Does Knowledge Protection Benefit Shareholders? Evidence from Stock Market Reaction and Firm Investment in Knowledge Assets[*]

Buhui Qiu
The University of Sydney

Teng Wang
Federal Reserve Board

December, 2016

Abstract

This paper studies whether knowledge protection affects shareholder value and firms' investment in knowledge assets using the staggered adoptions and rejections of the inevitable disclosure doctrine (IDD) by U.S. state courts as exogenous changes in the level of knowledge protection. We find positive (negative) abnormal stock returns around the IDD adoption (rejection) day for firms headquartered in the state and uncover a positive IDD treatment effect on firms' investment in knowledge assets. Moreover, the effects on stock returns and knowledge assets investment are stronger in more knowledge-oriented states, industries, and firms. Finally, enhancing knowledge protection does not discourage local entrepreneurial activity.

Keywords: Knowledge Protection; Inevitable Disclosure Doctrine; Shareholder Value; Investment in Knowledge Assets

[*] Buhui Qiu is affiliated with the University of Sydney, NSW 2006, Australia; Email: buhui.qiu@sydney.edu.au; Phone: 61-2-9036-6435. Teng Wang is affiliated with the Board of Governors of the Federal Reserve System, 20th Street and Constitution Ave NW, Washington, DC 20551, USA; Email: teng.wang@frb.gov; Phone: 1-202-452-6436. We thank Jarrad Harford (the editor), an anonymous referee, Stijn Claessens, Douglas Foster, Bobae Choi, Janet Gao (NFA discussant), Harald Hau, Kathleen Johnson, Doowon Lee, Amir Licht, Ben Marshall, Ron Masulis, Alexandre Mas, Nick Nguyen, Enrico Perotti, Tong Zhou (FMA Asia discussant), seminar participants at the Federal Reserve Board, Massey University, the University of Newcastle, and the University of Sydney, and conference participants at the 2017 American Economic Association Meeting (scheduled), 2016 Northern Finance Association Meeting, 2016 Financial Management Association Asia Pacific Conference, 2016 Eastern Finance Association Meeting, and 2015 FIRN Annual Conference for helpful comments and suggestions. We gratefully acknowledge Financial Management Association for the 2016 FMA Asia Pacific Conference Best Paper Award in Corporate Finance/Financial Institutions for an earlier version of the paper. All errors are our own. The views expressed in this paper are solely those of the authors and should not be interpreted as reflecting the views of the Board of Governors or the staff of the Federal Reserve System.

1. Introduction

The role of knowledge protection is controversial in today's knowledge economy. There has been a century-long debate around whether we should allow production-relevant knowledge to move freely across economic agents; little consensus has been reached thus far. On the one hand, knowledge protection restrains positive local externalities among industry peers. Studies show that firms benefit from having access to skilled labor/knowledge created by rivals and other agents and can improve efficiency and build up research capacity on the findings of others. Local knowledge externalities, for example, are considered to be a driver for industry clustering and regional economic growth (see, e.g., Marshall, 1920; Romer, 1986; Krugman, 1991; Porter, 1998; Ellison, Glaeser, and Kerr, 2010). On the other hand, absent knowledge protection, there is little incentive for firms to invest in training employees and generate firm-specific knowledge given that they expect proprietary knowledge to be easily leaked to competitors through employees' job switching. Literature suggests that investment in employee training and proprietary knowledge assets is an important engine for productivity improvement and economic growth (see, e.g., Tomer, 1987; Lucas, 1988; Becker, 1993; Jovanovic and Rousseau, 2001; Atkeson and Kehoe, 2005; McGrattan and Prescott, 2010; Bloom, Sadun, and Van Reenen, 2012).

Despite this longstanding controversy, there is a lack of empirical evidence illustrating the direct effect of knowledge protection on firm shareholder value and investment in knowledge assets. Does knowledge protection benefit the shareholders of a firm, or does it do more harm than good? Does it encourage firms to invest in knowledge assets? The lack of empirical evidence likely reflects the fact that several identification challenges exist in testing the impact of knowledge protection. For instance, how well a firm protects its proprietary knowledge is typically not directly observable and hence not measurable. Moreover, even if it were, the level of knowledge protection

would likely be correlated with other firm characteristics, which makes causality difficult to establish.

In this paper, we use the staggered adoptions of the inevitable disclosure doctrine (IDD) or rejections of the previously adopted IDD by U.S. state courts as natural experiments and study whether exogenous changes in the level of knowledge protection affect firm shareholder value and investment in knowledge assets. The extant literature suggests that one primary channel through which proprietary knowledge of the firm is leaked to competitors is through the mobility of employees with production-relevant knowledge (Jaffe, Trajtenberg, and Henderson, 1993; Matusik and Hill, 1998; Almeida and Kogut, 1999; and Breschi and Lissoni, 2001). The IDD is specifically designed to protect firm-specific knowledge from being leaked to rival firms: This legal doctrine prevents a former employee from working for a rival firm if doing so will inevitably disclose the former employer's proprietary knowledge or trade secrets to a rival. As the enforcement of the IDD is not contingent upon the type of a former employee's contract or the location of future rival firms or whether a non-compete agreement is in place, it limits potential outside employment options for knowledgeable employees. The adoption of this legal doctrine by a state court thus significantly enhances the ability of firms located in a particular state to protect their production-relevant knowledge.

To understand the impact of the IDD rulings on firm shareholder value, we rely on firm geographic location information and use the event study methodology to measure firm stock price reactions around major IDD court ruling events in states where firms are located. Ex-ante, the effect of IDD adoption on firm shareholder value is ambiguous. IDD adoption should increase a firm's incentive to train employees and invest in developing firm-specific knowledge, which will improve the firm's competitive edge and thus increase shareholder value. At the same time,

however, the adoption of the IDD can also make it more difficult for firms to recruit valuable employees from peer firms and institutions and obtain new knowledge, which can be detrimental to shareholder value. Given that the U.S. stock market is, on average, efficient (see, e.g., Fama, 1998), stock price reactions around major IDD rulings that change the level of state knowledge protection should reflect the net impact of the IDD on firm shareholder value.

We then investigate how the IDD rulings affect a firm's investment in knowledge assets by focusing on changes in the firm's annual selling, general and administrative (SG&A) expenses following IDD changes. SG&A expenses include employee training costs, IT investment, consulting, advertising and marketing expenses, R&D expenses, and information systems and distribution channel investment, which are expenses aimed at improving the firm's body of proprietary knowledge. Many studies (see, e.g., Lev and Radhakrishnan, 2005; Lev, Radhakrishnan, and Zhang, 2009; Banker, Huang and Natarajan, 2011; Eisfeldt and Papanikolaou, 2013; Zhang, 2014; Li, Qiu, and Shen, 2015) have validated that capitalized SG&A is a good proxy of a firm's organization capital, that is, the agglomeration of proprietary knowledge, including operational processes or know-how, that generates a competitive edge for the firm and cannot be easily imitated by its competitors (Prescott and Visscher, 1980).[1] We conjecture that firms gain more protection over their proprietary knowledge assets after the adoption of the IDD. Thus, they should have an increased incentive to invest in organization capital, and their annual SG&A expenses should subsequently increase. We exploit the staggered adoptions of the IDD and rejections of the previously adopted IDD across different states and over time and use a difference-

[1] SG&A expenses include R&D expenses (Compustat Manual) and 82% of Compustat firm-year observations have valid (i.e., non-missing) information on SG&A expenses. By contrast, many firms do not separately report R&D expenses. For example, Koh and Reeb (2015) find that in their sample of 3000+ NYSE-listed firms, 1,737 of them do not report any information on R&D while 373 of them report zero R&D. The proprietary knowledge assets the IDD aims to protect are trade secrets of the firm, which are typically not patented and hence not protected by patent law (see, e.g., Geng, Hau and Lai, 2014, for studies on patent protection and patent success).

in-differences regression approach to identify the causal relationship between knowledge protection and firms' investment in knowledge assets.

The main result from the event study shows that the adoption of the IDD by a state court, on average, leads to significantly positive abnormal stock returns around the adoption day for firms headquartered in that state, while the rejection of the previously adopted IDD leads to significantly negative abnormal returns. The magnitude of abnormal returns is also significant. The adoption of the IDD leads to an average cumulative abnormal return (CAR) of 1.0% in the (-2,2) event window, while the rejection of the previously adopted IDD leads to an average CAR of -2.7% in the (-2,2) window. The asymmetric responses on adoption and rejection decisions suggest that the rejection of the previously adopted IDD is a greater surprise to the market than is the initial adoption (i.e., the information content of a subsequent rejection ruling given the IDD was adopted in the first place is greater than that of an initial adoption ruling).

Our further investigation into the cross-sectional variation in stock price reactions reveals that the impact of knowledge protection changes on shareholder value is stronger (weaker) in states, industries, and firms that are more (less) knowledge oriented. Specifically, we find stronger results in states that have more abundant skilled labor supply, in industries that are high-tech or have more R&D intensity or a higher patent count, and in firms that spend more on R&D or SG&A or have more patents granted. Interestingly, we find that the positive (negative) effect of IDD adoption (rejection) on shareholder value is weaker in states with stronger connections between local research-intensive universities and related industries. This result suggests that, as local industries in those states depend heavily on research universities as a source for innovative knowledge and skilled labor (see, e.g., Zucker, Darby, and Brewer, 1998; Kantor and Whalley, 2014), the adoption of the IDD (rejection of the previously adopted IDD) makes it more difficult

(makes it easier) for firms to recruit valuable employees and obtain new knowledge from local research universities.

Using a difference-in-differences regression framework, we uncover a statistically significant and positive treatment effect of the IDD on annual knowledge assets investment, which, on average, amounts to 0.7% of annual sales revenue of a firm. The result indicates that firms increase their investment in organization capital to develop and accumulate firm-specific knowledge after the stricter legal protection of proprietary knowledge comes into force. This treatment effect is especially strong in knowledge-oriented states, industries, and firms. Various placebo tests with factitious IDD events, including neighbouring-state IDD rulings, confirm the robustness of our finding. We further find that the effect of headquarter state IDD ruling on stock price and subsequent knowledge assets investment is concentrated on firms that are geographically non-dispersed.

Finally, as prior literature argues that knowledge spillovers encourage entrepreneurship, we further examine whether enforcing knowledge protection harms local entrepreneurial activity. We fail to uncover any negative impact of the IDD on local entrepreneurial activity.

This study contributes to the literature on the role of firm knowledge protection. Liebeskind (1996) points out the importance of knowledge protection, as it allows a firm to maintain its competitive advantage and extract economic rents from such private knowledge. Proprietary knowledge assets of the firm can be spilled over to rival firms through the mobility of employees who disclose production-relevant proprietary knowledge and organizational know-how of the firm to its rivals (see, e.g., Jaffe, Trajtenberg, Henderson, 1993). Prior research disagrees on the consequences of knowledge protection. Some studies show that the enforcement of knowledge protection leads to firm innovation (see, e.g., Taylor, 1994; Zhao, 2006; Lerner, 2009) and

contributes to economic growth (see, e.g., Gould and Gruben, 1996; Park and Ginarte, 1997; Falvey, Foster, and Greenaway, 2006). Other studies argue that knowledge spillover within industry clusters is necessary, as it benefits firms and contributes to regional economic growth (see, e.g., Romer, 1986; Krugman, 1991; Samila and Sorenson, 2011). Theoretical work by Hellmann and Perotti (2011) argues that boundaries established by firms help generate new ideas but may prevent further improvement and completion through idea circulation. There is little evidence in the literature thus far on the effect of knowledge protection on shareholder value of the firm. In this paper, we empirically show that the exogenous increases in the legal protection of firms' proprietary knowledge bring net benefits to firm shareholders.

The study is also related to the literature on firms' investment in knowledge assets. Many studies focus on organization capital (i.e., the agglomeration of firm proprietary knowledge) and have established the positive effect of firms' investment in knowledge assets on production output (see, e.g., Marshall, 1930; Arrow, 1962; Rosen, 1972; Jovanovic, 1979; Prescott and Visscher, 1980; Tomer, 1987; Becker, 1993; Ericson and Pakes, 1995; Hall, 2000; Jovanovic and Rousseau, 2001; Atkeson and Kehoe, 2005; Bloom, Sadun, and Van Reenen, 2012). Several studies have shown positive associations between organization capital and firm value (see, e.g., Lev, Radhakrishnan, and Zhang, 2009; Banker, Huang and Natarajan, 2011; Eisfeldt and Papanikolaou, 2013). In this paper, we use staggered changes in the IDD as natural experiments and establish a positive treatment effect of knowledge-protection enforcement on the firm's investment in knowledge assets.

