Bankruptcy Claim Dischargeability and Public Externalities: Evidence from a Natural Experiment *

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Abstract

In 2009, the Seventh Circuit ruled in U.S. v. Apex Oil that certain types of injunctions requiring firms to clean up previously released toxic chemicals were not dischargeable in bankruptcy. This was widely perceived to represent a split with Sixth Circuit precedent, although Supreme Court cert was denied. Numerous legal commentators wrote of the significance of this decision in strengthening incentives for firms, and their creditors, to reduce the likelihood of costly environmental damage that would no longer be dischargeable in the event of bankruptcy. I show using difference in differences and triple difference methodologies that companies whose operations are confined to the Seventh Circuit (and thus likely to file for bankruptcy there) responded by reducing the volume of toxic chemicals they release on-site by approximately 15%. In place of these releases, firms substituted off-site treatment by specialized facilities generally considered to be safer for the environment. I also show evidence of a tightening of credit to impacted firms, helping shed light on the mechanism of influence via pressure from creditors. These results point to important ways in which bankruptcy law and other legal rules that impact recovery for firms' creditors can work to shape the positive or negative externalities those firms generate.

Keywords: Bankruptcy; Corporate Governance; Externalities; RCRA; Toxics Release Inventory

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1 Introduction

Under US bankruptcy law, a Chapter 11 reorganization is designed to give a struggling company a “fresh start.” Generally speaking, any pre-bankruptcy obligations that are not fully satisfied in the bankruptcy are “discharged” and cannot be pursued against the reorganized company. Congress has, however, carved out certain exceptions. In 2009, in \textit{U.S. v. Apex Oil Co.}, the US Court of Appeals for the Seventh Circuit issued a ruling that restricted the ability of corporations to discharge obligations to clean up toxic chemical contamination that they caused prior to filing for bankruptcy.

For Apex Oil, this meant being liable for an estimated $150 million in cleanup obligations which Apex argued it was immune to on account of its prior bankruptcy. This amount was by no means an outlier. Cleanup costs for the type of contamination faced by Apex Oil regularly run into the hundreds of millions or billions of dollars,\footnote{The National Priorities List (NPL) maintained by the EPA tracks sites with major toxic cleanup requirements subject to the Superfund program. These sites have cleanup requirements comparable to the site in question in Apex. Dixon et al. (1993) estimated average private party cleanup costs of $63 million per site in 2009 dollars or $74 million per site in 2018 dollars. And, these figures do not cover the costs of government contributions to cleanup at these sites, which occur when private parties are unable to pay for needed cleanup.} and newly contaminated sites were identified in the Seventh Circuit at a rate of more than one per year in the period leading up to the Apex decision.\footnote{For instance, in the ten years leading up to the Apex decision, twelve new sites were added to the NPL in the Seventh Circuit alone. And, not all sites with serious contamination as in Apex are added to the NPL. For a listing of these sites, see https://www.epa.gov/superfund/superfund-data-and-reports.} Apex appealed the Seventh Circuit’s ruling to the Supreme Court. It cited, amongst other factors, a ruling by the Sixth Circuit that had reached the opposite conclusion when interpreting comparable statutory language. Apex Oil argued that the Supreme Court should act to resolve this circuit split. The High Court, however, declined review, letting the Seventh Circuit’s decision stand.

What happens when a ruling such as Apex changes which parties will bear the burden of environmental cleanup if the polluting firm declares bankruptcy? Could such a ruling also impact the likelihood that such cleanup will be needed in the first place?

To investigate this, I start with an analysis of the legal context of the Apex decision. This highlights the ways in which Apex expanded the scope of non-dischargeability, even beyond what existed under environmental statutes such as CERCLA. I examine how this expansion of non-dischargeability can lead to greater losses to firms’ creditors in the event of substantial toxic contamination. This creates a
plausible mechanism by which firms’ observable behavior will be impacted: after *Apex*, creditors had greater incentives to induce borrowers to reduce their risks of causing toxic contamination.

Did creditors actually take such actions to influence borrower behavior? To answer this, I analyze the content of loan agreements made between banks and a sample of industrial firms impacted by the *Apex* ruling. Public companies regularly disclose major loan agreements in their securities filings. Thus, I am able to examine loan agreements amongst the subset of Seventh Circuit firms that are both public corporations and that handle toxic wastes of the type impacted by the *Apex* decision.

The loan agreements reveal two pertinent facts. First, they confirm that lenders are indeed aware of and concerned about toxic chemical contamination by the firms they lend to. Second, these documents provide anecdotal evidence that creditors became substantially stricter within the Seventh Circuit following the *Apex* decision. Post-*Apex* loan agreements introduce a variety of mechanisms, such as on-site inspections by environmental engineering firms (hired by lenders), that induce borrowers to handle toxic chemicals more carefully. In particular, these agreements encourage a shift from disposing of wastes on properties owned by borrowers and towards hiring specialized third parties to treat them off-site. Environmental experts with whom I consulted uniformly agreed that such a shift to specialized, off-site treatment serves to meaningfully reduce the risk that firms cause catastrophic contamination.³

Given these incentives and actions by lenders, was there any observable impact from *Apex* on outcomes of interest to the general public? For this, I examine data from the federal Toxics Release Inventory (TRI). This gives detailed information on the amounts of toxic chemicals that are handled by industrial facilities throughout the United States and how those chemicals are disposed of. From amongst these facilities and their parent companies, I identify a set of firms that operate exclusively or primarily within the Seventh Circuit. I document that bankruptcies by firms such as these have a high likelihood of being in the Seventh Circuit, thus making them subject to the *Apex* ruling. I next show that efforts to escape the ruling by filing in other circuits will generally be ineffectual.⁴

I contrast the post-*Apex* behavior of these exclusively Seventh Circuit firms with two different “con-

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³These experts also agreed that this shift in handling of wastes is generally superior from a public interest perspective, given the greater safety standards of firms that specialize in treating and disposing of toxic wastes. In Appendix C.5 I provide additional statistics pointing to the greater safety of specialized treatment and disposal facilities.

⁴Section 3.7 presents details on this.
trol” groups: first, firms that operate exclusively in other judicial circuits, and second, industrial facilities within the Seventh Circuit that are owned by firms that have operations across the country. I document that these “national” firms are much more likely to file for bankruptcy in Delaware, which already had a judicial precedent similar to Apex, making them less impacted by the decision.

Using difference in differences and triple differences statistical tests, I find that Seventh Circuit firms affected by Apex reduced the amounts of toxic wastes they dispose of on-site by approximately 15-25% and increased the amounts they send off-site to specialized treatment facilities by approximately 30%.

The decrease in on-site disposal and the increase in off-site treatment occur at precisely the same time following the Apex decision. Both effects are highly statistically significant, and are robust across the difference in differences and triple difference tests. I focus investigation on the chemicals identified by federal regulations as being governed by the Resource Conservation and Recovery Act (RCRA), the environmental statute interpreted by Apex.

In placebo tests, I look for an impact from Apex amongst chemicals not governed by RCRA, and see no meaningful change. I also look for an impact on air releases of toxic chemicals, which are not suited to retroactive cleanup orders of the type affected by Apex, and I find no impact from the decision. In similar tests, I investigate facilities designated as “Conditionally Exempt Small Quantity Generators” under RCRA. These facilities handle relatively small amounts of toxic chemicals, and are exempt from most RCRA requirements. I likewise see no impact from Apex on these facilities.

Taken together, these placebo tests, and the triple difference formulation, make it unlikely that the results I find could be explained by a factor such as a general tightening of environmental enforcement within the Seventh Circuit or some other event contemporaneous to the Apex decision such as the financial crisis. If, for instance, a general regulatory tightening were the cause, it would be challenging to explain why it would only impact facilities in the Seventh Circuit owned by firms likely to file for bankruptcy in the Seventh Circuit, but not facilities in the Seventh Circuit owned by “national” firms. It would similarly be difficult to explain why it would impact only ground based releases of toxic chemicals but not air releases, why it would only impact chemicals regulated under RCRA but not others, and why

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5 The discrepancy of the magnitude of these percentage changes is explained in part by the fact that prior to the ruling, facilities' total on-site disposal amounts were greater than their total amounts of off-site treatment, hence when the same volume of chemicals is shifted from one method to another, the percentage change is different.
it would have no impact on the set of facilities exempt from RCRA regulations.

The results are also robust to firm-size-by-time fixed effects to control for the possibility, discussed by Catan and Klausner (2017), that larger and smaller corporations are affected by different economic trends. Additionally, I conduct placebo tests in which I assume, counter to reality, that the Apex decision had occurred in each of the judicial circuits besides the Seventh. These counterfactuals show no meaningful responses to Apex.

To gather further information on creditor responses to Apex, I merge the data from TRI with public company information in Compustat. I find some evidence that lenders tightened credit to firms impacted by Apex in the wake of the ruling, with total credit extended declining by approximately 8%. Because only a subset of firms in the TRI data are also public companies, however, these findings are less statistically precise and less conclusive than the main results on changes in waste disposal procedures.

If firms shifted how they dispose of toxic wastes following Apex, it suggests that their new practices must be to some extent more expensive than their prior ones. But, was the cost difference small or large? The fact that (presumably profitable) firms exist that specialize in treating wastes suggests that in at least many instances the extra costs to outsource treatment and disposal are relatively small.

To gain more insight into this question, I look at total industrial output and profitability of firms impacted by Apex. I find no evidence of a drop in output or profitability. An absence of evidence does not equal evidence of an absence. While the results of my tests do not rule out a small reduction in output or productivity, they can bound the magnitude of a possible decline. I show, for instance, that a decline in output of greater than 5% can be rejected at roughly a 90% confidence level.

Taken together, these findings suggest that the Apex decision induced changes that were relatively low-cost, but that also had some meaningful impact on reducing pollution harms. A precise cost-benefit analysis, however, is beyond the scope of this paper.

For firms to have plausibly changed their behavior due to Apex, the decision must have been significant and surprising. In its web review of the decision, the American College of Environmental Lawyers wrote that the case, “will likely reverberate around the country for years to come” (Rosenthal, 2010).

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6For these, I calculate each firm’s total waste production pre-Apex as a measure of its size. I compute deciles from this distribution and interact them with a categorical variable for year.
C. Douglas Goins, associate general counsel for environmental affairs at Lockheed Martin, wrote that the case “will have a major impact on debtors, creditors and the government” (Goins and Bean, 2010). Apex was the titular or primary focus of numerous articles in law reviews and practice journals, and was the subject of more than two dozen client alerts by law firms.

Philip Hinerman, a partner in the environmental division of the national law firm Fox Rothschild, published an article shortly after the Apex decision in which he wrote: “the Apex Oil case seems on its face contrary to a case that practicing attorneys had relied on for a number of years, In re Whizco (6th Cir 1988)” (Hinerman, 2010). Mr. Hinerman noted that “[i]n the past, we were able to tell our clients that lawyers could help ‘sanitize’ a property through bankruptcy proceedings ... However, you cannot give that kind of advice to a client in light of cases such as Apex Oil.”

To get a fuller sense of the extent to which Apex was surprising and significant, I interviewed half a dozen attorneys who advise clients in the Seventh Circuit whose activities are regulated under RCRA. Section 3.6 gives a fuller account of these interviews, but one is particularly informative for understanding the impact of the Apex ruling. In the Apex case, there were actually five separate firms whom environmental regulators sought to hold jointly liable for cleanup of pollution contamination near the town of Hartford, Illinois. Four of these firms voluntarily agreed to a consent order to clean up the pollution, but the fifth, Apex Oil Co., refused, citing its prior bankruptcy and discharge.

One of the attorneys I interviewed represented a firm who voluntarily agreed to participate in the cleanup. By this person’s account, the Illinois Environmental Protection Agency declined to pursue further action against Apex Oil, believing that this would be futile due to Apex’s prior bankruptcy. In the face of this, counsel for the four companies that had entered into the cleanup agreement worked together to develop a legal strategy by which Apex could be required to participate in the cleanup. They then worked to convince the federal Environmental Protection Agency that pursuing such a strategy could have a viable chance of success. At least based on this account, the fact that neither the state nor the federal authorities considered it an easy or obvious matter that Apex Oil could be held responsible

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7To cite a few: Gardner and Pusha III (2014); Rdzanek (2010); Haider et al. (2010); Fil (2009); Viteskic (2010)
8These included major national firms such as Perkins Coie (Hird, 2010) and Weil (Bledsoe, 2010), as well as a great number of smaller firms, many in the Seventh Circuit, that specialize in counseling and representing firms handling the types of toxic chemicals that were at the center of the Apex ruling. A full set of copies of these alerts is available upon request.
for cleaning up its pre-bankruptcy contamination points strongly to the fact that Apex decision was a surprising and significant legal development.

The findings in this investigation have several implications for policy. Although the Supreme Court declined to review the Apex decision in 2010, close to a decade has now passed and the composition of the Court has changed meaningfully. Thus, the High Court could choose to resolve the circuit split that it has thus far not addressed. This study shows the potentially significant impact from either extending the Apex holding beyond the Seventh Circuit or from reversing the holding where it currently governs.

This study also informs congressional action. Environmental issues are a consistently and perhaps increasingly important part of political deliberation in the United States. This investigation shows that the precise wording of any legislative reforms could be consequential in ways that are far from obvious. An interesting facet of Apex is that it turned on how a particular wording in the RCRA statute interacted with text from the Bankruptcy Code, yet it is all but certain that the RCRA provision was not written with a mind to such interaction. This study shows that unintended legislative details can have large impacts for outcomes of interest to policymakers.

The findings in this study have potentially broader policy implications as well for how corporations are governed and how they do (or do not) externalize harms to the public. While it is on some level intuitive that firms might respond to the Apex decision in the ways documented here, it is by no means certain that they would. Apex impacted how obligations are handled in bankruptcy. As a first order matter, therefore, a firm's shareholders will already frequently have lost their investments, and the firm's top managers may well have lost their jobs. Instead, it is only a firm's creditors who are most directly impacted by this ruling. The fact that firm behavior as a whole changed suggests that changes in bankruptcy law, and potentially legal changes more generally that impact creditors, have the potential to be useful tools for constraining negative externalities.9

9In particular, as described in further depth in Appendix B.1, the key issue for Apex was whether the provisions of RCRA that enabled the EPA to demand cleanup also enabled the EPA to accept monetary compensation to cover the costs of that cleanup in lieu of the responsible party cleaning up the contamination directly. Paradoxically, the fact that the EPA's powers were more limited in statute, barring it from pursuing a monetary judgment, was the only reason that the Apex case reached the decision that it did and not a precisely opposite result.

10Nearly identical considerations also apply to how state environmental legislation interacts with the US Bankruptcy Code, meaning that these considerations can be relevant even when individual states take legislation action to revise their environmental codes.

11As I document in Section 4 below, even if managers are retained post-reorganization Apex should do little to directly influence their incentives.

12The potential importance of policy that impacts firm creditors as a tool to improve firm externalities is emphasized by two other factors as well. First, there is already an extensive literature that points to the importance of firm creditors in corporate governance more generally
The remainder of this paper proceeds as follows. Section 2 considers prior literature. Section 3 analyzes the legal background of Apex. Section 4 discusses the mechanisms through which Apex could plausibly impact firm behavior. Section 5 presents data on chemical disposal practices of industrial facilities. Section 6 presents the main statistical analyses. Section 7 discusses validation, robustness, and extension analyses, and Section 8 concludes. The Appendix offers additional details on robustness tests, legal analysis, and data construction.

2 Prior Literature

To my knowledge, this is the first empirical study to seek to isolate a causal impact on firm behavior of a change in bankruptcy law governing claim dischargeability or priority. There is, however, a rich literature that relates more broadly to the themes of this investigation.

One important and closely related study is Akey and Appel (2017) which uses TRI data and methods similar to this study to investigate how a change in limited liability protection impacted the toxic chemical release behaviors of firms. Boomhower (2019) examines how insurance and bonding requirements for fossil fuel producers can also address challenges of pollution externalities caused by limited liability production. Ringleb and Wiggins (1990) investigate the potential implications of limited liability protection for harm-externalizing behaviors of firms, and studies such as Feinstein (1989), Rose (1990), Dionne et al. (1997), Earnhart and Segerson (2012), Goetz (2018), Gao et al. (2018), and Chang et al. (2018) consider extensions of this analysis by investigating how financial risks and strains on firms relate to their public externalities. Theoretical grounding for the analyses of bankruptcy and limited liability law in influencing pre-bankruptcy firm behavior is developed by work such as Jensen and Meckling (1976); Black and Scholes (1973); Posner (1976); LoPucki (1996); Bebchuk and Fried (1995) and Hansmann and Kraakman (1991). Papers that look more generally at how legal rules such as liability standards impact firms’ toxic chemical contamination and harm externalizing behaviors include Alberini and Austin (1999); Alberini and Frost (2007); Boyer and Porrini (2011) and Chang and Sigman (2014). Papers investigating the general challenges of enforcing environmental regulations in (see, e.g., Triantis and Daniels, 1995; Baird and Rasmussen, 2005). Secondly, many US corporations are rapidly becoming even more heavily financed by debt, likely raising even further the prominence of creditors in US corporate governance.
the context of bankruptcy include Kornhauser and Revesz (1990, 1994, 1995).

This paper also contributes to a line of recent literature examining externalities associated with corporate bankruptcies, such as Bernstein et al. (2019a) and Bernstein et al. (2019b). Finally, this paper adds to investigations of loan covenants and how they mediate relations between creditors and borrowers, as explored, for instance, in Chava and Roberts (2008); Nini et al. (2009); Gopalakrishnan and Parkash (1995); Sweeney (1994); DeFond and Jiambalvo (1994); Chen and Wei (1993); Beneish and Press (1995).

3 Legal Background

3.1 Facts of the Apex Case

Apex Oil was formed in 1979 and throughout the 1980s operated an oil refinery in Hartford, Illinois. During this period, the refinery and pipelines connected to it suffered repeated failures in their environmental controls. This led to substantial pollution of the soil and groundwater in and around the town of Hartford, including one striking incident in which several public streets in Hartford were flooded, four to five inches deep, with fuel oil from the refinery.

In 1987, Apex filed for Chapter 11 bankruptcy. In 1988, while in bankruptcy, Apex sold the Hartford Refinery to Premcor Refining Group. In 1989, a new Apex Oil company was incorporated, merging with the old Apex Oil company in bankruptcy, thus effecting a reorganization. As part of the reorganization, Apex switched its line of business from oil refining to wholesale distribution.

In 2003, the US Environmental Protection Agency (EPA) assumed primary responsibility for enforcing cleanup of the area around Hartford. In 2003 and 2004, the EPA obtained agreements to begin cleanup operations from four companies it identified as responsible for the pollution in Hartford: Premcor Refining, Shell Oil, BP Amoco, and Sinclair Oil Co. Apex was the fifth and final party identified by the EPA as responsible. Apex refused to participate in the cleanup, arguing that any responsibility for

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13 Except as otherwise noted, all information in this background facts section is from the district court judgment: U.S. v. Apex Oil Co., Inc., Not Reported in F.Supp.2d (2008).

14 These were companies that had done business with Apex while it operated the refinery, companies that owned pipes going into and out of the refinery, and companies that operated the refinery during periods other than when it was owned by Apex.
the cleanup was discharged in its bankruptcy. In filings, Apex argued that it would cost $150 million to fulfill its cleanup obligations.

The US EPA brought suit under the Resource Conservation and Recovery Act (RCRA), seeking an injunction to force Apex Oil to participate in the cleanup. The question for the court to decide was whether this injunctive demand was the type of obligation that would have been discharged in Apex's prior bankruptcy. As described in more detail in Section 3.5 below, the Supreme Court in *Ohio v. Kovacs*\(^{15}\) had previously held that where the only way a debtor in bankruptcy can comply with an environmental cleanup order is by paying money to a regulator, then that order is akin to other obligations like debts and tort liability and thus dischargeable in bankruptcy.

Apex Oil argued that the only way that it could comply with the EPA injunction was by paying a third party the estimated $150 million in clean-up costs, and that being required to pay this money to a third party was the functional equivalent of being required to pay money to the EPA.\(^{16}\) Apex argued that it was incapable of performing the cleanup itself both because it no longer owned the contaminated site and because it was no longer in the oil refining business and thus lacked the specialized equipment and personnel needed for the cleanup.

The Seventh Circuit’s opinion,\(^{17}\) however, argued that the mere fact that Apex Oil would need to spend money to comply with the injunction should not be determinative. Thus, for the Seventh Circuit, whether the money was to be paid to a third party or to the government determined whether the EPAs demand was dischargeable. Judge Posner, who authored the opinion, reasoned that nearly every injunction imposes costs which can be expressed in monetary terms and that a ruling contrary would make it “unlikely that the state could effectively enforce its laws.”\(^{18}\)

An essential component of Judge Posner’s reasoning in this was that RCRA, unlike many other environmental statutes, did not grant the EPA the right to demand monetary compensation in lieu of compliance with a cleanup order. In the view of the Seventh Circuit, this made RCRA obligations sufficiently distinct from the more traditional types of debts and monetary obligations that fell under the

\(^{15}\)469 U.S. 274.


\(^{17}\)United States v. Apex Oil Co., 579 F.3d 734 (7th Cir. 2009).

\(^{18}\)Appendix B.1 provides more information on the precise terms in the bankruptcy code whose interpretation was at play in these arguments.
scope of dischargeable “claims” under the U.S. Bankruptcy Code. Paradoxically, the EPA’s more limited powers under RCRA were crucial to granting it greater ability to pursue post-bankruptcy corporations.

As discussed in Section 3.4, had Apex Oil still been operating the Hartford Refinery, the result in Apex would have been unremarkable: alternative legal mechanisms would have been available by which the EPA could have compelled cleanup of the facility. What was surprising was that Apex was held liable for the cleanup despite no longer having any connections to the contaminated land.

3.2 Liability under the Resource Conservation and Recovery Act (RCRA)

The specific environmental statute that the EPA used to bring its ultimately successful case against Apex Oil was the Resource Conservation and Recovery Act (RCRA). In order to understand how Apex might impact firm behavior, I analyze in this section how liability can accrue under RCRA and what steps firms can take to reduce their risks of such liability.

RCRA contains extremely broad and powerful enforcement provisions. As a result, liability for toxic contamination cleanup under RCRA, which the Apex case made more difficult to discharge in bankruptcy, can accrue to companies in many situations; it can be extremely difficult to avoid via other legal mechanisms, and it can be very costly to comply with. In Apex, the EPA brought suit under RCRA §7003, the “imminent hazard” provision which states:

Notwithstanding any other provision of this chapter, upon receipt of evidence that the past or present handling, storage, treatment, transportation or disposal of any solid waste or hazardous waste may present an imminent and substantial endangerment to health or the environment, the Administrator may bring suit on behalf of the United States . . . against any person . . . who has contributed or who is contributing to such handling, storage, treatment, transportation or disposal . . . to order such person to take such . . . action as may be necessary . . .

42 U.S.C.A. §6973

In other words, any time the EPA determines that past or present hazardous waste pollution may have created an imminent and substantial endangerment of health or the environment, the Administrator can bring suit to require essentially any party it finds contributed to the hazard to take whatever actions the EPA deems necessary in order to address the hazard. The liability under this provision is strict.19 As one practice manual describes it:

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19Apex District Court judgment, 2008 WL 2945402.
The breadth of those potentially liable under §7003 is demonstrated by the fact that even if the persons or activities causing the potential endangerment are not subject to any other provision of RCRA or other environmental law, they can be liable under the imminent hazard provision. [...] Furthermore compliance with a regulation or permit under RCRA is not a shield to a §7003 action to address a potential endangerment. (Broun and O’Reilly, 2018, §5.30, internal quotations omitted)

In particular, then, legal provisions that would normally exempt a firm from RCRA regulatory requirements, do not have a direct bearing on whether a firm can be required to comply with EPA orders to clean up catastrophic contamination of the type dealt with in Apex.

If a company does find itself targeted with an enforcement action under RCRA §7003 the results can be extremely expensive. The cleanup at issue in Apex was estimated to cost $150 million. Discussions with practitioners confirm this is by no means an outlier, either. $50 to $100 million is often the lower bound for costs to clean up a polluted site, and costs can reach well into the hundreds of millions or even billions of dollars if the contamination is extensive or in a highly populated area.

The strong enforcement powers under RCRA should not, however, be interpreted to imply that environmental cleanup liability is in any way an “act of God,” randomly striking companies with hundreds of millions of dollars in cleanup obligations regardless of how firms comport their operations. Instead, there is broad agreement that firms can and do take concrete steps to limit their liability.

One effective way to reduce risks of catastrophic contamination liability is for a firm to reduce the extent to which it disposes of toxic chemicals on site (in on-site landfills, in releases to on-site waterways, and so forth) and to instead hire a specialized company to take possession of its toxic wastes for proper treatment and disposal. The lawyers and other experts I spoke with who advise firms on RCRA compliance consistently agreed that doing this was a meaningful way that firms could reduce their likelihood of significant liability under RCRA.

Environmental experts that I spoke with also consider the move from on-site disposal to off-site treatment of wastes to generally be superior from a public interest perspective. Specialized facilities tend to have economies of scale that facilitate better treatment and containment of toxic chemicals.

20 For example: releasing RCRA-regulated chemicals into waterways, which can in some instances trigger a switch to regulation under the Clean Water Act, rather than RCRA.

21 Another related point is that although the Apex decision itself dealt specifically with §7003 of RCRA, other environmental laws, such as the Clean Water Act, have enforcement provisions very similar to those in RCRA §7003. See, e.g. Gross and Anderson (2010), an early analysis of the Apex decision that discusses its relevance for the Clean Water Act as well.

22 See the introduction to this paper and footnotes 1 and 2 for more specific statistics on the costs and frequency of catastrophic chemical contamination events.
Appendix C.5 gives further statistics that support this conclusion. Another option firms have is to increase the care with which they operate their facilities to reduce the likelihood of leaks and similar failures that can lead to large pollution contamination.

### 3.3 Chapter 11 Bankruptcy and Dischargeability of Claims

Even given an understanding of what actions can reduce or increase risks of liability under RCRA, it is necessary to understand how RCRA liability will influence outcomes in a bankruptcy process in order to locate the ways in which the Apex ruling was significant. This in turn requires an understanding of the dischargeability of claims in bankruptcy, which I address in this section.

#### 3.3.1 The Challenges of Defining Dischargeability

Chapter 11 of the Bankruptcy Code provides mechanisms for a corporation that is struggling financially to restructure its obligations and to hopefully re-emerge as a profitable and productive part of the economy. In a Chapter 11 reorganization, parties to whom the corporation has monetary or other obligations must file claims with the bankruptcy court by a given deadline.

Bankruptcy law governs how much each of these parties will receive on their claims, with some parties generally receiving less than the total value they would have expected had the corporation not become financially distressed. In theory, and generally in practice as well, all claimants are entitled to receive at least as much in a reorganization as they would have gotten had the corporation been liquidated. A Chapter 11 bankruptcy thus seeks to make all parties at least as well off as they would have been in a liquidation, and at least some parties better off, thereby generating a social surplus.\(^23\)

After a Chapter 11 reorganization, generally speaking, claims against a corporation stemming from activity prior to its bankruptcy filing are discharged. Thus, even if a party received only a small fraction of the amount owed to it, it will have no right to seek additional payment. Parties that failed to submit claims at all will have no right to any recovery.

There are, however, exceptions to this general framework. In particular, not all pre-bankruptcy obligations of the corporation can be discharged in a Chapter 11 reorganization. For instance, corpo-

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\(^23\)The surplus comes from the fact that in many situations, a corporation is “worth more alive than dead.”
rations prior to bankruptcy have obligations to obey federal and state laws. These obligations cannot be “discharged” en masse through bankruptcy.

More difficult situations arise, however, where there is ambiguity over whether the target of an injunction pertains to a reorganized corporation’s post-bankruptcy activity or its pre-bankruptcy activity. For instance, what if chemicals enter a river not through being directly and illegally dumped, but via leaking underground tanks owned by a corporation, with the leaks likely having started pre-bankruptcy? Can the reorganized company be compelled to repair the tanks? Even more difficult, what if the tanks have already leaked and contaminated the surrounding soil, such that repairing the tanks alone would not sufficiently reduce the harm being caused to the waterway? Would perhaps the injunction to fix the tanks be maintained through bankruptcy, but the injunction to clean the surrounding soil be discharged? And, how (if at all) will the answers to these questions change depending on whether the reorganized corporation still owns the contaminated site? Courts have grappled with these issues for more than three decades now.

3.3.2 The Implications of Non-Dischargeability

Within a firm, dischargeability is primarily relevant for the firm’s creditors. If an insolvent firm enters bankruptcy, the general result will be that its creditors will own the post-reorganization firm.\(^\text{24}\) Any obligations that are not discharged will carry over to the post-reorganization firm, making it less valuable than it otherwise would be. Since it is the firm’s creditors who now own the firm, this translates into larger losses for the creditors. Thus, Apex is best understood as increasing losses to creditors in the event a borrower enters bankruptcy with substantial environmental cleanup obligations.

3.4 CERCLA and the Broader Context of Environmental and Bankruptcy Law

On its face, the Apex ruling established that a cleanup order under RCRA was a non-dischargeable obligation in bankruptcy. This fact alone is sufficient to understand the impact of the decision for the Apex Oil Company. To understand the relevance of the decision for other corporations, however, it is

\(^\text{24}\) Some creditors may instead receive cash, and others may take new debt in the firm. Neither of these variations, however, substantially alters the conclusions of this analysis because the value of the cash or the debt will be directly related to the net value of the post-reorganization firm.
first necessary to investigate limits to dischargeability that existed even prior to the *Apex* decision. This thus helps to situate the *Apex* ruling as one that expanded the scope of non-dischargeable obligations beyond what existed previously under other environmental statutes such as CERCLA.

