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Caveat emptor as an obstacle to business transfers: Effect of product line liability exceptions on acquisitions, entry, and exit

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Abstract

Research Summary: Being able to sell a business not only allows a firm to exit an industry but is also a motivation for entrepreneurial entry. Therefore, factors that make acquisitions less desirable for potential acquirers could not only affect the rate of acquisitions, but also entry and exit. We test this in the context of judicial adoptions of product line exceptions, which increased acquirer exposure to potential accumulated liabilities. We find that after adoption, and relative to nonmanufacturing establishments, acquisitions of manufacturing establishments decrease, while exits through closure increase. Relative entry of manufacturing establishments declines. These effects are higher in industries where resalability of physical capital is lower and for smaller entrants. Interestingly, while the likelihood of acquisitions declines for older establishments, it increases for younger ones.

Managerial Summary: Making it harder to sell a business not only hinders business transfers but also affects business entry and exit. This is because entrepreneurs and businesses often exit by selling to other firms, not just through closures. Based on comprehensive data on

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US establishments, we provide evidence supporting this thesis. We find that after judicial adoption of a legal principle that holds acquirers accountable for the acquired firm's product line liabilities, the probability of manufacturing establishments (which are more likely to have such liabilities) being acquired decreases more than that of other establishments. Simultaneously, closures as a form of exit increase, and the relative entry of manufacturing establishments declines. These findings underscore the strategic importance of acquisition-driven exits for businesses and entrepreneurs.

KEYWORDS

acquisitions, business closures, entry, product liability, successor liability

1 | INTRODUCTION

Recent studies in the strategic management and adjacent literatures have highlighted the importance of exit through acquisitions (Catalini et al., 2019; Furr & Kapoor, 2018; Moeen & Agarwal, 2017) and how such exits offer a way for entrepreneurs to capture value (Arora et al., 2001; Moeen & Agarwal, 2017; Spulber, 2013). A largely separate but rich literature has studied barriers that impede the transfer of businesses from one firm to another through acquisitions (e.g., Chen et al., 2018; Chondrakis et al., 2021; Coff, 1999; Conti et al., 2021; Cuypers et al., 2015; Cuypers et al., 2017; Mahoney & Qian, 2013; Martin & Shalev, 2017; Shen & Reuer, 2005). Together, these studies suggest that obstacles that impede business transfers may affect business exit and, by induction, business entry. However, whether obstacles to business transfers affect the important strategic choices of entry and exit remains understudied.

We focus on this understudied aspect and examine how, when, and where business entry and exit are affected if an obstacle is imposed on interfirm business transfers. We do so by studying the adoption of the product line exception (PLE) to the successor non-liability doctrine by some US state supreme courts. The PLE makes buyers who continue the seller's product line responsible for any liabilities accumulated by the seller, in contrast to traditional corporate law principles that generally do not place responsibility for such liabilities on the buyer. This shift creates an obstacle to acquisitions in two broad ways. First, it reallocates the cost of potential product liabilities from the end consumers to the buyer, thus "internalizing" what was previously external to the buyer and seller. Second, since such liabilities can be hard to observe or predict, adopting the PLE also exacerbates underlying frictions related to information asymmetry and uncertainty. Together, these reduce the total surplus available to the buyer and seller from the transaction, thus making many previously mutually beneficial trades no longer so under the PLE. This surplus-reducing effect is like the effect of previously studied barriers, such as information asymmetry frictions that impose due diligence costs on the transacting parties (Reuer & Sakhartov, 2021), or other barriers such as capital gains tax on acquisitions (Todtenhaupt et al., 2020) and difficulties related to physical or cultural distance that require extra costs to mitigate (Erel et al., 2012).

We use comprehensive US Census Bureau data on about 150 million establishment-year observations from 1976 to 2014 for our study. We use a difference-in-difference-in-difference (DDD) approach with state fixed effects to control for omitted state-level variables that may be correlated with adoption of the PLE. In particular, we compare the changes in outcomes in states that adopted the PLE (California, Mississippi, New Jersey, New Mexico, Pennsylvania, and Washington) with the corresponding changes in other states. Such an inter-state comparison rules out the confounding effects of industry- and year-specific factors that affect all states. Also, because these adoptions arise from court decisions (rather than legislative action), we can consider them to be plausibly exogenous, mitigating concerns of dynamic bias. Further, because the PLE is salient in manufacturing, we compare the effects for manufacturing firms with firms in other sectors that serve as controls. This helps rule out bias from time-varying state-level omitted factors that affect firm outcomes in all sectors similarly within a state.

We find that after adoption of the PLE, on average, the probability of a manufacturing establishment being acquired decreases relative to nonmanufacturing establishments. Concomitantly, exits through closure increase and establishment entry decreases. Further analysis shows that these effects are larger in industries where it is harder to redeploy capital, consistent with the ability to sell the business as a whole (rather than as individual assets) being a relatively more important component of firm value in these industries. We also find that these effects appear to be larger for smaller entrants, consistent with their lower ability to reduce liability exposure for potential buyers. Further, consistent with the extent of liabilities only becoming apparent over time, we find a difference over the life cycle with regard to exit via a business transfer. Specifically, older manufacturing establishments are less likely to be acquired after adoption of the PLE (in line with the average effect), but younger manufacturing establishments (which likely have lower risk of having accumulated liabilities) are *more* likely to be acquired.

Our study makes three contributions. First, we show that imposing an obstacle to business transfers has consequences not only for business transfers but also for business entry and exit. Our findings suggest that this happens because the value from being able to transfer businesses is distinct from the value arising from a firm's own resources and capabilities (as considered in discounted cash flow models of firm value and in models such as Jovanovic, 1982, and Lippman & Rumelt, 1982). In this regard, we further contribute by presenting an integrated treatment of exit through business sale and exit via business closure as substitutes from a seller's perspective. More broadly, these findings also speak to recent concerns expressed by venture capital firms that antitrust restrictions on acquisitions by big tech firms could inhibit startup entry (Feiner, 2021). Second, we add to studies that have examined how the propensity for acquisitions varies over the life cycle (Ransbotham & Mitra, 2010; Shen & Reuer, 2005). We do so by highlighting that such a variation may also arise from the possibility of liability accumulation, an aspect that has not received much attention. Finally, our paper also extends studies that have found links between product liability risk and innovation (e.g., Galasso & Luo, 2018; Viscusi & Moore, 1993) by providing indirect evidence that such liabilities can also affect entry and exit through the process of interfirm business transfers.

2 | THE PRODUCT LINE EXCEPTION TO SUCCESSOR LIABILITY

Before we delve into the institutional details of the PLE, we briefly discuss two examples that offer anecdotal evidence on the salience of product liability-related concerns in the

United States. In a recent case, Bayer experienced a 46.6% decline in its market value 1 year after acquiring Monsanto, following losses in courts related to the Roundup herbicide produced by Monsanto (Bender, 2019). This example also highlights the significant uncertainty associated with assessing a target's product liabilities, with analysts' estimates of such costs varying from $5.5 billion to $27.5 billion (Bender, 2019) and Bayer announcing a settlement of $10 billion (Cohen, 2020). The second example pertains to the acquisition of Engelhard Corp., a chemical manufacturer, by BASF. Although the acquisition was completed in 2006, new information emerged in 2009 that Engelhard had hidden evidence for several decades about the presence of asbestos in its industrial talc, which led to numerous lawsuits against BASF (Voreacos & Feeley, 2015). This example not only highlights the uncertainty and information asymmetry that even large, sophisticated buyers (like BASF) may face with regard to product liabilities, but also "shows how liabilities may emerge long after acquisition" (Voreacos & Feeley, 2015). While these examples pertain to larger firms, product liability-related lawsuits also affect smaller firms. Indeed, the cases that resulted in the adoption of the PLE being studied here mostly relate to small or medium-sized firms (see Online Appendix Table A1.1 for details).