This paper also adds new evidence to the law and finance literature. Previous studies primarily focus on the role of the enforcement of legal systems in the area of investor protection and show that strong law enforcement, which provides good legal protection to investors, also

facilitates financial-market development and enhances firm valuation (see, e.g., La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1998, 2002). Some recent studies focus on labor regulations and investigate the impacts on firm behavior (see, e.g., Fallick, Fleischman, and Rebitzer, 2006; Marx, Strumsky, and Fleming, 2009; Garmaise, 2011; Acharya, Baghai and Subramanian, 2013; Wang, 2016; Younge and Marx, 2015).[2] There is a growing literature linking intellectual property law and firms' financing choices. For example, Klasa, Ortiz-Molina, Serfling, and Srinivasan (2014) find that intellectual property protection affects firms' capital structure decision, and Leung, Mazouz, and Chen (2015) find that intellectual property protection benefits small firms by improving the liquidity of equity financing and reducing their costs of capital. Finally, Flammer and Kacperczyk (2016) show that intellectual property protection affects firms' engagement in corporate social responsibility. Our paper contributes to the literature by showing that stricter enforcement of knowledge protection leads to positive abnormal stock returns and encourages the firm to increase its investment in knowledge assets, and the effects are stronger in states, industries, and firms that are more knowledge oriented.

The rest of the paper proceeds as follows. Section 2 discusses the legal background on the IDD and the related data and measurement. Section 3 reports the empirical strategy and results. Section 4 concludes. The Appendix provides a table that describes the variables used in the study and their data sources.

2. Institutional background and data

2.1. Knowledge protection and the inevitable disclosure doctrine

[2] Note that the state enforcement strength of non-compete agreements is largely time-invariant. There are only a few state regulatory changes related to the enforcement of non-compete agreements and the timing of these few changes is unrelated to our IDD count cases. In our cross-sectional and panel regressions, we control for state fixed effects or firm fixed effects as well as year fixed effects. Thus, heterogeneous state non-compete agreement enforcement is unlikely to affect the results.

Firms spend time and resources accumulating valuable production processes and knowledge, designing products, and compiling a client base. The doctrine of inevitable disclosure is a concept of common law that substantially strengthens the protection of trade secrets. The legal doctrine effectively prevents a firm's former employees from working at its competitors if such employment relationships lead to inevitable disclosures of the firm's trade secrets to its competitors (Hyde, 2003; Graves and DiBoise, 2006). In the United States, the enforcement of trade secrecy protection is at the state level. The strength of enforcement varies across states and time, and the nature of what a firm can claim as a legitimate protectable interest depends on the decision made at the level of state jurisdiction. With the adoption of the IDD by a state court, a firm registered in that state can obtain an injunction to prohibit a former employee from working at a competitor and, hence, effectively prevent its trade secrets from being spilled over to its competitors. By contrast, the rejection of the previously adopted IDD makes a firm's knowledge protection more vulnerable to employee job hopping. Evidence shows that the adoption of IDD effectively restrains knowledgeable employees' mobility to rival firms and, hence, limits cross-firm knowledge spillover (Png and Samila, 2013).

The main question asked in this study is how firm shareholder value and knowledge assets investment respond to significant exogenous changes in the level of knowledge protection in a state. To this end, we mainly focus on precedent-setting cases in which state courts make significant changes to the status quo with respect to the level of firm proprietary knowledge protection. Based on Png and Samila (2013) and the legal studies of Wiesner (2012), Kahnke, Bundy, and Liebman (2008), Kahnke and Bundy (2013) and Malsberger, Pedowitz, and Brock

(2015),[3] as well as a comprehensive review of IDD-related court cases in the LexisNexis database,[4] we identify major precedent-setting cases in which U.S. state courts 1) clearly adopted the IDD and hence increased firms' ability to protect proprietary knowledge or 2) clearly rejected the previously adopted IDD and hence decreased firms' ability to protect proprietary knowledge in each state over time.[5]

The list of primary U.S. state court rulings that adopted the IDD or rejected the previously adopted IDD is summarized in Table 1. In total, we identify 34 primary IDD court-ruling events spanning from 1960 to 2014 in the United States, of which 24 are adoption and 10 are rejection of the previously adopted IDD. The latter (IDD-reversal) events are in the states of California, Florida, Indiana, Massachusetts, Michigan, Minnesota, New York, North Carolina, and Texas.[6]

An example of an IDD-adoption case is *DoubleClick v. Henderson* in the state of New York in 1997. Two executives from DoubleClick, an online-advertising firm headquartered in NYC, considered launching their own online-advertising business. When discovered, they were fired and DoubleClick filed a lawsuit at the New York State Supreme Court, seeking a preliminary injunction to bar the two defendants from engaging in business activities that compete with DoubleClick. Although neither defendant had signed a non-compete agreement with DoubleClick,

[3] We thank Professor I.P.L. Png for sharing these legal studies with us and thank lawyers Randall Kahnke and Kerry Bundy for generously sharing with us insights into the state-by-state adoption and rejection of the IDD.
[4] When searching in the LexisNexis database, we used 'inevitable disclosure' and 'inevitably disclose' as keywords.
[5] IDD-rejection cases in the states that never adopted the IDD before, such as Virginia (e.g., *Gov. Tech. Servs., Inc. v. IntelliSys Tech. Corp.* in 1999), Louisiana (e.g., *Standard Brands, Inc. v. Zumpe* in 1967) and Maryland (e.g., *LeJeune v. Coin Acceptors, Inc.* in 2004), are not in our sample since such cases do not change the level of firms' ability in protecting proprietary knowledge in these states significantly.
[6] Minnesota later re-adopted the IDD. California reversed the previously adopted IDD via the *Electro Optical Indus., Inc. v. Stephen White* case on November 30, 1999, through two court rulings: 1) California Supreme Court ordered the California Court of Appeal's decision on the *Electro Optical Indus., Inc. v. Stephen White* case to be depublished on April 12, 2000, and 2) the California Court of Appeal's ruling on the *Whyte v. Schlage Lock Co.* case on September 12, 2002 clearly rejected the IDD. We treat the first ruling as "half rejection"; the Supreme Court left the Appeal Court's decision unchanged, but prevented the opinion from being cited by any California court, which dealt proponents of the inevitable disclosure doctrine a blow since this left them with no California case to cite for support (Lincicum, 2002).

the New York State Supreme Court ruled that the two defendants were enjoined for a period of six months from launching any company or taking employment with any company which competes with DoubleClick. The ruling was based on the doctrine that there is a high probability of "inevitable disclosure" of the former employer's trade secrets to competitors. The court states that "Injunctive relief may issue where a former employee's new job function will inevitably lead her to rely on trade secrets belonging to a former employer." The court based the six-month period on the rapidly evolving changes in the Internet advertising industry and left the door open for the plaintiff to apply for an extension after the expiration of the six-month period "upon a showing of good cause".

Unlike the passage of state laws, which might be subject to the influence of lobbying and other political pressure, adoption and rejection of the IDD are based on court rulings on specific major cases that serve as precedent-setting cases for future follow-up cases. As a court's ruling on a precedent-setting major IDD case mainly depends on the nature of the case and the character of the justices, state courts' rulings regarding the IDD are arguably exogenous to firms and shareholders' decision making processes. We further control for local market conditions and direct various checks to mitigate remaining concerns.

2.2. Firm characteristics and stock returns

We identify all firms that were headquartered in the IDD-event states at times when there were changes in the IDD. We focus on firm headquarters because corporate headquarters are close to corporate core business activities and employees who have access to key proprietary knowledge are likely to be concentrated at headquarters (Pirinsky and Wang, 2006). We extract firms' daily stock returns data from CRSP and financial data from Compustat. We measure firms' stock price

reactions around the adoption of the IDD and the rejection of the previously adopted IDD to capture the impact of IDD-change events on shareholder wealth. We then link stock price reactions to firms' characteristics *prior to* the IDD-change events to study the cross-sectional variation in stock price reactions to such events. We construct variables that reflect the degree to which firms are knowledge-oriented, such as firm R&D intensity (*Rnd_sale*), firm SG&A intensity (*Sga_sale*), and firm patent count (*Patent_count*). These three variables capture the knowledge intensity of firms, and a firm that is more knowledge-oriented should score higher on these variables. We also include standard control variables such as firm size (*Firm_size*), firm market-to-book equity ratio (*Market_to_book*), and past stock returns of the firm (*Past_stock_return*), as it is well known that these firm characteristics are related to cross-sectional stock returns. The cross-sectional sample consists of 4,535 firm events in which a firm's headquarter state adopts the IDD and 3,857 firm events in which a firm's headquarter state rejects the previously adopted IDD over the 1960 to 2014 period, with non-missing data on stock returns and firm characteristics. Following the prior literature on organization capital, we use annual SG&A expense to capture firms' investment in firm-specific knowledge assets (*Knowledge assets investment*).

2.3. Industry, state, and economic conditions

In addition to firm characteristics, we collect data at the industry and state levels to capture the level of knowledge intensity of the industry to which the firm belongs and the state where the firm is located. Based on data from the Census Bureau and the National Science Foundation, we construct two state-level knowledge-intensity variables reflecting the amount of skilled labor available (*Skilled_labor*) and state industry-financed R&D expenditure at research intensive (doctoral granting) universities (*Industry_financed_R&D*). Prior research considers research

universities as one important source of innovative knowledge and skilled labor for private enterprises in the area (e.g., Jaffe, 1989). Although higher values of both variables indicate greater knowledge intensity in a state, it is important to consider the different perspectives of knowledge intensity captured by these variables. While *Skilled_labor* captures local skilled labor intensity, industry-financed R&D expenditure reflects the reliance of local industries on research institutes as a source of knowledge creation and innovation.

To capture the level of knowledge intensity at the industry level, we include industry R&D intensity (*Ind_rnd_sale*), industry SG&A intensity (*Ind_sga_sale*), average number of patents granted to firms in the industry (*Ind_patent_count*), and an indicator variable for high-tech industries according to the Fama-French 10-industry classification (*High tech*). We expect that the more knowledge-oriented the state/industry/firm is, the larger the impact of the IDD changes on shareholder value and firms' investment in knowledge assets will be. To control for the potential effect of the state economic environment on shareholder value and firms' investment in knowledge assets, we further construct variables that reflect the local economic conditions, such as the level of local economic development (*Per_capita_state_income*), market size (*Total_state_income*), and growth perspective (*Total_state_income_growth*), based on data from sources such as the U.S. Census Bureau and Bureau of Economic Analysis.

Table A1 in the Appendix provides detailed definitions and data sources for each of these variables and Table 2 provides the summary statistics. The correlation matrix is shown in Table A2 in the Appendix. All dollar values are in 2014 constant dollars and all continuous variables are winsorized at the 1st and 99th percentiles to limit the influence of outliers.

3. Empirical results

3.1. The impact of knowledge protection on shareholder value

We use the event-study methodology to capture the impact of knowledge protection on shareholder value. We calculate cumulative abnormal returns (CARs) during the 11-day, 5-day, and 3-day event windows (i.e., *CAR(-5,5), CAR(-2,2)* and *CAR(-1,1),* respectively) around the adoption and rejection of the IDD. We use both the market-adjusted model and the market model to calculate cumulative abnormal returns, with the CRSP value-weighted stock market returns (including dividends) as the market portfolio returns. The estimation window for the market model is (-200, -60) before the event date (Chen, Harford, and Li, 2007). Findings are shown in Table 3. Standard errors are clustered at the state level to account for within-state cross-sectional correlations.

The results show that the adoption of the IDD (rejection of the previously adopted IDD) by a state court leads, on average, to statistically significant positive (negative) impact on shareholder value for firms headquartered in the IDD-change state. Using the market-adjusted model, we find an average 5-day abnormal return (*CAR(-2,2)*) of 1.0% during an adoption event and -2.7% during a rejection event. The result is economically meaningful given that the sample firms' average daily abnormal return during this period is only around 0.045%. The results remain qualitatively similar when we use the market model to calculate CARs. The results are also qualitatively similar when we use alternative windows of 3 days and 11 days around the events. The market, on average, reacts positively to IDD adoptions and reacts negatively if the previously adopted IDD is later revoked or rejected by a state court. If the court ruling outcomes had largely been expected, we should not have observed such strong average market reactions. If, given the previous adoption of the IDD, the subsequent reversal of the court's position on the doctrine is a greater surprise to the market than is the initial adoption, we should expect smaller positive abnormal returns for positive

rulings and larger (in magnitude) negative returns for negative rulings, and this is exactly what we see. Thus, the empirical evidence suggests that enhancing the level of knowledge protection in a firm does materially increase its shareholder value.

