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Bonus Depreciation as Instrument for Structural Economic Policy: Effects on Investment and Asset Structure

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Abstract

We analyze how the expiration of a regional bonus depreciation regime in eastern Germany (*Development Area Law*, DAL) affected real investments and asset structures of establishments in the manufacturing sector. Our rich administrative data allow us not only to identify the aggregate effect, but also to determine which types of investments and firms are most affected. Our baseline results indicate that the DAL increased real aggregate investment by 16.0% to 19.9%. This effect is stronger for investments in buildings (76.6% to 92.9%) with long regular depreciation periods and land (108.0% to 121.3%) that cannot be depreciated regularly. The impact on equipment investment is much smaller (7.3% to 10.5%). Thus, firms not only increased real investment, but also adjusted their asset structure in response to the policy. We observe significantly stronger investment responses for large firms with lower tax planning and compliance costs and multi-establishment firms with more opportunity for subsidy shopping. However, we do not find evidence that firms with higher financial reporting costs (i.e., incorporated firms and firms without an active business owner) show a weaker investment response.

JEL classification codes: G11; H25; H32; M41

Keywords: bonus depreciation, real investment, user cost of capital, tax elasticity

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1 Introduction

In recent decades policymakers frequently used bonus depreciation as a counter-cyclical policy to encourage investment and support economic growth. Examples include the 2009–2011 Dutch bonus depreciation (Wielhouwer and Wiersma 2017), the 2008–2010 U.S. bonus depreciation, the 2017 U.S. tax reform, and other examples (see Maffini et al. 2019 and Guceri and Albinowski 2021 for discussion). However, counter-cyclical fiscal policy is not the only potential use of bonus depreciation. Nowadays there is an ongoing debate about the bad condition of infrastructure in western economies (infrastructure gap, e.g.OECD 2019; WEF 2023) and the need for public and private investments to overcome economic challenges. Examples include digitalization (Vignon et al. 2023) and investments in decarbonization (DeCotis 2004; IMF 2023). Thus, the question arises if bonus depreciation might be an effective tool to increase investment activity in longterm assets.

Our paper addresses this question by analyzing the expiration of a German bonus depreciation program in 1998 with the target to increase investment activity in eastern Germany and to eliminate structural deficits in the eastern German economy. We analyse (1) whether and to what extent bonus depreciation may affect real investments of firms in the manufacturing sector, (2) how these incentives change a firm's asset structure (long-term assets versus short-term assets), and (3) which types of firms respond more strongly to the policy.

Empirical studies typically analyze the use of bonus depreciation as tool for counter-cyclical fiscal policy and find a positive effect of such programs on firm investment. The effectiveness of such programs is still debated (see the discussion in Ohrn 2017; Wielhouwer and Wiersma 2017).[1] Elasticity estimates with regard to the tax term of the user costs of capital are typically large but vary widely (2.9 to 14.0). It is further unclear whether estimates of studies using accounting data might be biased by accounting incentives (e.g., conforming tax avoidance, see Edgerton 2012; Eichfelder et al. 2024; Badertscher et al. 2019) and if the effects of the introduction and the expiration of such a policy are symmetrical. Moreover, while Zwick and Mahon (2017) find a large heterogeneity in investment

[1] Although most studies find a positive and significant effect of bonus depreciation on investment (House and Shapiro 2008; Edgerton 2012; Maffini et al. 2019; Zwick and Mahon 2017; Wielhouwer and Wiersma 2017; Ohrn 2019), there are also studies with insignificant results (Cohen and Cummins 2006; Dauchy and Martínez 2008; Hulse and Livingstone 2010; Edgerton 2011)

responses, there is only a relatively limited body of work examining firm heterogeneity (Aarbu and MacKie-Mason 2003; Edgerton 2010; Wielhouwer and Wiersma 2017; Zwick and Mahon 2017).

We use the expiration of a German bonus depreciation program (*Development Area Law*, DAL) to answer these important questions in a scenario where bonus depreciation was used for structural fiscal policy in an economically underdeveloped region. The first objective is to identify and quantify the average effect on real investment activity of the treated German establishments using a difference-in-differences (DiD) estimation strategy. A main advantage of our data is that we can observe real investment in a compulsory survey of the German Federal Statistical Office at the establishment level. Thus, the data remains unaffected by tax and accounting incentives such as earnings management or conforming tax avoidance that might bias accounting data (e.g., Edgerton 2012; Badertscher et al. 2019; Eichfelder et al. 2024).[2]

We consider subsidized establishments in the eastern German states as the treatment group and non-subsidized establishments in the western states as the control group, and compare investment in the DAL treatment period (1995-1998) with investment in the period after the expiration of the DAL (1999-2008). Thus, this study provides evidence if the expiration of a bonus depreciation policy results in a reduction of investment activity for different types of asset classes and firms. In 1995, the first year in our sample, the vast majority of establishments in former eastern Germany were owned by western German firms and firms in both parts of Germany and had access to the same technologies.[3] Therefore, western German establishments are an appropriate control group.[4]

[2]Conforming tax avoidance or tax-induced earnings management means that firms manage their book income downwards with the target to reduce their tax burden. As a consequence, firms might manage book values downwards which can result in measurement error regarding investments in total assets and fixed assets of firms. Eichfelder et al. 2024 provide evidence that conforming tax avoidance is positively associated with business tax rates.

[3]The main privatization strategy of the *Treuhand Agency* (THA) at the end of the German Democratic Republic was to find an experienced and established western German or international firm, while management buyouts were a secondary alternative (Paqué 2009, pp. 47f.) Since the share of international investors was only about 6%, experienced companies from the former West were by far the most important investor group (BvS 2003, p. 58)

[4]Note that our approach does not assume that economic conditions are identical in both parts of Germany, since we control for the economic situation at the county level. We also allow for differences in cross-sectional characteristics due to establishment fixed effects and other control variables. For robustness checks, we rely on enterprise panels with establishments in both parts of Germany and propensity score matching to increase the similarity of the control and treatment groups. Our analyses provide evidence of common trends in investment activity between the two groups in the post-DAL period-our reference point

Our baseline estimates suggest a treatment effect on investment at the extensive margin (investment probability) of 3.8 to 4.4 percentage points and at the intensive margin (conditional investment volume) of 11.7% to 14.8%, suggesting an overall effect of 16.0% to 19.9%. When we also consider a wide range of additional robustness checks, the effect size ranges from 10.5% (for a balanced panel of establishments over the entire observation period) to 34.8% (for a mixed panel of firms with establishments in both parts of Germany). Thus, our results suggest that bonus depreciation has a statistically and economically significant impact on real investment activity.

We go beyond identifying an aggregate investment response and examine two dimensions of heterogeneity: types of capital and firm characteristics. From a theoretical perspective, bonus depreciation becomes more valuable for capital goods with long regular depreciation periods (e.g., buildings). While existing empirical research often relies on this assumption (e.g., Desai and Goolsbee 2004; Edgerton 2010; Zwick and Mahon 2017), corresponding evidence is still missing. Considering our baseline tests as well as additional robustness checks, we find that the investment response for assets with long regular depreciation periods, such as building investment (71.9% 92.9%) and assets with no regular depreciation such as land investment (108.0% to 121.3%), by far exceeds the investment response of equipment investment (4.5% to 10.5%). This result is robust across a wide range of tests and underscores that investment tax incentives affect not only the volume of investment but also the asset structure of firms.

With respect to firm heterogeneity, we expect the effectiveness of bonus depreciation to increase with subsidy shopping opportunity, i.e., tax planning, and to decrease with tax planning costs (e.g., Jacob 2022). Due to economies of scale in tax avoidance (Hundsdoerfer and Jacob 2019), tax planning costs should decrease with firm size, increasing the effectiveness of bonus depreciation for large firms. Our analysis provides robust evidence that firms with multiple establishments and large firms are more responsive to bonus depreciation. We also address the importance of accounting incentives, but do not find evidence that these play an important role in the effectiveness of bonus depreciation programs.

Our paper contributes to the literature in several ways. First, we contribute to the literature on the effectiveness of bonus depreciation programs (e.g.,Desai and Goolsbee 2004; Zwick and Mahon 2017; Orihara and Suzuki 2023). While Eichfelder et al. (2023)

use the same policy variation to analyze the impact of German bonus depreciation on investment quality, our focus is on identifying the impact on the quantity and type of investment. An advantage of our study is that we rely on exogenous policy variation at the establishment level (unlike most studies that identify policy variation at the industry level) and have access to high-quality data on real investment from the German Federal Statistical Office. Thus, our analysis remains unaffected by tax avoidance and earnings management activities that might bias accounting data (e.g. Badertscher et al. 2019; Eichfelder et al. 2024). We estimate an investment elasticity with regard to tax term of the user cost of capital for the German bonus depreciation program that ranges from 4.0 to 4.9 for our baseline estimates and from 2.7 to 8.1 for additional robustness checks. This elasticity is relatively moderate when compared to existing evidence on bonus depreciation programs (elasticity range of 2.9 to 14.0, see House and Shapiro 2008; Maffini et al. 2019), but high when compared to semi-elasticity estimates with respect to statutory tax rates (range of 0.2 to 1, see Auerbach and Hassett 1992; Chirinko et al. 1999; Bond and Xing 2015; Melo-Becarra et al. 2021 with further references). Hence, our paper confirms previous research that temporary bonus depreciation policies are more effective to increase business investment than long-term reductions in tax rates. In addition, our paper shows that not only the introduction of a bonus depreciation policy (analyzed by previous research) but also the expiration of such a policy results in high elasticity estimates regarding the effectiveness of bonus depreciation to promote investments.

Second, as we have access to detailed administrative data regarding investment types at the establishment level, we are the first to estimate the impact of bonus depreciation on asset structures. While most studies use industry differences in tax benefits for different assets to identify firms' investment responses (e.g., Desai and Goolsbee 2004; Edgerton 2010; Zwick and Mahon 2017), empirical evidence of a stronger investment response for assets with long standard depreciation periods is still missing. Our paper provides evidence that a bonus depreciation policy should be especially effective in promoting investments in assets with long regular depreciation periods. This might include buildings and structures (as in our study) but also other long-term assets like digital infrastructure, energy grids, energy storage devices.[5]

[5]. For example, standard depreciation periods in Germany are 20 years for district heating pipes, 30 to 40 years for gas grids, 25 to 35 years for high-voltage overhead lines, 20 years for fiber optic cables and 50 years for electricity power stations, see German Ministry of Finance 1993, 1995.

Third, we contribute to the sparse literature on how different types of firms respond to tax incentives and bonus depreciation (Aarbu and MacKie-Mason 2003; Edgerton 2010; Zwick and Mahon 2017; Wielhouwer and Wiersma 2017). We follow the advice of Jacob (2022) and are the first to analyze the relationship between investment tax incentives, planning costs, and tax avoidance opportunity. We find that large firms with lower tax planning costs are significantly more responsive to the DAL. This is consistent with evidence of Aarbu and MacKie-Mason (2003) for depreciation benefits in Norway as well as with the findings of Knittel (2007) and Kitchen and Knittel (2011) on lower take-up of bonus depreciation by small firms in the United States.

While our results differ from Zwick and Mahon (2017), this is not necessarily a contradiction. Zwick and Mahon (2017) find a stronger investment response of the smaller firms in their U.S. sample and explain this by greater liquidity constraints of these firms. In our case, we find a weaker investment response of smaller firms and explain this with higher compliance costs. Considering that a) compliance costs and liquidity constraints in the U.S. setting are likely to be different from the German setting, b) the chosen size proxy (sales) of Zwick and Mahon (2017) is more related to liquidity than to our size proxy (employees), and c) the average size of entities is substantially larger in their sample compared with our data, it is not surprising that our results differ from Zwick and Mahon (2017). Overall, it seems likely that compliance costs and liquidity constraints are both factors that affect the effectiveness of investment tax incentives for small firms relative to large firms. It might be an interesting question for future research to disentangle in which settings and for which firm size liquidity effects might outweigh compliance cost effects, and vice versa.

We also find a stronger investment response of firms with multiple establishments that have more opportunity for subsidy shopping. Therefore, bonus depreciation programs seem to provide a competitive advantage for large firms and for multi-establishment firms. By contrast, we cannot confirm the findings of Aarbu and MacKie-Mason (2003) and Edgerton (2012) that firms with lower financial reporting costs (in our case non-incorporated firms and owner-managed firms) respond more strongly to the policy. Thus, accounting incentives do not seem to play a major role for the effectiveness of German bonus depreciation.

We structure the paper as follows. Section 2 describes the German investment tax incentives and corresponding accounting regulations. Section 3 introduces the theoretical framework and derives the hypotheses. We describe the identification strategy and data in Section 4. Section 5 presents the results, while Section 6 concludes.

2 Institutional Background and Development Area Law (DAL)

Corporate profits in Germany are subject to a corporate income tax (CIT), a local business tax (LBT), and to dividend tax upon distribution.[6] The German CIT and LBT codes define the tax base, including depreciation rules, that apply to all firms in Germany. In 1991, the German federal government enacted the Development Area Law (DAL) bonus depreciation program to encourage business investment in the five eastern states (Brandenburg, Mecklenburg-West Pomerania, Saxony, Saxony-Anhalt, and Thuringia) and Berlin. In addition to the DAL, firms were also able to apply for tax-free grants from the Investment Subsidy Law (German: *Investitionszulagengesetz*, expired in 2013, hereafter ISL) and taxable grants of the Joint Task Program "Enhancement of Regional Economic Structure", which supports investments in structurally weak areas of Germany (German: *Gemeinschaftsaufgabe "Verbesserung der regionalen Wirtschaftsstruktur"*, still ongoing, hereinafter JTP). The DAL was among the most costly subsidies of the 1990s and the only program that included bonus depreciation. In 1996, the DAL subsidy volume ranked first among all German tax incentive programs.

The DAL allowed businesses to immediately depreciate 50% of eligible investments, while the remaining 50% of the book value was depreciated over the asset's useful life.[7] Bonus depreciation could be claimed when filing regular tax returns and was not limited to specific industries or types of businesses. The DAL program was initially planned to expire by the end of 1996. However, as economic recovery took more time than expected, the bonus depreciation program was prolonged until December 31, 1998, as part of the

[6] From 1999 to 2001, there were major reforms of the German tax system affecting corporate taxation (with a large reduction in the German corporate income tax burden) and dividend taxation (with a large reduction in the dividend tax). Since the reform affected corporations in both parts of Germany in the same way, our DiD design accounts for these tax system changes.

[7] Alternatively, bonus depreciation could have been freely spread over the first five years after the investment if no other special depreciation provisions had been claimed.

"Tax Year Act 1996" (Jahressteuergesetz 1996) from October 11, 1995. This prolongation had already been announced on March 27, 1995 in a first draft of the "Tax Year Act 1996". However, the maximum bonus depreciation rate was reduced from 50% (until December 31, 1996) to 40% (from January 1, 1997 until December 31, 1998). As a consequence, the prolongation decreased the pressure for investors to finalize their investment projects until the end of 1996, but also slightly reduced the incentive of the policy. Bonus depreciation was available for all movable assets (except aircraft) and for structures (including building modernization). We exploit the expiration of the DAL in December 1998 for identification, which we interpret as an increase in the user cost of capital.

Unlike the DAL, JTP and ISL required a formal application, resulting in higher compliance costs. The assessment base for both programs was smaller and the funding criteria were more stringent. Prior to 1999, ISL grants were limited to new movable assets, with some exceptions (no low-value assets, automobiles, or aircraft). After 1999, ISL grants were extended to new structures, but only in the case of so-called "initial investments," which included the founding or expansion of an establishment, major changes in products and production methods, and the acquisition of a business that would otherwise have been liquidated. In the case of JTP, eligible investments included movable and intangible assets. Unlike DAL and ISL, JTP applicants did not have a legal entitlement to receive grants if they fulfilled the program requirements. Therefore, the funding depended on the quality of applications and the decisions of the managing authorities.