Turning to the institutional details of the PLE, traditional corporate law principles hold that the acquirer of business assets is not liable for injuries caused by defective products manufactured by the seller. With respect to this, the US Supreme Court declared over 120 years ago, "this doctrine is so familiar that it is surprising that any other can be supposed to exist" (see Fletcher & Jones, 1931 and Matheson, 2011). The rationale behind this general rule is that successors (i.e., acquirers) did not produce, market, or sell the goods and hence should not be responsible for any damages or injuries caused by the products. To this general rule, there are four widely accepted exceptions.[1] Since the late 1970s, courts in several states have expanded these four traditional exceptions by adopting the PLE. Under the PLE, a successor continuing to market a product line previously sold by the predecessor would be liable for tort-based product defect claims (for instance, personal injury) arising from products and services related to that product line sold by the seller before the acquisition.[2] In 1977, California became the first state whose state supreme court adopted this new exception, reasoning "the virtual destruction of the plaintiff's remedies against the original manufacturer [were] caused by the successor's acquisition of the business" (p. 783, Kuney, 2017). California was joined later by five more states: Mississippi (2001), New Jersey (1981), New Mexico (1997), Pennsylvania (1981), and Washington (1984). Table 1 and Online Appendix Table A1.1 provide further details.

While adopting courts have stated that the PLE's purpose was to provide incentives for firms to produce safer products and to provide recourse to victims of defective products, the PLE has been opposed by other courts and experts due to concerns related to effects on business activities. For example, the Florida Supreme Court rejected the expansion of traditional exceptions in *Bernard v. Kee Mfg. Co.*, saying that this could lead to the "economic annihilation [of] small

[1]These are: (1) the transaction is a fraudulent effort to avoid liabilities of the predecessor, (2) the successor expressly or impliedly assumes the obligations of the predecessor, (3) the transaction is a de facto merger, or (4) the successor is a mere continuation of the predecessor (see Matheson, 2011 and Zager & Johnson, 2005). Online Appendix Table A1.2 provides more details and relevant case citations, based on Kuney (2017).

[2]Note that consumers can always sue a firm for damages pertaining to a business that it sold off, if the seller continues to operate after the transaction and even if it is not in that business anymore (e.g., *Arevalo v. Saginaw Mach. Systems, Inc.*, 344 N.J. Super. 490, 504 (App. Div. 2001) states "[the] product line exception...does not operate to shield [defendant] from strict liability in tort imposed by other well settled principles of law"). Also, a firm cannot nominally change ownership just to get rid of product liabilities. That would be covered by the exceptions listed in the previous footnote.

TABLE 1 Judicial adoptions of product line exceptions by state.

State	Year	Case
California	1977	*Ray v. Alad Corp.*, 560 P.2d 3, 10 (Cal. 1977)
Mississippi	2001	*Huff v. Shopsmith, Inc.*, 786 So. 2d 383, 388 (Miss. 2001)
New Jersey	1981	*Ramirez v. Amsted Indus., Inc.*, 431A.2d 811
New Mexico	1997	*Garcia v. Coe Mfg. Co.*, 933 P.2d 243, 248–50
Pennsylvania	1981	*Dawejko v. Jorgensen Steel Co.*, 434 A.2d 106
Washington	1984	*Martin v. Abbott Labs.*, 689 P.2d 368

Note: This table is constructed from information in Kuney (2017).

businesses," forcing them to liquidate rather than transfer ownership. The Wisconsin Supreme Court in *Fish v. Amsted Indus., Inc.* and Epstein (2002) voiced similar concerns. With strong arguments on both sides, it is not clear ex ante that the law would always be settled in favor of or against the PLE, which bolsters the plausible exogeneity of judgments regarding the PLE.[3]

3 | THEORETICAL FRAMEWORK

We develop our hypotheses based on a simple theoretical framework that takes the perspective of a potential seller firm operating a business and examines the impact of an obstacle to business transfer on its strategic choices of selling, closure, and entry. We begin by presenting how the ability to exit through selling offers additional value to the seller beyond the value created through its own resources and capabilities, and then describe the impact of the PLE. A formal model broadly based on these arguments is presented in the Online Appendix A2. Note that our focus is on the effect of the PLE on the strategic choices made by potential entrants, acquirers, and sellers; we are agnostic about its welfare implications, as they would depend on factors not studied here, for example, whether market concentration increases or diminish, and costs and benefits of product safety.

3.1 | Value from being able to sell

In standard discounted cash flow models, the value of a business is the discounted sum of its future profits, typically from operating the business with its own resources and capabilities.

[3]A possible complication involves firms present in multiple states. Determining choice of law in such cases is a complex, case-specific exercise, but courts often apply the "most significant relationship test" to determine jurisdiction. Factors considered include where the injury occurred, where the conduct causing the injury occurred, place of incorporation, and place of business of the parties. In theory, this test could allow consumers in non-PLE states to sue businesses based in PLE states or consumers in PLE states to sue businesses in non-PLE states under the PLE. However, most past rulings appear to dissuade forum shopping to take advantage of the PLE (Matheson, 2011; Sclar, 2020). Later, we present robustness checks limited to single-state firms.

However, the firm can do better if it can potentially sell the business to a buyer with "more synergistic capabilities." Here, "more synergistic capabilities" refers to the buyer's greater ability (relative to the seller) to utilize the selling firm's resources and capabilities to generate economic value. This surplus comes from factors studied in the literature on acquisitions, such as the buyer's capabilities (e.g., Berchicci et al., 2012; Capron & Mitchell, 2009; Kaul & Wu, 2016), operational synergies and complementarities (e.g., Grimpe & Hussinger, 2014; Kim & Finkelstein, 2009; Makri et al., 2010; Rabier, 2017), and proximity (e.g., Baum et al., 2000; Chakrabarti & Mitchell, 2016; Chen et al., 2018). Some of this surplus created by transferring ownership is captured by the seller. While the exact division of surplus is a function of the bargaining process between the buyer and seller, a common finding is that the seller captures most of the value in acquisitions (Andrade et al., 2001). Hence, the possibility of selling a business to a buyer with more synergistic capabilities offers additional value to the seller beyond the value created through its own resources and capabilities. By affecting this channel of additional value creation, the PLE influences not only business transfers, but also entry and exit. We explain below.

3.2 | Impact of the PLE

Expanding on the two modes of exit considered in Furr and Kapoor (2018), consider a firm that at any point in time after entry faces three options, each with its own value: continue operating using its own resources and capabilities with a possibility of selling the business in the future, exit by selling the business to a buyer, or exit by closing the business through piecemeal sale of individual assets. To examine the impact of the PLE, we analyze what may happen at the three corresponding "margins"—sell-close (where firms are indifferent between selling and closing), sell-continue (where firms are indifferent between selling and continuing), and close-continue (where firms are indifferent between closing and continuing).