The success of knowledge-oriented firms highly depends on the creation of new knowledge and organizational know-how. Protecting proprietary knowledge from being leaked to competitors is thus more relevant for firms that are more knowledge-oriented; the adoption of the IDD enables such firms to maintain their competitive edge and thus creates more value for such firms. We conjecture that the shareholder-value-enhancing effect of knowledge protection should be stronger (weaker) for firms that are more (less) knowledge-oriented or that are located in more (less) knowledge-oriented states or industries. Table 4 reports the results of ordinary-least-squares regressions that investigate the relations between firms' cumulative abnormal stock returns surrounding the adoption and rejection of the IDD and various state/industry/firm characteristics reflecting the level of knowledge intensity. We focus on the regression results with *CAR(-2,2)* calculated using the market-adjusted model as the dependent variable. Results using alternative event windows or the market model are qualitatively similar and are omitted for brevity. Firm size, market-to-book, past stock returns, per capita state income, total state income, total state income growth, and year fixed effects are included as controls in all regressions. Robust standard errors are clustered at the state level to account for within-state cross-sectional correlations in regression residuals.

Panel A of Table 4 reports the influence of state-level variables of interest on *CAR(-2,2)* during the IDD adoption and rejection events. *CAR(-2,2)* is significantly and positively related to state skill labor intensity (*Skilled_labor*) in the IDD-adoption regression and insignificantly so in the IDD-rejection regression. This finding suggests that firms derive more benefit from their

proprietary knowledge due to the adoption of the IDD in states that are more knowledge-oriented, which is consistent with our conjecture that an increase in the level of knowledge protection is more important for more knowledge-oriented environments. Interestingly, the regression coefficient of *Industry_Financed_R&D* is negative in the IDD-adoption regression and significantly positive in the IDD-rejection regression, which suggests that the positive (negative) effect of IDD adoption (IDD reversal) on shareholder value becomes weaker when there are closer ties in a state between research-intensive universities and local industries. Prior research shows that industries located close to research institutes rely on positive externality and knowledge spillover from research-intensive universities (see, e.g., Zucker, Darby, and Brewer, 1998; Kantor and Whalley, 2014). Our results likely reflect the fact that the adoption of the IDD (the rejection of the previously adopted IDD) makes it more difficult (makes it easier) for firms to hire valuable employees from local research universities and receive beneficial knowledge spillovers from universities.

Panel B reports the influence of industry-level variables of knowledge intensity on *CAR(-2,2)*. In addition to year fixed effects, we include state fixed effects to control for the cross-sectional heterogeneity in state characteristics that may drive stock price reactions of firms located in the same state. Consistent with our conjecture, the regression coefficients of the industry-level knowledge-intensity proxies, such as industry R&D intensity (*Ind_rnd_sale*), industry SG&A intensity (*Ind_sga_sale*), industry patent count (*Ind_patent_count*) and the high-tech indicator (*High tech*), are all positive in the IDD-adoption regressions, although none of them is statistically significant. In contrast, the coefficients of these industry-level knowledge-intensity proxies are all negative in the IDD-rejection regressions, with the coefficients of *Ind_rnd_sale*, *Ind_patent_count*, and *High tech* also being statistically significant. The results indicate that the

impact of knowledge protection via the enforcement of the IDD is more pronounced for firms in more knowledge-oriented industries. Shareholder value increases (decreases) as knowledge-oriented firms are better (less) able to protect their proprietary knowledge and maintain their competitive edge due to the adoption of the IDD (rejection of the previously adopted IDD). The result also appears to be economically significant. For example, firms in the high-tech industry, on average, suffers an additional -3.1% abnormal return during the 5-day event window for IDD-rejection events, which more than doubles the average impact of IDD rejection.

Panel C reports the influence of firm-level variables of knowledge intensity on *CAR(-2,2)*. We find that the regression coefficients of firm R&D intensity (*Rnd_sale*), firm SG&A intensity (*Sga_sale*), and firm patent count (*Patent_count*) are all positive in the IDD-adoption regressions, with the coefficients of *Rnd_sale* being statistically significant. In contrast, these variables all have a negative influence on abnormal stock returns during the IDD-rejection events, and their regression coefficients are all statistically significant. These results are generally consistent with the findings at the state and industry levels and, again, support the conjecture that knowledge protection is especially relevant for knowledge-oriented firms. For firms for which know-how and organizational processes are important production inputs, the ability to protect such knowledge is crucial to their success and enables them to maintain their competitive edge, which increases their shareholder value.

In sum, the empirical evidence suggests that the positive (negative) effect of the adoption of the IDD (rejection of the previously adopted IDD) on abnormal stock returns is generally stronger for knowledge-oriented firms and firms that are located in states and industries that are more knowledge-oriented. The results suggest that proprietary knowledge protection brings greater benefits to shareholders of those firms.

3.2. The influence of knowledge protection on firms' investment in knowledge assets

We next investigate whether changes in knowledge protection affect firms' investment in firm-specific knowledge assets. The adoption of the IDD (rejection of the previously adopted IDD) by a state court exogenously increases (decreases) the ability of knowledge protection for all firms located in that state. We expect that these affected firms will have a stronger (weaker) incentive than before to develop and accumulate firm proprietary knowledge. We study changes in a firm's investment in knowledge assets following an IDD adoption or rejection by examining subsequent changes in its annual SG&A expenses. SG&A expenses are regarded as a common proxy for firms' investment in organization capital (i.e., the agglomeration of proprietary knowledge), including firms' investment in training employees and developing firm-specific production processes and know-how. Enforcing (weakening) a firm's level of knowledge protection via adopting the IDD (rejecting the previously adopted IDD) should result in an increase (decrease) in the firm's subsequent SG&A expenses.

We use a difference-in-differences approach to study the potential treatment effect of the IDD changes on firm's knowledge assets investment. The analyses are conducted using yearly CRSP-Compustat data that cover the period from January 1960 to December 2014. The dependent variable, *Knowledge assets investment*, is the amount of the firm's SG&A expenses scaled by sales revenue in a fiscal year. To allow enough time for firms to adjust their subsequent knowledge assets investment in response to the exogenous IDD shock to their level of knowledge protection when the IDD was adopted, we set the value of the indicator variable of interest, *IDD*, to one starting from the second year after state court (in which the firm is headquartered) adopted the IDD and zero for all years preceding. When the previously adopted IDD was subsequently rejected, the variable is reversed back to zero from one starting from the second year after state court (where

the firm is headquartered) rejected the IDD. In the case of California, we set the *IDD* indicator from zero to 0.5 after its IDD adoption and subsequent Supreme Court overrule, and from 0.5 to zero after the later IDD rejection.[7] In the case of North Carolina, we set the *IDD* indicator from zero to 0.5 when its state court first attempted but did not fully adopt the IDD, and from 0.5 to one after its court later fully adopted the doctrine, and from one to zero when its court rejected IDD subsequently.[8] The model specification is as follows:

$$Knowledge\ assets\ investment_{i,t} = \alpha + \beta_1 IDD_{s,t-2} + \beta_2 Controls_{s,i,t-1} + \omega_i + \mu_t + \varepsilon_{i,t}. \quad (1)$$

Regression (1) tests the impact of the IDD changes on knowledge assets investment, where i represents firm, *s* represents state, and *t* represents year. We control for various firm characteristics, including lagged firm size, lagged market-to-book, lagged knowledge assets investment, lagged sales growth, lagged leverage, and lagged return on assets (ROA). We also include lagged per capita state income, lagged total state income, and lagged total state income growth to capture the level of development, size, and growth perspective of the local economy, as local economic conditions could affect firm knowledge assets investment. In addition, we include firm fixed effect ω_i and year fixed effect μ_t to control for both time-invariant unobservable firm factors and nationwide shocks that happened during a particular year and could affect both changes in the IDD and knowledge assets investment patterns. Thus, we estimate the within-firm differences over time in firms' investment in knowledge assets (Wooldridge, 2006). Robust standard errors are clustered at the state level to address the potential concern of within-state correlations of the regression residuals.

[7] Our results remain qualitatively unchanged if we set *IDD* to zero for California throughout or exclude California from the analysis.

[8] Our results do not change in any qualitative manner if we set the IDD indicator in North Carolina to zero for all years before its court fully adopted the doctrine.

Table 5 presents the difference-in-differences regression results. It is clear that there is a positive treatment effect of the IDD changes on annual knowledge assets investment. The coefficient is statistically significant at the 5% level and, on average, amounts to 0.7% of the annual sales revenue of a firm. This result indicates that knowledge protection enforcement after the IDD changes stimulates firms to increase their investment in organization capital and knowledge accumulation. The economic significance is sizable: The average annual sales of CRSP-Compustat firms is around $786.7 million during the sample period. A 0.7% increase in sales-scaled knowledge assets investment means that, compared with firms located in states that do not adopt the IDD, an average firm will spend an extra $5.5 million investing in knowledge assets on an annual basis after its headquarter state court adopts the IDD.

We further conduct various placebo experiments by creating fictitious changes in the IDD around the actual changes in the law-change states. We re-estimate the difference-in-differences regression models using these placebo *IDD* indicator variables. Although the coefficients of *IDD* are positive in these placebo regressions, they are statistically insignificant and are decaying in magnitude when we move further away from the actual change.

We further visualize the treatment effect of the changes in state courts' enforcement of the IDD on firm knowledge assets investment. Figure 1A compares the changes in knowledge assets investment by firms headquartered in states where state courts adopted the IDD with that of firms headquartered in states where the IDD was not changed. It is clear that the treatment and control firms have parallel trends in knowledge assets investment before the IDD adoption, and the treatment firms' knowledge assets investment significantly increases relative to that of the control firms after their headquarter state courts adopt the IDD. Similarly, the treatment and control firms have parallel trends in knowledge assets investment before the IDD rejection, and only the

treatment firms' knowledge assets investment significantly decreases after their headquarter state courts reject the previously adopted doctrine (Figure 1B).

Possessing proprietary knowledge assets and organizational know-how is the key competitive advantage for knowledge-oriented firms. Those firms are more likely to invest in developing and accumulating knowledge assets when their proprietary knowledge is protected from being leaked to rivals. The treatment effect of the real IDD changes on the firm's investment in knowledge assets should be especially strong for knowledge-oriented firms or firms that are located in knowledge-oriented states or industries. To test this conjecture, we create an indicator variable that equals one if a firm belongs to the top quartile of firms based on the aforementioned different knowledge intensity variables (except the *High tech* indicator) measured at the state-, industry-, or firm-level in the past year and that equals zero otherwise. We construct an interaction term between the top-quartile indicator variable for knowledge intensity and the *IDD* indicator and include it in the regression model that investigates the treatment effect of the IDD changes on knowledge assets investment. Panels A, B, and C of Table 6 report the influence of the state-, industry-, and firm-level knowledge-intensity indicators, respectively, on the changes in firms' investment in knowledge assets after the IDD changes. All control variables and firm and year fixed effects in the regression models of Table 5 are also controlled for in the models of Table 6, with robust standard errors being clustered at the state level.

Panel A of Table 6 shows that the regression coefficients of the interaction terms of *IDD* with the top-quartile indicators based on *Skilled_labor* and *Industry_Financed_R&D* are both positive and the coefficient of the latter interaction term is also statistically significant. Thus, the treatment effect of the IDD on subsequent knowledge assets investment is stronger for firms headquartered in states with greater connections between local research universities and related

industries. This likely reflects that firms in the states with strong connections between local universities and related industries have to increase their knowledge assets investment after the adoption of IDD since they can no longer easily rely on universities to obtain valuable knowledge assets. Panel B shows that the regression coefficients of the interaction terms of *IDD* with the top-quartile indicators based on different industry-level knowledge-intensity proxies (i.e., *Ind_rnd_sale*, *Ind_sga_sale*, *Ind_patent_count*, and *High tech*) are all positive and statistically significant, confirming that the treatment effect is particularly strong for firms in high knowledge-intensity industries. Similarly, Panel C shows that the IDD treatment effect is especially strong in firms with high R&D or SG&A intensity. The economic magnitude is substantial, as the coefficients of the interaction terms are mostly much larger than the coefficient of the *IDD* indicator from the stand-alone effects of the IDD changes on knowledge assets investment. The result is consistent with our earlier finding from the event study, showing that knowledge protection is most relevant for knowledge-oriented firms, and that the types of firms that most heavily increase their investment in knowledge acquisitions tend to be those that also experience the largest increase in shareholder value.

