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PRELIMINARY VERSION

Tax Incentives to Encourage Corporate Investment in Latvia[1]

Mihails HAZANS[2] (University of Latvia, IZA, and GLO) and Anna Pluta (BICEPS)

This paper analyzes the effect of accelerated depreciation (AD) policy on firm investment using administrative firm-level data for 2007–14. We find that past use of AD had a positive effect on firm investment rates. The effect is stronger in industries with most of their assets in long-duration categories, among enterprises with fewer than six employees and among firms whose turnover is highly volatile. AD of new equipment has a significant effect both on next year investment rate and on probability to invest next year, but only for firms with six to ten workers. AD in specially assisted areas has boosted investment decisions after lifting the restrictive project requirement for this category of AD.

1. Introduction

During 2006-2017, Latvia has applied a rather generous accelerated depreciation (hereafter AD) policy to stimulate firm investment. Neighboring Estonia has applied, since 2000, a zero corporate income tax on reinvested profit. During 2008-2015, business investment rate (defined as gross investment/ gross value added of non-financial corporations) in Latvia was in line with other Baltic countries and Poland. However, since 2010, Latvia lags behind Estonia in terms of investment per person employed, and the gap is increasing (see Annex 1 for details). Moreover, in Latvia economic activities with high investment per person employed and high business investment rate are not among those with the highest apparent labor productivity. This might indicate that the AD scheme in Latvia was too general and/or too generous, resulting in over-investment in less productive firms or industries.

The purpose of this paper is to shed light on responses to the following questions:

1. Did the AD policy encourage firms to invest in Latvia?
2. How did past experience in using AD (in terms of relative and absolute size of accelerated depreciation value and the magnitude of the reduction of taxable income) affect the size of investment?
3. How do the effects of AD of new equipment, AD in SAAs, and other types of AD compare?

[1] The paper has benefited from many useful discussions with Emilia Skrok, Irem Guceri, Palma Mosberger, and three anonimous referees. The usual disclaimer applies.

[2] Corresponding author e-mail: mihazan@lanet.lv.

4. Did lifting the project requirement for AD in SAAs have a positive effect on investment?

Previous studies have identified several channels through which accelerated depreciation (AD) might affect investments: (1) It lowers the user cost of capital (Jorgenson 1963; Zwick and Mahon 2017). (2) For firms on a tight margin it relaxes the cash flow constraint (Kaplan and Zingales 1997, Stein 2003, Devereux and Liu 2017, Zwick and Mahon 2017, among others). (3) Managers keen on tax saving might use AD for this reason but only when the tax benefits are immediate (Zwick and Mahon 2017)—as is often the case under the Latvian AD policy. We are also going to explore the uncertainty-mitigating effect of accelerated depreciation: firms can afford more risky investment if the cash flow from AD is sufficient for "business-as-usual" investment as a plan B.

In what follows, Section 2 details Latvia's AD policy and compares it to U.S. bonus depreciation, which has been intensively studied (by among others House and Shapiro 2008, Zwick and Mahon 2017, Ohrn forthcoming). Section 3 summarizes the approaches and main findings of previous studies on temporary and permanent investment tax incentives in various countries. Section 4 describes our data sources and the matching process we apply to merge corporate tax return data with the anonymized extracts from annual enterprise reports. Section 5 outlines the econometric methodology, describing the main variables and treatment and control groups. Section 6 presents the results. Section 7 draws conclusions.

2. Policy Context

Since 2006 Latvia has used AD policy to stimulate firm investment. It allowed firms to use for tax purposes a larger asset depreciation value[3] (ADV) than for balance sheet depreciation,[4] so that firms were able to reduce taxable income by the difference between ADV and the balance sheet depreciation value (BDV).

The AD policy has three main components: (1) the general AD scheme, (2) incentives to acquire new technological equipment, and (3) Investment incentives in SAAs. Closely related to AD (although not limited to it) are R&D incentives (effectively, the fourth component of AD policy).

The general AD scheme sets out five asset categories, and the baseline depreciation rates range from 5 to 20 percent (Table 1). Because these rates are then doubled to determine the amount of depreciation for tax purposes, for most types of assets[5] (Table 1) the effective rates of depreciation are twice the baseline. There are two main exceptions to the "double rate" rule:

[3] We use the term "depreciation value" as synonymous with "depreciation expenses," "depreciation amount," or "depreciation deductions."

[4] For balance sheet depreciation, firms can choose common methods, like straight line or double straight line.

[5] Among assets to which depreciation does not apply are land, works of art and antiques, jewelry and other fixed assets that are not subject to physical or economic depreciation; and investment properties, organic assets, and long-term investments held for sale, which the taxpayer has chosen to value at their true value.

1. For passenger cars, motorcycles, sea and river, and air means of transport, a coefficient of 1.5 rather than 2 applies to the baseline rate of 20%, so that the AD rate is 30%.
2. Representation passenger cars (value above €50,000 without VAT) are not eligible for AD at all.

The incentives for new technological equipment were applied to new production equipment acquired or established by the taxpayer in a taxation period commencing in 2006 or later and used in economic activities. For such assets, the acquisition or creation value was multiplied by 1.5 before calculating the depreciation deduction (in 2007 the multiplier was 1.4 and in 2008 it was 1.3). On top of this, the general AD scheme with double depreciation rates applied (Table 1).

Table 1. Accelerated Depreciation and R&D Deductions, Latvia, 2007-17

Assets	**Depreciation or deduction rate**		**Multipliers (coefficients) applied to asset value or R&D costs before depreciation or deduction for tax purposes**	
	Baseline	**Double**	**New equipment, patents, trademarks** [a]	**SAAs (Specially Assisted Areas)** [b]
1. Buildings, structures, perennial plants	5%	10%	No	1.5
2. Railway rolling stock and technological equipment, sea and river fleet vessels, fleet and port technological equipment, power equipment	10%	20%	1.5	1.3 [c]
3. Computing devices and related equipment, including printing devices, information systems, software products, data storage equipment, means of communication, copiers, and related equipment. Computer programs	35 %	70%	1.5	1.8
4. Other fixed assets, except those in category 5	20 %	40% [d]	1.5	2.0 [e]
5. Oil exploration and extraction platforms, oil exploration and extraction ships	7.5 %	15%	1.5	1.0
6. Patents, trademarks (excl. those in category 7)	Straight line, 5 years		1.5 [g]	1.0
R&D costs			R&D costs	
7. R&D costs [f] related to taxpayer's economic activity	100%	No	Before January 1, 2014, 1.0; after, 3.0	

Source: Law on corporate income tax (as of 2017).

Notes: [a] In 2007, the coefficient for new equipment was 1.4 and in 2008 it was 1.3. [b] If an asset falls in both the "New equipment" and "SAAs" categories, only one multiplier can be applied. SAAs were removed from the CIT law after January 1, 2014, but firms previously operating in SAAs could continue to apply the AD rules for assets bought before that date. [c] Except for railway rolling stock and marine and river fleet vehicles. [d] 30% for cars, motorcycles, sea and river vehicles, and aircraft. [e] Except for cars, motorcycles, sea and river vehicles, and aircraft. [f] Except for costs of geological exploration. [g] Starting in 2009.

Investment incentives in the specially assisted areas (SAAs) applied to taxpayers established and operating in such areas (the least developed municipalities in Latvia, listed in the Cabinet regulations amending the Regional Development Law, see Figure 1). Before calculating the depreciation value for fixed assets acquired by eligible firms and used for economic activities in the SAAs, asset acquisition or creation value could be multiplied by a coefficient varying from 1.3 to 2.0 depending on the category of assets (see the right-hand column of Table 1).

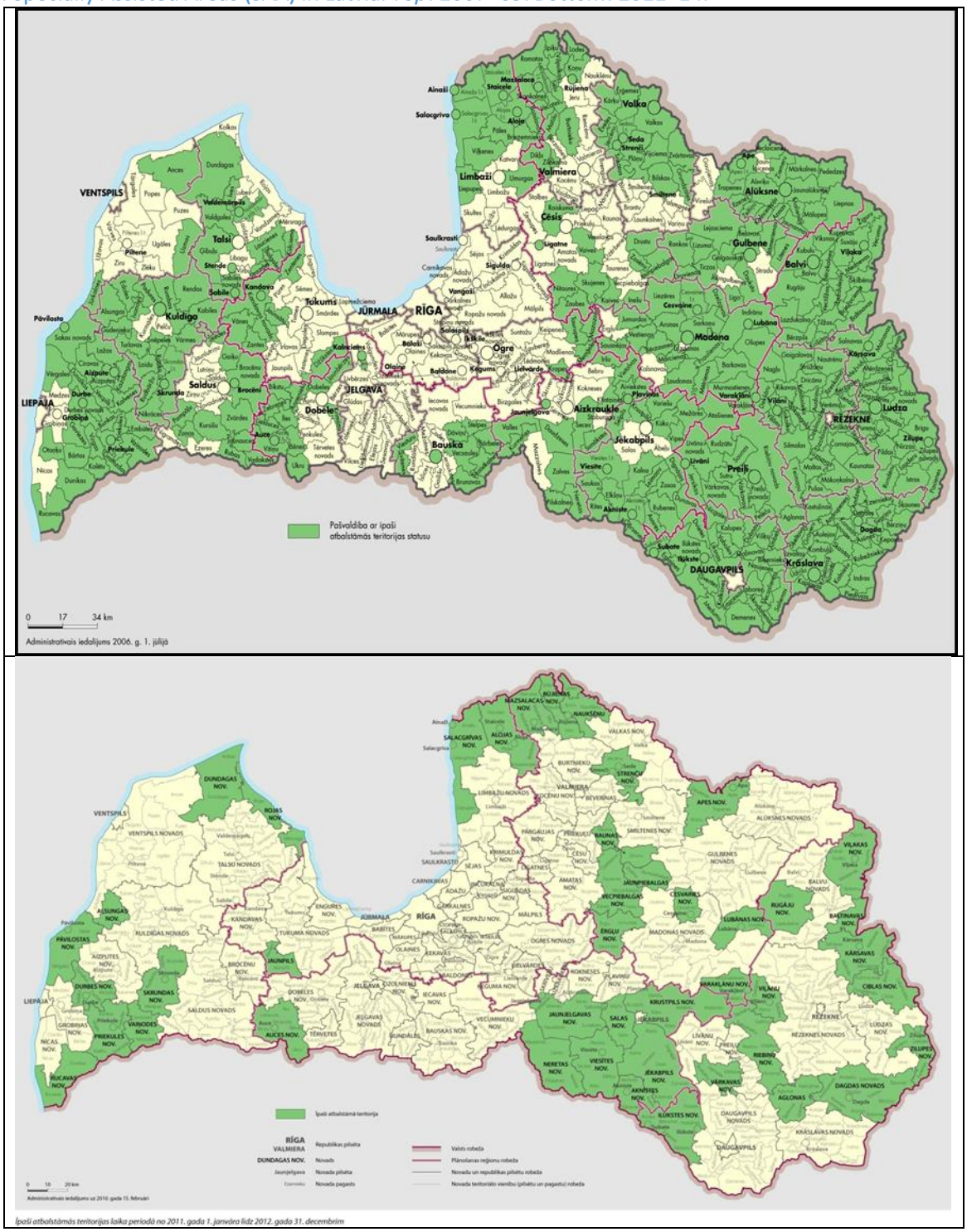
R&D incentives allowed taxpayers to write off 100% (after January 1, 2014 – 300%) of the costs of research and development related to their economic activity (other than costs for geological exploration) in the year when the costs are incurred.

Between 2006 and 2017, the Latvian AD policy was a permanent feature of the tax code, unlike U.S. bonus depreciation (see, e.g., House and Shapiro 2008, Zwick and Mahon 2017) but similar to the UK first-year allowance (see, e.g., Maffini et al. 2016). Due to multipliers, it is much more generous than bonus depreciation; see Table A2.1 in Annex 2).

Taxpayers eligible for both the SSA incentives and the incentives to acquire new technological equipment could apply just one (at their own choice) to the same fixed asset.

Up to 2010, the SSA incentives were project-based rather than universal: eligible taxpayers had to submit a project application to the Latvian Investment and Development Agency. In 2010, this requirement was lifted, but the list of SAAs was significantly reduced as of 2011. The data (see Table 2) suggest that the first change permanently increased the number of firms using this incentive. Lifting the project requirement allowed smaller firms in SAAs to benefit from AD, resulting in an immediate fall in median and average AD values in 2010. In 2011, these values declined even more dramatically, however (Table 2), plausibly, because medium-sized and less remote municipalities were excluded (Figure 1).

Figure 1. Specially Assisted Areas (SAA) in Latvia. *Top*: 2007–09. *Bottom*: 2011–14.



Source: Latvian Ministry of Environment and Regional Development.

Note: SAAs are shown in green. The list of SAAs for 2010 is similar to the one for 2007–09 but excludes three towns (Gulbene, Madona, and Kuldiga) and three smaller municipalities.

Table 2. Distribution of AD Value (in Thousands €) and Number of Firms Using AD in SAAs, 2008–14

Year	p10	p25	p50	p75	p90	Mean	N firms
2008	0.04	0.2	0.7	8.5	76.3	70.6	434
2009	1.40	3.8	32.8	188.0	312.3	175.0	91
2010	0.36	1.6	11.1	43.7	214.9	107.9	140
2011	0.10	0.4	2.2	9.5	40.0	29.2	1,186
2012	0.12	0.5	2.6	13.1	48.4	47.8	1,485
2013	0.12	0.5	2.4	12.3	44.7	25.6	1,516
2014	0.13	0.5	2.5	12.1	47.2	31.0	1,643

Source: MOF CIT data.

