Paid Sick Leave Mandates, Skilled Labor, and Corporate Innovation*

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Abstract

We examine how managerial concerns about labor costs influence hiring decisions between expensive skilled labor and ordinary workers, as well as corporate innovation. Following the staggered implementation of state-level paid sick leave (PSL) mandates, which heighten labor cost concerns, we document a significant decline in both corporate innovation output and quality. Further analysis reveals that while PSL mandates slightly reduce inventor attrition, they cause a tenfold larger reduction in inventor hiring, resulting in a net reduction of over one-third in inventor hiring. In contrast, firms' overall employment remains stable after PSL mandates. Additionally, firms post significantly fewer innovation-related job openings after PSL mandates, while maintaining non-innovation job postings. These effects are more pronounced among financially constrained firms. Our findings suggest that labor cost concerns disproportionately discourage firms from hiring skilled labor, leading to adverse consequences for innovation.

Keywords: Labor cost concerns, skilled labor, PSL mandates, corporate innovation, inventors, financial constraints

JEL Classification: G38, J63, O31

Corporate managers today face growing uncertainties about rising labor costs, driven by evolving economic conditions, social pressures, and regulatory changes, such as inflation, worker activism, demands for enhanced benefits, and stricter labor regulations. These intersecting challenges force managers to navigate a complex landscape where balancing cost control with talent retention and recruitment becomes increasingly difficult. This raises a critical question: Given that skilled employees demand significantly higher wages than ordinary workers, do managers disproportionately reduce the hiring of skilled employees relative to ordinary workers when they face labor cost concerns? And if so, what are the consequences for corporate innovation, a key driver of long-term competitiveness?

The answers to these questions are unclear ex ante. On the one hand, skilled employees' higher costs may render them more vulnerable to cost-cutting measures than ordinary workers. For example, R&D spending is the most often reduced category when managers seek to preserve earnings (Graham, Harvey, and Rajgopal 2005).[1] Similarly, Campello, Kankanhalli, and Muthukrishnan (2024) find that firms disproportionately reduce hiring for high-skilled employees during the COVID-19 pandemic. These findings suggest that labor cost concerns may indeed affect skilled labor more severely than ordinary workers. On the other hand, given the growing importance of skilled labor and innovation, managers may prioritize hiring skilled workers to maximize long-term value despite labor cost concerns. Additionally, managers may increase innovation efforts to develop labor-saving production methods (Bena, Ortiz-Molina, and Simintzi 2022). Under this scenario, labor cost concerns will not disproportionately affect skilled labor or innovation. In this study, we examine these questions by analyzing how state-level paid sick leave (PSL) mandates affect corporate innovation output and inventor employment patterns.

[1] Graham, Harvey, and Rajgopal (2005) document that 80% of surveyed managers would cut discretionary spending on areas like R&D to meet earnings targets.

Since 2008, twelve US states have implemented PSL mandates. While these policies provide crucial benefits to workers, including job protection and wage security during illness-related absences or when caring for sick family members, they simultaneously raise substantial labor cost concerns for businesses. The financial impact extends beyond direct salary expenses to indirect costs such as hiring replacement workers, managing increased absenteeism, and potential litigation arising from compliance disputes. Industry groups voice strong opposition to these mandates; for example, the Michigan Manufacturers Association contends that such a policy "*increases the cost of employing people and increases the cost of the administrative burdens, it makes it much more difficult and more expensive to operate a Michigan location compared to companies in other states and, frankly, other nations*".[2] Moreover, PSL mandates may amplify concerns about future labor cost escalations, as their implementation could increase the likelihood of additional related labor policies being adopted.[3] We therefore use the staggered implementation of state-level PSL mandates as a quasi-natural experiment to examine how elevated labor cost concerns affect corporate innovation and inventor employment dynamics.

We analyze a large sample of U.S. public firms between 2004 and 2019 using a difference-in-differences (DiD) design that exploits the staggered adoption of state-level PSL mandates. We end our sample period in 2019 because of the outbreak of the COVID-19 pandemic in 2020 and the introduction of FFCRA that provides universal PSL to employees for COVID-19 related reasons from April 2020. Our dependent variable, corporate innovation, is measured by patent filings and truncation-adjusted future citations (Hall, Jaffe and Trajtenberg 2001, 2005). The main independent variable is *PSL*, a dummy variable for firms headquartered in treated states following

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[2] See https://www.michiganradio.org/economy/2018-05-31/michigan-manufacturers-say-paid-sick-leave-mandate-could-hurt-job-growth .

[3] Policy feedback theory (e.g., Pierson 1993) posits that implemented policies generate recursive dynamics whereby they systematically reshape both sociopolitical contexts and subsequent policy decisions.

the implementation of PSL mandates. We follow the literature and include an extensive set of firm-level control variables including firm size, cash holdings, leverage, capital expenditures, PPE, ROA, R&D expenditures, and book-to-market ratio. We also include firm and year fixed effects to account for time-invariant firm heterogeneity and common temporal shocks.

Our DiD analysis reveals a significant decline in corporate innovation after the implementation of PSL mandates. Specifically, patent filings decrease by 6.3% standard deviation after PSL adoption. We also find a significant reduction in average patent quality, as measured by both citation counts and the number of breakthrough patents. These results remain robust across alternative sample constructions, time periods, and alternative empirical methodologies, including two-way fixed effects (TWFE) estimators (Callaway and Sant'Anna 2021; Sun and Abraham 2021). Furthermore, parallel trend tests confirm that treatment and control firms exhibit similar innovation levels before PSL mandates, but the treatment group experienced a noticeable decline in corporate innovation after PSL mandates relative to control firms. Taken together, these findings suggest that PSL mandates adversely affect corporate innovation.

PSL mandates could be associated with local factors that correlate with corporate innovations, such as strong economic growth. However, such factors would likely bias against finding a negative impact on corporate innovation, as robust economic conditions typically foster innovation. To further alleviate concerns about confounding local factors, we conduct several additional tests. First, we randomly assign pseudo-PSL adoptions to neighboring non-adopting states and find no significant effect on innovation. Second, since most adopting states lean Democratic, we examine subsamples by political affiliation and find that the decline in innovation persists in both Democratic and Republican adopting states. We also conduct a pseudo-event analysis by assigning the adoption of PSL mandates to a neighboring blue state without PSL mandates, and the results remain robust.

To further validate the causal impact of PSL mandates on corporate innovation, we conduct two cross-sectional tests. First, since PSL mandates are implemented at the headquarters state level, we examine whether the decline in innovation is driven by inventors in those specific states. Consistent with our prediction, we find that the reduction in patent filings is concentrated among inventors located in the headquarters states of treated firms. Second, we hypothesize that the effect of PSL mandates on corporate innovation should be stronger for firms in industries where employees traditionally have less voluntary access to PSL. The results confirm this prediction, showing a more pronounced decline in innovation for firms in these industries. These findings provide compelling evidence that the observed effects are directly linked to PSL mandates rather than other confounding factors.

Next, we investigate how PSL mandates affect inventor employment dynamics. Our analysis reveals two countervailing effects on net inventor hiring. While PSL adoption slightly reduces inventor attrition (as inventors are less likely to leave their firms after having access to PSL), this effect is outweighed by a tenfold larger reduction in new inventor hiring. Consequently, firms experience a more than one-third decline in net inventor hiring following PSL mandates, corresponding to 3% decrease in the total number of inventor workforce at the average firm. To compare inventors with ordinary workers, we also analyze PSL's impact on overall firm employment. Notably, we find no significant change in total employment following PSL mandates, in sharp contrast to the net outflow of inventors.[4] This disparity suggests that labor cost concerns disproportionately affect skilled labor relative to ordinary workers, highlighting the uneven consequences of PSL mandates across workforce segments.

[4] This result is consistent with the existing literature showing a non-negative effect of PSL mandates on ordinary workers (Al-Sabah and Ouimet 2023).

Hoberg and Maksimovic (2015) demonstrate that financially constrained firms are more likely to reduce discretionary research and development spending following negative shocks. We therefore investigate whether financial constraints similarly amplify the negative effect of PSL mandates on inventor hiring and corporate innovation. Following Hoberg and Maksimovic (2015), we evaluate financial constraints using their text-based measure.[5] Our results show that financially constrained firms experience a significantly larger net outflow of inventors following PSL mandates compared to their peers. This effect is primarily driven by a more pronounced reduction in new inventor hiring rather than increased inventor attribution. Consistent with these employment dynamics, we also find that the decline in corporate innovation following PSL mandates is substantially more severe for financially constrained firms.

We acknowledge that inventor flows may reflect inventor decisions rather than managerial actions. For example, a net inventor outflow could occur if inventors pursue better opportunities elsewhere. However, this concern is mitigated for us because the observed inventor outflow is driven by reduced new inventor hiring rather than increased inventor attrition. To further address this issue, we obtain job postings data from the Revelio Labs database and examine the effect of PSL mandates on firms' job postings. While we cannot directly identify inventor-specific postings, we use scientist and engineer postings as a proxy for innovation-related hiring (Dietz and Bozeman 2005). The results show a stark contrast: after PSL mandates, firms reduce scientist and engineer postings by 15.1%, and 16.9%, respectively (relative to the mean), while maintaining postings unrelated to innovation. Moreover, this reduction is more pronounced among financially constrained firms. These findings support our inventor flows analysis and confirm that PSL mandates disproportionately reduce firms' demand for innovation talent.

[5] The measure is derived from financial constraint-related words extracted from the capitalization and liquidity subsection of the MD&A section of the 10-K filings.

Finally, we examine whether PSL mandates also affect inventor productivity through coordination disruptions. Innovation often requires collaboration among highly specialized inventors (e.g., Jaravel, Petkova, and Bell 2018; Baghai, Silva, and Ye 2023).[6] Unlike typical employees, temporarily replacing absent inventors is particularly difficult, potentially delaying entire team's progress. As a result, reduced work hours may disproportionately harm inventor productivity by disrupting coordination. Using three coordination disruption proxies – team inventor interdependence, inventor buffer (availability of substitutes), and work-from-home policies – we find significantly greater declines in corporate innovation after PSL mandates when coordination disruptions are more severe.

Our study contributes to the growing literature on skilled labor. While prior research documents that government policies targeting skilled labor, such as non-compete enforcement (Marx, Strumsky, and Fleming 2009) and visa policies (Chen, Hsieh, and Zhang 2021, 2024), can significantly affect skilled labor and corporate policies, there is little evidence on how *general* government policies, which do not directly target skilled labor, might disproportionately impact skilled labor relative to ordinary workers. Our study addresses this question using the setting of PSL mandates. Furthermore, we show that labor cost concerns, a common challenge for corporate managers, can lead to a significant reduction in the hiring of inventors relative to ordinary workers. Our findings also complement prior studies that emphasize the role of financial constraints in corporate R&D activity and skilled labor employment (e.g., Hoberg and Maksimovic 2015; Campello, Kankanhalli, and Muthukrishnan 2024).

Second, our paper contributes to the literature on corporate innovation. In recent years, negative shocks–such as geopolitical tensions, economic instability, and unpredictable policy

[6] For example, Singh and Fleming (2010) find that 90% of patents are produced by teams rather than solo inventors.

shifts–have increasingly disrupted economic activity (e.g., Bloom et al. 2007; Bloom 2009). Corporate innovation, a crucial driver of growth in today's economy, can be highly susceptible to these uncertainties. For example, Bansal et al. (2023) show that firms facing higher uncertainty may reallocate resources away from innovative projects, and that such shifts negatively affect innovation and productivity growth. Our findings extend this literature by providing new evidence that corporate innovation can be particularly vulnerable to shocks associated with labor costs concerns.

Finally, our study sheds light on potential unintended consequences of PSL mandates. As the demand for a national paid sick leave policy in the United States continues to grow, it becomes increasingly important to understand the complexities and potential impacts of such a policy. Existing studies find little evidence that PSL mandates negatively impact the overall wages and employment (Pichler and Ziebarth 2020; Wething 2022; Al-Sabah and Ouimet 2023). Additionally, Chunyu, Volpin, and Zhu (2024) document enhanced labor productivity for US firms following the adoption of PSL mandates. In contrast, our findings reveal a significant unintended consequence of PSL mandates on inventors and corporation innovation, highlighting the need for policymakers to comprehensively consider the full spectrum of effects of such policies on the broader economy.

1. DATA AND SAMPLE CONSTRUCTION

We start with all firms in the CRSP-Compustat merged database with the available stock and accounting data, excluding financial firms (SIC codes from 6000 to 6999) and utility firms (SIC codes from 4900 to 4999). We start our sample period from 2004, four years before the first state-level PSL mandate in 2008. We end our sample period in 2019 because the introduction of the Federal-level Families First Coronavirus Response Act (FFCRA) on April 1, 2020 provides universal PSL to employees for COVID-19 related reasons (U.S. Department of Labor, 2020).