An interesting aspect for our analysis is the accounting treatment of DAL bonus depreciation. Prior to the German Accounting Law Modernization Act (German: *Bilanzrechtsmodernisierungsgesetz*) of 2008, German GAAP had a special form of book-tax-conformity that required special tax treatments to be taken into account in financial accounting (so-called "reverse" book-tax-conformity). Thus, if a company wanted to save taxes by using bonus depreciation in its tax accounts, it also had to report lower book income. Therefore, the use of bonus depreciation resulted in financial reporting costs for firms with the target to report high book income.[8]

[8] In contrast, direct and tax-exempt ISL grants were considered tax-exempt income in the financial accounts, which increased profit. JTP grants could be reported in their financial reports either as taxable income or as a reduction in acquisition costs. This resulted in either income in the current year or in lower depreciation (i.e., higher income) in future periods. Thus, while DAL bonus depreciation had a negative effect on current year earnings, ISL and JTP grants had either a neutral or a positive effect on current year earnings.

Table 1 summarizes the main features of the existing programs. Note that the most important changes were made to bonus depreciation (DAL), and DAL was the only program that included such tax incentives.

[Table 1 about here]

Figure 1 shows the total value of DAL, ISL, and JTP subsidies by their present value (for calculation details, see Online Appendix A) from 1995 to 2008. The total volume of all subsidies and DAL subsidies declined significantly around the phasing out of DAL in 1998/1999, while the total of ISL and JTP subsidies remained stable over time. The low but positive DAL subsidies after 1998 are due to delayed bonus depreciation payouts. Taken together, Figure 1 documents a sharp and permanent decline in total investment tax incentives in eastern establishments due to the expiration of the DAL program.

[Figure 1 about here]

3 Theoretical Framework and Hypotheses

The seminal work of Hall and Jorgenson (1967) provides a framework for the impact of tax policy on business investment. According to their model, taxes and tax incentives affect the user cost of capital. Abstracting from adjustment costs, the user cost of capital can be defined as (e.g. Cohen et al. 2002; Devereux and Griffith 2003)

$$C_t = \varphi_t \cdot T_t \cdot [\rho_t + \delta_t - E(\Delta\varphi_t/\varphi_t)], \tag{1}$$

with φ_t representing the price level, ρ_t the after-tax cost of funds, and δ_t the physical rate of depreciation at time t. $E(\Delta\varphi_t/\varphi_t)$ describes expected changes in the price of capital goods. Therefore, $\delta_t - E(\Delta\varphi_t/\varphi_t)$ is the expected net rate of depreciation. The tax term of the user costs of capital is defined as

$$T_t = \frac{(1 - \tau_t \cdot Z_t - s_t)}{(1 - \tau_t)}, \tag{2}$$

where τ_t is the tax rate on profits, s_t is the rate of direct subsidies (in our case ISL and JTP benefits), and Z_t is the present value of depreciation allowances per € invested (in our case the sum of regular depreciation benefits plus bonus depreciation benefits).

Given the sharp decline in total subsidy volume in 1998, as shown in Figure 1, we conclude that the expiration of the DAL increased the average user cost of capital for treated establishments and hypothesize that investment in these firms was unusually high during the DAL treatment period.

H1: *DAL increased real investment in treated establishments.*

As documented in Eq. 1, the user cost of capital decreases in depreciation benefits $\tau_t \cdot Z_t$. In the case of immediate depreciation, the value of depreciation benefits equals τ_t because Z_t equals one for $t = 0$ (see also Cohen et al. 2002). Therefore, bonus depreciation becomes more valuable when regular depreciation benefits are small. For $t \to \infty$, the present value of depreciation Z_t converges to zero, which is the case for assets with very long depreciation periods, such as undeveloped land or buildings. Therefore, we expect the bonus depreciation program to have a stronger impact on assets with long regular depreciation periods, such as building investments and land investments which are not depreciated regularly.

H2: *DAL had a stronger effect on investment goods with long standard depreciation periods.*

Furthermore, we analyze how firm characteristics are related to the effectiveness of the DAL bonus depreciation scheme. First, we take into account the fact that tax planning is a costly activity that also depends on tax avoidance opportunities. The literature on tax complexity and compliance costs clearly shows that the marginal costs of tax planning and compliance decrease with firm size (Gunz et al. 1995; Richardson and Lanis 2007). The combined costs of planning and compliance can be 10 or even 100 times higher for small firms than for large firms (Eichfelder and Vaillancourt 2014). As a result, larger firms tend to devote more resources to tax planning and tax optimization. Consistent with this argument, Knittel (2007) and Kitchen and Knittel (2011) provide evidence that small U.S. firms use bonus depreciation to a lesser extent than large firms (lower take-up rates). Aarbu and MacKie-Mason (2003) find that the underutilization of accelerated depreciation options in Norway is partly due to high compliance burdens of small firms. In addition, since small firm's tax returns are often prepared by tax advisers and not by chief executives (Eichfelder et al. 2012; • Bransch and Gurr 2019), it less likely that executives with limited tax knowledge take tax incentives into consideration when deciding on investment. In line with that, Heinemann-Heile et al. (2023) provide survey evidence that German SMEs often do not use accelerated depreciations for small firms or are even unaware of such regulations. As mentioned in the introduction, our argument differs from Zwick and Mahon (2017), who do not consider compliance costs but assume that the liquidity constraints of smaller firms are, on average, tighter than those of larger firms. Second, the literature on profit shifting and tax avoidance shows that business groups with international subunits shift patents, profits, or costs with the aim of saving taxes (e.g. Dharmapala 2014; De Simone et al. 2017; Hundsdoerfer and Jacob 2019). In line with these findings, we expect that firms with more than one establishment have more opportunity to adjust their investment strategy in order to take advantage of the German bonus depreciation program (”subsidy shopping”).

Finally, the use of the DAL bonus depreciation required an equal depreciation deduction in tax accounts and financial accounts (so-called ”reversed” book-tax-conformity). As a consequence, while bonus depreciation provided cash tax benefits, it also forced firms to report higher depreciation and lower earnings in financial accounts. Therefore, the investment response to the DAL might be partially offset by incentives of firms to report higher earnings (Aarbu and MacKie-Mason 2003; Edgerton 2012). We use two proxy variables to identify firms with a higher cost to under-report book income (financial reporting costs). First, due to accountability and the capital maintenance principle,[9] corporations likely face higher financial reporting costs as they are only allowed to distribute their book income as a dividend. We therefore expect a weaker investment response of corporations. Second, we expect that owner-managed firms have smaller financial reporting costs, since they are less affected by principal-agent problems.

H3: *The DAL had a stronger effect on investments of firms with low relative planning costs (large firms), firms with more opportunities for subsidy shopping (multi-establishment firms), and firms with lower financial reporting costs (non-corporate and owner-managed firms.)*

[9] In Germany, limited liability companies and other corporate firms are only allowed to distribute their (retained) book income after taxes as a dividend. In addition, such corporate firms are typically less closely held than partnerships and sole proprietorships, thereby increasing agency problems and related financial reporting costs.

4 Identification Strategy and Data

4.1 Identification Strategy

We interpret the expiration of the DAL as a natural experiment. Since establishments in western German states were not subsidized, we use them as a control group and identify the DAL effect through a difference-in-differences (DiD) estimation. An important advantage of our identification strategy is that the DAL bonus depreciation applied to almost all types of investments in the eastern states. It was not necessary to apply for the DAL or to actively choose the DAL program. Therefore, self-selection should be of little concern (see, e.g., Wielhouwer and Wiersma 2017 for related issues).[10] Furthermore, an important prerequisite for DiD estimation is the assumption of common trends.[11] We discuss possible concerns about this assumption in Section 4.4 in greater detail. Most importantly, the graphical analysis in this section provides convincing evidence of a common trend after the expiration of DAL bonus depreciation as well as of a structural break after the expiration of the program.

We account for possible differences between establishments in the two parts of Germany in several ways. First, we control for time-invariant differences using establishment fixed effects, α_i. Second, we capture differences in capital stock, productivity, and general economic conditions in the region (e.g., unemployment rate, GDP per capita) through a set of control variables, X_{it}. Third, to account for economic shocks, we also include year fixed effects, γ_t, and industry-year fixed effects, θ_{it}. Fourth, in robustness checks in Section 5.3 and additional analyses in Section 5.5, we perform tests on a sample of firms with establishments in both parts of Germany and also apply propensity score matching to make our control group more similar to our treatment group. Fifth, we provide estimates for a wide range of additional specifications with robust results. Our baseline model can

[10] To control for possible self-selection by establishing a branch in a treatment area, we also perform a robustness check in 5.3 for a balanced panel of establishments that existed at the beginning of our observation period (1995).

[11] Another important but often neglected prerequisite is the stable treatment unit assumption (SUTVA). SUTVA means that treatment affects the treatment group but not the control group. A possible problem in our case could be that investments were diverted from the West to the East to obtain higher bonus depreciation. However, given the dominance of the western German economy and the small size of the economy in eastern Germany, this should be a minor problem. Despite the bonus depreciation from 1995 to 1998, only about 14.5% of the investments in our data were made in eastern Germany. Thus, even if some of this investment was relocated from the West, this may have had only a small effect on investment activity in our control group (i.e., establishments in the western states).

be written as follows

$$I_{it} = \beta_0 + \beta_1 \cdot DiD_{it} + \phi \cdot X_{it} + \alpha_i + \gamma_t + \theta_{it} + \epsilon_{it}. \tag{3}$$

We use two alternative dependent variables, I_{it}, for total investment at the extensive and intensive margins of establishment i at time t (H1). We measure I_{it} either with a dummy variable indicating whether an establishment has invested or not (extensive margin) or with the logarithm of the (positive) investment volume (intensive margin). In additional analyses (Section 5.2), we also consider investment measures for different asset types (H2). Similar to Zwick and Mahon (2017), we rely on the logarithm of investment to measure investment at the intensive margin, which allows us to interpret the coefficients as elasticity estimates.[12]

The variable of interest in Eq. (3) is DiD_{it}, which is the interaction term of a dummy variable for establishments in eastern Germany and a dummy variable for the DAL treatment period. Therefore, DiD_{it} has a value of one if establishment i is located in an eastern German state and the observation is prior to 1999. We identify the average treatment effect by β_1. Since year and establishment fixed effects are included, the dummy variables $East_i$ and $Before99_t$ are redundant. At the establishment level, our control vector X_{it} includes the logarithm of the capital stock from the previous period, K_{it-1}, as a proxy for capital endowment. We use the ratio of revenue to K_{it-1} as a proxy for investment potential, which also serves as a measure of capital constraints as revenues are positively correlated with cash flows – a common indicator of capital constraints (Hadlock and Pierce 2010). To control for county-level economic conditions, we look at the unemployment rate, the logarithm of price-adjusted GDP per capita, and the logarithm of population in a county. When analyzing potential firm heterogeneity (H3), we interact dummies for the investigated firm characteristics (size, multi-establishment, financial reporting costs) with DiD_{it} in Eq. (3).

[12]In an unreported robustness check, we also use investment scaled by the capital stock as an alternative dependent variable with consistent results.

4.2 Data

Our analysis uses the German AFiD panel (German: *RDC of the Federal Statistical Office and Statistical Offices of the Federal States of Germany, Amtliche Firmendaten in Deutschland, survey years 1995 to 2008.*) for the manufacturing and mining industries from 1995-2008, which comprises a set of mandatory business surveys conducted by the German Federal Statistical Office.[13] The main surveys used in this analysis are the Investment Survey and the Monthly Report for Manufacturing and Mining.[14] Both surveys are a census of the population of establishments in these sectors with at least 20 employees, including managers and employed business owners. We also collect county-level data (GDP per capita, population, unemployment rate) from RegioStat[15] to monitor regional economic conditions. Thus, we have a comprehensive panel of establishments covering the period between 1995 and 2008.

Compared to firm panels from Compustat or AMADEUS, AFiD has clear advantages for our analysis. First, unlike accounting data, the investment survey provides information at the most granular level of identification, namely the establishment. This is critical for our analysis, as we need corresponding data to identify the investments treated by DAL. Second, as AFiD is a mandatory business survey for the universe of manufacturing establishments in Germany, non-response, self-selection or a possible lack of representativeness do not pose challenges for our analysis. In addition, the highly detailed information in our data allows us to separate responses on investments for different types of assets, namely equipment, buildings and land, which is usually not possible when using accounting data. Finally, our measures of business investment are not affected by depreciation policy, earnings management, or conforming tax avoidance (see Dobbins et al. 2018; Badertscher et al. 2019; Eichfelder et al. 2024), while we have data on investment flows instead of stocks. These conditions make it possible to study the impact of bonus depreciation on real investment activity.

A drawback is that our data are limited to the manufacturing sector, which is a very relevant part of the German economy. Moreover, since there is no financial report-

[13]The data are accessible only by remote data processing (Malchin and Voshage 2009).

[14]In German: *Investitionserhebung bei Betrieben des Verarbeitenden Gewerbes sowie der Gewinnung von Steinen und Erden; Monatsbericht bei Betrieben des Verarbeitenden Gewerbes sowie der Gewinnung von Steinen und Erden.*

[15]See also `https://www.regionalstatistik.de/genesis/online/logon` (07/20/2023).

ing at the establishment level, the data do not provide explicit information on capital stocks. Extending the approach of Wagner (2010), we therefore estimate the capital stock at the establishment level using information from the Cost Structure Survey (German: *Kostenstrukturerhebung*; see Online Appendix B for details on the calculation).

The raw data include 691,822 establishment-year observations. Due to the special status of the Berlin region, we omit the 13,394 observations in Berlin. We also omit 21,019 observations from mining companies, as these are limited in their location decision. Finally, we drop 113,324 observations with incomplete information on our primary variables of interest (e.g., due to firm restructuring or county-level restructuring). After these adjustments, our sample includes 544,085 observations over a 14-year period.[16]

We price-adjust the data on investments, sales and capital stocks. Since the German Federal Statistical Office does not report regional producer price indexes, we use the German producer price index for the manufacturing sector (Bofinger et al. 2011). However, construction prices depend on local economic conditions. Because a regional subsidy such as bonus depreciation can affect regional prices (Goolsbee 1998; House and Shapiro 2008), we use state-level construction price indexes for manufacturing to control for price differences in construction investment (see also Online Appendix C).

4.3 Descriptive Statistics

The descriptive statistics of our sample can be found in Table 2. On average, price-adjusted aggregate investment in the control group (West) (€ 1,140.45 thousand) is slightly higher than in the treatment group (East) (€ 1,021.27 thousand). While average equipment and land investments per establishment are slightly higher in the control group, average building investments are slightly higher in the treatment group. The percentage of establishments with positive aggregate investment is quite high and almost identical in the two groups (treatment group: 85.7%; control group: 86.6%).