### 3.4.1 Legal Framework

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and its state equivalents, set the baseline framework for dischargeability that *Apex* altered. Under CERCLA, the owner or operator of a property is liable for containing and cleaning up pollution on that property regardless of how that pollution was deposited there.\(^{25}\) This means that if a firm contaminates land, declares bankruptcy, and seeks to sell that land in the bankruptcy proceeding to pay its creditors, the value of the land will be reduced by the costs of cleaning up the contamination (which the new owners will be liable for). This will apply regardless of how dischargeability is addressed in a bankruptcy proceeding. Similarly, if a firm reorganizes and continues to operate on contaminated land, it will still be liable for cleaning up the land it owns, even without the innovations of the *Apex* ruling.\(^{26}\)

The key to understanding the impact of the *Apex* decision therefore is to identify the set of scenarios in which this baseline non-dischargeability under CERCLA would be inapplicable. One of the most important of these are a range of scenarios in which a firm does not own land that it has contaminated with toxic wastes. The *Apex* case is itself an example of one of these scenarios: *Apex Oil* had subsequently sold the property that it had contaminated. Similar fact patterns involving a sale of contaminated land followed by a bankruptcy proceeding occur in other cases as well. See, e.g., *In re Cottonwood Canyon Land Co.*\(^{27}\) and *In re Mark IV Indus.*\(^{28}\) A related situation is where a firm operates on and contaminates land that they have leased or otherwise do not own. See, e.g., *Matter of U.E. Sys., Inc.*\(^{29}\) and *In re Torwico*.\(^{30}\)

In each of these cases, all of which have addressed CERCLA, courts adopting holdings congruent with *Apex* (*Mark IV*, *Torwico*) have held the environmental cleanup orders to be non-dischargeable,

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\(^{25}\)See in particular CERCLA §106 and §107(a).

\(^{26}\)See Appendix B.5 below for additional documentation and details relating to this.

\(^{27}\)146 B.R. 992 (Bankr. D. Colo. 1992)


\(^{30}\)8 E3d 146 (3d Cir. 1993)
whereas courts following precedents contrary to Apex (Cottonwood Canyon, Matter of U.E. Sys.) have found the orders dischargeable. In these situations then, whether a court adopts an opinion congruent with or contrary to Apex can easily translate into millions or tens of millions of dollars of difference in recovery for a firm's creditors.

A related scenario, which came up directly in the facts of the Apex case, is that a firm may release toxic chemicals on one parcel of land that subsequently travel to another parcel of land which then requires cleanup. Here again, this generates a situation in which at least a portion of the contaminated land will not be owned by the firm in bankruptcy. Apart from the Apex case I have not found other cases within the Seventh Circuit that follow this fact pattern. But, the logic and likely difference in outcomes between precedents supporting or opposing dischargeability is likely comparable here.

3.4.2 A Concrete Example: CERCLA, Dischargeability, and Strategic Liquidation

To make these discussions more concrete, consider the following scenario. Suppose that a firm has borrowed $90 from a bank with the loan secured by all of the firm's tangible and intangible assets. The firm's assets are valued at $100 as a going concern. The firm is discovered to have contributed to toxic contamination on land that it does not own. This contamination will cost $50 to clean up and the EPA threatens to bring suit against the corporation if it does not begin immediately remedying the contamination. The firm now has a new liability on its balance sheet (for the cleanup) worth $50, giving it net value of -$40. With this capital structure it is impossible for the firm to get any new financing or in general to operate effectively. The firm therefore declares bankruptcy.

At this point, environmental regulators have the option to either clean up the contamination themselves and then sue the company for contribution under CERCLA §107(a), or they can bring an injunction demanding the firm clean up the contamination (as the EPA did under RCRA §7003 in the Apex case). In this situation, if the EPA knows that their injunctive order would be dischargeable, it will be

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31 At the time of this writing I have yet to conduct a complete review of the hundreds of district and bankruptcy court cases in other circuits addressing issues similar to Apex.
32 This is a relatively common provision in the loan agreements I analyze below.
33 $100 in asset value minus ($90 + $50) in liabilities.
34 It is this right to demand money compensation in lieu of demanding compliance with a cleanup order that would render CERCLA actions against a party that does not own the contaminated land dischargeable in bankruptcy. This would apply even under the Seventh Circuit's holding in Apex.
optimal for them to instead conduct the cleanup themselves and sue for damages.\textsuperscript{35} In that case, they will have, as in \textit{U.E. Systems}, an unsecured claim for $50 in the firm's bankruptcy proceedings. $90 of the firm's asset values will go to meet the bank's secured loan, leaving $10 in recovery for the EPA.

Conversely, under a holding such as \textit{Apex}, the EPA will find it optimal to bring a non-dischargeable injunction to force the firm to clean up. On its face, then, this injunction would carry forward in full force after the firm's bankruptcy. The creditors would likely need to accept roughly a $40 writedown on their loan, leaving the post-bankruptcy firm with, roughly, $50 in debt to the creditors and $50 in cleanup obligations to the EPA.\textsuperscript{36}

On its surface then, the difference between the \textit{Apex} holding and its opposite is the difference between the creditors getting $90 in value and the EPA getting $10, versus each party getting $50. This analysis so far, however, leaves out an important consideration. Namely, the firm's creditors, who will control the bankruptcy process, also have the option of liquidating the firm and selling off its assets piecemeal. In a liquidation, an injunction will not be effective because there is no post-bankruptcy firm whose behavior can be compelled.

The disadvantage of a piecemeal liquidation, from both the perspective of the creditors and of society as a whole, is that it will frequently destroy value in the firm. Much of the purpose of a company is to take component assets and combine them into something more valuable. It is challenging to estimate how big of a difference there is in a firm's value as a going concern versus in liquidation because, for instance, it is rare that the same firm at the same time will be put to a competitive auction both for its assets in a piecemeal sale as well as for the firm sold as a single entity. In the recent and prominent example of the Chrysler bankruptcy, the presiding judge found the firm's assets to be essentially worthless in liquidation, though there were significant procedural weaknesses that make it hard to place a high degree of confidence in this valuation (Adler, 2010). For the purposes of this discussion, I assume a 30% reduction in value from selling a firm's assets in a piecemeal liquidation.

Turning back to the scenario at hand, if the firm's creditors reorganize in response to an injunction, \textsuperscript{35}\textsuperscript{36}This conclusion is a slight simplification and leaves out certain strategic aspects relating to negotiations between the EPA and the firm's creditors that are discussed below. But, these do not materially impact the conclusions presented here. \textsuperscript{36}Practically speaking, some or all of the debt in this case would likely be converted into equity in the new firm, but nothing about that alters the results of this analysis.
they will get $50 and the EPA will get $50. If instead they liquidate the firm’s assets, they will receive $70. As a practical matter, the firm’s creditors and the EPA would like to avoid such a value-destroying liquidation. The $70 the creditors could acquire in a liquidation thus represents their BATNA (Best Alternative to Negotiated Agreement) in these negotiations, with the EPA and the creditors presumably finding some agreement whereby each claims a portion of the surplus in value that is maintained by not liquidating the company.

Thus, a more accurate view of the impact of dischargeability here is that it will mean the difference between a firm’s creditors getting the full value of their security interest ($90), versus them receiving the liquidation value of the assets backing their interest ($70), plus some surplus based on their negotiations with the EPA. If the $90 loan in this example represents instead $90 million (a value typical of the loan agreements I discuss more below), then the difference between the Apex holding and a contrary one here translates to tens of millions of dollars of additional losses for firm creditors. Losses of this magnitude create a tangible and plausible incentive for creditors to take steps to increase the safety with which firms handle toxic chemicals.

The discussion here illustrates just one example of a scenario in which firm creditors will do markedly worse in a bankruptcy on account of the Apex holding than they would under a contrary holding, even when considering the effects of CERCLA and environmental statutes. Another key scenario in which creditors do markedly worse under the Apex holding is when a firm contaminates land that it owns, and the costs of contamination exceed the value of the land. In Appendix B.5 I analyze the details of this scenario.

In particular, I show that when the firm owns the contaminated land, creditors can at times in fact suffer more from a non-dischargeability regime, as compared to a dischargeability regime. The basic intuition is that due to the operation of CERCLA discussed above, creditors are more likely to find themselves under-secured when the firm owns the contaminated land. This in turn gives creditors a weaker bargaining position with the EPA, making them tend to lose more in response to a non-dischargeable injunction or threat thereof. I also document in Appendix B.5 how Apex can lead to

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37 This is because the baseline non-dischargeability of the CERCLA cleanup obligations acts as a kind of ‘super priority’ lien against the value of contaminated land.
losses to firm creditors even when the firm owns the contaminated land and the costs of cleanup are less than the value of that land. In the wide range of scenarios analyzed in this section, therefore, *Apex* creates additional incentives for creditors to work to constrain the dangers that borrowers contribute to catastrophic toxic contamination.

### 3.5 Was *Apex* a Surprising Legal Development?

The above discussion highlights that *Apex* represented a substantial expansion upon the set of environmental obligations that are non-dischargeable. In this section, I also demonstrate that the legal precedents available to guide the Seventh Circuit in its decision-making were far from obvious in compelling the result reached by the court. In particular, the precedent from circuits beyond the Seventh was divided and inconclusive, and if anything, the pertinent prior cases within the Seventh Circuit pointed somewhat in favor of dischargeability of the cleanup obligations faced by Apex Oil. This helps to support the notion that it is plausible that creditors and firms would change their behavior in response to the *Apex* decision.

The foundational precedent for understanding the *Apex* decision is the Supreme Court’s 1985 decision in *Ohio v. Kovacs*.\(^\text{38}\) Here, the Court addressed questions of when a demand from an environmental regulator in response to toxic chemical contamination is dischargeable in bankruptcy. In the *Kovacs* case, the state of Ohio seized a property that had been polluted prior to the responsible party’s bankruptcy filing. As was authorized under its environmental laws, Ohio then sought monetary compensation from the debtor to cover the state’s expenditures to clean up the site. The Supreme Court ruled that because money was all that the state sought, it was akin to other obligations like debts and tort liability and thus dischargeable in bankruptcy.\(^\text{39}\)

The Supreme Court stipulated, however, that had the debtor continued to own and operate the contaminated facility, nothing in the ruling would permit the debtor to “maintain a nuisance” post-bankruptcy or refuse to comply with newly issued cleanup orders needed to comply with state environmental laws. As subsequent lower courts have sought to interpret *Kovacs*, the key question has been

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\(^{38}\) 469 U.S. 274.

\(^{39}\) The Appendix goes in to more detail on the specific issues of statutory interpretation at play.
when a court order effectively seeks only money compensation (making it dischargeable), versus when an order is more akin to prohibiting a nuisance (making it non-dischargeable).

An early case to tackle these questions was *U.S. v. Whizco, Inc.* 40 There, the Sixth Circuit held that even if an order for environmental cleanup did not seek money and in fact could not even demand or accept money (under the statute authorizing the order), if a party did not themselves have the equipment and personnel required to comply with the order, and thus would as a practical matter need to pay money to a third party in order to comply with the order, as was the case in *Kovacs*, then the order qualified as a dischargeable claim in bankruptcy. *Whizco*, and what has been termed the “practical effects” test (of whether a cleanup order in practice will require a debtor to pay money to comply) remains good law in the Sixth Circuit and has not been significantly distinguished. 41

Although no other court at the circuit level has adopted the *Whizco* precedent, some lower courts outside of the Sixth Circuit have adopted comparable reasoning. For instance, a bankruptcy court in the Tenth Circuit, in *In re Cottonwood Canyon Land Co.* 42 found that where a reorganizing company had sold contaminated property to another party, obligations to clean up contamination on that property were dischargeable because the only effective way it could clean up property it did not own was by paying money. See also *In re Kaiser Steel Corp.* 43 for a similar holding relying on the *Whizco* precedent.

Five years after the Sixth Circuit’s decision in *Whizco*, the Third Circuit staked out a substantially different position in *In re Torwico Elecs., Inc.* 44 The firm in question here, Torwico, had previously leased a site and contaminated it as part of its electronics manufacturing activities. Roughly four years after Torwico moved to other premises it filed for Chapter 11 Bankruptcy. New Jersey state regulators ordered Torwico to clean up the site it had previously leased. Despite the fact that Torwico did not own or occupy the site, the Third Circuit held that the firm’s cleanup obligations for it were not dischargeable on account of its bankruptcy.

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40 841 F.2d 147, (6th Cir. 1988)
41 As with *Kovacs*, *Whizco* deals with an individual debtor and a Chapter 7 liquidation, as opposed to cases involving corporate debtors and Chapter 11 reorganizations. Yet, the pertinent provisions of the bankruptcy code are comparable in the two situations, and even courts that rule for non-dischargeability, such as the Second Circuit in *Chateaugay* as discussed below, often explicitly state that they do not consider the differences between these types of bankruptcy to be relevant in impacting whether they extend or distinguish their cases from those in *Kovacs* and *Whizco*.
42 146 B.R. 992 (Bankr. D. Colo. 1992)
43 87 B.R. 662 (Bankr. D. Colo. 1988)
44 8 E3d 146 (3d Cir. 1993)
The Third Circuit reasoned that when Kovacs stipulated that a bankruptcy discharge could not permit a firm to maintain a nuisance, this was only one example of a broader principle, which is that a bankruptcy cannot discharge a firm from responsibility to obey state and federal laws, including if those laws stipulate that a firm is responsible for cleaning up its pre-bankruptcy contamination on sites it no longer owns or controls.\textsuperscript{45}

Between the poles of the Sixth Circuit (strong dischargeability) and the third circuit (strong non-dischargeability), the Second Circuit's precedent occupies an ambiguous middle ground. In \textit{In re Chateaugay Corp.}\textsuperscript{46} the Second Circuit held that a firm that reorganized and continued to operate on contaminated property could not discharge its obligation to clean up that property. At times, \textit{Chateaugay} is cited as a case that supports strong dischargeability. Yet on its facts, \textit{Chateaugay}'s holding is far more modest, covering none of the critical scenarios outlined in Section 3.4 above that go beyond the baseline non-dischargeability that is generally understood to exist under the CERCLA statute.

Much of the debate around \textit{Chateaugay} that occurs regularly, for instances, in later court cases seeking to apply it, regards how to interpret the justifications the Second Circuit gave in the case for reaching the decision that it did. Some of the language in the opinion can be interpreted as suggesting that its reasoning depends on the specific situation in which the firm continues to operate the contaminated land, whereas other language in the opinion suggests that it holds more broadly.

In Section B.2 I analyze the language in \textit{Chateaugay} in depth, demonstrating that it is hard to construe it as providing any kind of clear or strong support for the Apex decision. Indeed, \textit{Chateaugay} receives no discussion in the Apex decision and does not appear to be a substantial basis of support for justifying the Seventh Circuit's decision. In Section B.2, I also show that lower courts in the Second Circuit have interpreted \textit{Chateaugay} as establishing an explicitly narrower scope of non-dischargeability than that held by Apex, further demonstrating that \textit{Chateaugay} should not be seen as evidence that the Apex holding was obvious or inevitable given prior precedent.

Prior to Apex, therefore, the Seventh Circuit effectively faced a one to one split between the Sixth and the Third Circuits, with the Second Circuit providing relatively little on-point guidance. Precedent

\footnotesize{\textsuperscript{45}The Third Circuit similarly reasoned, arguably with some creativity, that even if Torwico did not own the contaminated property, it still "owned" the wastes it had deposited there, and thus Torwico was liable to clean up the nuisance that its wastes were continuing to create.}
\footnotesize{\textsuperscript{46}944 F.2d 997 (2d Cir. 1991)}
within the Seventh Circuit was similarly ambiguous. The leading Seventh Circuit case prior to Apex was Matter of CMC Heartland Partners. This 1992 opinion by Judge Easterbrook addressed a situation factually similar to that in Chateaugay and came to a similar holding, finding relatively unsurprisingly that a debtor that continued to operate on contaminated land after a bankruptcy reorganization was still liable to clean it up. Even more so than Chateaugay, however, the logic and language in CMC Heartland suggests that its holding is restricted to situations in which the reorganized firm continues to operate on contaminated land. Indeed, in briefs before the Seventh Circuit, CMC Heartland was one of the cases that Apex Oil relied most heavily on, and the EPA had in general only relatively weak responses to Apex’s arguments on this regard. Section B.2 presents additional analysis on the CMC holding and how it played out in the Apex proceedings.

An instructive case for insight into how situations similar to that in Apex were handled before the ruling is Matter of U.E. Sys., Inc. Here, the EPA brought suit under CERCLA for toxic contamination caused by the bankrupt firm at properties it did not own, including in response to future cleanup of the sites that would be required after the firm’s chapter 11 reorganization. After negotiations between the firm and the EPA, they reached a settlement by which the EPA’s CERCLA demands would be treated as a $27.5 million unsecured claim that would thus be dischargeable in bankruptcy. In approving the settlement, the court here in fact cited the Chateaugay decision, but neither the court nor the EPA apparently saw anything in that decision that would suggest the EPA could instead have achieved a non-dischargeable demand to clean up the pollution post-reorganization, something that would have been far more advantageous to the EPA in this situation.

Ultimately, Judge Posner’s opinion in Apex is one more grounded in policy than detailed analysis of judicial precedent or the wording of the bankruptcy code. Judge Posner acknowledged that because Apex Oil no longer owned the contaminated land, the only way that it could comply with the EPA’s

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47 966 F.2d 1143, 1147 (7th Cir. 1992). Another similar case was AM Int’l, Inc. v. Datacard Corp., 106 F.3d 1342 (7th Cir. 1997). As in CMC, this dealt with a suit against a party that had continued to occupy, and in fact, continued to contaminate the land following its bankruptcy. A separate line of cases, relating not to environmental cleanup obligations (positive requirements), but to non-compete clauses (negative requirements) also is discussed in the briefs for the Apex case. See, e.g., Matter of Udell, 18 F.3d 403 (7th Cir. 1994). For the purposes of brevity, and because this line of cases is not heavily relied upon by the Seventh Circuit’s opinion, I omit discussion of them here.

48 As with Chateaugay, the Seventh Circuit’s opinion gave no analysis to the CMC Heartland opinion and does not appear to have used it as a substantial basis in support of its holding.

49 No. 01-32791-HCD, 1992 WL 472113 (Bankr. N.D. Ind. Sept. 28, 1992). This is not a heavily influential case from a precedent perspective - instead, it is simply an instance of a bankruptcy court approving a settlement between the EPA and a debtor in Chapter 11 bankruptcy. The value of this case lies as a practical example of legal precedent played out in terms of outcomes for firms in bankruptcy.
injunction may be to pay a third party money, and that this bears similarities to the holding in Kovacs that an environmental order is dischargeable if the only way to comply is by paying the government money. But, Judge Posner argued that most injunctions cost some money to comply with and that dischargeability should not depend on whether a firm pays its own employees or pays another firm's employees to facilitate its compliance with an injunction. A primary motivation for this holding, as articulated in the opinion, is that a ruling to the contrary would have negative policy implications for the enforceability of injunctions in general.

Ex post, the Seventh Circuit's decision in Apex may appear obvious or inevitable. Yet, it is a well documented psychological phenomena that humans tend to over-estimate the ex-ante probabilities of events that indeed do come to pass (see generally Kahneman, 2011). As the preceding discussion illustrates, there was little in the way of judicial precedent to make the holding adopted in Apex assured, and there were many reasons that at least a subset of reasonable people may have viewed such a result as relatively unlikely. When the Apex decision was handed down, therefore, it represented an important new legal development with the potential to plausibly impact creditor and firm behavior.

3.6 Circumstantial Evidence of Apex's Significance

The legal analysis above that demonstrates that the Apex decision was at least a relatively unexpected development is bolstered by circumstantial evidence that many academics and bankruptcy practitioners considered it unexpected and contrary to precedent. It lies well beyond the scope of this paper to attempt to estimate any kind of consensus estimate of the probability that the Apex case would be decided as it was. Reasonable minds may differ here, and there is nothing to suggest categorically that the Apex holding must have been seen as less likely than not to have occurred. The goal of this section is simply to demonstrate that if some consensus estimate could have been taken ahead of time, inquiring as to the probability the Seventh Circuit would adopt the ruling that it did in Apex, the average probability would have been well below 100%.

In the introduction to this paper, I quote Philip Hinerman, a partner in the environmental division of a major law firm, who attested that Apex dramatically shifted the advice that he gives clients, and that
previously he and other lawyers had relied much more heavily on the Sixth Circuit’s opinion in *Whizco*. The fact that Mr. Hinerman’s practice is based in Pennsylvania, which falls within the Second Circuit and thus under the *Chateaugay* precedent, is additionally informative. Mr. Hinerman’s statements indicate, at least on an anecdotal basis, that not all lawyers advising clients considered the reach of *Chateaugay* to be as clear or as wide as it might appear in hindsight. Furthermore, the fact that Mr. Hinerman was awarded the Lifetime Achievement Award from the Environment and Energy Law Section of the Pennsylvania Bar Association suggests that his views may have at least some informative bearing on those of the mainstream.

Mr. Hinerman was by no means unique in his perspectives on *Apex*. In particular, while many commentators in the wake of *Apex* did regard it as the correct or proper result (see, e.g. Levin and Edward, 2010; Haider et al., 2010), many others viewed it as an erroneous result. G. Eric Brunstad, Jr., a law firm partner who at the time of the *Apex* decision was a twenty-year veteran of lecturing on bankruptcy at Yale Law School, and author of several chapters within the canonical *Collier on Bankruptcy*, wrote in his amicus brief to the Supreme Court that the Seventh Circuit’s decision in *Apex* “[d]eparts from this Court’s prior decisions regarding a fundamental issue of bankruptcy law” in a case with important implications for “thousands of facilities identified by USEPA for ‘corrective action’ under RCRA.”

James Brand, a practicing environmental law attorney and adjunct professor at University of Minnesota Law School wrote that “Judge Posner’s opinion in *Apex Oil* was striking in its failure to even consider that a few steps of civil procedure (in response to stalling) could convert the requirement for performance into the seizure of assets necessary to perform,” and states that “[t]he correct rule here is actually very straightforward” (Brand, 2011). Daniel Bussel, professor of law at UCLA, wrote “[i]n truth, monetary relief was equally an alternative (or not) in *Apex* and in *Kovacs*,” criticizing the court for not reaching what he termed “the correct resolution” (Bussel, 2017).

Krasoff (2010) argued that *Apex* was decided “contrary to Supreme Court case law and the Code,” and Mamutse and Fogleman (2013) wrote that “[i]t thus seemed [in the wake of *Chateaugay*] that the EPA was bound to failure in bringing many claims for clean ups against PRPs [Potentially Responsible

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50https://www.foxrothschild.com/philip-l-hinerman/
Parties - i.e., those who contributed to toxic contamination], who could then reorganize minus the claims.” Newton (2011) wrote of the “problem with the Apex decision” (criticizing its interpretation of ‘claims’) and Labarbera (2009) described Apex as a “rare outcome.”

Another set of commentators argued not necessarily that Apex was wrongly decided but that the ‘correct’ decision was ambiguous in the case. Goldberger (2009) described the precedent prior to Apex “still messy,” Slagle (2011) argued that “no unified national guideline exists” on the topic that Apex addressed. Watters (2015) remarked that because of the lack of clear precedent requiring the Apex decision, it is unlikely to be adopted as a national standard in the near future.

The introduction of this paper presents additional pieces of evidence. It provides quotes from the American College of Environmental Lawyers and from the general council for environmental affairs for Lockheed Martin, attesting to the impact the Apex decision was likely to have. It is hard to reconcile these statements with a view that the Apex decision was utterly predictable to the point of it being implausible that it would influence firm decision making. The introduction to this paper also gives an account from an attorney I interviewed who was involved in the original Apex case. This person stated that environmental regulators were initially skeptical that Apex Oil could be held responsible for the cleanup of its pre-bankruptcy contamination.

In the remainder of this section, I present evidence from the rest of the interviews that I conducted with practicing attorneys within the Seventh Circuit who advise firms and lenders on the handling of toxic chemicals such as those governed by RCRA. The majority of attorneys with whom I spoke with considered Apex to be a significant development, though perspectives did differ in meaningful ways.

Two practitioners I spoke with brought up, unprompted by me, that clients will at times express to them a belief that they can escape significant environmental cleanup obligations by declaring bankruptcy and reorganizing, and that Apex is an important case that they attorneys use in advising against this approach. One practitioner stated that he didn’t think that many of his clients would pay direct attention to the ruling, but that it was significant in influencing the willingness of lenders to extend new loans. Only one practitioner thought the ruling had little impact at all. This person noted that managers tend to be more focused on short-term profits rather than long-term liability (like the ruling impacted).

Two other attorneys whom I connected with briefly also responded that they personally saw little impact from Apex. But they noted that...
Several other practitioners, however, said that their clients are keenly aware of trying to minimize their potential for RCRA liability, and that small firms may be particularly impacted because for them, the corporation’s chair or CEO may also double as the firm’s primary environmental compliance officer.

I identified people to consult for these interviews primarily by performing internet searches for “RCRA Attorney” plus the states in the Seventh Circuit (e.g. Illinois). I also was given a lead to one expert by an environmental law scholar I had interviewed to assist me with understanding more general background information for this investigation. As such, the results from these interviews should not be interpreted as rigorously collected, statistically representative social science data. Nevertheless, they help to better contextualize an understanding of the Apex case and the plausibility that it could lead to the effects I document in the statistical tests in this investigation.

3.7 Bankruptcy Choice of Venue

Under US bankruptcy law, corporations have some choice in where to file for bankruptcy. The mechanics of this inform which corporations are likely to be most affected by the Apex decision. In this section I give an overview of the pertinent issues, saving a more detailed discussion for Appendix B.3.

In looking for impacts from Apex, I focus on firms that operate exclusively or primarily within the Seventh Circuit. Appendix B.3 documents that firms such as these have a high likelihood of filing for bankruptcy within their home circuit.\(^{53}\) Furthermore, Appendix B.3 demonstrates that it would be difficult for firms to avoid the Apex ruling by filing outside of the Seventh Circuit.

The Third Circuit, home to Delaware, is by far the most likely place a firm would file for bankruptcy other than where its primary operations are. Yet, as discussed above, the Third Circuit had the very strongest non-dischargeability precedent prior to the Apex ruling. Thus, a firm could not avoid the impact of Apex by filing in this common jurisdiction.\(^{54}\) As discussed in Section 3.5, the Sixth Circuit does have a precedent contrary to Apex. In theory, a firm could attempt to avoid the Apex decision by filing,

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\(^{53}\) As discussed in Appendix B.3, there is also some potential that a set of firms that operate primarily in the Seventh Circuit may have had a high likelihood of filing for bankruptcy in the Second or Third circuits prior to the ruling. These firms then would be expected to be less impacted by the ruling. But, this would simply serve to attenuate the effects of the Apex decision that I measure.

\(^{54}\) After Delaware, New York is the next most common jurisdiction for bankruptcy filings. Yet, under Chateaugay, and even more so under Mark IV, which was decided shortly after Apex, attempting a New York bankruptcy filing in an effort to avoid Apex would be a risky proposition at best.
or planning to file, for bankruptcy in the Sixth Circuit. In practice, however, Appendix B.3 discusses why this would be a costly choice that would not even guarantee evasion of the Apex precedent.

If the costs of changing behavior in response to Apex were great enough, it might still be worthwhile for a firm to attempt to evade the decision. Yet, given the evidence I document in Section 6 that the costs to firms of shifting their disposal practices following Apex were low, Appendix B.3 argues that in most instances it will be more cost-effective for firms to take modest but meaningful steps to limit the risks of catastrophic pollution contamination. Furthermore, even assuming a firm planned to try to evade Apex by filing in the Sixth Circuit, as long as there was a danger of this evasion failing, it could well still be worthwhile to reduce the risks of catastrophic contamination so as to limit the impact in the event the evasion was unsuccessful. And, as a practical matter, given the evidence in Section 6.3 that lenders responded to Apex by changing their loan agreements, any scheme of planned evasion of the Apex ruling as a substitute for altering firm behavior would require lender buy-in as well.

For these reasons, it is still rational and plausible that at least many firms in the Seventh Circuit would respond to Apex by changing their behavior, rather than ignoring the decision on account of bankruptcy choice of venue considerations. This discussion by no means rules out, however, the possibility that some firms (and necessarily their creditors too) might decide, rationally or not, to completely ignore the decision and plan instead to seek to circumvent it. To the extent this is true, it would simply mean that the effects I measure for Apex under-estimate the impact that could be expected if a similar rule were adopted nationally, either through judicial or legislative action.

### 3.8 Do Asset Sales Make Apex Irrelevant?

On its face, Apex addressed liability for a firm following a Chapter 11 reorganization in bankruptcy. As those who follow bankruptcy and corporate law are aware, classic Chapter 11 reorganizations are becoming less common. Instead, modern firms in bankruptcy frequently will sell most or essentially all of their assets to a new entity\(^{55}\) and then liquidate the remaining estate in a Chapter 7 proceeding. These procedures, known as “363 sales” (based on 11 U.S.C.A. §363(f), the provision of the bankruptcy

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\(^{55}\)Or sometimes to an already existing company.
code that authorizes them), thus effect what is in many ways a substantive equivalent to a bankruptcy reorganization but with certain advantages such as speed and flexibility with which an effective reorganization can be accomplished.