For a business with potential—and possibly unforeseen—product liabilities, the PLE (or more broadly, any barrier to acquisitions) reduces the value that sellers can get from selling their business because it makes buying the business less attractive to potential buyers. As alluded to in the Introduction, this can happen in two broad ways. First, adopting the PLE reallocates the cost of potential liabilities, which was previously borne by the consumer (who is not a party to the business transfer transaction), to the acquirer. This, in turn, reduces the surplus from the transaction for sellers that have (or will eventually have) product liabilities. Second, because these costs are often unobservable and uncertain (as in the Bayer and BASF examples discussed earlier), the buyer will face additional costs such as evaluating the liabilities (e.g., additional due diligence) and purchasing insurance. Moreover, the potential for liabilities will make it harder for firms to hedge such risks through insurance, as insurers will find it hard to price unknowable claims and then must either charge very high prices or offer policies that do not fully cover the costs (Thune, 2018). In both cases, the surplus available to the buyer and seller from the transaction declines. Thus, the value from selling is likely to fall after PLE adoption.

As a result, firms near the sell-close margin that had previously found selling marginally preferable to closing will now choose not to sell because the value from selling today declines (relative to the value from closing, which stays unchanged). However, for firms on the sell-continue margin, a reduction in the value of selling does *not* automatically imply a reduction in the extent of acquisitions. That is because, as discussed in the previous subsection, the

possibility of selling in the future is one component of the value of continuing, and hence a reduction in the value of selling due to the PLE (or more broadly, obstacles to acquisitions) also reduces the value of continuing. Thus, the net effect of impeding business transfers on the decision to sell or continue is ambiguous and depends on the relative magnitudes of these reductions in the values of selling and continuing. In this regard, the decline in the current value from selling will generally be more than the decline in the expected value from continuing because the likelihood of a future sale is not certain.[4]

So, we hypothesize:

> **Hypothesis 1.** On average, when a state adopts the PLE, the probability of acquisitions decreases in that state.

Sellers have two main ways to exit a business: close the business by disposing of its assets or sell the business as a continuing operation to a potential buyer (e.g., Furr & Kapoor, 2018; Maksimovic et al., 2011). As discussed earlier, the PLE leads to a reduction in the value from selling the business, which makes closing more optimal for sellers that were previously on the sell-close margin (since the value from closing remains unaffected by the PLE). Moreover, as discussed earlier, the PLE also reduces the value from continuing since some of the value from continuing comes from the possibility of selling the business in the future. In contrast, the value from closing is unaffected by the PLE, which makes closing a better option also for businesses that were previously on the close-continue margin. Consequently, we have:

> **Hypothesis 2.** When a state adopts the PLE, the probability of closures increases in that state.

The above arguments can be extended, via backward induction, to the entry decision. Broadly, firms enter a business if the expected value from entering exceeds the cost of entry. Since part of the expected value comes from being able to sell the business sometime after entry, which is lowered when the PLE is adopted (or more broadly, when acquisitions are hindered), the PLE also lowers the expected value from entering. Thus, we have:

> **Hypothesis 3.** When a state adopts the PLE, rates of entry decline in that state.

4 | DATA AND EMPIRICS

We test our hypotheses using establishment-level data from the US Census Bureau's Longitudinal Business Database (LBD) over 1976–2014. The LBD contains annual information on industry, location, employment, and parent firm affiliation (Jarmin & Miranda, 2002). We perform our empirical analysis primarily at the establishment level because acquisitions and sales can be identified in the LBD at that level and because it allows for more robust control of industry and geography effects. We present some state-level and firm-level analyses later.

In line with our hypotheses, we define two main dependent variables related to exit at the establishment level. We define an establishment as being acquired (*Acquired*) when the firm

[4]Such logic holds as long as the PLE-related costs do not increase too rapidly in the future (and cause a larger decline in the future value from selling).

identifier of an establishment in the current year is different from that in the preceding year. We define an establishment closure dummy (*Closed*) in a given year as 1 when the establishment identifier exists in the current year but does not appear in any future year, and 0 otherwise. Since we need information from the preceding year and subsequent years, we do not define these variables for the first and last years, 1976 and 2014, respectively. Finally, to focus our analysis on the more economically relevant firms and to keep the computational demands reasonable, in establishment-level analyses, we exclude very small firms that always have fewer than five employees. We include all firms in our analysis of (industry-state-year level) aggregate entry.

We test our establishment-level hypotheses (Hypotheses 1 and 2) using a difference-in-difference-in-difference (DDD) specification that compares establishments in manufacturing with those in other sectors. Our rationale is that doing so eliminates the effect of any unobserved factors that may affect all businesses in a state at the same time as the PLE adoption (e.g., the emergence of a more consumer-friendly government that also pushed judges to adopt the PLE at the same time). In contrast, the PLE applies only in the context of defective products, and hence, manufacturing establishments are significantly more likely to be affected than non-manufacturing establishments. Specifically, we use:

$$Y_{eikt} = \alpha_e + \gamma_{it} + \beta_1 * PLE_{k,t-1} + \beta_2 * PLE_{k,t-1} * MFG_{ek,t-1} + \delta * X_{ek,t-1} + \mu * S_{k,t-1} + \varepsilon_{eikt} \quad (1)$$

where e indexes establishments, k state, t years, i industry; Y_{eikt} is the dependent variable of interest (acquisition and closure of an establishment); α_e and γ_{it} are establishment and industry by year fixed effects; X_{ekt-1} are 1-year-lagged establishment-level control variables, the log of total establishment employment and average wage (total establishment payroll divided by total establishment employment); and $S_{k,t-1}$ are 1-year-lagged state-year-level control variables, log population, log GDP, and average corporate tax rate. $PLE_{k,t-1}$ is a dummy variable that equals 1 if the PLE has been adopted by year *t-1* in state k; *MFG* is a dummy variable for establishments in NAICS 31, 32, or 33; and ε_{eikt} is the error term (the direct term $MFG_{ek,t-1}$ is absorbed by the industry-year effects.). Thus, the coefficient β_1 reflects the change in the probability of acquisition (or closure) of a nonmanufacturing establishment after the PLE was adopted, relative to nonmanufacturing establishments in states that did not adopt the PLE. Then, the coefficient β_2 represents the additional change for manufacturing establishments over the corresponding change for nonmanufacturing ones. Note that Equation (1) fully controls for stable differences between treated and non-treated establishments via establishment fixed effects, while the industry by year fixed effects control for aggregate time-varying fluctuations within industries. Throughout, we cluster standard errors by state.

To evaluate the impact of the PLE on entry (Hypothesis 3), we compute the entry rate by dividing the number of new establishments for each state-industry-year cell by the total number of establishments for that cell in the previous period. We use a specification similar to Equation (1), but at the state-industry-year level, with the entry rate as the dependent variable. Besides entry rate, we also use log of the total number of new establishments as another dependent variable. In these specifications, we use state and industry by year fixed effects to control for time-invariant differences among states and different industry trends.

A recent literature on DID estimations has noted potential bias in two-way fixed effects analysis of staggered "treatments" (e.g., Baker et al., 2022; Callaway & Sant'Anna, 2021; Goodman-Bacon, 2021). In our context, our estimates of the effect of PLE implicitly include comparisons of states that adopted the PLE not only to states that never adopt the PLE, but also to states that adopted the PLE earlier (as well as to states that adopt the PLE later). As these

studies have shown, such comparison can lead to biased estimates if the effects of the "treatment" are time varying and heterogeneous.

