Does a Tax Deduction Scheme matter for Jobs and Investment by Multinational and Domestic Enterprises?[1]

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Abstract

Many countries have reduced corporate income tax rates or introduced tax deductions, exclusions, and credits to attract foreign direct investment. This paper analyzes the introduction of the Notional Interest Deduction (NID) in Belgium, which allows companies to deduct from their taxable income an interest that is calculated based on the company's equity. We use an event type study approach to analyze the evolution of employment and investment of foreign affiliates in Belgium. We find that the tax deduction has increased employment and investment in the Belgian affiliates on average by 7.4 and 6.1 percent respectively in the period after the introduction of the NID. The NID, however, also provides a higher after-tax return on investment to domestic Belgian firms. Using a matching analysis, we find that domestic Belgian firms with low external financial dependence also respond to the NID but somewhat less strongly, domestic firms with high external financial dependence do not show NID-driven investment nor employment creation.

JEL classification numbers: F21, F23, H25

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1. Introduction

During the last few decades, most countries have gone through an intensified process of economic integration resulting in increased trade flows and growing internationalization of the production process. An important part of these global value chains has been the rise in foreign investments by multinational enterprises (MNEs): increasingly, firms choose to locate production, head offices, R&D activities and sales across multiple countries. As a result, an increasing part of a country's employment and output is accounted for by MNEs. It is therefore not surprising that governments engage in various policy initiatives, such as tax deductions and subsidies, to attract MNEs and jobs that come with them (Hines, 2007). Whether or not these policies are justified depends on the social returns of foreign direct investment (FDI), for instance whether technological spillovers to domestic firms take place, or whether new jobs are being created which would not have been created in the absence of these policies.

In this paper, we study the impact of such a novel tax policy. We analyze the impact of the introduction of the 'notional interest deduction' (NID) on employment decisions of foreign MNEs and domestic enterprises in Belgium. The NID is an 'allowance for corporate equity' (ACE) introduced by the Belgian authorities in 2006[2]. The adoption of the NID was an unexpected and thus exogenous policy change following the negative decision adopted in 2003 by the European Commission for the Belgian coordination center tax regime. This regime was introduced in 1982 with the goal of attracting multinational enterprises, and in particular the affiliates of multinational groups that carry out service activities such as intra-group financing, central procurement, and factoring, for other companies in the group, to Belgium. The scheme was generally considered as very successful given that over 400 multinationals applied for the status of coordination center and around 280 multinational groups effectively established a coordination center in Belgium and operated under the regime for some time[3]. Following the EC ruling of state aid on February 17, 2003, the coordination center tax scheme was discontinued but a transition period was defined in which recognized coordination centers whose 10-year approval had not yet expired, could continue to benefit from this special tax regime until the end of 2010[4]. The recognized coordination centers that still benefitted from the advantageous tax regime for coordination centers could however not use the notional interest

[2] https://finance.belgium.be/en/enterprises/corporation-tax/tax-benefits/notional-interest-deduction

[3] PWC (2011), 'The Notional Interest Deduction, a true economic wealth-generator', Tax Freedom Day.

[4] Green, P. (2003), 'Coordination centres: the end of an era? Not quite…', *Competition Policy Newsletter*. Quaghebeur, M. (2005), 'Belgium renovates and generalizes coordination center regime', *Practical European Tax Strategies* 7(7): pp. 1, 14-19.

deduction, but had to opt for either one, coordination center regime or notional interest deduction.

While the NID was introduced to replace the coordination center tax regime, its coverage is wider and the NID is available to all companies subject to Belgian corporate income tax, both domestic enterprises and Belgian branches of foreign enterprises. The new rules were intended to provide both an incentive for multinationals to allocate activities to a Belgian affiliate and a higher after-tax return on investment for all companies, foreign and domestic alike.[5] The NID allows companies to deduct from their taxable income an interest[6] that is calculated on the company's equity. The notional interest deduction comes on top of the companies' interest deduction on debt and aims at reducing the tax discrimination between debt and equity financing, the so-called 'debt bias', by making investments financed by equity more attractive. The tax deduction also lowers the effective corporate tax rate of Belgian companies because the base to compute the interest deduction includes all existing equity[7] and not just the new equity of the company, a unique feature of the Belgian NID. The use of the NID does not entail any obligation to invest in (in)tangible fixed assets.

In line with the double goal of the NID -attracting foreign investment and improving the investment climate for domestic companies- we present an analysis of investment and job creation both by MNEs and by domestic firms. In both cases we use a difference-in-differences estimation approach (DiD). For the MNE setting, we compare the evolution of employment in Belgian affiliates with the employment in French affiliates belonging to the *same* multinational group. As affiliates of the same MNE active in neighboring countries arguably operate in very similar markets and are under control of the same corporate management, culture, and management practices, this makes for an appropriate control group. We focus specifically on affiliates in France as the legal reporting requirements in the annual accounts are the same as in Belgium. Further, the evolution of the institutional context in France, in particular its labor market and fiscal policies follows closely those in Belgium in the immediate period before and after the introduction of the NID. The only important difference is the introduction of the NID in 2006. For our second analysis, we use all domestic Belgian companies and match them to domestic companies in other Western European countries based on employment patterns prior

[5] https://finance.belgium.be/en/enterprises/corporation-tax/tax-benefits/notional-interest-deduction#q2

[6] The notional interest rate is defined as the yearly average of the Belgian 10-year government bond yield.

[7] 'Equity'- according to Belgian account law - includes capital, share premiums, revaluation gains, reserves, carry-forward of profits or losses, and capital investment subsidies. The calculation of the tax deduction start from the 'equity capital' as stated in the company's opening balance sheet for the taxable period. Some adjustments will be made to obtain the qualifying equity. The latter will form the basis for the calculation of the notional interest deduction(https://finance.belgium.be/en/enterprises/corporation-tax/tax-benefits/notional-interest-deduction#q3).

to the NID introduction. In our subsequent difference-in-differences estimations we control for the general tax environment by including the statutory corporate tax rate and industry-time and firm fixed effects. We further control for a set of time-varying firm characteristics not included in the matching procedure.

In both cases we focus on the intensive margin, in which MNEs and domestic companies in Belgium decide to change employment in response to the NID incentive. Of course, there may also be effects through the extensive margin, that is, MNEs may decide to open new affiliates or there might be an increase in domestic entry in response to the NID. However, our data do not allow to analyze this dimension of adjustment as we do not observe entry.

We find that the NID has increased investment in Belgian affiliates of foreign enterprises by 6.1 percent and employment by 7.4 percent on average in the period after the introduction of the NID. For domestic Belgian companies we find smaller, but still significant effects with increases of 2.7 percent for investment and 3 percent for employment on average. When we focus on the subset of domestic firms with low external financial dependence, i.e. firms that have internal resources to fund investment that can benefit from the NID, we find effects that are much closer to those for Belgian MNE affiliates.

The remainder of this paper is structured as follows. In section 2, we provide a theoretical motivation and the empirical approach for our analysis. Section 3 presents the MNE analysis, describing the data, showing summary statistics and providing results. Section 4 presents the data and analysis for domestic Belgian enterprises. We conclude in section 5.

