similarly, the $p-$value from the joint test under the null hypoethesis that the coefficient estimates of $\beta_{DE,Decile_1}$ to $\beta_{DE,Decile_3}$ and $\beta_{DE,Decile_9}$ to $\beta_{DE,Decile_{10}}$ are jointly zero is 0.765 and 0.252, respectively.

[21] In theory, the parent company can either inject equity with internal funds, or raise equity from external capital market.

[22] Note that as Amadeus only includes European affiliates, the group asset variable is a noisy measure of the worldwide company group asset.

[23] At the time of release, HMRC emphasized that the draft legislation was at an earlier stage of development than normal and significant changes should be anticipated. There was no date specified as to when the new legislation would take effect.

effect on July 1, 2009.[24] Despite a narrow three-month window between the announcement and implementation of the exemption system, UK multinationals may nevertheless have anticipated in 2008 the coming reduction in dividend taxation. Depending on the marginal source of finance, investment of UK-owned affiliates would respond in opposite directions. If new equity injected from the UK parent is the marginal source of finance, a forward-looking profit maximizing UK affiliate would delay some investment spending in low-tax countries in anticipation of a dividend tax cut until after the implementation of the policy. In this case, there would be a temporary decrease in investment by UK affiliates in the low tax countries in 2008 and then an overshoot in investment in 2009, and the difference-in-difference coefficient estimate could reflect strategically timing of investment spending rather than a genuine increase in investment spending.

For UK affiliates that rely on internal financing, equation (4) shows that the cost of capital becomes cheaper in 2008 given a forthcoming reduction in the tax rate. A forward-looking profit maximizing UK affiliate would increase some investment spending in the low-tax countries in 2008 prior to the tax reform, resulting a downward bias in the DD estimate. To identify the effect of anticipation on investment, I include in equation (5) another interaction term between a $Year_{2008}$ dummy and an indicator for an UK affiliate:

$$INVESTMENT_{ikt} = a_i + d_t + \beta_{2008} Year_{2008_t} \cdot UK_{MNC_i} + \beta_1 DE_t + \beta_{\mathbf{x}} \mathbf{x}_{ikt} + \beta_{\mathbf{z}} \mathbf{z}_{kt} + \varepsilon_{ikt},$$

where all other variables are as previously defined. The β_{2008} coefficient captures any differential change between investment by UK and non-UK affiliates in 2008, relative to the 2006 base-year level.

Table 6 summarizes the estimation results in low-tax countries. Regressions in columns 1 use gross investment as the dependent variable and follow the most comprehensive specification which includes additional controls at firm, host country and home country levels. While the DE_t coefficient remains positive and highly significant, the coefficient estimate of β_{2008} is statistically indistinguishable from zero, suggesting the lack of evidence that UK affiliates strategically adjusted their investment prior to the introduction of dividend exemption.[25]

[24] It is a 100% exemption rule for most dividends payable on or after 1 July 2009, including profits accumulated before the introduction of the new legistlation.

[25] Timing uncertainty associated with the dividend exemption reform may provide an alternative explanation to the lack of any anticipation effects. There are two components of reform proposed in the 2007 consultation: exemption of foreign-sourced income and a new Controlled Foreign Companies (CFC) regime. By 2008, however, implementation of the proposal was already "in jeopardy". This is due to HMRC's requirement that the dividend proposals must be "tax neutral", which required targeted measures to restrict the tax deductibility of interest and to use the CFC regime to generate additional tax revenues by including certain capital gains and income from intellectual property (IP). The proposed CFC regime has attracted wide criticism particularly from IP-rich companies and has led to a number of UK headquartered multina-

To further examine how quickly outbound investment reacted to dividend exemption, the regression in table 6 column 2 include two additional interaction terms between a post 2010/2011 year dummy and an indicator for a UK affiliate, respectively. Coefficient on each interaction term would capture the differential change between investment by UK and non-UK affiliates following the corresponding year, conditioned on any changes that already occurred in 2009. The estimate coefficient of DE_t remains positive and highly significant, while the DD coefficient in 2010 is also positive and significant at the 10 percent level. The results suggest that UK affiliates respond to dividend exemption by immediately increasing their current investment. Column 3 and 4 in Table 6 repeat the analysis using net investment as the dependent variable, and the results remain qualitatively the same.

Finally, I conduct simply placebo tests to see whether the investment by UK affiliates increased in 2007 or 2008 prior to the tax reform, by replacing the DE_t variable with an interaction term between a post 2007/2008 dummy indicator and an indicator for a UK affiliate, respectively. Figure 4 summarizes the coefficient estimates of the interaction terms. None of the coefficient estimates are significantly different from zero, except the one for the DE_t variable. The results are assuring that the identified effect of the 2009 tax reform is not a simple continuation of pre-reform increase in the outbound investment of UK multinationals.

F The Effect of Dividend Exemption on Other Outcomes

According to discussions in Section III, increases in investment following a dividend tax cut are financed out of new equity. Therefore some increases in the level of new equity issued to the UK affiliates would be consistent with the observed investment increases in the low-tax countries. Since there is no information on the amount of new equity in the data, I impute the amount of paid-in capital as the difference between shareholder funds and after-tax profit. This is a noisy measure of paid-in capital, as it also include other accumulated comprehensive income or loss as part of the shareholders' fund. The amount of additional paid-in capital or new equity, is computed as changes in the paid-capital between two consecutive years. To reduce the amount of measurement errors in the new equity variable, I construct a dummy indicator that takes value of 1 if the imputed new equity is positive, and zero otherwise. I

tionals (such as Shire Pharmaceuticals and United Business Media) announcing their intention to relocate to a more tax friendly jurisdiction, such as Ireland. In view of these criticisms and a potentially significant number of companies seeking to leave the UK, HMRC announced that it would postpone the new CFC regime and instead, tighten up the existing rules. HMRC also announced its intention to move forward with the dividend exemption, but only if suitable measures to protect UK tax revenues could be found. It was therefore unclear in 2008, in retrospect, the exact time when the dividend exemption would come into effect.

then run a binary discrete choice model of the following form:

$$NewEquity_{it} = a_i + d_t + \beta_{DE} DE_t + \beta_{DE,Cash-poor} DE_t \times \mathbf{I}\{i \in Cash\ Poor\} + \beta_{\mathbf{x}} \mathbf{x}_{ikt} + \beta_{\mathbf{z}} \mathbf{z}_{kt} + \varepsilon_{ikt}, \tag{7}$$

where $NewEquity_{it}$ represents the binary variable of receiving new equity, $\mathbf{I}\{i \in Cash\ Poor\}$ is an indicator that takes value of 1 for all subsidiaries in the 2nd-7th decile of the cash flow distribution, and all other variables are as previously defined. As identified in section D, the investment increases are concentrated in the subsample of UK affiliates in the 2nd-7th decile of the cash flow distribution. The regression results from a fixed-effect linear probability model suggest that the tax reform significantly increases the probability of getting additional paid-in capital for the cash-poor UK affiliates by around 6 percent ($\widehat{\beta}_{DE,Cash-poor} = -0.060$ with a robust standard error of 0.036), while there is no significant change in the probability of getting new equity for the cash-rich UK affiliates ($\widehat{\beta}_{DE} = -0.024$ with a standard error of 0.028).

Columns 3-6 in Panel B of Table 5 further examine the effect of dividend exemption on other outcome variables including firm-level wage rate, employment, labor productivity, and profitability. Wage rate is the only variable that shows a significant change to the tax reform, conditioning on the investment increase. As there is no significant change in the variables measuring labor productivity or profitability, the increase in wage rate could be interpreted as evidence on rent sharing. In circumstances where dividend taxes are effectively paid by the foreign affiliates, the tax reform increases the total after-tax profit and the share of profits that goes to workers in the form of compensation.

VII Reallocation or Increase in Total Investment?