During our sample period, twelve states adopted PSL mandates, including DC, Connecticut, California, Massachusetts, Oregon, Vermont, Arizona, Washington, Maryland, Rhode Island, New Jersey, and Michigan.[7] Figure 1 plots the cumulative number of states that have adopted PSL mandates over our sample period, which shows a gradual PSL adoption over time. Typically, PSL mandates require firms to provide one hour of paid sick leave for every 30-40 hours worked, with a cap on the total hours that can be accrued in a year. Paid sick leave usually covers both full-time and part-time employees and applies to most or all firms headquartered in the state, with different annual caps based on employee size. Some states exempt the smallest firms from providing PSL to their employees, such as those with less than five employees.[8]

We obtain information on the historical headquarters locations of sample firms from the University of Notre Dame's 10-X Header Data based on 10-K filings.[9] Several cities and counties implement separate PSL mandates during our sample period. We exclude all firms headquartered in these cities or counties. Robustness tests, which include firms headquartered in these cities and counties, yield similar results (see Section 3.3). We obtain the patent data from the United States Patent and Trademark Office (USPTO), and the inventor data from the PatentsView database. We match the patent data to sample firms using Professor Noah Stoffman's Patent and Citation File (KPSS database, 2022 version).[10] Our final sample consists of 37,726 firm-years from 2004 to 2019. For our analysis of skilled labor hiring, we obtain job posting data from the Revelio Labs

[7] Without PSL, sick employees would have to use unpaid leave under the Family and Medical Leave Act of 1993 (FMLA), which provides the right to unpaid leave for workers who are employed by a firm with 50 or more employees and have worked for the employer for a year and a minimum of 1,250 hours.
[8] Table B1 of Appendix B provides detailed information on the paid sick leave policy for the twelve states, which shows that majority of these states have a cap of 40 hours.
[9] The dataset can be accessed at https://sraf.nd.edu/sec-edgar-data/10-x-header-data/.
[10] We thank the authors of Kogan, Papanikolaou, Seru, and Stoffman (2017) for making this dataset available at https://github.com/KPSS2017/Technological-Innovation-Resource-Allocation-and-Growth-Extended-Data.

database, which aggregates job postings from multiple sources including LinkedIn, Indeed, and company websites starting in April 2016. Each posting includes details such as the company name, posting date, job title, and job category.

Table 1 presents the summary statistics from 2004 to 2019. To account for outliers, all firm-level continuous variables are winsorized at the 1st and 99th percentiles. Approximately 10% of sample firm-years are covered by PSL mandates. An average firm files 3.8 patents in a given year, with about three-fourths filed by inventor teams and one-fourth by single inventors. Sample firms have average book leverage of 0.21, ROA of -0.05, and book-to-market ratio of 0.54. These firms employ of 6,530 workers on average, of whom 3.8% (24.8 employees) are inventors. They maintain an average of 108 active job postings per month, with scientist and engineer positions accounting for approximately 3% and 24% of total postings, respectively. Detailed variable definitions are provided in Appendix A.

2. PSL MANDATES AND CORPORATE INNOVATION

2.1 Methodology

To examine the impact of PSL mandates on corporate innovation, we use a difference-in-differences (DiD) methodology. Specifically, we compare firms' innovation in states with and without PSL mandates before and after the implementation, based on a staggered implementation of state-level paid sick leave. The regression model is as follows:

$$Innovation_{i,t} = \beta \times PSL + \gamma' \times X_{i,t-1} + \eta_i + \Theta_t + \varepsilon_{i,t} \qquad (1)$$

where the dependent variable, $Innovation_{i,t}$, is one of the two measures of innovation for firm *i* in year *t*. The first measure is the number of patents filed by the firm in year *t* (*Patent*).[11] The second

[11] We include only granted patents, as the KPSS linkage file covers exclusively granted patents of public firms.

measure is the truncation-adjusted future citations of the patents filed by the firm in year *t* (*Citation*). Since recent studies highlight the potential biases that arise from taking the logarithm of count variables (Cohn, Liu, and Wardlaw 2022; Chen and Roth 2024), we use the raw counts of patents and citations as dependent variables in our analysis. To mitigate the impact of outliers, we winsorize them at the 95th percentile. Our results are robust when we use natural logarithm of the variables or winsorize them at alternative thresholds such as the 99th percentile.

The main independent variable is *PSL*, which is a dummy variable that equals one for the treated states after the years of PSL mandate implementation, and zero otherwise. We follow the literature and control for firm characteristics including firm size, cash holdings, leverage, capital expenditures, PPE, ROA, R&D expenditures, and book-to-market ratio in the previous year.[12] We further include firm and industry-year fixed effects to control for firm and industry-year level time-invariant characteristics that may affect corporate innovation.[13] We calculate t-statistics using robust standard errors adjusted for heteroskedasticity and clustered at the state level.

2.2 DiD Regression Analysis

We conduct the DiD regressions as specified in Equation (1) and report the results in Panel A of Table 2. In Columns (1) and (2), we regress patent filings on *PSL* and control variables. We also include firm and year (or industry-year) fixed effects. We find that the coefficient of *PSL* is negative and significant in both models, suggesting that PSL mandates have a significantly negative impact on firms' patent filings. This result is also economically significant. For example, the coefficient in Column (2) indicates that the number of patent filings decreases by 0.597 after the adoption of PSL mandates, which is equivalent to a 6.3% standard deviation decrease in patent

[12] We follow the literature and set a firm's R&D to zero if the data is missing. Our regression results remain similar when we further control for a dummy variable accounting for missing R&D values.
[13] The industry fixed effects are based on four-digit SIC classifications.

filing. Columns (3) and (4) of Panel A present the regressions of truncation-adjusted patent citations. In both regressions, the coefficient of *PSL* is negative and significant at the 1% level. For instance, the coefficient in Column (4) indicates that the adoption of PSL mandates leads to an 8.1% standard deviation decrease in firms' patent citations.

In Panel B of Table 2, we use two measures to examine how PSL mandates influence the average quality of patents. The first measure, *Average Citation*, is the average truncation-adjusted patent citations across patents filed by a firm in the year. The second measure, *Breakthrough Patent*, is the number of breakthrough patents filed by a firm in the year, where breakthrough patents are defined as those with forward citation counts being in the top 5% of all patents in the same application year and technology class (Singh and Fleming 2010). The coefficient of *PSL* is significantly negative in all four models, which confirms a reduction of patent quality after the implementation of PSL mandates. For example, the coefficient in Column (4) indicates that the number of breakthrough patent decreases by 0.055 following the implementation of PSL mandates, which is equivalent to a 7.6% standard deviation decrease in breakthrough patents. To summarize, the results in Table 2 reveal a significant decline in both the quantity and quality of corporate innovation following the implementation of PSL mandates.

2.3 Robustness Tests

We conduct several robustness tests using alternative sample constructions or empirical methods. First, we exclude firms with no patents during our sample period and repeat the analysis in Panel A of Table 3, where the coefficient of PSL remains significantly negative in all regressions.

Second, recent studies have shown that staggered DiD estimates may be prone to potential biases caused by differential treatment timing and treatment effects (e.g., Callaway and Sant'Anna 2021; Sun and Abraham 2021; Baker, Larcker, and Wang 2022). We conduct robustness tests using two alternative approaches proposed by Callaway and Sant'Anna (2021) and Sun and Abraham (2021) that obtain two-way fixed-effect (TWFE) estimates.[14] Columns (1) to (4) in Table 3 Panel B present the TWFE estimators from the aggregated group-time ATT (Callaway and Sant'Anna 2021), where the coefficient of PSL remains negative and significant in all regressions (t-statistics -2.99 to -3.39).

We then follow the approach proposed by Sun and Abraham (2021) to validate the crucial assumption that treated and control firms have parallel trends in the absence of PSL mandates. Their method provides unbiased interaction-weighted estimators by estimating regression coefficients on event-study leads and lags using the TWFE approach. In Columns (5) and (6) of Table 3 Panel B, we include lead and lag dummy variables where PSL^{-2}, PSL^{-3}, and PSL^{-4} are dummy variables representing two, three, and four or more years before implementation of PSL mandates, respectively.[15] PSL^{0} is a dummy variable for the PSL implementation year. PSL^{+1}, PSL^{+2}, PSL^{+3}, and PSL^{+4} are dummy variables representing one, two, three, and four or more years after the implementation of PSL mandates, respectively. We find that the coefficients on PSL^{-2}, PSL^{-3}, and PSL^{-4} are statistically indistinguishable from zero, while all the coefficients after the PSL implementation are negative and significant. We display these results in Figure 2 to provide a visual representation of these regression coefficients. Panels A and B present the dynamic impact for patents output and citations, respectively, which show little change in corporate innovation in the pre-event period and a noticeable decline in corporate innovation in the post-event period. These findings confirm that the parallel trend assumption holds in our analysis.

Third, our baseline sample excludes firms headquartered in cities or counties with separate

[14] Both approaches aim to correct for potential estimation bias by focusing on the average treatment effects on the treated (ATT) that accounts for differential treatment timing and heterogeneity in treatment effects based on the time of adoption.
[15] PSL^{-1} serves as the reference point and is omitted from the regression.

PSL mandates from our sample.[16] We conduct a robustness test by including these firms in the sample and report the regression results in Panel A of Table 4. Fourth, in Panel B of Table 4, we exclude observations in the implementation years of PSL mandates as part of the innovation activity in the implementation year occurs before PSL implementation. Fifth, we exclude observations during the global financial crisis (2007 to 2009) and report the results in Panel C of Table 4. Finally, in Panel D of Table 4, we exclude the states with PSL adoptions in 2018 or 2019 as these adoptions are close to the end of the sample period. We find that our baseline results remain robust in all these alternative settings.

We further repeat the regression analysis using PSL hours as independent variables (instead of the PSL dummy). PSL hours represents the maximum number of paid sick leave hours that can be accrued in a year in states that have implemented PSL mandates, and is set to zero for states without PSL mandates.[17] Table B3 of Appendix B presents the regression results, where we find the coefficient of PSL hours remains negative and significant in all models. Taken together, these robustness checks confirm the validity of our finding that PSL mandates leads to a significant decline in corporate innovation activity.

2.4 Do Local Factors Explain the Decline in Corporate Innovation?

PSL could be associated with local factors that correlate with corporate innovation. For example, states experiencing or anticipating stronger economic growth might be more inclined to implement welfare-related policies such as PSL mandates. This concern, however, is alleviated by the fact that such economic factors would likely bias against finding our results of a *negative*

[16] Table B2 of Appendix B provides details about the content and implementation dates of PSL mandates in these cities and counties.

[17] We exclude firms headquartered in the state of Washington from this analysis, as the state of Washington does not enforce an annual cap on PSL hours.

impact on corporate innovation. We conduct two additional tests to further alleviate the concerns about local factors.

First, we conduct a placebo test based on the assumption that neighboring states have local factors in common with the event states. Specifically, when a state adopts PSL mandates, we instead assign the adoption event to a randomly selected neighboring state without PSL mandates. We then repeat the DiD regressions and report the results in Panel A of Table 5. We find no significant impact of pseudo-adoptions on corporate innovation, which suggests that it is the adoption of PSL mandates, rather than some local factors, that drives our findings.

Second, as the majority of PSL mandates occurred in Democratic states, we conduct two analyses to examine if our findings are driven by the differences between Democratic and Republican states. We classify US states into Democratic ("blue state", won by Obama/Biden) and Republican ("red state", won by McCain/Palin) using the results of the 2008 United States presidential election, as the first state-level PSL mandates were adopted in 2008. Among the twelve event states, the only red state is Arizona.

We present a subsample analysis using treated Democratic and Republican states, with untreated states, in Panels B and C of Table 5, respectively. The coefficient of *PSL* is significantly negative across the two subsamples, suggesting that our results are not driven by the political leanings of the event states. In Panel D of Table 5, we conduct a pseudo-event analysis as in Panel A, except that we assign the adoption of PSL mandates to a neighboring *blue* state that has not adopted PSL mandates. We observe no decline in innovation after these pseudo-events, which confirms that the effect of PSL mandates is not driven by the political alignment of the states.

2.5 Cross-Sectional Analyses

In this section, we aim to further validate the impact of PSL mandates on corporate innovation by conducting two cross-sectional analyses based on investor locations and voluntary PSL access.

2.5.1 Inventor Locations

Our DiD analysis examines PSL adoptions in the sample firms' headquarters states. It is worth noting that PSL mandates in a firm's headquarters state cover only employees who work in that state. Therefore, if the decline in corporate innovation that we observe is driven by PSL mandates, we would expect the decline to be more pronounced for patents filed by invention teams with headquarters' inventor participation.

To test this prediction, we obtain inventor locations from the PatentsView database and construct two measures to quantify innovation at company headquarters. The first measure, *Headquarter Patent*, is the number of patents filed with at least one inventor based at the firm's headquarters.[18] The second measure, *Headquarter Citation*, counts the total number of truncation-adjusted citations received by the patents filed by at least one inventor based at the firm's headquarters. We then define *Non-Headquarter Patent* and *Non-Headquarter Citation* similarly, except they are constructed using patents where none of the inventors are based at the firm's headquarters.