Apparently, firms found the AD policy attractive. As shown in Table 3, AD deductions accounted for 11–12% of Latvia's GDP in most years reviewed, though during the crisis it was about 13%. The AD policy apparently reduced firm taxable income by 2.8% of GDP in 2008, 1.5–1.8% in 2009–11, and 2.4% in 2012–14. In 2009–14, more than 90% of all firms with depreciating assets applied AD schemes for tax purposes (Table 3). Indeed, in most cases AD makes it possible to write off an asset faster for tax purposes than for balance sheet needs, thus reducing taxable income.

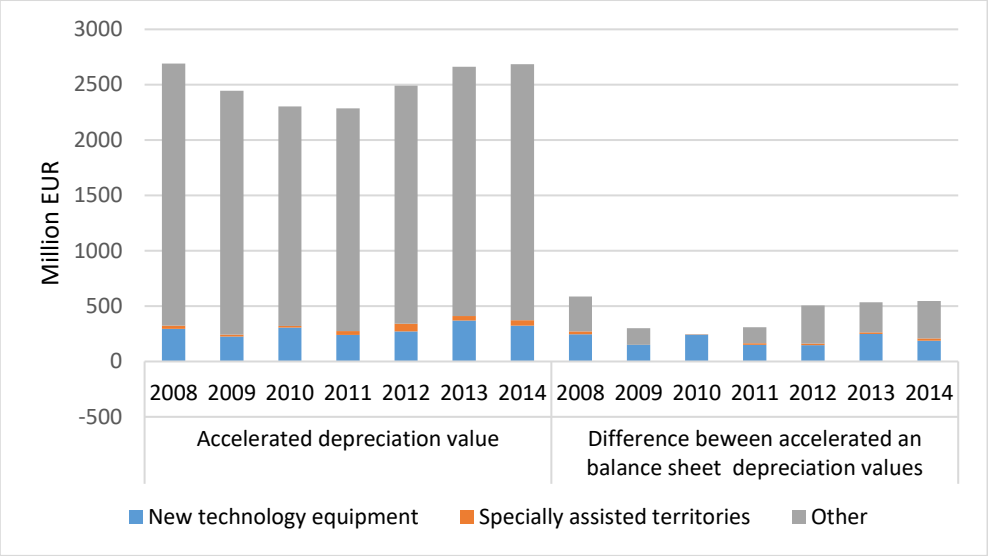
Table 3. Accelerated and Balance Sheet Depreciation Values, Latvian Firms, 2008–14

Year	Accelerated Depreciation Value (ADV)			Balance Sheet Depreciation Value (BDV)			ADV-BDV	ADV Coverage (ADV>0)	
	€ Mill.	% of GDP	# Firms with ADV>0	€ Mill.	% of GDP	# Firms with BDV>0	% of GDP	% of Firms with BDV > 0	% of all Firms in CIT data
2008	2,691	11.1	50,591	1999	8.2	57,075	2.8	88.6	66.1
2009	2,446	13.0	52,158	2109	11.2	55,511	1.8	94.0	67.6
2010	2,303	12.8	51,121	2030	11.3	54,954	1.5	93.0	63.7
2011	2,286	11.3	49,504	1953	9.6	53,317	1.6	92.8	60.4
2012	2,491	11.4	48,312	1960	9.0	51,502	2.4	93.8	57.2
2013	2,662	11.7	49,473	2,108	9.3	52,400	2.4	94.4	56.9
2014	2,684	11.4	49,216	2,120	9.0	51,908	2.4	94.8	56.0

Source: MOF CIT data.

AD for new technological equipment accounted for only a small share (from 9% in 2009 to 14% in 2013) of the total AD value (Figure 2, left) but for a very substantial share of the total reduction in corporate taxable income (Figure 2, right).

Figure 2. AD Value and Implied Reduction in Corporate Taxable Income by Category, Latvia, 2008–14



Source: MOF CIT data.

The share of new equipment in the reduction in corporate taxable income was 40–50% in 2008, 2009, 2011, and 2013; about 33% 2012 and 2014; and almost 100% in 2010 (Figure 2).

Table A2.2 (Annex A) lists the top 25 sectors (by 2-digit NACE classification) in terms of AD-caused reduction of taxable corporate income in 2012–14; 15 of these 25 sectors belong to manufacturing, while other sectors using AD heavily include utilities, real estate, agriculture, forestry, and land transport. In manufacturing alone, the annual average reduction was €88 million (Table A2.2).

By contrast, **AD in the SAAs accounts for a very small share of total AD value and the total reduction in corporate taxable income**. However**,** AD in the SAAs is still of utmost interest due to the change in eligibility conditions in 2010 and 2011, which makes it possible to identify the policy effect.

As of 2018, Latvia has abandoned its AD policy because its tax reform introduced, among other changes, the Estonian model of a zero CIT rate on profit that is reinvested rather than distributed.[6]

3. Literature Review

So far, only a few studies have investigated the effect of tax incentives and different types of depreciation, especially on business investment across sub-groups of firms.

Bronzini et al. (2008) evaluated the impact of the investment tax credit on business investment in Italy. They focus on the tax credit, which is not restricted to profitable enterprises with tax liability but can also be deducted from any outstanding payment due to central government. The amount of tax credit differs by area of eligibility, and the amount of the deduction decreases as

[6] See Jacobs et al (2017) for a discussion of possible advantages and disadvantages of applying the Estonian model in Latvia.

local development grows. The results suggest that the program has been effective in boosting investment.

Devereux, Maffini, and Xing (2016) provide evidence of a substantial positive effect of higher depreciation allowances on firm investments. In the UK, firms that qualify as an SME can claim a higher first-year capital allowance than the larger firms if they were below two of three thresholds for turnover, total assets, and number of employees. In 2004, the UK more than doubled the turnover and total assets thresholds. The authors found that access to more generous capital allowances increases firm investment by 2.1–2.6 percentage points (pp) relative to firms that never qualified for the more generous treatment; at the mean, this is equivalent to an 11 percent increase in investment.

Yagan (2015) studied the effect of the 2003 U.S. dividend tax cut on corporate investment and labor earnings. In his estimation, the tax cut caused zero change in corporate investment and employee compensation. Similarly, Desai and Goolsbee (2014) showed that the dividend tax cut, despite its high revenue cost, had minimal, if any, influence on investment incentives.

Bonus depreciation, passed in the U.S. in 2002 (it expired at the end of 2004) and again in 2008 allowed firms to deduct from their taxable income a "bonus" percentage of the cost of investment purchases. House and Shapiro (2008) explored the effect of the bonus depreciation allowance in 2002–03. Only investment goods with a tax recovery period up to 20 years qualified. The results suggest that bonus depreciation had a powerful effect on the composition of investment, in that there were steep increases in capital investment in assets that benefited substantially from the policy.

Recently Zwick and Mahon (2017) found that bonus depreciation had a substantial effect on investment in 2001–04 and 2008–10. Theirs was the most complete dataset yet applied to study U.S. business investment incentives, and their results suggest that the investment response is larger for small, cash-poor firms—but only when the policy generates immediate rather than future cash flows. Ohrn (forthcoming) estimated the response of manufacturing to bonus depreciation and depreciation allowances in the U.S. states that adopted such policies and found that both policies have been effective in boosting investment. The policies also affected employment and total production, but only several years after adoption. In a companion study, Ohrn (2018) examined how firms responded to the domestic production activities deduction, which allows firms to deduct a percentage of domestic manufacturing income from their taxable income and found that corporate tax rate reductions motivated larger firms with more cash flow to invest more, but smaller, more financially constrained firms were more responsive to depreciation policies. Edgerton (2010) found that tax incentives like bonus depreciation have the least impact on investment exactly when they are most likely to be used—during economic downturns when cash flows are low.

To our best knowledge, this paper is the first to ask whether the investment tax incentives that Latvia put in place in 2007–12 were effective. (Forthcoming papers by Skrok et al. and Mosberger and Varga look at the effects of tax incentives in two other CEE countries, Poland and Hungary.)

4. Data

4.1. Sources of Firm Data

The main data source for this paper (hereafter: CIT data) is the (anonymized) annual panel of CIT declarations of all 128,459 Latvian firms that paid CIT in 2008–14. In addition to pre-tax profit and loss statements, the data include detailed information necessary for calculating taxable income, such as total depreciation values for accounting purposes and AD values for tax purposes. For total depreciation value, the data report separately the depreciation of new equipment, assets employed in SAAs, and patents. The data include 4-digit NACE codes, 6-digit municipality codes, and type of settlement. The panel is not balanced, but for 47,280 firms data are available for each of the 7 years studies, and at least 5 years of data are available for more than 50% of all firms. However, the CIT data do not contain our key variables of interest, investments and fixed capital.

As an additional data source we use anonymized extracts from annual reports of all Latvian enterprises[7] for 2007–14, provided by *Lursoft IT*. For each firm and year, this dataset covers tangible fixed assets and intangibles at the end of the year, profit or loss before taxes, the 4-digit NACE code, registration year, legal form of the enterprise, turnover, number of persons employed, CIT paid for the given year, and a 4-digit municipality code. In merging the two datasets we used variables available in both (year, profit or loss, NACE, municipality, CIT paid). Doing so is complicated for several reasons, among them (1) the CIT declarations (extracted from the SRS data warehouse in 2016) include the most recent versions of profit data, which might differ from those in the annual reports.[8] (2) Similarly, the NACE and the municipality codes for the same firm might differ because annual reports and CIT declarations are not submitted simultaneously.

4.2. The Matching Procedure

Our matching procedure works as follows:

Step 1a. Match by year profit or loss before taxation, 4-digit NACE code, and 4-digit municipality code. *Step 1b.* For every pair of firms matched in Step 1a for a given year, compare profit or loss before tax for other years. If the absolute difference does not exceed €10 in at least one other year, the two firms are considered fully matched. However, if a firm from CIT data can be matched in annual report data with more than one other firm (i.e., has multiple twins) it is not considered fully matched.

Step 2a (for firms not fully matched): Match by year, profit or loss before taxation, 2-digit NACE code, and 4-digit municipality code. *Step 2b:* Similar to Step 1b, but follows the Step 2a result.

Step 3a (for firms not yet fully matched): Match by year, profit or loss before taxation and 4-digit NACE code. *Step 3b:* Similar to Step 1b, but follows the Step 3a result.

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[7] Except for single-owner or family enterprises with turnover below the threshold making annual reports mandatory.

8 Previous studies have also pointed out the difficulties in reconciling tax return data with annual reports, see, e.g., Mills et al. 2002.

Step 4a (for firms still not yet fully matched): Match by year, profit or loss before taxation. and 2-digit NACE code. *Step 4b:* Similar to Step 1b, but responds to the Step 4a result.

Step 5a (for any firms remaining unmatched): Match by year and profit or loss before taxation. *Step 5b:* Similar to Step 1b but responds to the Step 5a result.

We use a three-stage procedure to match firms: After Steps 1–5, 67.5% of all enterprises in the State Revenue Service Database are matched. For the firms still unmatched, we implement a second and third round of the same five steps but this time allowing for a profit difference of up to €100 rather than €10.[9] In the second and third round, only 1.5% of all firms from CIT data arematched. In the fourth round, we repeat the matching procedure using, in each step, the value of CIT paid in addition to the firm characteristics used in rounds 1-3; adding this new matching variable results in finding single twins in many new cases. As the result, 88.5% of all CIT payers (and 93% of observations in the CIT database) for 2008–14 are matched.

4.3. Quality of Matching

For the whole period, 2008–14, matched firms account for 93% of all observations in the CIT data; coverage ranges from 90% in 2008 to 94% in 2012–13 (Table 4). Descriptive statistics (see Annex 3) suggest that matched firms are representative of all firms. Indeed, distributions of the two sets by 2-digit NACE sectors, by region, and by type of settlement are very similar, as are also distributions by profit before taxes (see Tables A3.1 – A3.4 for details).

Table 4. Firms with Matched CIT and Annual Report Data, 2008–14

Year	Total	Matched		Matched; Fixed Assets not Missing		
	# obs	# obs	% of CIT Payers	# obs	% of CIT Payers	% of Firms Declaring Some Asset Depreciation
2008	76,578	68,776	89.8	55,496	72.5	90.2
2009	77,126	70,792	91.8	55,052	71.4	90.9
2010	80,306	74,787	93.1	55,737	69.4	91.1
2011	82,021	76,787	93.6	54,521	66.5	91.0
2012	84,396	79,474	94.2	54,374	64.4	91.1
2013	86,895	81,853	94.2	54,443	62.7	91.6
2014	87,822	82,336	93.8	54,194	61.7	92.2
Total	575,144	534,805	93.0	383,817	66.7	91.1

Source: Calculation with MOF firm-level CIT data and annual report data provided by *Lursoft IT*.

However, matching CIT and annual report data is not our main purpose: what we need are data on tangible assets and derived investment data. Unfortunately, data on tangible assets are missing for about 25% of matched firms in 2008–09, 20% in 2010, and 33% in 2011–14. As a result, the working sample (matched firms with non-missing data on tangible assets) covers about

[9] In the third round, new matches emerge because some firms from CIT data that had more than one match in the annual reports data during the second round are left with only one twin after completing the second round.

55,000 firms in each of the study years, from 72% of all firms in the CIT dataset in 2008–09 to 62% in 2014 (Table 4).