The observed increase in investment by UK multinationals in the low-tax countries could represent an increase in the aggregate investment by UK multinationals due to the reduction in the cost of capital. Alternatively, the investment increase may reflect a reallocation of investment from high-tax to low-tax countries with no impact on aggregate invesmtent. This concern is particularly relevant around the time of the great recession, when many companies are resource constrained with limited investment capacity. Alternatively, if UK multinationals use high-tax affiliates as a vehicle to lower taxes on repatriations, the territoriality reform may decrease the value of high-tax investment. To test these two competing hypothesis, I analyze investment by UK multinationals in the high-tax countries as well as in the UK.

A Outbound Investment Responses in High-Tax Countries

Table 7 presents the difference-in-difference estimation results based on equation (5), focusing on multinational affiliates operating in the EU-27 high-tax countries. Similar to Table 4, all regressions include a full set of subsidiary and year fixed effects. Each column follows the same specification in Table 4. Heteroscedasticity-robust standard errors clustered at the firm level.

Column 1 in Table 7 shows that the introduction of dividend exemption has a somewhat negative effect on investment by UK affiliates in the high-tax countries, which could be suggestive that the UK multinationals invested strategically in the high-tax countries to utilize cross crediting to minimize their foreign tax liability. However the negative effect becomes statistically insignificant once controlling for other non-tax firm-level determinants of investment in column 2, and remains imprecisely estimated in columns 3-7 that control for additional industry, host and home country characteristics. Since the introduction of the territorial system did not directly change the tax treatment of dividend repatriation in the high-tax countries, the lack of investment response in high-tax countries suggests that there is limited shifting of overseas activities from high to low-tax countries following the tax reform. Similarly, I do not find any significant changes in other outcome variables in response to the introduction of the territorial system, as shown in Table 8.

B Domestic Response to Dividends Exemption

To analyze the investment response of UK-owned multinational affiliates at home, I use a similar DD strategy with two alternative control groups: (1) non-UK multinational affiliates operating in the UK, and (2) UK affiliates that are part of a domestic company group.[26] Table 9 summarizes the regression results using non-UK multinational affiliates/domestic firms as the control group in panel A and B, respectively.[27] Columns 1-4 follow the same regression specification as in Table 4, while columns 5-6 attempt to identify the presence of any anticipation effects in 2008. In Panel A, the coefficient estimate of DE_t is mostly negative and insignificant, suggesting that there is no differential investment response by UK-owned affiliates relative to foreign affiliates in non-UK MNEs. In Panel B, the coefficient estimate of DE_t is statistically insignificant across all specifications, suggesting that there is no differential investment response by UK-owned affiliates relative to affiliates in domestic company groups. Regression results in both panels provide suggestive evidence that the exemption system did not systematically affect domestic investment by UK affiliates. Conceptually,

[26] I identify stand-alone firms and domestic company group with all subsidiaries in the UK from ownership information on all UK companies in FAME.

[27] The graphical evidence is presented in Figure in the Appendix.

there is no reason why we would expect such investment change at home, as the tax reform did not change the after-tax rate of return in the UK.

This finding is consistent with Dharmapala, Foley and Forbes (2011), which shows that repatriation following a 2004 tax holiday introduced by the Homeland Investment Act (HIA) did not increase domestic investment in the United States.[28] To reconcile with Egger et al. (2015), which finds that the territorial system induced UK affiliates to pay out significantly more dividends immediately after the reform, the lack of investment response at home may suggest that repatriations could be used to increase employment, pay off debt, or return to shareholders. Unfortunately, further investigation on the impact of dividend exemption on UK multinational groups requires additional data from consolidated financial statement at the company group level. I leave this exercise to further research. At the same time, the lack of investment response at home provides further supportive evidence that outbound investment in low-tax countries did not increase at the expense of domestic investment.

VIII Discussions

To gauge the quantitative impact of the 2009 reform on outbound investment of UK multinationals in low-tax countries, I calculate the increase in investment at the firm and country level. First, the pre-reform average fixed asset in the UK affiliates across low-tax countries is around €16.31 million. Given a DD coefficient estimate of 0.157, it implies that the average investment increase in the UK affiliates is around €0.82 million (in real 2006 terms). Second, I estimate the increase in aggregate investment by summing all the firm-level investment increase in each country.[29] The country-level investment increase is shown in Figure 5. In aggregate, the predicted investment increase is around €5.6 billion (in real 2006 terms) in the low-tax countries, where Ireland, Czech Republic and Poland see the largest increase in their foreign direct investment as a result of the UK tax reform. The aggregate investment increase in the low tax countries is approximately 9 times the amount of estimated foregone tax revenue, suggesting that the tax reform has a strong bang for the buck effect by stimulating £9 of foreign investment by UK multinationals in the low-tax countries for every £1

[28] Two major differences are worth noting. First, the HIA provides U.S. multinationals with a one-time deduction of 85 percent of dividends repatriated by their foreign affiliates. In contrary, UK's dividend exemption is permanent. Second, under the HIA, the 85 percent exemption applies only to "extraordinary dividends", which are defined as dividend payments exceeding average repatriations over a five-year period ending before July 1, 2003, excluding the highest and lowest years. Thus the exemption is limited to extraordinary dividends over and above the average level of dividends remitted. The UK's exemption applies to most dividends as discussed in Section B. The exemption permitted under the new system in the UK is different in nature and more generous than the exemption under the HIA in the United States.

[29] Specifically, for each firm the investment increase is computed as the average pre-2009 fixed asset times the estimated tax differential coefficient and the country-level reduction in the dividend tax rate

loss in tax revenue at home.

IX Conclusion

In this paper I analyze the causal effect of corporation tax in the home country on outward direct investment of multinationals in a quasi-experiment setting. Specifically, I exploit differential changes in dividend taxes on foreign earnings of UK multinational affiliates, following UK's change from the worldwide to territorial tax system in 2009. By exempting foreign earnings from dividend taxation, this reform lowered the after-tax cost of capital for investment by UK affiliates in countries with a lower statutory corporate tax rate compared to the UK.

The findings provide robust evidence that home-country taxes on foreign-source income exert a strong effect on the level and location of foreign investment. UK affiliates on average have increased their investment into the low tax countries by 16 percent, implying an elasticity estimate of investment with respect to repatriation taxes of around 0.2. The results shed light on the debate on whether the United States should implement the territorial tax system by showing that there is no evidence that the investment increase in the low tax countries leads to reallocation of foreign direct investment from the high tax countries or results any significant investment distortion or loss at home.

The findings that UK multinationals increased more investment into countries with a lower corporation tax bear further implication on the corporation tax policy of small capital-importing countries. In particular, the immediate investment responses of the UK multinationals after the reform suggests that the trend to shift from worldwide to territorial taxation in major capital-exporting countries may put downward pressure on corporate tax rates in small countries that compete with each other to attract inward foreign direct investment. Consistent with these findings, Matheson, Perry and Veung (2014) also finds that the bilateral UK FDI financed from new equity has become more sensitive to host-country statutory tax rate following the UK's move to territoriality.

Corporate investment is not the only behavioral margin through which the UK multinationals respond to the territorial tax system. By exempting foreign-source income from taxation at home, the reform may cost considerable revenue by encouraging profit shifting to abroad. If this is the case, it is important to consider proper anti-avoidance measures to protect the tax base at home. Preliminary findings from the current analysis suggest that the territorial reform did not lead to a systematic increase in the reported profitability of UK affiliates in the low-tax countries. Nor is there any systematic increase in the reported leverage ratio of UK affiliates in the high-tax countries. The average response may mask

important heterogeneity of behavioral responses at the firm level, and there are a number of alternative channels for multinationals to shift profit. I plan to analyze the effect of the territorial reform on the extent of base erosion and profit shifting, and to provide a more comprehensive welfare analysis of the territorial reform in future research.

References

Alstadsæter, Annette, Martin Jacob, and Roni Michaely. 2015. "Do Dividend Taxes Affect Corporate Investment?" *Journal of Public Economics*, forthcoming.

Altshuler, Rosanne, and Harry Grubert. 2003. "Repatriation Taxes, Repatriation Strategies and Multinational Financial Policy." *Journal of Public Economics*, 87(1): 73–107.