Establishments in the East are more likely to invest in buildings and land (28.4% and 5.1%, respectively) compared to establishments in the West (19.6% and 3.00, respectively). This is consistent with our expectation that DAL has primarily encouraged investment in assets with long depreciation periods. Establishments in the West have

[16]Please note that due to M&A and other forms of restructuring, the same establishment may be owned by more than one firm during the period under study

higher revenues and a larger capital stock than establishments in the East. This is consistent with representative balance sheet data from the Deutsche Bundesbank (German Federal Bank 2012), which show that the ratio of revenue to capital stock is smaller for eastern German firms. Unemployment rates in eastern German federal states are higher and GDP per capita ratios are lower than in western federal states.[17]

[Table 2 about here]

4.4 Common Trends Assumption

A key assumption of DiD analysis is a common trend between the treatment and the control group. Apart from the treatment effect, the trends of the two samples (the treatment group and the control group) should not differ. In our study, we examine the expiration of a bonus depreciation provision which we interpret as a policy change that *increases* the user cost of capital of investments in eastern establishments relative to western establishments. Consistent with standard DiD estimation, we expect a common trend in investment activity in both parts of Germany if there is no DAL treatment. Prior to the expiration of the DAL, H1 suggests a positive treatment effect on the volume of investment in eastern establishments.

A possible problem regarding the common trends assumption could be differences in the development or business cycles of establishments in the two parts of Germany. Note that our analysis does not require a common trend for both parts of Germany, but rather a common trend in the investment activity of manufacturing establishments in both parts of Germany. As mentioned earlier, establishments in the former East were generally owned by western German firms in the mid-1990s. They therefore competed in the same market, had a similar owner structure and access to the same technologies as their western German counterparts.

To obtain evidence of common trends, we compare graphically the investments for the treatment and control groups for the years before and after the repeal of the DAL program (the period from 1995 to 2008). Because we are interested only in differences

[17] We also use propensity score matching as a robustness check to make the control and treatment groups more comparable. Appendix D provides details on the matching process, while Table D.2 provides the results of estimating the baseline Eq. (3) with the matched sample. The results remain qualitatively and quantitatively unchanged

in trends for the two groups and not in differences in means, we de-mean all variables by their average value in the post-1999 period and subtract the mean of the logarithm of investments from the post-DAL period. In this way, we calculate the annual deviations from the "normal" average investment activity from 1999 to 2004. Panel (a) of Figure 2 shows the price-adjusted and de-meaned logarithm of investment for the treatment and control groups, while Panel (b) shows the logarithm of investments without demeaning. Prior to 1999, treated establishments have generally higher levels of investment, as one would expect given the bonus depreciation provision. Our graphical evidence suggests that the response of investment to the expiration of the DAL took about a year to approach normal levels in 2000. This is not surprising, since delays in construction projects are a common problem. Thus, even if companies intended to reduce their investment activity immediately after the expiration of the DAL, this response was likely to take some time.

In addition, Figure 2 suggests that there are two drops in investment activity in the treatment group (eastern establishments) compared to the control group (western establishments). First, there is a drop of investment activity from 1995 to 1996. From 1996 to 1998, investment activity in eastern establishments remained constantly higher than in the West until we observe a second relative decline after the expiration of the DAL. The first drop in 1995 can be explained by the original timing of the law. Until the final version of the "Tax Year 1996 Act" had been concluded on October 11, 1995, investors had a strong incentive to finalize their investment projects, as there was still risk that the subsidy might expire in 1996. In 1996, investors realized that delays in investment activity would slightly reduce the subsidy level (from 50% to 40%), but would not result in a loss of the subsidy. Therefore, investment activity remained abnormally high until the program expired in 1998.

[Figure 2 about here]

5 Results

5.1 Average Treatment Effect

Our analysis starts by estimating the baseline model in Eq. (3) for total investment at the extensive and intensive margin. For investment at the extensive (intensive) margin, the dependent variable is a dummy variable with a value of one for establishments with nonzero total investment (the natural logarithm of price-adjusted aggregate investment). When modeling investment at the intensive margin, we include only observations with positive investment, which reduces the number of observations. Our final sample includes 544,085 observations from 68,289 establishments for the extensive margin and 470,548 observations from 63,733 establishments for the intensive margin.

Since we are not interested in predicting investment but in explaining it, we rely on a linear probability model to study the extensive margin. The advantage of this type of model is that we can interpret the regression coefficients as changes in the conditional average investment probability in percentage points. In robustness checks (see Table 6, Panel D), we also estimate logit regressions that confirm our baseline analyses. Since our main variables of interest are dummy variables and the dependent variable in the intensive margin models is the logarithm of investment, our regression coefficients roughly correspond to the DAL-induced relative changes in investment activity. To obtain an unbiased estimate of the relative change, we apply the formula of Kennedy et al. (1981) and calculate the relative change as $exp\left[\hat{\beta}_i - \frac{1}{2} \cdot Var(\hat{\beta}_i)\right] - 1$.

Table 3 shows the regression results. Models (1) to (4) refer to investments at the extensive margin, while models (5) to (8) provide results for the intensive margin. In the first specifications, we only use establishment and year fixed effects to account for a possible bad control bias. In the other specifications, we gradually add industry-year fixed effects, county controls, and establishment controls. Our preferred specifications are the fully specified models (4) and (8). We report clustered standard errors at the firm level, since investment decisions are made by the firm, not the establishment.[18]

[Table 3 about here]

The coefficient on DiD is positive and statistically significant in all models. Thus, we find robust empirical support for H1, suggesting that DAL bonus depreciation increased investment activity either through new investment projects or by anticipating investment projects. In our preferred specification in column (4), we estimate a treatment effect on investment probability of 3.23 percentage points. Compared to the average investment

[18]In unreported robustness checks, we also compute bootstrapped standard errors that closely approximate the standard errors reported here. We report both the R-squared and the adjusted R-squared. Both R-squared measures account for the explanatory power of establishment fixed effects.

probability in eastern establishments (85.7%, Table 2), this implies a 3.8% increase in total investment at the extensive margin (= 0.0323/0.8568). Without any controls in column (1), we find a slightly larger effect of 4.4% (= 0.0378/0.8508).

The average increase in investment at the intensive margin can be calculated by applying the formula of Kennedy et al. (1981) to the coefficient estimates in columns (5) through (8). For our preferred model in column (8), we observe an 11.7% increase $[0.117 = exp\,(0.111 - 1/2 \cdot 0.0199) - 1]$ and for the reduced model in column (5) a 14.8% increase $[0.148 = exp\,(0.138 - 1/2 \cdot 0.0195) - 1]$. Thus, DAL increased the conditional investment volume by about 11% to 15%. Combining the two estimates, we calculate an overall increase in total investment in treated establishments of between 16.0% (= $1.1038 \cdot 1.117$) and 19.9% (= $1.1038 \cdot 1.148$).

5.2 Asset Structure

In models (1) through (6) of Table 4, we perform analyses similar to those in Table 3, but use equipment investment, building investment, and land investment at the extensive and intensive margins as dependent variables (H2). In these models, we use the specification with all control variables of Eq. 3.[19] Our results provide strong empirical support for H2, suggesting a stronger impact of the DAL on capital goods with long regular depreciation periods (buildings) and no regular depreciation (land). Moreover, we find only relatively moderate effects for equipment investments. Such investments could be depreciated over a small number of periods (i.e., Devereux et al. 2009 assume an average period of 7 years) and also by the declining balance method, which reduces the disadvantage of the regular depreciation regime compared to bonus depreciation.

[Table 4 about here]

Using calculations similar to those in Section 5.1 (i.e., comparisons with Table 2 and the Kennedy et al. 1981 formula), the coefficients in Table 4 translate into an DAL-induced increase in equipment investment at the extensive margin of 3.8% and 3.4% at the intensive margin, resulting in an overall effect on equipment of 7.3%. This relatively moderate effect is contrasted by an increase in building investment at the extensive margin of 28.6% and at

[19] In Online Appendix F, we also run alternative regressions without control variables and obtain qualitatively and quantitatively robust results.

the intensive margin of 37.3%, resulting in a total increase in building investment of 76.6%. Land investment increased by 37.6% at the extensive margin and 51.2% at the intensive margin, with an overall increase of 108.0%. While these large investment responses do not allow us to draw definitive conclusions about whether the DAL bonus depreciation led to additional investment projects or rather to an anticipation of investment activity for these types of capital goods over time, we can clearly demonstrate that the DAL not only increased total investment, but also affected the asset structure and led to a large increase in investment in buildings and land.

This is also underlined in column (7) of Table 4, where the share of building and land investment (i.e. the ratio of the sum of building and land investment to total investment) is the dependent variable. This share increased by 3.8 percentage points which implies a relative increase in the share of building and land investment of 23.8% (compared with the average share of 15.9%, see Table 2).[20]

5.3 Robustness Checks

In Table 5, we present year-specific DiD estimates for the DAL treatment years 1995 to 1998. Our reference period are the years after the bonus depreciation policy. Similar to Figure 2 of the paper, the regression results show stronger investment effects in eastern establishments in the year 1995 compared to the following DAL periods (except from land investments, where we find higher investments in 1996 and 1997 than in 1995). With regard to the other DAL years, we find some evidence for smaller DAL effects in 1997 and 1998 compared to 1996, which might be explained by a) the initially planned expiration of the DAL in 1996 and b) the reduced maximum bonus depreciation rate of 40% after 1996.

Because the DAL was initially planned to expire by the end of 1996, investors initially intended to finalize their projects not later than December 1996. This can explain the abnormally high investments over the whole treatment period and especially in the year 1995. When investors realized the prolongation of the DAL until 1998 in the "Tax Year Act 1996" from October 11, 1995, this reduced the pressure to finalize investments

[20] Goolsbee (1998) argues that investment tax incentives raise asset prices, which dampens their impact on real investment. For our purposes, this should not be a problem because we deflate the value of building investment at the intensive margin in all specifications using a regional building price index. In additional analyses, we find only weak evidence of a relevant effect of the DAL on building prices (see Appendix C).

and therefore resulted in a more even distribution of investments until 1998. From this perspective, the extraordinarily high investment levels in 1995 resulted from the DAL treatment.

However, high investment activity might not have been driven exclusively by the DAL, but also by other aspects of the of the transformation process of the eastern German economy that were unrelated to the DAL bonus depreciation. Therefore, one might argue that including the year 1995 in the overall average estimate of the DAL on investment activity results in overestimating the average treatment effect. To account for that, we calculate an alternative lower-bound estimate of the DAL impact on total investment and the different types of investment goods that excludes 1995 and thus relies on the average effects over the years 1996 to 1998 in Table 5. In doing so, we obtain the following alternative estimates on investment reactions (for comparison, we put the baseline estimates from tables 3 and 4 in brackets: a) total investment 12.6% (16.0%), b) equipment 4.5% (7.3%), c) buildings 71.9% (76.6%), d) land 111.1% (108.0%) and e) the share of buildings and land to total investments 23.0% (23.8%).

[Table 5 about here]

To further corroborate the robustness of our main results, Table 6 provides additional estimates for total investment (columns 1-2), equipment investment (columns 3-4), building investment (columns 5-6), and land investment (columns 7-8) when running four additional robustness checks.

One possible problem could be that the DAL bonus depreciation program not only affected investment by existing firms but also led to the formation of new establishments in eastern Germany or the relocation of establishments from the West to the East. In this case, our estimates in Section 5.1 would also capture the location decision of establishments, which could lead to an overestimation of the pure investment response. Therefore, we conduct an additional test that restricts our sample to establishments that existed in both parts of Germany in 1995 in Panel A. While this reduces the number of observations to 241,147, it does not have a large impact on our results. In fact, we still find statistically significant investment responses for total investment at the extensive margin and for all types of investment. When we use the investment responses of the different asset classes (equipment, buildings, land) to obtain a response in total investment,[21] we find an increase of 10.5%, which is slightly lower than our baseline estimate of 16.0%. Thus, part of the investment response could be due to (re)location decisions as a result of the DAL program.

Another problem could be that our treatment and control groups might differ in terms of technology access. To account for this, we restrict our analysis to a sample of western German firms with establishments in both parts of Germany (i.e. at least one establishment in the East and one in the West). We also add firm fixed effects to account for the fact that certain establishments may belong to more than one firm over time. This approach ensures that establishments in the West and East belong to the same firms, have access to the same technologies, and are broadly similar. In Panel B, we estimate Eq. (3) again at the firm level for this much reduced sample with only 38,259 observations. Still, we find significant investment responses for total investment, equipment investment, and building investment. For land investment, the estimated coefficients are positive but not significantly different from zero, likely due to the small number of observations with positive land investment (only 1,075 firm-year observations). When we use the investment responses of the different asset classes to calculate an aggregate investment response, we find a 32.5% increase in total that is considerably larger than our baseline estimate (16.0%). This has two implications. First, possible differences in technology access between the treatment and control groups should not lead to an overestimation in our baseline analysis, but rather could bias our baseline estimates downward. Second, firms with operations in both parts of Germany might respond more strongly because of subsidy shopping opportunities.[22]

[Table 6 about here]

In Panel C and Panel D, we consider two possible technical issues. In Panel C, we cluster standard errors at the industry-year level rather than at the firm level. This does not significantly affect our results. In Panel D, we report results of logistic regressions

[21] We calculate the investment response for each asset class and then weight each of these responses by the average share of investment in the asset class in total investment. We consider only statistically significant coefficients.

[22] In Online Appendix D.4, we document the robustness of this result by adding firm-year fixed effects to the specification in Panel B. We also show that our baseline results are qualitatively and quantitatively robust to an alternative control group based on a previously matched control group.

instead of linear probability models for the extensive margin analysis. In these logistic models, we still find statistically significant evidence that the DAL program increased investment activity for total investment, equipment, buildings, and land. Overall, Table 6 documents strong robustness of our baseline regression results.

In additional unreported robustness checks, we analyzed interaction terms of our DiD interaction term with German local business tax rates at the municipality level. Contrasting our expectations, we do not find evidence that the impact of the DAL on investment increases in the local business tax rate. In our view, this should be driven by two aspects. First, the variation in effective local business tax burdens in 1998 was small compared to the high overall business tax rates in retained earnings (2.6% compared to 56.2% for corporations and 2.5% compared to 58.0% for partnerships). Therefore, the variation in tax rates might have been too small to result in economically and statistically significant effects.

Second and in line with the literature on agglomeration economies (Brülhart et al. 2012; Fréret and Maguain 2017), we find positive associations between local business tax rates and investment activity suggesting that higher LBT rates proxy for agglomeration economies (i.e., the economic attractiveness of a municipality). Our findings suggest that economically more attractive municipalities have higher local business tax rates and are less strongly affected by the German DAL program than economically less attractive municipalities in eastern Germany. This suggests that DAL treatment effects were larger for the less attractive municipalities in eastern Germany.

5.4 Firm Heterogeneity

For the firm heterogeneity tests (H3), we run regressions with triple interaction terms. These terms interact the indicator DiD_{it} from Eq. 3 with the following dummy variables for firm characteristics: $Large_{it}$ is a dummy variable with a value of one for large firms with at least 250 employees, $Group_{it}$ is a dummy variable with a value of one for firms with multiple establishments, $Owner_{it}$ is a dummy variable with a value of one for firms with an active business owner in the management; $Corp_{it}$ is a dummy variable with a value of one for firms with limited liability. We obtain:

$$
\begin{aligned}
I_{it} = {} & \beta_0 + \beta_1 \cdot DiD_{it} \\
& + \beta_2 \cdot DiDLarge_{it} + \beta_3 \cdot DiDGroup_{it} + \beta_4 \cdot DiDOwner_{it} + \beta_5 \cdot DiDCorp_{it} \\
& + \beta_6 \cdot Large_{it} + \beta_7 \cdot Group_{it} + \beta_8 \cdot Owner_{it} + \beta_9 \cdot Corp_{it} \\
& + \phi \cdot X_{it} + \alpha_i + \gamma_t + \theta_{it} + \epsilon_{it}.
\end{aligned}
\tag{4}
$$

In Eq. (4), β_1 captures the average DAL effect, while β_2, β_3, β_4, and β_5 capture the additional DAL effects for large, multi-establishment, owner-managed and corporate firms. Thus, the effect for firms with all characteristics is the sum of all coefficients β_1 to β_5. We account for all control variables and industry-year fixed effects from our baseline model.

