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Corporate tax cuts, merger activity, and shareholder wealth☆

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ABSTRACT

We study the impact of the Domestic Production Activities Deduction (DPAD) on mergers and acquisitions. DPAD reduces corporate tax rates on income from work or goods made in the U.S. Results indicate that the quantity and quality of acquisition bids by DPAD-advantaged firms conform to the predictions of the neoclassical theory of the firm and the theory of financial constraints. Specifically, bids, particularly those cash-financed, increase substantially in industries with large DPAD-related tax cuts and for firms with financial constraints. Moreover, DPAD improves acquisition quality where acquirers and targets are likely to generate incremental DPAD tax benefits through their merger.

1. Introduction

Corporate taxes are likely to influence investment decisions because the size, timing, and uncertainty of tax payments and deductions distort the expected profitability and valuation of a project. Yet, even if taxes affect many real corporate decisions, their order of importance is still an open research question (Hanlon and Heitzman, 2010). This paper investigates the effect of targeted corporate tax reductions on merger and acquisition (M&A) activity, using Internal Revenue Code Section 199, the Domestic Production Activities Deduction (DPAD), enacted in 2004. This tax deduction, which is based on the income from goods produced in the US, represents a large benefit to firms with intensive local manufacturing activity, totaling in the tens of billions of dollars (Blouin et al., 2014).

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Our primary question is whether firms in industries that get large Section 199-related tax cuts engage in more acquisition bids and, in particular, cash bids. We also examine whether the response in acquisition activity varies in a manner consistent with neoclassical and financial constraint theories. The neoclassical theory suggests that not only will merger activity increase when there is an important industry shock, but also that these mergers will be value enhancing. Financial constraint theory predicts that new investments in acquisitions will be more likely and will be more wealth increasing for acquirers that have financial constraints loosened by the shock. We therefore explore questions about whether the DPAD-related tax reductions affect acquisition quality in terms of bidder returns and acquisition-related synergies. We also develop some supplemental evidence about targets and DPAD gains. Throughout our analysis, we pay particular attention to (1) the structure of the transactions and (2) the characteristics of the bidders and targets. In this regard, we find that the number of bids and bid quality is positively associated with the transaction's likelihood of generating incremental DPAD tax benefits.

The key variable in our study is ETRR (or effective tax rate reduction), which measures the DPAD induced *percentage* reduction in the effective tax rate paid by a firm's Internal Revenue Service (IRS) industry in a given year. We use the acquiring firm's industry ETRR as the main independent variable in all the empirical analyses to evaluate the effect of DPAD on M&A activity and quality. Higher ETRR indicates a larger reduction in tax rates from Section 199.

Our baseline empirical analyses show that DPAD has a positive first-order effect on cash M&A bids. A one standard deviation increase in ETRR is related to a 19.45% increase in the total cash value bid by industry acquirers in all-cash offers. At the deal level, a similar tax reduction is associated with a 1.39% increase in the cash offered in a deal.

The effect of DPAD on merger activity in our baseline tests supports both the financial constraints and neoclassical theory. Fazzari, Hubbard, and Petersen (1988a) conclude that factors such as corporations' financial constraints affect investment. Consistent with a cash-flow effect, we find that easing financial constraints through a Section 199-related tax cut leads to even more M&A activity in constrained firms than in unconstrained firms. For acquiring firms with a high pre-merger Kaplan and Zingales (1997) (KZ) index, a one standard deviation increase in ETRR is associated with a 0.42% increase in the probability of making an all-cash bid and a 1.04% increase in the total cash deal value relative to low KZ index (unconstrained) firms. These results hold not only for the KZ index,[1] but also when we use other proxies of financial constraints.

The neoclassical theory (Manne, 1965; Mitchell and Mulherin, 1996) also predicts increases in acquisition activity after an industry shock, as firms make acquisitions that increase their shareholders' wealth. Incremental to the cash flow effect described above, we suggest that M&A may increase for firms that are astute in finding targets that can yield incremental DPAD benefits (i.e., tax-related synergies). At the deal level, a one standard deviation increase in ETRR is associated with a 1.28% increase in the acquirers' M&A announcement return, and a 0.62% increase in the M&A synergy (defined as the percentage gain to the value-weighted portfolio of target and acquirer at announcement). We also document that the quality of deals and accounting measures of future performance are increasing in the potential future DPAD benefits of the combined entities. Our findings on M&A average deal quality are consistent with neoclassical predictions.

Making causal inferences when assessing and analyzing the economic impact of regulatory changes is often challenging. For instance, because regulatory changes frequently affect most firms at the same time, isolating the unique effect of a new policy is difficult as it could be confounded by other contemporaneous changes or events. Moreover, establishing a suitable matching sample of firms not affected by the policy is sometimes impossible since the new regulations often apply to all firms. Our identification strategy uses a difference-in-differences (DiD) method that circumvents these limitations and enables inferences that are more likely to be causal regarding the effect of DPAD on M&A activity and profitability.

Our DiD research design exploits the fact that firms in industries that produce a large portion of income from domestic manufacturing earn a significant Section 199 reduction in their corporate income tax rate, while firms in industries with little or no domestic manufacturing are basically unaffected by the policy. This cross-sectional variation allows within-year comparison for firms in different industries. We also note that DPAD was rolled out to allow a deduction of 3% in 2005–2006, of 6% in 2007–2009, and of 9% beginning 2010 and thereafter.[2] We therefore obtain both temporal and cross-sectional industry variation in the size of Section 199's influence on effective tax rates (as measured by ETRR).

Our DiD empirical design is further enhanced by the existence of precise announcement dates for acquisitions. This enables us to more accurately evaluate the effects of ETRR on the profitability and value of the particular investment choices taken after DPAD. This feature gives us the power to discriminate between hypotheses, such as those about acquisition quality and differences in quality across firms with different characteristics, which would be otherwise difficult to disentangle.

We perform three separate procedures to address the concern arising from our use of an industry-based ETRR at the acquirer firm's level.[3] First, in subsamples of firms with and without foreign operations, regression analyses that use both GAAP and cash measures of the firm's effective tax rate show that a one percentage point reduction in ETRR lowers the average acquirer firm's tax rate by one percentage point. Second, we confirm that our industry-based measure explains

[1] The Kaplan and Zingales (KZ) Index provides a commonly used ranking of how financially constrained a firm is. As implemented by Lamont et al. (2001), which we follow, the index consists of a linear combination of the following five accounting ratios: cash flow to total capital, the market to book ratio, debt to total capital, dividends to total capital, and cash holdings to capital. Additional details appear in Appendix A.

[2] As noted by Abadie (2005), when only a fraction of the population is exposed to the treatment, an untreated comparison group can be used to identify temporal variation in the outcome that is not due to treatment exposure. The DiD estimator is based on this simple idea. Abadie shows DiD estimators to be feasible when applied to repeated cross-sections.

[3] Ideally, we would like to use a firm specific ETRR measure for each year, but such data are not available to us.

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industry-level M&A activity. Third, in non-parametric permutation robustness tests where we randomize the industry ETRR assignment, we find results that corroborate those from our baseline analyses.[4] The evidence from all three tests mitigates concerns related to the use of industry ETRR to assess treatment.

In sum, we find that the data tell a consistent story about the relation between DPAD and acquisitions; higher DPAD benefits are associated with higher acquisition activity. Consistent with financial constraints theory, we find that financially constrained firms increase their acquisition activity even more than unconstrained firms. Further, consistent with neoclassical theory, DPAD-related acquisitions are value increasing overall.

Our paper advances several strands of the economics and accounting literature. First, we contribute to recent work that uses DPAD to obtain quasi-exogenous identification to study the effects of that regulation on various corporate actions. For example, Ohrn (2018) examines the effect of DPAD on corporate investment and financing choices. Blouin, Krull, and Schwab (2014) consider the effect of DPAD on payout policy. Lester (2019) explores how a Section 199 tax deduction influences domestic investment, employment, and income shifting across borders and across time.[5] None of these papers, however, considers the effect of DPAD on M&A activity, which reorganizes productive activities in ways that other investments do not. Given that mergers are large, our investigation enables us to measure the value effects of this particular investment induced by the DPAD and generally provides a richer view of the effect of this tax incentive on firm decision-making. Furthermore, we find evidence that the DPAD is associated with increases in acquisitions of both domestic and foreign targets. Although our results suggest that the DPAD had a stronger impact on domestic acquisitions, these findings suggest that an unintended consequence of the DPAD was to incentivize foreign investment.

Second, this paper adds to the literature on the effect of taxes on corporate decisions in general, and on merger decisions in particular.[6] Notably, the extant evidence on the association between tax considerations and deal quality is mixed.[7] Knowing the precise dates of these large investments, in particular, enables us to extract measures of investment quality from market abnormal returns at announcement and post-deal accounting performance. Such quality measures are otherwise very difficult to identify. Consequently, acquisitions provide an ideal setting to examine the role of taxes on the level and quality on corporate investment. The message to that literature from our findings is that seemingly small changes in corporate tax rates can have major effects in both the amount and quality of acquisition activity.

Our third contribution is showing that the effect of cash shocks on investment quality varies with the recipient corporations' financing constraints. Our evidence suggests that DPAD-related cash infusions soften financial constraints that enable firms to undertake additional M&A projects. Our tests also suggest that these incremental M&A transactions are profitable which conforms to the theory by Fazzari et al. (1988a) conjecturing that a decrease in the corporate tax would promote profitable investment in financially constrained firms.[8]

The paper continues as follows. Section 2 provides institutional background on the Domestic Production Activities Deduction and develops our hypotheses and empirical predictions. Section 3 describes our research design, our sample selection, and the measurement of key variables. Section 3 also addresses potential econometric issues related to our DiD research design and our ETRR variable. Section 4 contains the main empirical tests. Section 5 delivers our conclusions. The variables we use in this study are defined in Appendix A. Appendix B presents evidence establishing that our ETRR variable is reliable and also provides several robustness checks.

2. Institutional background and theoretical framework

2.1. Institutional background

Internal Revenue Code (IRC) Section 199, the Domestic Production Activities Deduction (DPAD), was enacted as part of the American Jobs Creation Act (AJCA) of 2004. The deduction reduces the tax rate on income derived from domestic manufacturing activity by a fixed percentage. The level of reduction started out at 3%, for 2005 and 2006. The percentage deduction increased to 6% (for 2007–2009), and then to 9% (for 2010 and later). This deduction is applied to manufacturing activity itself rather than to a whole firm. The overall effect on the effective tax rate for a firm can therefore range from zero, if

[4] The evidence on the ETRR-tax rate association and the permutation tests are presented in Appendix B. The evidence using industry randomization suggests that the assignment of an industry ETRR is only appropriate if the bidder firm actually belongs to that industry.

[5] In addition, Lester and Rector (2016) use C corporation tax return data to provide empirical evidence on the economic significance of DPAD and the characteristics of the companies that benefit from it.

[6] This literature goes back at least to Auerbach and Reishus (1987), and includes Ayers et al. (2003,2004); Erickson (1998); Erickson and Wang (2000,2007); Hayn (1989); Henning and Shaw (2000); Scholes and Wolfson (1990), Devos et al. (2009), Huizinga and Voget (2009), Hanlon et al. (2015), and Ohrn and Seegert (2019).

[7] For example, Hanlon et al. (2015) find that U.S. multinational companies use their accumulated lightly-taxed foreign earnings to undertake underperforming foreign deals. But findings in Bird et al. (2017) are consistent with U.S. firms' foreign tax attributes garnering incremental value in the M&A market. Because foreign firms can access U.S. MNCs' foreign cash without a significant tax cost, Bird et al. (2017) find that U.S. MNCs are more likely to be acquired by a foreign bidder than a domestic bidder. All else equal, this suggests that there is a greater pool of potential bidders for a U.S. MNC relative to a domestic target.

[8] Other papers on the association between financial frictions and investment includes Fazzari et al. (1988b), Kaplan and Zingales (1997), Erickson and Whited (2000), Gomes (2001), Alti (2003), Almeida et al. (2004), Almeida and Campello (2007), Denis and Sibilkov (2010), and Faulkender and Petersen (2012).

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the taxpayer does no domestic manufacturing, to 3.15% (9% of 35%) for an all-manufacturing, fully taxable firm. The dollar impact of DPAD on taxes over time has been large; it reduced tax collections by more than $US70 billion in the first ten years of its implementation. The Joint Committee on Taxation (2015) predicted that from 2015 through 2019, DPAD would be the second largest corporate tax expenditure.

The AJCA instituted DPAD and simultaneously revoked the extraterritorial income tax incentive (ETI), a provision that reduced taxes on overseas sales. The World Trade Organization had ruled that the ETI constituted an export subsidy that violated trade agreements, and in 2004 established large retaliatory penalties on U.S. exports (see Lester and Rector, 2016, p. 1272). DPAD was thought by many in Congress as a way to boost incentives for U.S. manufacturing activity, which many Congressional representatives wanted to do, while avoiding the penalties imposed by the World Trade Organization.

Exact calculation of DPAD can be extremely complicated. It requires judgments about gray areas, such as whether activities are manufacturing or not, how to allocate firm's expenses not directly allocable to particular items, and what to do about services embedded in manufactured items, to name just a few. In its simplest form, however, a firm claiming Section 199 deduction must first calculate qualified production activities income (QPAI) by manufactured item. The firm then would add up this income across all items (netting losses against gains) to get an overall QPAI for the firm. The Section 199 deduction in dollar terms would be the percentage reduction allowed for the particular year in question (3%, 6%, or 9%) multiplied by the minimum of (1) the overall QPAI of the firm, and (2) the firm's overall taxable income. Furthermore, the total Section 199 deduction in dollars is limited to no more than 50% of the W-2 wages paid by the firm.