Our empirical evidence suggests that increasing the level of knowledge protection does result in an increased incentive for firms to develop and accumulate proprietary knowledge assets and organizational know-how. This treatment effect of the IDD on subsequent knowledge assets investment is especially strong for states, industries, and firms that are more knowledge oriented.

3.3. Geographic dispersion and the effect of the IDD

Our analyses focus on the IDD-change events in firm headquarter states because headquarters are close to corporate core business activities, and employees who have access to key

proprietary knowledge are likely to be concentrated at headquarters (Pirinsky and Wang, 2006). As changes in a state court's enforcement of the IDD only affect the level of preparatory knowledge protection within that state, for those firms whose business operations are geographically dispersed, we conjecture that the effect of headquarter state IDD-change event on such firms' stock price and subsequent knowledge assets investment should be weaker. Garcia and Norli (2012) develop a measure of firm geographic dispersion based on the number of U.S. states mentioned in the firm's annual 10-K report. The idea is that firm's business operations are likely to be more geographically dispersed if more states are mentioned in its annual report. We use their measure and classify firms in the top quartile of state name count each year as geographically dispersed firms.[9] We expect weaker effect of headquarter state IDD changes on such geographically dispersed firms.

Panel A of Table 7 shows that the cumulative abnormal returns on headquarter state IDD-change events are large in magnitude and highly significant for firms that are geographically non-dispersed. In contrast, Panel B shows that CARs are small in magnitude and generally insignificant for geographically dispersed firms. To examine the heterogeneous impact of the IDD changes on knowledge assets investment across geographically dispersed and non-dispersed firms, we construct an interaction term of the *IDD* indicator with the top-quartile geographic dispersion indicator. Model 4 in Panel C of Table 6 shows that the regression coefficient of this interaction term is significantly negative and similar in magnitude to the regression coefficient of *IDD*, which suggests that the treatment effect of the IDD changes on knowledge assets investment mainly

[9] Firms in retail, wholesale, and transportation industries have a large percentage of employees that are geographically dispersed (Agrawal and Matsa, 2013). In an earlier version of the paper, we find that for such firms, abnormal stock returns on IDD events are almost zero and there is no IDD treatment effect on knowledge assets investment. Therefore, we exclude such firms from the sample before partitioning the sample according to the geographic dispersion measure of Garcia and Norli (2012). Data for geographic dispersion, which covers the sample period of 1992 to 2008, is downloaded from Diego Garcia's research website. We thank Diego Garcia for generously sharing the data.

concentrates on geographically non-dispersed firms. These results lend further support to our main findings of state court's enforcement of the IDD on firms' shareholder value and knowledge assets investment.

3.4. The influence of neighboring-state IDD adoption and rejection

A potential concern is that the IDD changes may not be fully exogenous. Specifically, time-varying local market characteristics might affect both justices' decisions in the IDD court rulings and firm stock price reactions/knowledge assets investment, leading to spurious relations. We run a test to examine whether the timing and decision of the IDD changes might be influenced by time-varying local economic/political forces. The results in Table A3 of the Appendix fail to depict a clear relationship between the local economic/political conditions and the timing and decision of the IDD changes. However, this test cannot rule out the potential effect of omitted time-varying state characteristics on the IDD court rulings.

To address this concern, we examine the reactions of firms located in states that are contiguous to the state that changes the level of IDD enforcement. This test can be viewed as a cross-sectional placebo test and its merit relies on the fact that, as contiguous states are geographically closely located, they are likely to subject to the same time-varying local market dynamics, such as trends in economic development and shocks to the local economy (e.g., resource discovery, natural hazards, etc.). If unobserved/uncontrolled time-varying local dynamics drive both the IDD enforcement changes and firm stock price reactions/knowledge assets investment, we should expect firms' stock price and knowledge assets investment to move in a similar fashion as that observed in Table 3 and 5 when the level of IDD enforcement changes in neighboring state. In contrast, if it is the actual state-specific changes in IDD enforcement that drive firm stock price

reactions and knowledge assets investment in the law-change state, we should not expect any reaction for firms located in neighboring state where no change happened to the level of knowledge protection.

The results in Panel A of Table 8 show that firm stock price reactions to neighboring-state IDD rulings are much smaller in magnitude as compared to the results from Table 3 and are largely statistically insignificant. The results in Panel B further show that neighboring-state IDD changes have no effect on firm subsequent knowledge assets investment in the focal state. This finding of little impact of neighboring-state court rulings on focal-state firm stock price and knowledge assets investment further confirms that our main findings are most likely driven by the state-specific changes in knowledge protection enforcement rather than by uncontrolled time-varying local market factors.

3.5. The influence of knowledge protection on local entrepreneurship activity

Prior literature (see, e.g., Acs, Braunerhjelm, Audretsch, and Carlsson, 2009) argues that knowledge spillovers encourage entrepreneurship. Thus, a potential "dark side" of enforcing knowledge protection is that it may deter entrepreneurial activity, which is a key contributor for economic development. As firms can better protect their proprietary knowledge, it might become more difficult for entrepreneurs, who often start small businesses providing goods and services similar to those of existing players, to benefit from knowledge spillovers. Does knowledge protection harm local entrepreneurial activity while contributing to existing firms' shareholder value? This section provides evidence on the effect of the IDD changes on local entrepreneurial activity.

We collect data on the number of new firms and job creation related to new firms from the Census Business Dynamics Statistics (BDS) database. We run a difference-in-differences regression following a structure similar to equation (1) to study the potential treatment effect of the IDD changes on local entrepreneurial activity. The analyses are conducted using yearly state-level panel data that covers the period from January 1960 to December 2014. Results are reported in Table 9. In Panel A, the dependent variable is the number of firms started up in a state scaled by state population in a year; in Panel B, the dependent variable is the number of new jobs created by new startups scaled by state population in a year. We control for various state characteristics, year and state fixed effects, and cluster the standard errors at the state level.

We find that enhancing knowledge protection via the IDD does not seem to pose a threat to local entrepreneurial activity or to the new jobs created by startups; the average impact of the IDD on firm creation and that of the IDD on job creation by new startups are both positive albeit statistically insignificant. We hence conclude that enhancing local knowledge protection through the IDD does not discourage local entrepreneurial activity.

4. Conclusion

There has been a century-long debate on how a society should allow for knowledge protection [see, e.g., Mercurio (2010) for a summary of the debate]. Knowledge protection stimulates innovation, as it restricts knowledge sharing by granting intellectual property rights (e.g., copyright, patent, and industrial design rights) only to the knowledge generator. At the same time, there is a strong public voice against the protection of intellectual property as it restrains positive knowledge externalities among industry peers. This debate exists in many fields, and questions such as whether we should have open-source software have yet to be answered. Little

empirical evidence has been documented thus far on the impact of knowledge protection on shareholder value and knowledge assets investment, as it is difficult to capture real changes in firms' levels of knowledge protection. In this paper, we employ the staggered adoption of the IDD (rejection of the previously adopted IDD) by the U.S. state courts as exogenous changes in the level of knowledge protection. We examine firms' stock price reactions and changes in knowledge assets investment following the changes in the IDD. Our findings help illuminate the role of knowledge protection in today's knowledge-based economy.

One important channel for proprietary knowledge leaks is through employee job changes. The IDD is designed to prevent such knowledge spillovers. It enhances the protection of a firm's proprietary knowledge but also makes it more difficult for the firm to obtain new knowledge from other firms or institutions. Thus, the impact of IDD adoption/rejection by a state court on shareholder value is an empirical issue. We find that the adoption of the IDD on average leads to significantly positive abnormal stock returns around the adoption day for firms headquartered in that state, while the rejection of the previously adopted IDD on average leads to significantly negative abnormal returns. Using a difference-in-differences regression framework, we further uncover a positive causal relationship between the adoption of the IDD by a state court and firms' subsequent investment in knowledge assets. Moreover, we find that the effect of the IDD-change events on shareholder value and firms' subsequent knowledge assets investment is stronger (weaker) in states, industries, and firms that are more (less) knowledge-oriented. Finally, we find that enhancing knowledge protection via the IDD does not discourage local entrepreneurial activity.

Our paper highlights the positive impact of knowledge protection for firms. Firms, on average, experience positive abnormal stock returns and increase their investment in knowledge

assets after the law enforcement of knowledge protection is strengthened. The effect is economically significant: For an average firm in the United States, the strengthening of law enforcement of knowledge protection will lead to an increase in its knowledge-assets spending by 0.7 percent of its annual sales, which is equivalent to an additional $5.5 million invested annually in knowledge assets for an average firm. This result means that after knowledge protection is enhanced, an average U.S. state will experience a significant surge in knowledge assets investment from the private sector, equivalent to $453.5 million averaged at the state-aggregate level on an annual basis. Our analyses further show that enhancing knowledge protection neither harms local entrepreneurial activity nor depresses job creations at new startups. The study adds new evidence to the longstanding debate on whether production-related knowledge should be allowed to move freely among firms.

References

Acharya, V., Baghai, R., & Subramanian, K. (2013). Wrongful discharge laws and innovation. *Review of Financial Studies* 27, 301-346.

Acs, Z., P. Braunerhjelm, D. Audretsch, and B. Carlsson, (2009). The knowledge spillover theory of entrepreneurship, *Small Business Economics* 32, 15-30.

Agrawal, A., and D. Matsa, (2013). Labor unemployment risk and corporate financing decisions, *Journal of Financial Economics* 108, 449-470.

Almeida, P., and B. Kogut, (1999). Localization of knowledge and the mobility of engineers in regional networks, *Management Science* 45, 905–917.

Atkeson, A. and P. Kehoe, (2005). Modeling and measuring organization capital, *Journal of Political Economy* 113, 1026-1053.

Arrow, K., (1962). The economic implications of learning by doing, *Review of Economic Studies* 29, 155-173.

Banker, R., R. Huang, and R. Natarajan, (2011). Equity incentives and long-term value created by SG&A expenditure, *Contemporary Accounting Research* 28, 794-830.

Becker, G., (1993). Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education, 3rd ed., Chicago: University of Chicago Press.

Bloom, N., R. Sadun, and J. Van Reenen, (2012). Americans do IT better: US multinationals and the productivity miracle, *American Economic Review* 102, 167-201.

Breschi, S., and F. Lissoni, (2001). Knowledge spillovers and local innovation systems: a critical survey, *Industrial and Corporate Change* 10, 975-1005.

Chen, X., J. Harford, and K. Li, (2007). Monitoring: Which institutions matter? *Journal of Financial Economics* 86, 279-305.

Eisfeldt, A., and D. Papanikolaou, (2013). Organization capital and the cross-section of expected returns, *Journal of Finance* 68, 1365-1406.

Ellison, G., E. Glaeser, and W. Kerr, (2010). What causes industry agglomeration? Evidence from coagglomeration patterns, *American Economic Review* 100, 1195-1213.

Ericson, R., and A. Pakes, (1995). Markov-perfect industry dynamics: A framework for empirical work, *Review of Economic Studies* 61, 53-82.

Fallick, B., C. Fleischman, and J. Rebitzer, (2006). Job-hopping in Silicon Valley: some evidence concerning the microfoundations of a high-technology cluster. *Review of Economics and Statistics* 88, 472-481.

Falvey, R., N. Foster, and D. Greenaway, (2006). Intellectual property rights and economic growth, *Review of Development Economics* 10, 700-719.

Fama, E., (1998). Market efficiency, long-term returns, and behavioral finance, *Journal of Financial Economics* 49, 283-306.

Flammer, C., and A. Kacperczyk, (2016). The risk of knowledge spillovers and corporate social responsibility: Evidence from the inevitable disclosure doctrine, Working Paper, Massachusetts Institute of Technology.

Garcia, D., and O. Norli, (2012). Geographic dispersion and stock returns, Journal of Financial Economics 106, 547-565.