2. Theoretical Motivation and Empirical Approach

The standard Modigliani-Miller (1958) theorem states that in a frictionless economy a firm is indifferent between various sources of financing for its projects (either issuing equity or issuing debt) and therefore, the capital structure of firms should be irrelevant for its profitability. Boadway and Bruce (1984) show how levying a business tax is 'neutral' in the sense that it does not affect the firm's decisions at the margin and it should have no effect on investment decisions. Also, the pecking order theory of finance suggests that the NID should not have an impact on the capital structure of firms (Myers, 1984). However, by now, various papers have discussed that this tax neutrality does not seem to hold in many cases, mainly because of the existence of agency and bankruptcy costs, asymmetric information, and limited market efficiency (e.g. Graham, 2002). For instance, the NID may trigger firms to substitute debt for own equity, reducing the potential bankruptcy costs. Previous research analyzing ACE found positive effects on corporate equity ratios, with the ownership structure and the number of owners playing an important role on the magnitude of its increase (e.g. Petutschnig and Rünger, 2017). Others have focused on the reduced tax discrimination between debt and equity financing following the introduction of an ACE (e.g. Zangari, 2014). Panier *et al*. (2013) and Hebous and Ruf (2015) focus on the NID introduction in Belgium and provide evidence for a more balanced capital structure (more equity, less debt), especially among the large firms. In contrast, the capital structure of SMEs which implemented the NID does not seem to have been affected in the short term (Laveren and Van Sweevelt, 2008; Van Campenhout and Van Caneghem, 2013).

These studies generally focus on the tax neutrality of the capital structure of firms and do not consider real effects, such as investment or jobs[8]. De Mooij (2011) suggests that the economic benefits of an ACE, such as the NID, will likely accrue primarily to employees. The return on capital after source taxes is determined by the world market since investors can move their assets freely across borders. Removing the tax on the normal return through an ACE will thus attract an inflow of capital, which could boost labor productivity and employment. Since the NID is reducing the effective corporate tax rate, the after-tax return on investment increases (Colmart and Hübner, 2005). In addition, the increased cash-flow which emerges from the NID system can trigger higher investment especially in financially constrained firms (Manigart,

[8] A notable exception is Hebous and Ruf (2015), who find that introducing an ACE increases lending between affiliates of the same multinational. They also analyzed the impact on investment but find no evidence for an increase in productive investments in affiliates in Belgium following the introduction of the NID.

Baeyens & Verschueren, 2002). Higher investment in turn could be associated with higher employment, depending on the substitution elasticity between capital and employment.

In contrast to previous research, our paper focuses on real effects that may emerge after the introduction of the NID. In particular, in the first analyses, we investigate the investment and employment effects in MNE affiliates after the introduction of the NID[9] in Belgium. We focus on multinational enterprises as an important political argument for introducing the NID was to keep and attract foreign jobs following the breakdown of the coordination centre regime[10]. In a next step, we repeat the analyses for all domestic Belgian firms, as the NID aims to provide a higher after-tax return on investment to all Belgian firms, not only the multinationals. A number of papers have analyzed the response of FDI to differences in corporate taxation across and within countries. However, the focus of these studies is on the location choice of foreign subsidiaries -the extensive margin- (Barrios *et al*., 2012; Becker *et al*., 2012). In particular, these and related papers focus on the relocation of taxable income of multinational groups operating in high-tax countries as well as low-tax countries and/or tax havens (Clifford 2019; Gumpert *et al*., 2016; Koethenbuerger *et al*. 2019), or the impact of a tax reform on the investment decisions (fixed assets) of foreign affiliates (Egger *et al*., 2015), but not on the employment effects in foreign subsidiaries. Most studies also look at existing differences in taxation across multiple countries or regions, but not to actual changes in taxation. However, in order to be able to infer causal effects from taxation, one needs sufficient and exogenous variation in corporate tax rates as in Fuest, Peichl and Siegloch (2018).

In contrast, we exploit an unexpected exogenous introduction of a tax deduction in Belgium in response to a policy decision of the European Commission and compare the employment of foreign affiliates in Belgium with the affiliates of the same MNEs in France and the employment of domestic Belgian firms with employment evolutions in matched domestic firms in other European countries. As such, our methodological approach can be seen as a quasi-natural experiment. Further, our setting does not suffer from other simultaneous changes in corporate tax rates and the corresponding tax base, which blurs the effects of how international tax competition affects employment and FDI in general[11]. In particular, the overall tax burden

[9] While there is ample evidence on the relationship between FDI spillovers and productivity (e.g. Javorcik, 2003; Damijan, *et al*. 2013, Merlevede et al., 2014), this paper looks at the direct employment effects of a specific and unique tax deduction.

[10] https://www.tiberghien.com/media/ACTL%20seminarie_Bernard&Thomas.pdf

[11] For instance, Devereux et al. (2002) show that the tax-cutting and base-broadening reforms that countries in the EU and G7 countries implemented in the early 1980s to the late1990s, have left the effective tax rate on marginal investment of firms, fairly unchanged.

of firms is impacted by additional tax deductions, exclusions and tax credits, which advanced economies typically offer to corporations (Hines, 2017). While we focus on employment, we will also analyze how corporate investment responds to the policy change. If lower taxes increase investment then labor productivity increases, which may result in increased employment (Fuest, Peichl and Siegloch, 2018).

3. NID and multinational enterprises

The NID was introduced to replace the coordination center tax regime, a successful scheme to attract MNEs to Belgium. The NID provides an incentive for MNEs to allocate activities to a Belgian affiliate. In this section, we investigate the impact of the NID on the employment of Belgian affiliates of multinational firms or how the NID is attracting foreign jobs, i.e. jobs created by affiliates of MNEs.

3.1 Data and Summary Statistics

Our dataset uses the annual September issues of the Amadeus database issued by Bureau van Dijk to construct a database of Belgian affiliates (treated group) and French affiliates (control group) belonging to the same MNEs. Belgian and French MNEs were removed from the dataset to exclude possible home bias effects on employment from domestic firms[12]. We also removed all affiliates active in the finance and insurance sector (NACE Rev.2 sectors 64-66) and the interim (labor agency) sector (NACE Rev.2 sector 78). Changes in employment in finance and insurance sectors may reflect portfolio optimization, while changes in demand for employment in other sectors may also impact employment in the interim sector that offers employment services to other firms. The resulting dataset consists of panel data for the period 2001-2009 containing Belgian and French affiliates belonging to the same ultimate owner, with corresponding balance sheet data, employment and sector of activity, and the parent's country of origin. Merlevede et al. (2015) provide a detailed description of the dataset and its construction. There were no major changes in the economic and institutional environment (market / labor costs / taxes) in France nor in Belgium in the immediate period before and after the introduction of the NID[13], except for the introduction of the NID in 2006.

To isolate the NID from other tax measures, we exclude some specific sectors from the analyses. First, we remove all affiliates with activities of head offices (NACE Rev.2 sector 70.10, or NACE Rev.1.1 sector 74.15) in Belgium and in France. After the abolishment of the

[12] For the year 2005, this related to 1,179 affiliates of Belgian MNEs and 2,567 affiliates of French MNE's.