Altshuler, Rosanne, Harry Grubert, and Scott Newlon. 2000. "Has U.S. Investment Abroad Become More Sensitive to Tax Rates?" In *International Taxation and Multinational Activity*. 9–38. National Bureau of Economic Research, Inc.

Auerbach, Alan J. 1979. "Wealth Maximization and the Cost of Capital." *The Quarterly Journal of Economics*, 93(3): 433–446.

Auerbach, Alan J. 1981. "A Note on the Efficient Design of Investment Incentives." *Economic Journal*, 91(361): 217–23.

Auerbach, Alan J. 1983. "Taxation, Corporate Financial Policy and the Cost of Capital." *Journal of Economic Literature*, 21(3): 905–940.

Auerbach, Alan J. 2002. "Taxation and Corporate Financial Policy." In *Handbook of Public Economics*. Vol. 3, , ed. Alan J. Auerbach and Martin Feldstein, 1251 – 1292. Elsevier.

Auerbach, Alan J., and Yuriy Gorodnichenko. 2013. "Output Spillovers from Fiscal Policy." *American Economic Review*, 103(3): 141–46.

Becker, Bo, Marcus Jacob, and Martin Jacob. 2013. "Payout Taxes and the Allocation of Investment." *Journal of Financial Economics*, 107(1): 1 – 24.

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan. 2004. "How Much Should We Trust Differences-In-Differences Estimates?" *The Quarterly Journal of Economics*, 119(1): 249–275.

Blouin, Jennifer L., Jana S. Raedy, and Douglas A. Shackelford. 2011. "Dividends, Share Repurchases, and Tax Clienteles: Evidence from the 2003 Reductions in Shareholder Taxes." *The Accounting Review*, 86(3): 887–914.

Bond, Steve, Michael Devereux, and Alexander Klemm. 2005. "Dissecting Dividend Decisions: Some Clues About The Effects of Dividend Taxation from Recent UK Reforms." Institute for Fiscal Studies IFS Working Papers W05/17.

Bradford, David F. 1981. "The Incidence and Allocation Effects of a Tax on Corporate Distributions." *Journal of Public Economics*, 15(1): 1 – 22.

Budd, John W., Jozef Konings, and Matthew J. Slaughter. 2005. "Wages and International Rent Sharing in Multinational Firms." *The Review of Economics and Statistics*, 87(1): 73–84.

Campbell, John L., James A. Chyz, Dan S. Dhaliwal, and William C. Schwartz. 2013. "Did the 2003 Tax Act Increase Capital Investments by Corporations?" *The Journal of the American Taxation Association*, 35(2): 33–63.

Chetty, Raj, and Emmanuel Saez. 2005. "Dividend Taxes and Corporate Behavior: Evidence from the 2003 Dividend Tax Cut." *The Quarterly Journal of Economics*, 120(3): 791–833.

Chetty, Raj, and Emmanuel Saez. 2010. "Dividend and Corporate Taxation in an Agency Model of the Firm." *American Economic Journal: Economic Policy*, 2(3): 1–31.

de Mooij, RuudA., and Sjef Ederveen. 2003. "Taxation and Foreign Direct Investment: A Synthesis of Empirical Research." *International Tax and Public Finance*, 10(6): 673–693.

Desai, Mihir A., and James R. Hines. 2003. "Evaluating International Tax Reform." *National Tax Journal*, 56: 487–502.

Desai, Mihir A., C. Fritz Foley, and James R. Hines. 2001. "Repatriation Taxes and Dividend Distortions." *National Tax Journal*, 54(4).

Devereux, Michael P., Clemens Fuest, and Ben Lockwood. 2015. "The Taxation of Foreign Profits: A Unified View." *Journal of Public Economics*, 125: 83 – 97.

Dharmapala, Dhamika, Fritz Foley, and Kristin Forbes. 2011. "Watch What I Do, Not What I Say: The Unintended Consequences of the Homeland Investment Act." *Journal of Finance*, 66(3): 753–787.

Dharmapala, Dhammika, and Nadine Riedel. 2013. "Earnings Shocks and Tax-motivated Income-shifting: Evidence from European Multinationals." *Journal of Public Economics*, 97(0): 95 – 107.

Dischinger, Matthias, and Nadine Riedel. 2011. "Corporate Taxes and the Location of Intangible Assets within Multinational Firms." *Journal of Public Economics*, 95(7): 691–707.

Egger, Peter, Valeria Merlo, Martin Ruf, and Georg Wamser. 2015. "Consequences of the New UK Tax Exemption System: Evidence from Micro-level Data." *The Economic Journal*, forthcoming.

Feld, Lars P., and Jost H. Heckemeyer. 2011. "FDI and Taxation: A Meta-Study." *Journal of Economic Surveys*, 25(2): 233–272.

Feld, Lars P., Martin Ruf, Uwe Scheuering, Ulrich Schreiber, and Johannes Voget. 2005. "Effects of Territorial and Worldwide Corporation Tax Systems on Outbound M&As." ZEW Center for European Economic Research ZEW Discussion Papers 13-088.

Foley, C. Fritz, Jay C. Hartzell, Sheridan Titman, and Garry Twite. 2007. "Why Do Firms Hold So Much Cash? A Tax-based Explanation." *Journal of Financial Economics*, 86(3): 579 – 607.

Gourio, François, and Jianjun Miao. 2011. "Transitional Dynamics of Dividend and Capital Gains Tax Cuts." *Review of Economic Dynamics*, 14(2): 368 – 383.

Graham, John R., Michelle Hanlon, and Terry Sheylin. 2010. "Barries to Mobility: The Lockout Effect of U.S. Taxation of Worldwide Corporate Profits." *National Tax Journal*, 63(4): 1111–1144.

Great Britain Parliament: House of Lords: Select Committee on Economic Affairs. 2009. "The Finance Bill 2009: 3rd Report of Session 2008-09." Vol. 2.

Grubert, Harry. 1998. "Taxes and the Division of Foreign Operating Income among Royalties, Interest, Dividends and Retained Earnings." *Journal of Public Economics*, 68(2): 269–290.

Grubert, Harry, and John Mutti. 2000. "Do Taxes Influence Where U.S. Corporations Invest?" *National Tax Journal*, 53(4): 825.

Hanlon, Michelle, Rebecca Lester, and Rodrigo Verdi. 2015. "The Effect of Repatriation Tax Costs on U.S. Multinational Investment." *Journal of Financial Economics*, 116(1): 179 – 196.

Hartman, David G. 1985. "Tax Policy and Foreign Direct Investment." *Journal of Public Economics*, 26(1): 107 – 121.

Hasegawa, Makoto, and Kozo Kiyota. 2015. "The Effect of Moving to a Territorial Tax System on Profit Repatriation: Evidence from Japan." National Graduate Institute for Policy Studies GRIPS Discussion Paper 15-09.

Heckman, James J, Hidehiko Ichimura, and Petra E Todd. 1997. "Matching as an Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Programme." *Review of Economic Studies*, 64(4): 605–54.

Hines, James R. 1996. "Altered States: Taxes and the Location of Foreign Direct Investment in America." *The American Economic Review*, 86(5): 1076–1094.

Hines, James R., and Eric M. Rice. 1994. "Fiscal Paradise: Foreign Tax Havens and American Business." *The Quarterly Journal of Economics*, 109(1): 149–182.

IMF. 2014. "Spillovers in International Corporate Taxation." International Monetary Fund IMF Staff Report.

King, Mervyn A. 1974. "Taxation and the Cost of Capital." *Review of Economic Studies*, 41(1): 21–35.

King, Mervyn A. 1977. *Public Policy and the Corporation.* London: Chapman and Hall.

Kleinbard, Edward. 2011. "Stateless Income." *Florida Tax Review*, 11: 699.

Matheson, Thornton, Victoria Perry, and Chandara Veung. 2014. "Territorial versus Worldwide Corporate Taxation: Implications for Developing Countries." In *Taxation and Development: The Weakest Link?*. Cheltenham, UK:Edward Elgar Publishing, Inc.