Notice that firms without taxable income cannot benefit from DPAD, even if the manufacturing part of the firm is highly profitable. Also, firms that rely on contract labor (where worker income is reported through 1099 forms) may not be able to fully use their potential Section 199 deduction given the limitation to 50% of W-2 wages. More importantly, the complexity and flexibility of the QPAI calculation may provide firms that have sophisticated tax departments (or advisors) with an advantage over other firms in the ability to use DPAD most effectively.

A large DPAD for a given firm represents incremental cash flow. This is especially true given that the idiosyncratic technicalities of the DPAD calculation would have made it difficult for any particular firm to precisely anticipate how this tax break would affect its taxes. Furthermore, DPAD provides incremental cash until competitive forces fully erode its advantages away. Importantly, the cash benefits have continued to be uncertain since the original passage of DPAD. Lester and Rector (2016, p. 1270) reports at least four Congressional attempts to repeal or reduce the deduction since 2006, and that DPAD's existence would be imperiled by any comprehensive tax reform plan (and was in fact eliminated by the Tax Cuts and Jobs Act of 2017). We therefore think it appropriate to view these Section 199 deductions partially as unexpected cash flows (or shocks) in the spirit of events like those in Blanchard et al. (1994) of lawsuit settlements.

2.2. Research questions and empirical predictions

We begin by exploring our primary question about the effect of DPAD on M&A. Following Ohrn (2018) and Lester (2019), we hypothesize that the DPAD should be associated with increased M&A activity. These prior studies are based on the fundamental idea that if tax rates on investment go down, and therefore the firm keeps a larger share of the future return, then there are incentives for the firm to invest more. This logic suggests an increase in M&A similar to the increase in other investment.

Both Ohrn (2018) and Lester (2019) provide evidence that, by effectively decreasing the U.S. corporate tax rate, the DPAD induced investment. Ohrn (2018) extends Poterba and Summers (1985) by developing predictions that the DPAD will increase investment using internally- or equity-generated funds. Using an industry-level measure of DPAD intensity, he finds investment and payout increase but debt decreases. Lester (2019) also studies the effect of DPAD on investment but focuses on the inter-temporal increases in the DPAD from 2005 to 2010 to better identify the DPAD-related effect on capital expenditures and employment.[9] In a study focused on the incidence of corporate taxation on labor, Dobridge et al. (2018) also finds evidence that the DPAD is associated with wages and employment.

We argue that DPAD has two types of effect on acquisition activity in addition to Ohrn and Lester's fundamental effect – (1) an effect coming directly through extra firm cash flow and (2) an effect due to the complexity of the DPAD provision itself. With regard to the direct cash flow effect (1), it is well known from Blanchard et al. (1994), Harford (1999), and other papers that increased infusions of cash often lead to acquisition increases. These papers, as well as Jensen (1986), stress that the acquisition increase can be the result of agency problems. The increase, however, can also occur because some high-value acquisitions are effectively impossible without substantial cash compensation to target shareholders. The impossibility can be created by severe adverse selection problems involving the value of the bidders' stock, corporate control and liquidity concerns, or other issues (see Eckbo et al. (1990), Martin (1996), and Faccio and Masulis (2005)). Thus, an influx of cash used as a form of payment can allow high-value acquisitions to materialize where previously they were impossible.

Our discussion of cash leads us to consider *the theory of financial constraints*, rooted in the model by Fazzari et al. (1988a), predicting that a reduction in the corporate tax would stimulate investment in firms facing financing constraints. Similar to

[9] Lester (2019) also documents that firms undertake intertemporal income shifting in order to maximize the DPAD.

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Faulkender and Petersen (2012), who find that financially constrained firms used some of the cash windfall created when taxes were reduced on repatriations (under the terms of the American Jobs Creation Act of 2004) for incremental investment, we anticipate that the DPAD could also result in additional M&A investment for firms with limited capital-raising opportunities.

The complexity inherent in the DPAD's structure, effect (2), may create acquisition activity through incremental tax savings accruing to particular deals. For example, if a firm is not getting its full Section 199 deduction (QPAI multiplied by the DPAD rate in force) because it has tax losses from non-manufacturing activity or because its W-2 wages are too small, there would be an incentive for the firm to combine with another firm that has service sector taxable income or high W-2 wage payments.[10] Less directly but perhaps more importantly, there also would be extra incentives for a firm with a sophisticated tax department to acquire another firm that is not realizing a potentially large Section 199 deduction because of a lack of sophistication. For example, a smaller firm may not take full advantage of the DPAD deduction because it perceives the cost of realigning its accounting systems to compute QPAI and/or of drawing the attention of the IRS to be too high. Merging such a firm with a tax-savvy larger firm that is already experienced at handling DPAD may provide synergies.[11] Thus, one mechanism driving changes in acquisition activity involves the structure of DPAD itself, and we should expect some increase in merger activity in industries where the DPAD impact on effective tax rates is large.

The tax savings opportunities generated by the DPAD provides a setting to investigate the *neoclassical theory* of M&A. Manne (1965) suggests that firms will execute acquisitions that enhance the wealth of their shareholders. Mitchell and Mulherin (1996) and Andrade et al. (2001) argue that major industry shocks affecting technology and government policy improve the investment opportunity set for acquiring firms. As a result, the neoclassical theory conjectures not only that merger activity should increase following industry shocks, but also that this increased activity should be associated with improved acquisition quality.

We suggest that the DPAD acts as a significant shock to firms' tax technology. Lester and Rector (2016) explain that although the DPAD has quickly grown to one of the U.S.'s largest corporate tax expenditures, the DPAD computation is complex and its benefits are concentrated in particular industries. We assume that some acquirers are likely more familiar with the DPAD due to their industry membership and size. Hence, the DPAD creates a new M&A synergy for more DPAD-astute firms.

2.2.1. Research questions

We formulate three different research questions regarding the effect of DPAD on the acquisition process in which the policy produces a shock (reduction in the effective tax rate) in some (but not all) industries. The questions are:

- Does acquisition activity increase for firms in high DPAD industries?
- Does the DPAD have a differential effect on deal activity depending on the financial constraints of the bidder firm?
- Does the DPAD affect M&A deal quality?

Only after we answer the first question can we address our additional questions relating to financial constraints and the neoclassic theory. Notice that if taxes are not an important part of merger decisions or DPAD forestalls some acquisitions that the policy renders unprofitable,[12] we might not be able to reject the null hypothesis of an equal or reduced amount of merger activity.[13]

Given that we find a change in acquisition activity, the second and third questions are natural ones to help uncover the reasons for the change and its effects on deal value. The second question helps us determine whether the effect of financial constraints is likely to be an important factor in the increase. The third question helps us determine whether the change in activity has caused value-increasing investments as the neoclassical theory predicts, or instead value-destroying investment in M&A.

3. Data, variable measurement and empirical design

3.1. Sample of transactions

Our sample consists of 5072 U.S. merger and acquisition (M&A) bids by U.S. incorporated public acquirers announced during 1997–2013 and tracked in the Securities Data Company's (SDC) M&A database. We screen bids from SDC following the

[10] Lester and Rector (2016) and Lester (2019) suggest that losses, not wages, are typically the binding constraint on DPAD qualification.

[11] In Table 5, Lester and Rector (2016) illustrate that 35.7% of all profitable public companies report DPAD and only 8.8% of all profitable, private companies report DPAD. Their analysis also suggests that profitable, private companies operating in qualifying industries report lower DPAD activity than profitable, public companies. For example, in Table 3, 56.8% of public companies in the Information industry report DPAD but only 4.3% of private companies do so.

[12] To see how DPAD can render a prospective takeover unprofitable, consider a U. S. firm thinking of shutting down its domestic manufacturing and acquiring a foreign manufacturing company whose labor costs are lower. Such a merger may be profitable before DPAD, but not better than the domestic manufacturing alternative after DPAD. That is, DPAD gives the firm an extra tax deduction if U.S. manufacturing is maintained, but not if it is moved overseas. If this DPAD benefit is greater than the labor cost gain, this merger will now be unprofitable.

[13] In fact, Goolsbee (1998) finds that investment tax incentives result in higher prices for capital goods, but not more investment.

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Table 1
Sample characteristics.

Panel A: Deal and firm characteristics

	N	Proportion of sample	Mean	Median
Deal characteristics				
All cash payment	5072	0.3095		
All stock payment	5072	0.2522		
Tender offer	5072	0.0641		
Hostile deal	5072	0.0089		
Multiple bidders	5072	0.0327		
Toehold	5072	0.0321		
Merger of equals	5072	0.0061		
Diversifying deal	5072	0.3364		
Completed	5072	0.9209		
Deals financed by debt	5072	0.1429		
Public targets	5072	0.3561		
Targets in manufacturing industries	5072	0.1268		
Acquirers with significant foreign operations	5072	0.2131		
Acquirers with net operating loss (NOL)	5072	0.3206		
Deal value (US$ billion)	5072		0.8574	0.0930
Relative size (Deal value/Acquirer market cap)	5072		0.3437	0.1267
Acquirer CAR(-1,+1) %	5072		0.0834	−0.2186
Combined CAR(-1,+1) %	1806		1.6199	1.1242
Offer premium %	1806		44.6374	35.6600
	N		Mean	Median
Acquirer characteristics				
Market value of equity (US$ billion)	5072		5.3787	0.7346
Market-to-book ratio	5072		3.4519	2.2763
Leverage	5072		0.1426	0.1002
ROA	5072		0.1296	0.1029
ETRR	5072		0.2466	0.0000
Public target characteristics				
Market value of equity (US$ billion)	1806		0.9946	0.2051
Market-to-book ratio	1806		2.4915	1.8066
Leverage	1806		0.1627	0.1126
ROA	1806		0.0995	0.0614
ETRR	1806		0.2210	0.0000

Panel B: Temporal distribution of acquirers' effective tax rate reduction (ETRR)

Deal announcement year	N	Mean	Median	Min	Max	Std dev
Pre-DPAD						
1997–2004	2856	0.00	0.00	0.00	0.00	0.00
Post-DPAD						
2005	335	0.01	0.00	0.00	0.62	0.07
2006	337	0.27	0.21	0.00	0.80	0.26
2007	322	0.34	0.25	0.00	1.44	0.33
2008	234	0.66	0.81	0.00	1.75	0.56
2009	161	0.73	0.86	0.00	1.97	0.57
2010	200	0.73	0.61	0.00	1.97	0.63
2011	181	1.05	0.84	0.00	2.94	0.85
2012	216	1.04	0.72	0.00	3.01	1.00
2013	230	0.92	0.18	0.00	2.94	1.02
All	5072	0.25	0.00	0.00	3.01	0.55

Panel C: Industrial distribution of acquirers' ETRR

Fama-French 12 industries	ETRR (post-DPAD)		Number of		Number of deals	
	Mean	Median	DPAD acquirers	Non-DPAD acquirers	Pre-DPAD	Post-DPAD
Manufacturing	1.20	1.11	383	0	218	165
Chemical	1.17	1.40	69	0	37	32
Durable consumer goods	1.02	0.94	57	1	34	24
Nondurable consumer goods	0.99	0.74	171	1	97	75
Business equipment	0.88	0.64	1277	7	783	501
Telecommunication	0.88	0.63	143	0	67	76
Health	0.72	0.56	395	21	189	227
Energy	0.64	0.58	183	5	85	103
Utilities	0.44	0.01	75	35	60	50
Others	0.40	0.09	327	200	279	248
Shops	0.19	0.12	239	16	130	125
Finance	0.06	0.01	23	1444	877	590
Total			3342	1730	2856	2216

This table describes our sample which consists of 5072 domestic merger and acquisition (M&A) bids by U.S. public acquirers announced during 1997–2013 and tracked in the Securities Data Company's (SDC) M&A database. We screen deals from SDC following the criteria used in Moeller et al. (2004). Specifically, we exclude observations involving spinoffs, recapitalizations, exchange offers, repurchases, self-tenders, privatizations, acquisitions of remaining interest, and partial interests or assets, and those with deal value less than US$1 million or with relative size (deal value/acquirer's market value of equity two days before deal announcement) less than 1%. In addition, we require that all acquirers have stock market and accounting data available from the Center for Research in Security Prices (CRSP) and Compustat, respectively. In Panel A, we report deal status, mode of acquisition, method of payment, deal attitude, deal value, and financial characteristics of the acquirers and the public targets in our sample. All financial variables are measured at the end of the fiscal years 1997–2012 before the merger public announcement date and winsorized at the 1% and 99% level. In Panels B and C, we report summary statistics for our key variable, ETRR, which is the percentage point reduction in an acquirer's effective income tax rate generated by the domestic production activities deduction (DPAD) by year and the Fama-French industry, respectively. Panel C also reports the number of firms in a treatment group (DPAD acquirers) and a control group (non-DPAD acquirers). The control firms are those operating in industries that get little or no benefit from DPAD. For every IRS industry, we add QPAI from fiscal years 2005 until 2012 and then divide this sum by the aggregated taxable income reported during the same period for all firms in the same industry. The control group consists of firms belonging to any ofthe 21 industries for which this ratio is less than 3% (corresponding to the first quartile of the ratio's distribution). The treatment (DPAD) group is populated by the remaining firms.