Garmaise, M., (2011). Ties that truly bind: Noncompetition agreements, executive compensation, and firm investment, *Journal of Law, Economics, and Organization* 27, 376-425.

Geng, H., H. Hau, and S. Lai, (2014). Technological progress and ownership structure, Working paper, University of Hong Kong.

Gould, D., and W. Gruben, (1996). The role of intellectual property rights in economic growth, *Journal of Development Economics* 48, 323-350.

Graves, C., and J. DiBoise, (2006). Do strict trade secret and non-competition laws obstruct innovation? *Entrepreneurial Business Law Journal* 1, 323-344.

Hall, R., 2000. E-capital: The link between the stock market and the labor market in the 1990s, Brookings Papers on Economic Activity.

Hellmann, T., and E. Perotti, (2011). The circulation of ideas in firms and markets, *Management Science* 57, 1813-1826.

Hyde, A., (2003). Working in Silicon Valley: Economic and Legal Analysis of a High-Velocity Labor Market, New York, NY: M.E. Sharpe.

Jaffe, A. B., Trajtenberg, M., and R. Henderson, (1993). Geographic localization of knowledge spillovers as evidenced by patent citations, *Quarterly Journal of Economics* 108, 577-98.

Jovanovic, B., (1979). Job matching and the theory of turnover, *Journal of Political Economy* 87, 972-990.

Jovanovic, B., and P. Rousseau, (2001). Vintage organization capital, NBER Working Papers 8166.

Kahnke, R., and K. Bundy, (2013). The Secrets To Winning Trade Secret Cases, New York, NY: Thomson Reuters Westlaw.

Kahnke, R., K. Bundy, and K. Liebman, (2008). Doctrine of inevitable disclosure, Faegre & Benson LLP.

Kantor, S., and A. Whalley, (2014). Knowledge spillovers from research universities: Evidence from endowment value shocks, *Review of Economics and Statistics* 96, 171-188.

Klasa, S., H. Ortiz-Molina, M.A. Serfling, and S. Srinivasan, (2014). Protection of trade secrets and capital structure decisions, Working Paper, University of Arizona.

Koh, P.-S., and D. Reeb, (2015). Missing R&D, *Journal of Accounting and Economics* 60, 73-94.

Krugman, P., (1991). Geography and Trade. Cambridge, MA: MIT Press.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. Vishny. (1998). Law and finance, *Journal of Political Economy* 106, 1113-1155.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. Vishny. (2002). Investor protection and corporate valuation, *Journal of Finance* 57, 1147-1170.

Li, K., B. Qiu, and R. Shen, (2015). Organization capital and mergers and acquisitions, Working Paper, University of British Columbia.

Liebeskind, J.P., (1996). Knowledge, strategy and the theory of the firm, *Strategic Management Journal* 17, 93-107.

Lincicum, D., (2002). Inevitable conflict?: California's policy of worker mobility and the doctrine of "inevitable disclosure", Southern California Law Review 75, 1257-1280.

Lev, B., and S. Radhakrishnan, (2005). The valuation of organization capital, in: Corrado, C., J. Haltiwanger, and D. Sichel (Eds.), Measuring Capital in the New Economy, Chicago: University of Chicago Press, 73-110.

Lev, B., S. Radhakrishnan, and W. Zhang, (2009). Organizational capital, *Abacus* 45, 275-298.

Leung, W.S., K. Mazouz, and J. Chen, (2015). Organization capital, labor market flexibility and stock returns around the world, Working Paper, Cardiff University.

Lerner, J., (2009). The empirical impact of intellectual property rights on innovation: Puzzles and clues. *American Economic Review* 99, 343-348.

Lucas, R., (1988). On the mechanics of economic development. *Journal of Monetary Economics* 22, 3–42.

Malsberger, B., A. Pedowitz, and S. Brock, (2015). Trade Secrets: A State-By-State Survey, Arlington, VA: Bloomberg BNA, Fifth edition.

Marshall, A., (1920). Principles of Economics. London: MacMillan.

Marshall, A., (1930). Principles of Economics: An Introductory Volume, 8th ed., London: Macmillan.

Marx, M., D. Strumsky, and L. Fleming, (2009). Mobility, skills, and the Michigan non-compete experiment, *Management Science* 55, 875-889.

Matusik, S., and C. Hill, (1998). The utilization of contingent work, knowledge creation, and competitive advantage, *Academy of management review* 23, 680-697.

Mercurio, B., (2010). Reconceptualising the debate on intellectual property rights and economic development, *The Law and Development Review* 3: 65-107.

McGrattan, E.R., and E.C. Prescott, (2010). Unmeasured investment and the puzzling US boom in the 1990s, *American Economic Journal: Macroeconomics* 2, 88-123.

Park, W., and J. Ginarte, (1997). Intellectual property rights and economic growth, *Contemporary Economic Policy* 15, 51-61.

Pirinsky, C., and Q. Wang, (2006). Does corporate headquarters location matter for stock returns? *Journal of Finance* 61, 1991-2015.

Png, I.P.L., and S. Samila, (2013). Trade secrets law and engineer/scientist mobility: Evidence from "inevitable disclosure, Working Paper, National University of Singapore.

Porter, M., (1998). *On Competition*. Boston, MA: Harvard Business School Press.

Prescott, E., and M. Visscher, (1980). Organization capital, *Journal of Political Economy* 88, 446-461.

Romer, P., (1986). Increasing returns and long-run growth, *Journal of Political Economy* 94, 1002-1037.

Rosen, S., (1972). Learning by experience as joint production, *Quarterly Journal of Economics* 86, 366-382.

Samila, S., and O. Sorenson, (2011). Venture capital, entrepreneurship, and economic growth, *Review of Economics and Statistics* 93, 338-349.

Taylor, M., (1994). Trips, trade, and growth, *International Economic Review* 35, 361-381.

Tomer, J., (1987). Organizational Capital: The Path to Higher Productivity and Wellbeing, New York: Praeger.

Wang, T., (2016). The role of local information in credit market development, Working paper, Federal Reserve Board.

Wiesner, R., (2012). A state-by-state analysis of inevitable disclosure: A need for uniformity and a workable standard, *Marquette Intellectual Property Law Review* 16, 211-231.

Wooldridge, J., (2006). Introductory Econometrics: A Modern Approach, 3rd Edition, South-Western, Cincinnati, OH.

Younge, K., and M. Marx, (2015). The value of employee retention: Evidence from a natural experiment, *Journal of Economics & Management Strategy*, forthcoming.

Zhang, R., (2014). Competition and SG&A spending, Working paper, University of Alberta.

Zhao, M., (2006). Conducting R&D in countries with weak intellectual property rights protection, *Management Science* 52, 1185-1199.

Zucker, L., M. Darby, and M. Brewer, (1998). Intellectual human capital and the birth of U.S. biotechnology enterprises, *American Economic Review* 88, 290-306.

Table 1. Adopting and rejecting the IDD

The table lists the legal cases in which state courts adopted the Inevitable Disclosure Doctrine (IDD) or rejected the previously adopted IDD.

State	Case	Date	Status
Arkansas	Southwestern Energy v. Eickenhorst, 955 F. Supp. 1078 (1997).	March 18, 1997	Adopt
California	Electro Optical Indus., Inc. v. Stephen White, 90 Cal.Rptr.2d 680 (1999), 76 Cal. App. 4th 653	November 30, 1999	Adopt
California	Supreme Court Overrule	April 12, 2000	Reject
California	Whyte v. Schlage Lock Co., No. G028382 (Ct. of App. of California 2002)	September 12, 2002	Reject
Connecticut	Branson Ultrasonics Corp. v. Stratman, 921 F. Supp. 909 (D. Conn. 1996)	February 28, 1996	Adopt
Delaware	E.I. DuPont de Nemours & co v. American Potash and Chemical Corp, 200 A. 2d 428 (Del Ch. 1964)	May 5, 1964	Adopt
Florida	Fountain v. Hudson Cush-N-Foam Corp., 122 So. 2d 232, 234 (Fla. Dist. Ct. App. 1960)	July 11, 1960	Adopt
Florida	Del Monte Fresh Produce Co. v. Dole Food Co., 148 F. Supp. 2d 1326 (S.D. Fla. 2001)	May 24, 2001	Reject
Iowa	Barilla Am., Inc. v. Wright, No. 4-02-CV-90267, 2002 U.S. Dist. Lexis 12773 (S.D. Iowa 2002)	July 5, 2002	Adopt
Illinois	PepsiCo, Inc. v. Redmond, 54 F.3d 1262, 1272 (7th Cir. 1995)	May 11, 1995	Adopt
Indiana	Ackerman v. Kimball Int'l, Inc., 652 N.E.2d 507, 510-11 (Ind. 1995).	July 12, 1995	Adopt
Indiana	Bridgestone/Firestone, Inc. v. Lockhart, 5 F. Supp. 2d 667 (S.D. Ind. 1998)	May 7, 1998	Reject
Kansas	Bradbury Co. v. Teissier-Ducros, 413 F. Supp. 2d 1203, 1209 (D. Kan. 2006)	February 2, 2006	Adopt
Massachusetts	Marcam Corp. v. Orchard, 885 F. Supp. 294, 298-300 (D. Mass. 1995)	April 3, 1995	Adopt
Massachusetts	U.S. Elec. Servs. v. Schmidt, Civil Action No. 12-10845-DJC (U.S. Dist. CT. for the Dist. of Mass. 2012)	June 19, 2012	Reject
Michigan	Allis-Chalmers Manufacturing Co. v. Continental Aviation & Engineering Corp., 255 F. Supp. 645, 654 (E.D. Mich.1966)	February 17, 1966	Adopt
Michigan	CMI International Inc. v. Intermet Inter. Corp., 649 N.W.2d 808 (Mich. Ct. App.2002)	April 30, 2002	Reject
Minnesota	Surgidev Corp. v. Eye Tech., Inc., 648 F. Supp. 661 (D. Minn. 1986)	October 10, 1986	Adopt
Minnesota	IBM Corp. v. Seagate Tech., Inc., 941 F. Supp. 98 (D. Minn. 1992)	April 21, 1992	Reject
Minnesota	La Calhene, Inc. v. Spolyar, 938 F. Supp. 523 (W.D. Wis. 1996)	August 23, 1996	Adopt
Missouri	H&R Block Eastern Tax Services, Inc. v. Enchura, 122 F.Supp. 2d 1067 (W.D.Mo. 2000).	November 2, 2000	Adopt
New Jersey	National Starch and Chem. Corp. v. Parker Chemical Corp., 530 A.2d 31 (N.J. Super. Ct. App. Div. 1987)	April 27, 1987	Adopt
New York	DoubleClick, Inc. v. Henderson, No. 116914/97, 1997 N.Y. Misc. Lexis 577 (Sup. Ct. N.Y. Co. Nov. 7, 1997)	November 7, 1997	Adopt
New York	EarthWeb, Inc. v. Schlack, 71 F. Supp. 2d 299 (S.D.N.Y. 1999)	Oct. 27, 1999	Reject
North Carolina	Travenol Labs., Inc. v. Turner, 228 S.E.2d 478, 483 (N.C. Ct. App. 1976)	October 6, 1976	Adopt
North Carolina	Merck & Co. v. Lyon, 941 F. Supp. 1443 (M.D.N.C. 1996)	September 11, 1996	Adopt
North Carolina	RCR Enters., LLC v. McCall, 14 CVS 3342 (N.C. Sup. Ct. 2014)	December 19, 2014	Reject
Ohio	Procter & Gamble Co., v. Stoneham, 747 N.E.2d 268 (Ohio Ct. App. 2000)	September 29, 2000	Adopt
Pennsylvania	Air Products & Chemical, Inc. v. Johnson, 442 A.2d 1114 (Pennsylvania Superior Ct. 1982)	February 19, 1982	Adopt
South Carolina	Nucor Corp. v. Bell, C/A No. 2: 06-CV-02972-DCN (U.S. Dist. Ct. for the Dist. of South Carolina 2008)	March 14, 2008	Adopt
Texas	Rugen v. Interactive Bus. Sys., Inc., 864 S.W.2d 548, 551 (Tex. App. 1993)	May 28, 1993	Adopt
Texas	Cardinal Health Staffing Network Inc. v. Bowen, 106 S.W.3d 230 (Tex. App. 2003)	April 3, 2003	Reject
Utah	Novell, Inc. v. Timpanogos Research Group, Inc., 46 U.S.P.Q.2d 1197 (Utah Dist. Ct. 1998).	January 30,1998	Adopt
Washington	Solutec Corp, Inc. v. Agnew, 1997 WL 794496, 8 (Wash. Ct. App.)	December 30, 1997	Adopt

Table 2. Sample description

The table reports descriptive statistics of our sample. The sample consists of 4,535 firm events in which firms' headquarter state adopted the IDD and 3,857 firm events in which firms' headquarter state rejected the previously adopted IDD and covers the period from January 1960 to December 2014. Detailed description of the variables is presented in Table A1 of the Appendix. All dollar values are in 2014 constant dollars. All continuous variables are winsorized at the 1st and 99th percentiles. We report the means, medians, standard deviations, 25 percentiles, 75 percentiles, and numbers of observations for the variables used in our study.