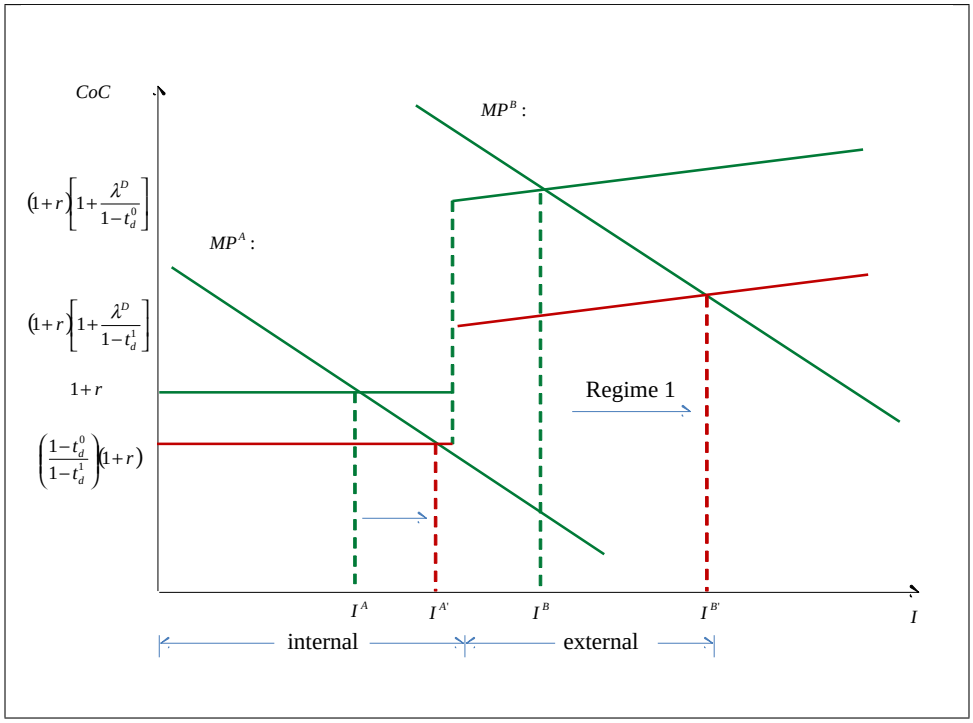
Mathur, Aparna, Nirupama Rao, Michael R. Strain, and Stan Veuger. 2015. " Dividends and Investment: Evidence of Heterogeneous Firm Behavior." New York University NYU Wagner Research Paper 2575860.

Poterba, James M, and Lawrence H Summers. 1984. " New Evidence that Taxes Affect the Valuation of Dividends." *Journal of Finance*, 39(5): 1397–1415.

Slemrod, Joel. 1990. "Tax Effects on Foreign Direct Investment in the United States: Evidence from a Cross-Country Comparison." In *Taxation in the Global Economy.* 79–122. National Bureau of Economic Research, Inc.

Yagan, Danny. 2015. "Capital Tax Reform and the Real Economy: The Effects of the 2003 Dividend Tax Cut." *American Economic Review*, forthcoming.

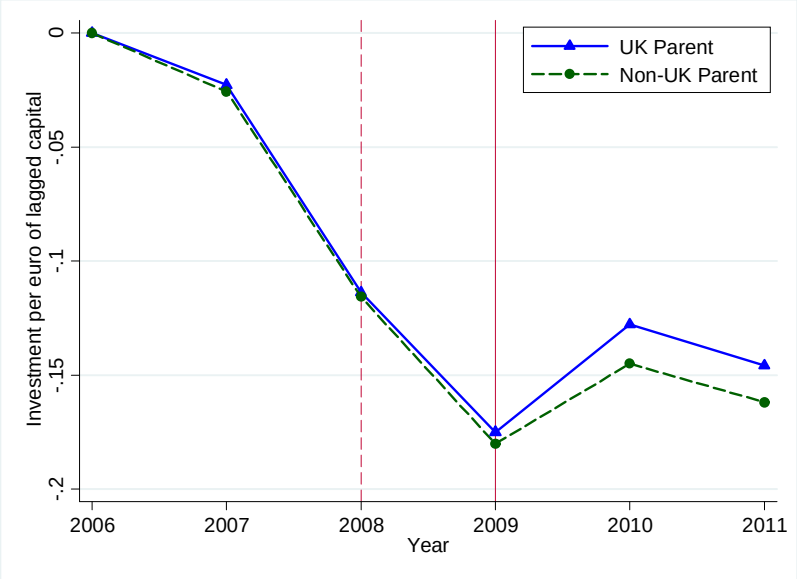
Figure 1. THE EFFECT OF DIVIDEND TAX CUT IN TWO FINANCIAL REGIMES



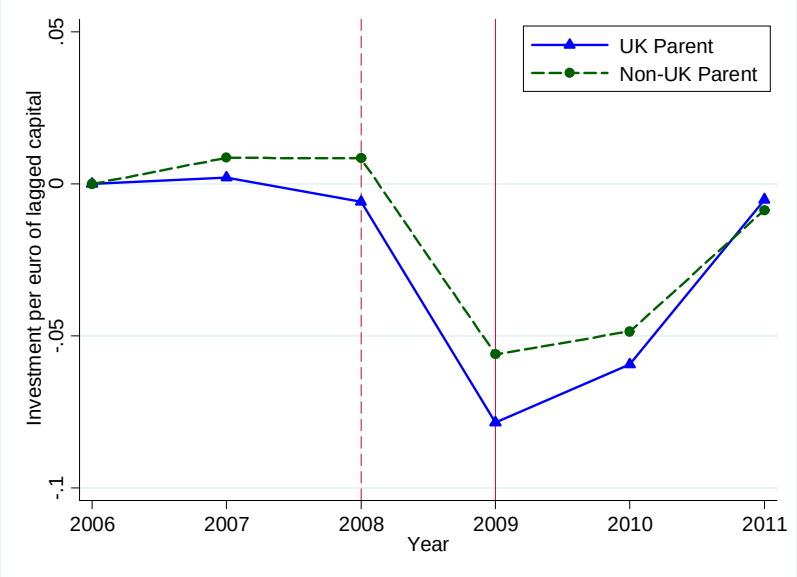
Notes: This figure depicts the two financial regimes under which a reduction in the dividend tax rate would have different effects on investment. In Regime 1, a multinational affiliate with a marginal productivity of type B (MP^B) finances its marginal investment out of new equity. Following a decrease in the dividend tax rate from t_d^0 to t_d^1, it would increase its optimal investment level from I^B to $I^{B'}$. In Regime 2, a multinational affiliate has a marginal productivity of type A (MP^A) and finances its marginal investment out of retained earnings. Its cost of capital is $1-r$ under a constant dividend tax but decreases to $\left(\frac{1-t_d^0}{1-t_d^1}\right)(1-r)$ when there is a temporary change in the rate of dividend tax, or there is expectation of such changes. Anticipating a decrease in the dividend tax rate, firms in financial regime 2 would also increase their investment in the current period.