A recent prominent example of this use of 363 sales can be seen in In the Matter of: Motors Liquidation Co. 829 F.3d 135 (2d Cir. 2016), cert denied, in which the Second Circuit held that a 363 sale will bar most forms of successor liability claims, even for harms that have not yet materialized, as long as the individuals with potential claims are given fair notice and the ability to dispute the sale in court.

In the wake of the Apex decision, could firms simply use a 363 sale to sell assets to a different or newly formed corporation that arguably had no direct legal connection to the prior corporation? In the discussion below, I consider the legal requirements for a 363 sale and demonstrate that such a sale likely could not allow a firm to circumvent the Apex decision. In Appendix B.4 I present circumstantial evidence based on contemporary legal writings that indicate lenders, firm managers, lawyers, and others were not receiving advice that they could use 363 sales to escape the Apex holding.

11 U.S.C.A. §363(f) states:

The trustee may sell property . . . free and clear of any interest in such property of an entity other than the estate, only if—

(1) applicable nonbankruptcy law permits sale of such property free and clear of such interest;
(2) such entity consents;
(3) such interest is a lien and the price at which such property is to be sold is greater than the aggregate value of all liens on such property;
(4) such interest is in bona fide dispute; or
(5) such entity could be compelled, in a legal or equitable proceeding, to accept a money satisfaction of such interest.

I highlight here two points that would likely cause significant difficulties for a party attempting to use a §363 sale to circumvent the Apex ruling. The first challenge concerns the five conditions, enumerated in §363(f) above, at least one of which must be met to use such a sale. The first four prongs would not likely apply in this analysis. Most important for this analysis is the fifth prong, which very frequently is the basis of selling assets “free and clear” via a 363 sale. This prong requires the entity with the interest to be able to be compelled to accept money satisfaction of such interest. Yet, a key issue in the Apex case is that the Seventh Circuit found that the RCRA statute at play does not allow the EPA

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56 Details on this reasoning are omitted for brevity and are available upon request.  
to accept money satisfaction in lieu of cleanup performance. Under an opposite finding, the Apex case almost certainly would have reached the opposite result under Kovacs, as detailed in Section 3.5 above.

The second challenge relates to whether cleanup obligations under RCRA would qualify as “interests” which §363 allows assets to be sold “free and clear” of. Some early cases to consider this, such as In re White Motor Credit Corp. 75 B.R. 944 (Bankr. N.D. Ohio 1987) interpreted this to be limited so-called in rem interests that adhere specifically to the property being sold, such as liens. Under this interpretation, in personam interests that attached to the holder of the assets would still travel with the property. Many later cases, such as In re Leckie Smokeless Coal Co., 99 F.3d 573 (4th Cir. 1996) and In re Trans World Airlines, Inc., 322 F.3d 283 (3d Cir. 2003) have taken broader interpretations of the “interests” that assets are sold free and clear of, reasoning that Congress intentionally left the term to be flexible and more expansive than just encompassing liens and similar devices.

The courts in Leckie and Trans World give relatively few details in their reasoning to support their more expansive reading of the “interests” an asset can be sold free and clear of under §363(f). But, a telling recent case by the Second Circuit does give more detail. In In the Matter of: Motors Liquidation Co., the Second Circuit explicitly links the bankruptcy court’s abilities to sell property free of “interests” with its ability to discharge “claims” under 11 U.S.C.A. §1141, precisely the provision of bankruptcy law that Apex held could not discharge RCRA cleanup obligations.

In particular, the Second Circuit, in Motor Liquidation, wrote: “the bankruptcy court’s power to bar ‘claims’ in a quick §363 sale is plainly no broader than its power in a traditional Chapter 11 reorganization.” At least under this reasoning, it seems all but certain that if a cleanup obligation is not dischargeable in a reorganization under Apex, it could likewise not be circumvented via a §363 sale. Even outside of the Second Circuit, it is reasonable to expect that courts would be reluctant to give broader powers to escape environmental cleanup orders under a §363 sale than via a Chapter 11 reorganization.58

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58For instance, although the Fourth Circuit in Leckie held that §363(f) sales are free in clear of “interests” beyond just in rem, and denied finding successor liability under the particular facts of that case, the Fourth Circuit expressly criticized the District court in that case for applying “an unduly broad interpretation” of “interests” under §363(f), and the Fourth Circuit listed specific examples that it would not consider to be interests under §363(f) but that would likely be dischargeable under §1141.
4 Mechanisms: How Would Apex Impact Firm Behavior?

4.1 Overview: Firm Creditors and the Impact of Apex

The primary lens through which Apex should be interpreted is its impact on firm’s creditors. As Section 3.3 documents, a change in dischargeability will reduce the recovery that a firm’s creditors receive in the event of that firm’s bankruptcy. If creditors risk losing more on their loans due to the Apex decision, they have several options they can pursue alternatively or in combination. Creditors may raise interest rates to compensate for the added risk, they may reduce total lending to affected firms, or they may demand that firms take additional precautions to reduce the likelihood that they create toxic contamination that would endanger the lenders’ recovery. In Section 6 below, I present empirical tests showing that one of the steps lenders took was to reduce credit to affected firms, and in Section 6.3 I present qualitative evidence that lenders also took steps to demand, through their loan covenants, that firms take extra precautions to avoid toxic contamination.

In the remainder of this, I examine several other topics relevant to understanding the mechanisms by which Apex could impact firm behavior. These include the impact of Apex to firm owners and managers (Section 4.2), the role of proximity to bankruptcy for determining how much firms will be impacted by Apex (Section 4.3), and whether it would be economically rational for firms to change their behavior on account of Apex (Section 4.4).

In Appendix B.6 I explore topics of how Apex differentially impacts secured vs. unsecured creditors. In general, note that a security interest is valuable to the extent that it gives creditors priority over a money claim by the EPA. If the EPA brings an injunction, however, it will not have a money claim, making priority less relevant. Because the focus of Apex is the dischargeability of injunctions, as a first order matter outcomes for secured vs. unsecured creditors will be similarly impacted by Apex. Appendix B.6, however, outlines a series of additional considerations that can lead to differential impacts of Apex.

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59 To the extent that firms are able to provide assurances to lenders that they have taken steps to minimize their risks of toxic contamination, they may be able to induce lenders to maintain or restore the interest rates and total amounts of credit those lenders provided prior to the Apex decision.

60 In the future, I plan to investigate whether interest rates changed. That has not yet been completed as of the time of this writing.

61 That is, situations in which the EPA elects to clean up the contamination itself and sue the firm for contribution under, for instance, CERCLA §107 or a comparable statute.
on secured versus unsecured creditors. For instance, the amount that the EPA can get under a money claim will impact its choice in whether to bring an injunction or not in the first place.

4.2 Manager and Shareholder Impact

While there is strong theoretical grounding for why Apex should be relevant to a firm's creditors, there is far less reason to believe that firm owners and managers, often considered the other key groups of stakeholders within a firm, would be directly impacted by Apex. If creditors are impacted, that in and of itself will have an indirect impact of firm shareholders and managers. Higher interest rates on loans, for instance, may reduce shareholder profits, and tighter covenants on debt are designed to prompt changes in management. These indirect effects are relatively obvious and unremarkable. The pertinent question then is whether Apex would have an impact on managers and shareholders that is un-mediated by actions of the firm's lenders.

By the time a bankruptcy occurs, shareholders will have typically lost the full value of their investment, meaning how the remaining value of the firm's assets gets distributed between creditors and regulators is not of a first order matter. For managers, even if a firm reorganizes in bankruptcy, top management is frequently replaced, meaning how value gets allocated in a bankruptcy may not be of direct relevance to managers.

Managers are, however, sometimes retained in a reorganization. Thus, managers may seek to increase the likelihood of a reorganization as opposed to a liquidation, even apart from their obvious incentive to avoid a bankruptcy in the first place. In the wake of Apex, some commentators suggested that it might make liquidations more common.62 This could in theory then provide a direct incentive for managers to work harder to avoid toxic contamination on account of the Apex ruling. A fuller analysis, however, suggests that in general, Apex actually should have little to no impact on the likelihood of firms reorganizing: a reorganization will occur when a firm is worth more as a going concern than it is in liquidation. Apex should only impact the distribution of value in such a reorganization between creditors and environmental regulators.

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In Appendix B.8 I examine these issues in more depth. I demonstrate that while in theory there is little reason for firm managers to be rationally impacted by the Apex decision directly, in some situations market frictions and/or departures from full rationality on the part of managers or lenders could lead to situations in which Apex does directly impact manager incentives. I also provide some direct evidence, based on my interviews of practitioners advising firms impacted by Apex, that some managers did consider the ruling to directly impact them by increasing the likelihood they would lose their jobs in the event their firms went bankrupt. As a pure theoretical matter, it is harder to justify this effect. As a practical matter, however, it does appear to play out in the on-the-ground reality of how Apex affected firm behavior. Finally, in Appendix B.8, I document that the theoretical reasons for why Apex should have no direct impact on firm owners are even stronger, but I note that there may frequently be an overlap between managers and owners, particularly at smaller firms.

4.3 The Role of Proximity to Bankruptcy

Although the Apex holding will lead to lower recovery for firm's creditors in the event of a bankruptcy, the ruling is relevant to a wide range of firms, even those that are not currently close to bankruptcy. The simplest way to see this is to consider the situation from the perspective of a lender that is considering entering into a credit agreement with a firm that produces toxic wastes as part of its activities. A common length for the loan agreements of the type I discuss in Section 6.3 is five years, with some being for seven or ten years. One option for a lender therefore would be to consider the financial condition of a firm it is extending credit to. If the firm appeared to be in solid financial condition, the lender could choose not to require any new loan covenants in the wake of the Apex decision. But, if the firm appeared to be in a weaker financial condition, the lender could instead require stricter covenants of the type discussed in Section 6.3.

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63 In some instances, though, creditors can in effect shorten this term ex-post by taking advantage of technical defaults of loan covenants to force contract renegotiation. On this point see generally Chava and Roberts (2008); Nini et al. (2009); Gopalakrishnan and Parkash (1995); Sweeney (1994); DeFond and Jiambalvo (1994); Chen and Wei (1993); Beneish and Press (1995). Lenders could therefore choose to ignore environmental risks in their initial covenants with borrowers and only impose them, in forced re-negotiations, when covenant breaches indicated that firms may be in greater financial distress. While under certain model assumptions this could be shown to be an advantageous strategy, it shares practical limitations similar to those of the other lender strategies discussed in this setting. In particular, if a lender forestalls environmental monitoring of borrowers until a borrower enters financial distress, and then requires it, and the additional monitoring uncovers a substantial toxic chemical contamination issue, it is quite likely that at that point it will be too late for the lender to extract itself. The newly discovered contamination could quite plausibly force the firm into bankruptcy and stay the lender's ability to collect on its loans.
Yet, as a lender strategy, this has serious drawbacks. In particular, a firm’s financial condition can shift substantially within a five-year window, much less a seven or ten-year period. While a firm that is healthier today is more likely to be financially healthy in five years, the more variability there is in firm outcomes, and the longer the period, the less predictive a firm’s financial condition today will be of its financial condition in the future. Furthermore, given that liability of the type relevant to the *Apex* decision can easily run into the hundreds of millions of dollars, even a firm that was previously financially stable can quickly find itself insolvent if a major toxic contamination problem develops.

In theory, of course, if one assumes that lenders have an infinite number of gradations for how strictly they write loan covenants, with more strict covenants presumably imposing costs that are shared by borrowers and lenders, one could show that it is indeed optimal for lenders to write stricter covenants for borrowers that are closer to default. Yet, in reality, it may be a herculean assumption to presume that lenders actually have the information necessary to perform such a nuanced optimization. A more realistic understanding is that lenders have one, perhaps at most a few different levels of strictness of covenants, and that they impose these largely as a matter of blanket policy to relevant borrowers. The preliminary investigations that I describe in Section 6.3 suggest that these broad policies may have changed in response to the *Apex* decision, thereby impacting firms regardless of their current financial conditions.

Thus, while under some theoretical models, one might anticipate a larger impact of *Apex* for firms near insolvency, under many practical scenarios firms across the board may experience the results more similarly. Nevertheless, for the sake of completeness, I do devise empirical tests for whether firms closer to insolvency appear to have a greater impact from *Apex*. I describe these tests and their results in fuller detail in Appendix A.10. In short, these tests find no disparate effects. One possibility is that this is because firms are indeed impacted equally regardless of their financial condition. Another possibility is that this result is due simply to the limitations of the tests. In particular, it is only the public firms in my sample for which I am able to obtain data to compute their proximity to insolvency. This gives only a relatively small subset of my data that I can use for these tests. This subset may simply not be adequate

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64 A similar strategy could be to use technical defaults of covenant terms to force re-negotiation and new environmental covenants upon indications of growing firm financial distress. See footnote 63 for a discussion of this.

65 On this point generally, see Pfleiderer (2018).
to testing a more nuanced hypothesis of differential effects across different types of firms within that already small subset.

4.4 Is It Economically Rational for Firms to Change Behavior Following Apex?

There are a host of factors that may be seen as attenuating the impact of Apex on firms as compared to, for instance, a new and completely unexpected law that directly governed how companies handle toxic chemicals. For instance, certain types of environmental cleanup obligations were already dischargeable under CERCLA, Apex simply expanded that set of non-dischargeable obligations. Similarly, while there is evidence that Apex was a surprising decision, this doesn’t mean that it was unthinkable within the Seventh Circuit. In addition, when viewed from a certain perspective, Apex is only most tangibly relevant to firms that become bankrupt, a relatively small subset of total firms. Finally, as I discuss in Section 3.7 and Section 5.1.3, there is some uncertainty in where firms will file for bankruptcy. Given all of these factors, one may ask whether it is sensible to expect any discernible impact on firm behavior from Apex at all.

I approach this question from two perspectives. First, I present several reasons why it may be rational for firms to change their behavior in response to the Apex ruling. Ultimately, a determination that firm responses were or were not rational would require an exceptionally detailed cost-benefit analysis: computing a host of probabilities, conditional expectations for losses under different scenarios, costs associated with changes in firm behavior, and many other factors. Not only is such a calculation well beyond what this research study can accomplish, it is also almost certainly well beyond what any or almost any firm or lender could compute. Thus, I also present a discussion of why it is possible that a complete cost-benefit analysis might not justify a behavioral response to the Apex decision, but that it would still be a plausible outcome to observe such a behavioral response.

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66Thus, one should view the Apex decision as moving from some positive probability of certain cleanup obligations being non-dischargeable to a pretty clear certainty that such obligations will be non-dischargeable.

67On this point, see Pfleiderer (2018)
4.4.1 How a Behavioral Response Could be Rational

Changes in Firm Behavior Prompted by Apex Appear to be Inexpensive

In Section 6 I document a roughly 15% reduction in on-site releases of RCRA regulated chemicals in response to the Apex decision. Although this is a relatively large proportional effect, its impact on total production costs to firms is likely modest. For instance, Table 1 documents that on-site chemical releases account for only 5-15% of total disposal for RCRA-regulated chemicals, and Section 5.1 notes that the RCRA-regulated chemicals comprise only about one hundred out of the six hundred different chemicals tracked in the TRI data. Furthermore, disposal expenses are only one component of the total costs of using those chemicals in production processes. The costs of acquiring or synthesizing those chemicals factor in here as well. And, for most facilities, chemicals are only one of the raw materials for their production processes, and raw materials are only one of the total costs, placed along side costs for labor, capital, and so forth. Thus, a 15% reduction in on-site disposal should not be in any way confused with, for instance, a 15% change in a firm's overall production processes.

In Section 6 I present several efforts to test for whether changes that firms made were expensive. I find no discernible impact of Apex on firm profits, and no discernible impact on total production levels. Clearly, shifting disposal of chemicals to specialized off-site facilities must have had some positive costs, or firms would have done so previously. Yet, the host of factors presented above suggest that those costs may have been relatively modest. If costs to the changes firms made post-Apex were low, then those changes may have been rational, even if expected costs (in terms of losses for lenders) were also low.

Lender Responses to Apex Were Plausibly Reasonable and Low-Cost

One of the biggest potentially attenuating factors discussed above is the fact that Apex is most salient for firms that declare bankruptcy, which represents only a minority of businesses. Yet, when considering the actions and perspectives of creditors, it is useful to keep in mind that in many ways it is lenders’ primary business to consider the potential that firms will become insolvent and what that will mean for their recovery. Indeed, this is much of the reason why loan covenants for the firms that I study
are one to two hundred pages, rather than one to two pages. Thus, while it is true that many firms will not become bankrupt, much of the work of the lender is to craft the loan agreement (and to select borrowers) with precisely this potentiality in mind. In Appendix B.9 I discuss in some additional detail how given this focus of lenders on the potential for borrower insolvency, their actions appear in general relatively low-cost and reasonable.

4.4.2 How a Non-Rational Behavioral Response Could be Plausible

Despite the above reasoning, it is still possible that a fully informed cost-benefit analysis, if it actually could be performed by firm managers or lenders, would determine that zero change in behavior was the “optimal” response to the *Apex* decision. Even if this could be conclusively shown, however, it would not necessarily render a behavioral response implausible.

The situation from the corporate governance literature on director and officer liability is instructive here. As Bernard Black, Brian Cheffins, and Michael Klausner document, the instances in which outside directors and officers have been held personally liable for breaches of fiduciary duties are vanishingly rare and exceptional in their fact patterns to the point that it is almost impossible to justify any rational fear on the part of corporate directors and officers of ever being held personally liable for actions they take to fulfill their corporate duties (Black et al., 2006). Yet, it is widely understood that fear of this liability remains at least a relatively potent incentive for these officers. I term this the “Smith v. Van Gorkom explanation,” after the famous but utterly anomalous case finding outside directors liable for fiduciary breach. Under this explanation, then, responses by firm managers or lenders following *Apex* may have been irrationally risk-averse, but still very understandable.

4.4.3 Interpreting Empirical Results Showing Potentially non-Rational Responses

The above discussion argues that there are many plausible reasons why firm behavior may change as a result of the *Apex* decision. The results in Section 6 present empirical evidence that firms did indeed change their behavior in the wake of *Apex*. In general, these results that appear to show consistent evidence of firms adjusting their behavior in the wake of *Apex*, should bolster the notion that it was

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68Thus, I exclude here actions such as blatant theft, embezzlement, and so forth.
rational or at least plausible for firms to respond.

Ultimately, however, it will not be possible to pin down precisely how rational or irrational, how plausible or implausible it would be for firms to adjust their behavior following Apex. If one's conclusion, after reading the discussion in Sections 3 and 4 is that it was indeed fairly plausible for firms to respond to Apex by changing their behavior, then the empirical results in Section 6 should yield a relatively strong conclusion that Apex did have a tangible impact on firm behavior. Conversely, if one views it as still relatively implausible that firms would change their behavior in the wake of Apex, the empirical results in Section 6 can be interpreted as perhaps adjusting one's perspective from viewing it as unlikely Apex would have an impact to viewing it as possible that it would, or at least, from viewing it as highly unlikely Apex would have an impact to viewing it as only somewhat unlikely that it would. No single empirical study can ever settle any issue of importance, so regardless of views regarding the plausibility of an impact from Apex, further research into this topic will no doubt be warranted and valuable.

5 Data

5.1 Toxics Release Inventory (TRI) Data

5.1.1 Data Construction

The core analyses in this study use data from the national Toxics Release Inventory (TRI). Facilities that fall within specific industries (such as manufacturing, waste management, mining, etc.), have ten or more full time employees, and that handle amounts of toxic chemicals above specified thresholds must submit detailed annual reports on the amount of each covered chemical used at the facility and how that chemical was processed or disposed of.

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70For many RCRA regulated chemicals, these thresholds are very low. For instance, 0.1 grams for dioxin compounds, 100 pounds for lead compounds, 40 C.F.R. §372.28. The general reporting requirements for chemicals not specifically designated in 40 C.F.R. §372.28 is 25,000 pounds, 40 C.F.R. §372.25. These thresholds are for total amounts of the chemical processed, meaning that the amounts of the chemicals released are generally much smaller (see Table 1 in particular, noting on average on-site releases are about 6% as large as total waste processed), thus still making this a relatively sensitive metric. In unreported tests, I examine the distributions of values for the key response variables across different chemicals and see no evidence of censoring - that is, histograms appear largely smooth with no obvious cutoffs or clustering of values.

71Specific reporting requirements are given in 40 C.F.R. §372.5, and §372.22-28.
TRI data is available in a year-by-facility-by-chemical format. For each such combination, there are roughly 40 separate elements giving information on how much of each chemical was disposed of in various fashions.\textsuperscript{72} For this study, I focus on a time period starting in 2004, five years prior to the Seventh Circuit’s Apex decision, and extending through 2014, five years following the Apex decision.

Not all chemicals reported in the TRI database are covered by RCRA. Similarly, some facilities that make reports to the TRI database are not directly regulated under any provisions of RCRA. I restrict my sample to chemicals and facilities directly regulated under RCRA.\textsuperscript{73} Some RCRA-regulated facilities are designated as CESQG facilities, or Conditionally Exempt Small Quantity Generators.\textsuperscript{74} These handle only small quantities of toxic chemicals and are deemed to pose significantly lower risk to health and the environment. On account of this, CESQGs are governed by less stringent regulation under RCRA. Because of their low risks, there is much less reason to anticipate that CESQGs would change behavior due to the Apex decision, so I exclude them from my main analyses.\textsuperscript{75}

To ensure that I analyze a balanced panel and that parameter estimates do not reflect changing composition of which facilities are in the data in a given year, I restrict the TRI data to facilities that have observations for the full eleven years of the sample period. As a practical matter, this eliminates fewer than 10\% of the observations from the data and has no material impact on the key coefficient estimates. Finally, since my objective is to study the extent to which facilities release toxic chemicals on-site, I eliminate any facilities that have zero on-site chemical releases during the study period. Again as a practical matter, doing this makes little difference in coefficient estimates\textsuperscript{76} but eliminating these gives a more accurate depiction of the effective sample size that determines those estimates. After making these restrictions, I am left with roughly 360,000 year-by-facility-by-chemical observations, covering 3,900 separate facilities owned by 1,546 separate companies.

\textsuperscript{72}Many of these elements are subsets of others, so this does not imply 40 unique disposal channels.
\textsuperscript{73}Appendix C.1 gives details on how I make these identifications.
\textsuperscript{74}For an overview of these designations, see \url{https://www.epa.gov/sites/production/files/2015-01/documents/cesqg.pdf}
\textsuperscript{75}Appendix A.3 does present a series of “placebo” tests, including ones that look specifically at these CESQG facilities and test for whether the Apex ruling had any perceptible effect on them. As would be expected, these tests show no evidence of an impact from Apex.
\textsuperscript{76}For these facilities, the fixed facility-level fixed effects completely determine all observation values.
5.1.2 Outcomes of Interest

There are two primary outcomes that I investigate in the TRI data: on-site releases and off-site treatment. On-site releases cover the total amount of each chemical that is released on-site at a facility. These include, for instance, injections into underground reservoirs, disposal in landfills, impoundments on surface-level pools, and discharges into streams or waterways. As informed by discussions with practitioners and environmental law experts, I study these releases as amongst the most likely to contribute to substantial toxic cleanup obligations.\footnote{In particular, although discharges to streams or waterways may at times not stay on-site (though the specifics vary), they do pose a real risk of contaminating groundwater which in turn can lead to some of the most expensive cleanup operations.}

There is nothing inherently illegal about such on-site releases of toxic chemicals, provided a facility obtains proper permits and processes the chemicals in the mandated ways prior to release. Yet, efforts to treat and dispose of chemicals properly can fail for many reasons, and when they do, companies can be held strictly liable for cleanup. Because my focus is on those chemical releases with the greatest potential to contribute to significant environmental cleanup obligations, I exclude from my metric of on-site releases those releases made into the air (e.g. through combustion of a toxic chemical). While these may be harmful to human health and the environment, and may occasion substantial penalties if such releases violate permitting and treatment requirements, the potential liability that comes from these air releases is much more likely to be presently assessed, in other words, impacting a company before its bankruptcy. Such air releases are not, by contrast, likely to occasion an environmental agency issuing an injunction to “clean up” its air releases from the period prior to its reorganization in bankruptcy.

Apart from these two key outcomes in the TRI data, I consider two additional items in supplemental analyses. First, I examine the total quantity of each chemical waste produced by each facility in each year. I analyze this to investigate whether the Apex decision impacted the overall quantity of chemical operations of affected companies or whether it merely changed how companies dispose of the wastes that they produce. Lastly, as a placebo test, I analyze the total amount of each waste released into the air from facilities. \footnote{See Appendix C.1.1 for a small technical note on the units by which weights of chemicals are measured and reported in this table.} Table 1 gives summary statistics\footnote{In Table 1 the amounts of chemicals released on-site, sent off-site for treatment, and released into the air, do not add up to the “total waste” given in that table. As mentioned, there are over 40 separate elements in the TRI data for each chemical covering the different ways that chemical can be processed or disposed of. For instance, chemicals be re-used in industrial processes and thus be counted towards “total waste” but not show up in any of specific disposal methods depicted in the table.} for the TRI data on these various outcomes.\footnote{In Table 1 the amounts of chemicals released on-site, sent off-site for treatment, and released into the air, do not add up to the “total waste” given in that table. As mentioned, there are over 40 separate elements in the TRI data for each chemical covering the different ways that chemical can be processed or disposed of. For instance, chemicals be re-used in industrial processes and thus be counted towards “total waste” but not show up in any of specific disposal methods depicted in the table.}
In Appendix C.1 I give additional technical details on construction of the TRI data I analyze, and in Appendix C.2 I address issues relating to the accuracy of the data, particularly regarding potential mis-reporting of TRI data.

5.1.3 Local vs. National Firms

As discussed in Section 3.7 I focus on firms that operate exclusively or primarily within the Seventh Circuit. The TRI data identifies each facility's ultimate parent company. This makes it possible to identify companies that only have TRI facilities within the Seventh (or another) Circuit.\(^{80}\) I term these “local” firms, which I contrast with “national” firms that have facilities across multiple circuits.\(^{81}\)

It is of course possible that a firm I identify as “local” might have facilities outside of the Seventh Circuit that do not appear in the TRI data. But, for the industries that TRI covers - mining, manufacturing, and so forth - there is a good chance that most firms will have most or all of their facilities covered by the TRI data, or at least most of their significant facilities. Also, the the “local” vs. “national” designation is simply a way to identify firms with a relatively high likelihood of filing for bankruptcy in the Seventh Circuit. Thus, even if there were a firm that I identify as “local” but in fact has, say, 25% of its operations outside of the Seventh Circuit, that firm would still share much of the propensity of other truly “local” firms to file for bankruptcy in the Seventh Circuit.

Finally, to the extent that I classify a firm as “local” where a fuller analysis would have identified it as “national,” (or potentially vice versa) this should simply attenuate the statistical estimates I derive, since I would be mixing a less impacted firm in with the truly local firms. Much the same reasoning applies regarding the fact that, although the appendix documents that roughly 80-90% of small firms file for bankruptcy locally, there is still some possibility that some of the firms I identify (rightly or not) as local to the Seventh Circuit might file for bankruptcy elsewhere. As I discuss in Section 3.7 this will simply serve to make the estimates of Apex’s impact under-estimates as compared to what would be anticipated if the holding were adopted nation-wide, thereby guaranteeing all firms would be affected.

As part of my robustness analyses, I also consider variations that allow for a more flexible definition

\(^{80}\) I make these determinations before eliminating any of the facilities for the reasons discussed above.

\(^{81}\) Each circuit thus has its own set of local firms.
of “local” firms. In particular, for each firm, I calculate the total amount of chemical wastes the firm produces over my sample period over all facilities and all different chemicals. I then calculate the percentage of that total is accounted for by facilities in each judicial circuit. I designate firms as “local” if, for instance, 70% or 95% of all their chemical wastes are handled in a single circuit.

The summary statistics in Table 1 break out firms separately based on whether they are “local” or “national.” Notable in the table is the fact that, for instance, when considering the firm-wide total wastes produced, “local” firms are less than half the size of “national” ones. Given that smaller firms are considerably more likely to file for bankruptcy locally (as discussed in Appendix B.3 in more detail), this further suggests that the local firms I identify will be those primarily impacted by Apex.

5.2 Compustat

The TRI data does not in and of itself contain any financial information on the firms and facilities it tracks. I thus gather financial information from Compustat which provides data on public companies in the US via their SEC filings. As with the TRI data, I construct a balanced panel by limiting my investigations to firms for which there are a full set of observations throughout my sample period, giving a sample of 2,802 firms.

I proceed to match these names by hand to the 1,564 firms in the TRI data. In the event that a firm in TRI is a subsidiary of a firm in Compustat, I consider this a match as well. This process yields 335 total firms in both data sets. Of these matches, only eight correspond with the “local” firms in TRI whose operations are exclusively within the Seventh Circuit. Fortunately, when I expand my scope of “local” to include corporations for whom the majority of their TRI operations are in the Seventh Circuit, I am able to identify forty-six “local” Seventh Circuit companies in Compustat. Table 2 gives summary statistics on the full Compustat panel and on the subsets of it that qualify for my differing definitions of “local” Seventh Circuit companies.