To address this concern, in addition to the baseline specifications discussed earlier, we include estimates from a stacked DID approach (Cengiz et al., 2019; Deshpande & Li, 2019) suggested in the literature (e.g., Baker et al., 2022).[5] Specifically, for each regression, we followed a four-step procedure: (i) we separate the six adopting states to five groups based on the adoption year; (ii) for each of the five treatment-year groups, we append duplicate observations of all of the observations from states that never adopted the PLE to form treatment year–specific panel datasets; (iii) we stack these five datasets into one combined dataset; and (iv) we then estimate the original regressions, except that all of the fixed effects (establishment, firm, state, year, or industry-year) are interacted with the dummies for each of the five datasets in the stack. This ensures that the estimated effect is a weighted average of the DID comparison of each adopter state with states that never adopted the PLE. We follow the suggested approach in Wing et al. (2021) for stacked DID and cluster standard errors by state. Given our sample size, this approach was not computationally feasible for the large samples (>100 million observations), and in such cases, only the baseline estimates are provided.

It is worth noting that in our context, the number of never-treated states in our analysis (44) significantly exceed the number of ever-treated states (6), so that our baseline results are unlikely to be significantly influenced by the inappropriate comparisons identified by Goodman-Bacon (2021) (i.e., between treated and previously treated states).

5 | RESULTS

5.1 | Descriptive statistics

Table 2 provides the descriptive statistics on acquisitions and closures for the various samples. For states with the PLE, we show the rates of acquisition and closure for periods before and after adoption of the PLE. We show these rates for states without the PLE in the last column. Panel a shows the statistics at the establishment level. Overall, we have about 36 million establishment-years in states with the PLE, with about 3.2 million of them in the period before adoption of the PLE. We have about 114 million observations in states without the PLE.

Comparing the means before and after the PLE is adopted (the "difference" column), acquisitions and closures increase in the overall sample (by about 0.21 percentage points and 0.42 percentage points, respectively) as well as in the nonmanufacturing samples after PLE adoption. In contrast, acquisitions decline by about 0.16 percentage points in manufacturing after PLE adoption. Closure increases much more in the manufacturing sample than in the nonmanufacturing one (0.55 vs. 0.40 percentage points). Closures for both young and old establishments increase, and the increase is higher for young establishments. Consistent with a dampening effect of the PLE on manufacturing acquisitions, there is a strong decline in the probability of being acquired for manufacturing establishments following PLE adoption. This decline is driven entirely by old establishments; consistent with our theoretical arguments presented in the Online Appendix, young manufacturing establishments show an increase in the probability of being acquired after PLE adoption. At the firm level (Panel b), exit increases after

[5]An alternative approach proposed by Callaway and Sant'Anna (2021) does not allow for time-varying covariates, and did not converge for the large samples when using *csdid* STATA code.

TABLE 2 Descriptive statistics: Mean acquisition and closure by sample.

	States with PLE			States without PLE
	Pre-change mean (SD)	Post-change mean (SD)	Difference (SE)	Mean (SD)
Panel a: Establishment-level samples				
Overall	(N = 3,189,000)	(N = 32,820,000)		(N = 114,100,000)
Acquired (Dummy × 100)	1.62 (12.61)	1.83 (13.39)	0.21 (0.08)	1.74 (13.09)
Closed (Dummy × 100)	6.19 (24.10)	6.61 (24.85)	0.42 (0.01)	6.21 (24.14)
Manufacturing sample	(N = 261,000)	(N = 2,259,000)		(N = 7,137,000)
Acquired (Dummy × 100)	1.98 (13.94)	1.82 (13.37)	−0.16 (0.03)	1.91 (13.68)
Closed (Dummy × 100)	6.02 (23.79)	6.57 (24.77)	0.55 (0.05)	5.69 (23.16)
Nonmanufacturing sample	(N = 2,928,000)	(N = 30,560,000)		(N = 107,000,000)
Acquired (Dummy × 100)	1.59 (12.49)	1.83 (13.39)	0.24 (0.01)	1.73 (13.05)
Closed (Dummy × 100)	6.21 (24.13)	6.61 (24.85)	0.40 (0.02)	6.25 (24.20)
Young manufacturing sample	(N = 174,000)	(N = 587,000)		(N = 2,000,000)
Acquired (Dummy × 100)	1.92 (13.71)	2.03 (14.10)	0.11 (0.04)	2.05 (14.18)
Closed (Dummy × 100)	6.18 (24.08)	9.66 (29.55)	3.48 (0.08)	7.81 (26.84)
Old manufacturing sample	(N = 73,000)	(N = 1,596,000)		(N = 4,794,000)
Acquired (Dummy × 100)	2.09 (14.31)	1.71 (12.97)	−0.38 (0.05)	1.84 (13.43)
Closed (Dummy × 100)	5.33 (22.47)	5.47 (22.74)	0.14 (0.09)	4.85 (21.48)
Panel b: Firm-level samples				
Overall	(N = 1,867,000)	(N = 22,740,000)		(N = 82,680,000)
Exit (Dummy × 100)	6.14 (24.01)	6.70 (25.00)	0.56 (0.02)	6.32 (24.33)
Employment growth (%)	−0.03 (50.60)	−2.30 (50.76)	−2.27 (0.04)	−1.63 (48.46)
Manufacturing sample	(N = 155,000)	(N = 1,864,000)		(N = 5,797,000)
Exit (Dummy × 100)	6.20 (24.11)	7.10 (25.68)	0.90 (0.07)	6.25 (24.21)
Employment growth (%)	1.34 (46.27)	−1.80 (45.92)	−3.14 (0.12)	−1.11 (43.62)
Nonmanufacturing sample	(N = 1,712,000)	(N = 20,880,000)		(N = 76,890,000)
Exit (Dummy × 100)	6.14 (24.00)	6.66 (24.94)	0.52 (0.02)	6.32 (24.34)

TABLE 2 (Continued)

	States with PLE			States without PLE
	Pre-change mean (SD)	Post-change mean (SD)	Difference (SE)	Mean (SD)
Employment growth (%)	−0.15 (50.97)	−2.34 (51.17)	−2.19 (0.04)	−1.67 (48.81)

Note: Standard deviations are shown in parentheses for each sample and variable for columns 1, 2, and 4. For column 3 (*Post-change mean–Pre-change mean*), the numbers in the bracket show the standard error of the mean difference before and after PLE adoption. Throughout, the number of observations is rounded to meet US Census Bureau disclosure requirements.

PLE adoption, more so for manufacturing than for nonmanufacturing firms. Employment growth also declines, and more so, for manufacturing firms. Thus, these raw data patterns are consistent with our theoretical arguments.

5.2 | Tests of hypotheses

We present the results of formally testing Hypotheses 1 and 2, both with and without controls, in Table 3. Across all industries, the effect of PLE adoption on the probability of being acquired is negative but very small (columns 1 and 2). The effect on the probability of closure is positive, but noisy (columns 5 and 6). Focusing on our preferred triple-difference specifications (columns 3 and 4), the coefficient on *PLE* × *Manufacturing* shows that the probability of being acquired for manufacturing establishments decreases by about 0.19–0.20 percentage points after PLE adoption relative to the acquisition probability of nonmanufacturing establishments, which is about 9.4–10.0% of the mean probability of acquisitions. Further, PLE adoption raises the probability of closure of manufacturing establishments by about 0.38–0.39 percentage points (columns 7 and 8), or about 6.4% of the mean level in the treatment group before the adoption. These results strongly support Hypotheses 1 and 2 and show that while acquisitions declined after the PLE was adopted, closures increased, especially in manufacturing.

Turning to the effect on entry (Hypothesis 3), columns 1 and 2 in Table 4 show results based on entry rate, while columns 3 and 4 present results using log number of new establishments as the dependent variable. Column 1 shows that the entry rate of manufacturing establishments decreases by 2.94 percentage points, that is, about 21.2% of the mean level in the adopting states before adoption of the PLE. Estimates in column 2 that include all controls are similar. The results using log number of new establishments show a similar pattern. Using a stacked DID approach yields very similar estimates (columns 5–8) as the baseline specifications. Thus, our results strongly support Hypothesis 3 and suggest that entry falls significantly (in manufacturing) after adoption of the PLE.