We then conduct the DiD regressions and present the results in Panel A of Table 6. In Columns (1), we regress *Headquarter Patent* on *PSL* and find that the coefficient of PSL is significantly negative (t-statistics -2.56). In Column (2), we regress *Non-Headquarter Patent* on *PSL*, and the coefficient is statistically insignificant. In Columns (3) and (4), we regress *Headquarter Citation* and *Non-Headquarter Citation* on PSL, respectively. The coefficient of PSL

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[18] In untabulated analysis, we define a patent as headquarter patent if *all* filing inventors are located in the firm's headquarters state, and find similar results.

is significantly negative in Column (3) but insignificant in Column (4). These results show that, consistent with our prediction, the decline in corporate innovation following the adoption of PSL mandates is concentrated in the event firms' headquarters states.

2.5.2 Voluntary Access to PSL

Firms in the states without PSL mandates can provide paid sick leave to their employees on a voluntary basis. If the observed decline in corporate innovation is driven by PSL mandates, we would expect a larger decline in innovation in the post-event period for firms in industries with a lower proportion of voluntary access to PSL prior to PSL mandates. To test this prediction, we obtained industry-level data (2-digit NAICS) on PSL access from the National Compensation Survey, conducted by the U.S. Bureau of Labor Statistics and published in March 2008. Since the first state-level PSL mandate becomes effective in November 2008 (the District of Columbia), the PSL access in this database results from voluntary access by employers.

We construct a dummy variable for low voluntary PSL access, *Low Access*, which equals one if a firm belongs to an industry with industry-level PSL access that is below the sample median, and zero otherwise. We then conducted DiD regressions that include an interaction term between *Low Access* and the PSL dummy. In Panel B of Table 6, we find that the coefficient of the interaction is negative and significant in all models (t-statistics -2.21 to -2.92). These results demonstrate that, consistent with our prediction, the negative effect of PSL mandates on corporate innovation is more pronounced for firms with low voluntary PSL access prior to PSL mandates.

3. PSL MANDATES AND INVENTOR EMPLOYMENT

With the recognition of the significantly negative impact of PSL mandates on corporate innovation, our focus shifts towards exploring the role of inventor employment in this unintended consequence. Specifically, we investigate whether managers, concerned about increased labor costs due to the passage of PSL mandates, reduce the hiring of inventors.

3.1 PSL Mandates and Net Inventor Hiring

PSL mandates may have opposing effects on net inventor hiring. On one hand, access to PSL–and potential expectations of improved employee welfare–could increase inventor retention, reducing inventor outflows. On the other hand, managerial concerns about rising labor costs may decrease new inventor hiring, reducing inventor inflows. As a result, the net effect depends on which of these countervailing forces dominates. To empirically examine this question, we follow the literature and define an inventor as having changed employers if she files two successive patents with different companies (e.g., Marx, Strumsky, and Fleming 2009; Chemmanur, Kong, Krishnan, and Yu 2019). In this case, the inventor is considered to leave the first firm and join the second firm in the year of the latter patent.[19] We then calculate inventor inflows for a firm-year as the total number of newly hired investors and inventor outflows as the total number of inventors leaving the firm. Finally, we calculate net inventor hiring as the difference between inventor inflows and inventor outflows.

Columns (1) and (2) in Panel A of Table 7 present the DiD regression of net inventor hiring on PSL mandates. We find that the coefficient of PSL is significantly negative in both models, suggesting that the net hiring of inventors decreases after the adoption of PSL mandates. This result is also economically significant as the coefficient in Column (1) indicates that PSL mandates leads to a decrease of 0.708 in the net inventor hiring, representing over a one-third decline from the mean.[20] Since an average sample firm has a total of 24.8 inventors, this decline in net inventor flows corresponds to a 3% decrease in the total number of inventors at a sample firm, which is

[19] For example, if an inventor A files two successive patents, one with Company X in 2006 and the other with Company Y in 2010, then she is identified as leaving Company X and joining Company Y in 2010.

[20] We winsorize the number of inventors and inventor flow variables at the 95th percentile, similar as the patent measures.

economically significant.

Next, we analyze inventor inflows and outflows separately. The results show that, consistent with our prediction, the decrease in net inventor hiring is primarily driven by a reduction in the hiring of inventors, rather than the departure of existing inventors, as the coefficient of *PSL* is significantly negative in Columns (3) and (4). Interestingly, the coefficient of *PSL* is negative and marginally significant in Columns (5) and (6), indicating that fewer inventors leave their firms after having access to PSL. However, this decline in outflows is outweighed by a much larger decline in new hires, resulting a net outflow of inventors following the PSL mandate. Panel A of Figure 3 presents the dynamic impact for net inventor hiring, which shows stable net inventor hiring in the pre-PSL period, followed by a marked decline post-implementation. Panels B and C of Figure 3 further demonstrate that in the post-PSL reduction in inventor outflows is much more significant than the decrease in inventor inflows.

To compare skilled labor with ordinary workers, we conduct DiD regressions of the firm's total number of employees and present the results in Panel B of Table 7. The coefficient of PSL is either insignificant or significantly positive (t-statistics 0.69 and 2.01). This result shows that firms' total number of employees does not significantly decrease after the adoption of PSL mandates. The contrasting effects of PSL mandates on inventors and ordinary workers provide further evidence on the uneven impact these mandates have on skilled labor compared to ordinary workers.

3.2 Financial Constraints and the Reduction in Inventor Hiring

Hoberg and Maksimovic (2015) demonstrate that financial constraints amplify firms' propensity to cut R&D investment following negative shocks. By extension, if managerial concerns about rising labor costs depress inventor hiring, this effect should be particularly pronounced among financially constrained firms.

To examine the interactive effects of financial constraints and PSL mandates on inventor hiring, we follow Hoberg and Maksimovic (2015) and utilize the text-based measure of financial constraints (henceforth HM measure). The measure is derived from financial constraint-related words extracted from the capitalization and liquidity subsection of the MD&A section of the 10-K filings.[21] We estimate DiD regressions that include an interaction term between *PSL* and *Financial Constraint*, where *Financial Constraint* is a dummy variable equals one if the text-based financial constraint measure for the firm in the previous year is above the annual sample median, and zero otherwise. Due to the availability of the HM measure, the sample period for this analysis ends in 2015.

In Panel A of Table 8, Columns (1) and (2) present regressions of net inventor hiring, where the coefficient of the interaction term is significantly negative. Additionally, the coefficient is significant negative in the regressions of inventor inflows (Columns (3) and (4)) but insignificant in the regression of inventor outflows (Columns (5) and (6)). These results suggest that the reduction in net inventor hiring following PSL mandates is significantly larger for financially constrained firms, which is due to these firms hire fewer inventors. In Panel B of Table 8, we further examine the interactive effect of financial constraints and PSL mandates on corporate innovation. We find that the coefficient of the interaction term is significantly negative in all regressions. These results align with the observed interactive effect on net inventor hiring in Panel A.

We conduct robustness tests using two alternative financial constraint measures. First, HM show that their equity-focused constraint score also effectively captures financial constraints. Therefore, we conduct a robustness test using this alternative text-based constraint measure.

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[21] We thank Professors Hoberg and Maksimovic for making their constraint measure available at https://faculty.marshall.usc.edu/Gerard-Hoberg/MaxDataSite/index.html.

Second, we use Linn and Weagley's (2024) machine learning-generated measure, which maps accounting variables to HM measures.[22] This dataset also offers an extended sample period from 1972 to 2021 and a broader coverage by eliminating the requirement for 10-K MD&A liquidity disclosures. As shown in Table B4 of Appendix B, our results remain robust to both alternative specifications.

3.3 PSL Mandates and Inventor Hiring: Evidence from Job Posting Analysis

A caveat of the inventor flows analysis is that these flows may reflect inventors' decisions rather than managerial actions. For example, inventor attrition could result from inventors pursuing better opportunities or "jumping ship". This concern is alleviated in our setting because our findings on net inventor outflows are driven by reduced hiring rather than increased attrition. However, one might be concerned that reduced hiring could stem from labor market conditions (e.g., difficulties in recruiting inventors) rather than deliberate managerial decision. To address this, we corroborate the inventor flows analysis with data firms' job postings, which more directly capture managerial hiring intentions.

We obtain job posting data from the Revelio Labs database and construct a firm-month-level measure, *Total Job Postings*, defined as the total number of job postings a firm maintains in a given month. Revelio Labs categorizes job postings into seven groups—administration, finance, marketing, operations, sales, engineering, and scientist—using clustering algorithms to analyze job titles and descriptions. Among these categories, scientists are typically hired for R&D tasks, and some inventors are hired as engineers (e.g., Dietz and Bozeman 2005; Craps et al. 2022). While the engineer category may include many positions unrelated to innovation, engineers are

[22] The financial variables used include all 19 financial variables in the traditionally used financial constraint proxies (the KZ, HP, and WW measures). We thank the author for providing the data at https://www.danielweagley.com/data.html.

generally considered skilled labor relative to other categories. Therefore, we consider scientist postings to be innovation-relevant, while engineer postings are partially relevant to innovation. In contrast, the remaining categories are less likely to be innovation-related.

We therefore construct three firm-month measures for scientist job postings (*Scientist Postings*), engineer job postings (*Engineer Postings*), and the remaining job postings (*Other Job Postings*).[23] To align with the monthly posting data, we construct a month-level dummy variable, *PSL Month,* which equals one for states and months after the adoption of a PSL mandates, and zero otherwise. Our sample period for this analysis begins in April 2016 due to the availability of job posting data.

Panel A of Table 9 presents DiD regression results examining the impact of PSL mandates on job postings. Column (1) shows a marginally negative coefficient of *PSL* in the regression of *Total Job Postings*, suggesting that PSL mandates modestly reduce firms' overall job postings. The effects, however, differ substantially across job posting categories. Specifically, Column (2) reveals a significantly negative coefficient for scientist postings, indicating that PSL mandates reduce scientist job postings by 0.43 per month, or a 15.1% decline relative to the mean. Similarly, Column (3) shows a significantly negative effect for engineer postings (-4.46 monthly, or a 16.9% decline relative to the mean). In contrast, Column (4) shows an insignificant coefficient for other job postings, indicating that while firms sharply curtail innovation-related and skilled hiring, they largely maintain general recruitment following PSL mandates.

We further examine if financial constraints amplify the impact of PSL mandates on innovation-related job postings. Since the HM financial constraint measure ends in 2015, we instead use the modified HM measure from Linn and Weagley (2024), which spans the job postings

[23] We winsorize the job posting measures at the 95th percentiles to control for outliers.

sample period. We repeat the DiD regressions of job postings by including an interaction term between *PSL Month* and *Financial Constraint*. In Panel B of Table 9, the interaction term is negative and significant in the regressions for total job postings, scientist postings, and engineer postings, however insignificant in the regression for other job postings. The results indicating that financially constrained firms exhibit a more pronounced reduction in innovation-related hiring following PSL mandates. Together, the results in Table 9 corroborate our inventor flows analysis, demonstrating that PSL mandates disproportionately dampen firms' demand for innovation talent, particularly when firms face financial constraints.

4. THE IMPACT OF PSL MANDATES ON INVENTOR PRODUCTIVITY

Beyond reducing the quantity of inventors, PSL mandates could also disproportionately reduce the productivity of inventors relative to ordinary workers. Specifically, inventors face unique productivity risk under PSL mandates because innovation is inherently collaborative, requiring effective coordination among specialists. For example, Singh and Fleming (2010) find that 90% of patents are produced by teams rather than solo inventors. Moreover, unlike ordinary workers, inventors are often irreplaceable in the short-term because each team member typically possess distinct and specialized knowledge. When an inventor takes sick leave, the resulting disruption to team coordination can delay progress for the entire project. These coordination frictions likely amplify the productivity costs of inventor absences under PSL mandates. In this section, we investigate this possibility using three proxies associated with disruptions in inventor coordination.

4.1 Inventor Teams versus Solo Investors

PSL-related disruptions in inventor coordination would be more pronounced among firms whose patents are developed by team inventors rather than single inventors. When a patent is developed by team inventors rather than a single inventor, inventor absences can potentially slow the progress of the entire team. We classify a patent as team-developed if it is filed by a team of more than one inventor, and then construct a dummy variable, *High Inventor Team*, which equals one if the proportion of patents filed by team inventors for the firm in the previous year is above the annual sample median, and zero otherwise.

We conduct DiD regressions that include an interaction between *High Inventor Team* and the *PSL* dummy. In Panel A of Table 10, we find that the coefficient of the interaction term is negative in all models and significant in three of the four models. These results suggest that, consistent with our prediction based on the interruption of coordination, the negative impact of PSL mandates on corporate innovation is more pronounced in firms with a higher proportion of patents filed by team inventors, rather than single inventors.

4.2 Inventor Buffer

Our second cross-sectional analysis is based on the buffer for absent inventors. Specifically, if a firm's inventors possess similar backgrounds and skill sets, it becomes easier to find a replacement inventor to assume the responsibilities of the absent inventor. Conversely, if a firm's inventors have diverse backgrounds and skill sets, finding such replacement becomes more challenging. Therefore, we expect that the decline in corporate innovation following the implementation of PSL mandates is more pronounced among firms with more diverse innovation (i.e., less inventor buffer).