The working sample coverage is much higher (above 90%, see Table 4, last column) for those firms in the CIT dataset whose balance sheets declare some asset depreciation (plausibly, most firms with non-negligible fixed assets do so). This suggests that for purposes of this paper the working sample is representative.

The set of firms declaring some asset depreciation does not differ significantly from the whole CIT dataset in terms of distribution by 2-digit NACE code (see Table A3.1, right panel), **region, and type of settlement**. The same is true for the working sample (results available on request). This suggests that there are no major objections to the idea that the working sample is representative of all firms with non-negligible fixed assets. On the other hand, the profits before taxes of firms in the working sample (and of those declaring some asset depreciation) are on average somewhat larger and more widely dispersed than those of all firms in the CIT dataset or all matched firms, see Table A3.4.

5. Econometric Methodology

5.1.The Difference-in-Differences Approach

To evaluate the effect of a firm's past AD experience on its investment we estimate fixed-effects panel data models of the following type:

$$Y_{it} = \alpha_t + \beta_t Z\_AD_{it-1} + \gamma X_{it-1} + u_i + \varepsilon_{it} \qquad (1)$$

where Y_{it} is a measure of investment by firm i in year t, α_t are time fixed effects, Z_AD_{it-1} is a measure of AD used by firm i in the previous year, β_t are time-varying effects of AD on investment, X_{it-1} is a lagged vector of firm characteristics (including fixed assets, employment, turnover, profit, and firm age), u_i are unobserved firm fixed effects, and ε_{it} are error terms. To simplify notation, we allow t in (1) to take all values including the one for the reference year, say, 1.

In model (1), the AD variable can suffer from endogeneity caused by reverse causality (a firm planning to invest in t may want to make use of AD in $t-1$) or by time-varying unobserved factors affecting both investment and AD decisions. Our baseline models use investment and AD rates rather than just indicators of positive investment and positive AD value, which arguably makes the endogeneity risk less significant. However, to address the endogeneity problem we proceed as follows:

1. Construct the treatment group *T,* firms whose investment behavior is likely affected by the AD policy, and the control group *C*, firms probably not significantly affected by the policy (see details below).
2. Estimate (1) separately on *T* and *C*.
3. Apply the difference-in-differences methodology by comparing the change in β_t (vs. the base year) in the treatment group with the corresponding change in the control group. Technically, this is equivalent to estimating on the pooled (*T* and *C*) sample a

fixed-effect model like (1) amended with the treatment group dummy (also denoted *T*) and its interactions with other variables:

$$Y_{it} = \alpha_t + \beta_t Z\_AD_{it-1} + \lambda_t T + \delta_t T \times Z\_AD_{it-1} + \gamma X_{it-1} + \mu T \times X_{it-1} + \varepsilon_i \quad (2)$$

The coefficients of interest in (2) are δ_t; these are equal to differences in β_t from (1) estimated on treatment and control groups. As argued next, if the base year corresponds to the crisis period, significant and positive δ_t in other periods will indicate that AD has a positive effect on firm investment.

We then modify this version of *regression discontinuity design* (RDD) by replacing the variation across time with the variation (within treatment and control groups) across firm size (in terms of employment). Model (2) then is replaced by a model with size-specific effects

$$Y_{ist} = \alpha_{st} + \beta_s Z\_AD_{it-1} + \lambda_s T + \delta_s T \times Z\_AD_{it-1} + \gamma_s X\__{it-1} + \mu_s T \times X\__{it-1} + u_i + \varepsilon_{it}\ , \quad (3)$$

where *s* varies across size categories and *X*_ includes firm characteristics other than employment. If one can argue that in the base category the treatment effect is absent, significant and positive δ_s will indicate that AD has a positive effect for firms in other categories. Finally, we estimate a model similar to (3) where *s* varies by firm category in volatility of turnover, and *X*_ includes other firm characteristics, size among them.

5.2. Identification Strategy

We follow Zwick and Mahon (2017) and use as the control group firms in industries where investment is mostly short-term as the control group, as AD only modestly alters their depreciation schedule.[10] Technically, our analysis differs from that of Zwick and Mahon (2017), which assigns an industry to the treatment group if in the industry the average discounted value of one dollar of investment deductions without bonus depreciation is low, and to the control group if it is high). We use for the same purpose the industry average[11] ratio *DR* of accelerated depreciation value to balance sheet depreciation value, and the industry average difference *DD* of the same quantities. Our treatment group features high values of *DR* and *DD* and our control group has low values (see Table A4.1 in Annex 4 for details).

When all types of AD are considered together, the treatment group includes firms belonging to the top 20% in terms of *DR* (i.e., having *DR* ≥ 1.275) and to the top 33% in terms of *DD* (i.e., having *DD* ≥ €3,000), which ensures that AD provides a non-negligible increase in tax deductions. On the other hand, the control group includes firms from industries with either *DR < 1.05* or *DD < €500* and hence the increase in tax deductions due to AD is small.

Our estimates of the AD effect on investment include firm fixed effects and also control for a number of time-varying firm characteristics. Nevertheless, in the spirit of the D-i-D methodology, it is preferably that the control and the treatment groups be as similar as possible. Tables A4.2–A4.3 show that distributions of treatment and control groups by firm size, turnover, investment rate, region and type of settlement are quite similar. Moreover, across the years the average proportion of firms making an investment of at least €100 is about 50% in both groups, and average investment rate (with respect to beginning-of-the-year capital) is 24.3% in the treatment group and 27.9% in the control group.[12]

Because AD began before our sample period, we are not able to use its introduction as a natural experiment, in which case *t = 1* in (1) would correspond to the pre-reform period.[13] Instead, we argue that during the crisis in 2009–10 investment rates were very low (see Figures A1–A2) due to cash constraints and the uncertain prospects of the economy, and hence the effect of past AD experience on investment was absent or very small in both groups (see Figure 3 for empirical evidence). Hence, this period can be used as a quasi-counterfactual. Post-crisis, investment activity in Latvia revived, but not to the pre-crisis level (Figures A1–A2); firms are more often cash constrained and are more careful in making decisions to invest. We expect that in comparison

[10] We thank Irem Guceri for this idea.

[11] Like Zwick and Mahon (2017), we use four-digit industries.

[12] With treatment and control groups defined by the industry they belong to, differences in this respect are inevitable. For example, real estate activities account for more than half of the treatment group observations, while retail trade, and trade and repair of motor vehicles, account for one-third of the control group. Most other services are almost completely in the control group, although manufacturing, utilities, and construction firms are found in both groups.

[13] As mentioned in Section 2, the AD component for SAAs experienced eligibility changes in 2010–11, but several factors make it complicated to use this as a natural experiment. Among them, first, the 2010 reform has made it much easier to apply AD, but in 2011 many eligible municipalities were removed from the list. Second, firms that lost eligibility could continue to use AD for items purchased while they were still eligible.

with 2009, the increase of the effect of past AD experience on investment is much larger in the treatment than in the control group, so the post-crisis δ_t in model (2) are positive. Figure 3 supports this hypothesis. A weakness in this approach is that we cannot convincingly test the parallel lines assumption because we only have 2 crisis years.

Our second version of RDD refers to variation across firm size instead of across time. Small firms are more likely to be cash-constrained and to have uncertain prospects, hence we expect that in the treatment group, the effect of past AD experience on investment increases as firm size (measured by employment) falls. By contrast, in the control group, because small firms do not see an immediate cash benefit from AD, they are likely to invest only sporadically if at all. For large firms in the control group investment is likely to be a part of their business model; plausibly, these investments are regular due to short asset lives, leading to reversed causality of the estimated AD effect, which is likely to increase with firm size (larger firms invest more regularly). Using large (50+ worker) firms as the base category, we estimate model (3) and indeed find a positive effect of AD on investment for smaller firms in the treatment group (Figure 4). In the treatment group, the effect gets larger as firm size falls, suggesting that there is no reversed causality. In the control group, the estimated effect grows with firm size, suggesting that reversed causality is at work. The D-i-D effect is highly significant for firms with fewer than six workers.

Our third version of RDD refers to the uncertainty-mitigating effect of accelerated depreciation and uses variation across groups with low, medium, and high volatility of turnover. We expect that in the treatment group, the effect of past AD experience on investment increases with volatility of turnover, while in the control group the uncertainty factor is unlikely to have a significant impact on a priori weak AD effect. The results presented in Figure 5 below support this expectation; the D-i-D effect is highly significant for firms with medium and high volatility of turnover (and larger among firms with high volatility).

6. Results

6.1 Key variables

We define a firm's investment rate in year *t* as

$$Inv\_rate\,(t) = \log(1 + (\text{Gross investment in fixed assets})(t))/\,(K(t-1)) \qquad (4)$$

where K(*t*) is the end-of-year value of fixed assets, and

$$(\text{Gross investment in fixed assets})(t) = K(t) - K(t-1) + \text{Balance sheet depreciation value}\,(t). \qquad (5)$$

Note that (4) is just the continuously compounded version of the usual investment rate. We have used two firm-level measures of AD experience: the accelerated depreciation rate:

$$AD\_rate\,(\mathrm{t}) = \log(1 + ADV(t)/K(t-1)), \qquad (6)$$

and the reduction in taxable income caused by AD (also scaled by K(*t*–1)):

$$AD\_gain\,(\mathrm{t}) = \log\,(1 + (ADV(t) - BDV(t))/K(t-1)). \qquad (7)$$

The rationale for using *AD_gain* is straightforward; use of the *AD_rate* is motivated by behavioral considerations: the tax declaration template refers to ADV as one of the items reducing taxable

income, so managers or owners of small firms might see this (rather than *AD_gain*) as a measure of the tax benefit. In models with *Inv_rate* as the dependent variable, estimated coefficients on lagged *AD_rate* or *AD_gain* can be interpreted as investment elasticities with respect to the previous year AD value or the corresponding reduction in taxable income.

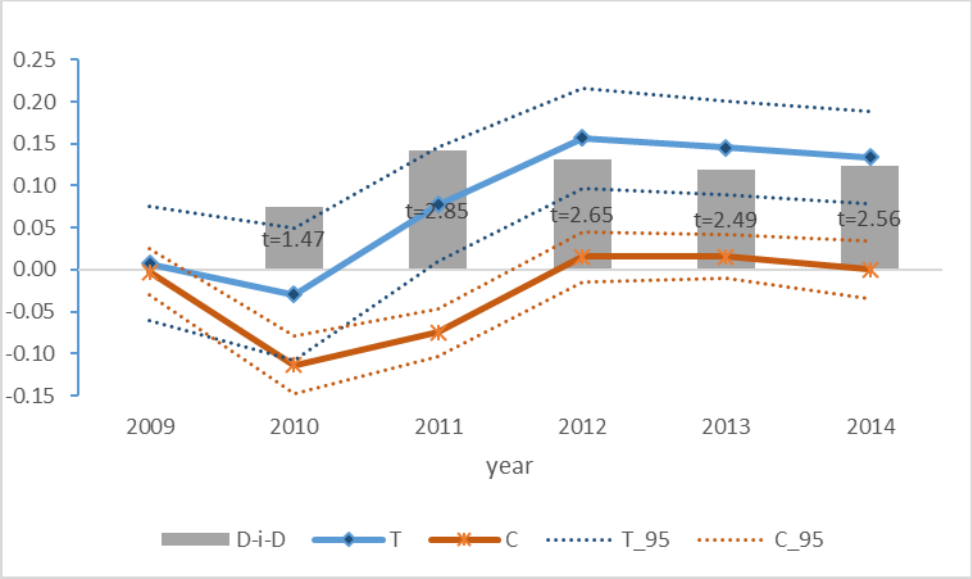
Both *AD_rate* and *AD_gain* can be decomposed into three *components corresponding to AD of* new equipment, AD in SAAs, and other types of AD. Accordingly, every model can be estimated in four specifications: with total *AD_rate*, decomposed *AD_rate*, total *AD_gain*, and decomposed *AD_gain*.

6.2 Total aggregate effects of accelerated depreciation

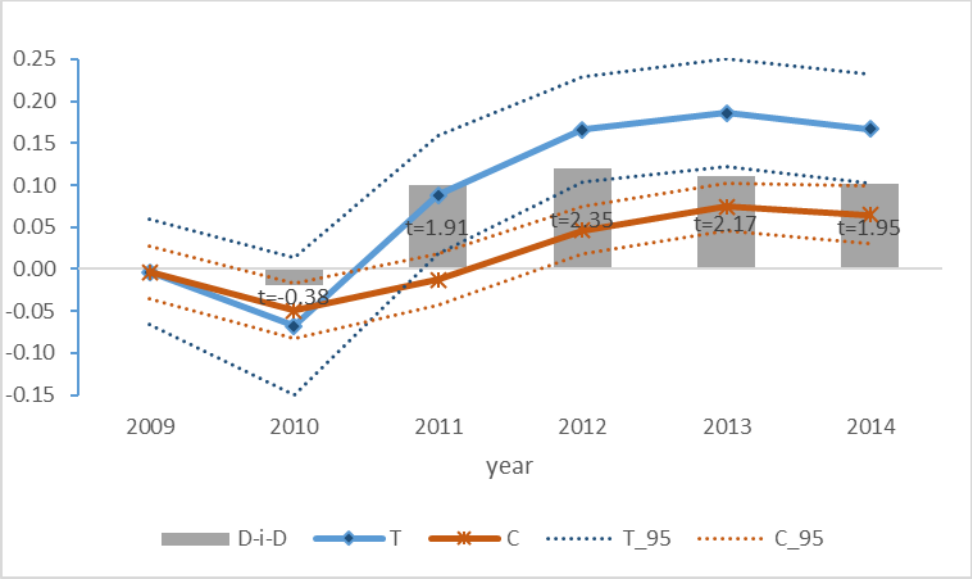
Estimation results from specifications (1) and (2) can be found in Table A5.1; Figure 3 displays the corresponding effects of AD.