Having established that adopting the PLE deters business acquisitions and entry and increases exit, we now examine if there are systematic variations in these effects.

5.3 | Heterogeneity in PLE effects

5.3.1 | Heterogeneity across industries

The PLE doctrine only imposes additional costs for buyers who continue the main product line of the predecessor after the purchase. This suggests that contexts where the seller's resources

TABLE 3 Impact of the product line exception on establishment acquisitions and closures (all-industry sample).

Baseline DID	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dep: Acquired dummy				Dep: Closed dummy			
Product line exception (PLE)	0.017 (0.036)	−0.033 (0.061)	0.035 (0.036)	−0.017 (0.06)	0.005 (0.327)	0.271 (0.158)	−0.029 (0.329)	0.237 (0.151)
PLE × manufacturing			−0.199 (0.042)	−0.186 (0.035)			0.383 (0.186)	0.388 (0.171)
Log (employment)		0.532 (0.026)		0.532 (0.026)		−2.393 (0.06)		−2.393 (0.06)
Log (average wage)		0.784 (0.082)		0.784 (0.082)		−1.579 (0.152)		−1.579 (0.152)
Log (state GDP)		−0.153 (0.141)		−0.152 (0.141)		−3.025 (0.551)		−3.026 (0.551)
Log (state population)		0.121 (0.231)		0.120 (0.231)		10.04 (1.225)		10.04 (1.225)
State corporate tax rate		0.007 (0.01)		0.007 (0.01)		−0.037 (0.03)		−0.037 (0.03)
Adjusted R^2	.054	.055	.054	.055	.115	.119	.115	.119
EST FE	YES	YES	YES	YES	YES	YES	YES	YES
IND by YEAR FE	YES	YES	YES	YES	YES	YES	YES	YES
N	150,100,000	150,100,000	150,100,000	150,100,000	150,100,000	150,100,000	150,100,000	150,100,000

Note: Standard errors clustered by state are in parentheses. Number of observations is rounded to meet US Census Bureau disclosure requirements.

TABLE 4 Impact of the product line exception on entry (all-industry sample).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Baseline DID				**Stacked DID**			
	Dep: Entry rate		**Dep: Log (Number of entrants)**		**Dep: Entry rate**		**Dep: Log (Number of entrants)**	
PLE	0.535 (0.966)	0.484 (0.745)	0.007 (0.037)	0.001 (0.028)	0.559 (0.986)	0.509 (0.778)	0.003 (0.038)	−0.005 (0.029)
PLE × manufacturing	−2.939 (0.942)	−2.956 (0.938)	−0.152 (0.064)	−0.151 (0.064)	−2.845 (0.992)	−2.861 (0.988)	−0.149 (0.066)	−0.148 (0.066)
Log (state GDP)		4.808 (0.966)		0.323 (0.033)		4.745 (1.021)		0.325 (0.033)
Log (state population)		−8.600 (1.41)		0.297 (0.066)		−8.207 (1.425)		0.311 (0.062)
State corporate tax rate		−0.027 (0.066)		0.000 (0.004)		−0.01 (0.071)		0.001 (0.004)
Adjusted R^2	.467	.468	.892	.893	.464	.888	.465	.889
STATE FE	YES	YES	YES	YES	YES	YES	YES	YES
IND by YEAR FE	YES	YES	YES	YES	YES	YES	YES	YES
N	454,000	454,000	454,000	454,000	2,041,000	2,041,000	2,041,000	2,041,000

Note: This table is based on a state-industry-year-level sample obtained by aggregating establishment information to that level. Entry rate is winsorized at the 99th percentile. Standard errors clustered at the state level are in parentheses. Number of observations is rounded to meet US Census Bureau disclosure requirements.

are harder for acquirers to redeploy to a different product, either within or outside the seller's industry, would be more strongly affected by the adoption of the PLE. In this regard, papers related to capital reallocation across manufacturing sectors by Ramey and Shapiro (1998, 2001) suggest that relatively more intensive use of physical capital is likely to make such redeployment more difficult. In particular, Ramey and Shapiro (2001) note that "most capital is specialized by industry, so that used capital has greater value inside the industry than outside the industry (p.961)." Lin (1988) draws on these findings for the assumption that shifting capital is harder than shifting labor across sectors. Another exit option that is not affected by the PLE is to sell the physical assets individually, potentially to buyers within the sector.[6] However, such a liquidation strategy is less viable for those sectors where the physical capital is not redeployable (e.g., machinery is costly to disassemble and transport to another location or is specific to the firm's production processes). In sum, these arguments suggest that the effects of the PLE may be higher in contexts where physical capital is harder to redeploy.

In Table 5, we test this conjecture. As a proxy for non-redeployability of physical capital, we define resalability-adjusted capital intensity as capital intensity (measured as the ratio of assets to employment) multiplied by the share of used capital in aggregate industry capital expenditure (obtained from Balasubramanian & Sivadasan, 2009). We limit our sample to manufacturing both because of data availability and because using all sectors would require adding another difference to Equation (1), making it a difficult-to-interpret quadruple-difference specification. Focusing on acquisitions (column 1), the coefficient on the interaction term is negative. Thus, PLE adoption appears to inhibit acquisitions to a greater extent in capital-intensive industries where firms cannot easily liquidate assets. Also in line with the argument, closure increases to a greater extent in such industries (column 2). Finally, the results in columns 3 and 4 show that the decline in entry due to PLE adoption is larger in such industries. Using a stacked DID approach yields similar estimates (columns 5–8) as the baseline specifications. Together, these results suggest that PLE adoption creates a larger obstacle in contexts where there may be greater specificity or lower redeployability of firm resources.

5.3.2 | Heterogeneity by initial firm size

The obstacle posed by the PLE (to selling firms) may be less formidable for larger entrants if they are more capable of writing contracts (or making funding provisions) to reduce liability exposure for potential buyers.[7] Furthermore, being able to exit by selling is likely to be particularly valuable for smaller firms that likely have lower levels of their own resources and capabilities. (The matching theory of Lichtenberg & Siegel, 1987, and Siegel & Simons, 2010, makes a similar argument.) We explore this potential heterogeneity by examining if PLE adoption dissuades smaller entrants more than larger entrants. Specifically, we re-estimate our results pertaining to the number of entrants (column 4 in Table 4) by size class. The results, presented in Table 6, show that entry among smaller entrants indeed falls considerably more than entry among larger entrants, across both the baseline and stacked DID specifications. Thus, inhibiting

[6]We thank a referee for suggesting this line of reasoning that highlights similarity of incentives for entrants and acquirers. Also, note that sellers cannot use asset sales to avoid liabilities since sale of all assets to a single buyer could be seen as a de facto merger.

[7]We thank a reviewer for noting this potential explanation for why larger entrants may be affected less by PLE adoption.