One challenge for our analysis is that the information on the legal form (*Corp* dummy) and the activity of the firm owner (*Owner* dummy) is based on the Cost Structure Survey. Unlike the Investment Survey, the latter is not conducted for the universe of German manufacturing establishments, but only for a sample of typically larger firms. This leaves us with a smaller sample of 243,919 (219,323) observations from 45,381 (42,895) establishments for the extensive (intensive) margin.

[Table 7 about here]

Most importantly, we find evidence for a stronger investment response of large firms whose tax planning costs are relatively low, as indicated by the positive and statistically significant interaction term *DiDLarge* at the intensive margin. Thus, firms with more than 250 employees show a larger investment response than small firms. We find an additional DAL-induced increase in investment among large firms of 19.6%[23] This result is in line with Aarbu and MacKie-Mason (2003), Knittel (2007) and Kitchen and Knittel (2011), but somewhat differs from findings of Zwick and Mahon (2017).

Regarding multi-establishment firms who have more opportunities for subsidy shopping, we also find evidence for a significantly higher investment response. While we find a statistically significant effect on investment at the extensive margin in model (3), we obtain a statistically significant increase on investment at the intensive margin in model (4).

[23] These aggregate effects result from a nonsignificant effect on investment at the extensive margin and a statistically significant effect on investment at the intensive margin.

Overall, our evidence suggests that large firms and also firms with multiple establishments reacted more strongly to the investment incentives of the German DAL program. This suggests that lower costs of tax planning and more opportunities for subsidy shopping are positively associated with the effectiveness of investment tax incentives.

By contrast, there is no evidence of a more positive response of owner-managed firms or corporations in all models. Thus, the results do not support the notion that financial reporting costs moderate the effectiveness of bonus depreciation (Edgerton 2012). There is no significant evidence that accounting regulations affect the investments response of the DAL program.

5.5 Additional Tests and Analyses

As documented in detail in Online Appendices D.1 through D.5, we perform the following additional tests and analyses. In Online Appendix D.1, we analyze the impact of the German DAL on building prices. Unlike Goolsbee (1998), we find only weak price effects. Even if we attribute the entire change in building price indexes to the DAL, the DAL-induced increase in prices is only 4.4%, compared with a 76.6% increase in real investment in buildings and a 108.0% increase in land.

To address concerns about the adequacy of our control group, we use propensity score matching to increase the similarity of the treatment and control groups and re-estimate regression Eq. (3) with the matched sample. The results in Table D.2 in Online Appendix D.2 qualitatively and quantitatively confirm our baseline evidence. In Table D.2, we find a range for the total DAL effect on real investment activity of 15.2% to 18.4%, which is very close to our baseline of 16.0% to 19.9%.

In Online Appendix D.3, we examine whether firms anticipated the expiration of the DAL and therefore simply shifted investments from post-DAL years to the DAL period. As shown in Table D.3, there is no evidence of a negative investment effect immediately after the expiration of the DAL. In other words, there was no unusual decline in investment in eastern establishments relative to control establishments after the DAL period.

In Online Appendix D.4, we show that our results are robust to several alternative control variables. In Table D.4, we report results for different investment types (equipment, buildings, land) without regression control variables and industry-year fixed effects.

In Table D.5, we consider the problem of potentially endogenous regression controls and report results when we use once-lagged control variables. In Table D.6, we include EBITDA per capital (as a measure of cash flow), interest per capital (as a measure of leverage), and the legal form of the firm (as a measure of financing options) as additional control variables, since one could argue that revenue per capital stock is not sufficient to control for capital constraints.[24] Table D.7 contains results for the panel of western firms with establishments in both parts of Germany from Table 6, Panel B, but adds firm-year fixed effects. In this way, we identify the DAL treatment effect at the establishment level when holding firm-years constant. Thus, for each firm, we compare investment responses between western and eastern establishments of the same firm. The average treatment effects remain very similar to those in Panel B of Table 5.

Finally, we re-estimate the heterogeneity analysis in Online Appendix D.5 for different types of capital goods in Tables D.8 (equipment), D.9 (buildings), and D.10 (land). These additional tests confirm our main results from Table 6. Most importantly, we find higher investment responses for large firms and firms with multiple establishments. In contrast, we find no consistent evidence for owner-managed firms and corporations.

5.6 External Validity and Comparison with Other Research

We analyze empirically how the bonus depreciation program "Development Area Law" affected investment activity of manufacturing establishments in eastern Germany at the end of the 1990s and the early 2000s. Considering the specific economic conditions at that time, this can raise concerns regarding the external validity of the results. The DAL was a program in order to overcome structural problems in the eastern German economy (i.e., a bad condition of the infrastructure, buildings and machinery in the manufacturing sector and the overall economy) and to support the economic transformation in eastern Germany. This required a major renovation of the capital stock. Our analysis does not focus on the introduction of the bonus depreciation policy that coincided with the economic shock of transformation, but on the expiration of the policy, which was a foreseeable event for investors and businesses.

Bonus depreciation and other subsidies with the target of promoting real investments

[24]This information is not available for all observations, so our sample size shrinks by more than 50%.

are often provided for a limited period of time (e.g., House and Shapiro 2008; Wielhouwer and Wiersma 2017; Maffini et al. 2019). Different from investments in capital markets (e.g., Eichfelder, Noack and Noth 2022), investors need time to adjust their investments and such adjustments can be very costly (Nick and Wetzel 2016). Thus, changes in investment tax incentives must be foreseeable for some time so that investors are able timely adjust their plans. In addition, it is a common problem in economic policy that structural changes in economic conditions require major renovations in the capital stock. Nowadays, digitalization, decarbonisation and demographic changes provide new challenges for developed economies that require such adjustments (e.g., digital infrastructure, traffic infrastructure, facilities for the generation, storage and transportation of energy and heat). Our setting of the manufacturing sector in eastern Germany provides robust evidence that a temporary bonus depreciation policy can be an effective tool to increase investment activity, especially for long-term assets. Thus, nowadays Germany might learn from its own past (Eichfelder, Kluska, Knaisch and Selle (2022)): a) The decarbonisation of the German industrial and residential sector requires major investments in longterm assets like buildings (e.g., insulation) or gas grids; b) the decarbonisation of the German traffic sector also requires major investments in long-term assets (e.g., electric grids, gas grids, charging stations); c) the relatively low quality of the digital infrastructure (typically owned by Deutsche Telekom) in Germany is a main problem for German firms. In business surveys, this is often regarded as the most important regional location factor by German firms (e.g., IHK München und Oberbayern 2023).

In similar terms our findings might also be relevant for development economics (e.g., Camino-Mogro 2022) and for regional economic policy (e.g., Criscuolo et al. 2019) with the the target to provide support for underdeveloped regions in European countries (e.g., Southern Italy, eastern Poland, northern England, rural areas in eastern Germany and the Ruhr area in western Germany) or in the United States (e.g., areas in the so-called rust-belt states like Michigan, Ohio, Pennsylvania and West-Virginia, rural areas in the middle West States like Iowa, Louisiana and Mississippi).

It further seems useful to compare the quantitative estimates of our German setting (bonus depreciation as instrument of regional development) with other studies that analyzed bonus depreciation and other forms of accelerated depreciation incentives with the target of counter-cyclical fiscal policy. We find an investment elasticity with regard to the tax term of the user costs of capital of 4.0 to 4.9 in our baseline tests (with and without control variables) and of 2.7 to 8.1 if we consider all robustness checks. For bonus depreciation and related forms of accelerated depreciation, elasticity estimates in the literature are 6 to 14 (House and Shapiro 2008, 2.9 to 7.2 (Zwick and Mahon 2017, 4.0 to 6.5 (Ohrn 2018), 8.6 to 9.6 (Ohrn 2019), 8.3 to 9.9 (Maffini et al. 2019 and 3.7 to 5.2 (Guceri and Albinowski 2021). Therefore, while our estimates are rather at the lower bound compared with House and Shapiro (2008), Ohrn (2019) and Maffini et al. (2019), they are very close to other studies (Zwick and Mahon 2017; Ohrn 2018; Guceri and Albinowski 2021). Thus, we cannot make the claim that the expiration of a bonus depreciation policy in our German setting had a significantly different effect compared to the introduction of such a policy for counter-cyclical fiscal policy.

Overall, our study provides several insights that should be generalizable to other settings. First, our paper confirms existing evidence suggesting that bonus depreciation and depreciation policies in general are very effective tax instruments to promote investment. That holds not only for counter-cyclical policies but also for subsidies to underdeveloped regions. Second, while the literature implicitly assumes that bonus depreciation is more effective in promoting long-term assets, we are the first to provide such evidence and also show that this will affect the asset structure of firms. This also suggests that the assumption of a constant asset structure in industries (e.g., Zwick and Mahon 2017) might result in biased estimates. Finally, our evidence on stronger responses for larger firms with lower compliance costs and for multi-establishment firms with more subsidy shopping opportunity aligns well with previous findings (e.g., Knittel 2007; Kitchen and Knittel 2011; Wielhouwer and Wiersma 2017; Hundsdoerfer and Jacob 2019 and should in principal also hold for other settings. In addition, at least for our German setting, we cannot confirm previous findings that accounting incentives and financial reporting costs might reduce the effectiveness of depreciation benefits in promoting investments (Aarbu and MacKie-Mason 2003; Edgerton 2012.

6 Conclusion

Using high-quality establishment-level data from the German Federal Statistical Office, we exploit a bonus depreciation scheme (Development Are Law, DAL) for establishments in eastern Germany to analyze whether, to what extent and how such tax schemes affect real investment activity. In our baseline tests, we find strong evidence that the DAL increased real investment activity by 16.0% to 19.9%. The relatively moderate average effect masks a large heterogeneity in investment responses. Across asset types, we find in the baseline specification an investment response of 7.3% to 10.5% for equipment, 76.6% to 92.9% for buildings, and 108.0% to 121.3% for undeveloped land. These results suggest that firms respond rationally to investment tax incentives and, at least temporarily, adjust their asset structure to optimize tax benefits. We can also show that large firms and firms with more than one establishment are more responsive to the policy. By contrast, we do not significant differences in investment responses for incorporated firms and owner-managed firms.

There are also some limitations of our analysis. First, since our sample is limited to the manufacturing sector in Germany, the results may not be representative for other industries and countries. Second, the observed policy change occurred at a time when German corporate tax rates were higher than today. Therefore, bonus depreciation programs might be less effective when tax rates are lower. Nevertheless, our elasticity estimates tend to be at the lower end of studies analyzing more recent bonus depreciation schemes. Overall, our paper underscores existing evidence that bonus depreciation is a very effective strategy for increasing real investment. This holds especially for asset classes with long regular depreciation periods.

A policy implication of our paper is that bonus depreciation schemes are more effective when standard depreciation periods are long. Thus, shortening standard depreciation periods may encourage investment in the long run, but it also makes temporary tax incentive programs less effective. Furthermore, large firms and firms with more opportunities for subsidy shopping derive higher benefits from investment tax incentives. Governments should therefore be cautious when thinking about investment incentives. Bonus depreciation might well increase investment, but can in the same term reduce average investment quality (Eichfelder et al. 2023). In addition it seems to privilege large firms in the competition with small and medium-sized firms. Therefore, application criteria and compliance criteria of such programs should be as simple as possible for smaller size classes.

Figures and Tables

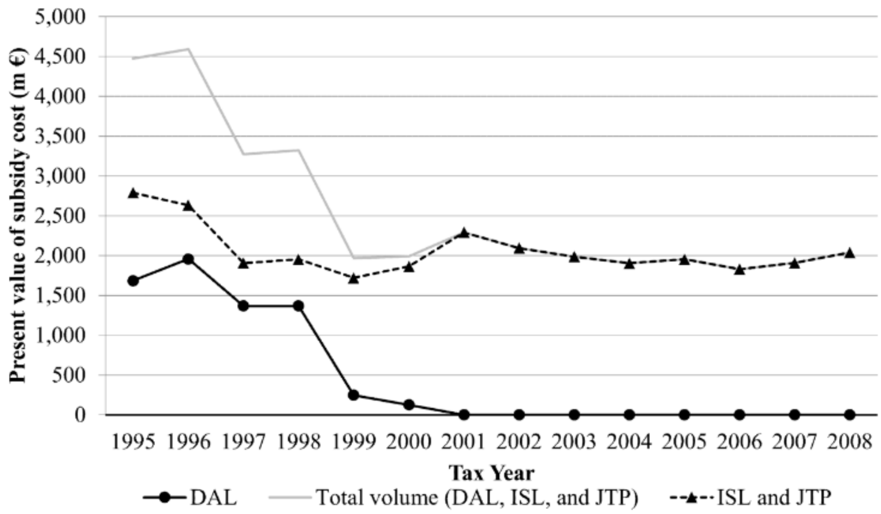
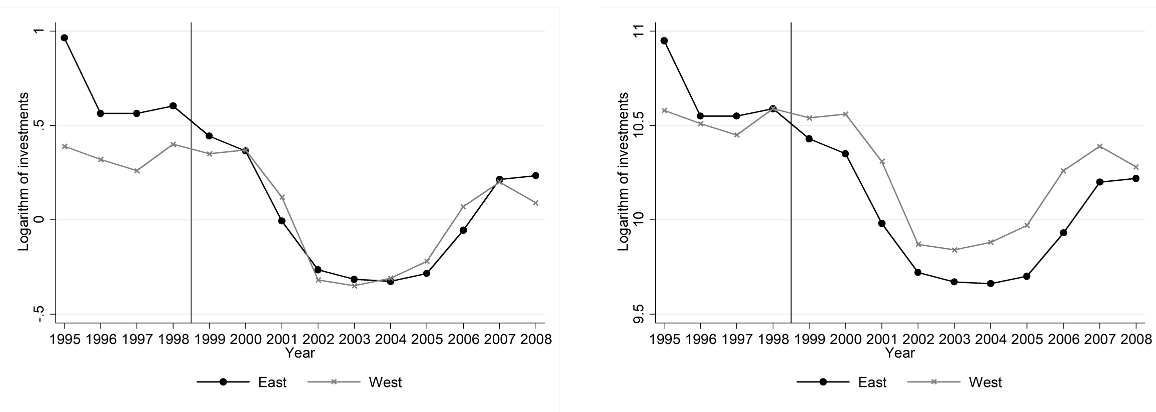


Figure 1: Subsidy volume of DAL, ISL, and JTP

Note: This figures plots the present value volumes of subsidy costs for the DAL program and the sum of the DAL and ISL programs, based on German government reports on subsidies (*Deutscher Bundestag, Drucksache 12/1525, Drucksache 13/2230, Drucksache 14/1500, Drucksache 15/1635, Drucksache 16/6275*). For the calculations, see Online Appendix A.



(a) De-Meaned investments East and West

(b) Investment levels East and West

Figure 2: De-meaned investment and investment levels before and after treatment

Note: Panel (a) plots the de-meaned value of the logarithm of total investments in the manufacturing sector for the treatment group (eastern German establishments) and the control group (western German establishments). The figure highlights the trend in the investment activity of both groups in the DAL period (1995–1998) and following years. Panel (b) does the same for investment levels.