Panel A. Summary statistics

Variable	Mean	Median	Std. Dev.	P25	P75	Obs.
CAR (-5,5)	0.470	-0.038	13.492	-5.923	6.098	8392
CAR (-2,2)	-0.719	-0.221	10.924	-4.437	3.877	8392
CAR (-1,1)	-0.276	0.021	7.666	-3.284	3.042	8392
State-level variables						
Skilled labor	14.523	15.011	0.719	14.029	15.044	4913
Industry_financed_R&D	2.836	2.853	0.101	2.778	2.884	7556
Per capita state income	10.582	10.620	0.142	10.528	10.654	8386
Total state income	20.208	20.485	0.826	19.533	21.024	8386
Total state income growth	0.060	0.058	0.023	0.049	0.076	8386
Industry-level variables						
Ind_rnd_sale	2.956	1.637	3.030	0.082	5.739	8391
Ind_sga_sale	18.727	19.605	8.733	12.630	25.655	8391
Ind_pat_count	4.959	5.338	3.013	2.079	7.980	8392
High tech	0.346	0.000	0.476	0.000	1.000	8392
Firm Characteristics						
Rnd_sale	0.217	0.000	0.788	0.000	0.089	8392
Sga_sale	0.384	0.233	0.619	0.098	0.401	8392
Patent count	0.370	0.000	0.874	0.000	0.000	8392
Firm size	5.324	5.130	2.066	3.811	6.665	8392
Market-to-book	3.328	1.826	5.742	1.057	3.556	8392
Past stock return	18.272	4.000	72.273	-18.750	30.557	8392
Geographic dispersion	6.955	5	6.940	3	9	5502

Table 3. Adoption and rejection of the IDD and firm stock price reactions

The table reports the event study results of the impact of states' adoptions of the IDD and rejections of the previously adopted IDD on stock returns of firms headquartered in the event states. The sample consists of 4,535 firm events in which firms' headquarter state adopt IDD and 3,857 firm events in which firms' headquarter state reject IDD and covers the period from January 1960 to December 2014. We report the mean of the 11-day, 5-day, and 3-day cumulative abnormal returns (CARs) during an event window of (−5, +5), (−2, +2), (−1, +1) surrounding the adoptions and rejections of the IDD. We calculate CARs using both the market-adjusted model and the market model. We use the CRSP value-weighted stock market returns (including dividends) as the market portfolio. Robust standard errors shown in parentheses are clustered at the state level to account for within-state cross-sectional correlations. ***, **, and * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

	Market-adjusted model			Market model			
	CAR (-5,5)	CAR (-2,2)	CAR (-1,1)	CAR (-5,5)	CAR (-2,2)	CAR (-1,1)	Obs.
IDD Adoptions	1.483***	0.978***	0.538***	0.758*	0.528**	0.034	4,535
	(0.518)	(0.273)	(0.184)	(0.411)	(0.233)	(0.145)	
IDD Rejections	-0.720	-2.714**	-1.233**	-2.160*	-4.147***	-1.870***	3,857
	(1.025)	(1.143)	(0.536)	(1.261)	(1.613)	(0.695)	

Table 4. Knowledge intensity and firms' abnormal stock returns during events of IDD adoption and rejection

The table reports the results of OLS regressions that investigate the influence of different variables of knowledge intensity at state-, industry- and firm-level on firms' 5-day cumulative abnormal returns (CAR (-2,2)) during an event window surrounding the adoption of the IDD or rejection of the previously adopted IDD in states where firms' headquarters are located. Detailed description of the variables is presented in Table A1 of the Appendix. The dependent variable is CAR (-2,2) estimated using market-adjusted model. Panel A, B and C report the results of OLS regressions of the influence of state-level, industry-level, and firm-level variables on CAR (-2,2) during events of IDD adoptions and rejections. Robust standard errors are clustered at the state level to account for within-state cross-sectional correlations in regression residuals and are shown in parentheses. ***, **, and * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A. The influence of state-level knowledge-intensity variables on CAR (-2,2) during IDD adoption and rejection

Dep. Var.: CAR (-2,2)	IDD adoptions		IDD rejections	
	Model 1	Model 2	Model 3	Model 4
State-level variables				
Skilled labor $_{t-1}$	7.086**		1.532	
	(3.336)		(6.666)	
Industry_Financed_R&D $_{t-1}$		-4.715		31.074*
		(4.548)		(16.454)
Controls				
Firm size $_{t-1}$	-0.418**	-0.320***	-0.302***	-0.135
	(0.211)	(0.114)	(0.104)	(0.262)
Firm market-to-book $_{t-1}$	0.004	-0.026	-0.339***	-0.305***
	(0.023)	(0.030)	(0.044)	(0.063)
Past stock return$_{t-1}$	0.023***	0.015**	-0.066***	-0.065***
	(0.004)	(0.007)	(0.003)	(0.007)
Per capita state income $_{t-1}$	-4.903	4.815***	-10.559**	-9.699
	(7.230)	(1.776)	(5.382)	(7.749)
Total state income $_{t-1}$	-8.381***	0.283	-2.970	-4.299**
	(2.866)	(0.381)	(6.113)	(1.915)
Total state income growth $_{t-1}$	34.147*	14.661	-22.698*	-16.462
	(18.234)	(15.622)	(11.645)	(15.547)
Year Fixed Effects	Yes	Yes	Yes	Yes
Intercept	Yes	Yes	Yes	Yes
Obs.	1,857	4,050	3,056	3,506
Adj. R^2	0.044	0.028	0.347	0.317

Panel B. The influence of industry-level knowledge-intensity variables on CAR (-2,2) during IDD adoption and rejection

Dep. Var.: CAR (-2,2)	IDD adoptions				IDD rejections			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Industry-level variables								
Ind_rnd_sale $_{t-1}$	11.376				-24.203*			
	(9.548)				(14.370)			
Ind_sga_sale $_{t-1}$		2.973				-7.627		
		(2.504)				(4.912)		
Ind_pat_count $_{t-1}$			0.124				-0.534*	
			(0.105)				(0.283)	
High tech $_{t-1}$				0.654				-3.131**
				(0.806)				(1.531)
Controls								
Firm size $_{t-1}$	-0.284***	-0.275***	-0.290***	-0.283***	-0.167	-0.182	-0.148	-0.156
	(0.103)	(0.098)	(0.107)	(0.101)	(0.222)	(0.240)	(0.211)	(0.199)
Market-to-book $_{t-1}$	-0.050**	-0.049*	-0.045	-0.047*	-0.287***	-0.284***	-0.289***	-0.288***
	(0.025)	(0.026)	(0.028)	(0.026)	(0.046)	(0.039)	(0.052)	(0.052)
Past stock return$_{t-1}$	0.013**	0.013**	0.013**	0.013**	-0.061***	-0.062***	-0.060***	-0.060***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)
Per capita state income $_{t-1}$	-0.422	0.476	-0.744	0.064	1.641	-0.586	1.092	0.936
	(3.649)	(3.599)	(3.752)	(3.585)	(4.308)	(5.193)	(4.550)	(4.797)
Total state income $_{t-1}$	-0.256	-0.317	-0.250	-0.248	-0.086	-0.006	0.008	-0.047
	(1.023)	(1.071)	(1.029)	(1.025)	(0.684)	(0.514)	(0.568)	(0.678)
Total state income growth $_{t-1}$	21.636	23.685*	22.539*	23.458**	-9.183	-5.850	-8.992	-5.578
	(13.394)	(12.352)	(12.354)	(11.671)	(9.026)	(12.368)	(9.636)	(10.949)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	4,531	4,531	4,532	4,532	3,854	3,854	3,854	3,854
Adj. R^2	0.029	0.028	0.028	0.028	0.316	0.314	0.319	0.318

Panel C. The influence of firm-level knowledge-intensity variables on CAR (-2,2) during IDD adoption and rejection

Dep. Var.: CAR (-2,2)	IDD adoptions			IDD rejections		
	Model 1	Model 2	Model 3	Model 5	Model 6	Model 7
Firm-level variables						
Rnd_sale $_{t-1}$	0.625***			-0.823*		
	(0.235)			(0.428)		
Sga_sale $_{t-1}$		0.027			-2.372***	
		(0.249)			(0.784)	
Patent count $_{t-1}$			0.200			-0.325*
			(0.220)			(0.167)
Controls						
Firm size $_{t-1}$	-0.278***	-0.294***	-0.328**	-0.171	-0.270	-0.089
	(0.105)	(0.108)	(0.141)	(0.238)	(0.278)	(0.238)
Market-to-book $_{t-1}$	-0.048	-0.038	-0.037	-0.304***	-0.268***	-0.319***
	(0.030)	(0.033)	(0.032)	(0.059)	(0.043)	(0.063)
Past stock return$_{t-1}$	0.014**	0.014**	0.014**	-0.062***	-0.062***	-0.063***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Per capita state income $_{t-1}$	-0.342	0.079	-0.110	1.258	0.588	0.322
	(3.490)	(3.711)	(3.676)	(4.728)	(5.172)	(4.907)
Total state income $_{t-1}$	-0.234	-0.226	-0.221	-0.094	0.124	-0.024
	(1.005)	(1.012)	(1.010)	(0.622)	(0.471)	(0.547)
Total state income growth $_{t-1}$	20.668	21.841*	22.039*	-14.085*	-10.488	-11.926
	(13.202)	(12.762)	(12.730)	(7.812)	(9.724)	(8.695)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	4,532	4,532	4,532	3,854	3,854	3,854
Adj. R^2	0.029	0.027	0.027	0.310	0.321	0.307

Table 5. Difference-in-differences analysis of knowledge protection on firms' investment in knowledge assets

The table presents estimated coefficients from difference-in-differences (DD) analyses of the impact of actual and fictitious changes in the IDD on firms' investment in knowledge assets using OLS regressions. We test the impact of the actual adoption of the IDD and rejection of the previously adopted IDD as well as the placebo experiments on knowledge assets investment. For the placebo experiments, we create fictitious changes in the IDD that take place one and three years before, as well as one and three years after, the real changes in the IDD in each law-change state. The dependent variable is the amount of annual SG&A expenses scaled by sales revenue, which reflects the firm's investment in knowledge assets. The coefficient on IDD captures the difference-in-differences estimate of the impact of the actual and fictitious IDD adoptions/rejections on firms' investment on knowledge assets. We control for lagged firm and state characteristics, firm fixed effects, and year fixed effects in all regressions. The analyses are conducted using yearly panel data that cover the period from January 1960 to December 2014. Detailed description of the variables is presented in Table A1 of the Appendix. Robust standard errors are clustered at the state level to account for within-state correlations in regression residuals and are shown in parentheses. ***, **, and * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Dep. Var.: Knowledge assets investment	Placebo change 3 years before the actual change	Placebo change 1 year before the actual change	Actual IDD change	Placebo change 1 year after the actual change	Placebo change 3 years after the actual change
IDD/Placebo IDD	0.002	0.005	0.007**	0.004	0.003
	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)
Controls					
Firm Size $_{t-1}$	-0.004**	-0.004**	-0.003	-0.004**	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Market-to-book $_{t-1}$	0.001	0.000	0.000	0.000	0.000
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Knowledge assets inv't $_{t-1}$	0.486***	0.458***	0.435***	0.434***	0.444***
	(0.026)	(0.019)	(0.016)	(0.015)	(0.018)
Sales Growth $_{t-1}$	-0.007*	-0.007*	-0.003	-0.003	-0.002
	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)
Leverage $_{t-1}$	-0.043***	-0.048***	-0.049***	-0.051***	-0.047***
	(0.010)	(0.009)	(0.010)	(0.011)	(0.011)
ROA $_{t-1}$	-0.037**	-0.042***	-0.048***	-0.051***	-0.032*
	(0.018)	(0.014)	(0.014)	(0.015)	(0.018)
Per capita state income $_{t-1}$	0.055**	0.051**	0.049**	0.051**	0.054*
	(0.027)	(0.024)	(0.024)	(0.025)	(0.030)
Total state income $_{t-1}$	-0.006	-0.006	-0.009	-0.006	-0.005
	(0.006)	(0.008)	(0.008)	(0.008)	(0.008)
Total state income growth $_{t-1}$	0.050	0.037	0.040	0.045	0.040
	(0.050)	(0.048)	(0.053)	(0.059)	(0.051)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Intercept	Yes	Yes	Yes	Yes	Yes
Obs.	143,416	169,711	183,633	187,606	170,593
Adj. R^2	0.710	0.705	0.702	0.704	0.700