TABLE 5 Inter-industry heterogeneity: impact of the product line exception on establishment acquisitions and closures (manufacturing sample).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Baseline DID				Stacked DID			
	Acquired dummy	Closed dummy	Entry rate	Log (num. of entrants)	Acquired dummy	Closed dummy	Entry rate	Log (num. of entrants)
Product line exception (PLE)	−0.068	0.675	1.037	0.090	−0.098	0.746	1.129	0.085
	(0.086)	(0.350)	(0.827)	(0.045)	(0.079)	(0.395)	(0.853)	(0.045)
PLE × Ind. capital intensity adjusted for resalability	−0.030	0.110	−0.420	−0.083	−0.029	0.107	−0.437	−0.081
	(0.012)	(0.051)	(0.300)	(0.035)	(0.011)	(0.050)	(0.310)	(0.033)
Adjusted R^2	.044	.118	.361	.733	.045	.118	.364	.645
Estab-year controls	YES	YES	NA	NA	YES	YES	NA	NA
State-year controls	YES	YES	YES	YES	YES	YES	YES	YES
EST FE	YES	YES	YES	YES	YES	YES	YES	YES
IND by YEAR FE	YES	YES	YES	YES	YES	YES	YES	YES
N	9,224,000	9,224,000	111,000	111,000	36,400,000	36,400,000	400,000	400,000

Note: Columns 1 and 2 present the baseline DID estimates from establishment-level regressions, while columns 3 and 4 present the baseline DID estimates based on a state-industry-year-level sample, obtained by aggregating establishment information. Columns 5–8 repeat the same regressions using a stacked DID approach. All analyses are limited to manufacturing. Entry rate is winsorized at the 99th percentile. Industry capital intensity is defined as the ratio of assets to employment. "Ind. capital intensity adjusted for resalability" is defined as industry capital intensity multiplied by (1—resalability index), where resalability index is measured as the share of used capital in aggregate industry capital expenditure (Balasubramanian & Sivadasan, 2009). Control variables include log (employment) and log (average wage level) at the establishment level as well as GDP, population, and corporate tax rate at the state level. Standard errors clustered at the state level are in parentheses. Coefficients on controls are not presented. Number of observations is rounded to meet US Census Bureau disclosure requirements.

TABLE 6 Heterogeneity in the effects of the PLE on entry.

Dep: Log (number of entrants)					
Panel a: Baseline DID	**Size class 1 (smallest)**	**Size class 2**	**Size class 3**	**Size class 4**	**Size class 5 (largest)**
Product line exception	0.029 (0.030)	−0.004 (0.021)	−0.021 (0.028)	−0.031 (0.038)	−0.033 (0.032)
Product line exception × manufacturing	−0.301 (0.114)	−0.193 (0.068)	−0.154 (0.076)	−0.091 (0.065)	−0.024 (0.017)
Adjusted R^2	.784	.844	.619	.566	.315
State-year controls	YES	YES	YES	YES	YES
STATE FE	YES	YES	YES	YES	YES
IND by YEAR FE	YES	YES	YES	YES	YES
N	438,000	438,000	438,000	438,000	438,000
Dep: Log (number of entrants)					
Panel b: Stacked DID	**Size class 1 (smallest)**	**Size class 2**	**Size class 3**	**Size class 4**	**Size class 5 (largest)**
Product line exception	0.011 (0.028)	−0.027 (0.023)	−0.016 (0.026)	0.041 (0.045)	0.026 (0.037)
Product line exception × Manufacturing	−0.288 (0.113)	−0.187 (0.069)	−0.149 (0.074)	−0.081 (0.062)	−0.021 (0.016)
Adjusted R^2	.777	.839	.607	.554	.312
State-year controls	YES	YES	YES	YES	YES
STATE FE	YES	YES	YES	YES	YES
IND by YEAR FE	YES	YES	YES	YES	YES
N	1,968,000	1,968,000	1,968,000	1,968,000	1,968,000

Note: The dependent variable in these regressions is the log number of entrants in each size category in each state-industry-year cell. The size classes are defined as 1–5, 6–25, 26–50, 51–500, and 501 employees and above.

business transfers due to the PLE appears to have a disproportionately larger effect on smaller entrants.

This initial size heterogeneity in the effect of the PLE persists after entry (Table 7). The decline in the probability of acquisition is smaller for larger entrants, as seen by the positive coefficient on the PLE–initial size interaction term (columns 1 and 5). Similarly, the increase in the likelihood of closure after PLE adoption is also smaller for larger entrants (columns 3 and 7). Thus, smaller entrants appear to be more affected by the PLE.

5.3.3 | Heterogeneity by firm age

Besides size, age may also accentuate or attenuate concerns around the PLE. Liabilities typically accumulate and manifest over time as any long-term harms associated with the product come into focus (e.g., as slow-developing conditions [like cancer] may take time to emerge and be recognized). Thus, any unknown (to both the buyer and seller) liabilities in older target businesses will likely manifest sooner than in younger businesses. Because buyers will have to incur the cost of such liabilities in a PLE regime, they will tend to discount such businesses more than in a non-PLE regime, which would inhibit the acquisition of older businesses to a greater degree.

TABLE 7 Post-entry heterogeneity in the effects of product line exception (manufacturing sample).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Baseline DID				**Stacked DID**			
	Dep: Acquired dummy		**Dep: Closed dummy**		**Dep: Acquired dummy**		**Dep: Closed dummy**	
Product line exception (PLE)	−1.048 (0.320)	0.249 (0.111)	2.947 (0.4897)	0.998 (0.367)	−1.076 (0.322)	0.259 (0.113)	3.031 (0.543)	1.051 (0.409)
PLE× log (initial employment)	0.315 (0.090)		−0.705 (0.193)		0.313 (0.091)		−0.706 (0.194)	
PLE × old dummy		−0.361 (0.151)		−0.376 (0.443)		−0.406 (0.167)		−0.304 (0.395)
Adjusted R^2	.044	.115	.049	.140	.049	.115	.045	.140
Controls at establishment level	YES	YES	YES	YES	YES	YES	YES	YES
Controls at state level	YES	YES	YES	YES	YES	YES	YES	YES
Fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
N	9,224,000	9,224,000	9,224,000	9,224,000	36,400,000	36,400,000	36,400,000	36,400,000

Note: Control variables include log (employment) and log (average wage level) at the establishment level as well as GDP, population, and corporate tax rate at the state level. All analyses are limited to manufacturing. Old dummy is defined as 1 for establishments that are 5 years or older. Columns 1 and 3 focus on initial size heterogeneity, while columns 2 and 4 on age heterogeneity in PLE effects. Columns 5–8 repeat the same regressions using a stacked DID approach. Standard errors clustered at the state level are in parentheses. Coefficients on controls are not presented. Number of observations is rounded to meet US Census Bureau disclosure requirements.

For instance, potential buyers of older firms may worry about a short-term threat from emergence of related product liability claims, while for buyers of younger companies such potential liabilities are likely to be seen more as a longer-term possibility, and hence discounted more. Further, buyers of younger firms could incorporate additional quality checks, or product or process improvements to reduce potential product liability, to mitigate these longer-term risks. In contrast, if aging ameliorates the potential uncertainty and information asymmetry associated with product liabilities, then the PLE will have a greater dissuasive impact on purchase of younger businesses.

We analyze this in even-numbered columns of Table 7, using a dummy for old establishments (i.e., 5 years or older).[8] The results in columns 2 and 6 show that the probability of being acquired *increases* by about 0.25 percentage points among young manufacturing establishments (the direct term). This is about 13% of the mean level among such establishments before the PLE in states that adopted it. In contrast, older establishments are less likely to be acquired (interaction terms), and in line with the results in Table 3, the probability of their being acquired declines after PLE adoption. Thus, there is a greater decline in acquisition propensity for older establishments relative to younger establishments after PLE adoption. Interestingly, the effect on younger establishments appears to be positive even though the overall effect on acquisitions is negative (Table 2 and Table 3). That is, the adoption of the PLE *increases* the likelihood of younger establishments being acquired. The probability of closure of young establishments increases by about one percentage point after PLE adoption (columns 4 and 8). Furthermore, a simultaneous examination of age and size using a three-way interaction (Online Appendix Table A3.9) indicates that this positive effect on young establishments' acquisition is likely driven by the increased acquisitions of larger young establishments (row 6), which presumably have better resources and capabilities than smaller ones.