In my baseline specifications, I Winsorize data in Compustat at the 2.5% and 97.5% levels, as is common practice in dealing with such data. I also consider variations with no Winsorizing. In most

82I also exclude from Compustat firms with NAICS code ‘525’ which corresponds to “funds, trusts, and other financial vehicles.” These are companies without any real operations of their own and thus are most appropriately excluded from these analyses.
cases there is no practical difference in results. In one place there is a small change in the significance of one estimate (from \( p = 0.029 < 0.05 \) to \( p = 0.053 < 0.1 \), and this is noted in Section 6 below.

### 5.3 Credit Agreement Data

I begin my analysis of credit agreements with the set of firms that appear in both the TRI and Compustat data. As public firms, many of these include copies of key credit agreements as part of their securities disclosures to investors. This provides a valuable window into how creditors responded to changing risks following the *Apex* decision.

Each credit agreement is hundreds of pages long, and while there are similar elements of each, they frequently contain uniquely worded provisions, meaning each requires manual investigation. To make this analysis tractable, I focus on the “local” firms within the Seventh Circuit, where *Apex* was decided, as well as the Third Circuit (which had a prior precedent congruent with *Apex*) and the Sixth Circuit (which had a precedent contrary to *Apex*).

Amongst the local firms within those circuits who are also public companies, 61 out of 73 (84%) regularly disclose credit agreements with their bank lenders as part of their securities filings. For these firms, I analyze the universe of their credit agreements disclosed via SEC filings during the study period.

I consider a credit agreement to contain strong environmental constraints if it allows the lender to proactively inspect a borrowers’ facilities in order to assess the safety with which it handles toxic chemical wastes. Some credit agreements provide for such inspections only upon the initiation of a new loan, whereas others allow for such inspections, at the lenders’ discretion, at any point during the term of the loan, which provides even stronger controls. A few credit agreements also require the borrower to take out insurance policies to the benefit of the lender to cover losses in the event of environmental catastrophes.

An example of such a strong provision can be seen in a credit agreement between Supreme Industries and Wells Fargo: 

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The Administrative Agent [Wells Fargo] shall have received a Phase I environmental assessment and such other environmental report reasonably requested by the Administrative Agent regarding each parcel of real property subject to a Mortgage by an environmental engineering firm acceptable to the Administrative Agent showing no environmental conditions in violation of Environmental Laws or
liabilities under Environmental Laws, either of which could reasonably be expected to have a Material Adverse Effect. (Supreme Industries Inc. 10-K. March 22, 2013, p.56)

Nearly all loan agreements include provisions that give lenders the right to inspect borrowers’ books and records at will. A relatively small proportion of these also give lenders general rights to inspect borrowers’ facilities at will. Unless an agreement explicitly mentions environmental assessments, however, I do not classify it as containing strong environmental controls.83

Many loan agreements make some mention of toxic chemical wastes, but have overall weaker environmental constraints. A common such provision is an agreement to indemnify the lender in the event that it is held liable for any environmental harms caused by the borrower. While indemnification provisions of many sorts are common in lending agreements, a provision such as this provides little tangible benefit to a lender, because in general the circumstances in which a lender would be held liable for a borrowers’ toxic contamination are those in which the borrower has become bankrupt or ceased operations and is unable to pay to remedy the contamination itself.84 In other words, circumstances in which the lender will have little or no ability to actually obtain meaningful recompense from the borrower.85

Written agreements are, of course, only one way in which lenders and borrowers relate to one another. Informal communications between lending officers and borrowers, for instance, may be equally important but are also obviously much more difficult to observe. Thus, the content of loan agreements is best seen as providing evidence of concerns of lenders about environmental contamination risks, rather than providing a complete account of every way through which such lenders may seek to monitor borrowers or exert control.

83I take it as a reasonable presumption that a lender that explicitly provides for environmental inspections has a greater concern for and intent to monitor a borrowers’ handling of toxic chemical wastes as compared to a lender that includes a more general provision providing for inspection of borrower facilities.

84Furthermore, it is actually quite rare that lenders will be held liable for borrowers’ activities. Such liability requires a showing that the lender “participates in the management” of the borrower in such an active way as to make the borrower essentially an extension of the lender. Furthermore, there are specific legislative carve-outs that specify that lenders imposing environmental related covenants explicitly do not constitute the exercise of such control. See 42 U.S.C. §9601(20)(G)(iv).

85Another common, but relatively weak, environmental provision in lending agreements is a covenant to notify the lender of any of the borrowers’ violations of environmental law that are serious enough to pose a material risk to loan repayment. Unlike provisions which enable pro-active site inspections, this is retroactive, and provides the lender relatively little tangible assistance in the event that a catastrophic contamination event has already occurred. Similarly, loan provisions that give the lender increased inspection rights only in the aftermath of a major chemical spill do not qualify as “strong” provisions in my accounting. Lastly, I qualify as “weak” provisions that simply require the borrower to disclose all pertinent information on environmental matters at the time of loan origination, and the nearly ubiquitous provisions in which borrowers covenant to obey environmental laws.
6 Analysis

6.1 Firm Responses to Apex Decision

6.1.1 Baseline Methodology

This section presents formal statistical analyses to investigate whether the Apex ruling caused specific firms in the Seventh Circuit to take steps to reduce risks of catastrophic chemical contamination. I focus on two outcomes: the quantity of on-site releases of a given toxic chemical and the amount of the chemical sent off-site for treatment. For all of my analyses with TRI data, my response variable is the natural logarithm of one plus the amount reported in the TRI data for a given year. This means that effects I estimate are interpreted as percentage increases from a baseline level for each metric.

I consider two complementary statistical forms for my analyses: difference in differences and triple difference methodologies. For the difference in differences approach, I restrict my sample just to “local” firms in each judicial circuit, and examine whether local firms in the Seventh Circuit significantly changed their behavior compared to local firms in other circuits in the wake of the Apex decision in ways that cannot be explained by the other regression controls I include.

For the triple differences formulation, my sample size includes all firms, both local and national. Here, roughly speaking, I am considering the difference in toxic release behavior between local and national firms in the Seventh Circuit and the same difference in the other circuits. I then look for whether the difference between local and national firms in the Seventh Circuit changed more than that same difference did in other circuits in the wake of the Apex decision.

Each of these methodologies has advantages and disadvantages. Using both in concert can help to capture the benefits of each while giving robustness against shortcomings. A challenge of the difference in differences method is that if, for instance, something changed in the regulatory environment of the Seventh Circuit around the time of the Apex decision (for instance, perhaps for reasons unrelated to the court case, regulators began inspecting RCRA facilities more stringently in the Seventh Circuit but not in other circuits), the impact of this change could be mistaken for the impact of the Apex decision.

Appendix A.9 considers different functional forms of the key response variables.
In Section 7 I explicitly consider several possibilities for such regulatory or economic changes and present results suggesting that there is no evidence for them. These tests help to address concerns with the difference in differences methodology. But, there is always the possibility that the tests failed to investigate a relevant change or were not sensitive enough to detect a change they did investigate.

The triple differences methodology helps to address these concerns. As long as whatever unobserved change in regulatory or economic conditions impacted “local” and “national” firms in the Seventh Circuit similarly, then this change will be controlled for by the statistical methodology. But, it is also possible that local vs. national firms differ fundamentally in how they are inspected by regulators or impacted by economic conditions. In this case, the triple differences may solve some problems (of controlling for factors that similarly affect local and national firms) at the expense of creating new problems (of failing to fully control for factors that differently affect these firms).

Supplemental tests can help to address these new concerns the triple difference methodology occasions. One way is to look explicitly for evidence of factors that differentially affected local vs. national firms in the Seventh Circuit near the time of the Apex decision. Another is by varying the definitions of “local” vs. “national” firms (as discussed in Section 5.1.3). But, none of these tests can prove with 100% certainty the absence of an unobserved, compounding factor.

By using both differences in differences and triple differences techniques, it is possible to create a suite of statistical tests that in aggregate is robust to a broader array of factors that could confound the analyses I conduct. Frequently, because the triple differences uses a larger sample (all firms, rather than just local) and a richer set of controls, it is able to deliver more precise estimates. Thus, I slightly favor these methodologies, but generally present both.

Formally, I define the difference in differences methodology I use as:

\[
\log(1 + \text{Amount}_{ict}) = (\text{Apex}_t \times \text{Seventh Circuit}_i)'\beta + (\text{Facility}_i \times \text{Chem}_c)'\Gamma_1 + (\text{Chem}_c \times \text{Year}_t)'\Gamma_2 + \varepsilon \tag{1}
\]

Here, \(i\) indexes facilities, \(c\) indexes chemicals, and \(t\) indexes time, measured in years. \(\text{Amount}_{ict}\) here represents either the amount of on-site releases or off-site treatment for a given chemical-facility-year. \(\text{Seventh Circuit}_i\) is an indicator for whether a given facility is within the Seventh Circuit. \((\text{Facility}_i \times \text{Chem}_c)'\)
Chem,\(i\) represents facility \(x\) chemical fixed effects\(^{87}\) and \((\text{Chem,}\times\text{Year,}\)) represents chemical by year fixed effects.\(^{88}\) \(\beta\) is the coefficient of interest, measuring the impact of the Apex ruling under the difference in differences statistical assumptions. \(\Gamma\) variables represent coefficients on fixed effects. I double cluster standard errors at the state and company levels.\(^{89}\)

In some formulations Apex,\(i\) represents an indicator for whether the year is \(\geq 2009\), the year of the Seventh Circuit’s Apex decision. This thus results in estimating a single average effect of the Apex decision for all years in which the decision was in effect. In other formulations, Apex,\(i\) represents a categorical variable for the year of observation, thus enabling a separate impact of Apex to be measured for each year in my sample. I set the base level of this categorical variable to be the year 2008, immediately prior to the Apex decision. Thus the coefficients for the interaction between the Apex variable and years other than 2008 represent the difference between those years and the base level.\(^{90}\)

For the triple differences methodology, I employ the following functional form:

\[
\log(1 + \text{Amount}_{ict}) = (\text{Apex,}\times \text{Single Circuit,}\times \text{Seventh Circuit,}\)′\(\beta + (\text{Facility,}\times \text{Chem,}\)′\(\Gamma_1 + (\text{Chem,}\times \text{Year,}\)′\(\Gamma_2 + (\text{State,}\times \text{Year,}\)′\(\Gamma_3 + (\text{Single Circuit,}\times \text{Year,}\)′\(\Gamma_4 + \epsilon \tag{2}
\]

In this framework, I now interact the Apex,\(i\) variable with an indicator both for whether a given facility is within the Seventh Circuit and for whether a given facility is owned by a company that operates only within the Seventh Circuit (Single Circuit,\(i\)). I also allow for state-by-year fixed effects, thus controlling for any time varying factors (such as changes in regulation, enforcement, or local economies) that would affect both local and national firms within a given state similarly. I also add fixed effects that interact the designation of “single-circuit” and the year.\(^{91}\)

\(^{87}\)In other words, this specification is considering deviations from a baseline amount of on-site releases or off-site treatment for each chemical handled by each facility.

\(^{88}\)Thus, if there were changes in the national economy that affected, for instance, the supply and demand for a particular chemical, and these changes affected firms similarly across different circuits, then those would be controlled for by these effects.

\(^{89}\)The “treatment” which these specifications seek to study the effects of is the decision by the Seventh Circuit, which impacted the states of Illinois, Wisconsin and Indiana. Because therefore whether a facility received the given “treatment” is determined by which state it resides in, I use states as the geographic component of my error clustering. This matches recommendations in Cameron and Miller (2015) as well as the practice followed by leading recent empirical studies in law and economics with similar research designs to this one, such as Honigsberg et al. (2017). I have observations from all fifty states plus DC and Puerto Rico in my data.

\(^{90}\)For more discussion of the timing of Apex’s impact and how this factors into my empirical tests, see Appendix B.10.

\(^{91}\)These add controls for the possibility that there may have been national-level economic or regulatory factors that may have impacted
6.1.2 Baseline Results

I now consider the results of fitting Equations 1 and 2 to the TRI data. Table 3 summarizes the results for models that use a single indicator for the Apex ruling being in force, whereas Figure 1 presents the models that estimate a unique value for each year. When considering on-site releases, the difference in differences and triple differences models in Table 3 show reductions amongst local firms in the Seventh Circuit following Apex of 14.4% and 23.3%, respectively. For off-site treatment, the results show increases of 31.4% and 29.4%, respectively. 92

The plots in Figure 1 also support these conclusions. For each of the two variables (on-site releases and off-site treatment) and each of the methodologies (difference in differences and triple differences), the plots show yearly estimates for the pre-Apex period that center near zero with little evidence of an “effect” from Apex beginning before the decision. Following Apex, by contrast, the plots show consistent downward and upward movements for the on-site release and off-site treatment variables respectively.

To complement the plots in Figure 1, I also construct a set of “raw data” difference in differences plots. For the first of these, I consider just observations from “local” firms, and compare the behavior of these single circuit firms that are in the Seventh Circuit vs. those in other circuits. For both on-site releases and off-site treatment, I compute the average amount by which the releases of each type of firm vary, in percentage terms, from the baseline level of 2008. I then plot these average yearly differences separately for those firms in the Seventh Circuit vs. those in the rest of the country. This is thus a close analogue to the regression analyses going on in the statistical formulation of the difference in differences analyses. Figure 2 presents the results of this. As in the formal statistical analyses, Figure 2 shows comparable behavior for firms in the Seventh vs. other circuits prior to the Apex decision but then a sharp divergence in both on-site releases and off-site treatment following the decision.

For the second “raw data” difference in differences plot, I perform the same operation but now look just at observations from within the Seventh Circuit and compare the behavior of facilities that are

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92In both the formulations, the magnitude of the percentage increase for off-site treatment is 1.5 or two times that as the magnitude of the percentage decrease for on-site releases. As Table 1 demonstrates, the base level for the amounts of toxic wastes released on-site is much higher than the base level for the amounts of such wastes sent off-site for treatment. Thus, if a given amount of waste moves from on-site disposal to off-site treatment, it will result in a smaller proportional change for on-site releases and a larger proportional change for off-site treatment. Also, some wastes that cease being disposed of on-site show up under the effects for “off-site disposal,” another variable in the TRI data not analyzed in depth in this study as effects on it are generally comparable to off-site treatment. Details are available upon request.
owned by “local” firms vs. those that are owned by national firms. This thus reflects the additional set of differences that is being compared in my triple difference regression specifications. Figure 3 presents the results. Prior to Apex the behavior of local and national firms within the Seventh Circuit is largely comparable. After Apex their behavior diverges in the anticipated directions.

Taken together, the results in Table 3 and Figures 1 to 3 present evidence that firms responded to Apex by reducing toxic wastes they release on-site and substituting off-site treatment. As discussed in Section 3.2, this is precisely the kind of response that would be expected of firms seeking to limit their exposure to catastrophic toxic chemical liability of the type Apex made more difficult to discharge.

For additional robustness, I also consider specifications that add two additional sets of fixed effects. For the first, I start by estimating facility size based on total waste produced during the pre-Apex period. I classify facilities into ten groupings based on whether they are in the bottom 10%, top 10%, or so on based on total waste produce. I then interact these classifications with a categorical variable for year in order to create firm-size-by-time fixed effects. Results are very comparable under this specification as to the main formulation.93

6.1.3 Impact of Apex on Total Waste and Air Releases

I now consider two additional outcomes: total waste and stack air releases. Total waste gives insights into total industrial activities at facilities. If production levels drop significantly, total waste would be expected to as well. Because this category includes, for instance, amounts of chemicals that are recycled, re-used, or burned for energy, simply shifting how a facility handles its wastes will have relatively little impact on its reported figures for total waste.94

If the Apex ruling did indeed induce a change in firm behavior, as the analyses above suggest, then that must have imposed some costs on firms. But, the results above give no indication of how large those extra costs were. Looking for evidence of the impact of Apex on total waste can give some insight. If costs were large, affected firms may have responded by reducing their net production levels.95

93For the triple difference formulation, the on-site release coefficient is $-0.2221^{**}$ and off-site is $0.29535^{***}$. For the difference in differences, the on-site coefficient is $-0.11497$ (p = 0.171) and the off-site coefficient is $0.3916^{**}$.

94It is of course possible that if a facility re-engineers its production techniques, it could use less of a toxic chemical while maintaining a given level of production, meaning that total waste is not a perfect measure of total industrial activity.

95This is by no means a certain outcome, and the analysis here does not purport to be a full general equilibrium analysis of the impact of increasing production costs on a segment of firms within a market, but under many reasonable modeling assumptions this would be the...
The results from Table 3 estimate a coefficient of 0.057 for the Apex variable when the outcome is total waste, one third to one sixth the magnitude of coefficients estimates for on-site releases and off-site treatment above. With a standard error of 0.11 this result is not even close to statistically significant. Rather than giving evidence that Apex increased total waste, this is best interpreted as a null result.

Nevertheless, based on this coefficient estimate and standard error, it is possible to construct a hypothesis test to assess the likelihood that the true impact of the Apex decision did include a sizable reduction in total waste and thus, presumably, in total production as well. Based on the findings in Table 3, one can reject at an 85% confidence level the hypothesis that Apex caused a reduction of 5.9% or more in total waste, and at a 90% confidence level a reduction of 8.6% or more in total waste. The relevant coefficient and standard error for total waste from the difference in differences analysis are 0.084 and 0.095, respectively. These indicate that one can reject, at an 85% confidence level, the hypothesis that Apex caused a reduction of 1.4% or more in total waste, and one can reject at the 90% confidence level the hypothesis that Apex caused a reduction of 3.7% or more in total waste.

These findings thus show no positive evidence that responses to Apex were sufficiently expensive to substantially alter firms’ cost structures and thus total output. Given that it seems likely that Apex did impose some costs, the analyses above suggest that those costs can be bounded to relatively low levels.

I now consider the impact of Apex on stack air releases. There are two reasons that investigating these may be informative. First, they serve as a type of placebo test. If there were other relevant regulatory or economic conditions that changed around the time of the Apex ruling, it is plausible that they would impact stack air releases as well. By contrast, there is much less reason to believe stack air releases would be affected by Apex directly, since they do not lead to accumulation of waste in the ground or water systems. Thus, if my tests detect an “impact” of Apex on air releases, it at least raises concerns that the tests may be reflecting some factor other than the court decision.

Nevertheless, there is a channel by which Apex could indirectly impact air releases. This would be if costs of reducing liability risk following Apex were great enough to curtail total firm production.

Given this background, Table 3 shows essentially zero impact of Apex on air releases, with a coeffi-
cient estimate of 0.025 and no statistical significance to speak of. Nevertheless, as with the coefficient for total waste, the standard error is relatively high (0.088). The fact that this “placebo” test shows no effect from the Apex decision where none is expected is at least consistent with the hypothesis that the earlier tests of Apex are indeed picking up the impact of the court case and not some extraneous contemporary factor. And, the small, insignificant change in on-site air releases also supports the notion that the net costs of the Apex decision were relatively small. But, in both cases, the relatively large standard errors limit the inferences that can be based on this particular result.

One final piece of insight from analyses of total waste and air releases can be gleaned by considering parallel trends analyses for them - that is, by looking at the estimates for effects of Apex for each separate year, depicted in Figure 4. Although there is a fair amount of noise, the plots show much the same effects both pre- and post-Apex. In other words, this demonstrates an added dimensions along with firms in the “treatment” group were comparable to those in the “control” group during the pre-Apex period.⁹⁷

6.2 Additional Credit & Financial Impacts of Apex

To shed more light on the nature and mechanisms of Apex’s impact, I now analyze financial data from Compustat. As discussed in Section 5.2, Compustat data is available only for a subset of firms in the TRI database. In fact, as the third column of Table 2 indicates, Compustat has data on only eight of the firms that I identify as operating exclusively within the Seventh Circuit. A sample size this small precludes meaningful analysis.⁹⁸ Thus, for my analyses using Compustat data, I rely on my expanded definitions of “local” firms that require only a fraction (either 70% or 95%) of their operations reported in the TRI data to be within a single circuit. By these definitions I identify, 46 firms and 18 firms, respectively, as both “local” to the Seventh Circuit and as having Compustat data available.⁹⁹

There are two primary outcomes that I look at in the Compustat data for an impact from Apex. First, I look at the natural logarithm of firms’ total liabilities to examine whether credit tightened in response

⁹⁷ In unreported tests, I also construct “raw data” difference and differences plots for the air releases and total waste variables. As with the regression analyses, these show comparable behavior in the treatment and control groups both before and after the Apex decision.⁹⁸ In unreported tests I try my baseline analyses on this sample, and unsurprisingly find no evidence of a statistically significant effect of Apex.⁹⁹ See again Table 2 for details on these firms.
to potentially lower recovery in the event of a firms’ bankruptcy. Secondly, I look at firms’ profits to better understand the costs of changes firms made in response to Apex. Firms of different sizes have very different magnitudes of profits, so using total profits would not be suitable here. And, since profits can be negative, taking the natural logarithm, as I do with liabilities, is also not possible. To achieve a metric of profitability that is comparable across firms, therefore, I take the net profits for each firm in each year and then divide this by the total assets the firm had as of year 2008, the year prior to the Apex decision. In this way, I calculate a version of firms’ return on assets, but one which will only respond to changes in firms’ total profits and not, for instance, be influenced by rising / falling asset values.

Given these outcomes, I formulate triple difference specifications of the form:

\[ y_{it} = (\text{Apex}_t \times \text{Single Circuit}_i \times \text{Seventh Circuit}_i) \beta + \text{Company}_i + (\text{State}_i \times \text{Year}_t) \Gamma_1 + (\text{NAICS 4}_i \times \text{Year}_t) \Gamma_2 + (\text{Single Circuit}_i \times \text{Year}_t) \Gamma_3 \epsilon \]  

(3)

Here \( i \) indexes firms and \( t \) indexes years. \( y_{it} \) represents either of the two outcomes for liabilities and profits discussed above. The key interaction of interest here is the same as in Equation 2: \( (\text{Apex}_t \times \text{Single Circuit}_i \times \text{Seventh Circuit}_i) \). This measures the unique change in outcomes for firms whose operations (based on the TRI data) are primarily within the Seventh Circuit. Also as with Equation 2, this formulation contains state-by-year fixed effects. \( \text{Company}_i \) represents a simple company fixed effect in this formulation. Finally, \( (\text{NAICS 4}_i \times \text{Year}_t) \) represents the interaction between firms’ NAICS4 industry classification and the yearly fixed effects. This enables each of the different four-digit NAICS industries to have a unique yearly time trend and thus helps to control for the greater diversity of firms in the Compustat data.

Figure 5 now plots the yearly coefficient estimates of the Apex effect calculated by fitting Equation 3 to the Compustat data using both the 70% and 95% thresholds for “local” firms. First, the plots show

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\(^{100}\)For my measure of total liabilities, I use Compustat variable ‘lt.’ For total assets, I use variable ‘at.’

\(^{101}\)Compustat variable ‘ib.’

\(^{102}\)As I discuss further below, I find evidence that firms’ liabilities reduced somewhat following Apex, suggesting a potential tightening of credit. Firm assets declined, but by a smaller amount, suggesting some partial substitution of funding. But, since firm assets are declining, if I simply measure return on assets on a year-by-year basis, then reductions in firm profits get confounded by corresponding reductions in firm assets, potentially making it look like firm “profitability” decreased less or even increased, when in fact this is being driven simply by reduced value of total assets.

\(^{103}\)Here, a firm’s state is based on its corporate headquarters as listed in the Compustat data.
little evidence of systematic trends or differences between the “treatment” and “control” groups during the pre-Apex period. Second, the plots in general show a decrease in total liabilities of the affected firms starting immediately after the Apex decision and increasing for several years following it. If I replace the post-Apex indicators in Equation 3 with a single indicator to average the post-Apex effect, it yields a coefficient indicating a reduction in total liabilities of 9.1% (p-value 0.029**) for the 70% “local” threshold and a reduction in total liabilities of 13.2% (p-value 0.031**) for the 95% “local” threshold.104

To contextualize the magnitude of these declines, in Table 2 I consider the “local” firms under these varying definitions, and calculate for each firm separately the year-to-year standard deviation in its log total liabilities. These figures thus represent how much, in percentage terms, firm total liabilities tend to vary from year to year. The average of these intra-firm standard deviations across the local firms in the Seventh Circuit is approximately 0.25. Thus, the declines in total liabilities of 9.1% and 13.2% measured over the different definitions of local firms suggest that Apex may have led to a decline in total liabilities equal to roughly one half of the amount of normal year-to-year variation amongst these firms - in other words, a relatively modest tightening of credit.

When I examine the log of total firm assets under these specifications, I get reductions in assets of 5.5% and 6.0% for the 70% and 95% “local” firm thresholds respectively. These are both roughly half the size of the declines in total liabilities and neither is statistically significant. That assets appear to reduce less than liabilities suggests that firms may be partially substituting for reduced credit via other funding methods, but the statistical imprecision of these estimates makes it difficult to conclude this for certain.

Finally, Figure 5 presents results on firm’s returns on assets. For both the 95% and 70% local thresholds, the plot shows a small dip in profits following the Apex decision. But, the magnitude of this dip is comparable to dips that existed pre-Apex as well, making it much less clear that the dip can be meaningfully attributed to the Apex ruling. And, in any case, the dip completely disappears within a few years, whereas all of the other measured impacts of Apex, over the credit outcomes from Compustat

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104 For versions of these analyses without Winsorizing, the p-values are 0.053* and 0.049**, respectively, and the coefficients are a modest amount smaller, showing reductions of 7.7% and 11.7% respectively.
and the pollution outcomes from the TRI data, are far more persistent. When I use a single coefficient to capture the post-Apex effects for return on assets, the coefficient is almost exactly 0 for the 95% and 70% local thresholds and has no statistical significance. Overall then, there is little evidence that Apex substantially impacted firm profitability, a result consistent with analyses of total waste in the TRI data. But, as with the total waste analyses, because the standard errors are relatively large, it is not possible to conclusively rule out a meaningful impact on firm profitability.

6.3 Credit Agreements Pre- and Post-Apex

To shed more light on the nature and mechanisms of Apex’s impact, I now analyze the content of the credit agreements between banks and firms operating in judicial circuits differently impacted by the Apex decision. As described in Section 5.3, I focus on local firms in the Third, Sixth, and Seventh circuits to make the detailed analysis of contract provisions tractable. I use the “70% local” threshold described above in identifying these firms in order to obtain a feasibly large sample size. This yields a total of 61 such firms in my sample that disclose their credit agreements in securities filings.

While the toxic waste releases that firms disclose in the TRI data change from year-to-year, firms’ credit arrangements with their lenders are often constant over multi-year periods in which none of their loans come due or are subject to renegotiation. Given this fact, and the relatively small sample of firms for which I have credit agreement data, a year-by-year is not tractable. Instead, I focus on a simple pre/post-Apex analysis, assessing whether firms had credit agreements with strong environmental constraints in effect before or after the Apex decision.

In summarizing the data on credit agreements, a challenge is that there is a clear ordinal ranking of strength of loan provisions, but not a clear numeric ranking. A credit agreement that provides for inspections at any point in the life of the loan is stronger than one that only provides for them at the outset, and one that mandates environmental liability insurance is stronger than one that doesn’t. I decline, however, to assign “points” or some other metric to assess the overall strength of loan provisions. While this makes summarizing data somewhat more challenging, it avoids difficult-to-justify

\textsuperscript{105}All of the results I present here carry through with higher thresholds for “local” firms. But, these shrink the sample size even further, making the results from this section even more anecdotal than they otherwise are.
presumptions that a given provision is, for instance, 50% or 100% “stronger” than another.

Accordingly, Table 4 presents one perspective on data from the credit agreements. Following the Apex decision, there was no change in the number of firms in the Third circuit with covenants providing for independent lender inspections, and only one out of 22 firms (4.5%) in the Sixth circuit saw their covenants change to add this provision. By contrast, eight out of 35 firms (23%) in the Seventh Circuit saw their covenants change post-Apex. Similarly, two of the firms in the Seventh Circuit see new requirements added post-Apex for environmental insurance, whereas no firms in the Third or Sixth Circuits change in this regard. Finally, five firms in the Seventh Circuit see new loan provisions enabling environmental inspections by lenders at will, whereas no firms in the Third circuit see any change, and only two firms in the Sixth circuit see a change.

With observations from just 61 firms, the sample size for these analyses is smaller than what can generally support robust statistical inference, thus I present these numbers largely as anecdotal evidence of changes in the content of lending agreements before and after the Apex decision. Furthermore, only a relatively small portion of the local firms in the sample are public companies that disclose loan agreements. It is quite plausible that these results understate the change in lender behavior, especially amongst smaller, non-public firms that may have a greater chance of becoming insolvent on account of expenses from environmental contamination events and that may have less bargaining power in negotiating loan terms with banks. Despite the limitations of these analyses, they help to shed light on a plausible channel of how the Apex decision impacted firm behavior through creditor control.

7 Validation, Robustness and Extension Analyses

In Appendix A I consider a number of tests to better gauge the validity and robustness of the primary findings of this investigation. This section summarizes those results.

First, I conduct additional tests to look for evidence of specific events other than the Apex ruling that may have impacted a similar set of firms in a similar way. Appendix A.1 looks for evidence in changes in RCRA enforcements near the time of the Apex ruling and Appendix A.2 investigates whether new specialized waste treatment and disposal facilities may have opened in or near the Seventh Circuit,
thus potentially making these facilities a cheaper or more attractive option than they previously were. Neither tests reveal significant changes around the time of the Apex decision.