Table 1: Regional investment subsidies for establishments in Eastern Germany, 1995–2008

	DAL	**ISL**	**JTP**
Validity period	Until December 31, 1998	Whole observation period	Whole observation period
Subsidy form	Bonus depreciation	Direct and tax-exempt subsidy	Direct and taxable grant
General rates	50% (1995–1996), 40% (1997–1998)	5% (1995–1998),c 10% (1999), 12.5% (since 2000)	Maximum rates (actual grants depend on authority decision and overall funding level): 35% (1995–1996); 28–35% (1997–2006); 30% (since 2007)
Increased rates	NA	+ 5% (Small and medium-sized enterprises, SME, 1995–1998), twice the general rate for initial equipment investment (SME, since 1999); + 2.5% (border areas, since 2001)	Additional maximum rates for small and medium-sized enterprises: +15% (1995–2006); +10–20% (since 2007)
Special regional regulations	NA	Berlin: reduced validity periods (West Berlin) and reduced rates under certain conditions	Maximum rates and detailed regulations depend on the regional area; reduced rates for Berlin area (since 2000)
Assessment base	Movable assets (excluding aircraft), immovable assets, modernization of buildings	New and movable assets (excluding low-grade assets, aircraft, cars), new and immovable assets (since 1999), restriction to initial investments (since 1999)	Movable assets and intangible assets; fundable investments depend on minimum investment volumes, employment effects, and authority decisions
Formal requirements	Tax return with legal entitlement	Formal application with legal entitlement	Formal application without legal entitlement

Note: This table summarizes the 3 major subsidies that were in place during the sample period 1995-2008. The last amendment of the law (ISL 2010) had run out by the end of 2013. The investment subsidy rate is up to 8% until the end of 1996 for investments that started before July 1994.

Table 2: Descriptive statistics by region

	Full Sample (N=544,085)			**West Germany (N=456,913)**			**East Germany (N=87,172)**		
Variable	Mean	SD	P50	Mean	SD	P50	Mean	SD	P50
Real investments (thousands €)									
Aggregate investment	1,121.36	10,947.59	111.28	1,140.45	11,243.91	113.46	1,021.27	9,239.69	99.70
Equipment investment	983.56	10,041.45	100.00	1,007.27	10,338.92	103.54	859.32	8,308.80	82.51
Building investment	129.97	1,498.17	0.00	125.07	1,384.05	0.00	155.65	1,949.36	0.00
Land investment	7.83	271.95	0.00	8.12	293.23	0.00	6.30	104.41	0.00
Fraction of establishments with positive investments (%)									
Aggregate investment	86.48	34.19	100.00	86.64	34.02	100.00	85.68	35.03	100.00
Equipment investment	86.10	34.59	100.00	86.28	34.40	100.00	85.15	35.56	100.00
Building investment	21.00	40.73	0.00	19.59	39.69	0.00	28.40	45.09	0.00
Land investment	3.34	17.97	0.00	3.00	17.07	0.00	5.11	22.02	0.00
Control variables									
Capital stock (thousands €)	5,104.99	39,896.66	1,375.64	5,200.81	41,021.10	1,354.22	4,602.75	33,384.80	1,488.71
Revenue (millions €)	29.90	296.16	5.77	32.84	321.33	6.25	14.48	77.32	3.87
Revenue per capital (%)	174.60	45,913.49	4.24	205.06	50,099.93	4.56	14.97	1,084.40	2.60
GDP per capita (thousands €)	25.01	9.72	23.07	26.49	9.76	24.03	17.27	4.33	16.21
Population (thousands)	273.86	239.69	202.20	297.87	251.63	241.77	148.02	88.55	130.30
Unemployment rate (%)	10.52	4.57	9.20	9.01	2.92	8.50	18.43	3.32	18.40

Note: Descriptive statistics of the main variables (see Section 4) for the AFiD panel of establishments in the manufacturing sector in Germany 1995-2008; The table contains the full sample, statistics for Western establishments (control group), and Eastern establishments (treatment group). All investment and regional variables are price-adjusted using the German Producer Price Index. Building investments are price-adjusted using building price indixes from the German states (see Online Appendix C).

Table 3: Aggregate investment at the extensive and intensive margin

Investment margin	Extensive margin				Intensive margin			
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DiD	**0.0378*****	**0.0356*****	**0.0320*****	**0.0323*****	**0.1380*****	**0.1190*****	**0.1070*****	**0.1110*****
	(0.0034)	**(0.0034)**	**(0.0036)**	**(0.0036)**	**(0.0195)**	**(0.0192)**	**(0.0201)**	**(0.0199)**
Capital stock				0.0088***				0.1310***
				(0.0001)				(0.0050)
Revenue per capital				-0.0302*				0.3230*
				(0.0181)				(0.1720)
Unemployment rate			-0.0021***	-0.0020***			-0.0131***	-0.0116***
			(0.0006)	(0.0006)			(0.0033)	(0.0033)
GDP per capita			-0.0077	-0.0091			0.1740***	0.1530**
			(0.0092)	(0.0092)			(0.0630)	(0.0625)
Population			-0.0164**	-0.0158**			-0.0157	-0.0099
			(0.0074)	(0.0074)			(0.0397)	(0.0393)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry–year FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Observations	544,085	544,085	544,085	544,085	470,548	470,548	470,548	470,548
Establishments	68,289	68,289	68,289	68,289	63,733	63,733	63,733	63,733
R-squared	0.472	0.472	0.472	0.473	0.702	0.704	0.704	0.705
Adjusted R-squared	0.396	0.396	0.397	0.397	0.655	0.657	0.657	0.658

Note: OLS regressions with establishment fixed effects and clustered standard errors at the firm level (in parentheses). In models (1)-(4), the dependent variable is a dummy variable with a value of one for an establishment i with positive aggregate investments in t (extensive margin). In models (5)-(8), the dependent variable is the logarithm of positive aggregate investments of establishment i in t (intensive margin). *DiD* is an interaction term of a dummy variable for establishments in Eastern German states and a dummy variable for the DAL treatment period (1995–1998). *Capital stock* is the logarithm of the capital stock of establishment i and *Revenue per capital* is the ratio of sales revenue to the capital stock. *Unemployment rate* is the unemployment rate of the district of establishment i in t in percentage points. *GDP per capita* (*Population*) is the logarithm of the gross domestic product per capita (the number of inhabitants) of this district. ***, **, and * indicate significance levels of 0.01, 0.05, and 0.1, respectively.

Table 4: Investment types

Investment type	Equipment		Buildings		Land		Buildings and land share
Investment margin	Extensive	Intensive	Extensive	Intensive	Extensive	Intensive	Intensive
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)
DiD	**0.0322*** **	**0.0336***	**0.0813*** **	**0.3180*** **	**0.0192*** **	**0.4350** **	**0.0377*** **
	(0.0037)	**(0.0189)**	**(0.0054)**	**(0.0498)**	**(0.0027)**	**(0.2080)**	**(0.0028)**
Capital stock	0.0088***	0.1380***	0.0112***	-0.0846***	0.0012***	-0.0242	-0.0023***
	(0.0009)	(0.0049)	(0.0009)	(0.0148)	(0.0004)	(0.0626)	(0.0005)
Revenue per capital	-0.0303*	0.3470**	0.0044	-0.3760***	0.0001	7.3590	-0.0126***
	(0.0181)	(0.1660)	(0.0074)	(0.0337)	(0.0001)	(67.200)	(0.0035)
Unemployment rate	-0.0019***	-0.0104***	-0.0006	-0.0396***	-0.0004	-0.0274	-0.0001*
	(0.0006)	(0.0032)	(0.0008)	(0.0095)	(0.0004)	(0.0417)	(0.0004)
GDP per capita	-0.0097	0.1520**	-0.0201*	0.2560*	-0.0078	0.1610	-0.00461
	(0.0094)	(0.0606)	(0.0119)	(0.1490)	(0.0053)	(0.6200)	(0.0062)
Population	-0.0175**	-0.0010	-0.0094	0.0359	-0.0039	-0.3070	0.0028
	(0.0052)	(0.0264)	(0.0030)	(0.0895)	(0.0264)	(0.2900)	(0.0035)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry–year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	544,085	468,458	544,085	114,285	544,085	18,175	470,228
Establishments	68,289	63,616	68,289	30,828	68,289	9,716	63,640
R-squared	0.471	0.711	0.450	0.489	0.274	0.623	0.288
Adjusted R-squared	0.394	0.666	0.371	0.298	0.170	0.170	0.176

Note: OLS regressions with establishment fixed effects and clustered standard errors at the firm level (in parentheses). For equipment (building, land) investment at the extensive margin in Model (1) (3, 5), the dependent variable is a dummy variable with a value of one for an establishment i with positive equipment (building, land) investments in t. For equipment (building, land) investment at the intensive margin in Model (2) (4, 6), the dependent variable is the logarithm of positive equipment (building, land) investments of establishment i in t. In Model (7), the dependent variable is the natural logarithm of the ratio of building plus land investments to total investments. *DiD* is an interaction term of a dummy variable for establishments in Eastern German states and a dummy variable for the DAL treatment period (1995–1998). Control variables include *Capital stock* (logarithm of the capital stock of establishment i), *Revenue per capital* (ratio of sales revenue to the capital stock), *Unemployment rate* (unemployment rate of the district of establishment i in t in percentage points), *GDP per capita* (*Population*) (logarithm of the gross domestic product per capita (the number of inhabitants) of this district); ***, **, and * indicate significance levels of 0.01, 0.05, and 0.1, respectively.

Table 5: Year-specific effects

Investment type	Aggregate		Equipment		Buildings		Land		Buildings and land share
Investment margin	Extensive	Intensive	Extensive	Intensive	Extensive	Intensive	Extensive	Intensive	Intensive
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DiD 1995	**0.0544*** **	**0.2880*** **	**0.0551*** **	**0.1870*** **	**0.1120*** **	**0.4680*** **	**0.0204*** **	**0.3800**	**0.0482*** **
	(0.0057)	**(0.0318)**	**(0.0058)**	**(0.0304)**	**(0.0086)**	**(0.0818)**	**(0.0047)**	**(0.3520)**	**(0.0048)**
DiD 1996	**0.0288*** **	**0.1530*** **	**0.0296*** **	**0.0596** **	**0.0887*** **	**0.3650*** **	**0.0259*** **	**0.4870**	**0.0436*** **
	(0.0053)	**(0.0287)**	**(0.0054)**	**(0.0274)**	**(0.0078)**	**(0.0743)**	**(0.0044)**	**(0.3210)**	**(0.0044)**
DiD 1997	**0.0394*** **	**0.0462* **	**0.0385*** **	**-0.0183**	**0.0731*** **	**0.3340** **	**0.0189*** **	**0.6200** **	**0.0344*** **
	(0.0048)	**(0.0254)**	**(0.0049)**	**(0.0241)**	**(0.0069)**	**(0.0680)**	**(0.0038)**	**(0.2830)**	**(0.0039)**
DiD 1998	**0.0178*** **	**0.0591** **	**0.0176*** **	**-0.0080**	**0.0695*** **	**0.2130*** **	**0.0147*** **	**0.2770**	**0.0319*** **
	(0.0044)	**(0.0241)**	**(0.0045)**	**(0.0233)**	**(0.0064)**	**(0.0623)**	**(0.0036)**	**(0.2670)**	**(0.0037)**
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry–year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	544,085	470,584	544,085	468,458	544,085	114,285	544,085	18,175	470,228
Establishments	68,289	63,733	68,289	68,616	68,289	30,828	68,289	9,716	63,640
R-squared	0.473	0.705	0.471	0.711	0.450	0.489	0.274	0.623	0.288
Adjusted R-squared	0.397	0.658	0.394	0.666	0.371	0.298	0.170	0.170	0.176

Note: OLS regressions with establishment fixed effects and clustered standard errors at the firm level (in parentheses). For gross (equipment, building, land) investment at the extensive margin in Model (1) (3, 5, 7), the dependent variable is a dummy variable with a value of one for an establishment i with positive gross (equipment, building, land) investments in t. For gross (equipment, building, land) investment at the intensive margin in Model (2) (4, 6, 8), the dependent variable is the logarithm of positive gross (equipment, building, land) investments of establishment i in t. In Model (9), the dependent variable is the natural logarithm of the ratio of building plus land investments to total investments. $DiD1995(1996, 1997, 1998)$ is an interaction term of a dummy variable for establishments in Eastern German states and a dummy variable for the corresponding year in the DAL treatment period (1995–1998). Control variables include *Capital stock* (logarithm of the capital stock of establishment i), *Revenue per capital* (ratio of sales revenue to the capital stock), *Unemployment rate* (unemployment rate of the district of establishment i in t in percentage points), *GDP per capita* (*Population*) (logarithm of the gross domestic product per capita (the number of inhabitants) of this district); ***, **, and * indicate significance levels of 0.01, 0.05, and 0.1, respectively.

Table 6: Robustness Checks

Investment type	Aggregate investment		Equipment		Buildings		Land	
Investment margin	Extensive	Intensive	Extensive	Intensive	Extensive	Intensive	Extensive	Intensive
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Balanced panel								
DiD	**0.0210*** (0.0043)**	**0.0334 (0.0253)**	**0.0215*** (0.0044)**	**-0.0213 (0.0240)**	**0.0478*** (0.0075)**	**0.254*** (0.0627)**	**0.0212*** (0.0040)**	**0.4810* (0.2580)**
Observations	241,147	219,744	241,147	218,899	241,147	63,744	241,147	10,396
Establishments	24,336	24,079	24,336	24,069	24,336	15,487	24,336	5,375
R-squared	0.446	0.696	0.442	0.704	0.463	0.474	0.290	0.616
Adjusted R-squared	0.383	0.658	0.379	0.668	0.402	0.303	0.210	0.181
All models include establishment and country controls, establishment fixed effects, year fixed effects and industry-year fixed effects.								
Panel B: Mixed groups with firm fixed effects								
DiD	**0.0127 (0.0144)**	**0.3180*** (0.0892)**	**0.0101 (0.0144)**	**0.2300*** (0.0881)**	**0.0711*** (0.0169)**	**0.3140* (0.1790)**	**0.0125 (0.0087)**	**0.5660 (0.7240)**
Observations	38,259	31,389	38,259	31,188	38,259	8,898	38,259	1,075
Establishments	7,308	5,996	7,308	5,995	7,308	2,627	7,308	561
R-squared	0.503	0.811	0.505	0.815	0.533	0.517	0.382	0.521
Adjusted R-squared	0.405	0.771	0.408	0.776	0.442	0.359	0.262	0.146
All models include establishment and country controls, establishment, year, parent, and industry-year fixed effects.								
Panel C: Standard errors clustered at industry-year-level								
DiD	**0.0323*** (0.0042)**	**0.1110** (0.0437)**	**0.0322*** (0.0042)**	**0.0336 (0.0428)**	**0.0813*** (0.0060)**	**0.318*** (0.0443)**	**0.0192*** (0.0023)**	**0.4350** (0.1710)**
Observations	544,805	470,548	544,805	468,458	544,805	114,285	544,805	18,175
Establishments	68,289	63,733	68,289	63,616	68,289	30,828	68,289	9,716
R-squared	0.473	0.705	0.471	0.711	0.450	0.489	0.274	0.623
Adjusted R-squared	0.397	0.658	0.394	0.666	0.371	0.298	0.170	0.170
All models include establishment and country controls, establishment fixed effects, year fixed effects and industry-year fixed effects.								
Panel D: Logistic models								
DiD	**0.3170*** (0.0350)**		**0.2890*** (0.0342)**		**0.4960*** (0.0239)**		**0.3400*** (0.0410)**	
Observations	544,805		544,805		544,805		544,805	
Establishments	68,289		68,289		68,289		68,289	
Log likelihood	-167,820		-171,565		-212,211		-66,652	
All models include establishment and country controls, establishment fixed effects, year fixed effects and industry-year fixed effects.								