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criteria used in Moeller et al. (2004). Specifically, we exclude observations involving spinoffs, recapitalizations, exchange offers, repurchases, self-tenders, privatizations, acquisitions of remaining interest, and partial interests of assets, and those with deal value less than US$1 million or with relative size (deal value/acquirer's market value of equity two days before deal announcement) less than 1%. In addition, we require that all bidders have stock market and accounting data available from the Center for Research in Security Prices (CRSP) and Compustat, respectively.

Panel A of Table 1 provides summary statistics for key characteristics, such as deal status, mode of acquisition, method of payment, deal attitude, deal value, and financial characteristics for the acquirers and the public targets in our sample. We note that in several important dimensions, our sample resembles those used elsewhere in the M&A literature.[14]

3.2. Variable measurement

Our variable of interest, ETRR, is the percentage point reduction in a firm's effective income tax rate generated by DPAD. To estimate it, we obtain data from the IRS Statistics of Income (SOI) reported in their table 7, which is labeled *Corporate Returns with Net Income* in the *Tax Stats Corporation Complete Reports*. The data in these reports are aggregated annually at the industry level from all firms that file a tax return, which allows us to calculate the proportion of taxable income derived from qualified production activities (QPAI proportion) for each industry.[15] We apply this QPAI proportion for all Compustat firms at the industry level each year by matching the 79 IRS industries with the Compustat NAICS 4-digit industries.[16] To calculate ETRR, we multiply the QPAI proportion by the deduction percentage (3% in 2005–2006, 6% in 2007–2009, and 9% in 2010-onwards) and then by the statutory corporate income tax rate of 35%. For example, a firm operating in an industry that claims 40% of its taxable income as income from qualified production activities in 2011 could see its effective tax rate drop by 1.26% (which equals 40 % × 9 % x 35%).

Table 1 Panel B reports the temporal distribution of ETRR for our sample acquirers. ETRR is zero before 2005 and starts increasing from 2005 when the DPAD was phased in. The mean acquirer's ETRR for the full sample period 1997–2013 is 0.25% while the maximum is 3%. Table 1 Panel C shows the distribution of acquirers' ETRR across different Fama-French 12 industries during 2005–2013. As expected, acquirers in manufacturing, chemical, and consumer goods industries exhibit a larger effective tax rate reduction as a result of DPAD.

In untabulated analyses, we estimate the amount of DPAD-generated cash using the ETRR and firms' pre-tax book income. We compare the industry-level amount of DPAD benefits for our sample of acquirers to the cash used in the post-DPAD-period M&A activity. The industry level DPAD benefits account for 0.5% (for low DPAD industries such as finance) to approximately 12% (Energy) of the total cash paid in acquisition activity. The DPAD generates significant cash tax savings for particular industries, and the DPAD benefits are certainly material enough to facilitate transactions in these industries that may not have otherwise been feasible. For example, firms involved in the 103 post-DPAD M&A bids in the energy industry garnered an estimated $5.1 billion in DPAD tax benefits that could be used to help fund these transactions.

3.3. Research design

The differential impact of DPAD across industries with different levels of domestic production and the way in which the policy was phased-in suggest a difference-in-differences (DiD) econometric strategy. Therefore, using regression analyses, we estimate the following baseline model,

$$y_{i,t} = \beta_0 + \beta_1 ETRR_{j,t} + \gamma X_{i,t} + \eta_{k,t} + \varepsilon_{i,t} \tag{1}$$

where i indexes firms, j indexes IRS industries, k indexes 1-digit SIC industries, and t indexes time. In equation (1), $y_{i,t}$ is the outcome of interest for firm i in year t. Following Gormley and Matsa (2014), the model includes industry-year fixed effects (η_{kt}) to control for time varying heterogeneity at the 1-digit SIC level (such as business cycle factors that may have overlapped with or led to the policy's passage). In equation (1), $X_{i,t}$ represents a set of control variables if they are present. As discussed by Gormley and Matsa (2014), in the presence of fixed-effects the inclusion of firm- or deal-level control variables is not advisable because they might be affected by the policy under study. Nevertheless, in some specifications we expand the baseline model to show that the results are robust to controls for deal and (acquirer and target) firm characteristics, as well as to the inclusion of acquirer firm fixed effects.

In our baseline specification, β_1 is the treatment effect and describes the increase in a given outcome variable that results from a one percentage point reduction in a firm's effective income tax rate generated by DPAD. The standard errors are

[14] For example, the fraction of public targets, the mean acquirer's market value of equity, and the mean acquirer's leverage in our sample are 0.35, $5.4 billion, and 0.14, respectively, while those in Masulis et al. (2007) are 0.33, $5.6 billion, and 0.15, respectively.

[15] While the DPAD was targeted towards domestic manufacturers, the credit is actually available to a much broader set of firms than those that are typically thought of as factory manufacturers. The DPAD is available to any domestic manufacturing, production, growth or extraction ("MPGE") activity. For ease of exposition, we will use the term "manufacturing" to capture any DPAD-qualifying MPGE activity.

[16] NAICS codes were introduced in 1997 and modified in 2002, 2007, and 2012. IRS Corporate Returns data are available for the period 1994–2012. As a result, we start our sample in 1997.

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adjusted for heteroskedasticity and double-clustered by 1-digit SIC industry and year following Petersen (2009) and Thompson (2011). This process helps mitigate concerns regarding bias in the estimation of standard errors noted by Bertrand et al. (2004).

We also perform triple difference (DiDiD) analyses to capture heterogeneity in the effect of the tax cut on mergers across acquirer firms with varying characteristics. In those regressions, the specification becomes:

$$y_{i,t} = \beta_0 + \beta_1 ETRR_{j,t} + \beta_2 ETRR_{j,t}\, CI_{i,t-1} + \beta_3 CI_{i,t-1} + \gamma X_{i,t} + \eta_{k,t} + \varepsilon_{i,t} \quad (2)$$

where $CI_{i,t-1}$ is a characteristic indicator variable. In the empirical tests that estimate Eq. (2), we will focus on β_2 to test whether the effect of DPAD varies with the acquirer firm's measure of financial constraint.

4. Results

4.1. Acquisition activity

Table 2 examines the relationship between DPAD and M&A activity. Panel A provides descriptive statistics for the 106,506 firm-years with data available from CRSP and Compustat during fiscal years 1997–2012 that we use as our sample for Panels B, C, and D. In Panel B, models (1) and (4) use a logit specification in which the dependent variable is set to 1 if the firm makes an M&A bid during the year and set to zero otherwise. All the other models consist of OLS regressions. The dependent variable in models (2) and (5) is the natural log of (1 + the number of M&A bids) whereas in models (3) and (6) it is the natural log of (1 + total deal value). In all models, the key independent variable, ETRR, is the percentage point reduction in the acquiring industry's effective income tax rate generated by Section 199. In Panel B, the dependent variable in the first three models considers all bids while the dependent variable in the last three tests consider cash-only transactions.

In each of our tests, our focus is on the association between the ETRR and M&A bids. In the first three columns of Table 2 Panel B, we find that the ETRR is associated with all bid activity. A one standard deviation increase in ETRR leads to a 0.45% increase in the probability of making a bid (model 1), a 0.21% increase in the number of bids made (model 2) and a 1.1% increase in total M&A deal value (model 3). As we explain in Section 2, we conjecture that the DPAD results in incremental *cash* to the firm and so we investigate not only whether all deal activity increased, but also whether increased cash deal activity is associated with ETRR. The results in Table 2 Panel B suggest that Section 199 has a first-order effect not only on all bids but also on cash M&A activity in the U.S. A one standard deviation increase in ETRR leads to a 0.52% increase in the probability of making a cash bid (model (4)).[17] As the unconditional probability of making an all-cash bid in the sample is 1.80%, our results suggest a 29% increase in bid activity. Similarly, the one standard deviation increase is associated with a 1.39% increase in M&A cash deal value (model (6)), which translates to an increase of $8.42 million for the average all-cash transaction.[18] Over the sample of all-cash deals, our results suggest an increase of $13.2 billion in aggregate cash bids.

In Panel C, we report one further test in which we try to isolate the effect of DPAD on acquisition frequency. The purpose of this test is to separate the firm-specific gains from DPAD for a group where we know the DPAD effect on taxes is likely to be small – companies with tax loss carryforwards (TLCFs). In effect, we are using the statutory rules of DPAD to create a natural control group that has similar characteristics to firms receiving DPAD deductions. Here we duplicate the form of the test in Table 2 Panel B models (4)–(6), but we add two variables related to the presence of net operating losses (NOLs). These are (1) an indicator taking on a value of 1 if a firm has a tax loss carryforward available in a given year, and (2) an interaction term for that indicator and ETRR.

The results of this different specification continue to show positive and significant effects of ETRR on M&A activity. When an NOL is present, however, the positive and significant effect goes away. That is, the sum of the coefficients on ETRR and the interaction term with the NOL indicator is insignificantly different from zero in all three of the Panel C regressions.[19] This evidence is consistent with the view that it is the effect of DPAD deductions themselves that are related to the takeover activity, and not some industry characteristic unrelated to DPAD itself.

In Panel D, we aggregate M&A activity by industry-year and re-estimate Panel B models (5) and (6) with added industry controls. By aggregating transactions to the industry-level, we better match the measurement of our dependent variables to

[17] If we constrain our sample to only bids for which the deal was ultimately consummated, the coefficient on ETRR in Table 2 Panel B Model (4) would be 0.1895 (p-value = 0.0004). This suggests that a one standard deviation increase in ETRR leads to a 0.47% increase in the probability of making an all-cash bid for a completed deal.

[18] In Panels C and D and all subsequent tables in the paper, we present evidence on all-cash bids only. The neoclassical theory suggests that the DPAD should also result in an increase in non-cash M&A. This is indeed what we find. Our key conclusions are robust to including all bids (i.e., stock only and mixed consideration) in the sample. However, because the theory of financial constrains only applies to cash transactions, we use the all-cash sample in the interest of brevity for the remainder of the paper.

[19] We replace any missing Compustat NOL observations (variable *TLCF*) with zero. Our results are robust to using only the sample of 55,557 firm-year observations with non-missing observations of TLCF. In addition, we continue to find a positive association between all three measures of deal activity and ETRR if we drop firms with NOLs from our sample.

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our key variable of interest (ETRR). Both models suggest that industries with greater DPAD undertake more M&A activity. A one standard deviation increase in ETRR leads to a 9.95% increase in the probability of making a cash bid (model (1)) and to a 19.45% increase in total cash value of M&A bids (model (2)). Our industry estimates are economically meaningful and are of similar magnitude as the DPAD effects found in other work.[20]

The preceding evidence in Table 2 is consistent with the DPAD increasing the likelihood of making a bid, the number of cash bids and the aggregate cash deal value. Like Ohrn (2018) and Lester's (2019) findings that the DPAD incentivized incremental investment, we find that the larger Section 199-related reduction in the effective tax rate for a given industry, the more acquisition activity by firms in that industry.

In Table 3, we compare whether the DPAD benefits incentivize more cash M&A activity for domestic acquirers relative to multinational (MNC) buyers. Although the DPAD benefits were intended to attach to domestic production activities, Lester and Rector (2016) document that MNCs capture the majority of the aggregate DPAD. Interestingly, Panels A and B suggest that the DPAD led to a similar increase in M&A activity for both domestic firms and MNCs. Note that this finding also mitigates the concern that funds repatriated under the American Jobs Creation Act of 2004 fuel the surge in acquisition activity documented in Table 2.

In Panels C and D of Table 3, we investigate whether the DPAD is associated with an increase in foreign M&A activity. As the DPAD benefits are clearly generated from domestic activity, it would be interesting and an unintended consequence to show that the DPAD is associated with acquisitions of foreign targets. Although Panels C and D provide evidence suggesting that the DPAD benefits are associated with foreign acquisitions, our findings imply that the DPAD effect on domestic transactions is more economically meaningful. For example in Panel C, a one standard deviation increase in the ETRR leads to a 0.16% increase in the probability of making an all-cash bid for a *foreign* target (model 1), a 0.12% increase in the number of cash bids (model 2) and a 0.67% increase in the all-cash deal value (model 3). The 0.67% corresponds to an increase of $2.68 million for the average all-cash cross-border bid. But the effect of a one standard deviation increase in the ETRR on the acquisition of a *domestic* target reported in Table 2 Panel B leads to a 0.52% increase in the probability of making an all-cash bid (model 4), a 0.29% increase in the number of cash bids (model 5) and a 1.39% increase in the all-cash deal value (model 6). The 1.39% increase in deal value, which represents an $8.42 million increase in the average all-cash domestic deal, is significantly (Chow test of the difference in coefficients has a p-value $= 0.0037$) larger than the 0.67% increase in average value for the all-cash cross-border bids.

4.2. Financial constraints

The results in Tables 2 and 3 suggest that the DPAD is associated with more M&A transactions. In Table 4, we use equation (2) to perform triple differences analyses to evaluate whether these results vary depending upon whether the acquirer is financially constrained. Specifically, we classify financially constrained firms as those with either a Kaplan-Zingales (KZ) index in the top tercile of the distribution during the year before they make a public merger bid or those without a credit rating from a major rating agency.

Tables 2 and 3 document a positive association between DPAD tax benefits and cash M&A activity. Since we hypothesize that the M&A activity is partially attributable to DPAD generated cash, the theory of financial constraints suggests that cash-based M&A should increase in the post-DPAD period more for firms that were financially constrained. In Table 4 Panel A, we find that financial constraints have a first-order effect on the DPAD's influence on M&A activity.[21] A one standard deviation increase in ETRR leads to a 0.42% increase in the probability of making a bid (model (1)) and to a 1.04% (or $6.3 million) increase in M&A deal value (model (3)) in financially constrained firms relative to non-financially constrained firms using the KZ index.