[13] In 2003, the Belgian authorities reduced the corporate income tax from 40.19 percent to 33.99 percent. The tax reduction was accompanied by a broadening of the tax base. In France, the corporate income tax rate gradually lowered from 40.0 to 35.43 percent between 1999 and 2002 as a consequence of the reduction of the social surcharges.

coordination center regime in 2003, the coordination centers in Belgium[14] - which are a subset of the head offices - could choose either for the continuation of the favorable coordination center regime during a certain transition period or switch to the NID. However, they were not allowed to cumulate the tax benefits of the coordination center regime with the NID, and the exact duration of the transition period also differed between firms depending on the expiration of their (10-year) recognition as a coordination center.

Other minor tax measures targeting specific types of firms[15] have been implemented or were in place during the period of investigation. We also remove affiliates benefitting from these measures from our sample to obtain our basic results regressions. In Belgium, a wage subsidy for R&D workers was introduced in 2005, reducing the withholding tax on labor income of R&D workers by 25 to 50 percent. The Belgian government also introduced a patent box regime in 2007, called the Patent Income Deduction (PID) and applicable from 2008 onwards. Therefor we also excluded affiliates of the high-tech industry sectors (NACE Rev.2 sector 21 and 26) and the scientific R&D service sector (NACE Rev.2 sector 72) in Belgium and France as those R&D intensive firms can apply for additional tax incentives to stimulate R&D activities and increase employment of R&D researchers. In 2005, the Belgian government also introduced an "excess profit" tax scheme, allowing MNEs to discount profits resulting from being part of an international group from their tax base. We identified 35 MNEs that received an excess profit ruling from the Belgian tax authorities, allowing them to strongly reduce their tax base. All the affiliates in Belgium and France of those 35 MNEs were removed from the base sample. In January 2016, the European Commission concluded that the "excess profit" scheme gives a preferential tax treatment to multinational companies, is therefore illegal under EU state aid rules and had to be abandoned [16]. In Appendix B.1 we show our results to be robust to the inclusion of these MNE affiliates from the estimation sample.

As employment data are key in our analyses, we only retain the MNEs for which both the Belgian and French affiliates report employment. The financial reporting requirements in Belgium and France are quite similar, and more stringent compared to other countries such as Germany and the Netherland. We further identified and removed outliers using the BACON algorithm to identify outliers in multivariate data (Weber, 2010).[17] We consider the following

[14] To benefit from the coordination center regime prior to 2003, firms had to obtain an approval by the Belgian tax authorities (renewable every 10 year), employ at least 10 full-time employees in Belgium and be part of a major multinational group with presence in at least four countries (Pieron, et. al, 2000).

[15] See Appendix 1 for full details.

[16] http://europa.eu/rapid/press-release_IP-16-42_en.htm

[17] BACON stands for 'block adaptive computationally efficient outlier nominator'.

variables: number of employees, cost of employees, average labor cost, equity, total assets and the equity-to-total asset ratio. We ended up with on average 2,142 affiliates in Belgium and 3,048 affiliates in France for the period 2001-2009.

Table 1 presents summary statistics at the level of Belgian and French affiliates for the period 2001-2005 (pre-treatment level). The table shows that, on average, French affiliates are larger than Belgian affiliates in terms of employment (150 versus 71 full time equivalents in the period 2001-2005). Average labor costs per worker are higher in Belgian affiliates than in French affiliates. In terms of equity and total assets, affiliates in France are larger than in Belgium. Prior to the NID introduction, Belgian affiliates have, on average, a slightly lower equity-to-total assets ratio than French affiliates.

Table 1 Affiliate level summary statistics (period 2001-2005)

	Labor (full time equivalent)	Average Labor cost per worker (euro)	Equity (th euro)	Total assets (th Euro)	Equity-to-total assets ratio
Belgium (n=10,677)					
mean	77	64,700	6,563	22,927	0.21
sd	224	43,519	32,603	79,526	0.61
France (n=16,827)					
mean	150	54,628	9,453	30,551	0.23
sd	344	41,484	34,060	84,737	0.54

One mechanism through which the NID works is by attracting more equity investments to Belgian affiliates. An increase in equity results in a more 'balanced' capital structure (more equity, less debt) and can be measured with the equity-to-total-assets ratio, which is the ratio of the firms' shareholder equity over the total assets of the firm. The average equity-to-total-assets ratio in 2001-2005 was 0.21 for the Belgian affiliates and 0.23 for the French affiliates of the same MNEs.

As a preliminary analysis, Figure 1 plots the results of regressing the equity-to-total-assets ratio in Belgian and French affiliates on year dummies and affiliate fixed effects. These fixed effects control for affiliate characteristics that do not change over time such affiliate's average size and age, sector of activity, average wages, and the country in which the affiliates operate. The dots represent the yearly change in the equity-to-total-assets ratio of the Belgian versus French affiliates compared to the year 2004, the vertical bars are the 95 percent confidence intervals. Figure 1 illustrates that in the period right before the introduction of the NID in 2006,

the equity-to-total-assets ratio of firms in Belgian and France did not change significantly compared to 2004, satisfying the common trend assumption. For the French affiliates, the equity-to-total-assets ratio also did not change after 2006. In contrast, in the Belgian affiliates the average equity-to-total-assets ratio starts to increase from 2005 onwards, with significantly higher ratios than their French counterparts from 2006 onwards. The higher equity-to-total-assets ratio corresponds with the introduction of the NID in 2006[18], and can only be observed in the Belgian affiliates. This confirms earlier findings by Panier *et al*. (2013).

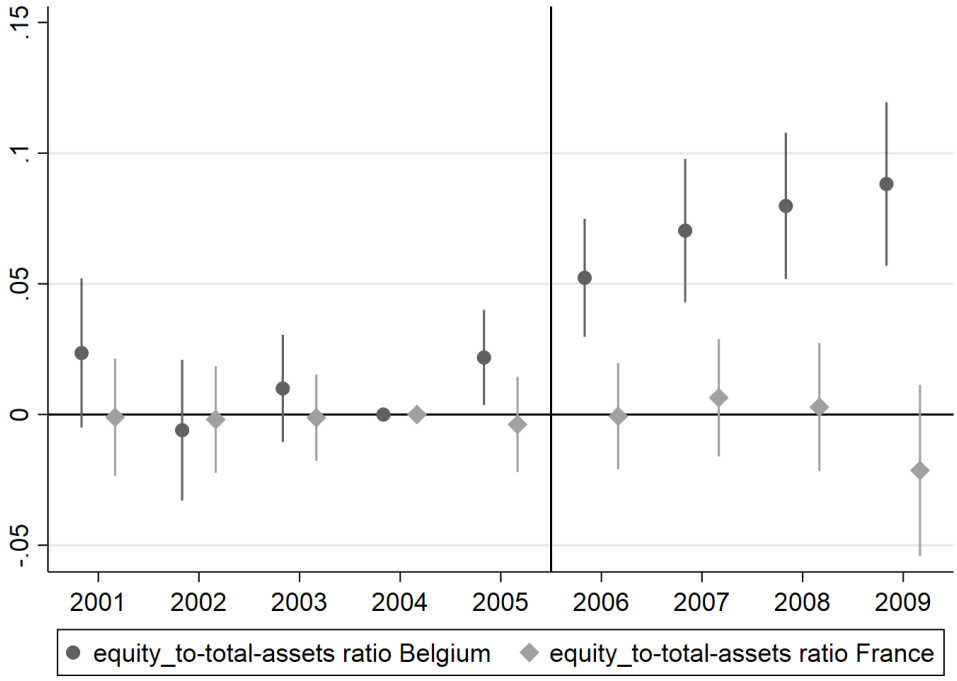

Figure 1 Evolution of equity-to-total-assets ratio, correcting for affiliate fixed effects