Note: OLS regressions for the intensive and extensive margins of aggregate investment (models 1 and 2), equipment (models 3 and 4), buildings (models 5 and 6), and land (models 7 and 8) are performed in Panels A, B, C, while a logistic for the extensive margin is shown in Panel D. Panel A contains results for a balanced panel including only establishments that already existed in the first sample year (1995). Panel B includes only firms with establishments in both parts of Germany and parent firm fixed effects. Panel C performs the baseline regression (Eq. 3) when standard errors are clustered at the industry-year level. ***, **, and * indicate significance levels of 0.01, 0.05, and 0.1, respectively.

Table 7: Firm heterogeneity: Aggregate investment

Investment margin	Extensive margin			Intensive margin		
Model	(1)	(2)	(3)	(4)	(5)	(6)
DiD	0.0284***	0.0294***	0.0108	0.0587***	0.2240**	0.1040
	(0.0039)	(0.0113)	(0.0120)	(0.0212)	(0.0891)	(0.0917)
DiD Large	**-0.0152**		**0.0091**	**0.1780*** **		**0.2580*** **
	(0.0101)		**(0.0124)**	**(0.0577)**		**(0.0774)**
DiD Group	**0.0177**		**0.0314*** *	**0.1330*** *		**0.1010**
	(0.0108)		**(0.0152)**	**(0.0588)**		**(0.0891)**
DiD Owner		**-0.0067**	**-0.0058**		**0.1450**	**0.1620**
		(0.0198)	**(0.0199)**		**(0.135)**	**(0.134)**
DiD Corp		**0.0007**	**0.0058**		**-0.1510**	**-0.1140**
		(0.0124)	**(0.0126)**		**(0.0941)**	**(0.0938)**
Large	0.0053		-0.0312***	0.3380***		0.3710***
	(0.0049)		(0.0063)	(0.0264)		(0.0358)
Group	-0.0332***		-0.0334***	-0.1750***		-0.2210***
	(0.0045)		(0.0057)	(0.0227)		(0.0322)
Owner		-0.0165**	-0.0191**		0.1330***	0.1270***
		(0.0078)	(0.0079)		(0.0454)	(0.0459)
Corp		-0.0123*	-0.0134**		0.1110***	0.1050***
		(0.0068)	(0.0068)		(0.0406)	(0.0406)
Establishment controls	Yes	Yes	Yes	Yes	Yes	Yes
District controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry–year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	544,085	243,919	243,919	470,548	219,323	219,323
Establishments	68,289	45,381	45,381	63,733	42,895	42,895
R-squared	0.474	0.543	0.544	0.705	0.778	0.779
Adjusted R-squared	0.398	0.438	0.439	0.659	0.724	0.725

Note: OLS regressions with establishment fixed effects and clustered standard errors at the firm level (in parentheses). In models (1)-(3), the dependent variable is a dummy variable with a value of one for an establishment i with positive aggregate investments in t (extensive margin). In models (4)-(6), the dependent variable is the logarithm of positive aggregate investments of establishment i in t (intensive margin). *DiD* is an interaction term of a dummy variable for establishments in the Eastern German states and a dummy variable for the DAL treatment period (1995–1998). *DiD Large* is an interaction term of a dummy variable for firms with at least 250 staff members (*Large*) and *DiD*. *DiD Group* is an interaction term of a dummy variable for firms with more than one establishment (*Group*) and *DiD*. *DiD Owner* is an interaction term of a dummy variable for firms that are managed by an owner (*Owner*) and *DiD*. *DiD Corp* is an interaction term of a dummy variable for corporations with limited liability (*Corp*) and *DiD*. All models include the full control variable setting, as well as year and industry-year fixed effects. ***, **, and * indicate significance levels of 0.01, 0.05, and 0.1, respectively.

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Supplementary Information for

Bonus Depreciation as Instrument for Structural Economic Policy: Effects on Investment and Asset Structure

Appendices

A Present Value of DAL Benefits

A.1 Calculation of DAL Present Value

We calculate the DAL present value as the sum of the tax savings from bonus depreciation during the first year plus the present value of remaining depreciations in the future, and minus the present value of the 'fastest' alternative depreciation scheme without bonus depreciation. Since we calculate the DAL benefit from the perspective of a given period t, we do not account for changes in taxes and the after-tax cost of funds in future periods (e.g., for the reduction of corporate income tax rates resulting from the German tax reform 1999/2000/2001). Taking into account that German tax rates declined after 1998, we calculate a lower-bound estimate of the ex-post DAL benefit, because the value of depreciation benefits increases with the tax rate. We also do not account for the possibility of future tax losses that would reduce the present value of future tax depreciation.[1] We assume that the DAL bonus depreciation is fully utilised in the first year and the investment is executed in the middle of the year. The present value of DAL benefits is then equal to

$$PV_t = \tau_t \cdot \Phi_t \cdot \left[\beta_t + (1 - \beta_t) \cdot \sum_{t+x}^{t+X} \frac{\delta reg_{t+x}}{(1 + \rho_{\tau t})^{x-1}} - \sum_{t+x}^{t+X} \frac{\delta alt_{t+x}}{(1 + \rho_{\tau t})^{x-1}} \right], \tag{A.1}$$

where Φ_t denotes the total sum of DAL-funded depreciations in the eastern German states in a given year t, τ_t the average tax rate in t, $\rho_{\tau t}$ the after-tax cost of funds in t, and x is an index for following depreciation years. The bonus depreciation rate of a given

[1] In case of a tax loss, the remaining depreciation volume does not result in a reduction of the tax burden (the tax payment is zero anyway), but increases the loss carryforward. Thus, future losses might decrease the present value of the remaining depreciation volume.

period (ranging from 40% to 50%) is denoted β_t. Thus, $(1 - \beta_t)$ is the remaining book value that has to be depreciated by the regular scheme. The parameters $0 \leq \delta reg_{t+x} \leq 1$ and $0 \leq \delta alt_{t+x} \leq 1$ describe the allocation of depreciations under the regular scheme and the alternative scheme, respectively.

German tax instalments are affected by depreciation allowances. In line with Cohen et al. (2002), we therefore reduce the number of discounting periods x by one. Subsidy reports of the German Federal Government (German Federal Government, 1995–1999; German Federal Ministry of Finance, 2001–2010) do not report the total amount of depreciations Φ_t, but only the amount of tax losses resulting from bonus depreciation $\tau_t \cdot \Phi_t \cdot \beta_t$. We use this information to calculate $\tau_t \cdot \Phi_t$.

A.2 After-Tax Coft of Funds

An important aspect affecting the present value of depreciation allowances is the after-tax cost of funds. Using the definition of weighted average costs of capital (WACC) (Hulse and Livingstone, 2010; Frank and Shen, 2016), after-tax costs of funds in a given period t can be written as

$$\rho_{\tau t} = \rho_{dt} \cdot d \cdot (1 - \tau_{t^*}) + \rho_{et} \cdot (1 - d). \tag{A.2}$$

In Eq. A.2, ρ_{dt} denotes the pre-tax cost of debt capital at time t, ρ_{et} the cost of equity capital, and d the – for simplicity, this is a constant – fraction of debt capital. The tax deductibility of interest payments at the firm level is included in the tax rate τ_{t^*}, thereby accounting for the limited tax-deductibility of interests for long-term debt with regard to the German local business tax (German: *Gewerbesteuer*).

To approximate the cost of debt capital ρ_{dt} for a given year t, we use average long-term interest rates published by the German Central Bank (German: *Deutsche Bundesbank*).[2] This can be justified by the fact that investments are generally financed by equity and long-term debt, while short-term debt is more relevant for operational business. The average interest rate between 1995 and 2008 was 6.07%. The average fraction of debt cap-

[2]Since the definitions of reported interest rates of the German Central Bank change over time, we rely on a number of different proxies for the cost of debt capital. For 1997 to 2002, we use average interest rates for business credits ranging from € 500,000 to € 5 million (BBK01.SU0509). For 2003 and thereafter, we use interest rates for credits to corporations exceeding € 1 million and a duration of more than 5 years (BBK01.SUD129). For the period from 1991 to 1996, we use floating long term mortgage interest rates (BBK01.SU0049) as business interest rates are not available. We use 'overlapping' periods with more than one possible proxy of interest rates to adjust all interest rates to a consistent definition over the whole period, using interest rates from 1997 to 2002 as our reference point (BBK01.SU0509).

ital is taken from representative balance sheet statistics of the manufacturing industry, which are also provided by the German Central Bank (2001–2012). In line with Hulse and Livingstone (2010), we focus on the ratio of long-term debt to equity. Therefore, we assume that short-term debt and accruals result from operational business and do not affect the after-tax cost of funds of long-term business investment. We do not observe strong changes in d during our sample period. Therefore, we use a fixed average value of $d = 0.3439$.

In contrast to the cost of long-term debt, the cost of equity is not published by the German Central Bank. While there are a number of proxies for ρ_{et}, there is no generally accepted definition of this variable. Botosan et al. (2011) describe 10 alternative proxies with a positive and significant correlation with future realised returns; we rely on the mean of these 10 proxies for equity cost as reported by Botosan et al. (2011). It should be noted that the values of ρ_{et} are based on U.S. data instead of German data. However, this should not be a severe problem, as Hail and Leuz (2006) do not find evidence for strong differences in the equity cost of capital in both countries. Nevertheless, we re-weight the equity cost by the corresponding differences reported in Hail and Leuz (2006) and obtain an average cost of 11.0%. To obtain average values per year, we relate this value to the average cost of long-term debt and obtain a ratio of 1.814. Thus, average ρ_{et} can be approximated by $\rho_{dt} \cdot 1.814$. This is very close to the relationship between ρ_{et} and ρ_{dt} of 1.8 as assumed by Hulse and Livingstone (2010).

The tax rate τ_{t^*} is a weighted effective tax rate with respect to the deduction of interest expenses of business establishments in eastern Germany. To calculate τ_{t^*}, we account for the distribution between profits generated by corporations (taxed at corporate income tax rates) and by self-employed businesses and partnerships (taxed at personal income tax rates). The fraction of profits generated by corporations is approximated by the corresponding distribution of revenue as documented in the VAT statistics of the German Federal Statistical Office. To calculate the effective tax rate of corporations (partnerships), we use the corporate income tax rate (the maximum marginal personal income tax rate) for accumulated business profits of a given year. We further consider the solidarity tax surcharge (German: *Solidaritätszuschlag*) and the average local business tax rate (German: *Gewerbesteuer*) of the eastern German states. We account for the fact that local business tax payments were deductible from taxable income until 2007. In addition, we account for the local business tax credit for partnerships (German: *Gewerbesteueranrechnung*) and the add-backs of long-term debt for the German local business tax (German: *Hinzurechnungen*).

A.3 Depreciation Regulations

To calculate the parameters $0 \leq \delta reg_{t+x} \leq 1$ and $0 \leq \delta alt_{t+x} \leq 1$ in Eq. A.1, we rely on the depreciation regulations of the German income tax code for different asset classes as well as the distribution of real investments between buildings and equipment for a given year (see Tables 2.1, 3.1 and 4.1 in German Federal Statistical Office, 2010).

In the 1990s, new buildings were generally depreciated over a period of 25 years. For investments after 2000, these depreciation periods for new business buildings were increased to 33.3 years. For the modernisation (extension, improvement) of old buildings, longer depreciation periods of 40 and 50 years (depending on the construction date of the building) were in force. We use the average fraction of new buildings as reported in the German building statistics of the corresponding period to construct weights for old and new buildings. For modernisations, we assume that one half of investments are depreciated over 40 and the other half over 50 years.[3]

Furthermore, we account for declining depreciation schemes for new buildings and modernisations as documented in § 7 Section 5 of the German income tax code. These alternative depreciation schemes were available if (1) the new building was constructed (or an old building was modernised) with a building application before January 1994 or January 1995, respectively, or (2) the building was purchased before January 1994 or January 1995, respectively. As buildings are constructed after the building application has been submitted, we assume that declining depreciation schemes are available for two years after the expiration date (100% in the first year after the expiration and 50% in the second year).

There is no data on average tax depreciation periods for equipment investment in Germany. Therefore, we assume an average depreciation period of seven years as documented by Devereux et al. (2009). In the 1990s, the depreciation rate of the declining balance method for movable assets was 30%. Hence, we assume that all equipment investments use the declining balance method, as long as corresponding depreciations are 'higher' than the alternative linear depreciations. Note that the declining balance method was not available if the bonus depreciation was utilised. Therefore, the consideration of these programs reduces the relative benefit of bonus depreciation to some extent.

[3]We rely on the number of constructed non-residential buildings in the former East (new buildings versus modernisations during the period from 1993 to 1999, which was relevant for the Development Area Law).

B Calculation of Capital Stocks

Our calculation is based on Wagner (2010), who uses depreciation values for tax purposes reported in the Cost Structure Survey, information on the composition of investments from the Investment Survey and average depreciation periods for different asset classes (buildings and equipment) to compute capital stocks. Our method extends this approach in a number of ways and can be described by

$$K_{i,t-1} = \left(D_{it} \cdot \left(\alpha_{it}^{E} \cdot P_{t}^{E} + \alpha_{it}^{B} \cdot P_{t}^{B}\right) - I_{it}^{N}\right) \cdot \frac{1}{2}, \tag{B.1}$$

where $K_{i,t-1}$ is the capital stock at the end of the previous period (or beginning of the current period) of the firm i, D_{it} is the depreciation of i in t, α_{it}^{E} is the fraction of equipment investment of a given year, α_{it}^{B} the fraction of building investment in that year, and P_{t}^{E} $\left(P_{t}^{B}\right)$ the average depreciation period for equipment (building) investment in Germany in t.

Multiplying the sum of depreciations with the average depreciation period yields the investment value at the beginning of the operating period. To account for depreciations after the beginning of the operating period of an asset, we divide this value by two. Therefore, we assume that the average operating period has expired by a factor of 50% for each asset. This implies further that price-adjusted depreciations are approximately evenly distributed over time. Note that investments in t have a positive effect on D_{it}. If investments are executed in the middle of the year, D_{it} should rather be a measure of the capital stock in the middle of the period instead of the beginning of the period. To account for that aspect, we deduct 50% of net investments I_{it}^{N} (defined as aggregate investment minus disinvestment) of firm i in time t.

The depreciation period P_{t}^{E} for equipment is assumed to be 7 years (see Devereux et al. 2009). For new buildings, the regular periods are 25 years (for old buildings 40 to 50 years). For simplicity, we do not account for declining depreciation schemes for buildings. This can be justified by the fact that declining schemes increase the present values of depreciation allowances, but not the average depreciation over the depreciation period. The composition of different asset classes is estimated by the distribution of investments α_{it}^{E} and α_{it}^{B} of the manufacturing industry in our data, with $\alpha_{it}^{E} + \alpha_{it}^{B} = 1$. To account for measurement error, we calculate average values for α_{it}^{E} and α_{it}^{B} by year, industry, business size (large firms compared to small firms with up to 250 staff members) and region (western versus eastern Germany).

The tax depreciation period for new buildings increased to 33.3 years in 2001, while depreciation periods for modernization remained unchanged. The increased depreciation period is only relevant for new installments. Thus, considering economic growth and declining depreciation schemes of preceding periods, we assume a declining adaptation process of the average depreciation period per firm over 25 years with $D_{2000+x} = D_{2000} + \Delta \cdot \sqrt{\frac{x}{25}}$, where D_{2000} denotes the average depreciation period in 2000 (29 years on average for old and new buildings), x the number of years after 2000 and the increase in the average depreciation period resulting from the reform. This yields an average depreciation period for buildings of 35.66 years in 2008.