To test this prediction, we first calculate the Herfindahl index (HHI) based on the three-digit technology class-share of a firm's patents in a year. We then construct a firm-level dummy variable, *Low Inventor Buffer*, which equals one if the firms' HHI in the previous year is below or equal to the annual sample median, and zero otherwise.[24] Panel B of Table 10 presents the DiD regressions that include an interaction term between *Low Inventor Buffer* and *PSL*. We find that the coefficient of the interaction term is significantly negative in all models (t-statistics -3.10 to -6.00). Therefore, consistent with the coordination prediction, the negative effect of PSL mandates on corporate innovation is significantly larger in firms with less inventor buffer.

4.3 Work from Home

Our third cross-sectional analysis on disrupted coordination is based on the proportion of a company's jobs that can be done at home. If a firm has few jobs that can be done at home, then sick absences will have a larger impact on the routine face-to-face coordination. To test this prediction, we obtain the data on industry-level proportion of jobs that can be done at home from Dingel and Neiman (2020), which is constructed based on the survey data.[25] The authors obtain occupation-level survey data relevant to work from home from ONET and then aggregate it to the industry level. We then construct a firm-level dummy variable, *Low WFH*, which equals one if the firm is in an industry whose percentage of jobs that can work from home is below the sample median, and zero otherwise.

Panel C of Table 10 presents the DiD regressions of innovation that include an interaction term between *Low WFH* and *PSL*. We find that the coefficient of the interaction term is significantly negative in all models. Therefore, consistent with the mechanism of disrupted inventor coordination, the negative effect of PSL mandates on corporate innovation is significantly larger among firms whose employees have less flexibility of working from home.

[24] For the analysis on inventor buffer, we exclude firms with no patents in the construction period. We require a firm to have at least two patents in the construction period to calculate the Herfindahl index.
[25] These two surveys were conducted by ONET, a program supported by the Department of Labor, to gain a better understanding of the nature of work and the workforce in the U.S. These surveys primarily ask questions about interpersonal relationships, physical work conditions, and work output in the workplace.

Overall, the results in Table 10 suggest that the disruptions in coordination amplify the effect of work hour losses on inventor productivity after the implementation of PSL mandates.

5. CONCLUSION

Despite the crucial role of skilled labor in modern economy, skilled employees can be particularly vulnerable to cost-cutting measures due to their high costs. Using the staggered implementation of state-level PSL mandates across twelve US states from 2008 to 2019 as a quasi-natural experiment, we examine how managerial labor cost concerns affect the differential employment dynamics between skilled and ordinary workers, as well as corporate innovation.

Our difference-in-differences (DiD) analysis reveals that PSL mandate implementation leads to a notable reduction in corporate innovation output, as measured by both patent filings and citations. Similarly, we observe a deterioration in patent quality, evidenced by declines in average citations per patent and breakthrough patent counts. These findings hold across an extensive set of robustness tests and are unlikely to be explained by local factors. We further find that the negative innovation effects are significantly stronger for innovation originated from event firms' headquarters states (where PSL mandates are implemented) and for firms that provided less voluntary PSL coverage prior to the mandate. Taken together, these results indicate that concerns about labor costs lead to a reduction in corporate innovation.

Next, we examine the impact of PSL mandates on inventor employment dynamics. We find a significant reduction in the recruitment of new inventors following PSL mandates, while the employment of ordinary workers remains stable. Additionally, the reduced inventor hiring is more pronounced among financially constrained firms. Firms also post fewer innovation-related jobs after PSL mandates while maintaining non-innovation related job postings. This reduction is also more pronounced among financially constrained firms. Therefore, labor cost concerns disproportionately affect skilled labor more than ordinary workers.

Additionally, we find that PSL mandates affect innovation not only through inventor headcount but also through inventor productivity. Because innovation typically requires collaboration among highly specialized inventors who are difficult to replace temporarily, PSL-induced absences may disproportionately reduce inventor productivity by disrupting coordination. Consistent with this mechanism, we find that firms with more team inventors, more diverse inventor backgrounds, and less work-from-home flexibility experience a larger decrease in corporate innovation after the adoption of PSL mandates.

The corporate world has been facing increasing uncertainties due to policy changes. While it is well-documented that government policies targeting skilled labor can significantly affect skilled workers (e.g., Marx, Strumsky, and Fleming 2009; Chen, Hsieh, and Zhang 2021, 2024), the question of how *general* labor policies might disproportionately impact skilled labor relative to ordinary workers remains underexplored. Our study provides new evidence that labor cost concerns associated with PSL mandates lead to a significant reduction in the hiring of skilled labor compared to ordinary workers, particularly among financially constrained firms. This, in turn, leads to a substantial decline in corporate innovation. By offering fresh insights into the interplay between government policy, labor cost concerns, and skilled workers, our findings highlight the need for a comprehensive evaluation of how government policies may affect skilled workers and the broader economy.

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Figure 1
Cumulative Number of States that Adopt PSL Mandates

This figure shows the cumulative number of states that have adopted PSL mandates from 2008 to 2019.

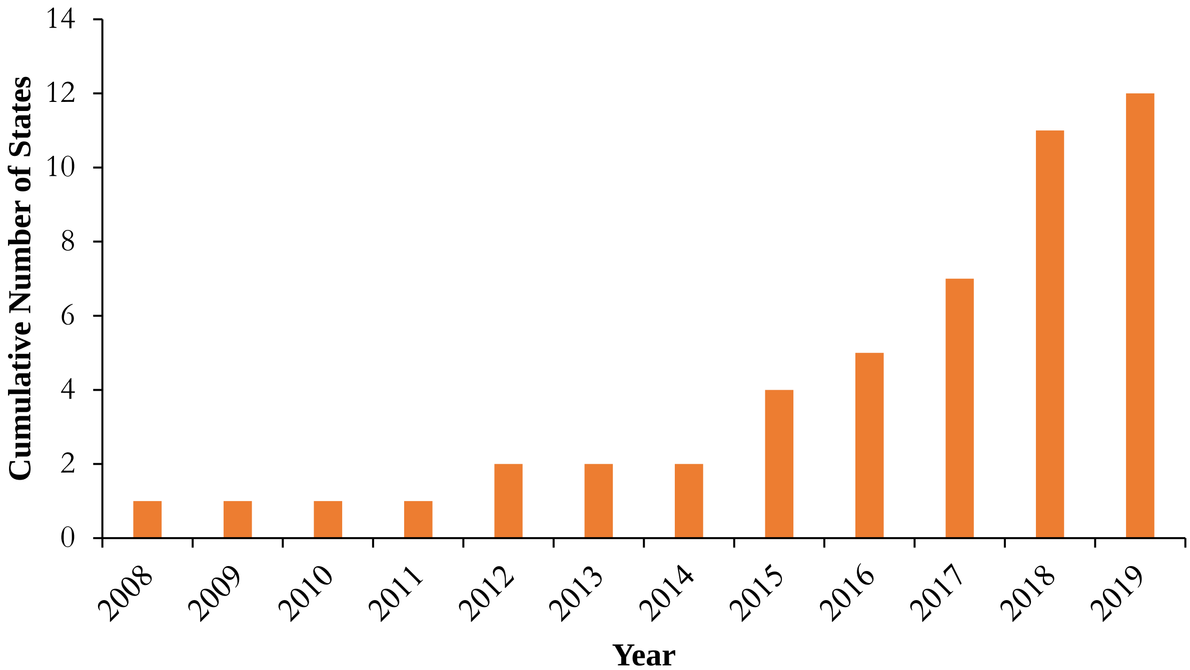
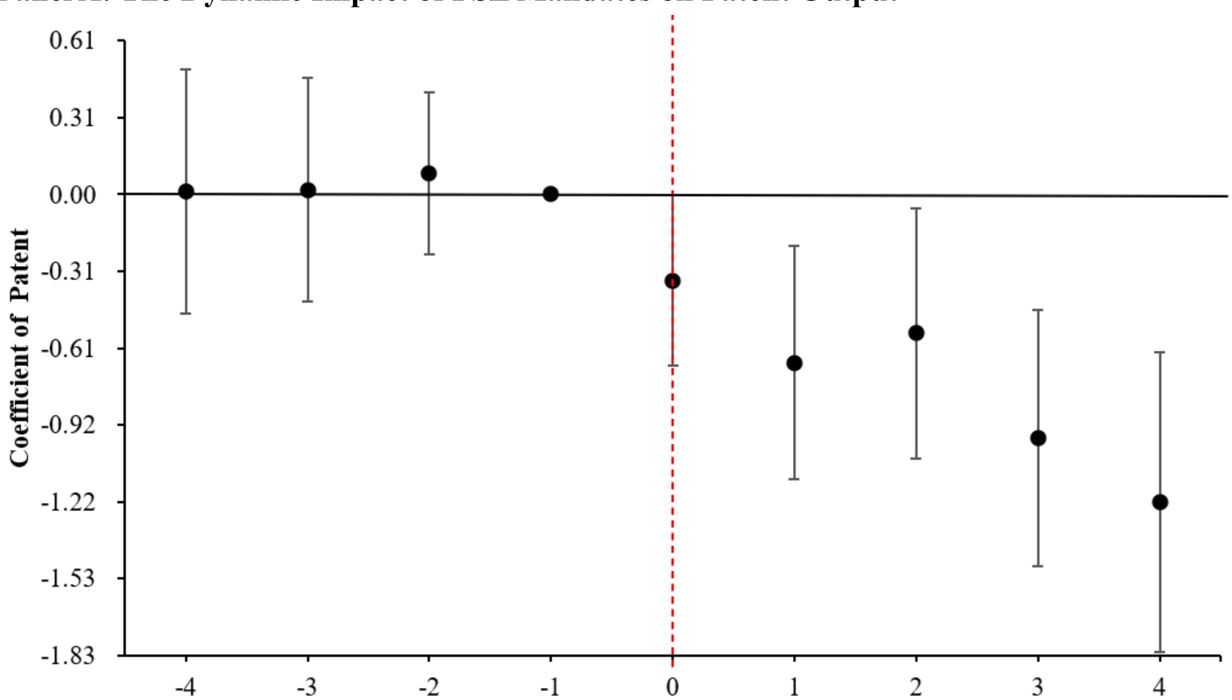


Figure 2

The Dynamic Impact of PSL Mandates on Corporate Innovation

This figure presents the dynamic impact of PSL mandates on corporate innovation using the TWFE DiD event study proposed by Sun & Abraham (2021). In Panel A, the dependent variable is *Patent*, which is defined as the number of patents filed. The independent variables are PSL^{-4}, PSL^{-3}, PSL^{-2}, PSL^{-1}, PSL^{0}, PSL^{+1}, PSL^{+2}, PSL^{+3} and PSL^{+4}. PSL^{-4}, PSL^{-3}, and PSL^{-2} are dummy variables that equal one if a firm is headquartered in a state that will adopt PSL mandates in four or more years, three years, or two years, respectively, and zero otherwise. PSL^{0} is a dummy variable that equals one if a firm headquartered in a state that has adopted PSL mandates in the current year and zero otherwise. PSL^{+1}, PSL^{+2}, PSL^{+3}, and PSL^{+4} are similarly defined, except that they equal one if a firm is headquartered in a state that has adopted PSL mandates one, two, three, or four or more years after the implementation year, respectively. The solid dots represent the estimated coefficients with one year prior to the mandate (t=-1) as the reference, while the solid vertical line segments present two-sided 95% confidence intervals. Control variables including total assets, cash holdings, financial leverage, capital expenditure, PPE, ROA, R&D, and book-to-market ratio in the previous year are defined in Appendix A. Panel B is similar to Panel A, except that the dependent variable is *Citation*, which is the firm's truncation-adjusted future citations. All models include firm and industry-year fixed effects, and t-statistics are clustered at the state level.