In Table 4 Panels B and C, we check whether the results are robust to other constraint measures. Our alternative classifications in Panel B are based on the Whited and Wu (2006) index (WW) and the HP index from Hadlock and Pierce (2010). In both cases, we designate firms with a score in the top tercile of these indexes as financially constrained with an indicator variable of 1; all other firms are assigned a zero. In Panel C, we classify firms as constrained based on their payout policy. A firm gets an indicator of 1 in the first row if its ratio of dividends to earnings before interest and taxes is in the bottom tercile of the distribution; all other firms get zero. This taxonomy is like that in Denis and Sibilkov (2010). In the second row, we assign an indicator of 1 only to firms without a dividend payout in the last 30 years. Results suggest that our inferences are robust to different measures of financial constraint. Overall, our results are consistent with the DPAD facilitating incremental M&A in financially constrained firms.

4.3. Acquisition quality

While Ohrn (2018) and Lester (2019) address questions about the *quantity* of investment (and employment), these papers are mostly silent about whether the incremental investment creates wealth or destroys it. We are concerned about deal

[20] For example, using industry-level estimates of DPAD, Ohrn (2018) finds that the DPAD increased capital expenditures by 8−14%. Our increase in total cash value of M&A bids implies an increase of $228 million for the average industry. Lester (2019) estimates that the DPAD increased annual investment by roughly $145 million.

[21] In untabulated tests, we also analyze all-stock M&A bids. Coefficient estimates for all the variables that include ETRR are not statistically significant.

Table 2
DPAD and M&A activity.

Panel A: Sample descriptive statistics

Firm characteristics	Number of firm-year observations	Mean	Median
Market value of equity (US$ billion)	106,506	2.6226	0.2519
Market-to-book ratio	106,506	2.7979	1.7816
Leverage	106,506	0.1701	0.1119
ROA	106,506	0.1106	0.0819
ETRR	106,506	0.2805	0.0000

Panel B: Firm level

Dependent variable =	Full sample			All-cash		
	Bid (0,1) Model (1)	ln (1 + # of bids) Model (2)	ln (1 + deal value) Model (3)	All-cash bid (0,1) Model (4)	ln (1 + # of all-cash bids) Model (5)	ln (1 + all-cash deal value) Model (6)
ETRR	0.0757**(0.0432)	0.0039***(0.0055)	0.0204**(0.0390)	0.2005***(0.0004)	0.0052***(0.0001)	0.0253***(0.0002)
Firm characteristics						
ln (Assets)	0.2335***(0.0001)	0.0101***(0.0001)	0.0939***(0.0001)	0.3455***(0.0001)	0.0054***(0.0001)	0.0462***(0.0001)
Market-to-book ratio	0.0001***(0.0001)	0.0000***(0.0001)	0.0001***(0.0001)	−0.0002 (0.2471)	0.0000 (0.1380)	−0.0002 (0.2730)
Leverage	−0.7504***(0.0001)	−0.0129***(0.0001)	−0.0751***(0.0001)	−0.6429***(0.0001)	−0.0039***(0.0002)	−0.0256***(0.0002)
Prior year return	−0.0004***(0.0001)	−0.0000***(0.0001)	−0.0000***(0.0001)	−0.0000 (0.6905)	−0.0000 (0.1224)	−0.0000 (0.2571)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	106,506	106,506	106,506	106,506	106,506	106,506
Adjusted R^2	0.0533	0.0203	0.0299	0.0880	0.0145	0.0201
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Panel C: The effect of NOL on M&A activity

Dependent variable =	All-cash bid (0,1) Model (1)	ln (1 + # of all-cash bids) Model (2)	ln (1 + all-cash deal value) Model (3)
ETRR	0.0891***(0.0088)	0.0040***(0.0026)	0.0261**(0.0065)
NOL (0,1)	0.0103 (0.6970)	0.0004 (0.6273)	0.0010 (0.8604)
ETRR x NOL (0,1)	−0.0888***(0.0059)	−0.0038***(0.0056)	−0.0231**(0.0370)
Controls and fixed effects as in Panel B	Yes	Yes	Yes
N	106,506	106,506	106,506
Adjusted R^2	0.0772	0.0150	0.0210
Regression's *p*-value	0.0001	0.0001	0.0001
Joint effect of ETRR+ ETRR x NOL (0,1)	0.0003	0.0002	0.0030
(*p*-value of *t*-test for joint significance)	(0.9779)	(0.8514)	(0.8136)

Panel D: Industry level

Dependent variable =	ln (1 + Total # of all-cash bids) Model (1)	ln (1 + Total all-cash deal value) Model (2)
ETRR	0.1809***(0.0001)	0.3537***(0.0041)
Firm characteristics (industry average)		
ln (Market value of assets)	0.0848***(0.0001)	0.6400***(0.0001)
Market-to-book ratio	−0.0000 (0.8537)	0.0001 (0.4366)
Leverage	−1.8808***(0.0001)	−1.0560**(0.0427)
Prior year return	0.0012 (0.8918)	−0.0175 (0.5388)
Year fixed effects	Yes	Yes
N	1207	1207
Adjusted R^2	0.1640	0.1863
Regression's *p*-value	0.0001	0.0001

This table presents the effect of DPAD on domestic M&A activity. Panel A provides descriptive statistics for the sample of 106,506 firm-year observations with data available from CRSP and Compustat during fiscal years 1997–2012. This sample is used for the tests on domestic M&A activity at the firm level in Panel B. Panel C presents the effect of net operating losses (NOL) and ETRR on M&A activity. In Panel D, M&A activities are aggregated at the IRS industry level with 1207 industry-year observations. In the first three models in Panel B, the dependent variable is one if the firm makes a domestic M&A bid in a given year in model (1), the number of domestic M&A bids made by the firm in a given year in model (2), the total value of domestic M&A bids made by the firm in a given year in model (3). In the last three models in Panel B, the dependent variable is one if the firm makes a domestic all-cash M&A bid in a given year in model (4), the number of domestic all-cash M&A bids made by the firm in a given year in model (5), the total value of domestic all-cash M&A bids made by the firm in a given year in model (6). In Panels B and C, models (1) estimates a logistic regression while all other models use OLS and the control variables for firm characteristics include log of market value of assets, market-to-book ratio, leverage, prior year return. In Panel D, these control variables are averaged at the IRS industry level for each year. Panel B and C controls for one digit SIC industry fixed effects and year fixed effects. Standard errors are double clustered by firm and year in Panels B and C, and by year in Panel D. We report p-values in parentheses.*,**, and*** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

quality in our setting because Harford (1999) and others show that new cash flow can result in value destroying acquisitions. Thus, a natural next question to ask about DPAD is whether the incremental M&A investment it encouraged was value creating. We address this question here.

We rely on four measures to capture the DPAD's effect on deal quality. Three are direct proxies of quality, and one is an indirect measure intended to capture the deal's potential quality. Our first direct proxy for quality is the three-day cumulative abnormal return for the acquiring firm upon the M&A bid public announcement. Our second direct proxy for quality is the synergy accruing to the merged firms. The third measure, our indirect measure, captures the target's likelihood of providing incremental DPAD benefits post-acquisition to target shareholders. This measure enables us to see if these first two direct

Table 3
Domestic-only vs. MNC acquirers and foreign transactions.

Panel A: Domestic-only vs. MNC acquirers - Firm level

	Domestic only firms			MNC firms		
Dependent variable =	All-cash bid (0,1) Model (1)	ln (1 + # of all-cash bids) Model (2)	ln (1 + all-cash deal value) Model (3)	All-cash bid (0,1) Model (4)	ln (1 + # of all-cash bids) Model (5)	ln (1+ all-cash deal value) Model (6)
ETRR	0.1725** (0.0330)	0.0051** (0.0351)	0.0448** (0.0109)	0.2028** (0.0209)	0.0057*** (0.0075)	0.0483** (0.0147)
Controls and FEs as in Table 2 Panel B	Yes	Yes	Yes	Yes	Yes	Yes
N	85,797	85,797	85,797	20,709	20,709	20,709
Adjusted R^2	0.0702	0.0113	0.0155	0.1198	0.0303	0.0374
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Panel B: Domestic-only vs. MNC acquirers - Industry level

	Domestic only firms		MNC firms	
Dependent variable =	ln (1 + Total # of all-cash bids) Model (1)	ln (1 + Total all-cash deal value) Model (2)	ln (1 + Total # of all-cash bids) Model (3)	ln (1 + Total all-cash deal value) Model (4)
ETRR	0.0980**(0.0155)	0.2130***(0.0071)	0.2200***(0.0002)	0.2509**(0.0311)
Controls and FEs as in Table 2 Panel D	Yes	Yes	Yes	Yes
N	1206	1206	1038	1038
Adjusted R^2	0.1295	0.2135	0.2432	0.1760
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001

Panel C: Foreign transactions - Firm level

Dependent variable =	All-cash bid (0,1) Model (1)	ln (1 + # of all-cash bids) Model (2)	ln (1 + all-cash deal value) Model (3)
ETRR	0.2203**(0.0263)	0.0021***(0.0001)	0.0121***(0.0006)
Controls and FEs as in Table 2 Panel B	Yes	Yes	Yes
N	106,506	106,506	106,506
Adjusted R^2	0.1200	0.0063	0.0073
Regression's *p*-value	0.0001	0.0001	0.0001

Panel D: Foreign transactions - Industry level

Dependent variable =	ln (1 + Total # of all-cash bids) Model (1)	ln (1 + Total all-cash deal value) Model (2)
ETRR	0.2936***(0.0001)	0.3029*(0.0599)
Controls and FEs as in Table 2 Panel D	Yes	Yes
N	1207	1207
Adjusted R^2	0.1710	0.0645
Regression's *p*-value	0.0001	0.0001

Panels A and B present the effect of DPAD on domestic M&A activity carried out by domestic-only firms vs. multinational corporations (MNC). MNC firms are those with significant foreign operations defined in Appendix A. The sample includes 85,797 firm-year observations for domestic-only firms and 20,709 firm-year observations for MNC firms with data available from CRSP and Compustat during fiscal years 1997–2012. This sample is used for the tests on M&A activity at the firm level in Panel A. In Panel B, M&A activities are aggregated at the IRS industry level. Domestic only firms appear in 1206 industry-year observations and MNC firms appear in 1038 industry-year observations. The dependent variables in Panels A and B follow those in Table 2 Panel B and D, respectively. Panels C and D present the effect of DPAD on cross-border M&A activity carried out by US firms bidding for foreign targets. The sample includes 106,506 firm-year observations with data available from CRSP and Compustat during fiscal years 1997–2012. This sample is used for the tests on cross-border M&A activity at the firm level in Panel C. In Panel D, cross-border M&A activities are aggregated at the IRS industry level. In Panel C, the dependent variable is one if the firm makes a cross-border all-cash M&A bid in a given year in model (1), the number of cross-border all-cash M&A bids made by the firm in a given year in model (2), the total value of cross-border all-cash M&A bids made by the firm in a given year in model (3). Panel A models (1) and (4) and Panel C model (1) estimate a logistic regression while all other models use OLS. All models in Panels A and C control for firm characteristics, one digit SIC industry fixed effects and year fixed effects as in Table 2 Panel B. All models in Panels B and D control for firm characteristics and year fixed effects as in Table 2 Panel D. Standard errors are double clustered by firm and year in Panels A and C.

quality measures are correlated with DPAD-specific target characteristics. The fourth (and final direct) quality measure represents firms' future accounting performance.

4.3.1. Acquirer returns

In Panel A of Table 5, we run two DiD regressions of the three-day merger announcement CAR for the bidders in our sample. This CAR is centered on the acquisition announcement day and we estimate it using standard event-study methods.[22] The key independent variable in all tests is ETRR. Model (1) reports our baseline specification for the sample of 1570 all-cash transactions. Model (2) is limited to the 582 observations in which both parties to the deal are public firms. Notably, the controls in model (2) include the target industry's ETRR, which could affect the acquirer's bid.

The coefficient of ETRR is positive and significant at the 5% level (or better) in all models. The results are economically meaningful. According to model (1) for example, increasing ETRR by one standard deviation leads to a

[22] See appendix A for a more complete description of the calculation.

Table 4
Financial constraints.