I next consider more general placebo tests, looking for an impact of Apex in areas where the legal analysis of the case predicts there should be none. Appendix A.3 examines the impact of Apex on chemicals not regulated under RCRA, and then looks for an effect from Apex on Conditionally Exempt Small Quantity Generator (CESQG) facilities which are only lightly affected by RCRA and have low risks of causing catastrophic contamination. In both cases, no impact from the Apex ruling is found, as would be expected.

The second type of tests that I consider in Appendix A are ones that employ plausible variations on the forms of the statistical analyses that I use in Section 6. Appendix A.4 investigates the TRI analyses from Section 6.1.2 but uses the alternative definitions of “local” firms that require only a majority, rather than all, of a company’s TRI activity to be within a single circuit. It finds results that are consistent with those in the main analyses, though at times with a lower degree of statistical significance.

Appendix A.5 then considers variations that omit circuits outside of the Seventh Circuit from the data. These seek to investigate the possibly that perhaps the Seventh Circuit did not change after the Apex decision but that instead, it was actually changes in some other circuit, perhaps a large one such as the Ninth, that made the Seventh Circuit look different compared to the country as a whole. These tests find no meaningful changes in results when any single circuit is omitted from the analysis.

Another possibility that Appendix A.5 considers is that the Apex decision, and perhaps the Supreme Court’s decision not to review it, may have sparked speculation that other circuits would also adopt the Apex precedent. If this were the case, then including circuits that did not yet have a precedent addressing the issues considered in Apex in the data might attenuate the measured impact of the Apex decision. Conversely then, restricting the sample to only the Seventh Circuit plus the Third and Sixth Circuits (which already had precedents on the issue Apex addressed) might amplify the results. The results discussed in Appendix A.5 suggest effect sizes roughly 30% larger when restricting the sample in this way. This may be evidence of an anticipatory impact from Apex in other circuits. Yet, the difference in magnitudes are within the confidence intervals for the estimated coefficients, meaning
that this should not be taken as hard evidence of an anticipatory impact of Apex in circuits outside of the Seventh.

In Appendix A.6 I consider “counterfactual” tests that assume, contrary to fact, that the Apex decision was actually decided in each of the other judicial circuits (excluding DC) apart from the Seventh. These can help to test for whether there was some factor apart from the Apex decision that might have accounted for a change in behavior. These tests find no consistent or significant impacts of the Apex decision for other circuits.

Next, Appendix A.7 examines whether firms impacted by the Apex decision became less likely to be cited for violations of RCRA regulations. If so, it could provide evidence of another dimension along which firms sought to reduce their liability risks. The mechanism here would not be so much an effort to avoid fines for RCRA violations - these tend to be small and in any case their impact on companies was not meaningfully changed by Apex. Instead, a more plausible explanation would be that firms sought to improve the overall safety of their operations in an effort to reduce the chances of spills that could lead to catastrophic contamination. A side effect of this could be reduced citations for RCRA violations.

Appendix A.7 presents a small amount of suggestive evidence in favor of such an effect. But, a challenge is that one of the best markers of serious violations of RCRA regulations, the incidence and amount of fines, is also extremely rare, with only a tiny number of facilities receiving such fines in the Seventh Circuit at any point in the study period. Thus, the safest interpretation of these results is that they present nothing contrary to the findings under the primary analyses in this investigation.

Appendix A.9 presents analysis results when using different functional forms for the key outcome variables. In the baseline specifications, outcomes are measured in log(1 + Amount) for the amount of chemicals released or treated off-site. In the alternative specifications, I consider outcomes that are binary indicators for whether any of a chemical was released on-site or treated off-site. I also consider an outcome that represents the ratio of off-site releases to the sum of on-site and off-site releases. These alternative formulations yield results that confirm the conclusions of the main analysis and with a generally high degree of statistical significance.

These tests also help to identify whether my statistical estimators are overly prone to identifying ‘false positive’ results that are classified as statistically significant when they actually just represent random noise.
8 Conclusion

When a corporation enters bankruptcy proceedings, very frequently there are more obligations to other entities than it can fully satisfy. Legal rules, such as those governing the dischargeability and priority of claims in bankruptcy, and those governing limited liability protections for firm owners, govern which obligations will be met and in what amounts, given limited resources. Scholars in law and economics have for some time been interested in how these rules governing distribution of resources after a firm fails might impact the behavior of firms before they fail, particularly when it comes to activities that externalize harms to other parties.

When the Seventh Circuit Court of Appeals issued its decision in *U.S. v. Apex Oil Co.* in 2009, it created a valuable natural experiment in which one set of firms saw a change in rules governing which obligations could be discharged in bankruptcy, whereas another set of firms saw no such change. A priori - it was not certain that a change in law such as this would impact firm behavior. *Apex* most directly impacted firm creditors and only indirectly affected firm managers and shareholders. Yet, the results from this investigation suggest firms subject to the precedent from *Apex* took meaningful new precautions to reduce risks of causing catastrophic toxic chemical contamination.

As public and academic interest in externalities created by corporations increases, and as corporations come increasingly to rely on debt, the findings in this paper point to the potential value in looking at bankruptcy law and law more generally that influences recovery for firm creditors as tools to improve net social efficiency. At the same time, the *Apex* decision impacted the dischargeability of a very specific type of obligation relevant to a very specific set of firms. Thus, there is much need for further research to better understand if, where, and how the findings here generalize to other pertinent contexts.
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Figure 1. TRI Baseline Analyses - Parallel Trend Plots - Local Firms Only. These plots depict the annual coefficients estimates from equations 1 and 2. For each, the base level for the categorical year variable is set to 2008, the year before the Apex decision. Thus, this coefficient is represented as zero by definition on all of these plots. All other coefficients represent an effect of Apex estimated for each given year, relative to the base year of 2008. Vertical lines in the plots depict 95% confidence intervals for the coefficients. All model aspects of fixed effects, error clustering, and sample size are the same as for the results depicted in Table 3.
Figure 2. "Raw Data" Difference in Differences Plot - “Local” Firms Only. This plot considers just the set of “local” firms that operate only in a single circuit: the same set of data used for the difference in differences statistical analyses. Rather than presenting regression coefficients, however, the data underlying this plot simply calculates, for each facility-by-chemical-by-year observation, the percentage by which the value of that observation differs from the facility-by-chemical observation from 2008, the baseline year prior to the Apex decision. Thus, if on-site releases are 100 pounds in 2008, and 90 pounds in 2009, then this will record “-10%.” Finally, I take the mean “percentage difference from 2008” across all chemicals and facilities across all “single circuit” firms in the Seventh Circuit, and across all “single circuit” firms outside of the Seventh Circuit, and plot those yearly mean percentage differences in this chart.
Figure 3. “Raw Data” Difference in Differences Plot - Seventh Circuit Facilities Only. This plot considers just the set of facilities located within the Seventh Circuit. It compares the behavior of those facilities that are owned by “local” firms that operate only within the Seventh Circuit with the behavior of facilities that are in the Seventh Circuit but that are owned by “national” companies whose operations span multiple circuits. Thus, this would represent the underlying data that would be used, for instance, to run a difference in differences statistical analysis, but looking only at facilities within the Seventh Circuit. As with Figure 3, however, rather than presenting regression coefficients, this instead simply plots the “raw data” representing the average change in chemical disposal levels across “local” and across “national” firms operating within the Seventh Circuit. As such, this can be seen as reflecting the additional set of differences that is being compared in the triple difference regression specifications.
Figure 4. TRI “Total Waste” and “Air Releases” - Parallel Trend Plots. This figure depicts parallel trend plots of the precise same nature and specifications as those in Figure 1 but simply uses total waste and air releases as the response variables.
Figure 5. Compustat Parallel Trends Plots. These plots depict the results from the triple difference analysis for the Compustat data defined by Equation 3. As with comparable TRI plots in Figure 1, these set the base level for the categorical year variable to 2008, the year before the Apex decision. Other coefficient estimates thus represent deviations from this as a baseline, and vertical bars represent 95% confidence intervals on the estimates, with robust errors clustered at the state level. Results from versions of these analyses that use just a single post-Apex indicator variable are discussed in Section 6.2.
Table 1
TRI Summary Statistics. Units for all statistics on wastes are in millions of pounds and represent sums taken over the eleven-year sample period from 2004 to 2014. Counts for total observations are at the facility-by-chemical-by-year level.

<table>
<thead>
<tr>
<th>Firm Type</th>
<th>All Firms</th>
<th>National</th>
<th>Local</th>
<th>National</th>
<th>Local</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Firms: Total Waste</td>
<td>87,347</td>
<td>77,163</td>
<td>10,183</td>
<td>7,567</td>
<td>921</td>
</tr>
<tr>
<td>Firm Avg. Total Waste</td>
<td>55.8</td>
<td>82.4</td>
<td>16.2</td>
<td>36.4</td>
<td>16.7</td>
</tr>
<tr>
<td>Facility Avg. Total Waste</td>
<td>23.1</td>
<td>23.9</td>
<td>15.2</td>
<td>22.4</td>
<td>15.1</td>
</tr>
<tr>
<td>Facility Avg. On-Site Releases</td>
<td>3.5</td>
<td>3.2</td>
<td>3.9</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>Facility Avg. Off-Site Treatment</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td>Facility Avg. Stack Air Releases</td>
<td>0.3</td>
<td>0.4</td>
<td>0.2</td>
<td>0.3</td>
<td>0.2</td>
</tr>
<tr>
<td>Observations</td>
<td>360,197</td>
<td>302,033</td>
<td>58,164</td>
<td>33,457</td>
<td>5,521</td>
</tr>
<tr>
<td>Unique Facilities</td>
<td>3,788</td>
<td>3,230</td>
<td>670</td>
<td>338</td>
<td>61</td>
</tr>
<tr>
<td>Unique Companies</td>
<td>1,564</td>
<td>936</td>
<td>628</td>
<td>208</td>
<td>55</td>
</tr>
</tbody>
</table>
Table 2
Compustat Summary Statistics. Values for total assets and liabilities are given in millions of dollars. The respective standard deviations are calculated as follows. For each of assets and liabilities, I take the natural logarithm and then compute the intra-firm yearly standard deviation of this figure over the sample period. The reported standard deviations for log total assets and log total liabilities then represent the mean of these intra-firm standard deviations. The standard deviation for return on assets follow the same mean, intra-firm calculation, but with no logarithm applied. Return on Assets is calculated by dividing total firm profits by assets in 2008. In this way, it seeks to create a consistent measure of net profitability that is on a scale comparable across firms.

<table>
<thead>
<tr>
<th></th>
<th>All Firms</th>
<th>7th Cir TRI Local</th>
<th>7th Cir TRI Local - 95%</th>
<th>7th Cir TRI Local - 70%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Firms</td>
<td>2,802</td>
<td>8</td>
<td>18</td>
<td>46</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>25,218</td>
<td>72</td>
<td>162</td>
<td>414</td>
</tr>
<tr>
<td>Avg. Total Assets</td>
<td>6,888</td>
<td>3,632</td>
<td>16,078</td>
<td>11,710</td>
</tr>
<tr>
<td>SD log(Total Assets)</td>
<td>0.27</td>
<td>0.21</td>
<td>0.21</td>
<td>0.21</td>
</tr>
<tr>
<td>Avg. Total Liabilities</td>
<td>4,445</td>
<td>2,516</td>
<td>10,238</td>
<td>7,451</td>
</tr>
<tr>
<td>SD log(Total Liabilities)</td>
<td>0.32</td>
<td>0.21</td>
<td>0.25</td>
<td>0.24</td>
</tr>
<tr>
<td>Avg. Return on Assets</td>
<td>0.028</td>
<td>0.042</td>
<td>0.064</td>
<td>0.061</td>
</tr>
<tr>
<td>SD Return on Assets</td>
<td>0.051</td>
<td>0.051</td>
<td>0.04</td>
<td>0.042</td>
</tr>
</tbody>
</table>
Table 3
TRI - Baseline Results. This table presents the results of fitting equations 1 and 2 to the TRI data. For each regression specification, the response variable is equal to the natural logarithm of one plus the value found in the TRI data. Coefficients are thus interpreted as percent changes in an outcome attributable to the Apex ruling. For the difference in differences formulation, the sample consists only of “local” firms (as defined in Section 5.1.3) in each judicial circuit. For the triple difference formulations, the sample consists of both “local” and “national” firms in each judicial circuit. Robust standard errors are double clustered at the state and company level.

<table>
<thead>
<tr>
<th></th>
<th>(Difference in Differences)</th>
<th>(Triple Differences)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(On-Site Release)</td>
<td>(Off-Site Treatment)</td>
</tr>
<tr>
<td>Apex x Seventh Circuit</td>
<td>-0.144 ( \ast )</td>
<td>0.314 ( \ast \ast )</td>
</tr>
<tr>
<td></td>
<td>(0.0816)</td>
<td>(0.1365)</td>
</tr>
<tr>
<td>Apex x Seventh Circuit x Single Circuit</td>
<td>-0.233 ( \ast \ast )</td>
<td>0.294 ( \ast \ast \ast )</td>
</tr>
<tr>
<td></td>
<td>(0.0909)</td>
<td>(0.0956)</td>
</tr>
<tr>
<td>Observations</td>
<td>57684</td>
<td>57684</td>
</tr>
<tr>
<td>Adjusted ( R^2 )</td>
<td>0.816</td>
<td>0.636</td>
</tr>
</tbody>
</table>

|                               | (On-Site Release)            | (Off-Site Treatment) |
|                               | (Total Waste)                | (On-Site Air)        |
| Apex x Seventh Circuit        | -0.233 \( \ast \ast \)      | 0.294 \( \ast \ast \ast \) |
|                               | (0.0909)                     | (0.0956)             |
| Apex x Seventh Circuit x Single Circuit | 0.057            | 0.025                |
|                               | (0.111)                      | (0.0887)             |
| Observations                  | 355176                       | 355176               |
| Adjusted \( R^2 \)           | 0.828                        | 0.669                |

|                               | 0.779                        | 0.826                |

Cluster robust standard errors in parentheses
\( \ast p < 0.1, \ast \ast p < 0.05, \ast \ast \ast p < 0.01 \)
<table>
<thead>
<tr>
<th>Circuit</th>
<th>N Local Firms with Covenants</th>
<th>% Inspect Pre-Apex</th>
<th>% Inspect Post-Apex</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4</td>
<td>0.500</td>
<td>0.500</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>22</td>
<td>0.273</td>
<td>0.318</td>
<td>0.045</td>
</tr>
<tr>
<td>7</td>
<td>35</td>
<td>0.086</td>
<td>0.314</td>
<td>0.229</td>
</tr>
</tbody>
</table>
Appendix

A Robustness and Extension Results

A.1 RCRA Inspections Actions

Is it possible that there was some change in environmental enforcement activity that occurred concurrently with the Apex decision that could have caused the reactions of firms that are documented in Section 6? To investigate this, I start by considering a simple plot of the total number of RCRA-related facility inspections occurring in the Seventh Circuit versus other circuits and then proceed to a more formalized regression analysis.\(^{107}\)

Figure A.1 shows the number of inspections in the Seventh Circuit was essentially flat throughout the study period. There is somewhat of an uptick in total inspections outside of the Seventh Circuit, which if anything might suggest a decrease of inspection activity in the Seventh Circuit relative to other circuits during the period of the study, thus producing results opposite to those obtained in Section 6. But, this uptick in enforcements outside the Seventh Circuit starts well before the Apex decision, and in any case, total non-seventh circuit enforcements end the sample period at largely the same level as they began with. In short, while this analysis is admittedly quite rough and informal, it is hard to square the patterns depicted in Figure A.1 with a story that they are driving the results measured for the Apex decision as depicted in, for instance, the main parallel trends analyses in Figure 1.

More formalized regression analyses also confirm the heuristic results presented in Figure 1. In particular, I consider the difference in differences and triple difference specifications used in Section 6, but now using as the response an indicator for whether the facility is subject to a RCRA inspection in a given year. Figure A.2 plots the annual coefficients estimated from these regressions. Neither of the regression results depicted in those plots gives much indication of a structural change in the likelihood of RCRA inspections around the time of the Apex decision.\(^{108}\)

As always, however, it is important to note that the absence of evidence of an effect is not equivalent to evidence of an effect’s absence. Thus, because the error bars on these estimates of inspection probabilities are relatively large, some change in inspection probability cannot be conclusively ruled out.

A.2 New Disposal Facilities in or Near the Seventh Circuit?

Another possible explanation for why on-site releases might decrease in the 7th circuit and off-site treatment increase would be if a new treatment facility opened in the area that offered more attractive pricing options than were previously available.\(^{109}\) To investigate this, I turn again to the TRI data but no longer restrict my sample to facilities that operate throughout the entirety of the sample period, as I do for my primary analyses. The TRI data contains, for each facility, the North American Industry Classification System (NAICS) code associated with that facility. NAICS codes are a way to identify firms and facilities based on the type of business or activity they are primarily engaged in. I use these NAICS codes to identify facilities that specialize in hazardous waste treatment and to investigate whether large new facilities opened in the Seventh Circuit near the time of the Apex decision.

I identify hazardous waste treatment and disposal facilities in the TRI data based on NAICS code 562112 - “hazardous waste collection” and NAICS code 562211 “hazardous waste treatment and disposal.” I calculate the total number of such facilities in the 7th circuit and in the nation as a whole, and then calculate the percentage of all such facilities within the seventh circuit. In 2008, there were 19 such facilities in the 7th circuit and 183 nationally, giving the Seventh Circuit 10.3% of the national share. In 2010, the numbers were 17 and 176 respectively moving the Seventh Circuit share to 9.7%.\(^{110}\) I also check individually to see if these net number of facilities mask the opening of a very large new facility and the closing of small facilities, and find no evidence of this. Results are much the same when I expand consideration to the Sixth and Eighth Circuits, which completely surround the Seventh and provide for the possibility that a major new facility with competitive prices might have opened near the Seventh circuit. Results are also much the same when I restrict consideration to just NAICS code 562211 “hazardous waste treatment and disposal.” Finally, results are consistent when I also look at facilities

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\(^{107}\)This draws on the data on inspections and enforcements described in Appendix C.3

\(^{108}\)These depicted results are for the baseline specification of “local” firms. Results are much the same when considering the alternative specifications for local firms considered elsewhere in this investigation.

\(^{109}\)In interviews, several practitioners raised this as a possibility to investigate, though none knew of specific instances of this occurring.

\(^{110}\)This figure remains relatively consistent, declining slightly but steadily through the remainder of the sample period.
based on NAICS codes “5621 - waste collection,” “5622 - waste treatment and disposal” and “5629 - remediation and other waste management services.”

## A.3 Placebo Tests: Chemicals and Facilities Exempt from RCRA

Is it possible that there was some other event or change that influenced the incentives of firms processing toxic chemicals that occurred in the Seventh Circuit around the time of the *Apex* decision but that was unrelated to the decision itself? In Appendix A.1 I consider one such possibility: changes in regulatory enforcement, and in Appendix A.2 I consider another: the opening of new hazardous waste disposal facilities that might have changed the economics of firms choosing to process their own toxic chemicals or outsource this to specialists. But, there could be some other change contemporaneous with the *Apex* decision that these tests fail to detect.

To investigate this, therefore, I consider several “placebo” tests that investigate the handling of toxic wastes in settings which might plausibly be influenced by some other unobserved factor contemporaneous with the *Apex* decision but which should not be directly influenced by the decision. To the extent that these placebo tests fail to show any effect where the legal analysis of the *Apex* case predicts there should be none, they help to bolster confidence that the main empirical specifications employed in this paper are not merely picking up false positive results on account of other factors contemporaneous with the *Apex* decision.

As discussed Section 5.1, I exclude from my analyses chemicals not governed under the RCRA statute, as these are less likely to have been influenced by the case. But, if there were some change in the regulation, technology, economy, etc. of industries handling toxic chemicals more generally, and this occurred contemporaneous with the *Apex* decision, it might be expected that non-RCRA regulated chemicals would also be impacted. Thus, for my first placebo test, I consider the same set of facilities that I do in my main empirical specifications, but look now at their handling of non-RCRA regulated toxic chemicals as they are reported in the TRI database.

Another issue discussed in Section 5.1 is my exclusion of what are termed CESQGs - Conditionally Exempt Small Quantity Generators. These are facilities that are governed by RCRA but that handle small enough quantities of the toxic chemicals at issue that they are not subject to as extensive of regulation. Naturally, I exclude these facilities because they are less likely to give rise to catastrophic toxic contamination of the type impacted by the *Apex* ruling. But, if there were some change contemporaneous with the *Apex* decision that impacted economic or regulatory environment facing firms more generally that handle toxic chemicals, these firms might be anticipated to show an effect.

Table A.1 presents the results of these two sets of placebo tests. It considers both the difference in differences and triple differences methodologies employed in Section 6 and looks at the on-site waste disposal and off-site treatment of chemicals that are the key outcomes of the main analyses. The majority of the coefficient estimates in the table are extremely small, around 0.01 or 0.02 in magnitude, whereas the coefficient estimates for the main analyses are an order of magnitude greater. Three of the eight analyses do show coefficients on the order of 0.1, yet in one of these cases, it is actually showing that positive increase for the on-site disposal variable - precisely the opposite of the result predicted by the legal analysis of the *Apex* decision. Only one coefficient out of the eight presented has any statistical significance, and that only at the 10% level. One coefficient in eight showing significance at the 10% level is roughly what would be anticipated by pure random chance. Overall then, the results in Table A.1 provide essentially no evidence of any impact of the *Apex* decision in the specifications where the legal analysis predicts none. Nevertheless, it is important to note that in many of the cases, the standard errors on the estimates are relatively large. As such, while these tests show no evidence for an impact of *Apex*, they by no means amount to hard proof that there was indeed no impact.

## A.4 Alternative Identifications of “Local” Firms

Section 5.1.3 discusses the primary way in which I identify “local” firms which are most likely to be file for bankruptcy locally and thus most likely to be impacted by the *Apex* ruling. In my main specifications, I identify these as firms that have facilities in the TRI database in only a single circuit. In this robustness and extension section, I expand that definition to cover firms that have a majority but not all of their operations in a single circuit. In particular, I consider two additional definitions of “local” firms - first that have at least 70% of the total waste produced (which likely is at least a rough proxy for total economic activity) in a single circuit, and firms that have at least 95% of their total waste produced in a single circuit. I make these determinations based on the full set of TRI data - thus, for example, prior to excluding non-RCRA regulated chemicals.
An advantage of expanding the definition of local firms in this way is that it enables some tests of the robustness of the legal and statistical analyses - in other words, it helps to address concerns that the results in the main analyses might somehow be a fluke of the particular firms identified as “local” in the Seventh, and other, Circuits. Related to this is the potential advantage in expanding the sample size in the “treatment” group. This in particular can be useful for some of the supplemental analyses, such as those looking at firms’ violations of RCRA regulations (consider in Appendix Section A.7 below), in which the frequency of violations is relatively low, meaning that looking just at a more limited definition of local firms can give a sufficiently small amount of underlying data as to make meaningful statistical analyses difficult.

But, the expansion of treatment group size comes with a tradeoff. Not only is it reasonable to expect that a firm that operates exclusively within the Seventh Circuit will be more likely to file for bankruptcy in that circuit, firms that operate exclusively within a single circuit are in general smaller than those that operate primarily within a circuit, and it is well established that smaller firms are considerably more likely to file locally as well. Thus, by loosening my definition of “local” I identify more firms that are potentially impacted by Apex, but there is a good chance that the additional firms identified will be on average impacted less.

Table A.2 presents summary statistics demonstrating that expanding the definition of “local” results in not just more firms, but larger firms, being designed as “local.” In particular, this table presents statistics for local firms identified according to these two alternative designations of “local” firms, and then repeats the summary statistics given in Table 1 for the baseline definition of “local” firm that requires exclusive operations in the Seventh Circuit. Looking for instance at total waste produced by firms, under the baseline local definitions, local firms in the Seventh Circuit produce on average 16.7 million pounds of such waste during the sample period. Under the 95% local definition, this average is 20.8 million pounds, and under the 70% local definition, this average is 35.9 million pounds.

Table A.3 presents triple differences analyses and compares results across the baseline definition of “local” analyzed in Section 6 as well as these two alternative definitions. The basic form of the analyses presented here are the same as those in Section 6, but now I also consider two modifications. In the first variation (contained in the first three columns of the table), the regression specification is the same as in Section 6, except standard errors are clustered at the circuit level, rather than the state level. In the second variation (contained in columns four through six of the table), standard errors return to being clustered at the state level, but I switch from using state x year fixed effects to circuit x year fixed effects. The final variation (in columns seven through nine of the table) is precisely the same as in Section 6 - namely clustering errors at the state level and using state x year fixed effects.111

These two variations, clustering errors at the circuit rather than state level112 and using circuit by year fixed effects rather than state x year fixed effects are clearly less conservative than the baseline specifications. But, both are generally reasonable. A common best-practice recommendation is to cluster standard errors at the geographic level at which the “treatment” in question is occurring (Cameron and Miller, 2015). Under this then, clustering at the circuit level would in fact seem the most natural and appropriate. The challenge here is that clustering at the circuit level yields twelve instead of fifty-two clusters,113 with the larger number of clusters clearly preferable from a statistical perspective (Cameron and Miller, 2015). Yet, this number of clusters is comparable to that used in other contemporary leading empirical legal research (see, e.g. Honigsberg et al., 2017).114 Similarly, controlling for circuit x year fixed effects would seem to be a reasonable and natural approach for a triple differences methodology in which the treatment occurs at a circuit level, even if state x year fixed effects admittedly give rise to even stronger controls for other contemporaneous changes that could impact the handling of toxic chemicals in the affected states.

This context of decisions in statistical modeling thus guides interpretation of the results in Table A.3. First, one notes that expanding from the “baseline” definition of “local” firms to the more expansive definitions results in effects that are consistent in direction but smaller in magnitude for the broader definitions of “local” firms - precisely what would be predicted by the analysis given above and the fact that these expanded definitions

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111I do not explicitly present a variation that uses both circuit level clustering and circuit x year fixed effects. As can be expected, however, results under this show even stronger levels of statistical significance for the Apex decision (and entirely consistent signs and magnitudes of effects).
112In particular, by this I mean double clustering of errors at the circuit and company level, as opposed to double clustering at the state and company level in the baseline specifications.
113Accounting for Washington DC and Puerto Rico.
114In this study, one of the three main specifications uses state-level error clustering in a sample of eight states for difference in differences and triple differences specifications.
encompass firms with potentially lower likelihoods of filing for bankruptcy in the Seventh Circuit. This is true across all of the different model specifications in Table A.3.

Second, in the alternative specification that uses circuit level error clustering and state x year fixed effects (columns one through three of the table), the results retain uniformly strong statistical significance across all of the outcome variables and all of the definitions of “local” firms. When considering the specification that uses state-level error clustering and circuit x year fixed effects (columns four through six of the table), half of the results for the broader definitions of “local” firm retain statistical significance. When considering the most exacting specification (columns seven through nine), only one of the coefficients for the alternative definitions of “local” retains statistical significance, though the signs and magnitudes of the coefficients remain consistent with the other specifications.

A.5 Alternative Control Groups

As another robustness check, I consider a series of variations on my analyses that restrict the data to exclude various circuits. The goal here is to investigate whether, for instance, there might be one or a few states or circuits other than the Seventh (perhaps including the Ninth, which is particularly large) that had unusual patterns of toxic chemical handling in roughly the opposite directions as those in the Seventh, such that the effects measured for Apex in the Seventh Circuit actually simply reflect the absence of the unusual activity occurring elsewhere in the country for reasons unrelated to the court case.

For the first of these tests, I consider my baseline triple differences specifications for the outcomes of on-site releases, off-site treatment, and the proportional difference between the two. Then I run ten alternative specifications in which I eliminate in turn each of the circuits other than the Seventh from my data. In every one of these specifications, all three outcomes remain statistically significant ($p < 0.05$) and retain comparable magnitudes and identical directions as in my main analyses.

For the next set of investigations, I restrict my analyses to just those circuits that already have settled precedents on the topic of the Apex decision - the Third and Sixth Circuits. Circuits without precedent on the topic of the Apex decision might be viewed as being more likely to adopt precedent that follows Apex after the decision. As such, it is possible that including these other circuits in the analysis could attenuate the magnitude of results measured for the Apex decision. In general, the results from these tests show effect sizes from the Apex decision that are roughly 30% larger than those when the entire country is used as a control group. This suggests the possibility that the Apex decision may have prompted an anticipatory response in other circuits without settled precedents. Yet, the difference in magnitudes are within the confidence intervals for the estimated coefficients, meaning that this should not be taken as hard evidence of an anticipatory impact of Apex in circuits outside of the Seventh.

A.6 Other Circuit Counterfactual Tests

As another way to investigate whether the results presented in Section 6 reflect an actual effect from the Apex ruling, I consider a series of placebo tests that assume, contrary to reality, that the Apex decision was actually decided in some circuit other than the Seventh. For these tests, I conduct everything the same as in my main methodologies, but simply substitute classify my treatment group as each of the other judicial circuits (excepting DC).

Across both the difference in differences (DiD) and triple difference (DDD) formulations, there is only one other circuit that sees a statistically significant decrease in on-site releases. That is the First Circuit. And, this result holds only in the DiD formulation for that circuit. The DDD formulation has absolutely no significance. Furthermore, in the First Circuit, the decrease in on-site releases is also paired with a decrease in off-site treatment, precisely the opposite as to what we see in the 7th circuit and what would be predicted by the legal analysis of Apex.