Figure 3. Estimated Effect of Past AD Experience on Firm Investment. Treatment and Control Groups, D-i-D: (T_year – T_2009) – (C_year – C_2009)

A. Effect of Lagged AD Value.



B. Effect of Lagged AD-caused Reduction in Taxable Income



Notes: Labels in the D-i-D series show t-values from fixed-effect model with interactions.

As expected, in both treatment and control groups and for both AD value and tax gain, lagged AD variables have no effect on firm investment in 2009–10. In 2011–14, we find a positive and significant effect for the treatment group. In the control group, there is no effect of the past AD value; the past AD gain appears to be significant in 2012–14, but the effect is much weaker than in the treatment group. Both specifications produce a strongly significant positive D-i-D effect in 2011–14.

As far as other factors are concerned, the investment rate tends to increase with firm size[14] and turnover, other things being equal. Lagged capital stock has a negative effect on investment. Not surprisingly, enterprises in the first two to three years after registration invest the most.

Among profit-making enterprises, as might be expected, investment rises in track with the previous year's profit—but loss-making firms also tend to invest more the larger the previous year's loss[15]. It is not unreasonable for firms with large losses to invest more than those with small losses, but that this might also relate to losses carried forward and coordination of investment plans with a tax-optimization strategy.

6.3 Effects of accelerated depreciation by firm size and by volatility of turnover

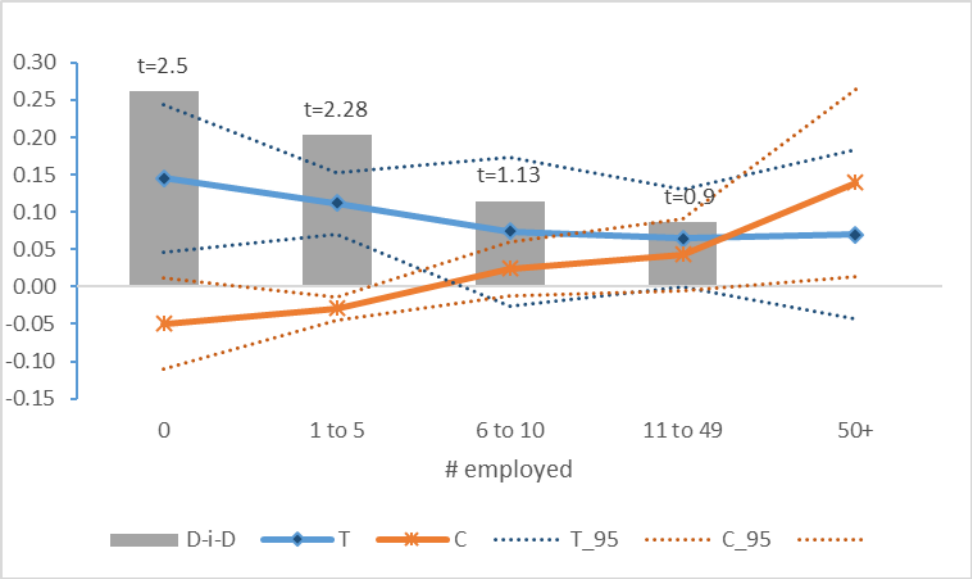
Figure 4 presents the estimation results for specification (3) with identification based on variation across firm size groups.

[14] However, zero-worker firms are more likely to invest than firms with 1–5 workers.

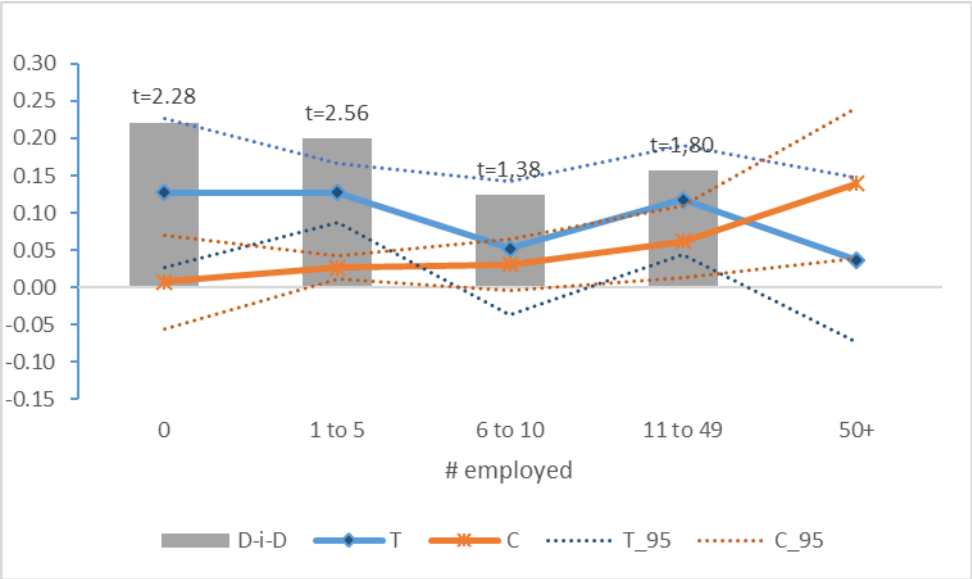
[15] In the treatment group, this effect is somewhat smaller than the similar effect among profit-makers; in the control group the effect among loss-makers is much weaker than among profit-makers.

Figure 4. Estimated Effect of Past AD Experience on Firm Investment, by firm size. Treatment and Control Groups, D-i-D: (T_size – T_50+) – (C_size – C_50+)

A. Effect of Lagged AD Value



B. Effect of Lagged AD-caused Reduction in Taxable Income



Notes: Labels in the D-i-D series show t-values from fixed-effect model with interactions.

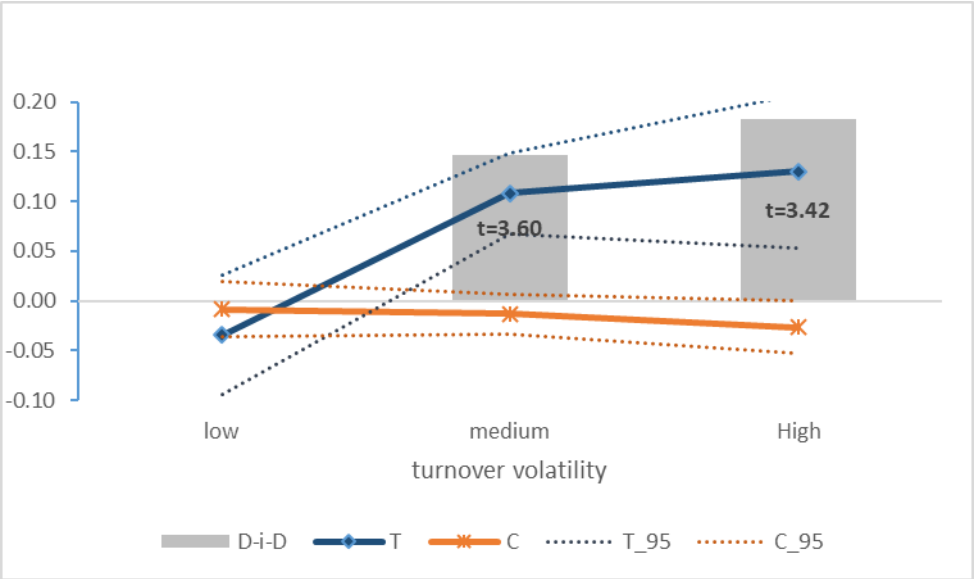
In the treatment group, there is a positive and significant effect of lagged AD value or lagged AD-caused reduction in taxable income on investment by firms with fewer than 50 workers, except for firms with 6–10 workers. This effect gets larger as firm size falls, suggesting that there is no reversed causality. In the control group, the estimated effect of AD-caused reduction in taxable income is positive and significant among firms with at least one worker; the effect of AD_rate is positive and significant for firms with more than 10 workers, while among firms with 6–10 workers it is almost significant. This effect grows with firm size, suggesting that reversed causality is at work (firms use AD because they invest regularly) in the control group. In both specifications,

the D-i-D estimate of AD effect on investment rate is highly significant for firms with fewer than six workers.

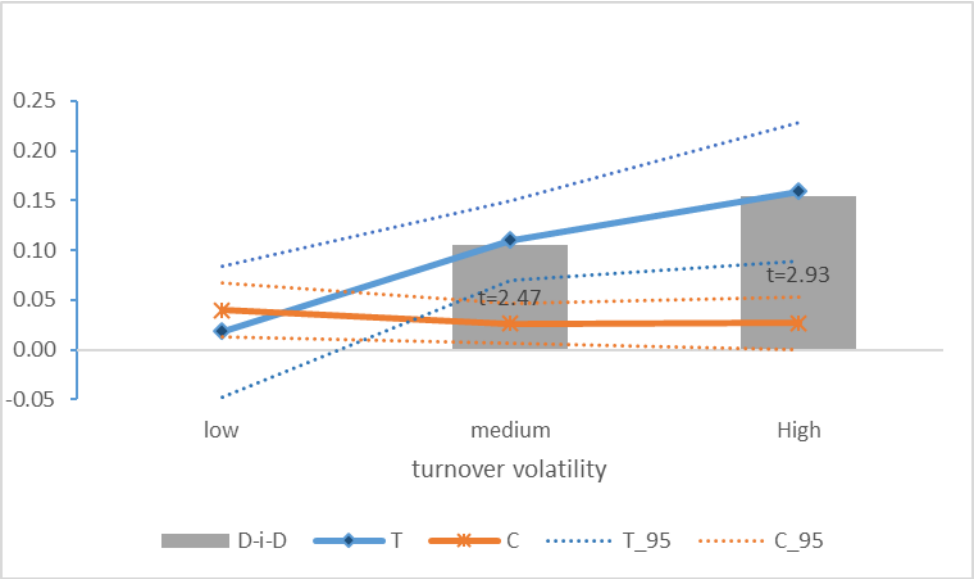
Figure 5 presents the results of specification (3) with identification based on variation across turnover volatility groups.

Figure 5. Estimates Effects of Past AD Experience on Firm Investment, by turnover volatility. Treatment and Control Groups, D-i-D: (T_high – T_low) – (C_high – C_low)

A. Effect of Lagged AD Value.



B. Effect of Lagged AD-caused Reduction in Taxable Income



Notes: Labels in the D-i-D series show t-values from fixed-effect model with interactions.

Among firms with low turnover volatility, there is no AD effect; firms with medium and high volatility show a positive and significant effect of past AD experience (*AD_rate* or AD-caused

reduction of taxable income) on investment. The latter effect rises with turnover volatility, and the estimated D-i-D effect is highly significant.

6.4 Disaggregated AD effects on firm investment rate and investment decisions, by program type

Table A5.2 presents the main results from versions of models (1) and (2) with three separate variables for new equipment (*AD rate_new*), SAAs (*AD_rate_terr*), and other types of AD (*AD_rate_oth*) instead of the total *AD_rate*. For the latter (referred to as "the general AD scheme" in Section 2 above), as well as for the AD of new equipment, we find, like for the total *AD_rate*, positive effects on investment rate in the treatment group during the post-crisis period 2011-2014. However, corresponding D-i-D estimates are significant only for the general scheme (coefficients on *AD_rate_oth* are close to the ones reported in Table A5.1 for the total *AD_rate* and even more significant). The D-i-D estimate of *AD_rate_new* is significant (and positive) only in 2014 (although in the treatment group significant effects are found in 2013-2014), and the D-i-D estimates of *AD_rate_terr* are not significant at all.[16] This is likely because only small share of firms were engaged in AD of new equipment and AD in SAAs (see Table 2 and Table A2.2)[17], so the control and treatment groups should be redefined to isolate these effects (if any). We come back to this later in this section.

Using the same sample of treatment and control groups, we also estimated *linear probability models* (1) and (2), where dependent variable Y_{it} is an indicator that firm *i* invests at least €100 in year *t*. Table A5.3 presents the results from models with disaggregated AD effects (results for the total AD effect are briefly discussed below). We find that in treatment and control group alike, both the total *AD_rate* and *AD_rate* related to the general AD scheme (*AD_rate_oth*) have a positive effect on probability to invest next year, but the D-i-D estimates are never significant, so the effect cannot be claimed causal. In the treatment group, moreover, *AD_rate_terr* has a positive and significant effect on investment decisions in 2010, when the restrictive project requirement for this category of AD was lifted. This supports the descriptive evidence from Table 2. However, here the D-i-D estimate is again not significant.

Estimates presented in Table A5.3 do not suggest there is any effect of the rate of AD of new equipment (*AD_rate_new*) on probability to invest next year, but this, plausibly, is because the "total" Treatment and Control groups are not suitable for this (see below). Effects of other variables[18] on probability to invest have the same signs as the effects on investment rate reported in Table A5.1 (an exception is lagged loss, which is not significant). Replacing *AD_rate* with *AD_gain* variables, as well as changing the investment threshold from 100 euro to 1000 euro does not change the conclusions.

[16] Replacing *AD_rate* with *AD_gain* does not change the situation.