Figure 2. GRAPHICAL EVIDENCE

A. Gross Investment Rate in Low-Tax Countries

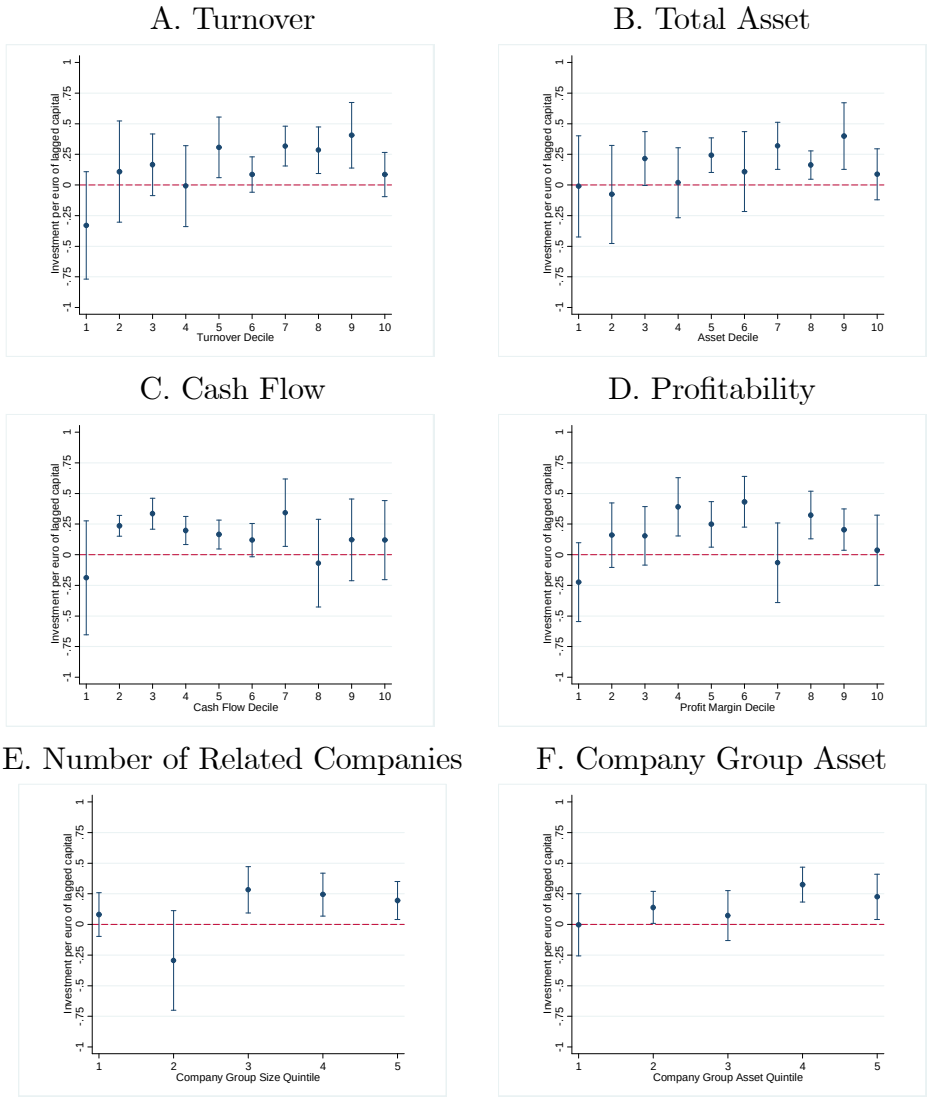


B. Gross Investment Rate in High-Tax Countries



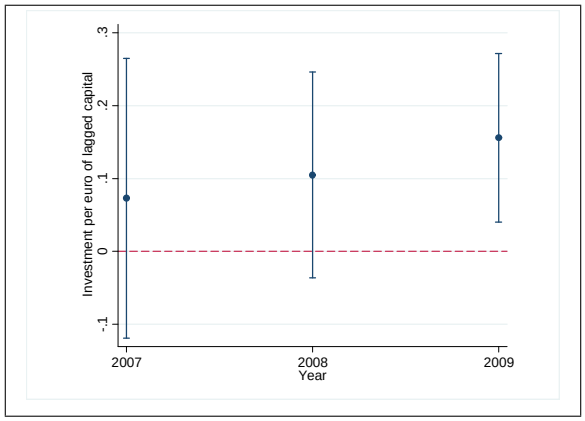
Notes: Panel A plots the median investment rate in 2006-2011 for UK and non-UK multinational affiliates in low-tax countries. Panel B plots the median investment rate in 2006-2011 for UK affiliates and non-UK affiliates in high-tax countries. The solid vertical line depicts the reform year when the territorial tax system was enacted, and the dashed vertical line depicts the year when the policy reform was announced.

Figure 3. HETEROGENEOUS INVESTMENT RESPONSES IN LOW-TAX COUNTRIES



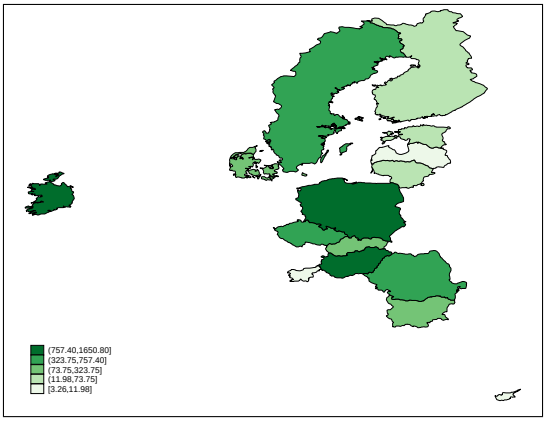
Notes: This figure reports regression results by dividing the main sample into deciles of ex ante financial constraints indicators based on firm size, total asset, cash flow (as a fraction of lagged fixed asset), and profitability. The DD estimation now includes ten interaction terms between the DE_t and each of the ten decile dummy indicators. All other variables are as previously defined. Each panel reports the ten coefficient estimates $\beta_{DE,Decile_j}$ and the corresponding $90th$ confidence interval.

Figure 4. INVESTMENT RESPONSES IN LOW-TAX COUNTRIES: TIMING



Notes: This figure reports the regression results from varying the paper's main investment regression specification (underlying Table 3 column 6) in order to conduct placebo tests. For each year y between 2007 and 2009, the figure reports the coefficient estimate for the interaction term between a post year-y indicator and an indicator that takes value of 1 for UK-owned affiliates, and the corresponding $95th$ confidence interval.

Figure 5. PREDICTED INVESTMENT INCREASES IN LOW-TAX COUNTRIES



Notes: This figure reports the predicted investment increase in the low-tax countries, using coefficient estimates in Table 3 column 7 and the actual decrease in dividend tax in each country following the UK's change from the worldwide to territorial tax system.

Table 1. COUNTRY STATISTICS

Number of Subsidiaries in	with Ultimate Parent in							
Host Country:	Total	UK	Europe	North America	Asia	Africa	South America	Oceania
Austria	3,218	128	2,527	52	117	11	7	9
Belgium	3,817	247	2,536	26	229	13	5	32
Bulgaria	1,098	35	795	21	140	6	0	2
Cyprus	15	2	6	2	0	1	0	1
Czech Republic	6,040	238	4,779	67	275	39	3	15
Germany	13,965	986	8,803	181	1,151	51	16	93
Denmark	1,183	104	790	11	46	1	0	4
Estonia	1,393	68	1,088	44	76	1	0	2
Spain	7,602	643	5,171	92	386	18	47	45
Finland	1,699	103	1,269	14	65	1	1	8
France	13,429	1,091	8,633	187	736	152	24	65
United Kingdom	41,787	24,246	7,709	592	1,566	223	25	547
Greece	1,147	83	855	10	33	17	0	9
Hungary	979	34	787	5	38	2	0	2
Ireland	1,485	294	531	27	54	3	1	15
Italy	7,367	613	4,947	81	339	22	15	55
Lithuania	635	19	535	15	21	1	0	2
Luxembourg	1,305	189	690	37	26	9	1	8
Latvia	1,043	43	802	22	99	8	0	4
Malta	67	8	46	0	3	1	0	1
Netherlands	2,453	272	1,083	34	257	12	14	18
Poland	6,820	303	5,462	36	248	11	2	22
Portugal	1,628	70	1,272	6	58	18	11	13
Romania	8,147	227	6,225	85	858	85	3	21
Sweden	1,774	125	1,301	9	59	0	1	13
Slovenia	293	10	249	1	6	2	0	2
Slovakia	1,225	25	1,037	11	31	1	2	3
Total	131,614	30,206	69,928	1,668	6,917	709	178	1,011

Notes: Countries in each row refer to the host country where the multinational affiliate is located. Countries/Regions in each column refer to the home country/region where the ultimate parent of the multinational affiliate is located.