Table 6. Knowledge intensity and the effect of knowledge protection on firms' investment in knowledge assets

The table presents estimated coefficients of the impact of the interactions between the IDD indicator and various state-level, industry-level and firm-level variables of knowledge intensity on firms' investment in knowledge assets using OLS regressions. The dependent variable is the amount of annual SG&A expenses scaled by sales revenue, which reflects the firm's investment in knowledge assets. We control for lagged firm and state characteristics, firm fixed effects, and year fixed effects in all regressions. The analyses are conducted using yearly panel data that cover the period from January 1960 to December 2014. Panels A, B, and C report the results of OLS regressions of the impact of the interactions between the IDD indicator and various knowledge-intensity variables at the state-level, industry-level, and firm-level variables, respectively. Detailed description of the variables is presented in Table A1 of the Appendix. Robust standard errors are clustered at the state level to account for within-state correlations in regression residuals and are shown in parentheses. ***, **, and * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A. The influence of state-level knowledge-intensity variables on the treatment effect of the IDD on knowledge assets investment

Dep. Var.: Knowledge assets investment	Model 1	Model 2
IDD $_{t-2}$	0.001	0.006**
	(0.004)	(0.003)
State-level variables		
IDD $_{t-2}$ × top 25 Skilled labor $_{t-1}$	0.015	
	(0.010)	
top 25 Skilled labor $_{t-1}$	-0.029***	
	(0.010)	
IDD $_{t-2}$ × top 25 Industry_Financed_R&D $_{t-1}$		0.016***
		(0.005)
top 25 Industry_Financed_R&D $_{t-1}$		-0.013*
		(0.007)
Controls		
Firm Size $_{t-1}$	-0.004	-0.003
	(0.004)	(0.003)
Market-to-book $_{t-1}$	0.001	0.000
	(0.001)	(0.001)
Knowledge assets inv't $_{t-1}$	0.425***	0.434***
	(0.013)	(0.012)
Sales Growth $_{t-1}$	0.000	-0.002
	(0.006)	(0.004)
Leverage $_{t-1}$	-0.056***	-0.060***
	(0.014)	(0.014)
ROA $_{t-1}$	-0.050**	-0.052***
	(0.021)	(0.015)
Per capita state income $_{t-1}$	0.005	0.059
	(0.043)	(0.043)
Total state income $_{t-1}$	-0.025***	-0.017**
	(0.009)	(0.007)
Total state income growth $_{t-1}$	0.200***	0.131**
	(0.072)	(0.054)
Year Fixed Effects	Yes	Yes
Firm Fixed Effects	Yes	Yes
Intercept	Yes	Yes
Obs.	74,271	123,713
Adj. R^2	0.727	0.698

Panel B. The influence of industry-level knowledge-intensity variables on the treatment effect of the IDD on knowledge assets investment

Dep. Var.: Knowledge assets investment	Model 1	Model 2	Model 3	Model 4
IDD $_{t-2}$	0.003	0.001	0.001	0.001
	(0.003)	(0.004)	(0.003)	(0.003)
Industry-level variables				
IDD $_{t-2}$ × top 25 Ind_rnd_sale $_{t-1}$	0.015**			
	(0.007)			
top 25 Ind_rnd_sale $_{t-1}$	0.002			
	(0.004)			
IDD $_{t-2}$ × top 25 Ind_sga_sale $_{t-1}$		0.024***		
		(0.007)		
top 25 Ind_sga_sale $_{t-1}$		0.004		
		(0.003)		
IDD $_{t-2}$ × top 25 Ind_pat_count $_{t-1}$			0.013***	
			(0.005)	
top 25 Ind_pat_count $_{t-1}$			0.006	
			(0.005)	
IDD $_{t-2}$ × High tech $_{t-1}$				0.026***
				(0.007)
High tech $_{t-1}$				0.016**
				(0.007)
Controls				
Firm Size $_{t-1}$	-0.003	-0.003	-0.003	-0.003
	(0.002)	(0.002)	(0.002)	(0.002)
Market-to-book $_{t-1}$	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Knowledge assets inv't $_{t-1}$	0.435***	0.435***	0.435***	0.435***
	(0.016)	(0.016)	(0.016)	(0.016)
Sales Growth $_{t-1}$	-0.003	-0.003	-0.003	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)
Leverage $_{t-1}$	-0.049***	-0.049***	-0.051***	-0.049***
	(0.010)	(0.010)	(0.011)	(0.010)
ROA $_{t-1}$	-0.047***	-0.047***	-0.052***	-0.047***
	(0.014)	(0.014)	(0.014)	(0.014)
Per capita state income $_{t-1}$	0.047**	0.047**	0.060***	0.044**
	(0.022)	(0.023)	(0.022)	(0.022)
Total state income $_{t-1}$	-0.008	-0.009	-0.010	-0.009
	(0.008)	(0.008)	(0.008)	(0.008)
Total state income growth $_{t-1}$	0.042	0.042	0.046	0.042
	(0.053)	(0.053)	(0.052)	(0.052)
Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Intercept	Yes	Yes	Yes	Yes
Obs.	183,633	183,633	180,650	183,633
Adj. R^2	0.702	0.702	0.702	0.702

Panel C. The influence of firm-level knowledge-intensity variables on the treatment effect of the IDD on knowledge assets investment

Dep. Var.: Knowledge assets investment	Model 1	Model 2	Model 3	Model 4
IDD $_{t-2}$	-0.001	0.002	0.007**	0.011**
	(0.003)	(0.002)	(0.003)	(0.005)
Firm-level variables				
IDD $_{t-2}$ × top 25 Rnd_sale $_{t-1}$	0.042***			
	(0.009)			
top 25 Rnd_sale $_{t-1}$	0.019***			
	(0.005)			
IDD $_{t-2}$ × top 25 Sga_sale $_{t-1}$		0.029***		
		(0.008)		
top 25 Sga_sale $_{t-1}$		0.042***		
		(0.004)		
IDD $_{t-2}$ × top 25 Patent count $_{t-1}$			0.000	
			(0.005)	
top 25 Patent count $_{t-1}$			0.003	
			(0.003)	
IDD $_{t-2}$ × top 25 Geographic dispersion $_{t-1}$				-0.010*
				(0.006)
top 25 Geographic dispersion $_{t-1}$				-0.008**
				(0.004)
Controls				
Firm Size $_{t-1}$	-0.004**	-0.002	-0.003	-0.001
	(0.002)	(0.002)	(0.002)	(0.004)
Market-to-book $_{t-1}$	0.000	0.000	0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Knowledge assets inv't $_{t-1}$	0.434***	0.420***	0.435***	0.400***
	(0.016)	(0.016)	(0.016)	(0.018)
Sales Growth $_{t-1}$	-0.003	-0.002	-0.003	0.000
	(0.003)	(0.003)	(0.003)	(0.005)
Leverage $_{t-1}$	-0.048***	-0.045***	-0.049***	-0.053***
	(0.010)	(0.010)	(0.010)	(0.015)
ROA $_{t-1}$	-0.043***	-0.042***	-0.048***	-0.035
	(0.014)	(0.014)	(0.014)	(0.022)
Per capita state income $_{t-1}$	0.046**	0.042*	0.049**	0.151
	(0.021)	(0.023)	(0.024)	(0.140)
Total state income $_{t-1}$	-0.009	-0.009	-0.009	-0.024
	(0.008)	(0.008)	(0.008)	(0.026)
Total state income growth $_{t-1}$	0.041	0.049	0.039	0.272***
	(0.054)	(0.054)	(0.053)	(0.084)
Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Intercept	Yes	Yes	Yes	Yes
Obs.	183,633	183,633	183,633	82,538
Adj. R^2	0.703	0.703	0.702	0.711

Table 7. Geographic dispersion and the effect of the IDD

The table presents the results of the effect of the IDD ruling on stock price of firms with operations that are less geographically dispersed vs. firms with operations that are more geographically dispersed. We classify a firm as geographically dispersed if it is in the top quartile of the Compustat universe in terms of the number of states mentioned in its annual report each year. Panel A reports the mean of the 11-day, 5-day, and 3-day cumulative abnormal returns (CARs) during an event window of (−5, +5), (−2, +2), (−1, +1) surrounding the adoptions of the IDD and rejections of the previously adopted IDD for firms that are geographically non-dispersed; Panel B reports the CARs for firms that are geographically dispersed. We calculate CARs using both the market-adjusted model and the market model. We use the CRSP value-weighted stock market returns (including dividends) as the market portfolio. All dollar values are in 2014 constant dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Robust standard errors are clustered at the state level to account for within-state cross-sectional correlations and are shown in parentheses. ***, **, and * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A. Impact of IDD adoptions and rejections on stock returns of geographically non-dispersed firms

	Market-Adjusted Model			Market Model			
	CAR (-5,5)	CAR (-2,2)	CAR (-1,1)	CAR (-5,5)	CAR (-2,2)	CAR (-1,1)	Obs.
IDD Adoptions	2.058***	1.185***	0.575***	1.038**	0.660**	0.004	2,935
	(0.644)	(0.353)	(0.215)	(0.526)	(0.300)	(0.176)	
IDD Rejections	-1.242	-3.789***	-1.751***	-3.089**	-5.453***	-2.512***	2,605
	(1.075)	(1.294)	(0.621)	(1.376)	(1.824)	(0.853)	

Panel B. Impact of IDD adoptions and rejections on stock returns of geographically dispersed firms

	Market-Adjusted Model			Market Model			
	CAR (-5,5)	CAR (-2,2)	CAR (-1,1)	CAR (-5,5)	CAR (-2,2)	CAR (-1,1)	Obs.
IDD Adoptions	-0.068	0.566	0.407	-0.367	0.218	-0.016	444
	(0.517)	(0.356)	(0.344)	(0.515)	(0.347)	(0.298)	
IDD Rejections	-0.686	-1.583*	-0.285	-1.144	-2.510**	-0.584	621
	(1.129)	(0.953)	(0.564)	(1.060)	(1.183)	(0.513)	

Table 8. The effect of neighboring-state IDD adoption and rejection

The table presents the results of the effect on firm stock price and subsequent knowledge assets investment when there is an IDD event in a neighboring state. Panel A reports the mean of the 11-day, 5-day, and 3-day cumulative abnormal returns (CARs) during an event window of (−5, +5), (−2, +2), (−1, +1) surrounding the adoptions and rejections of the IDD. We calculate CARs using both the market-adjusted model and the market model. We use the CRSP value-weighted stock market returns (including dividends) as the market portfolio. Panel B reports estimated coefficients from difference-in-differences (DD) analyses of the impact of actual and fictitious changes in the IDD in neighboring states on firms' investment in knowledge assets using OLS regressions. We test the impact of the actual adoption/rejection of IDD in neighboring states as well as the placebo experiments on knowledge assets investment. For the placebo experiment, we create fictitious changes in the IDD that have taken place one and three years before, as well as one and three years after, the first-time real changes in the IDD in neighboring states. The dependent variable is the amount of annual SG&A expense scaled by sales revenue, which reflects the firm's investment in knowledge assets. We control for lagged firm and state characteristics, firm fixed effects, and year fixed effects in all regressions as in previous tables. The analyses are conducted using yearly panel data that cover the period from January 1960 to December 2014. Detailed description of the variables is presented in Table A1 of the Appendix. All dollar values are in 2014 constant dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Robust standard errors are clustered at the state level and are shown in parentheses. ***, **, and * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A. The effect on firm stock price of neighboring-state IDD events