3.2 Method and Results

To measure the impact of the NID on employment, we compare the evolution of employment in the Belgian affiliates (treatment group) before and after the introduction of the NID with the evolution of employment in the French affiliates (control group) using a difference-in-differences (DiD) estimation. Our sample selection ensures that affiliates in Belgium and

[18] The small, but non-significantly different increase in the equity-to-total-asset ratio of the Belgian affiliates in 2005 might reflect an anticipation effect: firms that have increased their equity at the end of fiscal year 2005, in order to be able to fully benefit from the NID deduction in 2006.

France are comparable as they belong to the same MNEs, operate in similar markets and in an institutional context which is very comparable across both countries in terms of the level and evolution of labor costs and corporate income taxation. The only important difference in taxation, is the introduction of the NID in 2006 for the affiliates operating in Belgium.

As the growth rates of individual affiliates are likely to be different depending on the average size and age of the firm, the main sector of activity, the institutional context of the country in which it operates and different internationalization strategies of the parent firm, we control in our models for affiliate fixed effects and for time-varying sector fixed effects.

Before the introduction of the NID - after controlling for affiliate and sector-time fixed effects - employment in Belgian affiliates should not be significantly different from employment in our control group of French affiliates belonging to the same MNEs. Observing MNEs' yearly employment after the introduction of the NID, permits to estimate annual treatment effects. This is important as it may take time before the employment effects of the NID are fully realized and it also allows to investigate whether the employment effect of the NID has a permanent character.

The introduction of the NID in 2006 was an unexpected and thus exogenous policy change following the negative decision adopted in 2003 by the EC with respect to the Belgian coordination center regime. The implementation of the tax deduction is therefore unrelated to the existing employment level of firms in Belgium. Given that since 2003 no other major tax or labor reforms have been introduced in Belgium or in France, our difference-in-differences estimator therefore identifies a causal effect of the NID on employment in Belgian affiliates.

We compare the employment in Belgian affiliates with the employment in French affiliates of the same MNEs following the DiD specification in equation (1):

$$lnEMP_{it} = \alpha_i + \beta_t + \gamma_{st} + \tau\, NID_i + \varepsilon_{it} \qquad (1)$$

$LnEMP_{it}$ is the log of employment of affiliate *i* at time *t*, we omit a subscript to indicate the MNE group to which the affiliate belongs. Affiliate fixed effects are represented by α_i. These control for firm characteristics that do not change over time such as average firm size and sector. Since parent - affiliate linkages remain quite stable over time, the affiliate fixed effects also control to a large extent for parent characteristics such as size, country of origin and international orientation of the MNE[19]. The coefficients β_t represent the time fixed effects and

[19] Two-way clustering at the affiliate-MNE level yields similar results.

measure different aggregate time trends in employment across the firms in our dataset. Likewise, the coefficients γ_{st}, the sector-time interaction fixed effects, control for different aggregate time trends in employment across sectors. The variable NID_i takes the value 1 for the Belgian firms when the NID is in place (2006 and later), and the value zero otherwise. The coefficient τ therefore measures the average effect of the NID in the Belgian affiliates. We will also allow τ to vary over time by interacting with time effects. It estimates the annual difference in employment of the Belgian affiliates relative to the French affiliates compared to the base year 2005.

As argued before, one channel through which employment may be affected is through investment. Since the NID increases the after-tax returns of investment, we may expect an increase in investment. When investment and employment are complements, we may expect an increase in employment as well. We therefore also analyze whether investment is affected, using the same DiD approach. We measure investment as a ratio relative to the stock of tangible fixed assets in t-1. Investment is defined as the change in tangible fixed assets between year t and t-1 plus depreciation.

Table 2 shows the baseline results, starting in columns (1) and (2) with the impact on the investment ratio. We can note that the NID indeed has triggered higher investment on average by 6.1 percent, with stronger and more significant effects two years after the introduction of the NID scheme (Figure 2). Similarly, in columns (3) and (4) we find on average an increase in employment of 7.4 percent. In contrast to investment, the employment effects are significant immediately after the introduction of the NID (Figure 3). The affiliate fixed effects, the time fixed effects and the sector-year interaction fixed effects in the DiD estimations control for the average size, age, and wage differences between affiliates as well as common technology and aggregate shocks. In column (5) we show that the results are robust when we restrict our sample to a balanced one, so attrition in our panel does not seem to be systematically related to the employment effects of the NID.

The immediate effect on employment suggests that MNEs can adjust employment relatively quickly. Given the data are annual and the NID has been introduced on January 1, it is not unreasonable that at the end of a 12-month period, the date of the accounting information, employment has increased. The fact that investment, which refers to the increase in tangible fixed assets, responds somewhat slower is consistent with the idea that capital is fixed in the short run.

In Appendix B.2 we presents the results of a placebo test comparing Irish affiliates to French affiliates rather than Belgian to French affiliates. We find no “NID-effect” for Irish affiliates.

Table 2 DiD estimation: average and yearly investment and employment effects of the NID, Belgian versus French affiliates

	$\frac{I_{it}}{K_{it-1}}$	$\frac{I_{it}}{K_{it-1}}$	$\ln(N_{it})$	$\ln(N_{it})$	$\ln(N_{it})$
	All firms	All firms	All firms	All firms	Firms with 9 observations
	(1)	((2)	(3)	(4)	(5)
Average treatment *NID*	0.061*		0.074***		
	[0.033]		[0.018]		
2001 x BE		0.033		0.016	0.002
		[0.058]		[0.023]	[0.024]
2002 x BE		0.034		-0.002	-0.019
		[0.055]		[0.020]	[0.021]
2003 x BE		0.041		-0.010	-0.013
		[0.051]		[0.017]	[0.016]
2004 x BE		0.033		-0.002	-0.004
		[0.049]		[0.013]	[0.010]
2006 x BE		0.080		0.065***	0.058***
		[0.050]		[0.014]	[0.011]
2007 x BE		0.060		0.068***	0.065***
		[0.056]		[0.017]	[0.016]
2008 x BE		0.105*		0.084***	0.073***
		[0.058]		[0.021]	[0.021]
2009 x BE		0.122**		0.085***	0.094***
		[0.061]		[0.025]	[0.026]
Affiliate FE	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes
Sector x year FE	yes	yes	yes	yes	yes
Observations	37,426	37,426	46,720	46,720	24,753
R-squared	0.393	0.393	0.957	0.957	0.955

Notes: Specification includes affiliate fixed effects, year fixed effects, and sector- year interaction fixed effects (NACE 2-digit); robust standard errors clustered at affiliate level.