Table 2. LOW AND HIGH TAX COUNTRIES IN EU27

Country	2005	2011	Country	2005	2011
Low-Tax:			**High-Tax:**		
Cyprus	10	10	Portugal	29	29
Ireland	12.5	12.5	Austria	30	25
Bulgaria	15	10	Luxemburg	30.38	28.8
Latvia	15	15	Netherlands	31.5	25
Romania	16	16	Greece	32	24
Hungary	17.52	21	Belgium	33.99	33.99
Poland	19	19	France	34.93	34.93
Slovakia	19	19	Malta	35	35
Estonia	24	21	Italy	37.25	31.29
Slovenia	25	25	Germany	39.6	30.95
Finland	26	26	Spain	40.37	35.25
Czech Republic	26	19			
Denmark	28	25			
Sweden	28	25	**UK**	30	28

Notes: Low-tax countries refer to those with corporate tax rates consistently lower than the UK tax rate during 2005-2011, and high-tax countries refer to the rest of EU-27 countries.

Table 3. DESCRIPTIVE STATISTICS

Variable	Obs.	Mean	P10	Median	P90
Investment	395,771	1,273	- 41	83	2,969
Fixed Asset	590,648	15,368	6	609	17,305
Gross Investment scaled by Lagged Asset	395,771	0.21	- 4.19	0.34	0.30
Net Investment scaled by Lagged Asset	395,771	0.08	- 5.05	0.13	0.16
Firm-level controls					
Sales	634,601	52	0	6	74
Cash Flow	509,668	4,432	- 398	339	5,800
EBIT Margin	597,762	0.05	- 0.14	0.04	0.29
Sales Growth Rate	495,536	0.20	- 0.30	0.04	0.65
Country-level controls					
Population	634,601	45,361,335	8,355,260	60,182,050	64,658,856
GDP per Capita	634,601	22,811	6,911	26,638	31,000
Unemployment Rate	634,601	0.08	0.05	0.08	0.10
Corporate Tax Rate	634,601	0.28	0.19	0.30	0.36
Governance Quality Indicator	634,601	1.06	0.48	1.18	1.48
Financial Institution Stability Indicator	634,601	11.2	5.3	10.3	21.1
Parent country-level controls					
GDP growth rate (%)	624,479	1.29	- 3.82	1.80	4.01
GDP per Capita	624,708	32,828.78	23,752.86	30,963.23	43,453.36
Unemployment Rate	634,601	7.87	5.30	7.70	10.30
Governance Quality Indicator	630,949	1.20	0.67	1.25	1.64
Financial Institution Stability Indicator	625,101	13.847108	4.8564801	12.1894	25.6315

Notes: Unconsolidated values, in thousand Euros, current prices. All ratios winsorized at top and bottom 0.01 percentile. Country-level controls from the World Bank's World Development Indicators 2009. Country-level corproate tax rates collected from Oxford CBT Tax Database. CPIA transparency, accountability, and corruption in the public sector rating (1=low to 6=high). CPIA business regulatory environment rating (1=low to 6=high).

Table 4. INVESTMENT RESPONSE IN LOW-TAX COUNTRIES: BASELINE RESULTS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DE_t	0.156***	0.112**	0.120**	0.110**	0.096*	0.157***		0.203***	
	(0.059)	(0.051)	(0.051)	(0.051)	(0.052)	(0.057)		(0.065)	
$DE_t \times (\tau_{UK} - \tau_j)$							1.595***		2.136***
							(0.578)		(0.778)
Year FEs	x	x	x	x	x	x	x	x	x
Affiliate FEs	x	x	x	x	x	x	x	x	x
Affiliate-Level Controls		x	x	x	x	x	x	x	x
Industry-Year Fes			x	x	x	x	x	x	x
Host Country-Level Controls				x	x	x	x	x	x
Parent Country-Level Controls					x	x	x	x	x
Host Country-Year FEs						x	x	x	x
N	102,901	74,416	74,416	74,416	74,416	73,014	73,014	71,714	71,714
Clusters (firms)	26,808	23,541	23,541	23,541	23,541	23,075	23,075	22,645	22,645
R^2	0.014	0.008	0.009	0.01	0.013	0.013	0.013	0.013	0.013

Notes: This table reports difference-in-differences estimates of the effect of the 2009 dividends exemption on investment by UK affiliates in EU-27 countries which tax corporate profit at a lower rate than the UK. All columns display the coefficient on the DE_t variable, which is the interaction between a UK affiliate indicator and an indicator for the year being 2009 onwards, from a regression of investment on this interaction, affiliate fixed effects, year fixed effects and additional controls. Investment is gross investment scaled by book value of fixed capital asset in (end of) previous year. Affilate-Level controls indicates that the regression includes lagged turnover, lagged turnover growth rate, cash flow scaled by lagged asset, and lagged profit margin. All firm-level ratio variables are winsorized at top and bottom 0.01th percentile to remove the influence of outliers. "Host Country-Level controls" indicates that the regression includes statutory corporate tax rate, GDP per capita, population size, unemployment rate, and indicators of governance quality and financial institution stability in the host country. "Host Country-Year FEs" indicates that the regression includes two-way host country and year fixed effects. "Parent Country-Level controls" indicates that the regression includes GDP growth rate and GDP per capital, and indicators of governance quality and financial institution stability in the home country where the ultimate parent company is located. Regressions in columns 1-7 use the whole sample, while regressions in columns 8-9 use only wholy-owned multinational affiliates. Heteroskedasticity-robust standard errors are clustered at firm level. ***, **, * denotes significance at 1%, 5% and 10% level, respectively.

Table 5. INVESTMENT RESPONSE IN LOW-TAX COUNTRIES: ROBUSTNESS CHECKS

A. Investment

Dependent variable:	Investment (per lagged capital)					
Dep. Var. winsorized at:	P99					P97.5
Panel:	Unbalanced			Balanced	Matched	Unbalanced
	(1)	(2)	(3)	(4)	(5)	(6)
DE_t	0.157***	0.170***	0.157***	0.147**	0.183*	0.069*
	(0.050)	(0.058)	(0.057)	(0.059)	(0.094)	(0.035)
N	73,014	64,317	73,014	53,641	6,457	73,014
Clusters (firms)		23,075	23,075	14,039	2,021	23,075
Clusters (country pairs)	548					
R^2	0.013	0.013	0.013	0.016	0.021	0.025

B. Net Investment and Other Outcome Variables

Dependent variable:	Net Investment (per lagged capital)		Compensation (per lagged capital)	Employment	Productivity (Compensation per turnover)	Profitability (EBIT per turno
Dep. Var. winsorized at:	P99	P97.5	P99	P99	P99	P99
	(1)	(2)	(3)	(4)	(5)	(6)
DE_t	0.141***	0.058**	15.338*	2.829	-10.687	0.007
	(0.047)	(0.029)	(8.373)	(7.130)	(21.568)	(0.017)
N	73,689	73,689	84,307	89,736	87,737	102,000
Clusters (firms)	23,286	23,286	23,379	24,842	24,204	26,595
R^2	0.017	0.032	0.04	0.001	0.003	0.001

This table checks the robustness of the difference-in-difference estimation results reported in Table 4. All columns use the same regression specification as in 4 column 6 and report the coefficient on the DE_t variable. The dependent variable in Panel A is the gross investment per euro of lagged capital winsorized at the top and bottom $1th$ percentile in columns 1-5. The regression in column 1 clusters the standard error at the host-home country pair level. Column 2 excludes all affiliates that face a worldwide tax system in the home country. Column 3 controls the influence of the euro crisis by adding an interaction term between an indicator that takes value of 1 for host countries in the Eurozone and the post-2009 year indicator. Column 4 uses a balanced sample of firms that exist throughout the sample period. Column 5 uses a matched sample of UK and non-UK affiliates with similar turnover, turnover growth, operation profits, and employment. Column 6 uses the gross investment rate winsorized at the top and bottom $0.25th$ percentile. The dependent variable in Panel B columns 1-2 is the net investment per euro of lagged capital winsorized at the $1th$ and $0.25th$ percentile, respectively. The regressions in Panel B columns 3-6 check the impact of the territorial tax reform on workers' compensation, employment, labor productivity, and reported profitability in the UK affiliates in low tax countries, respectively. All other variables are as previously defined. Heteroskedasticity-robust standard errors are clustered at the firm level unless indicated otherwise. ***, **, * denotes significance at 1%, 5% and 10% level, respectively.