[17] Moreover, for AD in specially assisted areas the eligibility is based on territorial units, and the number of eligible firms in the control group for the total AD (see Table A4.1), which is used in estimates reported in Table A5.2, is substantially larger than in the treatment group. In this regard, the estimated positive effects of *AD_rate_terr* reported in Table A5.2 in the control group in 2011, 2012 and 2014 is noteworthy.

[18] To save space, Table A5.3 omits these effects.

To isolate the effect of the AD of new equipment, we narrow down the Treatment group used until now (*T_tot*) by imposing, in addition, the following conditions:

(i) the industry[19] average accelerated depreciation value of new equipment *ADV_new* ≥ 1000 euro;
(ii) the industry average ratio of the accelerated depreciation value to the balance sheet depreciation value of new equipment *DR_new* ≥ 2.00;
(iii) there are more than three observations with positive *ADV_new* in the industry.

Under these conditions, one can expect substantial tax savings from using the AD of new equipment for firms in the restricted Treatment group, *T_new*. Together, these conditions reduce the number of firms in *T_tot* by nearly a half, from 10.6 to 6.2 thousand (Table A4.1).

The restriction on the total Control group (*C_tot*) that the industry average difference $DD = ADV - BDV \leq 500$ EUR applies of course also to *DD_new* and is sufficient to make non-negligible tax savings unlikely. To ensure sufficient common support with the Treatment group *T_new*, we require, in addition, the industry average share of firms using AD of new equipment in *C_new* to be at least 0.38% (the minimum in *T_new*). This reduces the number of firms by one-third, from 30.9 in *C_tot* to 20.5 thousand in *C_new* (Table A4.1). Tables A4.2-A4.3 show that *T_new* and *C_new* do not differ much in terms of distribution by firm size, turnover, investment rate, region and type of settlement.

Disaggregated by type of AD specifications (2) and (3) estimated on pooled *T_new* and *C_new* samples provide some (inconclusive) evidence of the effect of the past AD of new equipment on firm's investment rate and investment decisions. In (2), with identification across periods, the D-i-D estimate of *AD_rate_new* is significant (at 10%) only for 2014, while *AD_rate_oth* is significant (at 1%) for 2011-2014 (these results are not presented to save space). Table A5.4 presents results from model (3), with identification across size groups. AD of new equipment is found to have a significant (at 5%) effect both on next year investment rate and on probability to invest next year, but only for firms with six to ten workers; the effect on investment rate is also positive and close to being significant for firms with 11 to 49 workers.

Finally, *to isolate the effect of AD in specially assisted areas (SAAs),* we restrict the "total" Treatment and Control groups to the subsample of firms which during some years between 2007 and 2010 operated in territories which had the SAA status but has lost it either in 2010 or (in most cases) in 2011[20] (see Figure 1). This choice is driven partly by data limitations: while we can identify all cases when firms used the SAA component of the AD policy, we cannot identify all eligible firms because in about 14% of our working sample the territory codes are not detailed enough. This limitation does not apply to the category of SAAs used for the identification. Furthermore, based on the results presented in Figure 4, we restrict the analysis by firms with 1 to 5 workers (as of the previous year); see Table A4.1 for formal definition of the Treatment and Control groups (*T_SAA* and *C_SAA*). Tables A4.2-A4.3 confirm that *T_SAA* and *C_SAA* are quite similar in terms of distribution by region, type of settlement, turnover and investment rate.

Fixed effects panel data linear probability models in form (1) and (2) find significant (at 5%) positive D-i-D effects of the rate of AD in SAAs in the previous year on probability of investing at

[19] As before, we use four-digit level industry.
[20] These firms could continue to use AD for items purchased under the SAA status.

least 100 EUR (or at least 1000 EUR) in 2010 and 2012[21]. This suggests that after lifting the restrictive project requirement for AD in SAAs in 2010, this component of the AD policy had a positive effect on investment decisions for small firms.

7. Conclusion

This paper has studied the effect of generous accelerated depreciation (AD) policy on firm investment in Latvia in 2009–14. Lacking data for a natural experiment, we use difference-in-differences methodology with identification based on variation across time, with the crisis period serving as quasi-counterfactual; by firm size, with large firms unlikely to be genuinely affected by the policy; and by turnover volatility, with low-volatility firms unlikely to be affected. We find a positive effect of the past use of the general AD scheme on firms' investment rate, and the effect is stronger in industries with most of their investment in long-lasting assets, in enterprises with fewer than six employees, and in firms with high turnover volatility. Regarding AD of new equipment, we find a significant effect both on next year investment rate and on probability to invest next year, but only for firms with six to ten workers. After lifting the restrictive project requirement for AD in specially assisted areas, this category of AD has boosted investment decisions of firms with 1 to 5 workers.

Our results indicate that AD policy has indeed stimulated investment in Latvia. However, the evidence for the effect is stronger for the general scheme than for new equipment and for specially assisted areas, and this raises the question whether the AD scheme in Latvia was too general and/or too generous, resulting in over-investment in less productive firms or industries.

[21] The effect of the general AD scheme remains positive as well, but AD of new equipment has no effect. These results are available on request.

References

Bronzini R., G. de Blasio **,** G. Pellegrini, and A. Scognamiglio. 2008. "The Effect of Investment Tax Credit: Evidence from an Atypical Programme in Italy." Banca D'Italia WP N661, Rome. https://www.bancaditalia.it/pubblicazioni/temi-discussione/2008/2008-0661/en_tema_661.pdf?language_id=1.

Desai, M. A., and A. D. Goolsbee**.** 2004."Investment, Overhang, and Tax Policy." *Brookings Papers on Economic Activity* 2: 285–338.

Devereux. M..P., G. Maffini, and J. Xing. 2016. "The Impact of Investment Incentives: Evidence from UK Corporation Tax Returns. Oxford University Centre for Business Taxation Working Paper Series. WP16/01. Oxford, UK.

Edgerton J. 2010. "Investment Incentives and Corporate Tax Asymmetries." *Journal of Public Economics* 94 (11-12): 936–52.

House, C. L., and M. D. Shapiro. 2008. "Temporary Investment Tax Incentives: Theory with Evidence from Bonus Depreciation." *American Economic Review* 98 (3): 737–68. http://www.aeaweb.org/articles.php?doi=10.1257/aer.98.3.737.

Jacobs, B., E. Sinnott, E. Skrok, M. Hazans et al. 2017. "Latvia Tax Review". Washington, D.C. : World Bank Group. http://documents.worldbank.org/curated/en/587291508511990249/Latvia-tax-review

Jorgenson, D. 1963. "Capital Theory and Investment Behavior." *American Economic Review* 53 (2): 247–59.

Kaplan S. N., and L. Zingales. 1997. "Do Investment-Cash Flow Sensitivities Provide a Useful Measure of Financing Constraints?" *Quarterly Journal of Economics* 112 (1):169–215.

Mills, L. F., K. J. Newberry, and W. B. Trautman. 2002. "Trends in Book-Tax Income and Balance Sheet Differences." *Tax Notes* 96 (8): 1109–25.

Mosberger, P., and Z. Varga. 2018. *Aid intensity and Choice of Location for Subsidiaries Investment in Hungary*. Manuscript, World Bank, Washington, DC.

Ohrn, E. (forthcoming). "The Effect of Tax Incentives on U.S. Manufacturing: Evidence from State Accelerated Depreciation Policies," *Journal of Public Economics.*

Ohrn, E. 2018. The Effect of Corporate Taxation on Investment and Financial Policy: Evidence from the DPAD. *American Economic Journal: Economic Policy* 10 (2): 272 - 301

Skrok, E., et al. 2018. "Investment Tax Incentives in Poland: A Quasi-Experimental Evaluation." Manuscript, World Bank, Washington, DC.

Stein, J. C. 2003. "Agency, Information and Corporate Investment." In *Handbook of the Economics of Finance*, Vol. 1, edited by G. M. Constantinides, M. Harris, and R. M. Stulz, pp. 111–65. Amsterdam: Elsevier.

Yagan, D. 2015. "Capital Tax Reform and the Real Economy: The Effects of the 2003 Dividend Tax Cut. "*American Economic Review* 105 (12): 3531–63.

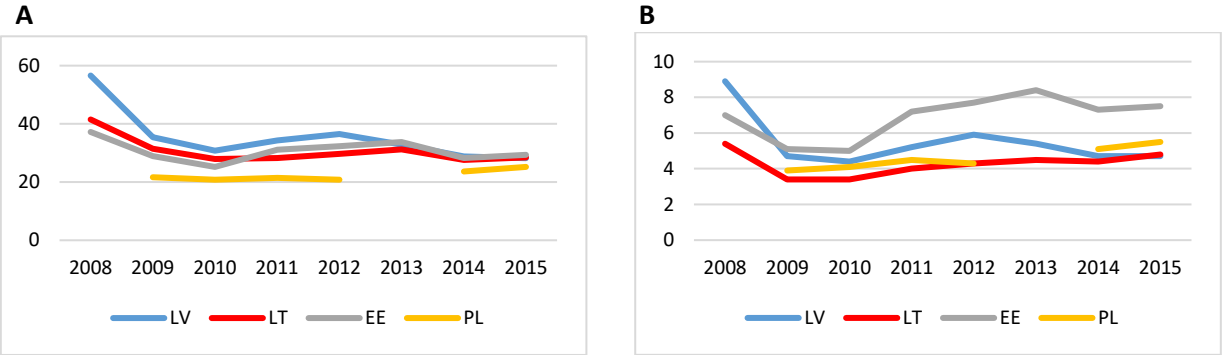
World Bank (2018).

Zwick E., and J. Mahon. 2017. "Tax Policy and Heterogeneous Investment Behaviour," *American Economic Review* 107(1): 217–48. https://doi.org/10.1257/aer.20140855.

Annex 1. The Economic Context: Firm Investment in the Baltic Countries and Poland

In 2009–15, the business investment rate (gross investment as percentage of the gross value-added of nonfinancial corporations) in Latvia was largely in line with other Baltic countries and Poland, although before the crisis (in 2008) the investment intensity in Latvia was well above its level in neighboring countries (Figure A1, A). However, since 2010, Latvia has trailed Estonia in terms of investment per person employed, and the gap is widening (FigureA1, B). This is true for most sectors (Figure A2).

Figure A1. Investment intensity in Total Business Economy. The Baltic countries and Poland, 2008-15.
A. Business Investment Rate, Percent B. Investment per Person Employed, €thousands



Sources: Calculation with Eurostat data.

Note: Total business economy includes all NACE activities except sections A, K, O, P, Q, R, S94, S96, T, U. Country notations: LV – Latvia, LT – Lithuania, EE – Estonia, PL – Poland.

Since 2008, gross investment in tangible goods in the Latvian business economy[22] plunged, hitting bottom in 2010. Despite some recovery thereafter, by 2015 the investment intensity was less than a half of its level in 2008 (Figure A1, A and B).

Up to 2012, business investment rate was higher in Latvia than in other Baltic countries and Poland. Since 2013, investment in the Baltics states has been getting closer, but in Poland is still lower than in any of the Baltic countries see Figure A1, A).

In 2009–15, investment per person employed in business economy in Estonia was well above that in Latvia, Lithuania, and Poland. As of 2009, Latvia lost its leadership position, and in 2015 investment there fell slightly below investment per person employed in Lithuania and Poland (Figure A1, B).

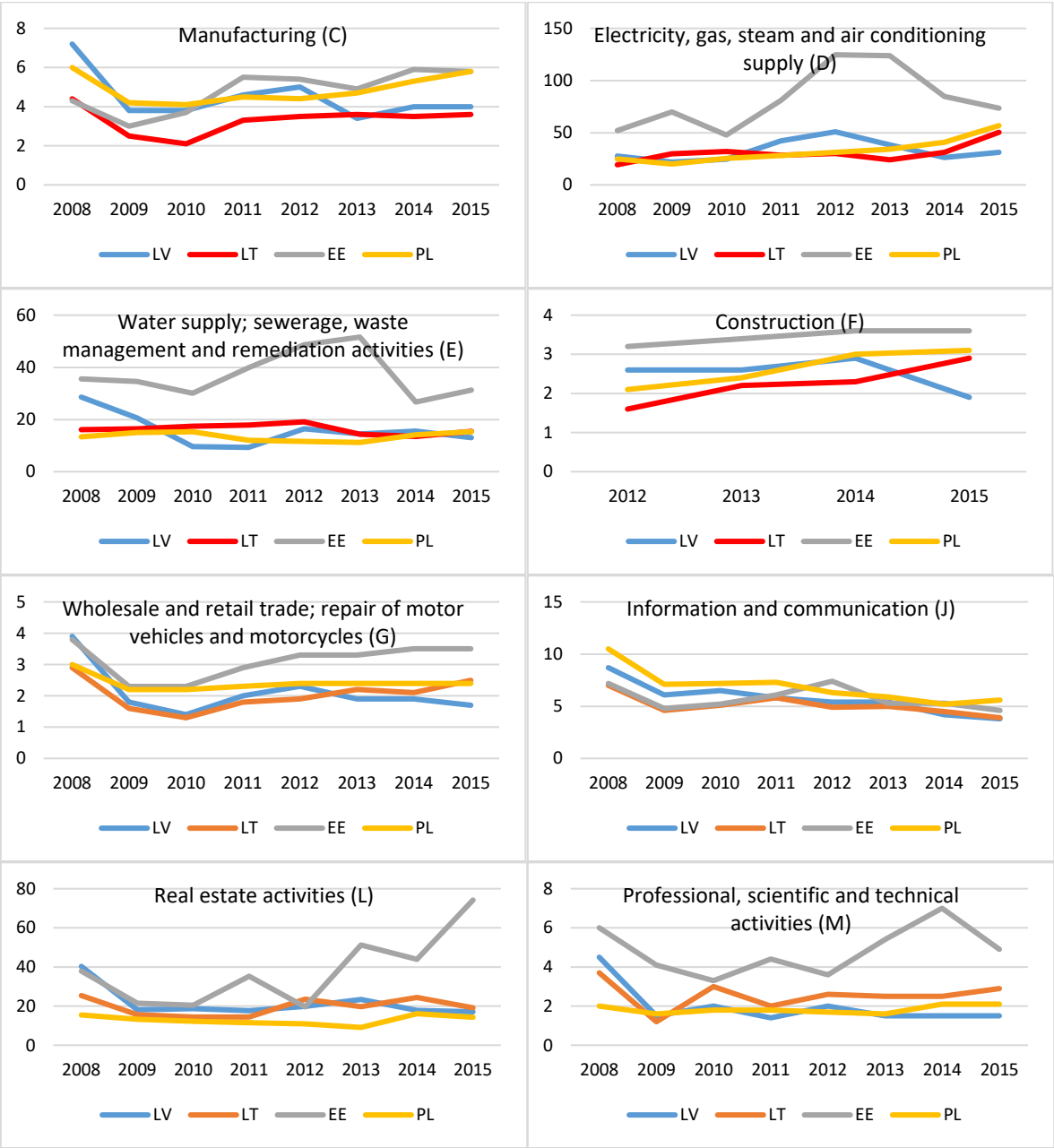
Investment per Person Employed by Industry

In Latvia, the most investment resources per person employed are found in utilities (NACE divisions s D and E), as well as real estate activities (NACE division L).