5.4 | Impact on overall firm performance

Thus far, our empirical analysis has focused primarily on establishments. However, decisions at the firm level can differ from those at the establishment level. For instance, it is possible that firms can offset the impact on one establishment by making changes at another establishment or by starting a new establishment (e.g., instead of acquiring). To address this, we present some analyses of overall firm performance—specifically, firm entry, firm closure, and firm growth. To do so, we aggregate establishment-level data to the firm level. For multiunit firms, we choose the state and industry in which the firm has the most employment. Firm closure is defined as 1 in a year if the firm identifier disappears in the following year. Firm growth rate from 1 year to the next is calculated as the ratio of the change in employment to the average employment of the 2 years (Davis et al., 1996). We use a specification similar to Equation (1), with firm growth and closure as the dependent variables.

Table 8 presents the results. The PLE increases manufacturing firm closures, with coefficients of about 0.34–0.37 percentage points, or 5.7–6.0% of the mean level in the treatment group before the adoption (Panel a). These results are consistent with those at the establishment level (Table 3). The PLE generally has a negative effect on firm growth. The coefficients are

[8]We choose 5 years as the cutoff as it is commonly used (e.g., Fort et al., 2013). Furthermore, this short time is likely to reduce the probability of significant accumulated liabilities, consistent with the intuition in our theoretical arguments. We consider alternatives in robustness checks.

TABLE 8 Impact of Product Line Exception on Firm Exit, Growth, and Entry.

Panel a	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Baseline DID	**Dep: Firm exit**				**Dep: Firm employment growth rate**			
Product line exception (PLE)	0.098 (0.38)	0.092 (0.392)	0.122 (0.221)	0.117 (0.225)	0.155 (0.802)	0.434 (0.784)	−1.145 (0.714)	−0.999 (0.704)
PLE × manufacturing	0.374 (0.155)	0.352 (0.135)	0.368 (0.153)	0.338 (0.136)	−1.363 (0.29)	−1.207 (0.432)	−0.480 (0.543)	−0.587 (0.491)
Adjusted R^2	.108	.111	.109	.112	.033	.136	.206	.214
Firm-level and state-level controls	NO	NO	YES	YES	NO	NO	YES	YES
FIRM FE	YES	YES	YES	YES	YES	YES	YES	YES
IND by YEAR FE	YES	NO	YES	NO	YES	NO	YES	NO
SIZE by IND by YEAR	NO	YES	NO	YES	NO	YES	NO	YES
N	107,300,000 in all models							

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Baseline DID				**Stacked DID**			
Panel b	**Dep: Entry rate**		**Dep: Log (number of entrants)**		**Dep: Entry rate**		**Dep: Log (number of entrants)**	
Product line exception	0.662 (1.012)	0.602 (0.778)	0.005 (0.04)	−0.001 (0.027)	0.662 (1.035)	0.605 (0.812)	0.0001 (0.041)	−0.007 (0.027)
Product line exception × manufacturing	−4.139 (1.126)	−4.156 (1.122)	−0.147 (0.068)	−0.146 (0.068)	−4.006 (1.195)	−4.021 (1.190)	−0.145 (0.069)	−0.144 (0.070)
Adjusted R^2	.409	.41	.891	.893	.407	.408	.887	.889
St-year-level controls	YES	YES	YES	YES	YES	YES	YES	YES
STATE FE	YES	YES	YES	YES	YES	YES	YES	YES
IND by YEAR FE	YES	YES	YES	YES	YES	YES	YES	YES
N	438,000	438,000	438,000	438,000	1,968,000	1,968,000	1,968,000	1,968,000

Note: Panel a uses establishment-year-level regressions, while Panel b uses aggregated state-industry-year-level regressions. Control variables in Panel a include log (employment) and log (average wage level) at the firm level as well as state GDP, population, and corporate tax rate at the state level. In Panel b, control variables are state GDP, population, and corporate tax rate at the state level. Coefficients on these controls are not presented. Standard errors clustered by state are in parentheses. Number of observations is rounded to meet US Census Bureau disclosure requirements.

always negative but become smaller when more controls are added. Similarly, the magnitude of the effect of the PLE on firm-level entry (Panel b) is negative and slightly larger than the establishment-level entry results. The entry rate of firms decreases by about 4.0–4.2 percentage points after PLE adoption (i.e., about 25% of the mean level in the treatment group), while the results using the log of the total of firm entry are similar but smaller, with a 14–15% decline. Using a stacked DID approach yields similar estimates (columns 5–8 of Panel b) as the baseline specifications.

Taken together, our firm-level results are consistent with the establishment-level results. Importantly, these results suggest that firms are not able to offset the establishment-level effects of the PLE, for instance through increased organic growth or by shutting down manufacturing establishments and starting nonmanufacturing establishments.

5.5 | Robustness checks

5.5.1 | Alternative samples and specifications

A potential concern is that while PLE adoption is state-specific, some firms are present in multiple states. Similarly, firms selling only a part of their business may be affected differently compared with those selling all their operations. While our firm-level analyses mitigate the effects of such concerns, to further assess robustness to these concerns, we replicate our baseline analyses (Table 3) in the Online Appendix, limiting the sample to (i) single-establishment firms (Table A3.1), (ii) single-state firms (Table A3.2), (iii) acquisitions where all establishments of a firm were sold (Table A3.3), and (iv) firms only in states that adopted the PLE (Table A3.4). These results are all similar to our baseline results, and thus rule out these concerns as the main drivers of our results.

In Online Appendix Table A3.5, we confirm robustness to using capital intensity rather than resalability-adjusted capital intensity as a measure of redeployability; in Panel b of the table, we confirm that the results are robust to including interactions of the PLE with measures of R&D and advertising intensity.

Our baseline analyses use a dichotomous measure of age to allow for nonlinearities in the effects. We estimate alternative specifications that use a linear age term and a trichotomous measure of age. The results are consistent with our baseline results. In the linear specification (Table A3.6), the decline in acquisitions due to PLE adoption is greater for older establishments. Similarly, in the trichotomous specification (Table A3.7), acquisitions increase for the youngest establishments and decline for the older ones. Finally, we re-estimated our baseline results by excluding one treated state at a time. The results (not presented) had similar signs and significance, and thus rule out the possibility that results are being driven by a single state.

5.5.2 | Pre-trends and staggered treatment

Another potential concern is that the observed trends were a continuation of previously occurring trends. For instance, if acquisitions were already on the decline in states before PLE adoption and the trend continued, we may mistakenly attribute that decline to the PLE. To rule out this concern, we use a more detailed breakdown of the time periods before and after PLE adoption. The results are presented in Online Appendix Table A3.8, where the time period of more

than 4 years before PLE adoption is set as the omitted category. Compared with this category, the relative probability of acquisition in manufacturing in the 4-year period before PLE adoption was about 0.146 (columns 1 and 2). Thus, acquisitions in manufacturing were actually on an increasing trend before PLE adoption. After PLE adoption, however, the relative probability of acquisition in manufacturing declines to about 0.046 in the 4-year period after adoption and further decreases to about −0.054 after the first 4 years. Similarly, there is no evidence that closures were increasing prior to PLE adoption (columns 3 and 4). In addition, we also present raw data plots by year around PLE adoption (Online Appendix Figures A3.1–3.4). These analyses also suggest that our results are not merely an extension of preexisting trends.