Panel A: Deal activity						
Dependent variable =	All-cash bid (0,1)		ln (1 + # of all-cash bids)		ln (1 + all-cash deal value)	
Financial constraint indicator =	*High KZ index (0,1)*	*Unrated firm (0,1)*	*High KZ index (0,1)*	*Unrated firm (0,1)*	*High KZ index (0,1)*	*Unrated firm (0,1)*
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
ETRR	0.0934***(0.0002)	0.0727***(0.0089)	0.0029***(0.0030)	0.0027**(0.0133)	0.0227***(0.0024)	0.0222***(0.0092)
ETRR × Indicator	0.0710***(0.0037)	0.1434***(0.0017)	0.0064**(0.0247)	0.0083**(0.0266)	0.0189**(0.0286)	0.0402***(0.0046)
Indicator	−0.1327***(0.0001)	0.0318 (0.2070)	−0.0055***(0.0001)	−0.0011 (0.1453)	−0.0393***(0.0001)	−0.0183***(0.0004)
Controls and FEs as in Table 2 Panel B	Yes	Yes	Yes	Yes	Yes	Yes
N	106,506	106,506	106,506	106,506	106,506	106,506
Adjusted R^2	0.0942	0.0927	0.0139	0.0133	0.0173	0.0168
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Panel B: Alternative measures of financial constraint			
	Model (1)	Model (2)	Model (3)
Dependent variable =	All-cash bid (0,1)	ln (1 + # of all-cash bids)	ln (1 + all-cash deal value)
ETRR × High WW index (0,1)	0.0972***(0.0001)	0.0071**(0.0282)	0.0267***(0.0006)
ETRR × High HP index (0,1)	0.0993***(0.0001)	0.0062***(0.0026)	0.0307***(0.0001)
Controls and FEs as in Table 2 Panel B	Yes	Yes	Yes
N	106,506	106,506	106,506

Panel C: Payout policy			
	Model (1)	Model (2)	Model (3)
Dependent variable =	All-cash bid (0,1)	ln (1 + # of all-cash bids)	ln (1 + all-cash deal value)
ETRR × Low payout ratio (0,1)	0.0756***(0.0043)	0.0085**(0.0249)	0.0198**(0.0128)
ETRR × No dividend payout in the past 30 years (0,1)	0.0925***(0.0001)	0.0086***(0.0001)	0.0216***(0.0008)
Controls and FEs as in Table 2 Panel B	Yes	Yes	Yes
N	106,506	106,506	106,506

This table presents triple differences estimates of the effect of the acquirer's effective tax rate reduction (ETRR) on deal activity based on whether the acquirer is financially constrained using the sample of 106,506 firm-year observations described in Table 2. The dependent variables follow those in Table 2 Panel B. All variables are defined in Appendix A. Standard errors are adjusted for heteroskedasticity and double-clustered by industry and year. We report p-values in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

1.28% increase in the acquirer CAR.[23] This result provides evidence in support of the neoclassical theory. Specifically, this theory predicts that bids should show greater acquirer returns because the DPAD creates a new opportunity for deal-generated tax synergies.

In Panel B of Table 5, we test whether the quality of the deals varies by acquirers' financial constraints. Consistent with the theory of financial constraints, the interaction between ETRR and High KZ is positive and significant suggesting that financially constrained firms are undertaking even higher quality M&A than financially unconstrained firms. Notice, however, that the significant coefficient on the non-interacted ETRR variable suggests that financially unconstrained firms also show significantly higher quality transactions with greater DPAD benefits.

In Table 5 Panel C we investigate whether the market rewards acquirers engaged in deals that are likely to create greater DPAD synergies. An acquirer derives more future DPAD benefit when it has a lower likelihood of incurring tax losses (see Lester, 2019). If an acquirer has net operating losses (NOLs) then, all else equal, there will be fewer future DPAD benefits generated in the merger. Note that NOLs would prevent acquirers from gaining a full DPAD cash benefit. The effect of the ETRR on deal value for firms with NOLs continues to be positive in each model in Panel C suggesting that even these acquirers with greater tax shields generate profitable transactions (the joint effect of the ETRR continues to be positive and significant in model (1) and model (2)). However, the negative coefficient on the interaction term between the NOL indicator and ETRR in both models suggests that the market does provide more reward to firms with greater potential DPAD benefits.

4.3.2. Synergies

We also explore how DPAD relates to the synergies arising in M&A deals. These synergies include not only acquirer CARs, but also gains to the target firm shareholders. The synergy question is important in determining the economy-wide gains from DPAD-induced acquisitions.

Models (3) and (4) of Panel A in Table 5 use equation (1) to estimate regressions of the acquisition synergies for the 582 cash bids in our sample where both parties to the deal are publicly traded firms. As in Bradley et al. (1988), the dependent variable in all models is the total percentage synergistic gain from acquisitions (or merger synergy). We compute this variable as the three-day CAR for a value-weighted portfolio of the acquirer and the target around the merger announcement date. This CAR is calculated as the residual from the market model estimated during the

[23] If we constrain our sample to only bids for which the deal was ultimately consummated, the coefficient on ETRR in Table 5 Panel A would be 0.0241 (*p*-value = 0.0010). This suggests that a one standard deviation increase in ETRR leads to a 1.32% increase in acquirer's CAR.

Table 5
Deal quality.

Panel A: Deal level				
Dependent variable =	Acquirer CAR (−1,+1)		Combined CAR (−1,+1)	
	Model (1)	Model (2)	Model (3)	Model (4)
Acquirer ETRR	0.0233**(0.0181)	0.0231**(0.0104)	0.0113**(0.0448)	0.0150***(0.0003)
Deal characteristics				
Public target (0,1)	−0.0200***(0.0001)			
Tender offer (0,1)	0.0237***(0.0064)	0.0035 (0.6134)	0.0050 (0.1282)	0.0051 (0.1299)
Hostile deal (0,1)	−0.0214 (0.1866)	−0.0241 (0.1763)	−0.0026 (0.7461)	−0.0034 (0.6812)
Multiple bidders (0,1)	−0.0103 (0.2278)	−0.0017 (0.8585)	−0.0024 (0.5954)	−0.0038 (0.4241)
Toehold (0,1)	0.0034 (0.6055)	0.0124 (0.3590)	−0.0061 (0.5000)	−0.0054 (0.5724)
Merger of equals (0,1)	0.0264 (0.1101)	0.0592***(0.0010)	0.0112 (0.1404)	0.0113 (0.1603)
Diversifying deal (0,1)	0.0052 (0.1774)	0.0029 (0.6505)	−0.0010 (0.7508)	−0.0011 (0.7318)
Acquirer characteristics				
ln (Market value of assets)	−0.0054***(0.0001)	−0.0042*(0.0917)	−0.0028***(0.0031)	−0.0035***(0.0068)
Market-to-book ratio	0.0001 (0.8186)	0.0000 (0.9881)	−0.0004 (0.4116)	−0.0004 (0.4898)
Leverage	0.0407***(0.0130)	0.0714***(0.0173)	0.0306**(0.0200)	0.0365***(0.0098)
Prior year return	−0.0013 (0.5929)	−0.0021 (0.6660)	−0.0010 (0.6667)	−0.0012 (0.6293)
Target characteristics				
ln (Market value of assets)		−0.0112***(0.0001)		0.0013 (0.2763)
Market-to-book ratio		−0.0006 (0.6068)		−0.0007 (0.1720)
Leverage		0.0080 (0.7250)		−0.0149 (0.1813)
Prior year return		−0.0005 (0.8832)		0.0022 (0.1741)
ETRR		0.0087 (0.2975)		−0.0000 (0.9966)
Intercept	0.0579***(0.0002)	−0.0122 (0.6145)	−0.0031 (0.7757)	−0.0047 (0.7383)
Acquirer fixed effects	Yes		Yes	
(Industry × Year) fixed effects	Yes	Yes	Yes	Yes
N	1570	582	582	582
Adjusted R^2	0.0490	0.1021	0.1173	0.1011
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001
Panel B: Financial constraints				
Dependent variable =	Acquirer CAR (−1,+1)		Combined CAR (−1,+1)	
	Model (1)	Model (2)	Model (3)	Model (4)
Acquirer ETRR	0.0151***(0.0336)	0.0171**(0.0294)	0.0098***(0.0002)	0.0142***(0.0009)
Acquirer ETRR x High KZ (0,1)	0.0119**(0.0416)	0.0111**(0.0377)	0.0046**(0.0195)	0.0050**(0.0173)
High KZ (0,1)	−0.0002 (0.9608)	−0.0035 (0.6322)	0.0024 (0.5551)	0.0031 (0.4726)
Controls and FEs as in Panel A	Yes	Yes	Yes	Yes
N	1570	582	582	582
Adjusted R^2	0.0482	0.1016	0.1177	0.1024
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001
Panel C: The effect of acquirer's NOLs				
Dependent variable =	Acquirer CAR (−1,+1)		Combined CAR (−1,+1)	
	Model (1)	Model (2)	Model (3)	Model (4)
Acquirer ETRR	0.0256**(0.0169)	0.0299***(0.0002)	0.0135***(0.0015)	0.0171***(0.0010)
NOL (0,1)	0.0027 (0.2957)	0.0026 (0.6840)	0.0031 (0.4920)	0.0043 (0.3394)
Acquirer ETRR x NOL (0,1)	−0.0116*(0.0634)	−0.0198**(0.0272)	−0.0046*(0.0893)	−0.0070*(0.0677)
Controls and FEs as in Panel A	Yes	Yes	Yes	Yes
N	1570	582	582	582
Adjusted R^2	0.0333	0.0838	0.0926	0.0849
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001
Joint effect of Acquirer ETRR + Acquirer ETRR x NOL (0,1)	0.0140**(0.0410)	0.0101*(0.0621)	0.0089***(0.0031)	0.0101**(0.0001)

This table presents difference-in-differences estimates of the effect of the acquirer's effective tax rate reduction (ETRR) on acquirer returns and combined returns three days around the merger announcement. In Panels A, B, C, and D, the sample consists of 1570 all-cash deals from the 5072 domestic M&A bids made by public acquirers announced during 1997−2013 described in Table 1 in model (1) and 582 all-cash deals from a subset of 1806 deals made by public acquirers for public targets in models (2), (3) and (4). In Panel C, we include an indicator variable for deals in which acquirers have NOL. All variables are defined in Appendix A. Standard errors are adjusted for heteroskedasticity and double-clustered by industry and year. We report p-values in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

one-year window ending four weeks prior to the merger announcement. The independent variable of interest in the two regressions reported in Panel A is ETRR.

The parameter estimates related to ETRR are positive and statistically significant in the Combined CAR Panel A regressions. The ETRR coefficient estimate in model (3) indicates that a single standard deviation increase in that variable is associated with a 0.62% increase in the combined return upon the bid's public announcement. Again, this evidence is in agreement with the neoclassical theory of M&A.

As with the acquirer returns, we find that financially constrained firms undertake higher quality M&A relative to financially unconstrained firms (models (3) and (4) in Panel B of Table 5). Finally, according to the last two columns in Panels C, we find some limited evidence that acquirer NOLs have a weaker link between the DPAD tax benefits and deal synergies.

Table 6
Target DPAD facilitation and post-deal accounting performance.

Panel A: Target's DPAD facilitation index

	Original sample of 1806 domestic M&A bids described in Table 1		Subsample of 582 all-cash bids from the total 1570 all-cash bids	
Index value	Frequency	Percent	Frequency	Percent
0	114	6.31	33	5.67
1	981	54.32	239	41.07
2	605	33.50	243	41.75
3	106	5.87	67	11.51
Total	1806	100.00	582	100.00
Mean	1.3893		1.5911	
Std deviation	0.6940		0.7657	

Panel B: The effect of target's DPAD facilitation on all-cash deal quality

	Model (1)	Model (2)
Dependent variable =	Acquirer CAR (−1,+1)	Combined CAR (−1,+1)
ETRR	−0.0038 (0.5477)	0.0003 (0.8939)
Target's DPAD facilitation index	−0.0049 (0.2026)	−0.0026 (0.4471)
ETRR × Target's DPAD facilitation index	0.0065**(0.0435)	0.0043**(0.0206)
Controls and FEs as in Table 5 Panel A	Model (2)	Model (4)
N	582	582
Adjusted R^2	0.1204	0.1312
Regression's *p*-value	0.0001	0.0001

Panel C: Post all-cash deal operating performance and goodwill write-off

	Dependent variable = Change in the combined firm's ROA		Dependent variable = Goodwill write-off (0,1)	
	Model (1)	Model (2)	Model (3)	Model (4)
Acquirer ETRR	0.0353***(0.0062)	0.0407***(0.0043)	−1.1720***(0.0076)	−1.0145**(0.0101)
Deal characteristics	Yes	Yes	Yes	Yes
Acquirer characteristics	Yes	Yes	Yes	Yes
Target characteristics		Yes		Yes
Acquirer fixed effects	Yes		Yes	
(Industry × Year) fixed effects	Yes	Yes	Yes	Yes
N	555	555	1465	555
Adjusted R^2	0.5385	0.5438	0.2090	0.2212
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001

Panels A and B present the effects of the acquirer's effective tax rate reduction (ETRR) on deal quality using a composite index that measures the target's DPAD facilitation. The sample consists of 1806 M&A bids made by public bidders for public targets announced during 1997–2013 described in Table 1. We create a target's DPAD facilitation index that adds one point if each of the following conditions happens: (1) the relative size (target market cap/acquirer market cap one month before deal announcement) is in the bottom quartile of the sample, (2) the target firm operates in manufacturing industries, and (3) the target firm does not have significant foreign operations. In our sample of 5072 bids, only 1806 bids for public targets have information available to calculate the DPAD facilitation index. In our sample of 1570 all-cash bids, only 582 bids for public targets have information available to calculate the DPAD facilitation index. Panel C presents analyses of the effect of the acquiring industry's effective tax rate reduction (ETRR) on post-deal operating performance and post-deal goodwill impairment write-offs. The sample in Model (3) include 1465 all-cash bids in which the combined companies have available information to calculate post-deal ROA and goodwill write-offs during the period of three years after deal completion. The sample in Models (1), (2), and (4) include 555 all-cash bids from the original 1465 all-cash bids used in Model (3) with available target characteristics. All other variables are defined in Appendix A. Standard errors are adjusted for heteroskedasticity and double-clustered by industry and year. We report p-values in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

4.3.3. DPAD facilitation index

In Table 6, we develop a measure that captures the target's likelihood of providing incremental DPAD benefits post-acquisition. Based on Lester and Rector (2016), we surmise that smaller, domestic, manufacturing firms have lower uptake of the DPAD than expected. As such, an astute acquirer should be able to garner greater M&A synergies by capturing the previously unutilized DPAD. To measure this construct, we develop a score that provides each target a point for each of the following attributes: being small relative to its acquirer (the target market cap relative to the acquirer market cap is in the bottom quartile of the sample), operating in a manufacturing industry, and having no significant foreign operations.[24] As only domestic activity is eligible for the DPAD, firms with predominantly domestic operations should have more opportunity to generate DPAD. Our "facilitation index" has values ranging from zero to three. In Panel A of Table 6, we report that the mean index value is 1.39.[25]

In Panel B of Table 6, we introduce the facilitation index and its interaction with acquirer ETRR into our base model. Consistent with the quality of the DPAD transaction stemming from potential target-generated DPAD synergies, we find that the interaction term between our facilitation index and ETRR is associated with the acquirer CAR (model (1)), and combined

[24] Because we require financial information about the target to estimate the facilitation index, this analysis is limited to deals involving public targets (1806 of all deals; 582 of all-cash deals).