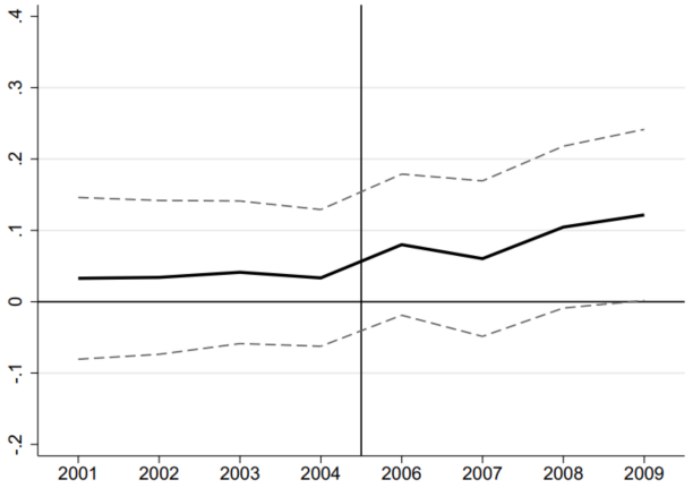

Figure 2 Average effect of NID on investment ratio in Belgium, period 2001-2009, dotted lines are 95% confidence bands, the bold line is the point estimate.

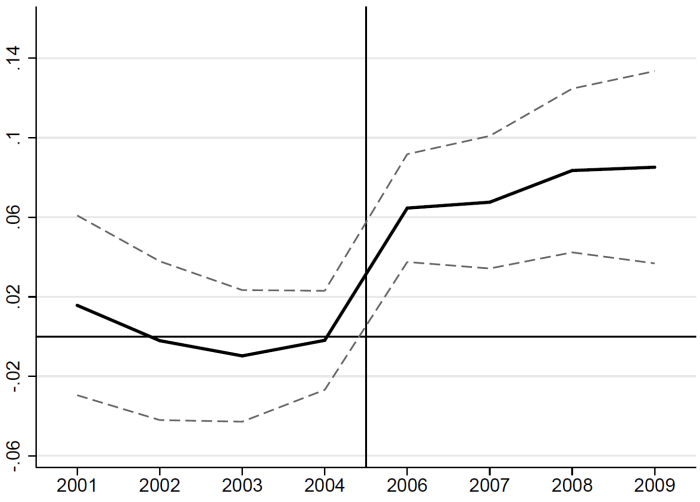

Figure 3 Average effect of NID on employment in Belgium, period 2001-2009, dotted lines are 95% confidence bands, the bold line is the point estimate.

4. NID and domestic enterprises

Whereas the previous section focuses on employment effects in Belgian affiliates of MNEs, this section provides an analysis of the NID effects for domestic Belgian enterprises. As indicated before, the introduction of the NID constitutes an incentive for multinationals to allocate activities to a Belgian affiliate but the coverage of the NID is wider and also provides a higher after-tax return on investment for all companies subject to Belgian corporate income tax, both foreign and domestic.

4.1 Data and Summary Statistics

Specifically, in this section we perform a matching analysis to test the NID effect using all Belgian firms taken from Amadeus rather than our specific sample of MNE affiliates in the previous section (see Merlevede et al. (2015) for construction of the dataset). As in the MNE analysis and for the reasons discussed there, we also exclude firms active in the finance and insurance sector (NACE Rev.2 sectors 64-66), the interim (labor agency) sector (NACE Rev.2 sector 78), activities of head offices (NACE Rev.2 sector 70.10, or NACE Rev.1.1 sector 74.15), the high-tech industry sectors (NACE Rev.2 sector 21 and 26) and the scientific R&D service sector (NACE Rev.2 sector 72) from our sample.

We focus on the "within-effect" and consider firms for which we observe employment, the equity ratio, and the investment ratio from 2003 till 2009. For each Belgian firm we then find close matches based on firms' pre-NID employment patterns (employment levels in 2003, 2004, and 2005) using multivariate-distance matching (Mahalanobis) and we retain the nearest neighbor. We consider firms from other Western European countries available from Amadeus with the necessary information to match with Belgian firms. We have 14,378 Belgian firms that are matched to firms from 10 other Western European countries. Firms are matched within industries and domestic Belgian firms are matched with domestic firms in the control group countries. The distribution across control countries is provided in table 3. Table 4 provides distribution statistics for employment, the equity ratio, and total and tangible fixed assets for both Belgian firms and the control firms. The distribution for employment, employment growth and the equity ratio fully overlap between treated and matched control firms suggesting good pre-NID comparability. In terms of assets, Belgian firms are somewhat larger.

Table 3 Country distribution of matched dataset (year 2005)

country	*# firms*	*share*
BE	14,378	50
AT	1	0
DE	133	0.46
DK	1,326	4.61
ES	8,142	28.31
FI	481	1.67
FR	1,734	6.03
IT	2,023	7.04
NL	124	0.43
PT	23	0.08
SE	391	1.36

Matching performed on employment levels in 2003-2004-2005 for firms reporting data over the entire period for all variables necessary for the analysis.

Table 4 Pre-treatment (period 2003-2005) distribution statistics of selected variables

	mean	sd	p10	p25	p50	p75	p90	p95
Employment (#)								
control	25.4	47.7	2	4	11	27	56	95
BE	25.4	47.8	2	4	11	27	57	95
Employment growth (log changes)								
control	0.02	0.27	-0.18	-0.03	0.00	0.08	0.22	0.40
BE	0.02	0.24	-0.17	-0.04	0.00	0.07	0.22	0.40
Equity ratio								
control	0.32	0.33	0.05	0.14	0.30	0.50	0.70	0.79
BE	0.32	0.49	0.06	0.16	0.31	0.50	0.70	0.80
Total assets (deflated, log)								
control	9.7	1.6	7.6	8.4	9.6	10.7	11.7	12.3
BE	10.0	1.4	8.3	8.9	9.9	10.8	11.9	12.5
Tangible fixed assets (deflated, log)								
control	7.5	2.0	5.0	6.1	7.4	8.8	10.0	10.8
BE	8.2	1.7	6.0	7.1	8.3	9.3	10.3	11.0

4.2 Method and Results

We now proceed by comparing the evolution of investment and employment in domestic Belgian firms with the evolution in the control group using a similar DiD specification as in equation (1) above. Table 5 shows the results. All regressions include firm fixed effects, and sector- year interaction fixed effects. Controls included in the specification with the investment ratio as dependent variable (results in columns 1-4) are the country-level statutory tax rate, firm size measured by real total assets, and lagged profits scaled by total assets. Controls included in the specification with the log of employment as dependent variable (results in columns 5-8) are the country-level statutory tax rate, firm size measured by real total assets, the real wage, and lagged real output as a demand proxy.