The computation of capital stock may be affected by measurement error in D_t. This is especially a problem for a high variation of tax depreciations over time, implying a fluctuating capital stock. To account for that, we rely on estimated capital stocks of future periods to obtain a more consistent estimate of the capital stock of preceding periods. Hence, we define the capital stock of the preceding period as the capital stock of the following period plus investments and minus depreciations and disinvestments in t. In addition to fixed assets, and extending Wagner (2010), we consider leased investments as increasing the effective capital-in-kind. We rely on data from the Investment Survey to compute the ratio of leased assets to fixed assets by year, industry, business size and region (western versus eastern Germany). The value of fixed assets of each firm is multiplied by one plus the computed ratio.

A drawback of our data is that depreciation volumes of the Cost Structure Survey are only available at the firm level. Therefore, we allocate depreciations to the establishment. We compute the ratio of the capital stock to the number of staff members by year, industry, business size (large firms compared to small firms with up to 250 staff members) and region (establishments in the western and establishments in the East). Using these ratios, we allocate the firms' capital stock to the establishments.

C Calculation of Tax Burden and Elasticities

C.1 Effective Net-of-Tax Rate

The effective net-of-tax rate of investments in eastern German establishments can be written as

$$NETR_t = \frac{1 - \tau_t^W \cdot Z_t^W - s_t^W}{1 - \tau_t^E \cdot Z_t^E - s_t^E} \cdot \frac{1 - \tau_t^E}{1 - \tau_t^W}, \tag{C.1}$$

where τ_t^E, Z_t^E, s_t^E (τ_t^W, Z_t^W, s_t^W) denote the tax rate on profits, the present value of depreciations per € invested, and the effective ISL subsidy rate for eastern (western) Germany in a given period, respectively. As introduced in Appendix A, τ_t^E and τ_t^W are based on weighted tax rates of partnerships and corporations including taxes on income, the solidarity tax surcharge, and the local business tax. To calculate τ_t^E (τ_t^W), we use average local business tax multipliers (German: Hebesätze) for the eastern (western) German states. Z_t^E and Z_t^W are calculated as in Appendix A. The after-tax costs of funds of Appendix A.2 are used to compute discounted values of depreciation allowances.

We account for the fact that applications for ISL subsidies are generally related to investments of the preceding year. Therefore, the effective subsidy rate s_t^E is defined as the nominal ISL rate discounted by one period. As shown in Table 1, the ISL rate for equipment investment of large firms was 5% (small firms 10%) from 1995 to 1998, 10% (small firms 20%) in 1999, and 12.5% (small firms 25%) thereafter. Regarding building investment, funding rates were zero before 1999 and 10% (12.5%) for initial investments in 1999 (after 1999). In this case, there were no increased rates for firms with no more than 250 staff members. There was also a higher subsidy rate of 8% for equipment investments of all firms before 1997 if investments had been initiated before June 1994. We assume that this is relevant for 50% of investments in 1995 and 0% thereafter. Correspondingly, we assume that the increase of funding rates in 2000 (from 10.0% to 12.5%) was relevant for 50% of businesses in that period and for 100% thereafter. Note that s_t^W is zero, as ISL subsidies were restricted to investments in the eastern states. In addition, there was a funding gap for investments initiated before August 25, 1997 and completed after December 31, 1998. For simplicity, we do not consider this aspect in our calculations. This can be justified by the fact that this funding gap was not expected by owners and managers.

C.2 Investment Elasticities

Following Zwick and Mahon (2017), we calculate investment elasticities with respect to the net of the effective tax rate $1-\tau_\epsilon$ (in the following NETR), respectively the reciprocal of the tax term of the user cost of capital. For the calculation of the effective tax rate, we rely on the same assumptions as for the calculation of the relative tax burdens Appendix C.1) Consistent with our regression approach, we focus on the relative tax benefit of establishments in eastern Germany. Thus, we rule out any other tax law changes affecting establishments in both parts of Germany equally. We define the additional relative tax incentive of eastern German establishments during the treatment period as the difference between the average relative NETR in the treatment period and the average relative NETR in the post-treatment period. Thus, the change in the relative tax incentive of eastern German establishments is

$$\Delta NETR = \overline{NETR}_{TREAT} - \overline{NETR}_{POST}, \tag{C.2}$$

with $NETR_t = \frac{1-\tau_t^W \cdot Z_t^W - s_t^W}{1-\tau_t^E \cdot Z_t^E - s_t^E} \cdot \frac{1-\tau_t^E}{1-\tau_t^W}$. We calculate $\Delta NETR$ for large and small firms for three classes of buildings and equipment: 1a) initial building investment, 1b) new buildings (no initial investment), 1c) modernisation of buildings (no initial investment), 2a) initial equipment investment, 2b) non-initial equipment investment, and 2c) non-fundable equipment investment. To calculate the aggregate average $\Delta NETR$ for small and large firms, we make assumptions about the average distribution of these six different types of investments. Note that there are no official statistics on initial investments according to ISL or the fundability of assets.

As extensions of an establishment are considered as initial investment according to ISL, the majority of building constructions should be initial investments. Hence, in case of the aggregate volume of building investments, we assume that the majority (55%) are initial investments. Corresponding to the German building statistics, about 20% of building investments are modernizations. We regard the remainder (25% of building investments) as constructions, but not as initial investments (e.g. extensions of buildings, major enhancements of buildings). In case of equipment investments, we assume that the majority (55%) are replacement investments and are therefore not considered as initial investments. This is consistent with the empirical observation that the increased funding rates of the ISL 1999 did not result in a significant increase in aggregate ISL subsidy payments. As most equipment in the manufacturing sector was fundable (e.g. machines), we assume that non-fundable equipment is only 1/5 of the remaining equipment investments. Thus, the remainder (4/5) falls on fundable initial equipment investments.

D Additional Robustness Tests and Analyses

D.1 DAL and Building Prices

Goolsbee (1998) finds evidence that investment tax incentives increase asset prices, which dampens their impact on real investment. While studies on bonus depreciation do not provide support for such pricing effects (House and Shapiro 2008; Edgerton 2011; Zwick and Mahon 2017), we account for that by deflating building investment at the intensive margin by a regional building price index. Corresponding price indices are provided by the statistical offices of ten major federal German states. The state of Berlin has been excluded from our data. For the remaining five states (Bremen, Hamburg, Mecklenburg-West

Pomerania, Rhineland-Palatinate, and Schleswig-Holstein), we rely on average building price indices for the western and the eastern German states. These average price indices are calculated using the average of existing GDP-weighted price indices for states in the former West (Baden-Württemberg, Bavaria, Hessen, Lower Saxony, North Rhine-Westphalia and Saarland) and in the former East (Brandenburg, Saxony, Saxony-Anhalt and Thuringia). Using building price indices from states in the East and the West, we calculate weighted building price indices for both parts of Germany and report the results in Table D.1.

Table D.1: Building price indices: manufactoring sector

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
East	97.9	98.1	97.3	96.3	95.0	94.7	94.1	94.3	95.3	97.8	100.0	102.5	110.4	114.6
West	93.9	94.2	93.9	94.5	94.7	95.9	96.7	96.9	97.2	98.4	100.0	102.3	109.6	113.6

Notes: Weighted average building price indices for the manufacturing sector in the eastern and western German states. We calculate the indices from GDP-weighted price indices in the manufacturing sector as reported by the Statistical State Offices for the western German federal states (Baden-Württemberg, Bavaria, Hessen, Lower Saxony, North Rhine-Westphalia and Saarland) and the eastern states (Brandenburg, Saxony, Saxony-Anhalt and Thuringia). Due to the specific economic and legal conditions in Berlin, we do not account for price developments in that area. There are no corresponding price indices available for Bremen, Hamburg, Mecklenburg-West Pomerania, Rhineland-Palatinate or Schleswig-Holstein.

We find only weak pricing effects. Using 2005 as reference year, the building price index in eastern Germany in the treatment period (1995–1998) exceeds the index for western Germany by 3.0 percentage points on average, while it is slightly lower than the western German index in the post-treatment period (1.2 percentage points). Even if one were to assume that this change in the difference of the building price indices is exclusively the result of the DAL, this suggests a DAL treatment effect of 4.2 percentage points (estimated by the difference in the differences of 3.0 and minus 1.2) or 4.4% of the building price level in 1999. This is minor if compared to our estimated average response for real building investments of 83% that we calculate in Section 5.2.

D.2 Propensity Score Matching

To ensure the comparability and similarity of our treatment group and control group, we use propensity score matching (Caliendo and Kopeinig 2008). Relying on one-to-one matching with replacement and the base year 1999, we generate a pre-matched control group that is similar to our treatment group. We match on the following variables: investment activity (as measured by the logarithm of building investment and the logarithm of equipment investment; both increased by one to avoid undefined values), establishment size and economic activity (as measured by the logarithm of sales revenue and the logarithm of the number of employees), industry, firm type (single establishment firm, multi-establishment firm, multinational firm, establishment of a foreign firm), and the type of goods produced (input goods, investment goods, durables, commodities). We do not use the capital stock as a matching characteristic, as this variable has been constructed using the information on investments (for the calculation of the capital stock see Appendix B). We select 1999 as our base year for matching but also consider outcome values from future periods (2000–2008) for our time-variant matching variables to account for the common trends assumption. To ensure a minimum common support, we drop establishments with propensity scores that are higher than the maximum (and lower than the minimum) propensity score in our control group. We end up with a final sample of 89,734 observations from 7,406 establishments.

Table D.2 depicts the results from performing the baseline model (Table 3) for the matched sample. The coefficient estimates are in line with Table 3 qualitatively and quantitatively.

Table D.2: Aggregate investment at the extensive and intensive margin–Matched Sample

Variables	Extensive margin				Intensive margin			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DiD	0.0213***	0.0207***	0.0180***	0.0181***	0.1450***	0.1450***	0.1210***	0.1210***
	(0.0049)	(0.0049)	(0.0052)	(0.0052)	(0.0303)	(0.0299)	(0.0312)	(0.0309)
Capital stock				0.0048**				0.1230***
				(0.0019)				(0.0106)
Revenue per capital				-0.0162***				101.9
				(0.0011)				(86.66)
Unemployment rate			-0.0011	-0.0011			-0.0159***	-0.0148***
			(0.0001)	(0.0001)			(0.0055)	(0.0055)
GDP per capita			-0.0215	-0.0230			0.0866	0.0470
			(0.0166)	(0.0166)			(0.1010)	(0.0997)
Population			-0.0152	-0.0145			0.0496	0.0636
			(0.0105)	(0.0105)			(0.0680)	(0.0673)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry–year FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Observations	89,734	89,734	89,734	89,734	81,777	81,777	81,777	81,777
Establishments	7,406	7,406	7,406	7,406	7,375	7,375	7,375	7,375
R-squared	0.371	0.373	0.373	0.374	0.669	0.673	0.673	0.675
Adjusted R-squared	0.314	0.315	0.315	0.316	0.636	0.640	0.640	0.641

Notes: OLS regressions with establishment fixed effects and clustered standard errors at the establishment level (in parentheses). In models (1)-(4), the dependent variable is a dummy variable with a value of one for an establishment i with positive aggregate investments in t (extensive margin). In models (5)-(8), the dependent variable is the logarithm of positive aggregate investments of establishment i in t (intensive margin). DiD is an interaction term of a dummy variable for establishments in Eastern German states and a dummy variable for the DAL treatment period (1995–1998). Capital stock is the logarithm of capital stock of establishment i and Revenue per capital is the ratio of sales revenue to the capital stock. Unemployment rate is the unemployment rate of the district of establishment i in t in percentage points. GDP per capita (Population) is the logarithm of the gross domestic product per capita (the number of inhabitants) of this district. ***, **, and * indicate significance levels of 0.01, 0.05, and 0.1, respectively.

D.3 Investment Loopholes and Delays

As the DAL bonus depreciation provided a temporal enhancement in depreciation opportunities and the expiration of the program might have been a foreseeable event for firms, a potential reaction of firms could have been a temporal anticipation of investments that would have been executed otherwise in future periods. Thus, firms might anticipate investments from the period after the expiration (after 1998) of the program into the subsidy period (before 1998). If this is the case, it could lead to abnormal reduction of investment activity in treated eastern establishments compared to control establishments in western Germany. Therefore, we perform an additional test, considering not only the overall treatment effect in the period before the expiration (baseline model) but also a treatment effect in the post-DAL year 1999. We estimate the following model:

$$I_{it} = \beta_0 + \beta_1 \cdot DiD_{it} + \beta_2 \cdot PostDiD_{it} + \phi \cdot X_{it} + \alpha_i + \gamma_t + \theta_{it} + \epsilon_{it}. \quad \text{(D.1)}$$

In this model, $PostDiD_{it}$ is an interaction term of the post-DAL year 1999 and a dummy variable with a value of one for establishments in eastern German states. As documented by Table D.3, and opposite from expectations regarding an investment hole, we still find a positive regression coefficient for $PostDiD_{it}$. Thus and in line with our graphical evidence in Figure 2, we still find evidence for slightly higher investment activity in eastern establishments in the post-DAL year 1999. An explanation for our finding is the presence of temporal delays of investments that were initially intended to be executed within the DAL period. Considering that DAL-driven investment were especially relevant for buildings and project delays are a common problem in the building industry, it should not be surprising that not all DAL-related projects were finished in time before the funding period ended. Notwithstanding, Table D.3 does not provide evidence that investment projects were anticipated from the past-DAL period to maximise tax benefits before the DAL period ended.

Table D.3: Tests for post–DAL investment effects

Variables	Extensive margin				Intensive margin			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DiD	**0.0407*** **	**0.0383*** **	**0.0351*** **	**0.0356*** **	**0.1450*** **	**0.1240*** **	**0.1130*** **	**0.1210*** **
	(0.0036)	**(0.0036)**	**(0.0039)**	**(0.0039)**	**(0.0206)**	**(0.0204)**	**(0.0216)**	**(0.0213)**
Post DiD	**0.0184*** **	**0.0174*** **	**0.0163*** **	**0.0173*** **	**0.0405* **	**0.0347**	**0.0337**	**0.0505** **
	(0.0043)	**(0.0043)**	**(0.0044)**	**(0.0044)**	**(0.0218)**	**(0.0218)**	**(0.0221)**	**(0.0220)**
Capital stock				0.0089***				0.1310***
				(0.0009)				(0.0050)
Revenue per capital				-0.0302*				0.3230*
				(0.0181)				(0.171)
Unemployment rate			-0.0019***	-0.0018***			-0.0127***	-0.0111***
			(0.0006)	(0.0006)			(0.0033)	(0.0033)
GDP per capita			-0.0052	-0.0064			0.1800***	0.1610**
			(0.0093)	(0.0093)			(0.0633)	(0.0628)
Population			-0.0174**	-0.0170**			-0.0180	-0.0132
			(0.0074)	(0.0074)			(0.0397)	(0.0393)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry–year FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Observations	544,085	544,085	544,085	544,085	470,548	470,548	470,548	470,548
Establishments	68,289	68,289	68,289	68,289	63,733	63,733	63,733	63,733
R-squared	0.472	0.472	0.472	0.473	0.702	0.704	0.704	
Adjusted R-squared	0.396	0.397	0.397	0.397	0.655	0.657	0.657	

Notes: OLS regressions with establishment fixed effects and clustered standard errors at the establishment level (in parentheses). In models (1)-(4), the dependent variable is a dummy variable with a value of one for an establishment i with positive aggregate investments in t (extensive margin). In models (5)-(8), the dependent variable is the logarithm of positive aggregate investments of establishment i in t (intensive margin). DiD is an interaction term of a dummy variable for establishments in Eastern German states and a dummy variable for the DAL treatment period (1995–1998). Post DiD is an interaction term of a dummy variable for establishments in Eastern German states and a dummy variable for the post DAL year 1999. Capital stock is the logarithm of capital stock of establishment i and Revenue per capital is the ratio of sales revenue to the capital stock. Unemployment rate is the unemployment rate of the district of establishment i in t in percentage points. GDP per capita (Population) is the logarithm of the gross domestic product per capita (the number of inhabitants) of this district. ***, **, and * indicate significance levels of 0.01, 0.05, and 0.1, respectively.