Similarly, across both the DiD and DDD formulations, there is only one other circuit that sees a statistically significance increase in off-site treatment. That is the Eleventh Circuit. This time, the result holds only for the DDD model. Under DiD, the coefficient drops to essentially zero and has no statistical significance. And, in that circuit, we actually see an increase (although small and not significant) in on-site releases, again very different from what we see in the Seventh Circuit and what is predicted by the legal analysis of Apex.

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115 That is, the set of outcomes analyzed in Table A.2.

116 The one circuit I omit this for is the DC circuit, as there are, unsurprisingly, no local firms by my definitions in the DC circuit.
A.7 Impact of Apex on Violations of RCRA Regulations

The primary dimension along which I analyze firms’ efforts to reduce their risks of catastrophic pollution liability in the wake of the Apex decision is the amount of wastes they dispose of on site versus the amount they outsource for off-site processing and disposal. A key reason for this is that the data on these outcomes is rich and extensive, with consistent yearly observations across many facilities. Information on violations of RCRA regulations, by contrast, is far more scarce, simply because these occur rarely, particularly when considering relatively serious violations. Table C.1 gives summary statistics on these violations and their frequency. For instance, during my whole sample period, there are only a total of twelve fines that are assessed to local firms (under my primary definition of such) within the Seventh circuit. These fines though are arguably the most reliable metric of compliance, both since they represent instances in which the violation is presumably particularly severe so as to warrant a fine, but also because they give at least some meaningful quantification of that severity, whereas other violation metrics merely record that a violation of one type or another occurred. It is for this reason of data sparsity that I save analyses of RCRA regulatory violations for the appendix and present it mainly as an extension and robustness analysis.

In this analysis, I consider the same set of outcomes described in the summary statistics in Table C.1: namely, the logarithm of one plus the amount of a fine that a facility receives (which will thus be zero if no fine is assessed), the probability that a fine is assessed, the probability that a violation of any type is recorded, and the probability that a “formal” violation is recorded. Table A.4 presents the results of these analyses using my triple differences methodology.\textsuperscript{117} When using the most expansive definition of “local” firms considered in Appendix A.4 above (required 70% or more of a firm’s waste production to occur within a single circuit), Table A.4 first presents results under the most expansive definition of “local” firms considered in Appendix A.4 above (required 70% or more of a firm’s waste production to occur within a single circuit), as this data has the greatest number fines and other violations available to analyze for local companies. Under this specification, there is a statistically significance (\(p < 0.05\)) 9% reduction in fine amount for local Seventh Circuit firms following the Apex decision, and a marginally significant (\(p < 0.1\)) decrease in the probability of a fine of any sort being assessed. In general, however, the results across the different metrics of violations and definitions of “local” firms presented in Table A.4 show statistically insignificant, and generally relatively small, effects. Furthermore, given that there are twelve results presented in the table, while the fact that two of them are statistically significant (and in the predicted direction, given the anticipated impact of Apex) is perhaps somewhat unlikely to occur due to pure chance, that possibly cannot be strongly ruled out. Overall then, the safest interpretation of the results in Table A.4 are that they present no evidence contrary to the predictions of the impact of Apex (i.e. they present no strong evidence of a large increase in violations by firms after the Apex decision), and at best provide relatively heuristic, almost anecdotal evidence in support of the main analyses in Section 6.

A.8 Can the Financial Crisis Explain Firm Actions after Apex?

The timing of the Apex decision coincides roughly with the recent global financial crisis. One may therefore wonder whether the effects measured in this paper and attributed to the Apex decision may have simply been due to the financial crisis. In this appendix section I present a variety of reasons why it is unlikely the financial crisis can explain the effects measured for Apex.

As an initial matter, it is not clear why the financial crisis would have a direct impact on the outcomes studied here. Some of the most salient impacts of the global financial crisis is that it reduced the availability of credit and it reduced demand for goods and services. Reduced demand for goods might lead firms to reduce their total production in the wake of the crisis (which roughly coincided with Apex). But, it is far less clear why the reduced demand for goods and services would lead firms to start sending more of their wastes to off-site treatment facilities, which as I note are likely at least somewhat more expensive. Similarly, if credit became scarce as a general matter (not as a result of lenders becoming more worried about their losses on account of Apex), it is likewise not obvious why that would translate into industrial firms switching to more expensive but safer waste disposal methods.

One could of course devise explanations: for instance, perhaps the financial crisis made lenders more worried about losses on their loans, and this led them to exert new pressure on borrowers to constrain their toxic chemical risks. But, these explanations do require potentially greater leaps of assumption than the explanations discussed above.

\textsuperscript{117}Results from differences in differences methodologies are similar but with less statistical significance and are omitted for brevity.

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Even more so than this, however, even if one posits that the financial crisis would, in and of itself, lead firms to switch from more dangerous to safer waste disposal mechanisms, it would be difficult for a macro event such as the crisis to explain the precise pattern of results found in this study. For instance, the difference in differences design compares the behavior of local firms in the Seventh Circuit to local firms in other circuits. It is not immediately clear why the financial crisis would be expected to have a notably greater impact on local Seventh Circuit firms as opposed to those in other circuits.

The triple difference formulations I use can be seen as asking two questions:

1. After *Apex*, did the facilities owned by 'local' firms in the Seventh circuit start using safer disposal methods for their chemicals as compared to facilities owned by 'national' firms in the Seventh Circuit?

2. If so, how did this compare to the change in other circuits between those facilities owned by local vs. national firms?

Thus, even if one posits that there was something about the financial crisis that caused local firms to disproportionately start using safer disposal methods, as long as this affected local firms comparably across the country, it would be controlled for in the triple difference formulation. It would only be if the financial crisis uniquely impacted local firms in the Seventh Circuit (as compared to those in other circuits) that this would cause problems for the validity of the tests. Also, note in this context the tests in Appendix A.5 in which I restrict my set of “control” circuits along a variety of dimensions.

One potential weakness of the difference in differences and triple difference designs I employ is that they are fundamentally based on comparisons. Thus, for instance, if I document a 25% increase in off-site treatment of toxic chemicals, does that really mean that firms impacted by *Apex* started spending more for this safer treatment method? Could it instead be that firms not impacted by *Apex* started cutting back on their off-site disposal (perhaps due to pressures from the financial crisis)?

Even if this were the case, it would not necessarily invalidate the analyses. If *Apex* indeed did have a real impact, one way that could manifest would be that at a time when other firms were cutting back on their environmental safety, firms affected by the decision stayed the course. If this were true, it would in fact be a very interesting and salient result, particularly given findings from my other research that firms in general tend to take more environmental risks when they become financially more vulnerable (Ohlrogge, 2018). Nevertheless, this would still present a more complex picture for the impacts of *Apex*, a picture that would need to be described and convincingly explained. In the absence of such credible explanations, concerns about some other factor, such as the financial crisis, could arise.

In this regard, the “raw data” difference in differences plots that I first present and discuss in Section 6.1.2 are useful. In both Figure 2 and Figure 3, the “control” group, whether that be local firms outside of the seventh circuit or facilities within the seventh circuit owned by national firms, shows either a flat pattern following *Apex* or one that is in line with, but much smaller, than the one followed by the “treatment” group of local firms in the Seventh Circuit. In other words, although it might be an interesting one, in this case, the “story” of *Apex* is not one of other firms deteriorating in their environmental precautions (perhaps due to the crisis).

Finally, many of the other placebo tests presented in this paper are also pertinent to this question. For instance, if the “effects” measured by the *Apex* decision were actually caused by the financial crisis, why would they show up only for solid wastes but not for air releases, as documented in Section 6? Similarly, why would the impact from the financial crisis lead firms to constrain their RCRA regulated chemicals, but not, as documented in Section A.3, the 500 other toxic chemicals tracked in the TRI? And, why would the financial crisis not affect conditionally exempt small quantity generators, as documented as well in Section A.3? For each of these questions, if the true impact is indeed because of the *Apex* court decision, then the legal analysis of the case presents very clear and intuitive reasons for why the effects should be seen where they are and where they are not. It is certainly possible that reasons could be devised to explain the precise pattern of where effects are and are not seen, based on some explanation other than the *Apex* decision. But, at the very least, the answers to why another cause would result in such a precise pattern of effects are less immediately obvious.

### A.9 Alternative Functional Forms

As described in Section 6, the primary outcome that I study is the logarithm of one plus the amount of each chemical released on site or sent off-site for treatment. Here, I consider two alternatives to that which yield both robustness and additional insights.
For the first alternative outcome, I replace these with a simple indicator for whether a facility releases any amount of a chemical on-site or sends any amount of the chemical off-site for treatment. Some of the motivation behind this alternative is that, for instance, for a firm looking to reduce its risk of toxic chemical contamination, completely eliminating on-site disposal of a given chemical may be disproportionally valuable as compared to just cutting on-site releases of that chemical in half. For on-site releases, this analysis yields a reduction of four percentage points ($p = 0.0004^{***}$) in the likelihood of a given facility disposing of a given chemical.\footnote{This result is for the triple difference formulation. Under the difference in differences formulation, the result is a 2.4\% decrease ($p = 0.0024^{***}$).} For off-site treatment, this yields an increase of 2.6\% ($p = 0.16$) in the probability that a given facility will use at least some off-site treatment for a given chemical.\footnote{Again, the given result is the triple difference estimator. For the difference in differences estimator, the result is a 3.4\% increase ($p = 0.095^{*}$)} As one might expect, the effect is larger and stronger for the probability of completely eliminating on-site disposal of a given chemical: going from some on-site releases to no on-site releases is likely more valuable in reducing contamination risk, whereas going from no off-site treatment to some off-site treatment does not in and of itself impact risk as directly (though of course, this is likely correlated with going from some to no on-site disposal).

For the second alternative outcome, I calculate the following:

\[
Pct \text{ Off-Site} := \frac{\text{Off-Site Treatment}}{\text{On-Site Releases} + \text{Off-Site Treatment}}
\]

and use this as an outcome variable. One potential challenge of my baseline specification (using log amounts of chemicals disposed) is that, given the fixed effects, it essentially measures percent changes in the amounts of chemicals released on site or sent off-site for treatment. If, for instance, the amount sent off-site starts as a small amount, then a modest increase could result in a relatively large percentage increase. This “Pct Off-Site” measure would then be potentially more robust against results being skewed by large percentage changes that represent small absolute changes.

A disadvantage of this measure, and one of the key reasons I don’t use it in my primary analyses, is that for some facility-chemical-year combinations, facilities did not have any on-site releases or off-site treatment. In these instances, then, the “Pct Off-Site” variable is undefined and must be dropped from the data. In particular, therefore, this has the potential to miss valuable information, such as instances where a facility might completely stop using a given chemical, perhaps in response to the Apex decision.\footnote{Another disadvantage of the measure is that it is in some respects less detailed: the “Pct Off-Site” can change either from a reduction in on-site disposal, an increase in off-site disposal, or both. Thus, if on-site releases stay constant, and off-site treatment goes up, it is less clear that really represents a reduction in contamination risk for a firm.} Despite this challenge, the metric can still be valuable as a robustness check. In the triple difference formulation, I find a 5.2 percentage point ($p = 0.007^{***}$) increase in this metric associated with the Apex decision and for the difference in differences formulation, I find a 3.6 percentage point ($p = 0.0003^{***}$) increase.

### A.10 Proximity to Bankruptcy and the Impact of Apex

Given that Apex affected the treatment of creditors in bankruptcy, it is natural to expect that the impacts of the decision may be most acute for firms that are near bankruptcy. To investigate this, I take the subset of companies in the TRI data for which I also have Compustat data. For each company, I calculate Merton’s Distance to Default.\footnote{See Shumway (2001) for references.} I then interact this with the key indicators in the triple difference and difference in differences formulations that measure the causal impact of the Apex decision. This yields coefficients of the anticipated sign (firms closer to default decrease on-site releases more and increase off-site treatment more). But, the effects are small and not statistically significant. I discuss interpretation of these results in Section 4.3.
Figure A.1. RCRA Inspections. This plot depicts the total number of annual RCRA-related inspections of facilities in the Seventh Circuit and outside of the Seventh Circuit. Details on this inspection data are provided in Appendix C.3.
Figure A.2. RCRA Probability of Inspection. This figure depicts results from the difference in differences and triple difference formulations described in Appendix A.1. These analyses test for whether the probability of receiving a RCRA related inspection changed for local firms in the Seventh Circuit in the wake of the Apex decision. Observations are at a facility-by-year level, rather than facility-by-year-by-chemical level in the main analyses of the TRI data, but otherwise take the same form. Robust errors are clustered at the state level and vertical bars depict 95% confidence intervals.
Table A.1
TRI Placebo Tests. This table presents the results of fitting the same difference in differences and triple difference formulations given in equations 1 and 2 and with the same outcomes as presented in Table 3 but fitted over different sets of data. In “Placebo Test 1: non-RCRA Chemicals” the tests are fit only over chemicals not directly governed by RCRA and thus in general substantially less likely to lead to the kind of catastrophic contamination cleanup for which the Apex case addressed. In “Placebo Test 2: CESQG” the sample returns to consideration of the RCRA-regulated chemicals analyzed in the main analyses, but now restricts the set of facilities in the investigation to those designated as Conditionally Exempt Small Quantity Generators, or CESQGs, under RCRA. Robust standard errors are double clustered at the state and company level.

<table>
<thead>
<tr>
<th></th>
<th>(Difference in Differences)</th>
<th>(Triple Differences)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(On-Site Release)</td>
<td>(Off-Site Treatment)</td>
</tr>
<tr>
<td>Placebo Test 1: non-RCRA Chemicals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apex x Seventh Circuit</td>
<td>-0.011 (0.0976)</td>
<td>0.022 (0.126)</td>
</tr>
<tr>
<td>Apex x Seventh Circuit x Single Circuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>28403</td>
<td>28403</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.725</td>
<td>0.625</td>
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<td>Placebo Test 2: CESQG Facilities</td>
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<td></td>
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<tr>
<td>Apex x Seventh Circuit</td>
<td>-0.029 (0.0967)</td>
<td>0.106 * (0.0633)</td>
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<tr>
<td>Apex x Seventh Circuit x Single Circuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
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<td>19370</td>
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<tr>
<td>Adjusted $R^2$</td>
<td>0.85</td>
<td>0.419</td>
</tr>
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</table>

Facility x Chem FE yes yes yes yes
Chem x Year FE yes yes yes yes
State x Year FE no no yes yes
Local Firm x Year FE no no yes yes

Cluster robust standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Table A.2
TRI Summary Statistics - alternative definitions of “local” vs. “national” firms. This table presents precisely the same summary statistics for TRI firms and facilities presented in Table 1 but now considers two additional definitions of “local” firms in Panels 1 and 2 of this table. Panel 3 is a precise duplicate of the information in Table 1 and is included to contextualize the information in Panels 1 and 2.

<table>
<thead>
<tr>
<th>Panel 1: 95% “local” threshold</th>
<th>All Circuits</th>
<th>Seventh Circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm Type</td>
<td>All Firms</td>
<td>National</td>
</tr>
<tr>
<td>All Firms: Total Waste</td>
<td>87,347</td>
<td>59,314</td>
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<tr>
<td>Firm Avg. Total Waste</td>
<td>55.8</td>
<td>78.4</td>
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<td>Facility Avg. Total Waste</td>
<td>23.1</td>
<td>20.5</td>
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<tr>
<td>Facility Avg. On-Site Releases</td>
<td>3.5</td>
<td>2.1</td>
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<tr>
<td>Facility Avg. Off-Site Treatment</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Facility Avg. Stack Air Releases</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td>Observations</td>
<td>360,197</td>
<td>263,997</td>
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<tr>
<td>Unique Facilities</td>
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<td>2,894</td>
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<td>Unique Companies</td>
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<td>757</td>
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<table>
<thead>
<tr>
<th>Panel 2: 70% “local” threshold</th>
<th>All Circuits</th>
<th>Seventh Circuit</th>
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<td>Firm Type</td>
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<td>National</td>
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<td>All Firms: Total Waste</td>
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<td>Firm Avg. Total Waste</td>
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<td>Facility Avg. Total Waste</td>
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<td>19.9</td>
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<td>Facility Avg. On-Site Releases</td>
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<th>Panel 3: Baseline “local”</th>
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<td>Facility Avg. Off-Site Treatment</td>
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<td>0.4</td>
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<tr>
<td>Facility Avg. Stack Air Releases</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td>Observations</td>
<td>360,197</td>
<td>302,033</td>
</tr>
<tr>
<td>Unique Facilities</td>
<td>3,788</td>
<td>3,230</td>
</tr>
<tr>
<td>Unique Companies</td>
<td>1,564</td>
<td>936</td>
</tr>
</tbody>
</table>
Table A.3
Alternative identifications of “single-circuit” companies. This table presents differences in differences formulations from the model in Equation 2 and thus equivalent to the baseline results presented in Table 3. For additional context, this table considers the on-site disposal and off-site treatment variables studied in the main analyses of this investigation plus their difference, represented as “On-Site - Off-Site” in this table. The final three columns of this table include the same specifications for fixed effects and error clustering as in Table 3. Earlier columns represent modifications on these to use judicial circuits rather than states to cluster standard errors and for interactions with time fixed effects. Panel 1 of this table uses the “baseline” identification of single-circuit companies used in Table 3 - that is, requiring 100% of TRI facilities associated with a company to be located in a single circuits. Panels 2 and 3 relax this local definition. All specifications contain fixed effects for chemical x year, single circuit x year, and facility x chemical, as in the models in Table 3.

<table>
<thead>
<tr>
<th></th>
<th>(Circuit Cluster + State x Year FE)</th>
<th>(State Cluster + Circuit x Year FE)</th>
<th>(State Cluster + State x Year FE)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(On-Site)</td>
<td>(Off-Site)</td>
<td>(On-Site - Off-Site)</td>
</tr>
<tr>
<td></td>
<td>(On-Site)</td>
<td>(Off-Site)</td>
<td>(On-Site - Off-Site)</td>
</tr>
<tr>
<td>Observations</td>
<td>354250</td>
<td>354250</td>
<td>354250</td>
</tr>
<tr>
<td></td>
<td>354250</td>
<td>354250</td>
<td>354250</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.828</td>
<td>0.669</td>
<td>0.795</td>
</tr>
<tr>
<td></td>
<td>0.827</td>
<td>0.667</td>
<td>0.794</td>
</tr>
<tr>
<td></td>
<td>(On-Site)</td>
<td>(Off-Site)</td>
<td>(On-Site - Off-Site)</td>
</tr>
<tr>
<td></td>
<td>(0.0385)</td>
<td>(0.0294)</td>
<td>(0.033)</td>
</tr>
<tr>
<td></td>
<td>(0.0865)</td>
<td>(0.1031)</td>
<td>(0.1111)</td>
</tr>
<tr>
<td></td>
<td>(0.0601)</td>
<td>(0.0977)</td>
<td>(0.1131)</td>
</tr>
</tbody>
</table>

1: “Single Circuit” Baseline
Apex x Seventh Circuit x Single Circuit -0.232*** 0.295*** -0.527*** -0.258*** 0.294*** -0.551*** -0.233** 0.294*** -0.527*** -0.233** 0.294*** -0.551*** -0.233** 0.294*** -0.527***
(0.0385) (0.0294) (0.033) (0.0865) (0.1031) (0.1111) (0.0601) (0.0977) (0.1131)
Observations 354250 354250 354250 355176 355176 355176 355176 355176 355176
Adjusted R² 0.828 0.669 0.795 0.827 0.667 0.794 0.828 0.669 0.795

2: “Single Circuit” 95% Threshold
Apex x Seventh Circuit x Single Circuit -0.102** 0.071*** -0.173*** -0.133** 0.086 -0.219* -0.103** 0.07 -0.173
(0.0434) (0.0187) (0.0348) (0.0518) (0.0959) (0.1159) (0.0514) (0.0914) (0.1051)
Observations 354250 354250 354250 355176 355176 355176 355176 355176 355176
Adjusted R² 0.828 0.669 0.795 0.827 0.667 0.794 0.828 0.669 0.795

3: “Single Circuit” 70% Threshold
Apex x Seventh Circuit x Single Circuit -0.085** 0.134*** -0.218*** -0.103* 0.149 -0.252 -0.085 0.132 -0.217
(0.033) (0.0257) (0.0392) (0.0579) (0.1333) (0.1664) (0.0559) (0.1512) (0.1386)
Observations 354250 354250 354250 355176 355176 355176 355176 355176 355176
Adjusted R² 0.828 0.669 0.795 0.827 0.667 0.794 0.828 0.669 0.795

State x Year FE yes yes yes no no no yes yes yes
Circuit x Year FE no no no yes yes yes no no no
Clustered Errors circuit circuit circuit state state state state state state
Cluster robust standard errors in parentheses
* p < 0.1, ** p < 0.05, *** p < 0.01
Table A.4
RCRA Enforcement Actions. This table depicts triple difference investigations of the same set of facilities considered in the main TRI analyses in this paper. The difference in sample construction is that the units of observation here are facility-by-year observations, rather than facility-by-chemical-by-year. Apart from omitting chemical-level fixed effects and interactions, the regression specifications are the same here as in equation 2. “Fine Amount” represents the total fines (in dollars) levied on a facility in a given year for violations of RCRA regulations. The other columns of this table, for probabilities of fines or types of violations, are from a regression of an indicator for whether the given type of violation was found for a given facility in a given year on the same set of controls as in 2. Robust standard errors are double clustered at the state and company level.

<table>
<thead>
<tr>
<th>1: “Single Circuit” 70% Threshold</th>
<th>log(1 + Fine Amount)</th>
<th>(Probability of Fine)</th>
<th>(Probability of Violation)</th>
<th>(Probability of Serious Violation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apex x Seventh Circuit x Single Circuit</td>
<td>-0.091 **</td>
<td>-0.008</td>
<td>0.004</td>
<td>-0.003</td>
</tr>
<tr>
<td>Observations</td>
<td>41668</td>
<td>41668</td>
<td>41668</td>
<td>41668</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.125</td>
<td>0.11</td>
<td>0.216</td>
<td>0.196</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2: “Single Circuit” 90% Threshold</th>
<th>log(1 + Fine Amount)</th>
<th>(Probability of Fine)</th>
<th>(Probability of Violation)</th>
<th>(Probability of Serious Violation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apex x Seventh Circuit x Single Circuit</td>
<td>-0.082</td>
<td>-0.008</td>
<td>-0.019</td>
<td>-0.013</td>
</tr>
<tr>
<td>Observations</td>
<td>41668</td>
<td>41668</td>
<td>41668</td>
<td>41668</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.125</td>
<td>0.11</td>
<td>0.216</td>
<td>0.196</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3: “Single Circuit” Baseline</th>
<th>log(1 + Fine Amount)</th>
<th>(Probability of Fine)</th>
<th>(Probability of Violation)</th>
<th>(Probability of Serious Violation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apex x Seventh Circuit x Single Circuit</td>
<td>0.073</td>
<td>0.01</td>
<td>0.014</td>
<td>0.01</td>
</tr>
<tr>
<td>Observations</td>
<td>41668</td>
<td>41668</td>
<td>41668</td>
<td>41668</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.125</td>
<td>0.11</td>
<td>0.216</td>
<td>0.196</td>
</tr>
</tbody>
</table>

| Facility FE | yes |
| State x Year FE | yes |
| Single Circuit x Year FE | yes |

Cluster robust standard errors in parentheses

$^* p < 0.1$, $^{**} p < 0.05$, $^{***} p < 0.01$
B  Legal and Institutional Details

B.1 Apex Decision - Details

Under US bankruptcy law, a corporation that reorganizes under Chapter 11 receives a discharge:

from “any debt that arose before the date of” confirmation, 11 U.S.C. §1141(d)(1)(A), with immaterial exceptions. “Debt” is defined as “liability on a claim,” §101(12), and “claim” as either a “right to payment,” §101(5)(A), or - the critical language in this case - a “right to an equitable remedy for breach of performance if such breach gives rise to a right to payment...”


The key issue for courts to resolve in Apex, therefore, was whether the injunction sought by the EPA against Apex Oil constituted a “claim” for the purposes of US bankruptcy law. If it were a claim, then it would have been discharged when Apex reorganized in Chapter 11 bankruptcy. If not, then Apex could still be ordered to clean up damage from pollution it contributed to prior to its bankruptcy.

B.2 Interpreting the Chateaugay and CMC Heartland Precedents

In re Chateaugay

In Chateaugay, a firm sought to reorganize and to continue operating on property that it had contaminated prior to its bankruptcy. The contamination was leaching beyond the confines of the property. The Second Circuit held that an injunctive order to clean up the contamination was non-dischargeable since it was necessary to prevent the firm’s property from continuing to harm those around it. The Second Circuit argued that “[i]t is difficult to understand how any injunction directing a property owner to remedy ongoing pollution could be a dischargeable ‘claim’ if, as Kovacs instructs, the owner ‘may not maintain a nuisance, pollute the waters of the State, or refuse to remove the source of such conditions.’”

Because of the facts of the case, Chateaugay does not explicitly address whether its non-dischargeability holding would also apply to situations in which a corporation no longer owns the contaminated property, as was the case in Apex or Torwico. And, indeed, as the discussion in Section 3.4 makes clear, it is this situation in which a corporation no longer owns the contaminated property that is in many respects the most critical issue for determining the practical impact of dischargeability.

Unsurprisingly, parties favoring dischargeability (such as the Apex Corporation), have argued that Chateaugay’s holding is limited to the situation in which the reorganizing firm still owns the contaminated property. These parties point to text in Chateaugay, such as the court’s reasoning that “what seems to have been decisive [in Kovacs]” was that the debtor’s loss of possession of the property “precluded Kovacs [the debtor] from taking any steps to comply with the injunction” and thus the only way to comply with the order was “the payment of money.” Proponents of non-dischargeability, by contrast, argue that the focus in Chateaugay on continuing ownership of the contaminated land is only due to the particular facts of the case, mirroring the Second Circuit’s logic in interpreting Kovacs and focusing on the broader obligation of firms to obey the law.

At least in some circumstances, the reasoning here comes close to circularity. The non-dischargeable requirement to obey a law stating that firms must clean up pre-bankruptcy pollution only applies if a given entity is indeed a continuation of a pre-bankruptcy polluter. This in turn can hinge (particularly in the context of a §363 sale discussed in Section 3.8) on whether the claims against that pre-bankruptcy polluter were dischargeable.122

In other words, a court, adopting an ostensibly strong non-dischargeability position (such as in Torwico) can tell New Polluter that bankruptcy does not change its obligations to obey the law, including a law ordering that it clean up wastes caused by Old Polluter. But, such a law will only be constitutionally valid if there is some connection between New Polluter and Old Polluter. And, whether there is a connection between New Polluter and Old Polluter depends on whether Old Polluter’s obligations are dischargeable. Thus, the starting premise for a strong non-dischargeability holding in some respects requires an initial assumption of non-dischargeability.123

122In particular, as described in Section 3.8, a 363 asset can be used to accomplish the effective equivalent of a bankruptcy reorganization by selling all or most of a firm’s assets to a newly formed corporation. But, whether that sale is “free and clear” of cleanup obligations hinges on whether those obligations are dischargeable.

123The reverse is also true, meaning this circularity does not necessarily support a dischargeability position either.
To date, the Second Circuit has not addressed the question of how its holding in Chateaugay applies to situations in which the reorganizing firm no longer owns the contaminated property. About a year after the Apex decision, a bankruptcy court (affirmed by the district court) within the Second Circuit did take up this topic in In re Mark IV Indus., Inc.\textsuperscript{124} Notably, in this case, the court did not explicitly adopt the Torwico precedent, though it does quote from portions of the opinion approvingly. Instead, the court in Mark IV attempted to articulate its own “three factor” weighting framework to determine whether or not an environmental cleanup order is dischargeable. The crux of this weighting scheme hangs on whether “the debtor [is] capable of executing the equitable decree, or can he only comply by paying someone else to do it?” This in turn depends in part on whether the debtor has “access” to the contaminated site.

If a company no longer owns a contaminated site, as a legal matter it will generally not have carte blanche access to it. Yet, it is only in the most bizarre of hypothetical scenarios that the owner of such a site would prohibit another party from coming on to that site to clean up contamination. Thus, if one defines ‘legal access’ narrowly (as in Cottonwood Canyon, discussed above), the Mark IV case essentially reduces to Whisco. If one defines ‘legal access’ broadly, Mark IV reduces to Torwico. It is not clear that there is an intelligible middle ground between these poles of interpreting legal access.

On the particular facts of Mark IV, the court found the obligations non-dischargeable. Yet, the fact that this court attempted, yet, arguably, largely failed to articulate a meaningful test for non-dischargeability helps to illustrate that how a court should decide a case like Apex, based on precedent, is far from a simple or obvious matter.\textsuperscript{125}

Finally, while Mark IV does quote approvingly from the Apex opinion, it is noteworthy that part of Mark IV’s “three factors” includes questions of whether the debtor would need to pay someone else to clean up the pollution. Yet, Judge Posner in his Apex opinion explicitly considered and rejected giving any legal distinction to this distinction, writing, “[t]he root arbitrariness of Apex's position is that whether a polluter can clean up his pollution himself or has to hire someone to do it has no relevance to the policy of either the Bankruptcy Code or the Resource Conservation and Recovery Act.” In other words, the holding in the recent bankruptcy and district court case of Mark IV is weaker on dischargeability than the Apex holding, which further suggests that Apex was not merely an obvious application of settled Second Circuit precedent.