Results in columns (1) and (2) and columns (5) and (6) confirm our earlier findings. In the post-NID period, we observe a significant increase in investment and employment in Belgian firms compared to their matched counterparts. At 2.7% (investment) and 3.0% (employment) point estimates of the effects are smaller than those for foreign affiliates at 6.1% and 7.4% (see table 2).

In columns (3) and (4) and columns (7) and (8) of table 5, we split our sample based on Belgian firms' median external financial dependence over the period 2003-2005 and keep the matched firm in the same sample as its Belgian treated counterpart. To determine external financial dependence (EFD), we calculate a Rajan-Zingales style indicator at firm-level (see Rajan and Zingales, 1998). Specifically, we calculate the share of investment that cannot be financed through internal cash flows, i.e. investment (change in tangible fixed assets plus depreciation) minus cash flow divided by investment. As the NID stimulates investment financed through internal resources, we expect the effect to be explicitly pronounced among firms that generate more own resources and thus score lower on our measure of external financial dependence. This is exactly what we observe in columns (3) and (4) (Figure 4 investment) and columns (7) and (8) (Figure 4). Firms that score below the median of the indicator prior to the NID introduction and have relatively large cash flows compared to investment, show a stronger and consistently positive reaction to the introduction of the NID. This is not the case for firms with high initial external financial dependence that have less cash flow resources available to internally finance NID-driven investment and employment creation. Point estimates in column (7) are now also closer to the estimates in Table 2 above, reaching 7.4% higher employment by 2009. This is in line with the idea that the external financial dependence of MNEs with internal capital markets is generally lower than for (smaller)

domestic companies. These findings thus corroborate our earlier results with respect to MNE affiliates.

Table 5 DiD estimation: average and yearly investment and employment effects of the NID for domestic Belgian firms

	$\frac{I_{it}}{K_{it-1}}$	$\frac{I_{it}}{K_{it-1}}$	$\frac{I_{it}}{K_{it-1}}$	$\frac{I_{it}}{K_{it-1}}$	$\ln(N_{it})$	$\ln(N_{it})$	$\ln(N_{it})$	$\ln(N_{it})$
	All firms	All firms	EFD-low	EFD-high	All firms	All firms	EFD-low	EFD-high
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Avg treat *NID*	0.027**				0.030***			
	[0.010]				[0.007]			
2003 x BE		-0.010*	-0.017**	-0.003		0.004	0.007	0.001
		[0.005]	[0.006]	[0.006]		[0.005]	[0.006]	[0.006]
2004 x BE		0.001	-0.010	0.012**		0.004	0.005	0.003
		[0.005]	[0.007]	[0.005]		[0.004]	[0.003]	[0.006]
2006 x BE		0.016**	0.041***	-0.008		0.038***	0.041***	0.036***
		[0.006]	[0.007]	[0.005]		[0.002]	[0.003]	[0.004]
2007 x BE		0.025**	0.041**	0.010		0.021*	0.035***	0.009
		[0.011]	[0.013]	[0.012]		[0.010]	[0.009]	[0.011]
2008 x BE		0.039*	0.057**	0.022		0.021	0.043**	0.001
		[0.019]	[0.023]	[0.016]		[0.015]	[0.018]	[0.014]
2009 x BE		0.078**	0.096**	0.061**		0.055**	0.074**	0.037
		[0.026]	[0.031]	[0.022]		[0.022]	[0.026]	[0.020]
Stat. tax	0.008	0.002	0.003	0.001	0.005	0.004	0.002	0.006
	[0.005]	[0.006]	[0.007]	[0.005]	[0.003]	[0.004]	[0.005]	[0.004]
Observations	123,043	123,043	60,201	62,842	118,670	118,670	58,017	60,653
R-squared	0.354	0.354	0.339	0.373	0.972	0.972	0.973	0.971
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Sector x year FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: Specification includes firm fixed effects, year fixed effects, and sector- year interaction fixed effects. Observations with investment ratios larger than one excluded. Controls included in columns (1)-(4) are the statutory tax rate, firm size and lagged profits. Controls included in columns (5)-(8) are the statutory tax rate, firm size, wage, and lagged output as a demand proxy. Robust standard errors are clustered at country level.

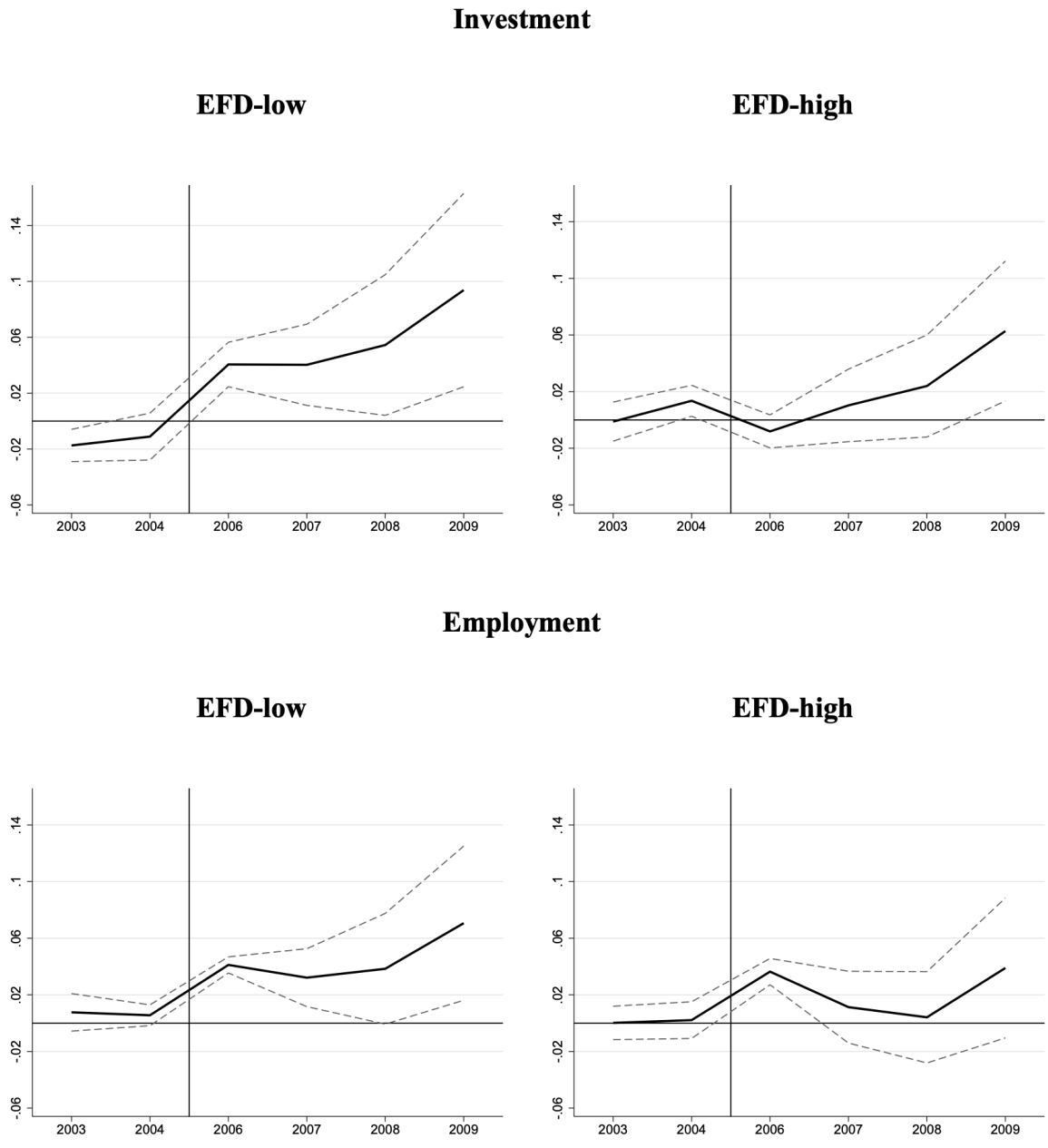

Figure 4 Effect of NID on investment and employment on Belgian domestic firms with low and high external financial dependence, period 2003-2009, dotted lines are 95% confidence bands, the bold line is the point estimate.