Panel A: The Dynamic Impact of PSL Mandates on Patent Output



Panel B: The Dynamic Impact of PSL Mandates on Adjusted Citations

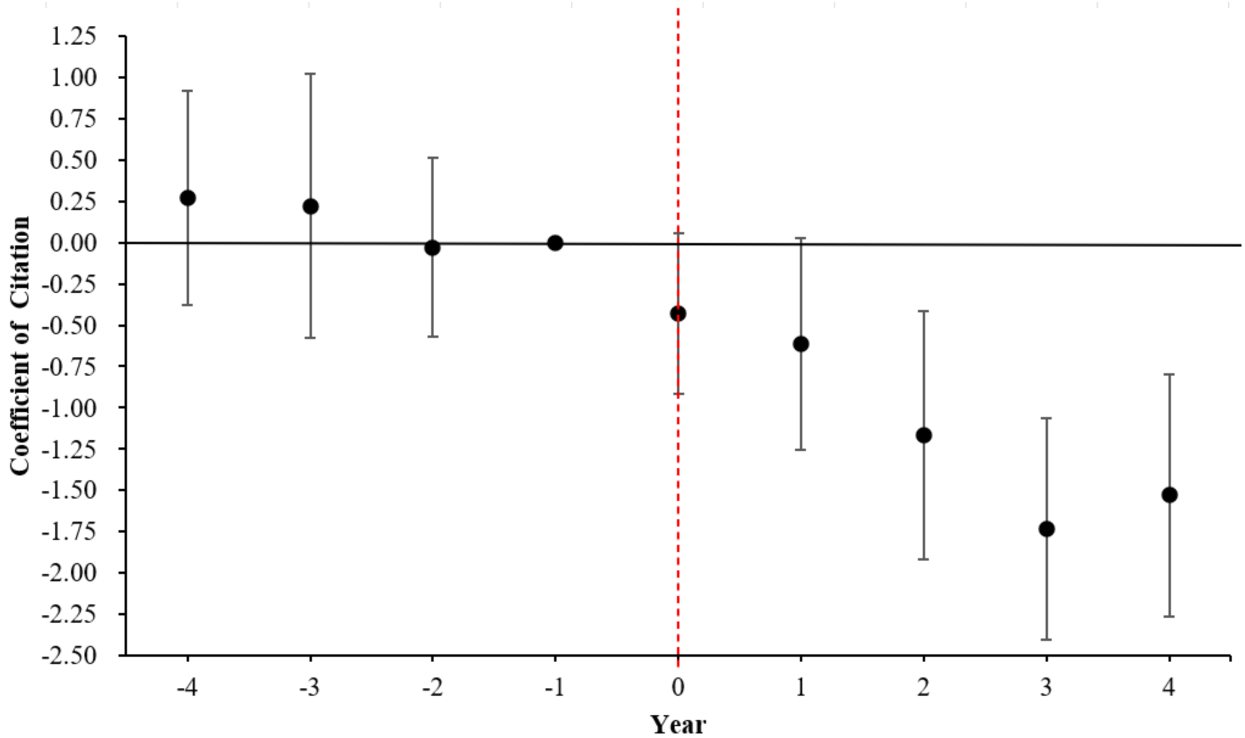
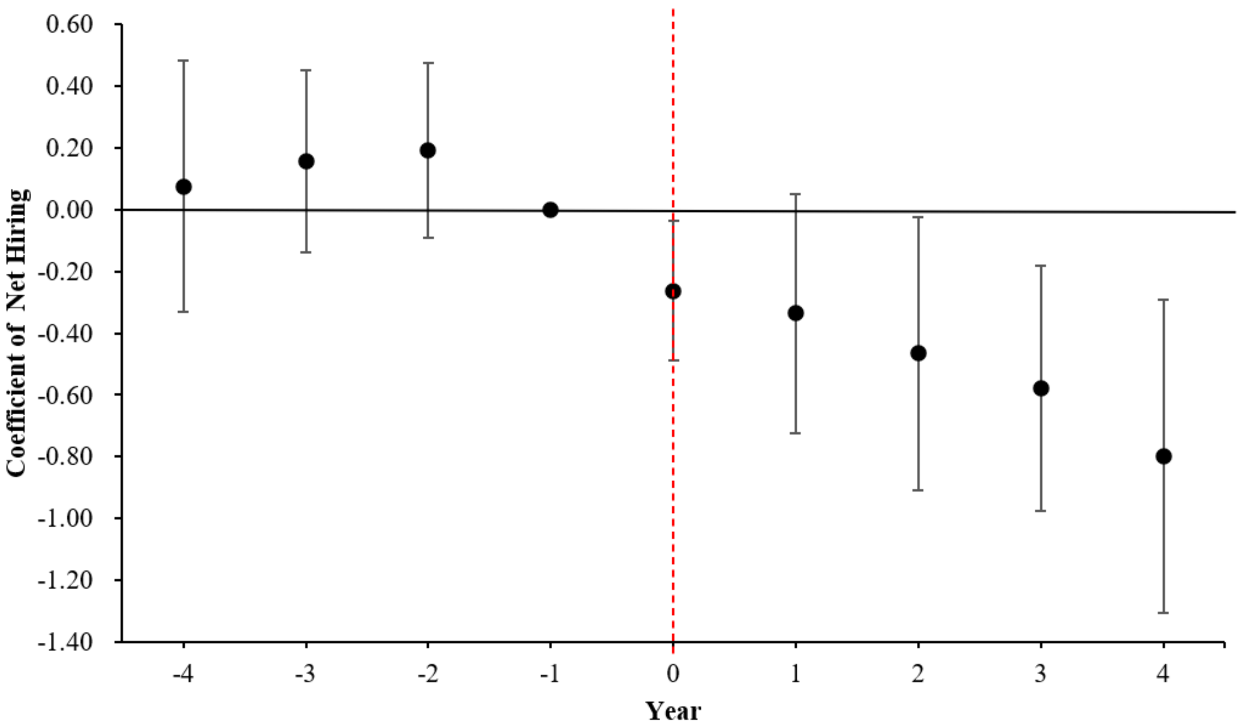


Figure 3

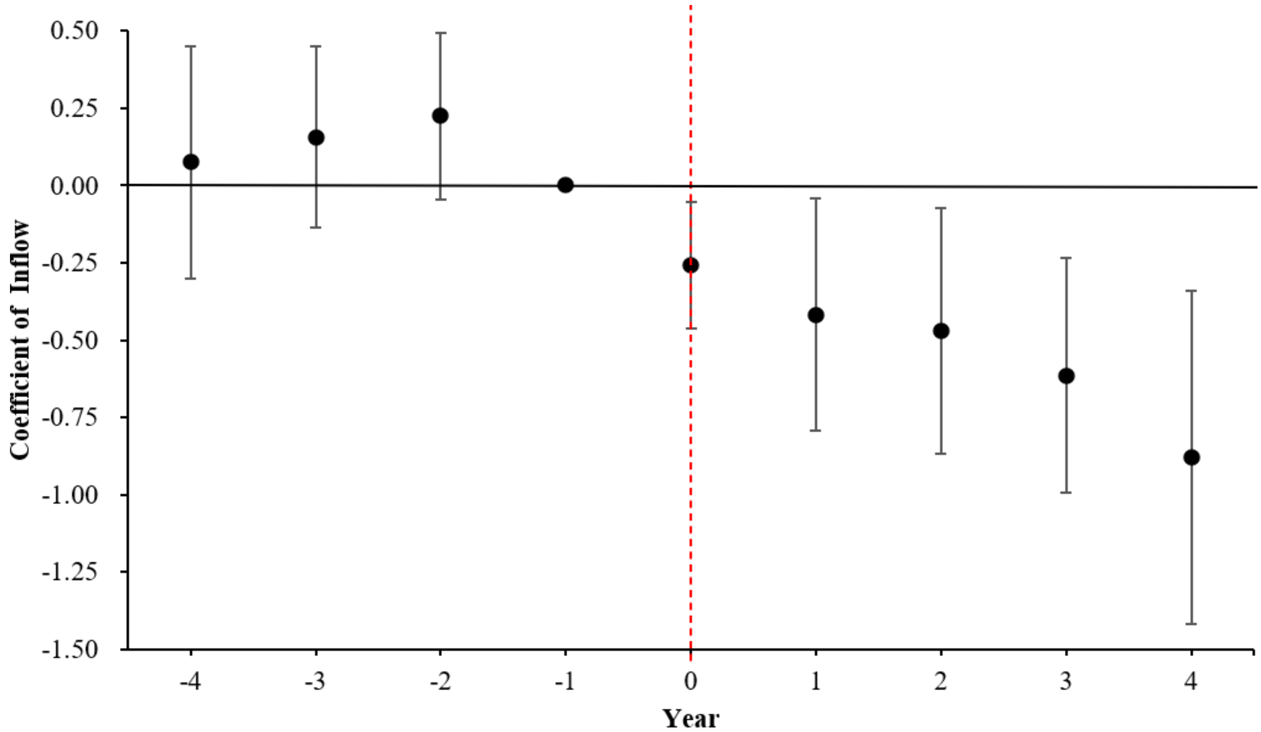
The Dynamic Impact of PSL Mandates on Inventor Hiring

This figure presents the dynamic impact of PSL mandates on inventor hiring using the TWFE DiD event study proposed by Sun & Abraham (2021). In Panel A, the dependent variable is *Net Hiring*, which is the difference between the number of inventors who join a firm in the year and the number of inventors who leave a firm in the year. The independent variables are PSL^{-4}, PSL^{-3}, PSL^{-2}, PSL^{-1}, PSL^{0}, PSL^{+1}, PSL^{+2}, PSL^{+3} and PSL^{+4}. PSL^{-4}, PSL^{-3}, and PSL^{-2} are dummy variables that equal one if a firm is headquartered in a state that will adopt PSL mandates in four or more years, three years, or two years, respectively, and zero otherwise. PSL^{0} is a dummy variable that equals one if a firm headquartered in a state that has adopted PSL mandates in the current year and zero otherwise. PSL^{+1}, PSL^{+2}, PSL^{+3}, and PSL^{+4} are similarly defined, except that they equal one if a firm is headquartered in a state that has adopted PSL mandates one, two, three, or four or more years after the implementation year, respectively. The solid dots represent the estimated coefficients with one year prior to the mandate (t=-1) as the reference, while the solid vertical line segments present two-sided 95% confidence intervals. Control variables including total assets, cash holdings, financial leverage, capital expenditure, PPE, ROA, R&D, and book-to-market ratio in the previous year are defined in Appendix A. Panel B is similar to Panel A, except that the dependent variable is *Inflow*, which is the number of inventors who join a firm in a given year. Panel C is similar to Panel A, except that the dependent variable is *Outflow,* which is the number of inventors who leave the firm in that year. All models include firm and industry-year fixed effects, and t-statistics are clustered at the state level.

Panel A: The Dynamic Impact of PSL Mandates on Net Inventor Hiring



Panel B: The Dynamic Impact of PSL Mandates on Inventor Inflow



Panel C: The Dynamic Impact of PSL Mandates on Inventor Outflow

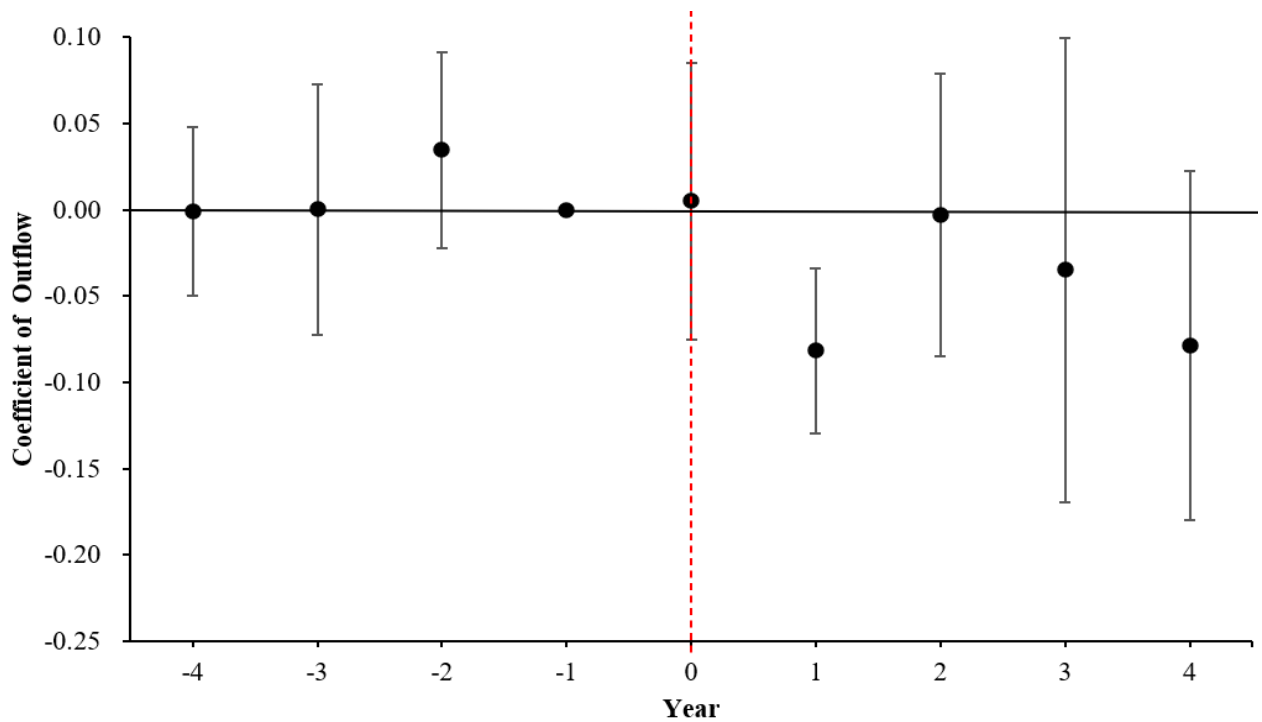


Table 1
Summary Statistics

This table reports summary statistics for sample firms from 2004 to 2019. *PSL* is a dummy variable that equals one for the state and the period after the adoption of the PSL mandate, and zero otherwise. *Patent* is the total number of patents filed by the firm in the year. *Citation* is the firm's truncation-adjusted future citations of patents filed in the year. *Average Citation* is the average truncation-adjusted patent citations across patents filed by a firm in the year. *Breakthrough Patent* is the number of breakthrough patents filed by a firm in the year. *R&D* is research and development expenditures scaled by total assets. *ln(Asset)* is the natural logarithm of total assets. *Cash* is cash scaled by total assets. *Leverage* is total debt scaled by total assets. *Capx* is capital expenditures scaled by total assets. *PPE* is net property, plant, and equipment scaled by total assets. *ROA* is net income scaled by total assets. *B/M* is book equity scaled by market value. *Total Employees* is the total number of employees in thousand for a firm in the year. *Total Job Postings* is the monthly total number of job postings for a firm. *Scientist Postings* is the monthly total number of scientist job postings. *Engineer Postings* is the monthly total number of engineer job postings. *Other Job Postings* is the monthly number of job postings unrelated to innovation. *Delaycon* is the text-based measure of financial constraint by Hoberg and Maksimovic (2015). *Single Inventor* is the percentage of patents that filed by one inventor for a firm in a year. *Inventor Buffer* is the Herfindahl index (HHI) based on the three-digit technology class-share of a firm's patents in the year. *WFH* is the percentage of jobs that can be done at home in each 2-digit NAICS from Dingel and Neiman (2020). *Inflow* is the number of inventors who join a firm in the year. *Outflow* is the number of inventors who leave a firm in the year. *Net Hiring* is the difference between *Inflow* and *Outflow*.