Table 6. SEPARATING THE ANTICIPATION EFFECT

Dependent var:	Gross Investment (£per lagged capital)			Net Investment (£per lagged capital)		
	(1)	(2)	(3)	(4)	(5)	(6)
$Year_{2008}$ * UK Affiliate	0.003	0.094	0.092	0.004	0.077	0.076
	(0.089)	(0.098)	(0.098)	(0.065)	(0.081)	(0.081)
DE_t	0.157**	0.216**		0.147***	0.190**	
	(0.074)	(0.090)		(0.056)	(0.074)	
$Year_{2009}$ * UK Affiliate			0.259***			0.214***
			(0.094)			(0.077)
$Year_{2010}$ * UK Affiliate			0.166*			0.161**
			(0.100)			(0.082)
$Year_{2011}$ * UK Affiliate			0.207			0.187
			(0.140)			(0.122)
Year FEs	x	x	x	x	x	x
Affiliate FEs	x	x	x	x	x	x
Affiliate-Level Controls		x	x		x	x
Industry-Year Fes		x	x		x	x
Host Country-Level Controls		x	x		x	x
Parent Country-Level Controls		x	x		x	x
Host Country-Year FEs		x	x		x	x
N	73,014	73,014	73,014	73,689	73,689	73,689
Clusters (firms)	23,075	23,075	23,075	23,286	23,286	23,286
R^2	0.013	0.013	0.013	0.017	0.017	0.017

Notes: This table reports difference-in-differences estimates of the effect of the 2009 dividends exemption on UK outbound investment in low-tax countries. Columns 1-3 report results using the gross investment rate as the dependent variable, and Columns 4-6 report results using the net investment rate as the dependent variable. All columns display the coefficient on the interaction between a UK affiliate indicator and an indicator for the year 2008 when the reform was announced. Columns 1-2 and 4-5 display the coefficient on the DE variable, which is the interaction between a UK affiliate indicator and an indicator for the year being 2009 onwards. Column 3 and 6 display the coefficients on the interaction terms between a UK affiliate indicator and a year indicator for 2009, 2010, and 2011, respectively.

Table 7. INVESTMENT RESPONSE IN HIGH-TAX COUNTRIES

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
DE_t	-0.071*	-0.025	-0.010	-0.010	-0.009	-0.010	
	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.044)	
Tax Differenial $\times$ DE_t							-0.304
							(0.751)
Year FEs	x	x	x	x	x	x	x
Affiliate FEs	x	x	x	x	x	x	x
Affiliate-Level Controls		x	x	x	x	x	x
Industry-Year Fes			x	x	x	x	x
Host Country-Level Controls				x	x	x	x
Parent Country-Level Controls					x	x	x
Host Country-Year FEs						x	x
N	176,678	130,341	130,341	130,341	130,341	128,330	128,330
Clusters (firms)	42,666	37,550	37,550	37,550	37,550	36,948	36,948
R^2	0.004	0.005	0.006	0.006	0.006	0.007	0.007

Notes: This table reports difference-in-differences estimates of the effect of the 2009 dividends exemption on investment by UK affiliates in EU-27 countries which tax corporate profit at a higher rate than the UK. All columns display the coefficient on the DE_t variable, which is the interaction between a UK affiliate indicator and an indicator for the year being 2009 onwards, from a regression of investment rate on this interaction, affiliate fixed effects, year fixed effects and additional controls. Investment rate is gross investment scaled by book value of fixed capital asset in (end of) previous year. Affilate-Level controls indicates that the regression includes lagged turnover, cash flow scaled by lagged asset, lagged profit margin, and firm age. All firm-level ratio variables are winsorized at top and bottom 0.25th percentile to remove the influence of outliers. "Host Country-Level control" indicates that the regression includes statutory corporate tax rate, GDP per capita, population size, and unemployment rate at the host country level. "Host Country-Year FEs" indicates that the regression includes two-way host country and year fixed effects. "Parent Country-Level controls" indicates that the regression includes GDP growth rate and GDP per capital at the parent country level. Heteroskedasticity-robust standard errors are clustered at the firm level. ***, **, * denotes significance at 1%, 5% and 10% level, respectively.

Table 8. OTHER OUTCOME RESPONSES IN HIGH-TAX COUNTRIES

Dependent variable:	Compensation		Employment		Productivity		Profitability		Total Leverage	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DE_t	-9.177	-9.181	5.238	5.242	-1.984	-1.708	0.002	0.002	0.009*	0.009*
	(6.013)	(6.012)	(5.899)	(5.899)	(14.656)	(14.663)	(0.011)	(0.011)	(0.005)	(0.005)
Number of workers	0.003	0.003								
	(0.002)	(0.002)								
Turnover (thous Euro)	0.024	0.023	0.117***	0.115***						0.000*
	(0.019)	(0.017)	(0.041)	(0.040)						(0.000)
Total Assets (thous Euro)		0.005		0.004		0.069**		-0.000		
		(0.005)		(0.013)		(0.029)		(0.000)		
Year FEs	x	x	x	x	x	x	x	x	x	x
Affiliate FEs	x	x	x	x	x	x	x	x	x	x
N	158,266	158,266	211,420	211,420	187,067	187,067	245,889	245,889	254,121	254,121
Clusters (firms)	37,701	37,701	44,354	44,354	43,250	43,250	49,131	49,131	52,792	52,792
R^2	0.005	0.005	0.002	0.002	0.003	0.004	0	0	0.004	0.004

Notes: This table reports difference-in-differences estimates of the effect of the 2009 dividends exemption on other outcomes in the high tax countries. Compensation is the average company wage and salary per worker, productivity is the total output per worker, profitability is the EBIT relative to total output, and total leverage is the ratio of total liability relative to total asset. All other variables are as previously defined in Table 4. Heteroskedasticity-robust standard errors are clustered at firm level. ***, **, * denotes significance at 1%, 5% and 10% level, respectively.

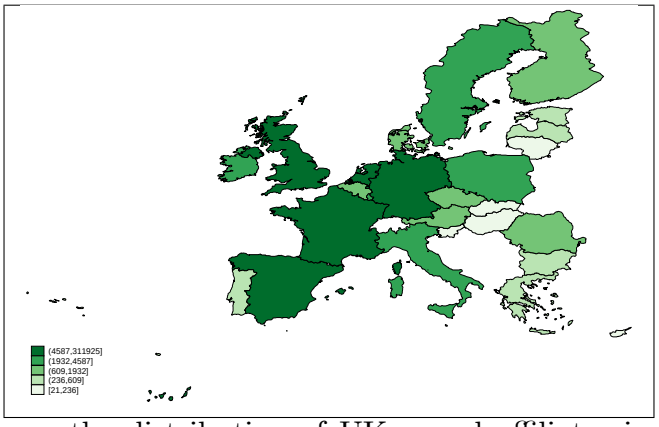
Table 9. INVESTMENT RESPONSE IN THE UK

	(1)	(2)	(3)	(4)	(5)	(6)
A. Control Group:	Non-UK MNE Affliates					
DE_t	-0.059	-0.038	-0.023	-0.017	-0.020	0.037
	(0.040)	(0.043)	(0.043)	(0.054)	(0.076)	(0.083)
$Year_{2008}$ * UK Parent					-0.003	-0.006
					(0.074)	(0.074)
$Post_{2010}$ * UK Parent						-0.109*
						(0.065)
$Post_{2011}$ * UK Parent						0.006
						(0.086)
N	68,679	51,474	51,474	49,863	49,863	49,863
Clusters (firms)	16,535	14,702	14,702	14,208	14,208	14,208
R^2	0.003	0.006	0.007	0.008	0.008	0.008
B. Control Group:	UK Domestic Group Affiliates					
DE_t	-0.029	0.004	-0.000	-0.000	0.010	0.058
	(0.043)	(0.046)	(0.048)	(0.048)	(0.063)	(0.073)
$Year_{2008}$ * UK Parent					0.019	0.019
					(0.072)	(0.072)
$Post_{2010}$ * UK Parent						-0.096
						(0.068)
$Post_{2011}$ * UK Parent						0.042
						(0.083)
N	38,253	27,875	27,875	27,875	27,875	27,875
Clusters (firms)	9,841	8,358	8,358	8,358	8,358	8,358
R^2	0.004	0.007	0.009	0.009	0.009	0.009

Notes: This table reports difference-in-differences estimates of the effect of the 2009 dividends exemption on investment by UK affiliates in the UK. All columns display the coefficient on the DE_t variable, which is the interaction between a UK affiliate indicator and an indicator for the year being 2009 onwards, from a regression of investment rate on this interaction, affiliate fixed effects, year fixed effects and additional controls. Panel A reports results using Non-UK multinational affiliates that operate in the UK as a control group. Panel B reports results using stand-alone firms and firms in domestic groups in the UK as a control group. All variables are defined as in Table 3. Heteroskedasticity-robust standard errors are clustered at firm level. ***, **, * denotes significance at 1%, 5% and 10% level, respectively.