In most industries, investment per person is very close in Latvia, Lithuania, and Poland, but Estonia significantly outstrips its neighbors in almost all sectors (Figure A2).

[22] NACE: B-N_S95_X_K: Total business economy; repair of computers, personal and household goods; except financial and insurance activities. This aggregate includes all NACE activities except sections A, K, O, P, Q, R, S94, S96, T and U

Figure A2. Investment per Person Employed, Selected Industries, the Baltics and Poland, € thousand

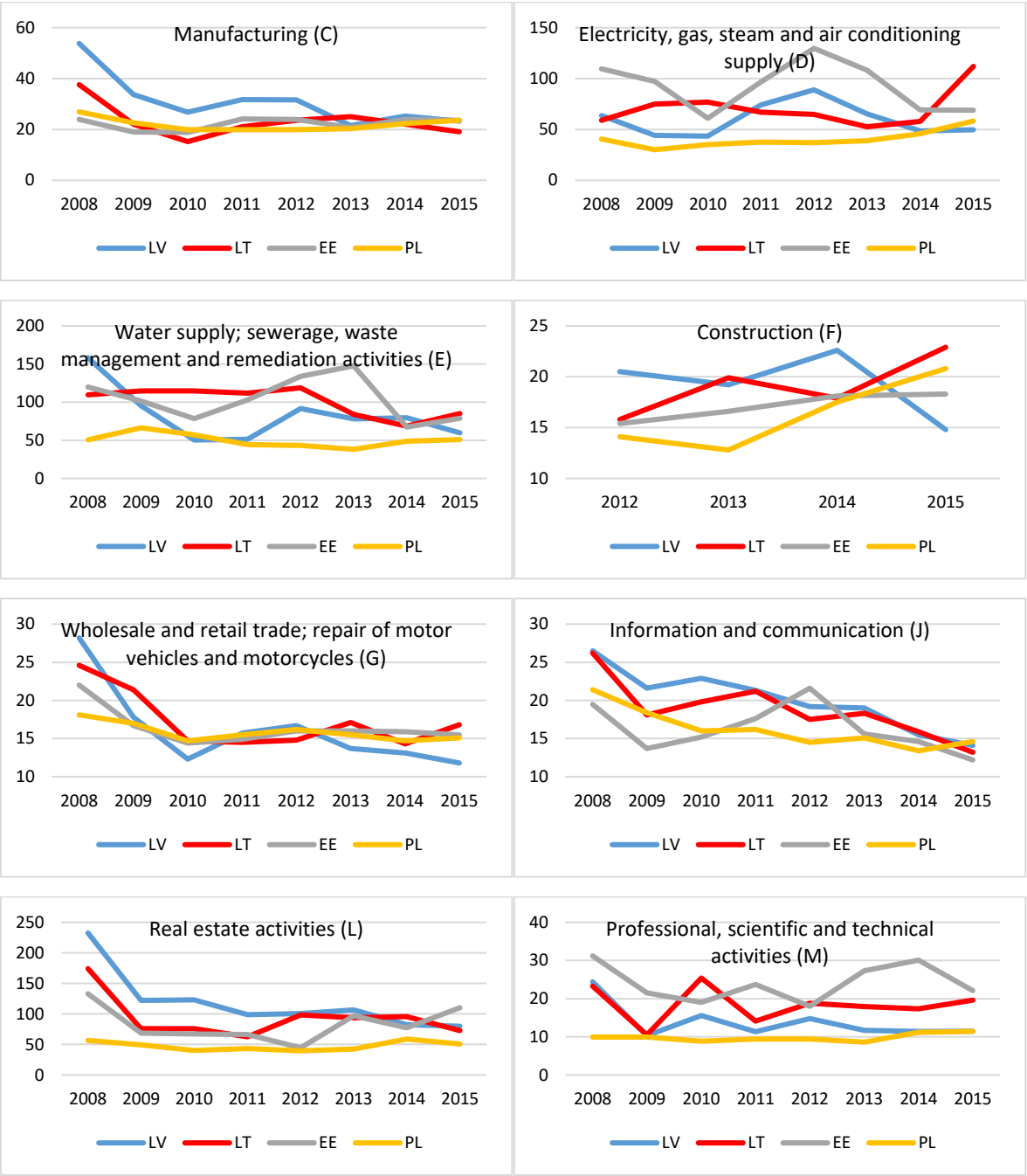


Sources: Eurostat data.

Investment Rate by Industry

Investment rate in Latvia was higher than in the other Baltic countries and Poland in manufacturing (up to 2013), construction (2012 and 2014), and real estate activities (up to 2012).

Figure A3. Investment Rate in Selected Industries, the Baltics and Poland, Percent

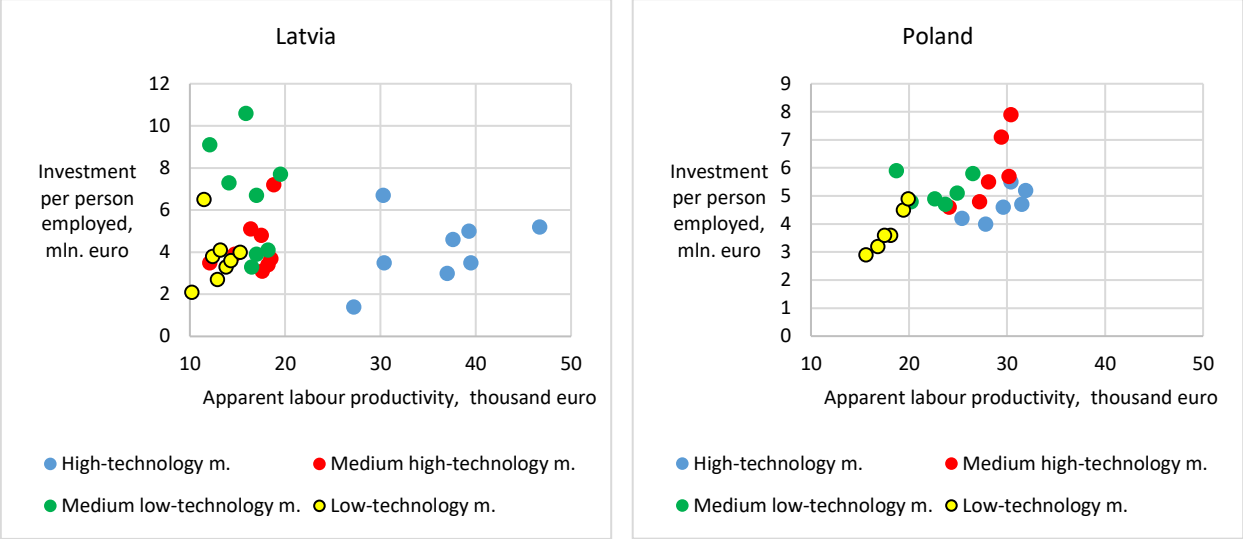


Sources: Eurostat data.

Figure A4 features relationship between investment per person employed and apparent labor productivity (measured as gross value added per person employed) in manufacturing in Latvia and Poland in 2008-15, separately for high technology, medium-high technology, medium-low technology, and low-technology industries. Figure A5 shows the relationship between business investment rate and apparent labor productivity (gross value added per person employed) for the same groups of industries in Latvia and Poland, in 2008–15.

The relationship between investment per person employed and apparent labor productivity is stronger in Poland than in Latvia (Figure A4), though for both the relationship between investment and apparent labor productivity is weak (Figure A5).

Figure A4. **Investment per Worker and Apparent Labor Productivity by Level of Technology in Manufacturing, Latvia and Poland, 2008–15, € Thousand**



Surces: Eurostat data.

*Note: (*1) High-technology manufacturing (C_HTC) covers NACE activities:C21, C26 and C30.3; (2) medium-high (C_HTC_M) covers NACE activities C20, C25.4, C27 to C29, C30 (except C30.1 and C30.3) and C32.5; (3) medium-low (C_LTC_M) covers NACE activities C18.2, C19, C22 to C24, C25 (except C25.4), C30.1 and C33;and (4) low-technology manufacturing (C_LTC) covers NACE activities C10 to C17, C18 (except C18.2), C31 and C32 except C32.5).

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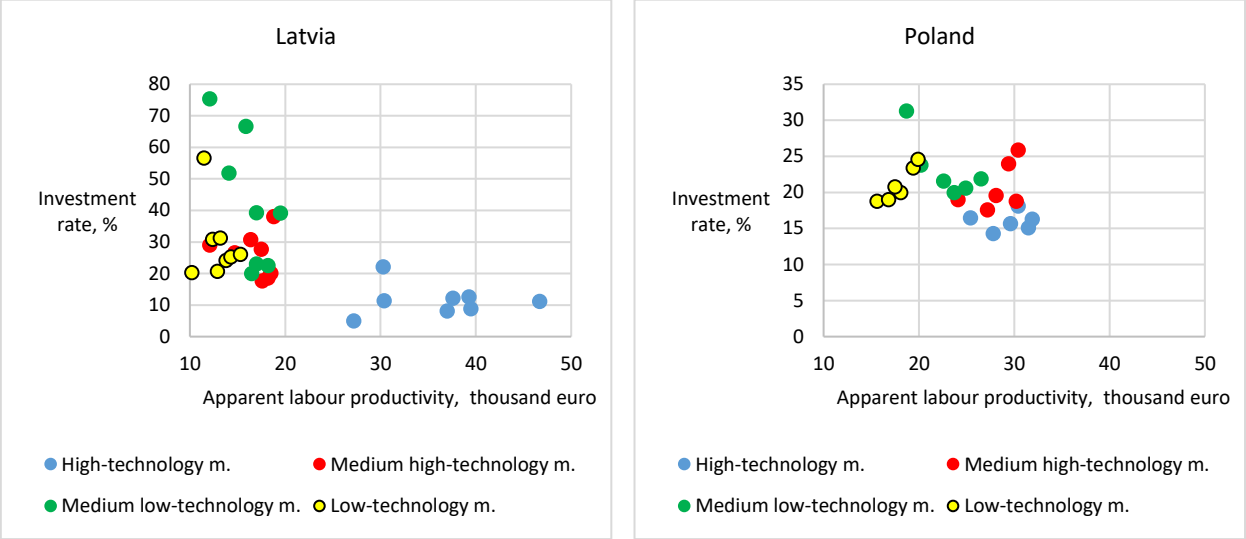
Figure A5. **Business Investment and Apparent Labor Productivity by Level of Technology in Manufacturing, Latvia and Poland, 2008–15**



Source: Eurostat data.

Notes: The business investment rate equals gross investment divided by gross value added of non-financial corporations. Data for Poland for 2008 and 2012 are missing. (1) High-technology manufacturing (C_HTC) covers the following NACE activities: C21, C26 and C30.3. (2) Medium-high (C_HTC_M) covers NACE activities C20, C25.4, C27 to C29, C30 (except C30.1 and C30.3) and C32.5. (3) Medium-low (C_LTC_M) covers NACE activities C18.2, C19, C22 to C24, C25 (except C25.4), C30.1 and C33. (4) Low-technology g (C_LTC) covers NACE activities C10 to C17, C18 (except C18.2), C31 and C32 (except C32.5).