[25] Our "facilitation index" results are also robust to the inclusion of a target NOL indicator as a fourth attribute in our index. Since target NOLs are potentially valuable to an acquirer even when limited by IRC Section 382, we are concerned that their inclusion in our index could confound our DPAD story. Therefore, we do not include NOLs as part of the facilitation index in the tables presented.

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CAR (model (2)). These results, together with those in Panel A of Table 5, indicate that DPAD firms benefit from pursuing targets that are likely to facilitate greater future DPAD tax savings. Overall, our facilitation index findings provide support for the neoclassical theory of M&A and identify extra DPAD as a likely source of additional value. It is otherwise difficult to explain why the DPAD-gain-specific characteristics of *target* firms, independent of *bidder* cash increases, would be associated with larger acquisition gains.

4.3.4. Post-deal accounting measures of deal quality

We are mindful that stock-price-dependent measures (such as bidder CARs, and synergies) are often subject to the concern of potential bias related to investor perceptions and market sentiment.[26] To circumvent this concern, in Panel C of Table 6 we perform tests based on *ex post* (long-run) accounting measures of performance. The advantage of this approach is that it provides evidence based on accounting realizations, rather than on future expectations or sentiment embedded in asset prices. In models (1) and (2) of Panel C, the dependent variable is the combined (merged) firm's three-year average return on assets (ROA) after the acquisition minus the weighted average ROA of the target and the acquirer before the acquisition. In models (3) and (4), the dependent variable is set to 1 if the combined firm takes a goodwill write-off in the three years subsequent to the acquisition.[27] Our interest in goodwill write-offs is based on the arguments by Li et al. (2011) and Gu and Lev (2011) that the impairment of goodwill often identifies M&A deals involving overpayment and/or agency problems. As such, goodwill could be used as a proxy for deal quality.

ETRR estimates in models (1)–(4) of Panel C are statistically significant implying that high-DPAD firms make higher quality acquisitions. After M&A deals are completed, those with high-DPAD acquirers exhibit an improvement in ROA and are less likely to exhibit a goodwill write-off. Based on models (1) and (3), a one standard deviation increase in ETRR generates a 1.94% increase in the average post-deal ROA and a 13.57% reduction in the probability of a goodwill write-off, respectively. These effects are economically important when benchmarked against the average post-deal change in ROA of −1.38% and the 30.84% incidence of goodwill write-offs in the set of completed acquisitions in our full sample.

Overall, the findings in Table 6 are consistent with the baseline results in Table 5. All tests consistently support the *neoclassical theory* that Section 199-related tax cuts result in higher quality mergers on average. Moreover, the substantial improvement in post-deal performance shown in Table 6 in takeovers by DPAD-advantaged bidders rationally explains the market's assessment of deals by these firms (higher acquirer M&A announcement CARs) and mitigates the concern that our baseline evidence is somehow biased by either market sentiment or investor psychology.

5. Conclusions

We use difference-in-differences quasi-experimental methods to examine the Domestic Production Activities Deduction (IRC Section 199). Our research design exploits the fact that this policy produces plausibly exogenous variation in effective corporate income tax rates to study whether corporate income tax cuts affect M&A transactions. Despite the seemingly modest nature of the effective tax rate reductions, which never exceed 3.01% in any industry in any year of our sample, its effect on merger activity is substantial. Our tests show that firms with Section 199 deductions become more acquisitive. Furthermore, a one standard deviation increase in DPAD's effective tax rate reduction is associated with a 1.39% increase in the dollar amount spent on acquisitions. Notwithstanding past mixed evidence on the impact of other corporate taxes, our results make a strong case for DPAD having a first order effect on M&As in the US.

Our difference-in-differences method also uncovers important results about the effect of DPAD on average acquisition quality. Bidder firms in high DPAD industries make better acquisitions for their shareholders in terms of acquirer returns and overall synergies in cash-financed deals. Assuming that the policy improves the investment opportunity set for firms generating high ETRRs through DPAD, this evidence is consistent with the prediction from the neoclassical theory suggesting that mergers enhance shareholders' wealth.

Of course, we must be cautious about taking the evidence we find as *implying* causality. By using firms in industries with a low level of DPAD deductibility as a control group, we necessarily run into the problem that these firms are different in some ways from the high DPAD group. We try to allay the worries that these differences are driving our results through many of the paper's statistical procedures, especially the parallel trends tests and the permutation tests described in Appendix B. These tests consistently show that the DPAD treatment itself is most likely causal. In sum, we must acknowledge the possibility that industry differences could be causing our results, but we think our evidence suggests that they are unlikely to be a primary driver.

[26] See, for example, Lee (2001) and Daniel et al. (2002).

[27] The requirement of pre-acquisition financial data on the target limits the sample size in Panel C models (1), (2), and (4) to 555 all-cash acquisitions of publicly traded targets, while the requirement for post-acquisition data limits the sample in Panel C Model (3) to 1465 observations.

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Other tests also show the beneficial impact of DPAD on M&A quality is more acute when the tax policy improves the bidder's investment opportunity set. This evidence supports the theory of financial constraints. Overall, our results on the heterogeneity of DPAD effects complement the findings in contemporaneous work by Blouin et al. (2014), Lester (2019), and Ohrn (2018), and also contribute to the ongoing policy debate on the effects of corporate income tax deductions.

Appendix A. Variable definitions

Key independent variable	
ETRR	the percentage point reduction in the effective income tax rate for a firm's industry generated by the domestic production activities deduction
Effective tax rates	
GAAP effective tax rate	the ratio of current tax expense over taxable income, scaled by the top statutory tax rate, with taxable income estimated using the methodology in Lev and Nissim (2004)
Cash effective tax rate	computed as the ratio of cash paid for income taxes over taxable income, scaled by the top statutory tax rate, with taxable income estimated using the methodology in Lev and Nissim (2004)
Deal characteristics	
Acquirer CAR	the acquirer's cumulative abnormal return over the window around the merger announcement date, calculated as the residual from the market model estimated during the one-year window ending four weeks prior to the merger announcement
Target CAR	the target's cumulative abnormal return over the window around the merger announcement date, calculated as the residual from the market model estimated during the one-year window ending four weeks prior to the merger announcement
Combined CAR	the three-day cumulative abnormal return for the value-weighted portfolio of the acquirer and the target around the merger announcement
Offer premium	the offer price divided by the target's stock price four weeks before the merger announcement date, as reported by SDC and limited between 0% and 200%
Post deal combined ROA	the change in the combined firm's average ROA three years after deal completion compared to the weighted average ROA of the acquirer and the target before the deal, with the weights being their respective market cap a month before deal announcement
Post deal goodwill write-offs (0,1)	one if the acquirer reports an impairment of goodwill related to the merger during the period of three years after the completion date
Relative size	deal value divided by the acquirer's market value of equity measured one month before the deal announcement date
Public target (0,1)	one if the target is publicly traded
All cash payment (0,1)	one if the deal is paid entirely in cash
All stock payment (0,1)	one if the deal is paid entirely in equity
Tender offer (0,1)	one if the form of the deal is tender offer
Hostile deal (0,1)	one if the deal is classified hostile by SDC
Multiple bidders (0,1)	one if the deal has multiple bidders identified by SDC
Toehold (0,1)	one if the bidder owns some of the target's shares outstanding
Merger of equals (0,1)	one if the deal is classified by SDC as a merger of equals
Diversifying deal (0,1)	one if the target and the acquirer belong to a different Fama and French (1997) 48 industrial classification group
Deal financed by debt (0,1)	one if the source of financing identified by SDC includes "debt issue", "borrowing", "bridge loan", "junk bond issue", "line of credit", or "mezz. fin"
Targets in manufacturing industries (0,1)	one if the target firm operates in manufacturing industries defined by the Bureau of Labor and Statistics (NAICS codes 31, 32 and 33)
Financial characteristics	
Size	the natural logarithm of the market value of assets
Market-to-book	the market value of assets divided by the book value of assets
Leverage	the book value of debt divided by the sum of book value of debt and market value of equity.
ROA	the operating income before depreciation divided by the beginning book value of assets
Prior year return	the buy-and-hold abnormal return during the one-year window ending four weeks prior to the merger announcement, calculated as the residual from the market model estimated during the year before
NOL (0,1)	one if during the year the firm has positive tax loss carry forward (Compustat item "TLCF", which is net operating loss carry forward in the old Compustat data item #52)
Significant foreign operations (0,1)	one for firms having substantial income from foreign operations in one of the three fiscal years before the merger announcement. Following Lev and Nissim (2004), income from foreign operations is defined to be substantial if the ratio of the absolute value of "pretax income-foreign" (*pifo*) to the sum of that amount and the absolute value of "pretax income-domestic" (*pidom*) exceeds 20%. All variables in italics are Compustat data items.
Financial constraint proxies	
High KZ index (0,1)	one for firms that have a KZ index in the top tercile of all firms in the previous year, with KZ Index being constructed following Lamont et al. (2001) as -1.001909 [$(ib + dp)$/lagged *ppent*] $+ 0.2826389$ [$(at + prcc\_f \times csho$ - ceq - $txdb)/at$] $+ 3.139193$ [$(dltt + dlc)/(dltt + dlc + seq)$] $- 39.3678$ [$(dvc + dvp)$/lagged *ppent*] $- 1.314759$ [*che*/lagged *ppent*], where all variables in italics are Compustat data items
High WW index (0,1)	one for firms that have a WW index in the top tercile of all firms in the previous year, with WW Index being constructed following Whited and Wu (2006) and Hennessy and Whited (2007) as -0.091 [$(ib + dp)/at$] $- 0.062$ [indicator set to one if $dvc + dvp$ is positive, and zero otherwise] $+ 0.021$ [$dltt/at$] $- 0.044$ [log (at)] $+ 0.102$ [average industry sales growth, estimated separately for each three-digit SIC industry and each year, with sales growth defined as above] $- 0.035$ [sales growth], where all variables in italics are Compustat data items
High HP index (0,1)	one for firms that have a HP index in the top tercile of all firms in the previous year, with HP Index being constructed following Hadlock and Pierce (2010) as -0.737 Size $+ 0.043$ Size^2 $- 0.040$ Age, where Size equals the log of inflation-adjusted Compustat item *at* (in 2004 dollars), and Age is the number of years the firm is listed with a non-missing stock price on Compustat
Low payout ratio (0,1)	one for firms that have a dividend payout ratio (*dvt/ebit*) in the bottom tercile of all firms in the previous year, where all variables in italics are Compustat data items
Unrated firm (0,1)	one for firms that do not have a credit rating from S&P, Moody's, Fitch, or Duff & Phelps, using data obtained from Compustat (variable *splticrm*) or for firms that do not have debt outstanding

Appendix B. Econometric issues and robustness tests

In this appendix, we address potential concerns related to our use of DiD methods and our estimation of ETRR. Afterwards, we explore whether our results are sensitive to particular measures, statistical procedures, or specific subsamples.

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B.1. Econometric issues: Parallel trends assumption

Fulfillment of the parallel trends assumption is critical to ensure internal validity of DiD models. It requires a similar trend in the outcome variable for both treatment and control groups during the pretreatment era. We therefore estimate trends in our two key outcome variables of interest (acquirer returns and synergies) during the five years *before* a treatment firm first claims the deduction. The choice of five years mitigates concerns that other policies (such as bonus depreciation, which was part of the Economic Growth and Tax Relief Reconciliation Act of 2001),[28] affect pretreatment trends across the two groups. The control firms are those operating in industries that get little or no benefit from Section 199 deductions. More precisely, for each IRS industry we add QPAI from 2005 until the end of our sample and divide it by the addition of that industry's taxable income during the same period. A firm in one of the 21 industries for which this ratio is less than 3% (corresponding to the first quartile) is placed in the control group.[29] Otherwise, the firm is placed in the treatment (DPAD) group.

In Panel A of Table B.1, the time series of the number of acquisitions in both the DPAD and low DPAD groups are broken down by years. The left side of Panel A represents acquisitions preceding DPAD and the right-side years represent acquisitions post-DPAD. The bottom of the table presents a z-test that shows that the proportion of M&A deals in DPAD industries significantly increased post-DPAD.

Panel B shows that the pretreatment trends in the outcome variables are not statistically different when comparing firms in industries that benefit from DPAD with those that do not.[30] This evidence suggests that differential trends across groups in the pretreatment era are unlikely to account for the estimated effects of the policy.