5. Conclusions

To attract foreign direct investment, many countries traditionally engaged in reducing statutory corporate income tax rates. Increasingly, however, countries have implemented tax deduction schemes that affect the tax base rather than the tax rate. In this paper, we exploit the

introduction of such a tax scheme in Belgium, the notional interest deduction (NID), to identify the impact of corporate income taxation on employment in affiliates of MNEs and in domestic firms.

Using a unique dataset that covers the multinational nature of firms, our difference-in-differences analyses find that the tax scheme has increased employment in Belgian affiliates by about 7.4 percent over the period 2006-2009 relative to affiliates of the same MNEs located in France. The observed employment effects are not related to other tax deductions or tax credits that have been introduced in Belgium and France in the 2000s, nor are they related to the activities of MNEs which operated a coordination center in Belgium before the abolishment of this scheme in 2003. These findings are robust to a placebo exercise.

In addition, we find similar but smaller effects when we extend the analyses beyond MNEs towards domestic Belgian firms matched with similar firms in 10 other Western European countries. More particularly, we find that domestic Belgian firms with low external financial dependence sufficient, and therefore more internal funds to finance investment, also respond to the NID with increased employment but somewhat less strongly. In contrast, domestic Belgian firms with high financial dependence do not show increased levels of investment nor employment following the introduction of the NID.

Our paper shows that the NID introduction matters for equity, investment, and jobs both at MNE affiliates and domestic firms. The results also show that the NID was an important instrument for the international competitiveness of Belgium after the disappearance of the coordination centre tax regime targeting MNEs. We estimate that the average decrease in corporate taxes in our sample of MNE firms following the introduction of the NID amounts to 104,377 euro per firm[20]. The 7.4% increase in employment in the period 2006-2009 resulting from the introduction of the NID generated an average of 6 extra jobs per MNE firm, raising the average income tax on wages[21] with 186,018 euro per firm. The net effect of the NID therefore consists of an extra tax revenue for the Belgian government of 81,642 euro per MNE firm. Clearly, this back-of-the-envelope calculation excludes effects such as new employment at MNEs displacing employees from other firms, but it suggests a net benefit in terms of government tax revenues from MNEs as the increase in wage taxes exceeds the cost of the NID

[20] This amount is the reduction in the effective average tax rate in Belgium in the period 2005-2009 (-4.80%, Appendix 1, table A.2) multiplied by the average profit and loss before tax of MNEs in 2005 (1,331,192 euro).

[21] The average employment in 2005 is 81 FTE per MNE, while the labor cost is 67,034 euro. We estimate the net wages of employees to 36,095 euro (labor cost / tax wedge). The tax wedge in Belgium, which is calculated as (1 + employer tax rate) / (1 – employee tax rate) approximates 1.86 given an average employee tax in Belgium of about 30%. The income tax per job, i.e. the labor costs minus net wages, therefore equals 30,938 euro.

tax deduction for MNE affiliates. Our complementary analysis on domestic Belgian firms reveals no evidence for a negative, job-displacing effect of the NID on local firms. On the contrary, the NID also contributed to increased employment of domestic Belgian firms with low external financial dependence.

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Appendix A: Evolution of corporate taxation in Europe

Table A.1 Evolution of STR in Europe, period 2003-2009

	2003	2004	2005	2006	2007	2008	2009	change
Belgium	33.99	33.99	33.99	33.99	33.99	33.99	33.99	0.00
Denmark	30.00	30.00	28.00	28.00	25.00	25.00	25.00	-5.00
Germany	39.58	38.25	38.70	38.70	38.70	30.18	30.18	-9.41
Ireland	12.50	12.50	12.50	12.50	12.50	12.50	12.50	0.00
Greece	35.00	35.00	32.00	29.00	25.00	35.00	35.00	0.00
Spain	35.00	35.00	35.00	35.00	32.50	30.00	30.00	-5.00
France	35.43	35.43	34.95	34.43	34.43	34.43	34.43	-1.00
Italy	38.25	37.25	37.25	37.25	37.25	31.40	34.43	-6.85
Luxembourg	30.38	30.38	30.38	29.63	29.63	29.63	28.59	-1.79
Netherlands	34.50	34.50	31.50	29.60	25.50	25.50	25.50	-9.00
Austria	34.00	34.00	25.00	25.00	25.00	25.00	25.00	-9.00
Portugal	33.00	27.50	27.50	27.50	26.50	26.50	26.50	-6.50
Finland	29.00	29.00	26.00	26.00	26.00	26.00	26.00	-3.00
Sweden	28.00	28.00	28.00	28.00	28.00	28.00	26.00	-1.70
United Kingdom	30.00	30.00	30.00	30.00	30.00	30.00	28.00	-2.00
EU-15 average	**31.91**	**31.39**	**30.05**	**29.64**	**28.67**	**28.21**	**27.89**	**-4.02**

Source: EU Taxation Database.

Table A.2 Evolution of EATR in Europe, period 2003-2009

	2003	2004	2005	2006	2007	2008	2009	change
Belgium	29.50	29.50	29.50	25.70	25.40	24.90	24.70	-4.80
Denmark	26.80	26.80	25.10	25.10	22.50	22.60	22.60	-4.20
Germany	37.00	35.80	35.80	35.50	35.50	28.20	28.00	-9.00
Ireland	14.30	14.30	14.30	14.40	14.40	14.40	14.40	0.10
Greece	30.40	30.40	27.80	25.20	21.70	21.80	30.50	0.10
Spain	36.50	36.50	36.50	36.50	34.50	32.80	32.80	-3.70
France	35.00	35.00	34.80	34.40	34.60	34.60	34.70	-0.30
Italy	32.60	31.80	31.80	31.80	31.80	27.30	27.50	-5.10
Luxembourg	26.50	26.50	26.50	25.90	25.90	25.90	25.00	-1.50
Netherlands	31.00	31.00	28.40	26.70	23.10	23.10	22.20	-8.80
Austria	31.00	31.20	23.00	23.00	23.00	23.00	22.70	-8.30
Portugal	29.40	24.60	24.60	24.60	23.70	23.70	23.70	-5.70
Finland	27.20	27.20	24.50	24.50	24.50	24.50	23.60	-3.60
Sweden	23.10	23.10	24.60	24.60	24.60	24.60	23.20	0.10
United Kingdom	29.30	29.30	29.30	29.20	29.30	28.00	28.30	-1.00
EU-15 average	**29.31**	**28.87**	**27.77**	**27.14**	**26.30**	**25.29**	**25.59**	**-3.71**

Source: EU Taxation Database.