Annex 2. Descriptive Evidence on Accelerated Depreciation in Latvia

Table A2.1 Regular and Bonus Depreciation Schedules for 1 million Investment in Five-Year Items: U.S ($). vs Latvia (Euro)

Year	0	1	2	3	4	5	Total
US							
Normal depreciation							
Deductions (000s)	200.0	320.0	192.0	115.2	115.2	57.6	1000.0
Tax benefit (t=35%)	70.0	112.0	67.2	40.3	40.3	20.2	350.0
NPV	70.0	104.7	58.7	32.9	30.8	14.4	311.4
Bonus depreciation (50 percent)							
Deductions (000s)	600.0	160.0	96.0	57.6	57.6	28.8	1000.0
Tax benefit (t=35%)	210.0	56.0	33.6	20.2	20.2	10.1	350.0
NPV	210.0	52.3	29.3	16.5	15.4	7.2	330.7
Present value payoff							**19.3**
Latvia							
Balance sheet depreciation (Double declining balance method or 2x straight line)							
Deductions (000s)	200.0	320.0	192.0	115.2	69.1	103.7	1000.0
Tax benefit (t=35%)	70.0	112.0	67.2	40.3	24.2	36.3	350.0
NPV	70.0	104.7	58.7	32.9	18.5	25.9	310.6
Depreciation for taxation purpose (35% rate, doubled)							
Coefficient of 1.5 is applied to asset value before depreciation for tax purposes							
Deductions (000s)	525.0	682.5	204.8	61.4	18.4	5.5	1497.6
Tax benefit (assuming t=35%)	183.8	238.9	71.7	21.5	6.4	1.9	524.2
NPV	183.8	223.2	62.6	17.5	4.9	1.4	493.4
Present value payoff (if t=35%)							**182.8**
Present value payoff (actual t=15%)							**78.4**

Table A2.2. Reduction in Taxable Corporate Income due to Accelerated Depreciation of New Equipment, €1,000

Top 25 Sectors, Annual Average, 2012–14

Sector	NACE Code	Total	Mean	p50	p75	p90	# firms
Manufacturing	10-33	88,040	184	7	75	35	478
Wood products	16	31,899	288	7	66	548	111
Food products	10	15,254	218	20	186	666	70
Basic Metals	24	12,920	3,524	161	376	3,097	4
Metal Products	25	5,074	89	7	84	231	57
Printing & reproduction	18	4,270	200	6	26	474	21
Rubber & plastic products	22	3,207	182	19	135	460	18
Other nonmetallic products	23	2,615	76	0	45	216	34
Pharmaceutical	21	2,300	431	6	308	1,802	5
Beverages	11	2,251	193	61	320	567	12
Electronic and optical products	26	1,350	109	4	122	229	12
Chemicals & chemical products	20	1,247	87	8	39	181	14
Textiles	13	994	107	2	44	271	9
Machinery & equipment n.e.c.	28	887	67	18	113	255	13
Electrical equipment	27	864	216	23	360	852	4
Furniture	31	753	27	5	33	84	28
Other sectors							
Electricity, gas, steam	35	86,356	1364	120	371	1,048	63
Real estate	68	8,352	234	1	7	150	36
Agriculture	1	6,316	95	11	68	191	66
Waste collection	38	2,587	268	33	219	1,045	10
Forestry	2	2,303	93	4	96	210	25
Land transport	49	2,113	60	2	24	77	35
Water collection & supply	36	1,686	632	347	1,002	2,210	3
Rental & leasing activities	77	1,310	179	8	57	156	7
Other mining and quarrying	8	1,114	68	10	60	203	16
Specialized construction	43	868	26	1	9	27	34

Sources: Ministry of Finance firm-level CIT data.

Annex 3. Matched Firms and All Firms: Distribution of Key Characteristics

Table A3.1 2-digit NACE Sector Share Differences: Distribution Parameters, 2008–14

Percentage Points

	Matched firms vs all firms in CIT data				Matched firms vs all firms declaring some asset depreciation			
	2008	2009-2010	2011-2012	2013-2014	2008	2009-2010	2011-2012	2013-2014
p50	0.01	0.01	0.01	0.02	0.01	0.02	0.03	0.03
p75	0.02	0.02	0.04	0.05	0.05	0.05	0.09	0.11
p90	0.05	0.06	0.12	0.10	0.18	0.21	0.24	0.33
p95	0.08	0.10	0.18	0.15	0.27	0.37	0.48	0.46
max	0.14	0.27	0.76	0.49	1.22	1.23	2.09	1.79
mean	0.02	0.02	0.05	0.05	0.07	0.08	0.12	0.13
sd	0.03	0.04	0.11	0.08	0.15	0.18	0.28	0.28
N	95	95	95	95	95	95	95	95

Source: Firm CIT and annual report data.

Table A3.2 Distribution of Firms by Region, 2008–14

Percentage Points

	Full CIT database				Matched firms			
	2008	2009-2010	2011-2012	2013-2014	2008	2009-2010	2011-2012	2013-2014
Riga	56.9	56.2	55.2	54.5	56.0	56.0	54.9	54.1
Pieriga	15.5	16.1	16.6	17.1	16.0	16.4	16.8	17.3
Kurzeme	8.0	8.0	8.1	8.1	8.1	8.0	8.2	8.3
Latgale	6.7	6.7	6.7	6.7	6.4	6.4	6.6	6.6
Vidzeme	6.4	6.5	6.6	6.7	6.5	6.6	6.7	6.8
Zemgale	6.4	6.5	6.8	6.8	6.6	6.6	6.8	6.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Firm CIT and annual report data.

Table A3.3 Distribution of firms by type of settlement, 2008-2014

Percentage points

	Full CIT database				Matched firms			
	2008	2009-2010	2011-2012	2013-2014	2008	2009-2010	2011-2012	2013-2014
Riga	56.9	56.2	55.2	54.5	56.4	56.0	54.9	54.1
Other main cities	13.9	13.8	13.5	13.3	13.7	13.6	13.3	13.2
Small towns	11.1	11.2	11.1	11.2	11.4	11.4	11.3	11.5
Rural	18.1	18.8	20.3	20.9	18.5	19.0	20.5	21.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Firm CIT and annual report data.

Table A3.4 2%Trimmed Distribution of Firms by Profit (€1,000) Before Taxes, 2013–14

	p10	p25	p50	p75	p90	mean	sd	N
All firms	-13.1	-2.1	0.0	5.0	35.0	9.5	60.8	171 223
Matched firms	-14.0	-2.4	0.0	5.9	37.1	9.9	61.9	160 907
Matched firms with non-missing fixed assets	-18.0	-3.5	0.6	13.2	58.1	16.5	79.5	106 464
All firms declaring some asset depreciation	-19.6	-4.0	1.0	15.1	64.5	18.6	89.1	102 222

Source: Firm CIT and annual report data.

Annex 4 Treatment and control groups

Table A4.1 Definitions of treatment and control groups in terms of 4-digit industry average accelerated depreciation value (ADV) and balance sheet depreciation value (BDV)

	Accelerated depreciation category					
	Total		New Equipment		Specially assisted areas (SAAs)	
	Treatment	Control	Treatment	Control	Treatment	Control
ADV/BDV	≥ 1.275	< 1.05	≥ 1.275	< 1.05	≥ 1.275	< 1.05
ADV – BDV	≥ € 3000	< € 500	≥ € 3000	< € 500	≥ € 3000	< € 500
ADV_new/BDV_new			≥ 2.00			
ADV_new			≥ € 1000			
N obs with ADV_new > 0			> 3			
% obs with ADV_new > 0				> 0.38%		
Firm size (N workers)	any	any	any	any	1 - 5	1 - 5
SAA status	no requirements				2007-2010	
N firms	10649	30872	6245	20544	430	1092
N obs	59297	158259	36907	106119	1205	3057

Source: Firm CIT and annual report data.

Notes: Firm size refers to the previous year. Firms in SAA Treatment and Control groups were operating in territories which had SAA status in 2007-2009 and/or 2010, but lost it since 2010 or (in most cases) 2011; these firms could, however, continue to use AD for items purchased under the SAA status. N firms and N obs refer to the working sample.

Table A4.2 Distribution of treatment and control groups by firm size, region and type of settlement

	Total		New equipment		SAAs	
	Treatment	Control	Treatment	Control	Treatmen	Control
# workers						
0	13.2	8.4	12.2	7.9		
1 - 5	58.9	60.9	57.8	60.1	100.0	100.0
6 -10	9.9	14.6	10.2	15.3		
11 - 49	13.1	13.3	14.9	13.9		
50+	4.8	2.8	4.9	2.8		
Total	100.0	100.0	100.0	100.0	100.0	100.0
region						
Riga	55.3	56.3	52.7	53.7	0.0	0.0
Pieriga	16.5	16.8	16.3	17.0	8.8	6.8
Kurzeme	9.1	7.8	10.0	8.4	19.8	17.8
Latgale	6.1	6.6	6.9	7.4	33.0	36.2
Vidzeme	6.6	6.0	7.2	6.6	28.9	26.9
Zemgale	6.4	6.5	6.9	6.9	9.5	12.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
settlement						
Riga	55.3	56.3	52.7	53.7	0.0	0.0
Other main cities	13.6	14.5	14.2	14.8	0.0	0.0
Small towns	11.1	12.7	12.0	13.7	31.0	38.9
Rural	20.0	16.5	21.1	17.8	69.0	61.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Firm CIT and annual report data.

Table A4.3 Distribution of treatment and control groups by turnover, investment rate and incidence of investment ≥ €100

	Total		New equipment		SAAs	
	Treatment	Control	Treatment	Control	Treatment	Control
turnover, €1000						
p10	4.7	5.6	5.2	6.6	3.3	3.1
p25	17.4	18.7	19.0	22.7	9.8	11.1
p50	77.7	69.8	80.8	79.8	30.4	35.9
p75	337.8	255.7	338.6	276.8	88.4	89.3
mean	78.9	69.4	82.5	78.1	27.9	27.8
investment rate, %						
p10	-3.3	-2.2	-3.0	-2.4	-1.9	-0.9
p25	0.0	0.0	0.0	0.0	0.0	0.0
p50	0.4	1.3	0.3	1.8	0.0	0.0
p75	21.8	32.0	17.0	28.5	17.9	14.3
mean	24.3	27.9	20.9	24.9	24.6	19.5
Investment ≥ €100, %						
	50.6	49.6	51.0	50.9	47.3	40.4

Source: Firm CIT and annual report data.

Annex 5 Estimation Results – Fixed Effects Panel Data Models

Table A5.1 Determinants of Firm Investment Rate with Total AD Effects, 2009–14

Dep. Var.: Inv_rate,	AD = AD_rate, see (6)			AD = AD_gain, see (7)		
see (4)-(5)	Treatment	Control	D-i-D	Treatment	Control	D-i-D
L.Log(Fixed assets)	-0.5017***	-0.3738***		-0.5053***	-0.3843***	
	0.0122	*0.0054*		*0.0124*	*0.0057*	
L.Log(Turnover)	0.0790***	0.0767***		0.0778***	0.0754***	
	0.0083	*0.0043*		*0.0082*	*0.0043*	
L.log(Profit)	0.0149***	0.0108***		0.0151***	0.0105***	
(if Profit ≥ 1 EUR)	*0.0037*	*0.0019*		*0.0036*	*0.0019*	
L.log(|Loss))	0.0125***	0.0033*		0.0124***	0.0034*	
(if |Loss| ≥ 1 EUR)	*0.0036*	*0.0019*		*0.0036*	*0.0019*	
Firm age (vs. 2-3 yrs)						
4-7	-0.0282	-0.0498***		-0.016	-0.0419***	
	0.0207	*0.0102*		*0.0205*	*0.0101*	
8-10	-0.0677**	-0.037**		-0.0505*	-0.0306*	
	0.0293	*0.016*		*0.0287*	*0.0159*	
11-19	-0.0759**	-0.0547***		-0.0482	-0.0485**	
	0.0383	*0.021*		*0.0375*	*0.0210*	
20+	-0.0586	-0.0513*		-0.033	-0.0488*	
	0.0471	*0.0264*		*0.0461*	*0.0263*	
L.#employed (vs. 1-5)						
0	0.0896***	0.0398***		0.0835***	0.0411***	
	0.0234	*0.014*		*0.0232*	*0.0139*	
6-10	0.063***	0.0679***		0.0590***	0.0690***	
	0.0196	*0.0104*		*0.0195*	*0.0103*	
11-49	0.0916***	0.0905***		0.0949***	0.0953***	
	0.0282	*0.0151*		*0.0281*	*0.0149*	
50+	0.1230***	0.1106***		0.1230***	0.1179***	
	0.0456	*0.0277*		*0.0456*	*0.0276*	
L.AD	0.0074	-0.0026		-0.0033	-0.0039	
	0.0350	*0.0140*		*0.0323*	*0.0163*	
year#L.AD: 2010	-0.0369	-0.1109***	0.0740	-0.0647	-0.0457**	-0.019
	0.0457	*0.0213*	*0.0504*	*0.0457*	*0.0214*	*0.0505*
2011	0.0697	-0.0725***	0.1422***	0.0917*	-0.0088	0.1005*
	0.0457	*0.0202*	*0.0499*	*0.0474*	*0.0227*	*0.0525*
2012	0.1494***	0.0179	0.1315***	0.1696***	0.0503**	0.1192**
	0.0453	*0.0201*	*0.0496*	*0.0459*	*0.0218*	*0.0508*
2013	0.1381***	0.0184	0.1197**	0.1896***	0.0782***	0.1113**
	0.044	*0.0194*	*0.0481*	*0.0462*	*0.0225*	*0.0513*
2014	0.1267***	0.0024	0.1243**	0.1705***	0.0684***	0.1021*
	0.0433	*0.0222*	*0.0486*	*0.0462*	*0.0244*	*0.0522*
Year fixed effects	yes	yes	yes	yes	yes	yes
Firm fixed effects	yes	yes	yes	yes	yes	yes
R-sq: within	0.3252	0.2387	0.2678	0.3167	0.2402	0.2655
overall	0.0753	0.0479	0.0329	0.0679	0.0476	0.034
N obs/N firms, 1000	37.3 / 8.98	103.9 / 26.6	141.2 / 35.6	37.0 / 8.97	103.4 / 26.6	141.4 / 35.5

Source: Calculation with firm CIT and annual report data. *Notes:* AD refers to total accelerated depreciation variables. Columns "Treatment" and "Control" present estimates of model (1) on groups defined in Table A4.1 (panel "Total"). Columns D-i-D present only time-varying coefficients δ_t of interactions of the treatment dummy (T) with lagged AD_rate or AD_gain from model (2) estimated on the Treatment + Control sample. Robust standard errors clustered on firms in italics. Legend:* p<.1; ** p<.05; *** p<.01.