Panel C of Table B.1 reports mean and median levels for the outcome variables once DPAD is in effect. Foreshadowing future results with more rigorous econometric methods, the univariate estimates suggest better quality M&A deals for the acquirers impacted by the policy. At the mean (and median), deals by these firms exhibit higher M&A bidder announcement returns and higher synergies. Combined, the evidence in Panels B and C shows that the trend in every outcome variable changes once the tax policy is in effect, but not before.

Figure B.1 presents Table B.1 results pictorially. Panel A shows that for each measure of deal activity, there is a noticeable *upward* shift in the outcome variable of interest *after* the DPAD is implemented. Panel B of the figure shows the same kind of shift in the deal quality variables.

B.2. Econometric issues: Using industry-ETRR at the firm level

Throughout the paper, we use the acquirer firm's industry ETRR as the key variable to examine the effect of the DPAD on acquisitions. The use of industry ETRR at the firm level, instead of the firm specific ETRR for each year, is subject to at least three concerns. First, not all firms in the industry are able to claim a tax deduction under Section 199. Second, ETRR ignores potential correlations between DPAD and other tax strategies firms employ (such as the lost ETI for some firms). Third, ETRR is a generally noisy measure of corporate tax benefits. Because of these issues, we are worried that imprecision in our ETRR measure will bias its coefficients.

To address the concerns noted in the previous paragraph, we examine the effect of DPAD on the acquirer firm's effective tax rates to ascertain whether DPAD is properly assigned. For this purpose, we follow the method in Ohrn (2018). He argues that if the DPAD treatment is correctly assigned, then a one percentage point decrease in the treatment should cause a firm's effective tax rate to decrease by one percentage point.

In Panels D and E of Table B.1, we examine the effect of the domestic production activity deduction on the GAAP effective tax rate and the cash effective tax rate of acquirers. Panel D shows that there are no significant differences in DPAD and non-DPAD tax rates before DPAD, but DPAD tax rates are significantly lower after DPAD. The difference in effective tax rates in the post-DPAD period is consistent with the ETRR capturing DPAD's material effect on firms' tax burdens.[33]

In Panel E, we estimate four ordinary least squares (OLS) regressions in which the key independent variable is ETRR. The dependent variable in models (1) and (2) is the financial statement effective tax rate (GAAP ETR). Regressions (3) and (4) use the cash effective tax rate (Cash ETR) as the dependent variable. In models (2) and (4) we limit the analyses to firms without substantial foreign operations because the effective tax rates of multinational companies are influenced by changes in foreign tax rate and rules. We follow Lev and Nissim (2004) to estimate GAAP ETR, Cash ETR and also to construct a sample of firms without substantial foreign operations. We define income from foreign operations (from

[28] Bonus depreciation also increased under President Bush in 2003.

[29] The mean is 26% and the third quartile is 55%.

[30] Consistent with our results, Ohrn (2018) presents a graph showing that there is no divergence in corporate investment between DPAD firms and other firms during the 5 years prior to the policy's enactment. Likewise, Lester (2019) shows that, prior to the implementation of DPAD, her treatment and control firms exhibit similar trends in the outcome variables she considers (income-shifting, cross-border shifting, investment, and employment).

[33] Panel C of Figure B.1 provides graphical confirmation that both GAAP and Cash effective tax rates decrease after DPAD is enacted.

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Compustat variables) to be substantial if the ratio of the absolute value of "pretax income-foreign" to the sum of that amount and the absolute value of "pretax income-domestic" exceeds 20%. This procedure limits the sample size to 3991 observations.

In model (1), a one percentage point reduction in ETRR is associated with a reduction of 1.12 percentage points in GAAP ETR, whereas in model (3) a similar drop in ETRR leads to a 1.3 percentage point reduction in Cash ETR. Neither estimate is statistically different from the predicted one percentage point decrease.

While this evidence from models (1) and (3) is reassuring, the tests that use the sample of acquirers with no substantial foreign operations yield estimates even closer to the predicted amount. A one percentage point reduction in ETRR is associated with a 0.95 percentage point reduction in GAAP ETR in model (2) and with a Cash ETR drop of 1.02 percentage point in model (4). Furthermore, especially in the cash measure in model (4), the standard error of the predicted tax rate is quite small at 0.21%. Given these findings and notwithstanding the caveats discussed above, our ETRR industry variable appears well suited to measure DPAD treatment at the acquirer firm level.

B.3. Permutation tests

We perform nonparametric permutation tests for our outcome variables like those in Ohrn (2018), Zidar (2019), and Chetty et al. (2009). The permutation tests are helpful in assessing the suitability of using industry ETRRs at the acquirer firm level. The tests also alleviate concerns about serial correlation (Bertrand et al., 2004). As noted by Chetty et al. (2009), since the permutation tests do not make parametric assumptions about the error structure, they are immune to the overrejection bias of the *t*-test in the presence of serial correlation.

Each permutation relies on a "placebo ordered pair" that consists of an [IRS industry]-[acquirer firm year]. We begin by randomly selecting a placebo implementation year between 1997 and 2004 (before DPAD is enacted). We then assign (without replacement) another industry's actual ETRR treatment from the years 2005–2013 to the placebo implementation year. For each outcome variable, we then re-estimate the baseline specification in equation (1), acting as if the placebo ordered pair is the actual treatment pair. We repeat this process 2000 times using as many different random number generator seeds. For each iteration, we record the point estimates to produce the plots in Figure B.2.

Each of the three panels in Figure B.2 displays a cumulative density function (CDF) of the 2000 placebo estimates for our three outcome variables, respectively. The CDFs appear smooth because of the large number of points used in the plots and not due to parametric smoothing (which we do not apply). In each CDF plot, the vertical lines provide the average ETRR treatment we obtain in our baseline regressions. For all-cash bids (0,1), 20 out of 2000 (1%) of the placebo coefficients are larger than the estimated effect in Table 2 Panel B model (4) (0.2005). For ln (1 + # of all-cash bids), 3 out of 2000 (0.15%) of the placebo coefficients are larger than the estimated effect in Table 2 Panel B model (5) (0.0052). For ln (1 + all-cash deal value), 28 out of 2000 (1.40%) of the placebo coefficients are larger than the estimated effect in Table 2 Panel B model (6) (0.0253). For acquirer CAR(-1,+1), 26 out of 2000 (1.30%) of the placebo coefficients are larger than the estimated effect in Table 5 Panel A model (2) (0.0231). For combined CAR(-1,+1), 5 out of 2000 (0.25%) of the placebo coefficients are larger than the estimated effect in Table 5 Panel A model (4) (0.0150). The incidence of the placebo coefficients can be interpreted as the implied *p*-value of the regression estimates in our Tables. In general, it is reassuring that the non-parametric results confirm those from our baseline DiD analyses.

Importantly, the results from the permutation tests (1) mitigate the concern of artificially small standard errors, (2) imply that random differences in time trends at the industry level do not account for the DPAD treatment effects in our baseline tests, and (3) supplement the tests in Panel D of Table 2 in mitigating concerns related to the use of the bidder-industry ETRR at the acquirer-firm level. The rationale for this last item is that the evidence from the permutation test implies that using an industry ETRR at the firm level only makes sense if the bidder firm really operates in that industry. Otherwise the random assignment of another industry's ETRR treatment to the acquirer firm-year would not yield statistically significant implied *p*-values.

B.4. Single industry focus – Broadcasting

To further examine the effect of DPAD on merger activity and quality in a way uncontaminated by any previous cash from ETI, we focus on the broadcasting industry.[31] This industry did not receive any tax benefit under ETI, but was given a large amount of DPAD deductions.[32] We recognize that this industry represents a very small sample in the universe of firms. The results here are therefore subject to idiosyncratic shocks that reduce power and potentially suggest spurious associations.

[31] We thank an anonymous referee for this suggestion.

[32] For all industries, the mean (median) ETRR during 2005–2013 is 0.56% (0.18%), but for the broadcasting industry it is 1.71% (1.89%).

Nevertheless, we think it interesting to verify whether any effect of DPAD in this industry is consistent with our overall results. As DeFond (2010) points out in related research on earnings quality, "when … proxies are simply noisy measures of the same underlying theoretical construct, triangulation may rule out the possibility that the observed association is driven by the noise component of a given measure." Because we have no perfect proxy for DPAD benefits net of ETI, we think examining this industry with zero contamination owing to pre-DPAD ETI provides a helpful triangulation that can increase confidence in our results.

The untabulated results derived from this industry offer support for our overall conclusions from the full sample in both acquisition activity and quality. Before DPAD (1997–2004), the broadcasting industry executed 3 all-cash deals out of 486 overall (0.6%). After DPAD (2005–2013), the same industry performed 13 all-cash deals out of 555 overall (2.3%). The z-statistic for the difference in proportions is 2.36, with a p-value of 0.0238.

The mean acquirer 3-day CAR is −1.55% (−1.35% median) in the 3 all-cash deals before DPAD and +4.54% (0% median) in the 13 all-cash deals after DPAD. The t-statistic for the difference in mean returns is 1.91 (p-value of 0.079) and the z-statistic for the difference in median returns is 1.35 (p-value of 0.17). Again, the results from the broadcasting industry increase our confidence in the full sample results.

B.5. Untabulated analyses

We run a myriad of additional robustness tests. Specifically, we use alternative measures of deal quality as dependent variables. All of our results hold if we compute acquirer returns using a five-day (−2,+2) CAR centered on the bid announcement instead of the three-day CAR.

We also use some alternative proxies for post-deal performance to replace the accounting dependent variables reported in Table 6 Panel C. Our results are robust to using the three-year buy-and-hold-returns (BHAR) calculated once the merger is completed, the three-year CAR, and the three-year BHAR for matched size and book-to-market decile portfolio returns.

We also investigate an alternative measure for the likelihood of generating DPAD synergies in Table 5 Panel C, where we change our NOL indicator variable to an indicator for either an NOL or the use of debt financing in an acquisition. Similar to the effect of an NOL, if a transaction is debt financed it generates interest tax shields that may reduce DPAD benefits from a deal. The results with this different indicator variable are essentially the same as with the NOL-only indicator.

Some alternative econometric test structures are used to probe the robustness of our results. Following Roberts and Whited (2013), we estimate falsification tests where, instead of using current ETRR, we use ETRR from three years before the acquisition bid. Some misspecification could be driving the results if this placebo test produces results similar to those in earlier tables. Nevertheless, we find no ETRR coefficients significantly different from zero. This result suggests that potential misspecification is not the cause of our baseline results.

We also follow the prescription of Gormley and Matsa (2014) to deal with unobserved heterogeneity concerns. Because of the 800+ (Acquirer industry × Target industry × Year) fixed effects required by this technique, we must keep all cash acquisition bids in the sample, even if the targets are not public. Therefore, we restrict the dependent variable to acquirer returns only. Our untabulated result on the ETRR coefficient is remarkably close to what we report in model (1) of Table 5. Thus, the tests that control for unobserved heterogeneity generate results similar to the baseline results.

Finally, we consider alternative samples in our analysis. We alter the base sample to rule out potential confounding factors that may be influencing our results by excluding various periods. We drop acquisitions in the period before 2003 to make sure the effects are not due to "before and after" the Bush tax cut. Using only data after 2003 ensures that the differences are due to "before and after" the DPAD tax policy. We also remove acquirers with substantial income from foreign operations in one of the three fiscal years before the M&A announcement. This check may be important as firms with foreign operations may have been affected by a repatriation tax holiday provision of the 2004 AJCA that came along with DPAD. This tax holiday, which is studied by Blouin and Krull (2009), Dharmapala et al. (2011), Faulkender and Petersen (2012), and Hanlon et al. (2015) among others, may influence the amount and quality of domestic acquisitions in ways unrelated to Section 199. If some firms used repatriated funds to engage in M&A, then our results may be attributable to the repatriation holiday rather than DPAD. Our findings are robust to the exclusion of sample firms with substantial foreign activity.

Despite smaller sample sizes, across many of these specifications, our results are similar to our earlier findings. All ETRR coefficients have the same sign as the analogous estimates in Panel B (A) of Table 2 (5) and all coefficients are statistically significant at conventional levels.