Appendix B: MNE analysis - further robustness checks

B.1 Firms that benefitted from other tax advantages

In Table B.1 we add the observations of Belgian and French affiliates of the MNEs that could benefit from a favorable tax regime (coordination center regime, R&D tax credits, excess profit ruling) in Belgium and / or France during the period 2001-2009 to the analyses. In our main analysis, we excluded those firms which could also benefit from other tax reliefs. Including these firms in our sample in Table B.2 results in about 3,000 extra observations. Results remain unaffected, we find a 6-8% increase in employment in Belgian affiliates compared to French affiliates belonging to the same MNE group.

This is consistent with Roggeman *et al*. (2014) who find that the reduction in the tax burden due to the NID is of a much larger nature than the reduction caused by the implementation of the R&D tax credits. For large companies, they find that the NID leads to a reduction in the effective tax burden of -12.57%, while the investment deduction or the tax credit for patents only diminishes the effective tax burden by -0.5%. Bornemann *et al*. (2018) find that the introduction of the patent box regime in Belgium had a significant impact on the innovative activities of firms. However, they find only a reduction in the EATR for the subsidiaries of MNEs without opportunities to shift income out of the country, and not for subsidiaries of MNEs with income shifting opportunities.

Table B.1 DiD estimation: average and yearly employment effect of the NID, coordination centers, R&D firms and firms with EPR included, robustness

	$\ln(N_{it})$ All firms	$\ln(N_{it})$ All firms	$\ln(N_{it})$ Firms with >=7 observations
	(1)	(2)	(3)
NID_average	0.066***		
	[0.017]		
2001 x BE		0.021	0.005
		[0.022]	[0.023]
2002 x BE		0.005	-0.015
		[0.019]	[0.020]
2003 x BE		-0.005	-0.010
		[0.016]	[0.015]
2004 x BE		0.001	-0.003
		[0.012]	[0.010]
2006 x BE		0.064***	0.051***
		[0.013]	[0.011]
2007 x BE		0.065***	0.057***
		[0.016]	[0.016]
2008 x BE		0.078***	0.062***
		[0.020]	[0.020]
2009 x BE		0.075***	0.082***
		[0.024]	[0.025]
Affiliate FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Sector x year FE	Yes	Yes	Yes
Observations	52,024	52,024	27,566
R-squared	0.957	0.957	0.954

Notes: Specification includes affiliate fixed effects, year fixed effects, and sector- year interaction fixed effects (NACE 2-digit); robust standard errors clustered at affiliate level

B.2 Placebo test with Irish affiliates

We want to provide further evidence that the positive employment effects shown in Table 2 are related to the introduction of the NID and not to any other factors that may have impacted employment in French affiliates differently from employment in affiliates of the same MNEs located in Belgium. Therefore, we perform a placebo experiment in which the evolution of employment in Irish firms before and after the introduction of the NID is compared with the employment in French firms belonging to the same MNEs.

Our placebo experiment uses the same set-up as in the main model: we construct a database of affiliates in Ireland and France that are part of the same MNE and perform a DiD estimation to measure the impact of the NID on employment. In the placebo experiment the affiliates of MNEs in Ireland form the treatment group, while the counterfactual consists of the affiliates of the same MNEs in France. Firms in Ireland are subject to similar financial reporting requirements than Belgium and France. Like Belgium, Ireland is a small economy with FDI contributing substantially to the overall economic performance of the country. In addition, besides France, Ireland is one of the few European countries that did not introduce a major tax change in the immediate period before or after the introduction of the NID[22]. Therefore, Irish affiliates of foreign MNEs are a good candidate for the placebo. We expect the evolution of employment in Irish affiliates not to differ from the employment in French affiliates after 2005. This will provide additional evidence that the employment differences in Belgian affiliates compared to the French affiliates after 2005 found in our main model are driven by the NID treatment affecting Belgian affiliates, and not by other factors affecting employment at French affiliates.

Table B.2 presents the results of the placebo test with the Irish affiliates. Similarly, as in the main model, we start from all French and Irish affiliates in column (1), do an extra check in column (2) on the dataset in which employment data is available for at least 5 of the 6 years. Finally, we split the affiliates in column (1) into affiliates of MNE groups that have no Belgian siblings (column (3)) and those that do have Belgian siblings (column (4)). The results of the placebo test show that in the period immediately before the introduction of the NID (2003-2005), there is no significant difference in employment between Irish and French affiliates, validating the common

[22] Alternative candidates would be Austria or Finland, but both countries had substantial reduction in corporate income tax in 2004.

trend assumption[23]. After the introduction of the NID in 2006, there is no increase of employment in Irish affiliates compared to the French affiliates. Therefore, there is no indication of other factors affecting employment in French affiliates that potentially would show up as a NID effect in our main estimations.[24]

Table B.2 DiD estimation: yearly employment effects, Ireland placebo, robustness

	ln (N_{it}) All firms	ln (N_{it}) Firms with >=6 observations	ln (N_{it}) Firms with no BE links	ln (N_{it}) Firms with BE links
	(1)	(2)	(3)	(4)
2003 x IE	-0.044	-0.064	-0.026	0.045
	[0.033]	[0.045]	[0.037]	[0.238]
2004 x IE	0.001	0.008	-0.000	-0.078
	[0.037]	[0.064]	[0.040]	[0.217]
2006 x IE	0.008	-0.020	0.060	-0.031
	[0.043]	[0.049]	[0.048]	[0.220]
2007 x IE	-0.048	-0.025	-0.026	0.337
	[0.048]	[0.060]	[0.049]	[0.212]
2008 x IE	-0.052	-0.027	-0.033	0.237
	[0.054]	[0.066]	[0.061]	[0.212]
2009 x IE	-0.072	-0.075	-0.027	-0.068
	[0.057]	[0.072]	[0.066]	[0.212]
Affiliate FE	yes	yes	yes	Yes
Year FE	yes	yes	yes	Yes
Sector x year FE	yes	yes	yes	Yes
Observations	13,583	4,756	12,667	916
R-squared	0.962	0.951	0.963	0.982

Notes: Specification includes affiliate fixed effects, year fixed effects, and sector- year interaction fixed effects (NACE 2-digit); robust standard errors clustered at affiliate level.

[23] If we consider the larger period 2001-2009, we find that at the turn of the century, when the Irish economy was hardly hit by the crash of the ICT bubble, Irish firms did suffer substantial and significant losses in employment compared to French affiliates belonging to the same MNE. However, analog to the analyses with Belgian and French affiliates, we decide to focus the analyses to the period immediately before and after the introduction of the NID.

[24] The overall results remain very similar when removing the Irish and French firms active in the ICT sectors. Compared to France and Belgium, the ICT sector is much more important in Ireland.