6 | DISCUSSION

6.1 | Obstacles to business transfers and entry and exit

We have presented a theoretical framework that shows how an obstacle related to transfer of business ownership can affect the important strategic choices of acquisitions, entry, and exit. We used a plausibly exogenous source of variation—adoption of the PLE by state courts—along with microdata on US firms and establishments to show that an obstacle to acquisitions can have economically significant effects on business entry and exit.

Based on Table 3, an obstacle to business transfers clearly changes the mode of exit toward closures; acquisitions decline by 0.19 percentage points, while closures increase by 0.39 percentage points among manufacturing establishments relative to nonmanufacturing establishments. Further, combined exits through closures and acquisitions appear to increase (as seen from the sum of −0.19 and 0.39). The results in Table 4 suggest that the corresponding effect on entry was to decrease entry by about 15% (column 4). Thus, on average, impeding the transfer of business ownership appears to deter entry and increase exit, especially through closures.

These results are consistent with our argument that the ability to exit by selling has some value that is independent of a firm's ability to create value through its own capabilities. In line with this, in our post hoc analyses, we find that the effects are larger in industries where it is harder to redeploy capital, and so where the relative importance of the value of being able to sell the business is likely to be higher. In line with the concerns in the policy debates, the PLE indeed has a larger negative impact on the entry and acquisition of small firms, who are less likely to be able to afford the due diligence costs needed to mitigate potential product liabilities. Further, we find that the effect of the PLE is not uniform across the life cycle of the firm. In particular, while we find that old businesses are less likely to be sold, younger ones (which would likely wait to sell in the absence of the PLE) are more likely to be sold after PLE adoption. This suggests that younger targets become relatively more attractive after the PLE so that although the overall likelihood of acquisitions drops due to the PLE, acquirers shift toward younger targets, resulting in this group experiencing an increase in the likelihood of acquisitions.

Together, our findings speak to recent studies that have highlighted the role of exit via acquisitions (Arora et al., 2001; Catalini et al., 2019; Furr & Kapoor, 2018; Moeen & Agarwal, 2017; Spulber, 2013). Indeed, in our data, exit via sales had a 33% employment share of all exits over 2004–2013, with the share being 40% or higher in some years (Online Appendix Table A3.10). Similarly, Feiner (2021) notes that about 10 times as many startups exit through acquisitions as through going public, per the National Venture Capital Association, suggesting that the possibility of exit through acquisitions is an important source of value for startup firms.

Moreover, the likelihood of acquisition for young firms has increased over time in our data, after controlling for state-industry fixed effects. In this regard, our results suggest that impediments to business transfers likely reduce the ability of entrants to capture value by exiting via acquisitions. Thus, our findings are also relevant to recent concerns that restricting acquisitions by big tech firms could inhibit startup entry (Feiner, 2021).

Furthermore, our theoretical arguments and empirical findings also offer a pathway to extend the literature on business transfer frictions, which have been studied in strategic management primarily with respect to their impact on value, scope, and governance (e.g., Cuypers et al., 2017; Mahoney & Qian, 2013; Shen & Reuer, 2005), to entry and exit choices. For one, we are unable to disentangle if the inhibitory effect of the PLE is attributable to the internalization of previously external costs (i.e., reallocation of the liability-related costs from the end consumer to the buyer) or from increased frictions (i.e., the higher uncertainty and information asymmetry associated with the buyer being responsible for the liabilities). A fruitful step for research could be to distinguish the relative influence of each of these two effects. Furthermore, although we have empirically studied a specific obstacle, PLE adoption, our theoretical framework is general and can likely be extended. Specifically, most of our arguments related to the impact on acquisitions, entry, and exit are likely to apply to any frictions or obstacles in the acquisition process that reduce the surplus available to the transacting parties. Examples include taxes on capital gains on sales and acquisitions (Todtenhaupt et al., 2020), and extra due diligence costs (Reuer & Sakhartov, 2021) that could arise in the context of other sources of liability or risk (such as pending intellectual property disputes), all of which reduce the surplus available to the transacting parties. The framework can also be extended to cases where frictions decrease, such as increasing public information on early-stage patents (Chondrakis et al., 2021).

Incidentally, our firm-level results (Table 8) suggest that firms are not able to offset the decrease in growth from acquisitions through increased organic growth, and hence that these two modes may not be perfect substitutes. Future studies can investigate how this effect varies based on previously studied determinants of acquisitions versus internal development (e.g., Lee & Lieberman, 2010; Moatti et al., 2015; Silverman, 2002).

6.2 | Role of liabilities

By studying the impact of the PLE, our study also indirectly suggests that liabilities influence acquisitions, entry, and exit. In this regard, we are limited by being unable to observe the actual liabilities of the firms. Hence, our estimates represent the average "intent-to-treat" effect across the sample. As an exploratory exercise, we examine whether industries that sell goods directly to consumers (where some of the most prominent lawsuits seem to occur; e.g., Craig, 2020; Field, 2021) are more likely to be affected by adoption of the PLE. In line with being at greater risk of product liabilities-related costs, we find that PLE adoption decreases acquisitions and increases closures to a greater extent in industries with a larger share of final goods sold (Online Appendix Table A3.11). Future research can expand on this exercise using data on actual liabilities. More generally, the role of liabilities remains an understudied topic in the strategic management literature and can benefit from increased attention from scholars. Also, while studies have found that product liability risk affects R&D and patenting (e.g., Galasso & Luo, 2018; Viscusi & Moore, 1993), its impact on other strategic choices, to our knowledge, has not been explored. Thus, studying the strategic impact of liabilities likely offers fruitful lines of

inquiry for future research. Finally, there could be spillover effects into neighboring states (e.g., if a buyer's preferred location was a PLE state, they may now seek targets in neighboring states), which could be explored in future work.

6.3 | Potential caveats

A possible solution to ameliorate the effects of the PLE is to purchase insurance against potential liabilities that may arise in the future, which we do not observe. However, this solution is imperfect for two reasons. First, given the uncertainty surrounding such liabilities, complete insurance is generally infeasible. Indeed, courts have been explicitly concerned about the unavailability or infeasibility of insurance in such cases (Beyer, 2012). Our results are consistent with these concerns. Second, it is important to note that even if fairly priced insurance were available, the insurance cost would effectively increase acquisition costs and hence discourage acquisitions in a similar way to increased liabilities.

Another important caveat is that our results should not be interpreted as a policy evaluation of the PLE. The effect of reduced business transfers on aggregate welfare would depend crucially on whether such transfers predominantly increase allocative efficiency or result in increases in market power through increases of concentration. While early work (e.g., Maksimovic & Phillips, 2001) has shown efficiency gains from ownership transfers, recent literature (e.g., Covarrubias et al., 2020) documents evidence for decreasing competition and increasing levels of "inefficient" concentration across industries in the United States. Furthermore, we do not evaluate potential benefits (e.g., improved product safety) from PLE adoption, which can be a topic for future inquiry. Our intent here is limited to illustrating that being able to transfer ownership has value for firms that is independent of the value related to their own capabilities, and hence that discouraging ownership transfers (which is one of the effects of the PLE) has economically significant effects on business entry and exit. We invite others to build on this.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the US Census Bureau, subject to completion of the Census Bureau data access processes.

US CENSUS BUREAU DISCLAIMER

Research results in this article are those of the authors, and do not necessarily represent the views of the US Census Bureau. The results presented here have been screened to ensure that no confidential data are revealed.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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