Variables	Obs.	Mean	SD	P10	P25	P50	P75	P90
PSL	37,726	0.10	0.30	0.00	0.00	0.00	0.00	0.00
Patent	37,726	3.81	9.52	0.00	0.00	0.00	1.00	13.00
Citation	37,726	4.49	12.02	0.00	0.00	0.00	0.46	14.76
Average Citation	37,726	0.28	0.56	0.00	0.00	0.00	0.22	1.19
Breakthrough Patents	37,726	0.23	0.72	0.00	0.00	0.00	0.00	1.00
R&D	37,726	0.07	0.13	0.00	0.00	0.00	0.07	0.20
ln(Asset)	37,726	6.08	2.03	3.39	4.58	6.06	7.50	8.74
Cash	37,726	0.23	0.25	0.01	0.04	0.13	0.33	0.64
Leverage	37,726	0.21	0.22	0.00	0.01	0.17	0.34	0.51
Capx	37,726	0.05	0.06	0.01	0.01	0.03	0.06	0.11
PPE	37,726	0.24	0.24	0.02	0.06	0.16	0.36	0.65
ROA	37,726	-0.05	0.27	-0.34	-0.06	0.03	0.08	0.12
B/M	37,726	0.54	0.52	0.10	0.24	0.44	0.74	1.13
Total Employees	37,425	6.53	11.54	0.07	0.24	1.39	6.34	21.7
Total Job Postings	44,613	107.91	197.08	2.00	5.00	22.00	96.00	354.00
Scientist Postings	44,613	2.82	7.06	0.00	0.00	0.00	1.00	8.00
Engineer Postings	44,613	26.33	45.21	0.00	1.00	6.00	27.00	87.00
Other Job Postings	44,613	61.62	115.15	1.00	2.00	11.00	51.00	212.00
Delaycon	22,484	-0.01	0.09	-0.13	-0.08	-0.01	0.05	0.11
Single Inventor	10,282	0.24	0.27	0.00	0.00	0.18	0.33	0.56
Inventor Buffer	13,638	0.62	0.35	0.16	0.30	0.56	1.00	1.00
WFH	37,507	0.43	0.20	0.22	0.36	0.36	0.37	0.80
Net Hiring	37,726	1.99	5.28	0.00	0.00	0.00	0.00	8.00
Inflow	37,726	2.48	6.15	0.00	0.00	0.00	0.00	9.00
Outflow	37,726	0.49	1.26	0.00	0.00	0.00	0.00	2.00

Table 2
The Effect of PSL Mandates on Corporate Innovation

This table examines the effect of PSL mandates on corporate innovation. Panel A presents firm-level DiD regressions of corporate innovation from 2004 to 2019. The dependent variable is the number of patents filed by a firm in year *t* (Models (1) and (2)), or the truncation-adjusted future citations for patents filed by the firm in year *t* (Models (3) and (4)). The main independent variable is *PSL*, which is a dummy variable that equals one for the state-years after the adoptions of PSL mandates, and zero otherwise. Control variables including total assets, cash holdings, financial leverage, capital expenditure, PPE, ROA, R&D, and book-to-market ratio in the previous year are defined in Appendix A. Panel B is similar to Panel A, except that the dependent variable is the average citations for patents filed by the firm in year t (Models (1) and (2)) or the number of breakthrough patents filed by the firm in year t (Models (3) and (4)). Breakthrough patents are defined as those with forward citation counts in the top 5% of all patents of the same application year and technology class. We control for firm and year fixed effects, or firm and industry-year fixed effects in some models. T-statistics using robust standard errors adjusted for heteroscedasticity and clustered at the state level are reported in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively.

Panel A: DiD Regressions of Corporate Innovation

Dep. Var.	Patent		Citation	
	(1)	(2)	(3)	(4)
PSL	**-0.946*****	**-0.597****	**-1.600*****	**-0.974*****
	(-4.36)	**(-2.10)**	**(-3.85)**	**(-3.11)**
ln(Asset)	0.783***	0.752***	0.791***	0.775***
	(4.23)	(4.05)	(4.17)	(4.11)
Cash	-0.043	-0.052	0.710	0.349
	(-0.12)	(-0.14)	(1.43)	(0.74)
Leverage	-0.913***	-0.764***	-1.172**	-1.172***
	(-3.21)	(-3.64)	(-2.03)	(-2.93)
Capx	-0.381	0.752	-0.339	1.248
	(-1.10)	(1.46)	(-0.72)	(1.23)
PPE	0.349	0.114	0.868	-0.215
	(0.83)	(0.32)	(1.54)	(-0.39)
ROA	-0.265	-0.109	-0.105	0.152
	(-1.23)	(-0.55)	(-0.43)	(0.64)
R&D	1.006***	1.044***	1.897**	2.184**
	(3.25)	(3.28)	(2.06)	(2.32)
B/M	-0.154**	-0.188***	-0.130**	-0.180**
	(-2.28)	(-3.02)	(-2.03)	(-2.49)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes
Adj. R^2	0.861	0.862	0.813	0.814
Observations	37,100	36,015	37,100	36,015

Panel B: DiD Regressions of Patent Quality

Dep. Var.	Average Citation		Breakthrough Patent	
	(1)	(2)	(3)	(4)
PSL	**-0.066***** **(-3.03)**	**-0.031*** **(-1.82)**	**-0.090***** **(-3.44)**	**-0.055***** **(-3.24)**
Firm Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes
Adj. R^2	0.581	0.580	0.704	0.704
Observations	37,100	36,015	37,100	36,015

Table 3

Robustness Tests: Alternative Sample Constructions or Empirical Methods

This table presents robustness tests for our baseline DiD analysis. In Panel A, we exclude firms without patents during the sample period. The dependent variable is the number of patents filed in year t (Columns (1) and (2)), or the truncation-adjusted future citations for patents filed in year t (Columns (3) and (4)). The independent variable *PSL* is a dummy variable that equals one for the state and time period after the adoption of PSL mandate, and zero otherwise. Panel B reports the two-way fixed-effect (TWFE) estimates using the approaches proposed by Callaway and Sant'Anna (2021) and Sun and Abraham (2021). In Columns (1), (2), and (5), the dependent variable is the number of patents filed in year t. In Columns (3), (4), and (6), the dependent variable is the truncation-adjusted future citations for patents filed in year t. The independent variable is PSL in Models (1) to (4). PSL is a dummy variable that equals one for the state and time period after the adoption of PSL mandate, and zero otherwise. The independent variables in Models (5) and (6) are PSL^{-4}, PSL^{-3}, PSL^{-2}, PSL^{0}, PSL^{+1}, PSL^{+2}, PSL^{+3} and PSL^{+4}. PSL^{-4}, PSL^{-3}, and PSL^{-2} are dummy variables that equal one if a firm headquartered in a state that will adopt PSL mandates in four or more years, three years, or two years, respectively, and zero otherwise. PSL^{0} is a dummy variable that equals one if a firm headquartered in a state that has adopted PSL mandates in the current year and zero otherwise. PSL^{+1}, PSL^{+2}, PSL^{+3}, and PSL^{+4} are dummy variables that equal one if a firm headquartered in a state that adopts PSL mandates one, two, three, or four or more years after the implementation year, respectively. All models include the same firm-level control variables as in Table 2, and their coefficients are not reported for brevity. We control for firm and year fixed effects, or firm and industry-year fixed effects in some models. T-statistics using robust standard errors adjusted for heteroscedasticity and clustered at the state level are reported in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively.

Panel A: Exclude Firms Without Patents During the Sample Period

Dep. Var.	Patent		Citation	
	(1)	(2)	(3)	(4)
PSL	**-1.881***** **(-3.09)**	**-1.728*** **(-1.92)**	**-3.088***** **(-3.24)**	**-2.418**** **(-2.13)**
Firm Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes
Adj. R^2	0.866	0.865	0.823	0.823
Observations	18,112	16,699	18,112	16,699

Panel B: Two-Way Fixed-Effect (TWFE) Estimates

	Callaway & Sant'Anna				Sun & Abraham	
Dep. Var.	Patent		Citation		Patent	Citation
	(1)	(2)	(3)	(4)	(5)	(6)
PSL	**-0.767***** **(-3.24)**	**-0.860***** **(-3.39)**	**-1.153***** **(-3.09)**	**-1.289***** **(-2.99)**		
PSL^{-4}					**0.011** **(0.04)**	**0.270** **(0.84)**
PSL^{-3}					**0.018** **(0.08)**	**0.221** **(0.55)**
PSL^{-2}					**0.084** **(0.52)**	**-0.028** **(-0.11)**
PSL^{0}					-0.342** (-2.03)	-0.428* (-1.76)
PSL^{+1}					-0.668*** (-2.89)	-0.614* (-1.92)
PSL^{+2}					-0.552** (-2.24)	-1.167*** (-3.10)
PSL^{+3}					-0.969*** (-3.83)	-1.735*** (-5.22)
PSL^{+4}					-1.221*** (-4.12)	-1.529*** (-4.18)
Firm Controls	No	Yes	No	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	No	No
Industry-Year FE	No	No	No	No	Yes	Yes

Table 4
Additional Robustness Tests: Alternative Samples

This table presents the additional robustness tests using alternative sample selection criteria or fixed effects. The dependent variable is the number of patents filed in year t (Columns (1) and (2)), or the truncation-adjusted future citations for patents filed in year t (Columns (3) and (4)). The independent variable *PSL* is a dummy variable that equals one for the state and time period after the adoption of PSL mandate, and zero otherwise. In Panel A, we include firms that are headquartered in cities or counties with separate PSL mandates into the sample. In Panel B, we exclude observations in the year of the implementation of PSL mandates. In Panel C, we exclude observations during the financial crisis (2007 to 2009). In Panel D, we exclude the states with adoptions in 2018 or 2019. Control variables including total assets, cash holdings, financial leverage, capital expenditure, PPE, ROA, R&D, and book-to-market ratio in the previous year are defined in Appendix A. Their coefficients are not reported for brevity. We control for firm and year fixed effects, or firm and industry-year fixed effects in some models. T-statistics using robust standard errors adjusted for heteroscedasticity and clustered at the state level are reported in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively.

Panel A: Include Firms Headquartered in Cities or Counties with Separate PSL Mandates

Dep. Var.	Patent		Citation	
	(1)	(2)	(3)	(4)
PSL	**-0.934***** **(-4.71)**	**-0.592**** **(-2.56)**	**-1.516***** **(-3.93)**	**-0.881***** **(-3.08)**
Firm Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes
Adj. R^2	0.879	0.894	0.835	0.855
Observations	41,474	40,530	41,474	40,530

Panel B: Exclude Observations in the Implementation Year of PSL Mandates

Dep. Var.	Patent		Citation	
	(1)	(2)	(3)	(4)
PSL	**-1.101***** **(-5.37)**	**-0.740**** **(-2.45)**	**-1.833***** **(-3.99)**	**-1.197***** **(-3.35)**
Firm Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes
Adj. R^2	0.878	0.895	0.837	0.859
Observations	36,294	35,194	36,294	35,194

Panel C: Exclude Observations During the Financial Crisis

Dep. Var.	Patent		Citation	
	(1)	(2)	(3)	(4)
PSL	**-1.051***** **(-4.68)**	**-0.648**** **(-2.52)**	**-1.671***** **(-4.03)**	**-1.011***** **(-3.74)**
Firm Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes
Adj. R^2	0.880	0.897	0.837	0.859
Observations	29,541	28,663	29,541	28,663

Panel D: Exclude States with Adoptions in 2018 and 2019

Dep. Var.	Patent		Citation	
	(1)	(2)	(3)	(4)
PSL	**-1.062***** **(-6.13)**	**-0.667**** **(-2.00)**	**-1.753***** **(-4.72)**	**-0.996**** **(-2.67)**
Firm Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes
Adj. R^2	0.873	0.890	0.830	0.852
Observations	33,750	32,574	33,750	32,574

Table 5

Do Local Factors Explain the Decline in Corporate Innovation?