Matter of CMC Heartland Partners

The facts of CMC are very similar to those in Chateaugay: a debtor reorganized and continued to operate on land that it contaminated prior to its bankruptcy. More so than Chateaugay, however, the CMC opinion has passages in it that seem to bear strongly in favor of dischargeability. Indeed, perhaps more than any other opinion, Apex Oil based its arguments in its Seventh Circuit briefs on CMC. The Seventh Circuit’s opinion in CMC, written by Judge Easterbrook, states that to the extent that CERCLA (the environmental statute at play in that case) “require[s] a person to pay money today because of acts before or during the reorganization proceedings, CERCLA creates a ‘claim’ in bankruptcy” which is thus dischargeable.

The above quote, and others like it in CMC, may have been substantial contributors to Apex Oil believing it had a winnable case before the Seventh Circuit. And, interestingly, the EPA in its briefs gave only relatively weak counter-arguments to Apex’s reliance on CMC. The EPA first argued that CMC Heartland was decided under the 1898 Bankruptcy Act and so was not informative for interpreting the modern 1978 version of the Bankruptcy Code.\textsuperscript{126} Apex Oil quickly and rightly dispatched with this contention in its reply brief, pointing out that the Supreme Court in Johnson v. Home State Bank\textsuperscript{127} had expanded, not contracted, the scope of ‘claim’ in the new Bankruptcy Act and thus the scope of dischargeable obligations.\textsuperscript{128} The EPA’s second response to CMC was to argue that the holdings in it upon which Apex Oil relied were dicta, since other cleanup obligations on the part of CMC Heartland had been ruled non-dischargeable, and these resulted in the substantial accomplishment of the EPA’s desired cleanup in that case.

Rather than attempting this dicta-based defense, the EPA may have had a stronger response to CMC had it

\textsuperscript{124}438 B.R. 460 (Bankr. S.D.N.Y. 2010), aff’d, 459 B.R. 173 (S.D.N.Y. 2011)
\textsuperscript{125}It is certainly conceivable that the court in Mark IV essentially wanted to adopt the Torwico precedent but did not feel, for whatever reason, empowered to do so. Speculation as to the motives at play in Mark IV falls beyond the scope of this present paper.
\textsuperscript{126}U.S. Brief, March 20, 2009 at 48.
\textsuperscript{128}Apex Oil Reply Brief, April 3, 2009 at 9.
simply conceded that cleanup obligations based solely on “acts before or during the reorganization proceedings” are indeed dischargeable, but that continued ownership of contaminated land (as was the case in CMC) is only one way that present (post-bankruptcy) obligations can accrue: environmental statutes such as RCRA (and CERCLA) also provide for present cleanup obligations for prior owners of property. Yet, there is a lot of language in the CMC opinion that focuses on the issue of present ownership of contaminated land (and the assertion from Kovacs that dischargeability cannot allow a present owner to maintain a nuisance), which may have made the EPA reluctant to press this point too heavily.

Ultimately, Judge Posner gave no substantive discussion or consideration to the CMC opinion, mentioning it only twice in passing as part of long string citations. At a minimum, therefore, this does not appear to suggest that Posner viewed it as important in arriving at or justifying his decision in Apex oil.

**B.3 Bankruptcy Choice of Venue - Additional Details**

Under 28 U.S.C.A §1408, a Chapter 11 bankruptcy may be commenced in the federal court district:

(1) in which the domicile, residence, principal place of business in the United States, or principal assets in the United States, of the person or entity that is the subject of such case have been located ... or (2) in which there is pending a case under title 11 concerning such person’s affiliate, general partner, or partnership.

Here “domicile” is generally interpreted to mean a company’s place of incorporation (Cole, 2002). A great many companies are incorporated in Delaware (and a lesser but still significant number in New York). Thus, it is not uncommon that a corporation will have at least two natural venues to file for bankruptcy: the location of its principal place of business (e.g. generally corporate headquarters)129 or its location of incorporation. By incorporating a subsidiary in another jurisdiction and then having that subsidiary file for bankruptcy, a corporation can achieve greater flexibility still.

Given the flexibility corporations have in where they are legally allowed to file for bankruptcy, the more relevant question often then becomes the practical considerations that will influence them to file in one place or another. Existing literature documents the considerations at play.130 In general, firms will choose either to file in their local venue (i.e. where their headquarters or principal operators are) or in one of the established bankruptcy “hubs” - meaning usually in Delaware and to a lesser extent in New York.

Filing locally caries several potential advantages for firms. Local judges and bankruptcy receivers may be more familiar with (or perhaps sympathetic to) the firm and its industry, and thus may be able to make decisions throughout the bankruptcy process that are more informed (or at least favorable to the firm’s management). Filing locally also will tend to mean that the legal precedents that govern the bankruptcy proceeding will be more familiar to a firm’s internal and external counsel, thus reducing the legal costs of the filing and potentially obviating the need to retain a new counsel that specializes in the law of another jurisdiction in which a filing could be made. A local bankruptcy also means reduced need for a firm’s officers and counsel to travel to a foreign jurisdiction to participate in the bankruptcy proceedings.

Filing in a bankruptcy hub such as Delaware of New York carries different potential advantages. Judges and receivers in these jurisdictions may have more experience with bankruptcies (particularly large, complex ones) and thus may be able to handle certain proceedings more quickly and efficiently. Key legal precedents may also be more developed in these venues, leading to greater predictability of results.

As an empirical matter, Cole (2002) documents that 10-20% of all bankruptcies are filed in Delaware, meaning that 80-90% (the vast majority) are not filed in Delaware and thus in all likelihood are filed where firms’ primary places of business are. Relatively small businesses account for the vast majority of both US firms and bankruptcy filings, meaning that these statistics are dominated by small firms. Large firms, by contrast, much more heavily favor Delaware or New York. Lynn LoPucki has compiled a database on bankruptcy filings of firms with assets over $250 million. Of the firms in this database whose corporate headquarters are not in Delaware or New York, roughly 55 - 60% choose to file in Delaware or New York.131

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130 See, for instance, Cole (2002); Ellias (2018).
131 Delaware generally captures about 40 - 45% of filings and New York 10 - 15%, depending on the particular time frame in question.
Additionally, I use LoPucki’s data to fit a regression to predict the likelihood that a firm headquartered outside of Delaware or New York will file for bankruptcy in either of those two jurisdictions. The regression uses just a constant plus the logarithm of the firm’s pre-bankruptcy assets. It shows a significant result ($p < 0.05$) that for every doubling of a firm’s assets (e.g. from $500$ million to $1$ billion), its probability of filing in New York or Delaware increases by 4 percentage points (e.g. from 51% to 55%). This further illustrates the relationship between firm size and bankruptcy choice of venue.

In order to identify firms potentially impacted by Apex, I start by considering firms that operate either primarily or exclusively within the Seventh Circuit. Section 5 discusses details of how I identify these firms. It is possible that a small number of firms that operate primarily outside of the Seventh Circuit might have chosen to file for bankruptcy there, but the above discussion suggests that this is in general relatively unlikely.\(^{132}\)

The more relevant question then is how likely it is that firms that operate primarily within the Seventh Circuit would file for bankruptcy within the Seventh Circuit. Clearly, the less likely a firm is to file in the Seventh Circuit, the less impact the Apex case would be expected to have. There are two facets of this question to consider: first, would firms seek to strategically avoid the Seventh Circuit post-Apex to circumvent the ruling? Second, would firms, even pre-Apex, be sufficiently likely to file in the Seventh Circuit so as to be impacted by the Apex ruling?

An important point of consideration in this instance is that as described in Section 3.5 the Third Circuit, home to the primary bankruptcy hub of Delaware, already had a precedent congruent with Apex.\(^{131}\) It is conceivable that a firm whose operations are primarily in the Seventh Circuit could, for instance, attempt to file for bankruptcy in the Sixth Circuit so as to avoid the Apex ruling. There is no guarantee that this would succeed. The Bankruptcy Code allows for other parties in a bankruptcy to object to the venue in which a case is filed and for the District Court to move the venue “in the interest of justice or for the convenience of the parties.” (28 U.S.C.A. §1412). If a firm had little or no connection to the Sixth Circuit and appeared to be blatantly filing there to take advantage of its differing legal precedent\(^{134}\) then it could be vulnerable to an attack to move venue back to the Seventh Circuit under 28 U.S.C.A. §1412.

Eisenberg and LoPucki (1998) document that while changes of bankruptcy venue under 28 U.S.C.A. §1412 are uncommon, they do occur. Furthermore, one key factor that Eisenberg and LoPucki (1998) cite for the limited number of these transfers is an absence of interested parties who submit motions for them. If an environmental regulator were pursuing an injunction against a firm that appeared to be blatantly forum shopping to avoid the Apex precedent, it seems hard to imagine the regulator would not try vigorously to resist such forum shopping. Furthermore, the arguments that changing venue would advance the interests of justice would seem much stronger in the context of a firm trying to avoid Apex than in the situations discussed by Eisenberg and LoPucki (1998).

Furthermore, even if a firm succeeded in having its bankruptcy filing remain in the Sixth Circuit, that would not necessarily protect it from the effects of Apex. The reason here is that a court in the Seventh Circuit would not necessarily consider a ruling by a bankruptcy court in the Sixth Circuit regarding discharge of obligations to be binding. In Zerand-Bernal Grp., Inc. v. Cox, 23 F3d 159 (7th Cir. 1994), for instance, a firm filed for bankruptcy in Chicago (within the Seventh Circuit) and effected a §363 sale of assets in the course of that bankruptcy.\(^{135}\) Plaintiffs then brought a successor liability suit against the purchaser of those assets in Pennsylvania, which is part of the Third Circuit. The purchaser of the assets sought an injunction in the Seventh Circuit to stop this suit from within the Third Circuit, on the ground that the asset sale had discharged successor liability and that the bankruptcy court should retain jurisdiction over any remaining disputes to that effect. The Seventh Circuit in Zerand-Bernal rejected this argument, however, writing in its opinion, “a court cannot write its own jurisdictional ticket.” In other words, even if a firm filed for bankruptcy in the Sixth Circuit and obtained a discharge of cleanup liabilities from a bankruptcy court in that circuit, it could not be certain that the Sixth Circuit could adequately protect it from suits emanating from the Seventh.\(^{136}\)

\(^{132}\)In any case, since my analyses are based on comparing the behavior of firms in the Seventh Circuit to those outside of the Seventh Circuit in the pre- and post-Apex periods, if there are a small number of firms outside of the Seventh Circuit who nevertheless would be likely to file in the Seventh Circuit and thus may be impacted by Apex, this would simply serve to attenuate any impacts of the decision that I document.

\(^{131}\)As I also argue in Section 3.5, the precedent in the Second Circuit, home to New York, is more ambiguous. This might make it a modestly more attractive target as a venue to file and try to circumvent the ruling, but it would be a pretty risky proposition.

\(^{134}\)This could be, for instance, by creating a new shell-company or empty subsidiary in the Sixth Circuit and having it file for bankruptcy, or by a company moving its state of incorporation in the Sixth Circuit relatively soon before filing.

\(^{135}\)See Appendix 3.8 for more details on §363 asset sales.

\(^{136}\)The precise contours of this legal question have not fully been scoped by courts, however, particularly if it came to be the case that there were disagreement between circuits on such suits. Also, it should be noted that it is still clearly preferable (for the debtor and its creditors)
A strategy to file in the Sixth Circuit would also come with costs. In particular, a firm would face all of the costs described above of filing outside of its home circuit, while receiving none of the benefits of filing in a bankruptcy hub. Furthermore, if a company sought venue in the Sixth Circuit by moving its place of incorporation there (which could give it a greater chance of resisting an attack under 28 U.S.C.A. §1412 than would establishing an empty subsidiary in the Sixth Circuit), this would need to be done at least six months prior to a bankruptcy filing, under 28 U.S.C.A §1408. Since a firm might not be able to anticipate bankruptcy this far in advance, in practice this could potentially mean needing to shift its place of incorporation well before significant risks of the firm entering bankruptcy arose.\textsuperscript{137} This shift in state of incorporation then would amplify costs for a firm since, for instance, its local counsel would no longer be as familiar with the corporate law governing the firm’s state of incorporation.

If the impact of the Apex decision for firms handling toxic chemicals were truly catastrophic, then the costs and risks of attempting to avoid the decision by filing for bankruptcy in the Sixth circuit might still be worth it. As a practical matter, however, many facilities that handle toxic chemicals do so in ways that are profitable while also minimizing the risks of catastrophic chemical contamination. And, the evidence that I present on how firms responded to the Apex decision is generally consistent with Apex inducing changes that meaningfully reduce firms’ risks of catastrophic contamination but which do not fundamentally transform the nature or scope of their operations. As such, in at least a large number of instances, there is reason to believe that it is simply more cost-effective for firms to respond to Apex by tweaking their operations to improve safety, rather than attempting to pursue an awkward, expensive, and risky strategy of choosing the Sixth Circuit as a bankruptcy venue in the event the firms find themselves in financial distress.

Finally, as a simple practical matter, not all of the attorneys I spoke with who advise Seventh Circuit firms on RCRA and related matters were aware of the Sixth Circuit precedent contrary to Apex. This suggests that at least some firms could be constrained from seeking to avoid the Apex ruling (and from planning on such avoidance in structuring their pre-bankruptcy operations) by virtue of simply being unaware that avoiding Apex would be possible.

Nevertheless, it is certainly possible that in some instances, the existence of a precedent contrary to Apex in the Sixth Circuit may have tempered the responses of firms in the Seventh Circuit to the Apex decision. To the extent that this is true, then, it would simply mean that the effects I estimate from the decision would be perhaps less than those that could be expected if, for instance, the Apex precedent came to govern nation-wide, either through judicial or legislative action.

The second question to address is the extent to which firms in the Seventh Circuit might be less impacted by the Apex decision if they already were highly likely to have filed for bankruptcy outside of the Seventh Circuit. As the statistics on bankruptcy filings given above document, small to mid-sized firms are extremely likely to file for bankruptcy locally. And, even large firms have a significant probability (roughly 40-45%) of filing locally. As documented in Section 5 the firms that operate in the Seventh Circuit primarily or exclusively tend to be smaller than firms that operate across multiple different circuits, thereby likely increasing their probability of filing locally. And, in most cases, firms likely weigh the options near the time of bankruptcy to decide where to file, rather than making a firm commitment well in advance.

Again, of course, it is natural to expect that some firms may have been less impacted by Apex on account that their management may have been under the assumption that they would likely file for bankruptcy in the Second or Third Circuits, and thus the Apex decision would have had a less material impact on the law that would govern a prospective future bankruptcy. As with before, however, this simply means that the impacts that I measure from the Apex decision may be smaller than they otherwise would be if a judicial or legislative change were to impact claim dischargeability on a national level.

\textsuperscript{137}A change of place of incorporation precisely (and suspiciously) six months before filing for bankruptcy could also cause problems for a firm seeking to resist a change of venue attack under 28 U.S.C.A §1412.
B.4 Asset Sales and the Apex Decision: Circumstantial Evidence

As I note in the introduction to this paper, there were more than two-dozen law firm client alerts addressing Apex in the wake of this decision. More precisely, through online searches, I found ten alerts by major national firms and seventeen by smaller local firms. Of these alerts, only two of the twenty-seven even mention 363 sales.

If a 363 sale were a simple and obvious way to essentially negate the Apex opinion, one would think that it would be in law firms' clear interests to point this out to their clients. In particular, doing so would be a powerful way to demonstrate the value of the law firms' services to their clients: the law firms would be highlighting how their skillful use of legal tools (that would likely be non-obvious to non-lawyers) could help their clients avoid detrimental impacts from what could otherwise be a significantly disadvantageous decision for the interests of those clients.\footnote{Conversely, if 363 sales were an obvious escape from the Apex holding, and a given law firm failed to mention this, but their competitors did, it would represent not just a lost opportunity to demonstrate value to a firm's clients, it might in fact make those clients question the skill and knowledge of their lawyers.}

Other circumstantial evidence also suggests that there was no widespread belief that 363 sales could effectively circumvent the Apex ruling. For instance, the beginning of this article quotes a top lawyer for Lockheed Martin commenting on the significance of the Apex case. If the Apex ruling were essentially vacuous, it would seem odd for a lawyer in such a position to make these comments. Similarly, two attorneys at Perkins Coie (a major, sophisticated national firm) authored a 2016 article for aptly titled “Section 363 Is No Magic Bullet For Environmental Liability” (Jennings and Wilson-McNerney, 2016). The article was published by Law 360, a major source of legal analysis used by practicing lawyers. In the article, the authors argue that even when a 363 sale does not relate to contaminated property itself, if it is selling assets formerly owned by a firm with significant environmental contamination there is no guarantee that the purchaser will be able to escape environmental responsibilities on account of the asset purchase.

B.5 Differences in Lender Outcomes Between Sixth and Seventh Circuit Holdings

Here I consider in greater detail scenarios referenced in Section 3.4 that explore different outcomes for a bankrupt firm's creditors under the Apex vs. the contrary Whizco precedent.

Cleanup Costs Exceed Value of Contaminated Land

Consider first a concrete scenario, the details of which are comparable to the concrete scenario analyzed in Section 3.4, but now the firm owns the contaminated land. In particular, therefore, the firm has $100 in assets valued as a going concern, and $70 in asset values in liquidation. The contaminated land is worth $25 and the cleanup costs are $50. The firm has $90 in debt secured by all of the firm's assets. For simplicity, I will assume the value of the land is the same in liquidation or as a going concern.\footnote{This could easily be modified, it just leads to slightly more complicated calculations. In some particular scenarios this modification could change the specific results of the analysis, but it does not alter the underlying concepts illustrated here.}

Under a non-dischargeability holding such as Apex, if the EPA brings an injunction and the firm reorganizes, the creditors will receive $50 on their $90 claim, just as in the example in Section 3.4. If the creditors instead choose a liquidation, they will not be able to sell the contaminated land for a positive amount. Thus, they will be left with $70 - $25 = $45 in value to satisfy their claim. In reality, by bargaining with the EPA, they will likely be able to achieve a somewhat better outcome than this, but this $45 represents their BATNA.

Now, consider a stronger dischargeability holding, such as in Whizco. Here, the creditors can sell the assets apart from the contaminated land in a 363 sale that allows for more preservation of the value of the firm as a going concern. This is not mere supposition, In re Heldor Indus., Inc.\footnote{131 B.R. 578 (Bankr. B.N.J. 1991), rev'd and vacated on other grounds sub nom. N.J. Dept. of Envt'l Protection & Energy v. Heldor Indus., Inc., 989 F.2d 702 (3d Cir. 1993).} is a case illustrating a firm taking just such an approach. This was a case in the Third Circuit, but it came two years before the Torwico ruling that established a precedent similar to Apex. As such, the bankruptcy court here found that environmental cleanup requirements were dischargeable claims, as would be the case today under Sixth Circuit precedent. The debtor in this case owned various assets apart from those that were subject to environmental contamination and a cleanup order. It sought to sell essentially all assets apart from the contaminated property in a 363 sale. The court, specifically relying on the powers of the bankruptcy court to discharge claims (powers which Torwico and Apex subsequently...}
circumscribed), held that the debtor was entitled to do so, despite objections by the New Jersey Department of Environmental Protection and Energy that doing so was prohibited until cleanup of the environmental contamination had been completed.

Using a 363 sale in this scenario will yield $100 (going concern value) minus $25 (land value) = $75 in funds to satisfy the creditors' claims. As with the non-dischargeability setting, this $75 represents the creditors' BATNA in negotiations with the EPA.

In Section 3.4, in the scenario in which the firm did not own the contaminated land, creditors' BATNAs under dischargeability and non-dischargeability were $90 and $70, respectively ($20 difference). Here, their BATNAs are $75 and $45, respectively ($30 difference). Two points are particularly salient here. First, as would be expected, creditors are worse off when the firm owns the contaminated land, and this applies regardless of whether the firm operates under a dischargeability regime (such as Whizo) or a non-dischargeability regime (such as Apex). Second, however, in at least some scenarios, such as this one, a non-dischargeability regime actually hurts creditors more when the firm owns the contaminated land than when it does not.

Why would this be, that non-dischargeability can hurt creditors more when the firm owns the contaminated land? Note first that under the non-dischargeability regime, the creditors' BATNA is $70 when the firm does not own the contaminated land and $45 when it does - in other words, the BATNA is decreased by precisely the value of the contaminated land ($25), a point made in the legal analysis of CERCLA in Section 3.4. Under the dischargeability regime, by contrast, the creditors' BATNA is $90 when the firm does not own the land, and $75 when the firm does. In other words, under the dischargeability regime, the first $10 of losses from the lost value of the contaminated land come out of the amount by which the creditors are over-secured. Under non-dischargeability, which pushes creditors' BATNAs towards those achievable in liquidation, creditors are much less likely to remain over-secured.

The illustration given here is just a single scenario. Nevertheless, it is relatively realistic in certain of its assumptions, such as that contamination costs exceed land value and that creditors have an encompassing security interest.

It is not uncommon for the costs of cleanup to exceed the value of contaminated land. Indeed, if this were not the case, there would be little need for the 'Superfund' created by the CERCLA - aka Superfund - statute. The Superfund is a government-owned pool of money available to clean up contaminated land when those costs exceed what can be collected from any of the potentially responsible parties that contributed to the contamination. In general, if contaminated land is worth more than the cost of cleanup, then it should at the least be able to be sold for a non-negative amount to a new owner who will conduct the cleanup. Thus, in general, at a very minimum, any contaminated site that has been cleaned up using Superfund money likely represents one where the costs of cleanup exceed the value of land. Similarly, the assumption of creditors having a security interest in all of a firm's assets is a typical provision in the credit agreements I analyze in Section 6.3.

A fuller analysis would add additional variables. For instance, here, I assumed that a 363 sale of non-contaminated assets preserves the full value of those assets as a going concern, whereas a fuller analysis would allow a certain amount of value destruction to occur from the non-contaminated assets being divorced from the contaminated land. There are also a host of issues dealing with strategic choices by the creditors and the EPA in their negotiations, and how those are impacted by uncertainty (e.g. in costs of cleanup, liquidation value that can be achieved for the firm's assets, etc.) and various market frictions. I sketch these issues in more detail in Appendix B.6.

Thus, in other plausible variations of this scenario, the difference in creditor recovery between a dischargeability vs. non-dischargeability, and between a scenario in which the firm owns or does not own the contaminated land, may well be different than that depicted here. Nevertheless, in many of these scenarios, the result will still apply that even where the firm owns the contaminated land, creditors do markedly worse, frequently to the tune of tens of millions of dollars worse, under a non-dischargeability regime.

### Cleanup Costs are Less than the Value of Contaminated Land

In the event that cleanup costs are less than the value of contaminated land (and immovable equipment), a firm filing for bankruptcy under the Whizo precedent still enjoys advantages as compared to the Apex precedent, though these advantages may be smaller than the other scenarios considered above. Nevertheless, there are still at least three reasons that a firm operating under the Sixth Circuit's precedent may be better positioned than one operating under the Apex precedent.
The first reason is that in some situations, it may be possible for the firm to sell contaminated property to a buyer under arrangements such as the EPA's Bona Fide Purchaser Program (BFPP) that would enable the purchaser to avoid the majority of the cleanup responsibilities. In this way, the bankrupt firm cleanses itself of cleanup obligations through the discharge, while the purchaser avoids at least many of those obligations via the BFPP. This could then allow something closer to the full value of the contaminated site to be available to satisfy other claims in the bankruptcy, as opposed to just the difference between that site’s value and the cleanup costs, as would be the case under the Apex precedent.

Second, so far, my discussions have presumed that the costs of cleanup operations are known at the time of the bankruptcy filing. A more realistic assumption, however, is that these costs are unknown, with at best general estimates available. On the one hand, these uncertainties could themselves be priced in to the measured “costs” and the calculations above performed based on some form of “certainty equivalent” of costs. But, in a fuller consideration of the scenario, it is quite possible that the uncertainties will come with different economic costs depending on which party bears them.

In particular, even if a facility is worth more than the expected costs of cleanup, or even risk-adjusted expected costs of cleanup, it may be advantageous to sell that facility to a larger firm that is more able to bear the risks of variable cleanup costs and that has more access to different funding mechanisms. By contrast, a firm that emerges from reorganization with a significant uncertain liability could have difficulty obtaining future funding, thereby impeding its recovery efforts.

Because of the expansiveness of environmental laws such as RCRA, even if a bankrupt firm sold a contaminated facility to another party, the selling firm could still be liable for cleanup costs at that facility. This is far from speculative: indeed, this is precisely what occurred in the factual situation in *Apex*: Apex Oil Co. had sold the contaminated refinery as part of its bankruptcy proceedings, but was still liable for cleanup obligations under RCRA. Thus, under a precedent such as the Sixth Circuit’s that allows for broader discharge, it may be easier for a bankrupt firm to transfer a facility to an economic actor that will have a higher value for it.

The third and final reason that a firm operating under the Sixth Circuit’s precedent may be better off than one operating under the Seventh’s in *Apex* is that the enhanced ability to sell a facility can facilitate not just more effective risk allocation, but also greater flexibility in the bankruptcy reorganization. Again, the situation with *Apex Oil* is illustrative. As discussed in Appendix B.1, *Apex Oil* sold the contaminated refinery as part of a strategy to completely change the focus of its business, from oil refining to wholesale distribution. And, whereas the facts of the case demonstrate that *Apex Oil* had failed for many decades to competently run an oil refinery, the fact that it is today still a viable company suggests that its decision to switch business lines was an apt one. Thus, the greater ability to sell contaminated facilities and change business lines (or similarly, geographic scopes, etc.) enables the potential for greater creditor recovery under the Sixth Circuit’s precedent as compared to the Seventh’s under *Apex*.

In summary then, it is relatively clear that the advantages (for creditors) of the Whisco precedent are greater in situations in which the costs of contamination exceed the value of the contaminated facilities. But, even where the reverse holds and the value of the facilities exceeds the costs of their cleanup, the Sixth Circuit’s precedent results in outcomes that are potentially more favorable to creditors along several different dimensions. All of these considerations therefore further support the notion that the *Apex* decision represented a significant development.

### B.6 Impact of Apex on Secured vs. Unsecured Creditors

In Section 4 I note that upon initial consideration, the impact of *Apex* on secured versus unsecured creditors will be comparable because a security interest is valuable in giving creditors priority over a money claim by the EPA, whereas *Apex* is most relevant to the impacts of an injunction. Nevertheless, I note additional considerations that complicate this simple story. In this section, I sketch out the set of relevant considerations. More fully

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141 I provide additional details on the BFPP in Appendix B.7

142 There are of course complexities here. In theory, for instance, the purchasing party can provide assurances that it is assuming all cleanup obligations. But, these may not be fully protective. The purchasing party may itself become bankrupt, or it may challenge the validity of its indemnification agreements if, for instance, pollution is discovered to be worse than expected on the site and thus gives rise to a breach of warrant claim. Another issue that can complicate the application of sales such as this is of course the suite of asymmetric information problems that exist between buyer and seller.

143 In fact, the scenario in which a bankrupt firm with pollution liabilities reorganizes into a new line of business comes up repeatedly in the case law on this issue. See for instance *In re Chicago, Rock Island & Pac. R. Co.*, No. 75 B 2697, 1999 WL 1144906 (N.D. Ill. Dec. 7, 1999); *Maytag Corp. v. Navistar Intern. Transp. Corp.* (7th Cir 2000)
investigating these considerations is a topic of ongoing research, and one that is relevant to a wide variety of questions concerning dischargeability and bankruptcy priority - questions that extend well beyond determining the impact of Apex on secured versus unsecured creditors.

The best way to conceptualize this issue is to view it from the perspective of a competitive game, drawing on the field of game theory. In this game, there are two players, the EPA and the firm, which at the point of bankruptcy will be controlled by its creditors. The firm has declared bankruptcy with a substantial amount of toxic contamination on one of its properties.

Each of these two actors has a set of choices that they can make. For the EPA, their choices are to clean up the pollution and demand monetary compensation for the work (which they are authorized to do under CERCLA), or to bring an injunction demanding the firm clean up the pollution (as they can do under RCRA). For the firm, its choices are to reorganize, to conduct a piecemeal liquidation, or to sell its non-contaminated assets in a §363 sale.

The next component of this game to recognize is the set of relevant parameters. These include the cost of cleaning up the pollution (which may be assumed either to be a definite known value or an uncertain, random amount), the value of the land that is contaminated, the value of the firm’s non-contaminated assets, the amount of firm value (in the form of synergies) that would be lost if the firm conducts a piecemeal liquidation, and the firm value that would be lost if the firm conducts a 363 sale of non-contaminated assets. The relevant parameters also include whether the bankruptcy is governed by a strong dischargeability regime (such as Whizco) or a strong non-dischargeability one (such as Torwico or Apex). Finally, these parameters include whether the firm’s lenders are secured, unsecured, or some combination thereof, and whether there is one lender or many different lenders.

Another important component of the game is the challenges faced by each decision-maker. For instance, the EPA must decide first whether it will clean up the pollution and seek damages, or bring an injunction. Most likely, this is a relatively irrevocable decision. After the EPA makes this decision, the firm responds by reorganizing, conducting a piecemeal liquidation, or a 363 sale. Yet, in making its decision, the EPA must account for how the firm will respond. Thus, for instance, if the EPA were assured the firm would reorganize, it would essentially always do better by bringing an injunction. But, if bringing an injunction means that the EPA would benefit too much at the expense of the creditors, the creditors may rationally respond by choosing a 363 sale or a piecemeal liquidation (under Whizco, the creditors could choose a 363 sale, under Apex they would be limited to the more destructive piecemeal liquidation).