D.4 Alternative Control Variable Settings

The following tables report regression results for four alternative control variable settings to control if our results are driven by control variable choices. In Table 4, we investigate investment types including the full set of control variables. Table D.4 reports the same analysis without controls and industry-year fixed effects, similar to the simplest baseline analyses for total investment (Table 3). The results confirm our baseline findings in Table 4. Like in table 3, we obtain quantitatively larger effects if we do not include regression controls and industry-year fixed effects. We find an increase of 10.5% (baseline 7.3%) for equipment, of 92.9% (baseline 76.6%) for building investment and of 121.3% (108.0%) for land investment.

A potential concern might be that our regression controls are endogenous with investment as dependent variable. Therefore, we estimate an alternative specification with once-lagged regression control variable and report results in Table D.5. As the choice of lagged controls reduces our observation period, the number of firm-year observation decreases to 468,549. If we use the investment responses of the different asset classes (equipment, buildings, land) to calculate an aggregate investment response (similar to Table 5), we obtain an overall investment response of 15.0%, which is very close to our baseline estimate.

Another concern might be an omitted varialbe bias. Therefore, we perform a robustness check that adds additional control variables at the level of the firm. These include the legal form of the company (corporation or pass-through entity), interest expenses per capital stock as a measure for liquidity and capital constraints and operating income (EBITDA) per capital stock as a measure for profitability. These variables are provided by the Cost Structure Survey and therefore only available for less than 50% of our sample. We report results in Table D.5. Using the investment responses of the different asset classes (equipment, buildings, land) to calculate an aggregate investment response (similar to Table 5), we obtain an overall investment response of 14.5%, which is very close to our baseline estimate.

Finally, we extend the robustness check of Panel B in Table 5 by adding firm-year fixed effects. In doing so, we control for each firm-year combination and thus use only the variation at the establishment level to identify the DAL effect. Hence, holding firm-year combinations constant, we compare investment activities of eastern and western establishments of the same firm, to estimate the DAL effect. Our results confirm the evidence in Panel B of Table 5. Using the investment responses of the different asset classes (equipment, buildings, land) to calculate an aggregate investment response, we obtain an overall investment response of 34.9%, which is close to Table 5.

Table D.4: Investment types without controls

Variables	Equipment		Buildings		Land		Buildings and land share
	Extensive	Intensive	Extensive	Intensive	Extensive	Intensive	Intensive
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
DiD	**0.0375***** **(0.0035)**	**0.0573***** **(0.0185)**	**0.0867***** **(0.0052)**	**0.3910***** **(0.0466)**	**0.0215***** **(0.0026)**	**0.4630**** **(0.1990)**	**0.0404***** **(0.0027)**
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry–year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	544,085	468,458	544,085	114,285	544,085	18,175	470,228
Establishments	68,289	63,616	68,289	30,828	68,289	9,716	63,640
R-squared	0.470	0.708	0.449	0.485	0.273	0.614	0.287
Adjusted R-squared	0.393	0.662	0.370	0.295	0.169	0.168	0.176

Notes: OLS regressions with establishment fixed effects and clustered standard errors at the firm level (in parentheses). For equipment (building, land) investment at the extensive margin in Model (1) (3, 5), the dependent variable is a dummy variable with a value of one for an establishment i with positive equipment (building, land) investments in t. For equipment (building, land) investment at the intensive margin in Model (2) (4, 6), the dependent variable is the logarithm of positive equipment (building, land) investments of establishment i in t. In Model (7), the dependent variable is the natural logarithm of the ratio of building plus land investments to total investments. DiD is an interaction term of a dummy variable for establishments in Eastern German states and a dummy variable for the DAL treatment period (1995–1998). ***, **, and * indicate significance levels of 0.01, 0.05, and 0.1, respectively.

Table D.5: Lagged control variables

Investment type	Aggregate investment		Equipment		Buildings		Land	
Investment margin	Extensive	Intensive	Extensive	Intensive	Extensive	Intensive	Extensive	Intensive
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DiD	**0.0330***** **(0.0037)**	**0.0880***** **(0.0206)**	**0.0329***** **(0.0038)**	**0.0184** **(0.0196)**	**0.0764***** **(0.0057)**	**0.3130***** **(0.0524)**	**0.0211***** **(0.0030)**	**0.3850*** **(0.2320)**
Establishment controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry–year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	468,549	407,241	468,549	405,481	468,549	97,531	468,549	15,522
Establishments	63,628	58,068	63,628	57,817	63,628	26,309	63,628	8,528
R-squared	0.490	0.716	0.488	0.722	0.462	0.506	0.286	0.641
Adjusted R-squared	0.412	0.668	0.409	0.675	0.380	0.309	0.176	0.183

Notes: OLS regressions with establishment fixed effects and clustered standard errors at the establishment level (in parentheses). ***, **, and * indicate significance levels of 0.01, 0.05, and 0.1, respectively.

Table D.6: Reduced sample and firm controls

Investment type	Aggregate investment		Equipment		Buildings		Land	
Investment margin	Extensive	Intensive	Extensive	Intensive	Extensive	Intensive	Extensive	Intensive
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DiD	**0.0250*** **	**0.1000*** **	**0.0266*** **	**0.0339**	**0.0816*** **	**0.2970*** **	**0.0167*** **	**0.6300* **
	(0.0061)	**(0.0374)**	**(0.0044)**	**(0.0360)**	**(0.0111)**	**(0.0877)**	**(0.0064)**	**(0.3800)**
Establishment controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry–year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	192,232	175,188	192,232	174,596	192,232	54,255	192,232	8,941
Establishments	42,879	39,077	42,879	38,946	42,879	??	42,879	5,001
R-squared	0.568	0.798	0.568	0.802	0.551	0.561	0.372	0.642
Adjusted R-squared	0.448	0.740	0.448	0.745	0.428	0.348	0.198	0.164

Notes: OLS regressions with establishment fixed effects and clustered standard errors at the establishment level (in parentheses). ***, **, and * indicate significance levels of 0.01, 0.05, and 0.1, respectively.

Table D.7: Mixed firms with parent–year fixed effects

Investment type	Aggregate investment		Equipment		Buildings		Land	
Investment margin	Extensive	Intensive	Extensive	Intensive	Extensive	Intensive	Extensive	Intensive
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DiD	**0.0182**	**0.3830*****	**0.0159**	**0.3130*****	**0.0769*****	**0.2990**	**0.0171****	**0.9610**
	(0.0123)	**(0.0846)**	**(0.0124)**	**(0.0835)**	**(0.0155)**	**(0.2520)**	**(0.0084)**	**(0.8560)**
Establishment controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry–year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	37,508	29,584	37,508	29,336	37,508	6,631	37,508	492
Establishments	7,165	5,651	7,165	5,654	7,165	2,153	7,165	334
R-squared	0.490	0.716	0.488	0.722	0.462	0.506	0.286	0.641
Adjusted R-squared	0.412	0.668	0.409	0.675	0.380	0.309	0.176	0.183

Notes: OLS regressions with establishment fixed effects and clustered standard errors at the establishment level (in parentheses). ***, **, and * indicate significance levels of 0.01, 0.05, and 0.1, respectively.

D.5 Firm Heterogeneity and Asset Structure

In Tables D.8, D.9, and D.10, we report regression results using triple difference specifications as in Table 5, but using equipment (Table D.8), building (Table D.9), and land (Table D.10) investments at the extensive and intensive margins as dependent variable.

Table D.8: Firm heterogeneity for equipment investment

Margin	Extensive	Intensive
	(1)	(2)
DiD	0.0207*	0.0589
	(0.0122)	(0.0887)
DiD Large	0.0062	0.2470***
	(0.0125)	(0.0746)
DiD Group	0.0309**	0.0602
	(0.0152)	(0.0871)
DiD Owner	-0.0119	0.1410
	(0.0204)	(0.1290)
DiD Corp	-0.0015	-0.1180
	(0.0127)	(0.0906)
Firm type controls	Yes	Yes
Establishment controls	Yes	Yes
County controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Industry–year FE	Yes	Yes
Observations	243,919	218,491
Establishments	45,381	42,835
R-squared	0.542	0.785
Adjusted R-squared	0.436	0.732

Notes: OLS regressions with establishment, year, and industry-year fixed effects. Standard errors are clustered at the establishment level (in parentheses). DiD is an interaction term of a dummy variable for establishments in the Eastern German states and a dummy variable for the DAL treatment period (1995–1998). DiD Large is an interaction term of a dummy variable for firms with at least 250 staff members (Large) and DiD. DiD Group is an interaction term of a dummy variable for firms with more than one establishment (Group) and DiD. DiD Owner-Managed is an interaction term of a dummy variable for firms that are managed by an owner (Owner-Managed) and DiD. DiD Corporation is an interaction term of a dummy variable for corporations with limited liability (Corporation) and DiD. ***, **, and * indicate significance levels of 0.01, 0.05, and 0.1, respectively.

As seen in Table D.8, results for equipment are widely in line with Table 5. We find some evidence for a stronger increase in investment activity for multi-establishment firms with the opportunity for subsidy shopping as well as strong evidence for a positive aggregate response for large firms with at least 250 employees that is primarily driven by the large increase of investments at the intensive margin for this type of firms. For owner-managed and corporate firms, there is no evidence for statistically significant effect.

Table D.9: Firm heterogeneity for building investment

Margin	Extensive	Intensive
	(1)	(2)
DiD	0.0444	-0.0315
	(0.0276)	(0.222)
DiD Large	0.0283	0.5740***
	(0.0205)	(0.1620)
DiD Group	0.0286	-0.1180
	(0.0203)	(0.1730)
DiD Owner	0.0510	0.3140
	(0.0381)	(0.3170)
DiD Corp	0.0101	0.2210
	(0.0276)	(0.2190)
Firm type controls	Yes	Yes
Establishment controls	Yes	Yes
County controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Industry–year FE	Yes	Yes
Observations	243,918	66,783
Establishments	45,381	19,964
R-squared	0.529	0.539
Adjusted R-squared	0.420	0.339

Notes: OLS regressions with establishment, year, and industry-year fixed effects. Standard errors are clustered at the establishment level (in parentheses). DiD is an interaction term of a dummy variable for establishments in the Eastern German states and a dummy variable for the DAL treatment period (1995–1998). DiD Large is an interaction term of a dummy variable for firms with at least 250 staff members (Large) and DiD. DiD Group is an interaction term of a dummy variable for firms with more than one establishment (Group) and DiD. DiD Owner-Managed is an interaction term of a dummy variable for firms that are managed by an owner (Owner-Managed) and DiD. DiD Corporation is an interaction term of a dummy variable for corporations with limited liability (Corporation) and DiD. ***, **, and * indicate significance levels of 0.01, 0.05, and 0.1, respectively.

For building investments, the results in Table D.9 are somewhat different from the results for aggregate investments in Table 5. Most notably, we do not find significant effects for DiD Group but likewise a very strong and positive effect for DiD Large at the intensive margin. Thus, especially investments with a very large investment response (buildings) seem to be abnormally high for large firms with low tax planning costs. This documents that large firms use bonus depreciation to a higher extent than their smaller counterparts. For land investment (Table D.10), there are no statistically significant triple difference interaction terms, which might be partially due to smaller observation numbers.

Table D.10: Firm heterogeneity for land investment

Margin	Extensive	Intensive
	(1)	(2)
DiD	0.0332**	0.1960
	(0.0163)	(0.8390)
DiD Large	-0.0149	0.6090
	(0.0133)	(0.7240)
DiD Group	-0.0089	0.3780
	(0.0121)	(0.8070)
DiD Owner	0.0109	0.5210
	(0.0230)	(0.9740)
DiD Corp	-0.0149	-0.1110
	(0.0165)	(0.8530)
Firm type controls	Yes	Yes
Establishment controls	Yes	Yes
County controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Industry–year FE	Yes	Yes
Observations	243,919	10,737
Establishments	45,381	5,855
R-squared	0.346	0.640
Adjusted R-squared	0.196	0.166

Notes: OLS regressions with establishment, year, and industry-year fixed effects. Standard errors are clustered at the establishment level (in parentheses).DiD is an interaction term of a dummy variable for establishments in the Eastern German states and a dummy variable for the DAL treatment period (1995–1998). DiD Large is an interaction term of a dummy variable for firms with at least 250 staff members (Large) and DiD. DiD Group is an interaction term of a dummy variable for firms with more than one establishment (Group) and DiD. DiD Owner-Managed is an interaction term of a dummy variable for firms that are managed by an owner (Owner-Managed) and DiD. DiD Corporation is an interaction term of a dummy variable for corporations with limited liability (Corporation) and DiD. ***, **, and * indicate significance levels of 0.01, 0.05, and 0.1, respectively.

D.6 Interaction Effects with Local Business Tax Rates

Table D.11: Local business tax interaction effects

Investment type		Aggregate investment			Building & land share	
Margin	Extensive	Extensive	Intensive	Intensive		
Model	(1)	(2)	(3)	(4)	(5)	(6)
DiD	**0.0906*** **	**0.0928*** **	**0.2660** **	**0.2320* **	**0.0423** **	**0.0489** **
	(0.0260)	**(0.0271)**	**(0.1350)**	**(0.1390)**	**(0.0209)**	**(0.0210)**
DiD × Weighted LBT Rate	**-0.396** **		**-1.021**		**-0.0309**	
	(0.1750)		**(0.9610**		**(0.1400)**	
Weighted LBT Rate	**-0.1890**		**2.1270*** **		**-0.0384**	
	(0.1190)		**(0.6430)**		**(0.0756)**	
DiD × LBT Rate		**-0.4130** **		**-0.8050**		**-0.0765**
		(0.1820)		**(0.9400)**		**(0.1420)**
LBT Rate		**-0.1210**		**1.8450** **		**-0.0811**
		(0.1330)		**(0.7280)**		**(0.0876)**
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	543,765	543,646	470,271	470,172	469,951	469,852
R-squared	0.473	0.473	0.705	0.705	0.289	0.289
Adjusted R-squared	0.397	0.397	0.658	0.658	0.177	0.177

Notes: OLS regressions with establishment fixed effects and clustered standard errors at the firm level (in parentheses). For the models (1) and (2), he dependent variable is a dummy variable with a value of one for an establishment i with positive aggregate investments in t. For the models (3) and (4), the dependent variable is the natural logarithm of positive aggregate investment. For the models (5) and (6), the dependent variable is the share of building and land investments to aggregate investments. DiD is an interaction term of a dummy variable for establishments in Eastern German states and a dummy variable for the DAL treatment period (1995–1998). (Weighted) LBT Rate is the (wage-weighted) local business tax rate of establishment i in year t and DiD × (Weighted) LBT Rate is an interaction term of DiD and this tax rate variable; ***, **, and * indicate significance levels of 0.01, 0.05, and 0.1, respectively.

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