This table presents the analyses that address the concerns that the decline in corporate innovation is driven by local factors that correlate with the passage of PSL mandates. The test design is similar as our baseline analysis (Panel A of Table 2). Panel A presents the pseudo-event test by assigning PSL mandate to a neighboring state that has not adopted PSL. Panel B presents the analysis using the subsample of blue event states (DC, Connecticut, California, Massachusetts, Oregon, Vermont, Washington, Maryland, Rhode Island, New Jersey, and Michigan) and states that have not adopted PSL mandates. Panel C presents the analysis using the subsample of red event state (Arizona) and states that have not adopted PSL mandates. Panel D presents the pseudo-event test similar as Panel A except that we assign PSL mandate to a neighboring *blue* state that has not adopted PSL. We control for firm and year fixed effects, or firm and industry-year fixed effects in some models. T-statistics using robust standard errors adjusted for heteroscedasticity and clustered at the state level, are reported in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively.

Panel A: Pseudo-Event Analysis Based on Neighboring States

Dep. Var.	Patent		Citation	
	(1)	(2)	(3)	(4)
PSL	**-0.147**	**0.052**	**-0.019**	**0.215**
	(-0.43)	**(0.22)**	**(-0.04)**	**(0.70)**
Firm Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes
Adj. R^2	0.878	0.894	0.835	0.857
Observations	37,100	36,015	37,100	36,015

Panel B: The Subsample of Blue Event States

Dep. Var.	Patent		Citation	
	(1)	(2)	(3)	(4)
PSL	**-0.937*****	**-0.567***	**-1.632*****	**-0.950*****
	(-4.10)	**(-1.92)**	**(-3.83)**	**(-2.94)**
Firm Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes
Adj. R^2	0.861	0.862	0.813	0.814
Observations	36,571	35,465	36,571	35,465

Panel C: The Subsample of Red Event State

Dep. Var.	Patent		Citation	
	(1)	(2)	(3)	(4)
PSL	**-0.872***** **(-6.09)**	**-1.022***** **(-3.29)**	**-0.622***** **(-4.03)**	**-1.028***** **(-3.16)**
Firm Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes
Adj. R^2	0.853	0.868	0.798	0.812
Observations	23,014	21,764	23,014	21,764

Panel D: Pseudo Events Using Blue States

Dep. Var.	Patent		Citation	
	(1)	(2)	(3)	(4)
PSL	**-0.136** **(-0.37)**	**0.088** **(0.30)**	**-0.005** **(-0.01)**	**0.204** **(0.51)**
Firm Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes
Adj. R^2	0.878	0.894	0.835	0.857
Observations	37,100	36,015	37,100	36,015

Table 6
Cross-Sectional Tests: Inventor Locations and Voluntary PSL Access

This table reports the cross-sectional analysis of the effect of PSL mandates on corporate innovation. Panel A presents the cross-sectional analysis based on inventor locations. *PSL* is a dummy variable that equals one for the state and time period after the adoption of PSL mandate, and zero otherwise. *Headquarter Patent* or *Headquarter Citation* is the total number of patents filed or truncation-adjusted citations received by invention teams that contain at least one inventor located at the firm's headquarters. *Non-Headquarter Patent* and *Non-Headquarter Citation* are defined similarly to *Headquarter Patent* and *Headquarter Citation*, except they are the total number of patents and citations where none of the inventors in the invention team are located at the headquarters. Panel B presents the cross-sectional analysis based on voluntary PSL access, where we include the interaction of *PSL* and *Low Access*. *Low Access* is a dummy variable that equals one if a firm belongs to an industry (2-digit NAICS) with a ratio of voluntary PSL access below or equal to the sample median, and zero otherwise. We control for firm and year fixed effects, or firm and industry-year fixed effects in some models. T-statistics using robust standard errors adjusted for heteroscedasticity and clustered at the state level are reported in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively.

Panel A: Headquarters Inventor Participation

Dep. Var.	Headquarter Patent	Non-Headquarter Patent	Headquarter Citation	Non-Headquarter Citation
	(1)	(2)	(3)	(4)
PSL	**-0.342****	**-0.047**	**-0.576*****	**-0.134**
	(-2.56)	**(-0.50)**	**(-4.31)**	**(-1.35)**
Firm controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.879	0.871	0.828	0.817
Observations	36,015	36,015	36,015	36,015

Panel B: Voluntary PSL Access

Dep. Var.	Patent		Citation	
	(1)	(2)	(3)	(4)
PSL×Low Access	**-1.649*****	**-1.539*****	**-2.390****	**-2.278****
	(-2.90)	**(-2.92)**	**(-2.21)**	**(-2.22)**
PSL	0.260	0.140	0.110	0.003
	(0.89)	(0.52)	(0.22)	(0.01)
Firm controls	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.875	0.876	0.833	0.834
Observations	34,214	34,214	34,214	34,214

Table 7
PSL Mandates and Inventor Employment

This table presents that the effect of PSL mandates on inventor employment at the firm level. Panel A examines the effect of PSL mandates on inventor inflows. The dependent variables are net inventor inflow *(Net Hiring)* in Models (1) and (2), inventor inflow *(Inflow)* in Models (3) and (4), and inventor outflow *(Outflow)* in Models (5) and (6), respectively. *Inflow* is the number of inventors who join a firm in a given year, while *Outflow* is the number of inventors who leave the firm in that year. *Net Hiring* is the difference between *Inflow* and *Outflow*. The main independent variable *PSL* is a dummy variable that equals one for the state and time period after the adoption of PSL mandate, and zero otherwise. Control variables including total assets, cash holdings, financial leverage, capital expenditure, PPE, ROA, R&D, and book-to-market ratio in the previous year are defined in Appendix A. Panel B is similar to Panel A but examines the effect of PSL mandates on the total number of employees. We control for firm and year fixed effects, or firm and industry-year fixed effects in some models. T-statistics using robust standard errors adjusted for heteroscedasticity and clustered at the state level are reported in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively.

Panel A: PSL Mandates and Inventor Inflows

Dep. Var.	Net Hiring		Inflow		Outflow	
	(1)	(2)	(3)	(4)	(5)	(6)
PSL	**-0.708*****	**-0.417****	**-0.770*****	**-0.471****	**-0.062***	**-0.054***
	(-3.87)	**(-2.10)**	**(-4.22)**	**(-2.50)**	**(-1.91)**	**(-1.81)**
ln(Asset)	0.373***	0.341***	0.429***	0.399***	0.056***	0.059***
	(4.96)	(4.66)	(5.08)	(4.78)	(3.78)	(3.44)
Cash	0.087	-0.008	0.014	-0.065	-0.073	-0.057
	(0.42)	(-0.04)	(0.06)	(-0.27)	(-0.94)	(-0.85)
Leverage	-0.643***	-0.534**	-0.655***	-0.533**	-0.011	0.000
	(-3.67)	(-2.64)	(-3.72)	(-2.45)	(-0.34)	(0.01)
Capx	-0.031	0.899	-0.253	0.677	-0.222**	-0.222**
	(-0.07)	(1.34)	(-0.72)	(1.11)	(-2.20)	(-2.11)
PPE	0.476	0.197	0.450	0.184	-0.026	-0.013
	(1.41)	(0.47)	(1.41)	(0.49)	(-0.45)	(-0.19)
ROA	-0.144	0.010	-0.154	-0.017	-0.010	-0.027
	(-0.99)	(0.07)	(-1.18)	(-0.13)	(-0.42)	(-1.15)
R&D	0.323*	0.416*	0.590***	0.599***	0.267*	0.183*
	(1.74)	(1.93)	(2.83)	(2.72)	(1.86)	(1.69)
B/M	-0.068	-0.104*	-0.069	-0.115*	-0.001	-0.010
	(-1.44)	(-1.75)	(-1.43)	(-1.95)	(-0.14)	(-1.03)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes	No	Yes
Adj. R^2	0.710	0.714	0.785	0.789	0.777	0.778
Observations	37,100	36,015	37,100	36,015	37,100	36,015

Panel B: PSL Mandates and Total Employment

Dep. Var.	Total Employees	
	(1)	(2)
PSL	**0.124**	**0.325****
	(0.69)	**(2.01)**
Firm Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	No
Industry-Year FE	No	Yes
Adj. R^2	0.956	0.961
Observations	36,800	35,712

Table 8

Financial Constraints and the Crowd-Out of Innovation

This table presents the interactive effect of PSL mandates and financial constraint on firm's inventor hiring and innovation. In Panel A, the dependent variables are net inventor inflow (*Net Hiring*) in Models (1) and (2), inventor inflow (*Inflow*) in Models (3) and (4), and inventor outflow (*Outflow*) in Models (5) and (6), respectively. *Inflow* is the number of inventors who join a firm in a given year, while *Outflow* is the number of inventors who leave the firm in that year. *Net Hiring* is the difference between *Inflow* and *Outflow*. The independent variable is the interaction of *PSL* and *Financial Constraint*, where *Financial Constraint* is a dummy variable that equals one if the overall text-based constraint score in Hoberg and Maksimovic (2015) for the firm in the previous year is above the annual sample median, and zero otherwise. Control variables including total assets, cash holdings, financial leverage, capital expenditure, PPE, ROA, R&D, and book-to-market ratio in the previous year are defined in Appendix A. Panel B is similar to Panel A except the dependent variables is the number of patents in Models (1) and (2), or the truncation-adjusted future citations in Models (3) and (4). We control for firm and year fixed effects, or firm and industry-year fixed effects in some models. T-statistics using robust standard errors adjusted for heteroscedasticity and clustered at the state level are reported in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively.

Panel A: Financial Constraints and Inventor Hiring

Dep. Var.	Net Hiring		Inflow		Outflow	
	(1)	(2)	(3)	(4)	(5)	(6)
PSL× Financial Constraint	**-0.676***** **(-3.56)**	**-0.758*** **(-1.89)**	**-0.726***** **(-3.53)**	**-0.759*** **(-1.89)**	**-0.050** **(-1.16)**	**-0.000** **(-0.01)**
PSL	-0.143 (-0.64)	0.060 (0.18)	-0.165 (-0.92)	0.001 (0.00)	-0.022 (-0.42)	-0.059 (-1.30)
Financial Constraint	-0.030 (-0.47)	-0.025 (-0.38)	-0.041 (-0.68)	-0.039 (-0.61)	-0.011 (-0.99)	-0.014 (-1.15)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes	No	Yes
Adj. R^2	0.734	0.732	0.808	0.806	0.779	0.774
Observations	21,832	20,812	21,832	20,812	21,832	20,812

Panel B: Financial Constraints and Innovation

Dep. Var.	Patent		Citation	
	(1)	(2)	(3)	(4)
PSL× Financial Constraint	**-1.009***** **(-2.87)**	**-1.059***** **(-4.20)**	**-1.975***** **(-3.81)**	**-2.085***** **(-4.88)**
PSL	-0.013 (-0.08)	0.048 (0.19)	0.497 (1.36)	0.457 (0.94)
Financial Constraint	-0.079 (-1.43)	-0.090 (-1.35)	-0.090 (-0.96)	-0.127 (-1.16)
Firm controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes
Adj. R^2	0.900	0.914	0.859	0.879
Observations	21,832	20,812	21,832	20,812

Table 9
The Impact of PSL Mandates on Corporate Job Postings

This table presents DiD regressions of firms' job postings on PSL mandates. In Panel A, the dependent variables include a firm's total number of job postings in a given month (*Total Job Postings*), total number of scientist postings (*Scientist Postings*), total number of engineer postings (*Engineer Postings*), and total number of remaining job postings (*Other Job Postings*). *Other Job Postings* include administration, finance, marketing, operations, and sales roles. The independent variable, *PSL Month*, is a dummy variable equal to one for states and months after the adoption of PSL mandates, and zero otherwise. Control variables, including total assets, cash holdings, financial leverage, capital expenditures, PPE, ROA, R&D expenditure, and the book-to-market ratio from the previous year, are defined in Appendix A. Panel B is similar to Panel A, except that we further include the interaction term between *PSL Month* and *Financial Constraint*, where *Financial Constraint* is a dummy variable for financial constraint which equals to one if the firm's equity-focused constraint score (Linn and Weagley 2024) in the previous year exceeds the annual sample median, and zero otherwise. We control for firm and industry-year fixed effects in all models. T-statistics using robust standard errors adjusted for heteroscedasticity and clustered at the state level are reported in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively.