Table A5.2 Disaggregated AD Effects on Firm Investment Rate, by Program Type

Dep. Var.: Inv_rate, see (4)-(5)	AD = AD_rate, see (6)			AD = AD_gain, see (7)		
	Treatment	Control	D-i-D	Treatment	Control	D-i-D
L.AD_new	-0.0773	-0.0181		-0.052	0.1007	
	0.0609	*0.1773*		*0.0622*	*0.1958*	
year#L.AD_new: 2010	-0.115	-0.0981	-0.0227	-0.0193	-0.2066	0.1879
	0.1431	*0.1769*	*0.2274*	*0.1735*	*0.1988*	*0.2655*
2011	0.0314	-0.1797	0.2185	-0.0014	-0.01	0.0158
	0.0778	*0.2199*	*0.2333*	*0.0843*	*0.2345*	*0.2489*
2012	0.1070	0.0933	0.0221	0.0254	0.0862	-0.0536
	0.0735	*0.1919*	*0.2055*	*0.0818*	*0.2127*	*0.2279*
2013	0.3441***	0.2017	0.1506	0.3502***	0.0742	0.2837
	0.1019	*0.2301*	*0.2519*	*0.1248*	*0.2045*	*0.2397*
2014	0.4375***	0.0168	0.4303*	0.4352**	-0.0493	0.4911*
	0.1449	*0.1881*	*0.2379*	*0.1748*	*0.211*	*0.2743*
L.AD_terr	-0.2146	-0.3285		-0.3075	-0.0364	
	0.1785	*0.2277*		*0.2809*	*0.1252*	
year#L.AD_terr: 2010	-0.1839	0.1091	-0.2955	-0.1777	-0.0492	-0.1354
	0.2289	*0.2912*	*0.3700*	*0.3119*	*0.3417*	*0.4612*
2011	0.1386	0.4835*	-0.3456	0.4548	0.5557**	-0.1034
	0.1796	*0.2647*	*0.3193*	*0.2916*	*0.2758*	*0.4003*
2012	0.414	0.3919*	0.0183	0.4076	0.0702	0.3361
	0.4804	*0.2318*	*0.5329*	*0.348*	*0.1395*	*0.3728*
2013	0.2802	0.3672	-0.0886	0.3634	0.0292	0.3330
	0.1893	*0.2322*	*0.2988*	*0.2961*	*0.1356*	*0.3233*
2014	0.0701	0.4697**	-0.4018	0.2478	0.2177	0.0293
	0.1941	*0.2387*	*0.3069*	*0.4771*	*0.1472*	*0.4976*
L.AD_oth	0.0123	-0.0004		0.0003	-0.0019	
	0.0359	*0.0140*		*0.0334*	*0.0162*	
year#L.AD_oth: 2010	-0.0405	-0.1124***	0.0716	-0.0678	-0.0468**	-0.0209
	0.0463	*0.0214*	*0.0510*	*0.0465*	*0.0216*	*0.0513*
2011	0.0688	-0.0761***	0.1450***	0.0898*	-0.0114	0.1013*
	0.0468	*0.0201*	*0.0509*	*0.0500*	*0.0226*	*0.0549*
2012	0.1462***	0.0137	0.1330***	0.1724***	0.0461**	0.1265**
	0.0455	*0.0204*	*0.0499*	*0.0468*	*0.0220*	*0.0517*
2013	0.1341***	0.0141	0.1204**	0.1965***	0.0751***	0.1216**
	0.0453	*0.0194*	*0.0493*	*0.0476*	*0.0226*	*0.0527*
2014	0.1244***	-0.0064	0.1316***	0.1664***	0.0606**	0.1063**
	0.0445	*0.0222*	*0.0497*	*0.0477*	*0.0245*	*0.0537*
Other controls	As in Table A5.1					
N obs/N firms, 1000	37.2 / 8.98	103.9 / 26.6	141.2 / 35.6	36.9 / 8.96	103.3 / 26.6	140.2 / 35.5
R-sq: within	0.3253	0.2390	0.2681	0.3158	0.2404	0.2653
overall	0.0756	0.0483	0.0327	0.068	0.048	0.0340

Source: Calculation with firm CIT and annual report data. *Notes:* AD_new, AD_terr and AD_oth refer to AD of new equipment, AD in specially assisted areas and other types of AD, respectively. Otherwise, Notes to Table A5.1 apply.

Table A5.3 Disaggregated AD effects on Probability of Investment, by Program Type

Dep. Var.: 1 if investment ≥ 100 EUR	AD = AD_rate, see (6)			AD = AD_gain, see (7)		
	Treatment	Control	D-i-D	Treatment	Control	D-i-D
L.AD_new	-0.0083	-0.1286		-0.0194	-0.0473	
	0.0565	*0.1839*		*0.0567*	*0.1921*	
year#L.AD_new: 2010	*-0.046*	0.2545	-0.3005	-0.0931	0.1307	-0.2238
	0.2005	*0.185*	*0.2728*	*0.1647*	*0.1968*	*0.2566*
2011	0.0001	0.0008	-0.0008	-0.0025	0.001	-0.0035
	0.0574	*0.2585*	*0.2648*	*0.0617*	*0.2717*	*0.2787*
2012	-0.0576	0.2272	-0.2848	-0.0431	0.1389	-0.1820
	0.0842	*0.1885*	*0.2064*	*0.0841*	*0.1993*	*0.2163*
2013	*0.0935*	0.2524	-0.1589	0.1567	0.1425	0.0141
	0.0699	*0.1955*	*0.2076*	*0.0872*	*0.195*	*0.2136*
2014	0.0796	0.2445	-0.1649	0.1488	0.1663	-0.0174
	0.0845	*0.1893*	*0.2073*	*0.108*	*0.1985*	*0.2260*
L.AD_terr	-0.1187	-0.0517		-0.0601	0.0978	
	0.2306	*0.1488*		*0.3329*	*0.1456*	
year#L.AD_terr: 2010	0.4362**	0.3302	0.1060	0.3305	0.0844	0.2461
	0.1809	*0.2647*	*0.3206*	*0.2522*	*0.2410*	*0.3488*
2011	0.1603	0.1505	0.0098	-0.0615	-0.1101	0.0486
	0.2223	*0.1659*	*0.2773*	*0.3975*	*0.2119*	*0.4504*
2012	0.0815	0.1027	-0.0213	0.0349	-0.0815	0.1164
	0.2317	*0.1536*	*0.2780*	*0.3342*	*0.1493*	*0.3659*
2013	0.183	0.0818	0.1012	0.1000	-0.1028	0.2029
	0.2318	*0.153*	*0.2777*	*0.334*	*0.1481*	*0.3653*
2014	0.0523	0.1592	-0.1070	0.1579	-0.0031	0.1611
	0.2345	*0.1515*	*0.2792*	*0.349*	*0.1493*	*0.3795*
L.AD_oth	0.0274*	0.0243**		0.0399**	0.0113	
	0.0143	*0.0107*		*0.0160*	*0.0096*	
year#L.AD_oth: 2010	-0.0072	-0.0149	0.0077	-0.0352*	-0.0092	-0.0261
	0.0167	*0.0149*	*0.0224*	*0.0198*	*0.0128*	*0.0236*
2011	-0.0030	-0.0161	0.0131	-0.0284	-0.0044	-0.0240
	0.0167	*0.0138*	*0.0217*	*0.0194*	*0.012*	*0.0230*
2012	0.0231	0.0092	0.0139	0.01	0.0177	-0.0077
	0.0158	*0.0131*	*0.0205*	*0.0186*	*0.0115*	*0.0219*
2013	0.0210	0.0177	0.0033	0.0258	0.0422***	-0.0164
	0.0162	*0.0128*	*0.0207*	*0.019*	*0.0116*	*0.0223*
2014	0.0207	0.0354	-0.0147	0.0315	0.0649***	-0.0333
	0.0167	*0.0135*	*0.0215*	*0.0201*	*0.0124*	*0.0236*
Other controls	As in Table A5.1					
N obs/N firms, 1000	37.5 / 9.05	104.8 / 26.8	142.3 / 35.9	37.2 / 9.0	104.2 / 26.8	141.4 / 35.8
R-sq: within	0.0335	0.0287	0.0299	0.0338	0.0300	0.0309
overall	0.0000	0.0024	0.0020	0.0002	0.049	0.0035

Source: Calculation with firm CIT and annual report data. *Notes:* AD_new, AD_terr and AD_oth refer to AD of new equipment, AD in specially assisted areas and other types of AD, respectively. Otherwise, Notes to Table A5.1 apply.

Table A5.4 AD of New Equipment: Effects on Firm Investment Rate and Probability of Investment

	Dep. Var.: Inv_rate, see (4)-(5)			Dep. Var.: 1 if investment ≥ 100 EUR		
	AD = AD_rate, see (6)			AD = AD_gain, see (7)		
	T_new	C_new	D-i-D	T_new	C_new	D-i-D
L.AD_new	-0.0686	0.0256		0.0307	0.004	
	0.0894	*0.1219*		*0.0495*	*0.071*	
N workers (vs. 50+)#L.AD_new						
0	0.3184**	0.4146***	-0.0962	-0.0945	0.1772	-0.2717*
	0.1452	*0.155*	*0.2123*	*0.1069*	*0.1184*	*0.1594*
1 to 5	0.0595	-0.0373	0.0968	-0.038	0.1036	-0.1416
	0.1249	*0.1362*	*0.1848*	*0.1075*	*0.0785*	*0.1331*
6 to 10	0.7773***	0.1444	0.6329**	0.4237***	0.1017	0.3220**
	0.2318	*0.142*	*0.2717*	*0.1051*	*0.0976*	*0.1434*
11 to 49	0.2347**	-0.0454	0.2801	0.0293	0.0641	-0.0348
	0.1019	*0.1498*	*0.1811*	*0.0602*	*0.0895*	*0.1079*
L.AD_terr	0.1454***	0.1247		0.0537***	0.1512	
	0.0412	*0.1915*		*0.0188*	*0.1702*	
N workers (vs. 50+)#L.AD_terr						
0	-1.6803	-0.3311	-1.3492	-1.250***	0.1571	-1.407***
	1.6234	*0.262*	*1.6430*	*0.3144*	*0.3312*	*0.4565*
1 to 5	-0.1306	0.0058	-0.1364	-0.0821**	-0.1049	0.0228
	0.0832	*0.2045*	*0.2208*	*0.0403*	*0.1732*	*0.1778*
6 to 10	0.051	0.0511	-0.0002	0.1013	-0.1721	0.2735
	0.457	*0.2005*	*0.4987*	*0.2117*	*0.1749*	*0.2745*
11 to 49	-0.118	0.0221	-0.1401	0.0537	-0.1102	0.1639
	0.283	*0.2415*	*0.3719*	*0.0684*	*0.1784*	*0.1911*
L.AD_oth	0.0377	0.1568***		0.0704	0.0747**	
	0.1054	*0.0602*		*0.045*	*0.0346*	
N workers (vs. 50+)#L.AD_oth						
0	0.1028	-0.2376***	0.3404**	-0.0473	-0.0564	0.0090
	0.1198	*0.0711*	*0.1392*	*0.0523*	*0.0397*	*0.0656*
1 to 5	0.0826	-0.1835***	0.2661**	-0.0332	-0.0442	0.0110
	0.1065	*0.0609*	*0.1226*	*0.0456*	*0.0349*	*0.0574*
6 to 10	0.045	-0.1267**	0.1717	-0.0245	-0.032	0.0074
	0.1235	*0.0642*	*0.1391*	*0.0504*	*0.0363*	*0.0621*
11 to 49	0.0056	-0.1424**	0.148	-0.0145	-0.0148	0.0003
	0.1126	*0.0642*	*0.1296*	*0.0502*	*0.0369*	*0.0623*
Other controls	As in Table A5.1					
N obs/N firms, 1000	24.4 / 5.6	70.3 / 17.7	94.7 / 23.3	24.3 / 5.6	70.5 / 17.8	94.8 / 23.5
R-sq: within	0.3592	0.2416	0.2802	0.0396	0.0308	0.0329
overall	0.0915	0.0510	0.0582	0.0009	0.0062	0.0000

Source: Calculation with firm CIT and annual report data. *Notes: AD_new*, *AD_terr* and *AD_oth* refer to AD of new equipment, AD in specially assisted areas and other types of AD, respectively. Columns "T_new" and "C_new" present estimates of fixed effect models $Y_{is} = \alpha_{st} + \beta_s Z\_AD_{it-1} + \gamma_s X_{it-1} + u_i + \varepsilon_{it}$ on groups defined in Table A4.1 (panel "New equipment"). Columns D-i-D present only size-varying coefficients δ_s of interactions of the treatment dummy (T) with lagged AD_rate or AD_gain from model (3) estimated on the pooled (*T_new* and *C_new*) sample. Robust standard errors clustered on firms in italics.