A Appendix

Figure A.1. SPATIAL DISTRIBUTION OF UK SUBSIDIARIES



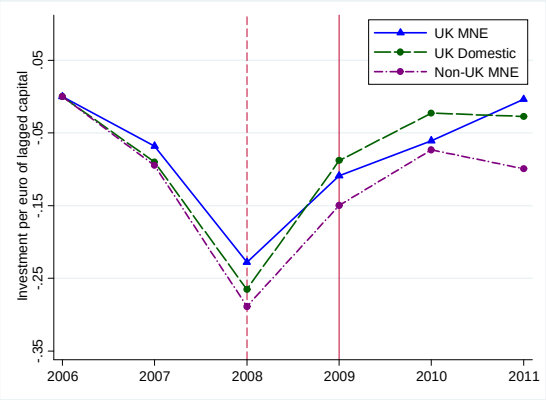
Notes: This figure shows the distribution of UK-owned affiliates in the EU-27 countries. Numbers in the square brackets refer to the five quantiles of the sample distribution. The top 10 industries for the UK and non-UK affiliates in the host countries are:

Top-10 Industries of Multinational Affiliates in Host Countries (NACE)

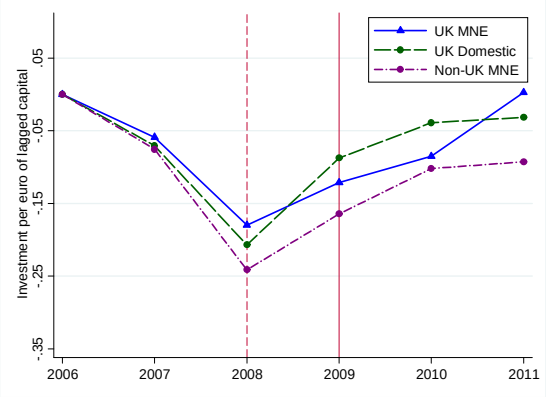
Low-Tax Countries		High-Tax Countries	
UK Affiliates	Non-UK Affiliates	UK Affiliates	Non-UK Affiliates
2120	2910	4671	4671
7311	2932	1920	4511
4730	4671	4675	1920
4635	4646	6120	2910
1200	4511	2120	3511
4711	6202	4672	4646
4673	4651	1200	7010
4719	4711	4646	4669
4646	4730	6190	4651
1920	4690	7311	4711

Figure A.2. GRAPHICAL EVIDENCE ON INVESTMENT IN THE UK

A. Gross Investment Rate



B. Net Investment Rate



Notes: The figure plots the average gross investment rate in 2006-2011 for UK MNE affiliates, UK affiliates of domestic company group, and non-UK MNE affiliates in the UK. The solid vertical line depicts the year when the exemption system became effective, and the dashed vertical line depicts the year when the policy reform was announced.

Table A.1. MEAN CHARACTERISTICS BY TREATED AND CONTROL GROUP

A: Full Sample	UK Affiliates		Non-UK Affiliates		Mean Difference
Variable	Obs.	Mean	Obs.	Mean	p-value
Investment	18,728	2,685	265,232	737	0.19
Fixed Asset	27,807	16,502	396,023	12,894	0.01
Gross Investment scaled by Lagged Asset	18,421	0.167	261,158	0.059	0.00
Net Investment scaled by Lagged Asset	20,424	-0.042	295,490	-0.060	0.00
Firm-level controls					
Sales	28,998	69,610	412,417	50,291	0.00
Cash Flow	23,636	6,118	339,381	3,338	0.00
EBIT Margin	26,962	-0.079	379,458	-0.055	0.00
Sales Growth Rate	22,605	0.211	321,607	0.222	0.04
B: Matched Sample					
Investment	4,952	1,854	3,958	2,181	0.43
Fixed Asset	7,342	15,820	5,664	12,984	0.09
Gross Investment scaled by Lagged Asset	4,877	0.124	3,928	0.190	0.05
Net Investment scaled by Lagged Asset	5,440	- 0.007	4,399	0.080	0.00
Firm-level controls					
Sales	7,778	52,029.18	6,043	53,959	0.628
Cash Flow	6,359	5,920.06	5,084	4,690	0.424
EBIT Margin	7,562	- 0.120	6,016	- 0.010	0.000
Sales Growth Rate	6,040	0.241	4,945	0.205	0.011

Notes: Notes: Unconsolidated values, in thousand Euros, current prices. All ratios winsorized at top and bottom 0.01 percentile.

Table A.2. INVESTMENT RESPONSE IN LOW-TAX COUNTRIES: FULL TABLE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DE_t	0.112**	0.120**	0.110**	0.096*	0.157***		0.203***	
	(0.051)	(0.051)	(0.051)	(0.052)	(0.057)		(0.065)	
$DE_t \times (\tau_{UK} - \tau_j)$						1.595***		2.136***
						(0.578)		(0.778)
Turnover$_{t-1}$	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cash Flow$_{t-1}$	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Profitability$_{t-1}$	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Turnover Growth Rate$_{t-1}$	-0.005	-0.005	-0.012	-0.016	-0.017	-0.017	-0.017	-0.017
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.018)	(0.018)
τ_j			0.978					
			(1.668)					
Host Country Population (in Log)			6.381***					
			(1.499)					
Host Country Unemployment Rate			-0.096	-0.158	-0.114	-0.118	0.078	0.074
			(0.075)	(0.190)	(0.193)	(0.193)	(0.178)	(0.178)
Host Country GDP per Capita			-0.537**					
			(0.267)					
Host Country Governance Quality			-0.000**	-0.000*	-0.000**	-0.000**	-0.000**	-0.000**
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Host Country Bank Z-score			0.017***	0.030***	0.032***	0.032***	0.033***	0.033***
			(0.007)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Home Country GDP Growth Rate					-0.001	-0.001	-0.001	-0.001
					(0.005)	(0.005)	(0.005)	(0.005)
Home Country GDP per Capita					0.000**	0.000**	0.000**	0.000**
					(0.000)	(0.000)	(0.000)	(0.000)
Home Country Governance Quality					-0.000	-0.000	-0.000	-0.000
					(0.000)	(0.000)	(0.000)	(0.000)
Home Country Bank Z-score					0.001	0.001	0.001	0.001
					(0.004)	(0.004)	(0.004)	(0.004)
N	74,416	74,416	74,416	74,416	73,014	73,014	71,714	71,714
Clusters (firms)	23,541	23,541	23,541	23,541	23,075	23,075	22,645	22,645
R^2	0.008	0.009	0.01	0.013	0.013	0.013	0.013	0.013

Notes: This table reports the full regression results from Table 4. A full set of firm fixed effects and year fixed effects are always included. A set of industry-year fixed effects are included in columns 2-8; a set of country-year fixed effects are included in columns 5-8. Host country corporation tax rate, population and GDP per capita are omitted in columns 5-9 mostly due to collinearity once the country-level specific trends are included. For definition of variables please see notes in Table 3. Heteroskedasticity-robust standard errors are clustered at firm level. ***, **, * denotes significance at 1%, 5% and 10% level, respectively.