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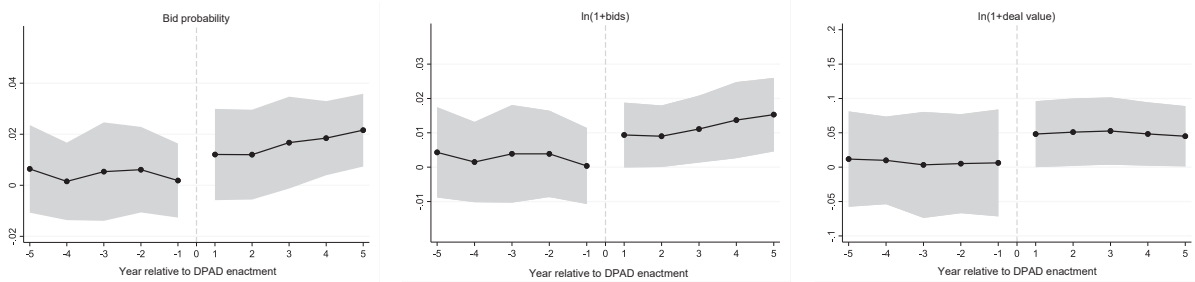
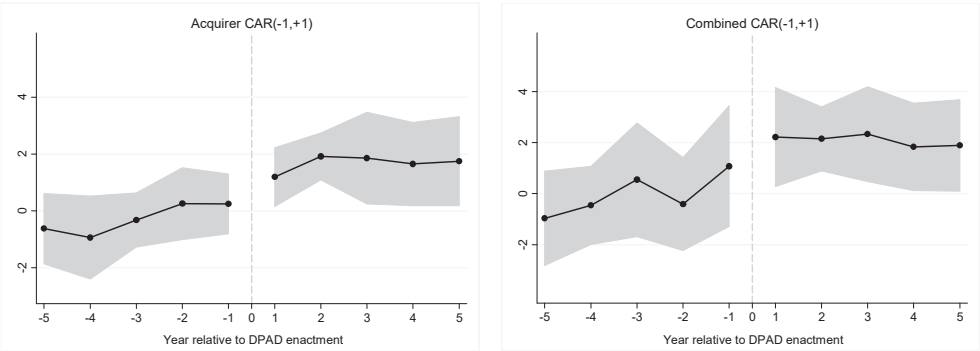
Panel A: M&A activity



Panel B: Deal quality



Panel C: Effective tax rates

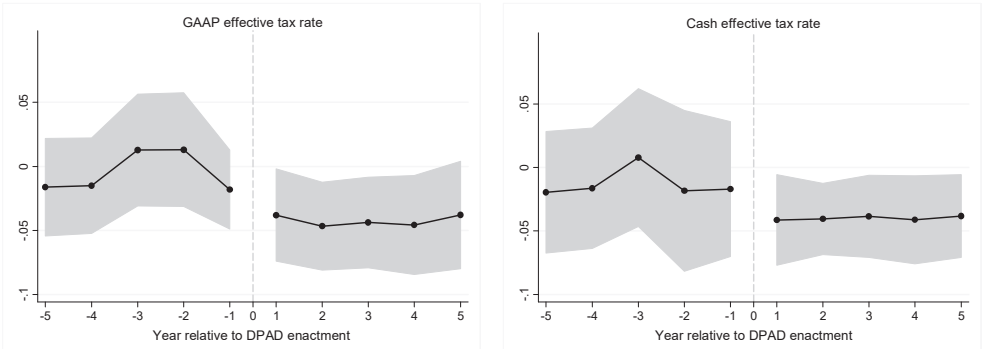


Figure B.1: Parallel trends: DPAD acquirers vs. non-DPAD acquirers. This figure plots OLS point estimates of the effect of DPAD on our outcome variables of interest. To cleanly identify the timing of the effect, we construct cohorts of treated and control firms for ten years (year −5 to +5) around the DPAD enactment year 2005 (year 0). We then pool the data across cohorts and regress the outcome variable on DPAD indicator (treatment vs control). The control firms (non-DPAD acquirers) are those operating in industries that get little or no benefit from DPAD. For every IRS industry, we add QPAI from fiscal years 2005 until 2012 and then divide this sum by the aggregated taxable income reported during the same period for all firms in the same industry. The control group consists of firms belonging to any of the 21 industries for which this ratio is less than 3% (corresponding to the first quartile of the ratio's distribution). The treatment (DPAD) group is populated by the remaining firms. We exclude the indicator for year 2005 (0) so that the OLS point estimates map out the effect relative to year 0. The goal of these plots is to determine whether there is a clear visual change in the trend of the variables around DPAD enactment. The black points represent the point estimates and the gray shading represents 90% confidence intervals using heteroskedasticity-consistent standard errors clustered by industry and year.

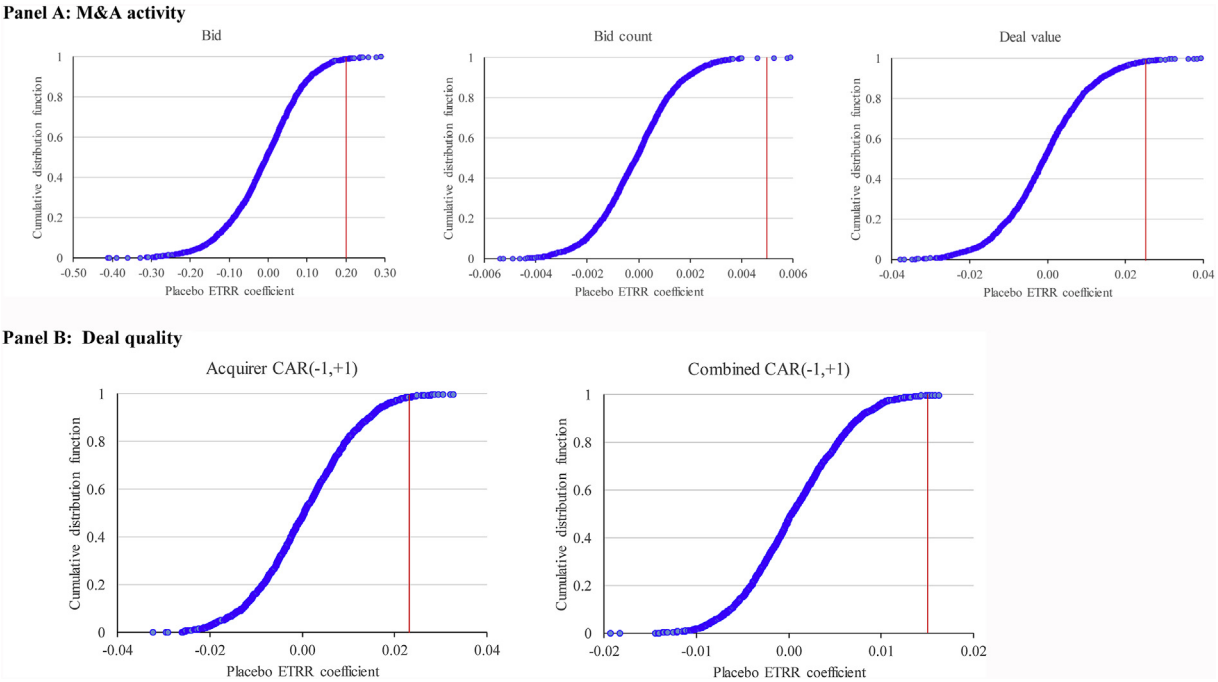


Figure B.2: Permutation tests. This figure plots the distributions of placebo effects for M&A activity variables (all-cash bid(0,1), ln(1 + # of all-cash bids), and ln(1 + all-cash deal value)) in Panel A and all-cash deal quality variables (acquirer CAR(-1,+1) and combined CAR(-1,+1)) in Panel B. Each cumulative distribution function is constructed by regressing each of the above acquisition outcome variables on 2000 randomly assigned ETRR treatments as in Table 2 Panel B Models (4), (5), and (6) in Panel A and in Table 6 Panel A Models (2) and (4), respectively. To create the random treatments, each IRS industry is randomly assigned another industry's actual ETRR treatment. We do not apply parametric smoothing. The vertical lines show the treatment effects reported in Table 2 Panel B Models (4), (5), and (6) and in Table 6 Panel A Models (2) and (4). For all-cash bid(0,1), 20 out of 2000 (1%) of the placebo coefficients are larger than the estimated effect in Table 2 Panel B Model (4) (0.2005). For ln(1 + # of all-cash bids), 3 out of 2000 (0.15%) of the placebo coefficients are larger than the estimated effect in Table 2 Panel B Model (5) (0.0052). For ln(1 + all-cash deal value), 28 out of 2000 (1.40%) of the placebo coefficients are larger than the estimated effect in Table 2 Panel B Model (6) (0.0253). For acquirer CAR(-1,+1), 26 out of 2000 (1.30%) of the placebo coefficients are larger than the estimated effect in Table 6 Panel A Model (2) (0.0231). For combined CAR(-1,+1), 5 out of 2000 (0.25%) of the placebo coefficients are larger than the estimated effect in Table 6 Panel A Model (4) (0.0150).

Table B.1
Parallel trends assumption and internal validity of DPAD.

Panel A: Frequency of bids made by DPAD acquirers vs. non-DPAD acquirers

Year	DPAD acquirers	Non-DPAD acquirers	Total	Year	DPAD acquirers	Non-DPAD Acquirers	Total
All	3342	1730	5072				
Pre-DPAD				*Post-DPAD*			
1997	39	13	52	2005	206	129	335
1998	351	241	592	2006	221	116	337
1999	356	162	518	2007	219	103	322
2000	320	141	461	2008	176	58	234
2001	203	114	317	2009	123	38	161
2002	167	89	256	2010	147	53	200
2003	186	126	312	2011	143	38	181
2004	214	134	348	2012	144	72	216
				2013	127	103	230
Total	1836	1020	2856	Total	1506	710	2216
Pre-DPAD				Post-DPAD			
% of deals	64.29%	35.71%	100%	% of deals	67.96%	32.04%	100%

z-stat for the difference in proportion of DPAD acquirers post- vs. pre-DPAD period: 2.74***

Panel B: M&A performance five years pre-DPAD trends

	DPAD acquirers		Non-DPAD acquirers		Difference	
	Mean	Median	Mean	Median	*t*	*z*
Year 2004 N = 348	N = 214		N = 134			
Acquirer CAR(-1,+1) %	0.75	0.08	−0.39	−0.31	1.41	0.84
Combined CAR(-1,+1) %	1.82	0.62	0.37	0.20	1.43	0.80
Year 2003 N = 312	N = 186		N = 126			
Acquirer CAR(-1,+1) %	−0.23	−0.42	−0.83	−0.90	0.74	0.78
Combined CAR(-1,+1) %	−1.31	−0.25	0.49	−0.32	−1.52	0.51
Year 2002 N = 256	N = 167		N = 89			
Acquirer CAR(-1,+1) %	−0.17	0.63	0.01	−0.03	−0.24	0.49
Combined CAR(-1,+1) %	1.65	2.29	1.08	0.01	0.42	0.74
Year 2001 N = 317	N = 203		N = 114			
Acquirer CAR(-1,+1) %	−1.43	−1.44	0.05	−0.30	−1.41	−1.53
Combined CAR(-1,+1) %	0.36	0.35	0.99	1.04	−1.26	−1.31

(*continued on next page*)

Table B.1 (*continued*)

Panel B: M&A performance five years pre-DPAD trends

	DPAD acquirers		Non-DPAD acquirers		Difference	
	Mean	Median	Mean	Median	*t*	*z*
Year 2000 N = 461	N = 320		N = 141			
Acquirer CAR(-1,+1) %	−1.62	−1.71	−1.00	−0.87	−0.77	−1.10
Combined CAR(-1,+1) %	0.03	0.15	0.99	0.94	−0.86	−0.92
Years 2000–2004 N = 1694	N = 1090		N = 604			
Acquirer CAR(-1,+1) %	−0.66	−0.70	−0.48	−0.50	−0.50	−0.57
Combined CAR(-1,+1) %	0.46	0.58	0.76	0.51	−1.29	0.93

Panel C: M&A performance once DPAD in effect

Years 2005–2013	DPAD acquirers		Non-DPAD acquirers		Difference	
	Mean	Median	Mean	Median	*t*	*z*
N = 2216	N = 1,506		N = 710			
Acquirer CAR(-1,+1) %	0.84	0.20	−0.13	−0.43	3.41***	4.57***
Combined CAR(−1,+1) %	3.28	2.26	1.59	0.91	3.73***	4.27***

Panel D: Effective tax rates pre- vs. post-DPAD

	DPAD acquirers		Non-DPAD acquirers		Difference	
	Mean	Median	Mean	Median	*t*	*z*
Pre-DPAD period						
GAAP effective tax rate %	29.86	35.15	29.98	33.26	−0.18	1.47
Cash effective tax rate %	25.54	23.49	26.04	21.19	−0.28	1.15
Post-DPAD period						
GAAP effective tax rate %	24.78	29.46	27.02	31.39	−3.04***	−2.46**
Cash effective tax rate %	22.70	20.75	25.85	26.89	−3.46***	−4.57***

Panel E: The effect of DPAD on effective tax rates

Dependent variable =	GAAP effective tax rate		Cash effective tax rate	
	Model (1)	Model (2)	Model (3)	Model (4)
ETRR	−0.0112***	−0.0095*	−0.0130***	−0.0102***
	(0.0018)	(0.0909)	(0.0001)	(0.0001)
t-test for (ETRR = −0.01): *t*-statistic	−0.3778	0.1063	−1.0098	−0.1538
Excluding firms with significant foreign operations	No	Yes	No	Yes
(Industry × Year) fixed effects	Yes	Yes	Yes	Yes
N	5072	3991	5072	3991
R^2	0.0360	0.0449	0.0356	0.0441
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001

The sample consists of 5072 domestic M&As by public acquirers announced during 1997–2013 described in Table 1. Panel A shows the frequency of bids made by DPAD acquirers vs. non-DPAD acquirers. Panel B presents statistics related to the parallel trends assumption for the difference-in-differences specification during the five years before DPAD is implemented. Specifically, Panel B compares the mean and median values in the M&A outcome variables for a treatment (DPAD) group and a control group. Panel C provides a similar comparison once DPAD is in effect. The control firms are those operating in industries that get little or no benefit from DPAD. For every IRS industry, we add QPAI from fiscal years 2005 until 2012 and then divide this sum by the aggregated taxable income reported during the same period for all firms in the same industry. The control group consists of firms belonging to any of the 21 IRS industries for which this ratio is less than 3% (corresponding to the first quartile of the ratio's distribution). The treatment (DPAD) group is populated by the remaining firms. Panel D shows summary statistics of GAAP effective tax rates and cash effective tax rates. Panel E presents the effect of DPAD on GAAP effective tax rates and cash effective tax rates. All variables are defined in Appendix A. In Panel E, standard errors are adjusted for heteroskedasticity and double-clustered by industry and year. We report p-values in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

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