Panel A: Regression of Job Postings on PSL

Dep. Var.	Total Job Postings	Scientist Postings	Engineer Postings	Other Job Postings
	(1)	(2)	(3)	(4)
PSL Month	**-11.779***	**-0.426****	**-4.461****	**-6.282**
	(-1.91)	**(-2.55)**	**(-2.12)**	**(-1.45)**
Firm controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.676	0.754	0.642	0.675
Observations	44,576	44,576	44,576	44,576

Panel B: Regression of Job Postings on PSL and Financial Constraints

Dep. Var.	Total Job Postings	Scientist Postings	Engineer Postings	Other Job Postings
	(1)	(2)	(3)	(4)
PSL Month × Financial Constraint	**-18.983****	**-0.310****	**-3.329***	**-7.583**
	(-2.10)	**(-2.02)**	**(-1.84)**	**(-1.35)**
PSL Month	-1.543	-0.258	-2.439	-2.333
	(-0.18)	(-1.35)	(-1.00)	(-0.41)
Financial Constraint	5.917	0.034	1.479	2.334
	(0.97)	(0.34)	(1.17)	(0.62)
Firm controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.678	0.754	0.643	0.677
Observations	44,258	44,258	44,258	44,258

Table 10

The Impact of PSL Mandates on Corporate Innovation: Disruption of Inventor Collaboration

This table examines the varying effect of PSL mandates on corporate innovation based on *team inventors*, *inventor buffer*, or *work from home*. The regression design is similar to our baseline regressions in Table 2, except we further include the interaction of *PSL* and *High Inventor Teams* (Panel A), *Low Inventor Buffer* (Panel B), or *WFH* (Panel C). We classify a patent as team-developed if it is filed by a team of more than one inventor. *High Inventor Team* is a dummy variable that equals one if the proportion of patents filed by team inventors in the previous year is above the annual sample median, and zero otherwise. For inventor buffer, we first calculate the Herfindahl index based on the three-digit technology class-share of granted patents for the firm in the previous year, and define *Low Inventor Buffer* as a dummy variable that equals one if HHI is below or equal to the annual sample median, and zero otherwise. *WFH* is the percentage of jobs that can be done at home in each 2-digit NAICS from Dingel and Neiman (2020). *Low WFH* is a dummy variable that equals one if the WFH measure is below the sample median, and zero otherwise. Coefficients of control variables are not reported for brevity. We control for firm and year fixed effects, or firm and industry-year fixed effects in some models. T-statistics using robust standard errors adjusted for heteroscedasticity and clustered at the state level are reported in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively.

Panel A: Inventor Teams

Dep. Var.	Patent		Citation	
	(1)	(2)	(3)	(4)
PSL× High Inventor Teams	**-1.723**	**-2.287***	**-3.120****	**-3.816****
	(-1.08)	**(-1.80)**	**(-2.30)**	**(-2.14)**
PSL	-1.132	1.165	-1.626	1.855
	(-0.63)	(0.45)	(-0.83)	(0.60)
High Inventor Teams	-1.418*	-1.224	-1.303	-0.536
	(-1.88)	(-1.61)	(-1.44)	(-0.54)
Firm controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes
Adj. R^2	0.887	0.893	0.847	0.854
Observations	10,050	8,962	10,050	8,962

Panel B: Inventor Buffer

Dep. Var.	Patent		Citation	
	(1)	(2)	(3)	(4)
PSL×Low Inventor Buffer	**-3.889***** **(-5.44)**	**-3.414***** **(-3.63)**	**-5.760***** **(-6.00)**	**-4.552***** **(-3.10)**
PSL	0.045 (0.06)	0.443 (0.38)	-0.260 (-0.29)	0.222 (0.14)
Low Inventor Buffer	3.041*** (8.15)	3.067*** (8.42)	4.152*** (5.92)	4.250*** (6.01)
Firm controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes
Adj. R^2	0.875	0.874	0.834	0.834
Observations	13,515	12,218	13,515	12,218

Panel C: Work From Home

Dep. Var.	Patent		Citation	
	(1)	(2)	(3)	(4)
PSL×Low WFH	**-1.557***** **(-2.79)**	**-1.522***** **(-2.96)**	**-2.316**** **(-2.18)**	**-2.280**** **(-2.28)**
PSL	0.217 (0.77)	0.155 (0.61)	0.100 (0.21)	0.053 (0.12)
Firm controls	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.859	0.861	0.811	0.812
Observations	36,896	36,896	36,896	36,896

Appendix A
Variable Definitions

Variable	Definition
PSL	Dummy variable that equals one for the state and the period after the adoption of the PSL mandate, and zero otherwise.
PSL Hours	The maximum number of paid sick leave hours that can be accrued in a year in states that have implemented PSL mandates, and is set to zero for states without PSL mandates.
PSL Month	Dummy variable that equals one for states and months after the adoption of a PSL mandates, and zero otherwise.
Industry Access	The percentage of access to voluntary PSL in each 2-digit NAICS sector.
Patent	The number of patents filed by the firm in the year.
Citation	The firm's truncation-adjusted future citations of patents filed in the year. We adjust the truncation by dividing patent citations by the mean number of citations filed in that year and in the same three-digit technology class.
Average Citation	The average citations for patents filed by the firm in year t.
Breakthrough Patent	The number of breakthrough patents filed by a firm in the year. Breakthrough patents are defined as those with forward citation counts being in the top 5% of all patents in the same application year and technology class.
R&D	Research and development expenditures, scaled by total assets.
ln(Asset)	The natural logarithm of total assets in million dollars.
Cash	Cash scaled by total assets.
Leverage	Total debt in million dollars, scaled by total assets in million dollars.
Capx	Capital expenditures scaled by total assets.
PPE	Net property, plant, and equipment scaled by total assets.
ROA	Net income, scaled by total assets.
B/M	Book equity scaled by market value.
Total Employees	Total number of employees in thousand for a firm in a given year.
Total Job Postings	Monthly total number of job postings for a firm.
Scientist Postings	Monthly total number of scientist job postings for a firm.
Engineer Postings	Monthly total number of engineer job postings for a firm.
Other Job Postings	Monthly total number of non-innovation-related job postings for a firm. Non-innovation-related jobs including administration, finance, marketing, operations, and sales.
Delaycon	The text-based financial constraint measure based on Hoberg and Maksimovic (2015).
Inventor Buffer	The Herfindahl index (HHI) based on the three-digit technology class-share of a firm's patents in year t.
Team Inventors	Patents that filed by more than one inventor.

Variable	Definition
Inflow	Number of inventors who join a firm in the year.
Outflow	Number of inventors who leave a firm in the year.
Net Hiring	The difference between Inflow and Outflow.
WFH	The percentage of jobs that can work from home in each 2-digit NAICS sector.
Headquarter Patent	The total number of patents filed by invention teams that contain at least one inventor located at the firm's headquarters.
Non-Headquarter Patent	The total number of patents where none of the inventors in the invention team are located at the headquarters.
Headquarter Citation	The total number of truncation-adjusted citation received by invention teams that contain at least one inventor located at the firm's headquarters.
Non-Headquarter Citation	The total number of truncation-adjusted citation where none of the inventors in the invention team are located at the headquarters.

Appendix B
Additional Data Description and Results

Table B1
State-Level Paid Sick Leave Mandates

State	Effective Date	Annual Cap
DC	Nov 13, 2008	<24 employees: 24 hours 24 to 99 employees: 40 hours ≥100 employees: 56 hours
Connecticut	Jan 1, 2012	40 hours
California	July 1, 2015	24 hours
Massachusetts	July 1, 2015	40 hours
Oregon	Jan 1, 2016	40 hours
Vermont	Jan 1, 2017	2018: 24 hours 2019 and after: 40 hours
Arizona	July 1, 2017	<15 employees: 24 hours ≥15 employees: 40 hours
Washington	Jan 1, 2018	no explicit cap
Maryland	Feb 11, 2018	≥15 employees: 40 hours
Rhode Island	July 1, 2018	≥18 employees: 2018: 24 hours 2019: 32 hours 2020 and after: 40 hours
New Jersey	Oct 28, 2018	40 hours
Michigan	Mar 28, 2019	≥50 employees: 40 hours

Table B2
City/County Level Paid Sick Leave Mandates

City	Effective Date	Annual Cap
San Francisco	February 5, 2007	<10 employees: 40 hours ≥10 employees: 72 hours
Seattle	September 1, 2012	<50 employees: 40 hours 50 to 249 employees: 56 hours ≥250 employees: 72 hours
Portland	January 1, 2014	>5 employees: 40 hours
New York	April 1, 2014	≥5 employees: 40 hours
Newark	June 21, 2014	<10 employees: 24 hours ≥10 employees: 40 hours
Philadelphia	May 13, 2015	≥10 employees: 40 hours
Oakland	March 2, 2015	<10 employees: 40 hours ≥10 employees: 72 hours
Montgomery	October 1, 2016	<5 employees: 32 hours ≥5 employees: 56 hours
Cook	July 1, 2017	40 hours
Minneapolis	July 1, 2017	>5 employees: 48 hours
Saint Paul	July 1, 2017	48 hours
Tacoma	January 1, 2018	40 hours
Austin	October 1, 2018	<16 employees: 48 hours ≥16 employees: 64 hours

Table B3
The Effect of PSL Mandates on Corporate Innovation: PSL Hours

This table examines the effect of PSL mandates on corporate innovation. The regression design is similar to Table 2 in the paper, except that the independent variable is *PSL Hours*, which is defined as the maximum number of paid sick leave hours that can be accrued in a year in states that have adopted PSL mandates, and zero for states that have not adopted PSL mandates. T-statistics using robust standard errors adjusted for heteroscedasticity and clustered at the state level are reported in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively.

Dep. Var.	Patent		Citation	
	(1)	(2)	(3)	(4)
PSL Hours	**-0.029*** **	**-0.017** **	**-0.045*** **	**-0.025*** **
	(-3.46)	**(-2.23)**	**(-2.93)**	**(-3.02)**
ln(Asset)	0.786***	0.754***	0.798***	0.777***
	(4.05)	(3.89)	(4.08)	(4.07)
Cash	-0.084	-0.112	0.623	0.227
	(-0.23)	(-0.28)	(1.14)	(0.46)
Leverage	-0.953***	-0.777***	-1.232**	-1.209***
	(-3.23)	(-3.67)	(-2.10)	(-3.16)
Capx	-0.361	0.794	-0.257	1.391
	(-1.02)	(1.48)	(-0.52)	(1.34)
PPE	0.396	0.101	0.832	-0.350
	(0.91)	(0.27)	(1.45)	(-0.61)
ROA	-0.266	-0.116	-0.132	0.138
	(-1.16)	(-0.55)	(-0.51)	(0.57)
R&D	1.140***	1.149***	2.188***	2.514***
	(4.21)	(3.65)	(2.76)	(3.00)
B/M	-0.166**	-0.195***	-0.137**	-0.182**
	(-2.42)	(-3.00)	(-2.17)	(-2.47)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes
Adj. R^2	0.862	0.863	0.814	0.815
Observations	36,574	35,471	36,574	35,471

Table B4
Robustness Tests: Alternative Text-Based Financial Constraint Measures

This table presents the robustness test on the interactive effect of PSL mandates and financial constraint on firm's inventor hiring and innovation. In Panel A, the dependent variables are net inventor inflow (*Net Hiring*) in Model (1), inventor inflow (*Inflow*) in Model (2), inventor outflow (*Outflow*) in Model (3), the number of patents filed (*Patent*) in Model (4), and the truncation adjusted future citation (*Citation*) in model (5), respectively. *Inflow* is the number of inventors who join a firm in a given year, while *Outflow* is the number of inventors who leave the firm in that year. *Net Hiring* is the difference between *Inflow* and *Outflow*. The independent variable is the interaction of *PSL* and *Financial Constraint* in the previous year, where *Financial Constraint* is a dummy variable that equals one if the equity-focused constraint score in Hoberg and Maksimovic (2015) for the firm in the previous year is above the annual sample median, and zero otherwise. Control variables including total assets, cash holdings, financial leverage, capital expenditure, PPE, ROA, R&D, and book-to-market ratio in the previous year are defined in Appendix A. Panel B is similar to Panel A except *Financial Constraint* is constructed using the equity-focused constraint score in Linn and Weagley (2024). We control for firm and industry-year fixed effects in all models. T-statistics using robust standard errors adjusted for heteroscedasticity and clustered at the state level are reported in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively.

Panel A: Equity-Focused Constraint Score (Hoberg and Maksimovic, 2015)

Dep. Var.	Net Hiring	Inflow	Outflow	Patent	Citation
	(1)	(2)	(3)	(4)	(5)
PSL×Financial Constraint	**-0.797***** **(-3.42)**	**-0.881***** **(-3.78)**	**-0.084**** **(-2.21)**	**-1.536**** **(-2.41)**	**-2.125**** **(-2.27)**
PSL	0.077 (0.31)	0.061 (0.24)	-0.016 (-0.37)	0.288 (0.68)	0.470 (0.63)
Financial Constraint	0.100* (1.73)	0.078 (1.44)	-0.021* (-1.71)	0.030 (0.50)	0.061 (0.58)
Firm controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.740	0.813	0.772	0.914	0.879
Observations	20,812	20,812	20,812	20,812	20,812

Panel B: Equity-Focused Constraint Score (Linn and Weagley, 2024)

Dep. Var.	Net Hiring	Inflow	Outflow	Patent	Citation
	(1)	(2)	(3)	(4)	(5)
PSL×Financial Constraint	**-0.582****	**-0.578****	**0.004**	**-0.963*****	**-1.440*****
	(-2.62)	**(-2.52)**	**(0.17)**	**(-3.34)**	**(-3.01)**
PSL	-0.137	-0.168	-0.032	-0.058	-0.221
	(-0.57)	(-0.72)	(-1.11)	(-0.18)	(-0.67)
Financial Constraint	0.051	0.042	-0.009	-0.026	0.033
	(0.99)	(0.84)	(-0.87)	(-0.33)	(0.26)
Firm controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.729	0.790	0.754	0.896	0.859
Observations	34,767	34,767	34,767	34,767	34,767