Just because the EPA does better via an injunction than a money suit (to recompense cleanup costs) doesn’t necessarily mean the creditors will choose a 363 sale over liquidation. There are at least some scenarios in which the amount the creditors lose in terms of firm value and synergies via a 363 sale or liquidation outweigh what they lose from giving the EPA the higher priority it effectively gets by bringing a non-dischargeable injunction. But, in many cases, the EPA will conclude that it is actually optimal for it to bring a money suit, rather than an injunction. Even here though, the situations in which the EPA would reach this conclusion will be impacted by whether a holding such as Apex vs. Whizco applies.

In the simplest setting, where one assumes costless negotiation and perfect information on the part of both the EPA and the firm’s creditors, the firm will always be reorganized where it is efficient to do so (i.e. where there are positive valued synergies to keeping it intact). Thus, the considerations above will simply impact the BATNAs of the EPA and the firm’s creditors and thus define the scope of potential settlements they will come to in negotiations, with the EPA likely accepting partial payment/compliance from the firm in exchange for dropping further cleanup actions.

But, as any Coasian analysis recognizes as it continues, in situations where there are frictions the outcomes may be different. There may be some costs to negotiation, but in general these should not pose substantial frictions - the relevant parties can easily identify and communicate with one another, and the large sums of money at stake will generally make this worthwhile.

Other frictions, however, will be more salient. Uncertainty about the costs of cleanup is one complicating factor. Another is uncertainty about the synergies that will be destroyed if the firm liquidates or sells its non-contaminated assets in a 363 sale. In general, it is difficult to know how much value will be lost in this process.

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144Thus, when I refer to actions taken by the ‘firm,’ this implies actions taken by the creditors.
145Thus, this allows for the possibility that a 363 sale preserves more value and synergies than does a piecemeal liquidation.
146Clearly, if the EPA cleans up the pollution, it cannot then bring a new (potentially non-dischargeable) injunction demanding the firm do so. It is less clear, but probably relatively unlikely that the EPA could first bring an injunction and then switch to cleaning up and demanding damages. The precise mechanics of this though are a topic of ongoing research.
until a company's assets are actually put to auction. The EPA and the firm's creditors will likely have different information about the value of these synergies. And, the creditors may have difficulty credibly conveying information that they have. For instance, if the value of the synergies is low, creditors will be closer to indifference between reorganizing and liquidating. The creditors may wish to convey to the EPA that they will liquidate at the drop of a hat, and thus that the EPA should accept a low settlement rather than bringing an injunction. But, the EPA may not believe these assertions, potentially leading it to bring an injunction that prompts the creditors to liquidate inefficiently (i.e. to liquidate when there were positive value synergies that would have been preserved in a reorganization).

Furthermore, the considerations and implications of this go beyond just questions of whether frictions will cause at times inefficient liquidations. Even if a firm reorganizes efficiently (i.e. reorganizes when doing so preserves synergies), if, for instance, frictions lead the EPA to bring a money suit where it could have achieved better recovery via an injunction, then this could represent a situation in which there is sub-optimal recovery to the public for environmental harms, and likewise suboptimal deterrence for future harms.

As is likely apparent, an examination of these dynamics is relevant for reasons that extend well beyond understanding the specific Apex decision. In particular, this investigation is useful for informing policy regarding whether to make environmental cleanup obligations non-dischargeable (as is the case under Apex) vs. considerations of an alternative approach, which would be to instead give these obligations a high or super-high priority as claims within a bankruptcy proceeding. This investigation is also useful for informing how courts and legislatures handle other types of obligations, such as those under non-compete clauses, for which dischargeability vs. non-dischargeability is a frequent point of disagreement between different courts.

**B.7 The EPA’s Bona Fide Purchaser Program (BFPP)**

The EPA's Bona Fide Purchaser Program (BFPP) was authorized by the 2002 Brownfields Revitalization Act. It allows a new owner who knowingly purchases a contaminated property and complies with certain requirements (such as not impeding cleanup at the site and not taking actions to make the contamination worse) to escape the normal requirements of landowners to abate pollution on sites they own, regardless of whether they contributed to that pollution.

The BFPP program has been criticized for placing overly onerous requirements on land purchasers, requirements which if violated can subject those purchasers to potentially significant cleanup liabilities. But, sale transactions under the program do continue to occur. I have not yet been able to find comprehensive statistics on the number or characteristics of such transactions. But, court cases continue to be decided with some regularity that address interpretations of the program, and there is an active field of practice guides advising companies on how to conduct transactions under BFPP.

**B.8 Would Apex Have any Direct Impact on Manager or Shareholder Incentives?**

Apex influenced how injunctions to clean up hazardous waste are handled for firm in and post-bankruptcy reorganization procedures. By the time a firm has declared bankruptcy, its shareholders have frequently lost most or all of the value of their shares. Similarly, a firm’s top management and decision-makers are frequently replaced in a reorganization procedure. Thus, as a first order matter, by the time a firm reaches the point where the Apex decision is relevant, firm managers and shareholders have little to nothing left to lose. Overall therefore, the best theoretical prediction is that the Apex decision should be anticipated to have only a minimal direct influence on the incentives of these parties.

Nevertheless, there are at least some situations in which Apex may be expected to have a smaller, but still direct, impact on the incentives of parties other than a firm’s creditors. In particular, although managers are frequently replaced in a reorganization, there are also a non-trivial number of instances in which managers stay with a firm post-bankruptcy. As such, managers can be seen to have incentives to see that firms reorganize rather than liquidate.

Would Apex impact the likelihood that a firm liquidates rather than reorganizes in bankruptcy? As a basic matter, it is true that if a firm liquidates, the non-dischargeability of a cleanup injunction becomes far less relevant.

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148 See, for instance, PCS Nitrogen Inc. v. Ashley II of Charleston LLC, 714 F.3d 161 (4th Cir. 2013).
Apex Oil in its briefs before the District Court argued that had it known its obligations would not be dischargeable, it never would have reorganized, instead choosing liquidation. In the wake of the Apex decision, some commentators took Apex Oil at their word, trusting that this largely unprovable assertion made to advance their judicial interests in the case must certainly be factually accurate, and thus concluding that the Apex decision would lead to more liquidations and fewer reorganizations.

Yet, sophisticated followers of bankruptcy law know that, at least on a basic level, what impacts whether a firm reorganizes rather than liquidates is whether or not the firm is worth more as a whole or in liquidation. The amount that a firm’s creditors can get in liquidation thus simply sets their BATNA (Best Alternative to Negotiated Agreement) in discussions with environmental regulators, and presumably these parties will be able to work out an agreement to split the surplus value generated by keeping a valuable firm intact, with environmental regulators accepting partial satisfaction of their cleanup demands as part of this settlement. The Apex decision thus would impact the bargaining power that regulators would have in these negotiations, leading them to get more value to support cleanup than they would in its absence. But, as a first order matter, it should not impact the likelihood of reorganizations. This very point was made, for instance, in an amicus brief before the Supreme Court urging it to let the Apex decision stand.

Thus, generally speaking, even if a firm’s managers fear a liquidation and hope for a reorganization, Apex should not have a direct impact on them, apart from its indirect influence through the channel of lenders.

Nevertheless, there may be some exceptions to this general analysis that could lead some managers to feel a direct impact on their actions from Apex. For instance, although the above discussion illustrates that in a frictionless world, Apex should have no impact on whether a firm reorganizes, if it is at times difficult or costly for a firm’s creditors to negotiate a settlement with the EPA, then there could be situations in which a liquidation occurs that otherwise would not have. In reality, it is very common practice for the EPA to negotiate settlements with firms in all manner of situations. Thus, the plausibility of such negotiation failures may be low.

But, firm managers might not always be fully informed. Just as some commentators bought into the (theoretically) erroneous proposition that Apex would lead some lenders to prefer liquidation to reorganization, some firm managers might as well. In this event, firm managers might feel that Apex placed them at greater risk of having their firms liquidated in the event of a bankruptcy, and thus generated for them a direct incentive to reduce their risks of causing toxic contamination.

Similarly, from a theoretical standpoint, whether a firm can get financing post-reorganization should depend on the business prospects of that post-reorganization firm, and not on the magnitude of losses lenders may have suffered in the firms preceding bankruptcy. Thus, even if lenders might lose more in a reorganization on account of Apex, this should not make either those or other lenders any less likely to finance a reorganized firm. Nevertheless, deviations from this theoretical construct could occur. Lenders might behave irrationally, or perhaps more likely, firm managers might expect lenders to behave irrationally. Either could then lead managers to think that Apex would make it less likely for their firms to reorganize post-bankruptcy, and could thus generate a direct impact.

From my discussions with attorneys advising firms impacted by Apex, several people did indeed bring up that they found managers to be concerned by the decision, that managers saw Apex as making it harder to “cleanse” outstanding pollution obligations (which is true), which in turn would mean worse outcomes for those managers (which seems more dubious). From the perspective of the generally accepted theoretical framework described above, this sentiment on the part of managers seems relatively irrational. If one assumes sufficient frictions in the basic framework, the perspective expressed by these managers can start to seem more rational. Another possibility is that the managers were simply erroneous in their beliefs and assumptions. Ultimately, whether managers are correct or incorrect on this matter is less important. There is at least some evidence that managers felt directly impacted by the Apex decision, and thus some reason to view it as having some direct impacts on manager incentives and behavior, even apart from the impacts of the decision on creditors.

Finally, when considering a firm’s shareholders, it is even harder to see a plausible reason why they would be

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149 United States v. Apex Oil Co., 438 ESupp.2d 948, 953 n. 6 (S.D.III.2006);
151 I provide more details on how Apex improves the BATNA for regulators and thus results in more value delivered to them, and less value to firm creditors, in Section 3.4 below.
152 See the joint amicus brief by Atlantic Richfield Corporation, Shell Oil Products, the Premcor Refining Group and Sinclair Oil Corporation, available http://www.scotusblog.com/case-files/cases/apex-oil-company-inc-v-united-states/.
153 Lenders might charge more for credit, including new credit to a post-reorganization firm, on account of Apex. But, that is an example of the direct effect on lenders discussed above, not a direct effect on firm managers.
directly impacted by the Apex decision. Nevertheless, it is not uncommon, particularly amongst smaller firms, for there to be some overlap between top managers and owners. Thus, to the extent that owners are also managers, they would be impacted similarly to what is described for managers above.

B.9 Costs of Lender Responses to Apex

It is useful to note that at a basic level, many of the changes that lenders made in their covenants were not tremendously expensive for them to implement. For instance, the covenant for Supreme Industries quoted in Section 6.3 calls for site inspections of the borrowers’ properties to assess the safety of toxic chemical disposal practices. The costs of these are certainly nonzero, but compared to a five-year, $45 million credit exposure, they may be relatively modest. The covenant discussed above for Thor Industries does not explicitly prohibit disposal of toxic wastes on-site, but requires any such instances to be more explicitly disclosed as risk factors to the lenders.

In both cases, the new covenants may plausibly shift firm disposal of toxic chemicals from on-site to off-site facilities. Lenders and borrowers are generally assumed to split in some fashion the profits from the firm activity financed by the lenders’ credit. Thus, to the extent that safer, off-site disposal methods are more expensive, they may ultimately result in lower profits to creditors. But, with the direct costs of many of these changes born by the borrowers, any impact on lender profits may be subtle, indirect, and non-immediate.

B.10 The Timing of Apex’s Impact

A consideration in formulating statistical tests is when to mark the Apex decision as having occurred. The District Court decision for Apex came in 2008, the Circuit court decision in 2009, and the denial of cert by the Supreme Court came in 2010. In fact, although the district court decision was reached in 2008, the case commenced in 2005, and in 2006, the District Court granted motions that were favorable to the EPA’s efforts to deny dischargeability of Apex’s environmental cleanup obligations.154

For my empirical specifications, I consider 2009, the date of the Seventh Circuit’s decision, to be the start point of when to begin looking for an impact of Apex. This is a natural marker, given that is when the precedent became binding for the whole of the Seventh Circuit.155 When interviewing attorneys for this project, one question I asked was when they became aware of the case and its outcome. Apart from the attorney directly involved in the proceedings, no one I spoke with was aware of it prior to 2008 when the District Court issued its final decision.156 Some attorneys were aware of the decision in 2008, whereas more became aware at the time of the Seventh Circuit’s decision in 2009.157

In general for my analyses, I estimate separate effects of Apex for each year. Thus, readers can view these and make their own determinations regarding a reasonable start time to look for its effects. Generally speaking, as evidenced in Figure 1, for instance, my tests show a small effect for the case in 2009, but often one that cannot be fully distinguished from statistical noise. This effect then grows consistently and considerably over the next several years. Given an increasing awareness of the case over time, this pattern would be precisely what one would expect to see.

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155 Nevertheless, some of the client alerts on the case and news coverage of it came in 2008 in response to the District Court’s decision, suggesting that some saw the District Court’s decision as potentially having a broader impact than just the specific court in which it was decided.
156 Indeed, although the District Court had granted rulings favorable to the EPA in 2006, it was only upon a full resolution of the issues in the case that it became clear what, if any, practical impact those rulings would have.
157 Some of the press attention and other writings on the case came in 2010 with the Supreme Court’s denial of Cert, and so undoubtedly this was when some practitioners and likely managers in affected industries became aware of it as well. No one I personally spoke with, however, said they became aware of the case at this point.
C Data Details

C.1 TRI Data Details

This subsection discusses several additional details in constructing the TRI data not covered in Section 5.1. First, in creating my measure of on-site releases, I start with TRI data element ON_SITE_RELEASE_TOTAL and subtract from this the two TRI data elements STACK_AIR and FUGITIVE_AIR. My measure for off-site treatment of waste is simply the TRI data element OFF_SITE_TREATED_TOTAL and my metric for total waste is simply the TRI data element PROD_WASTE.

In identifying which facilities are regulated by RCRA (so as to restrict my analyses to those), I follow the procedure for matching between TRI and RCRA datasets described in Appendix C.4 below. The RCRA data in turn contains designations of CESQG facilities, which I also use in my data selection.

In identifying which chemicals are regulated by RCRA, I begin with the EPA’s website for its “Substance Registry Services.” I enter “RCRA” in the search terms under the “Browse by chemical / substance lists” and download the pertinent Excel files that correspond to the different subsections of RCRA that list specific chemicals covered by the statute. These Excel files (which I most recently accessed on July 6, 2018) in turn contain the CAS (Chemical Abstract Service) compound ID for the RCRA regulated chemicals. I then match these to the CAS IDs for chemicals in the TRI database. In most cases, the TRI data gives a precise chemical ID to be used in this match. In some instances, the TRI designation is more general - stating, for instance, “Arsenic Compounds” or “Cadmium Compounds.” In these cases, if the underlying element or chemical in the compound is regulated under RCRA, I also include it in my analyses.

In reporting on TRI data, if a given facility has zero releases of a particular chemical via a particular method (e.g. on-site release) for a given year, in some cases the facility will report a ‘0’ for that year and in other cases it will simply omit that chemical and release method for its reporting. Accordingly, I create a fully balanced chemical-by-facility-by-year-by-release method panel by filling in ‘0’ for instances in which (a) a given facility has no record of a given chemical for a given year, (b) the facility does have record of that chemical for other years, and (c) the facility has reported records of other chemicals for a given year.

C.1.1 Units in TRI Data

A final data detail regarding the TRI data is the units of weight in which chemicals are measured. In my regression analyses, I treat each chemical separately, take its logarithm, and use facility by chemical fixed effects. Thus, the units chemicals are measured in are irrelevant to the statistical estimates obtained in my analyses. For the summary statistics in Table 1, however, I do aggregate totals across different chemicals to give a rough sense of aggregate amounts. This clearly is a simplification: different chemicals have different toxicities and so a given amount of one chemical is not directly comparable to the same amount of another chemical.

Also, for almost all the chemicals in TRI, the reported units are in pounds. But, there are a few chemicals that tend to be used in very small amounts but which have very high toxicities, and the amounts of these chemicals are reported in grams, not pounds. When reporting aggregate statistics, I could divide the amounts of these chemicals by 453 to convert pounds to grams. Yet, doing so would in many ways be less informative rather than more, since it would fail to capture the special toxicity of these chemicals whose weights are reported in grams. Thus, in a technical sense, the amounts reported in Table 1 should best be understood as representing “total units” rather than “total pounds.” Again though, I stress this issue is only pertinent to the reporting of summary statistics and has no bearing at all on any regression results.

C.2 TRI Data Reliability

US law provides for strict penalties for both firms and individual employees of those firms caught violating TRI reporting requirements, which includes fabricating or mis-representing reported data.\footnote{https://ofmpub.epa.gov/sor_internet/registry/substreg/LandingPage.do} Firms subject to TRI reporting receive periodic audits and inspections to assess their data accuracy.

As an initial matter then, it is reasonable to expect some relatively high level of accuracy of the data. Nevertheless, a more careful consideration of the matter is in order. Some early research examined statistical patterns...
in TRI data reporting and concluded that it was likely that some facilities were submitting inaccurate information, primarily for certain types of chemical releases into the air. For these air releases, naturally, it is far harder for EPA inspectors to identify mis-reporting and pin it to a certain facility (De Marchi and Hamilton, 2006). Yet, even looking at these difficult-to-verify air releases, later research using similar techniques identified large improvements in the accuracy of TRI reporting, particularly since 2001 (Zahran et al., 2014). This same research notes that releases such as off-site treatment (one of the key outcomes examined in this study) are far easier to accurately monitor and inspect, and as such have maintained a higher level of accuracy even when air-release reporting raised more statistical suspicions. These statistical investigations thus bode relatively well for the accuracy of the TRI data used here: data accuracy has improved significantly over time, and the major sources inaccuracy were for difficult-to-verify air emissions that are not a central component of this study.

Yet, what is perhaps the most persuasive evidence in support of the accuracy of the TRI data used in this study comes from a careful examinations of the incentives of firms to accurately or inaccurately report their data and how those relate to the Apex decision. In some situations, if there were some kind of intensification of regulatory enforcement or increase in penalties, it might be anticipated that firms could respond by fabricating their reporting data. Firms might perhaps falsely depict that they had reduced their on-site releases of toxic chemicals. This might be particularly true if the new regime set strict new limits on total on-site releases, and firms found these new limits difficult or costly to honestly comply with. For a strategy like this to be effective, the new regime would presumably also need to not increase the likelihood or penalties of detection, or at least not sufficiently to overcome the benefits of fabricating data.

Yet, a scenario such as this is completely at odds with the legal reality of the Apex decision. First, the Apex decision did nothing to change any kinds of limits on amounts of chemicals released. Thus, there would seem to be little direct pressure from the decision for companies to start fabricating more information on the TRI reports that they make. Furthermore, if a firm did violate any permits or regulations governing the amounts of chemicals it released on site, those would be subject to regulatory fines. Such fines would impact a company immediately, rather than the kinds of longer-term considerations of dischargeability in the event of bankruptcy that Apex affected. The Apex decision in fact decidedly had no impact on the dischargeability of fines already assessed, and in any event, the magnitude of these fines tends to be quite minor. In short, the type of catastrophic contamination relevant to the Apex decision is of a completely nature than any penalties firms might seek to avoid by fabricating their TRI reporting information.

Thus, when considering the reporting for on-site releases, there are very strong reasons to believe that the Apex decision would not in any way alter the incentives of firms to accurately report their data. For the other key outcome in this study, off-site treatment, the reasoning in support of data accuracy is even stronger. First, there is less of an incentive to artificially inflate this number in general - firms do not get any kind of regulatory “credit” for increasing the amounts of wastes they send off-site for treatment.

Perhaps equally importantly, fabricating this information is far more difficult. RCRA regulations require very detailed reporting of which wastes are sent to which treatment facilities and by which methods. Treatment facilities in turn must maintain their own detailed records of the wastes they receive, their amounts and origins. Thus, as is relatively clear from this situation, and as has been noted in prior research (Zahran et al., 2014), for a firm to fabricate off-site treatment reporting it would need to collude with one or more other companies, who, in this case, would somehow need to have an incentive to risk serious penalties to falsely claim they are treating and disposing of more toxic chemicals than they actually are. It seems almost impossible to imagine a scenario in which the Apex ruling would have increased the incentive for such multi-firm, collaborative fraud. Accordingly, even if one accounts the results reported here for on-site releases slightly less certain due to questions of data accuracy, the results for changes in off-site treatment should remain reliable in this regard.

### C.3 RCRA Inspections and Enforcements Data

As discussed in Section 5.1 I already restrict the sample for my main analyses to the set of facilities reporting in TRI that are also subject to regulation under RCRA. This in turn makes it a relatively straightforward matter to

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160 For instance, as noted in Table A.4, total fines over all facilities nationally during the entire eleven-year study period are $55 million, roughly one third the amount of cleanup obligations due in the single instance of the contamination at issue in the Apex case.

161 Additionally, for the findings in this investigation to be valid, it is not necessary that the TRI data be completely accurate in every respect. Instead, it is merely necessary that the Apex ruling did not systematically induce the local, Seventh Circuit firms that it impacted to start fabricating more than they previously did.
merge data on RCRA inspections and enforcements in to the data sets I use for my primary analyses.

I start by identifying the TRI facility ID associated with each facility ID in the RCRA database, with details on this process given in Appendix C.4. I then access the EPA's RCRA database from the “Downloads” section of the EPA's ECHO (Environmental Compliance History Online) program.\textsuperscript{162} For information on inspections of facilities to assess RCRA compliance, I access the file: “RCRA_EVALUATIONS.csv” which is a component of the zip archive download described above. I remove from this data evaluations marked (in the field EVALUATION_DESC) as being self-disclosure,\textsuperscript{163} though as a practical purpose these comprise only a few percent of the total data and their inclusion or exclusion makes no discernible impact on any of my analyses. I extract the year (based on the EVALUATION_START_DATE field) for these inspections, and then merge these annual records of inspections into the annual TRI disclosure data in order to record whether a given facility in the TRI data received one or more RCRA related inspections in a given year.

For information on RCRA enforcement actions, I access the “RCRA_ENFORCEMENTS.csv” file that is part of the same zip archive that contains the RCRA inspection information described above. I obtain the year of the enforcement based on the ENFORCEMENT_ACTION_DATE field. I record the penalty amount of the enforcement based on the value of the FMP_AMOUNT.\textsuperscript{164}

To distinguish between what I term “formal” and “informal” enforcement actions, I look at the “ENFORCEMENT_DESC” field in this data. Any type of enforcement that contains the word “informal” (e.g. “written informal” and “verbal informal”) I mark as informal. EPA documents specifically note that in most cases, informal actions correspond to smaller and more isolated problems.\textsuperscript{165}

Table C.1 gives summary statistics on the RCRA inspection and enforcement actions described in this section.

### C.4 Matching RCRA to TRI

The TRI and RCRA databases use separate systems of numeric IDs to track facilities, but resources exist to cross reference one set of IDs to another. In particular, I draw on the EPA's centralized Facility Registry System (FRS).\textsuperscript{166} I download the national-level zip archive associated with this\textsuperscript{167} and access the “national alternative name file” from within this. This file in turn contains a list of facilities and their respective IDs for both the TRI data and the RCRA data, along with a centralized ID across all EPA databases (which the EPA terms the “Registry ID”). I thus first create a mapping from RCRA facility IDs to the centralized Registry ID and then a mapping from these Registry IDs to TRI IDs.

By using this centralized FRS database, I am able to complete almost all of the matching that I utilize between TRI and RCRA facility IDs. The EPA does have one additional source of data for matching IDs that allows me to match a few more facilities that were not matched from the FRS system. In particular, I access the EPA's “TRI EZ Search” reference.\textsuperscript{168} This gives detailed information on the facilities in the TRI data, including in some cases the RCRA ID associated with the facility. In most cases, these identifications match those in the FRS. But, there are a few cases where this database has additional matches. From investigation, I believe a cause of this is that there is some ambiguity across EPA systems as to what precisely constitutes a facility - in other words, there are a small number of instances where a given set of operations will be considered a single facility in one database, but as multiple facilities in another database. Thus, if there is a TRI facility not matched to a RCRA ID via the FRS system, but that is matched via this TRI EZ Search, then I use that identification as well.

\textsuperscript{162}As of September 2018, this downloads section is available at this address: https://echo.epa.gov/tools/data-downloads and the specific RCRA data is available on this page under the heading: “RCRAInfo Data Set” and at the link: https://echo.epa.gov/files/echodownloads/rcra_downloads.zip. Data documentation is also provided on this same site.

\textsuperscript{163}This includes two labels, differing only in capitalization: “FACILITY SELF DISCLOSURE” and “Facility Self Disclosure.”

\textsuperscript{164}FMP stands here for “Final Monetary Penalty” amount. It reflects the amount of money a facility must pay as a fine, and does not reflect any adjustments to this as credits for the cost of upgrades to equipment that the facility agrees to make as part of the process of settling the enforcement action.


\textsuperscript{166}Data on this is available at https://www.epa.gov/enviro/epa-state-combined-csv-download-files. I downloaded these files on June 18, 2018.

\textsuperscript{167}https://www3.epa.gov/enviro/html/fii/downloads/state_files/national_combined.zip

\textsuperscript{168}Available here: https://www.epa.gov/enviro/tri-ez-search. I accessed this database on June 18, 2018.
C.5 Safety of Specialized Waste Treatment Facilities

Section 3.2 mentions in its discussion that sending wastes to specialized treatment and disposal facilities is generally regarded by environmental law experts and practitioners to be a safer and preferable approach as compared to individual facilities disposing of such wastes on site. Some evidence of this can also be seen directly in the data analyzed in this study, though it is admittedly of a relatively informal and suggestive nature. In particular, I consider the six-digit NAICS industry-activity classifications, which are included for facilities in both the TRI and RCRA databases. I focus in particular on the code “562211 - Hazardous Waste Treatment and Disposal.” I look first at the TRI data and examine total on-site releases of each RCRA-regulated chemical across all facilities and total on-site releases just for facilities with NAICS 562211. On average across these chemicals, facilities with NAICS 562211 account for roughly 30% of all such releases. I then look at violations of RCRA regulations, first across all RCRA-regulated facilities and then across facilities with NAICS 562211. These facilities account for only 4.6% of all enforcement actions, 4.7% of all formal enforcement actions, and 10.6% of total monetary penalties.
### Table C.1
RCRA Enforcement Summary Statistics. This table contains summary statistics for the RCRA related inspections and enforcement actions reported for the facilities whose data from TRI is used in the paper’s main analyses. Probabilities in this table are given at a yearly basis - e.g. probably of being assessed a fine for RCRA violations by a given facility in a given year. The standard deviation of fine amounts is calculated over all facilities in a given group, rather than any kind of intra-firm metric as for the summary statistics for the Compustat data.

<table>
<thead>
<tr>
<th></th>
<th>All Firms</th>
<th>All 7th Cir</th>
<th>7th Cir Local</th>
<th>7th Cir Local - 95%</th>
<th>7th Cir Local - 70%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Firms</td>
<td>1,564</td>
<td>263</td>
<td>55</td>
<td>86</td>
<td>140</td>
</tr>
<tr>
<td>Number of Facilities</td>
<td>3,788</td>
<td>389</td>
<td>61</td>
<td>98</td>
<td>167</td>
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<tr>
<td>Number of Inspections</td>
<td>12,793</td>
<td>1,156</td>
<td>155</td>
<td>262</td>
<td>495</td>
</tr>
<tr>
<td>Inspection Probability</td>
<td>30.7%</td>
<td>27%</td>
<td>25.2%</td>
<td>24.8%</td>
<td>27.6%</td>
</tr>
<tr>
<td>Number of Fines</td>
<td>724</td>
<td>59</td>
<td>12</td>
<td>17</td>
<td>30</td>
</tr>
<tr>
<td>Fine Probability</td>
<td>1.7%</td>
<td>1.4%</td>
<td>1.9%</td>
<td>1.6%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Median Fine Amount</td>
<td>15,422</td>
<td>10,200</td>
<td>15,200</td>
<td>12,960</td>
<td>12,082</td>
</tr>
<tr>
<td>SD Fine Amount</td>
<td>325,385</td>
<td>1,002,425</td>
<td>36,715</td>
<td>32,820</td>
<td>1,401,989</td>
</tr>
<tr>
<td>Unique Firms with Fines</td>
<td>301</td>
<td>40</td>
<td>11</td>
<td>14</td>
<td>25</td>
</tr>
<tr>
<td>Total Fine Amount</td>
<td>54,589,813</td>
<td>9,551,307</td>
<td>394,078</td>
<td>455,232</td>
<td>8,359,057</td>
</tr>
<tr>
<td>Number of Violations</td>
<td>5,696</td>
<td>492</td>
<td>84</td>
<td>129</td>
<td>235</td>
</tr>
<tr>
<td>Violation Probability</td>
<td>13.7%</td>
<td>11.5%</td>
<td>13.6%</td>
<td>12.2%</td>
<td>13.1%</td>
</tr>
<tr>
<td>Unique Firms with Violations</td>
<td>976</td>
<td>157</td>
<td>34</td>
<td>53</td>
<td>88</td>
</tr>
<tr>
<td>Number of Formal Violations</td>
<td>2,175</td>
<td>225</td>
<td>44</td>
<td>61</td>
<td>110</td>
</tr>
<tr>
<td>Formal Violation Probability</td>
<td>5.2%</td>
<td>5.3%</td>
<td>7.1%</td>
<td>5.8%</td>
<td>6.1%</td>
</tr>
<tr>
<td>Unique Firms with Formal Violations</td>
<td>539</td>
<td>96</td>
<td>25</td>
<td>35</td>
<td>58</td>
</tr>
</tbody>
</table>