	Market-adjusted model			Market model			
	CAR (-5,5)	CAR (-2,2)	CAR (-1,1)	CAR (-5,5)	CAR (-2,2)	CAR (-1,1)	Obs.
IDD Adoptions	0.431**	0.135	0.033	-0.097	0.147	-0.006	4,386
	(0.180)	(0.169)	(0.172)	(0.308)	(0.174)	(0.182)	
IDD Rejections	-0.567	-0.381	-0.538	-0.171	-0.639	-0.479	3,255
	(0.798)	(0.572)	(0.469)	(0.402)	(0.607)	(0.306)	

Panel B. The effect on subsequent firm knowledge assets investment of neighboring-state IDD events

Dep. Var.: Knowledge assets investment	Placebo change 3 years before the actual change	Placebo change 1 year before the actual change	Actual IDD change	Placebo change 1 year after the actual change	Placebo change 3 years after the actual change
$IDD_{neighboring}$ /	-0.004	0.001	-0.002	-0.004	-0.001
Placebo $IDD_{neighboring}$	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
Control Variables	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Intercept	Yes	Yes	Yes	Yes	Yes
Obs.	143,416	169,711	183,633	187,606	170,593
R^2	0.710	0.705	0.702	0.704	0.700

Table 9. Difference-in-differences analysis of knowledge protection on entrepreneurship activity

The table presents estimated coefficients from difference-in-differences (DD) analyses of the impact of the IDD on entrepreneurship activity and job creation related to firm openings using OLS regressions. The dependent variables are the annual number of new startups scaled by total state population (Panel A) and the annual number of new jobs created related to firm openings scaled by total state population (Panel B), respectively. The coefficient on IDD captures the difference-in-differences estimate of the impact of the IDD on entrepreneurship activity and job creation related to firm openings. We control for lagged state characteristics, state fixed effects, and year fixed effects in all regressions. The analyses are conducted using yearly panel data that cover the period from January 1960 to December 2014. Detailed description of the variables is presented in Table A1 of the Appendix. Robust standard errors are clustered at the state level and are shown in parentheses. ***, **, and * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A. The impact of the IDD on entrepreneurship activity

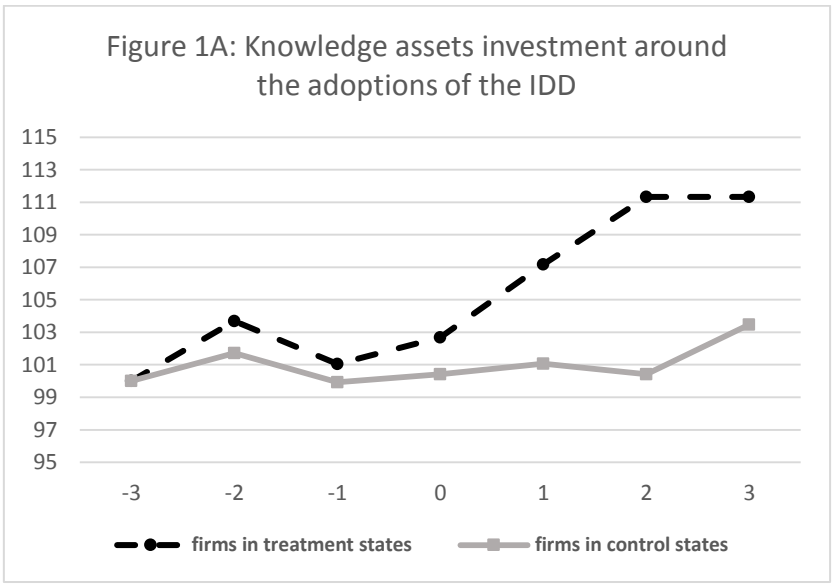
Dep. Var.: newfirm/population (in thd)	3 years before the IDD change	1 year before the IDD change	IDD change	1 year after the IDD change	3 years after the IDD change
IDD/Placebo IDD	0.025	0.024	0.026	0.029	0.035
	(0.053)	(0.054)	(0.054)	(0.055)	(0.054)
Control Variables	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Intercept	Yes	Yes	Yes	Yes	Yes
Obs.	1,887	1,887	1,887	1,887	1,887
Adj. R^2	0.875	0.875	0.875	0.875	0.875

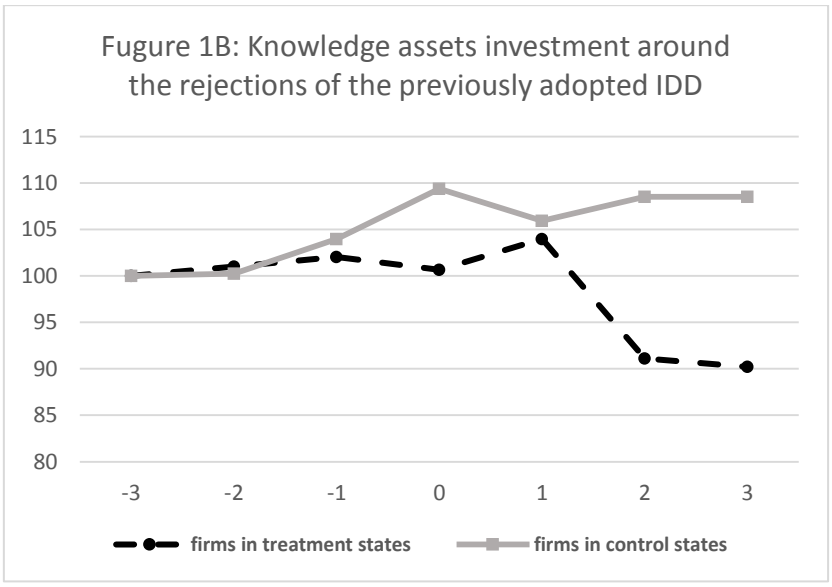
Panel B. The impact of the IDD on job creation due to new firm openings

Dep. Var.: new job created due to business openings/population (in thd)	3 years before the IDD change	1 year before the IDD change	IDD change	1 year after the IDD change	3 years after the IDD change
IDD/Placebo IDD	0.112	0.049	0.078	0.136	0.194
	(0.356)	(0.341)	(0.341)	(0.328)	(0.317)
Control Variables	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Intercept	Yes	Yes	Yes	Yes	Yes
Obs.	1,887	1,887	1,887	1,887	1,887
Adj. R^2	0.728	0.728	0.728	0.728	0.728

Figure 1. Knowledge assets investment around the IDD events

The figure compares the changes in median knowledge assets investment by firms headquartered in states where state courts changed the IDD versus firms headquartered in states where the IDD is not changed, around the IDD adoptions and rejections years in the treatment states. In figure 1A, the treatment group (black dotted line) includes firms whose headquarter state courts adopted the IDD in court rulings while the control group (grey solid line) includes firms whose headquarter state courts do not have any IDD rulings around the adoption years. In figure 1B, the treatment group (black dotted line) includes firms whose headquarter state courts rejected the previously adopted IDD in court rulings while the control group (grey solid line) includes firms whose headquarter state courts do not have any IDD rulings around the rejection years. The level of knowledge assets investment in year -3 is rescaled to 100 for both groups.





Appendix A1. Variable Description

Variable	Definition	Source
CAR (-5,5)	Cumulative abnormal return (in percentage) of the firm in the (-5,5) window, where day 0 is the date when the IDD is adopted or rejected in state where firm's headquarters locate; daily abnormal stock returns are calculated using the market/market-adjusted model and the CRSP value-weighted index with the estimation window being days (-200, -60) before the event date	CRSP
CAR (-2,2)	Cumulative abnormal return (in percentage) of the firm in the (-2,2) window, where day 0 is the date when the IDD is adopted or rejected in state where firm's headquarters locate; daily abnormal stock returns are calculated using the market/market-adjusted model and the CRSP value-weighted index with the estimation window being days (-200, -60) before the event date	CRSP
CAR (-1,1)	Cumulative abnormal return (in percentage) of the firm in the (-1,1) window, where day 0 is the date when the IDD is adopted or rejected in state where firm's headquarters locate; daily abnormal stock returns are calculated using the market/market-adjusted model and the CRSP value-weighted index with the estimation window being days (-200, -60) before the event date	CRSP
Knowledge assets investment	Annual SG&A expense as a ratio of sales revenue	Compustat
State-level variables		
Skilled labor	Logarithm of number of workers with at least bachelor degree in a state	Census QWI
Industry_financed_R&D	Logarithm of industry-financed R&D expenditure at doctoral-granting institutions per state	National Science Foundation
Per capita state income	Logarithm of per capita income of the state which firms' headquarters is located in	Bureau of Economic Analysis
Total state income	Logarithm of total income of the state which firms' headquarters is located in	Bureau of Economic Analysis
Total state income growth	Percentage change in the total income of the target county from year *t-1* to year *t*	Bureau of Economic Analysis
Political balance	Share of U.S. House of Representatives that are members of Democratic Party for a state and in a given year	House of Representatives
Industry-level variables		
Ind_rnd_sale	Median percentage of R&D spending of total sales for firms in an industry defined by the first 2-digit SIC code	Compustat
Ind_sga_sale	Median percentage of SG&A spending of total sales for firms in an industry defined by the first 2-digit SIC code	Compustat
Ind_pat_count	Logarithm of one plus the industry-average number of patent granted to a firm within in a year	NBER Patent Database
High tech	Dummy variable equals to one when firm is in one of the high-tech industries	Kenneth French's website
Firm Characteristics		
Rnd_sale	The percentage of firm's R&D spending of total sales	Compustat
Sga_sale	The percentage of firm's SG&A spending of total sales	Compustat
Patent count	Logarithm of one plus the number of patent granted to a firm within a certain year	NBER Patent Database
Firm size	Logarithm of Firm Market Cap	Compustat
Market-to-book	Market value of assets/book value of total assets	Compustat
Sales growth	Percentage change in firm's total sales from year *t-1* to year *t*	Compustat
Leverage	Book value of debt / book value of assets	Compustat
ROA	The firm's earnings before extraordinary items scaled by book value of assets	Compustat
Past stock return	The firm's buy-and-hold abnormal stock return in the (-210,-30) window, where day 0 is the date when IDD is adopted or rejected in state where firm's headquarters is located; buy-and hold abnormal stock return is calculated by subtracting the buy-and-hold CRSP value-weighted index return from the buy-and-hold stock return of the firm	CRSP
Geographic dispersion	Garcia and Norli's (2012) measure of firm geographic dispersion based on the number of U.S. states mentioned in the firm's annual 10-K report	Diego Garcia's website

Appendix A2. Correlation Matrix

The table reports correlations between different variables in our sample. The sample consists of 4,535 events in which firms' headquarter state adopted IDD and 3,857 events in which firms' headquarter state rejected IDD and covers the period from January 1960 to December 2014. Detailed description of the variables is presented in Table A1 of the Appendix.

	CAR (-5,5)	CAR (-2,2)	CAR (-1,1)	Skilled labor	Industry_financed_R&D	Per capita state income	Total state income	Total state income growth	Ind_rnd_sale	Ind_sga_sale	Ind_pat_count
CAR (-2,2)	0.534										
CAR (-1,1)	0.428	0.736									
Skilled labor	-0.048	-0.092	-0.053								
Industry_financed_R&D	-0.008	-0.016	-0.005	0.660							
Per capita state income	-0.052	-0.052	-0.033	0.447	-0.321						
Total state income	-0.010	-0.092	-0.052	0.993	0.161	0.477					
Total state income growth	0.038	-0.002	0.015	0.228	0.321	-0.241	0.074				
Ind_rnd_sale	-0.005	-0.108	-0.086	0.241	-0.018	0.234	0.219	0.014			
Ind_sga_sale	-0.008	-0.045	-0.030	0.129	-0.027	0.189	0.125	-0.014			
Ind_pat_count	-0.012	-0.119	-0.097	0.287	0.171	0.067	0.197	0.053	0.609		
High tech	-0.007	-0.128	-0.090	0.241	0.053	0.170	0.186	0.086	0.759	0.402	
Rnd_sale	-0.005	-0.062	-0.046	0.106	-0.011	0.129	0.114	0.005	0.726	0.406	0.564
Sga_sale	-0.041	-0.130	-0.100	0.165	0.039	0.112	0.159	0.048	0.307	0.212	0.180
Patent count	-0.008	-0.044	-0.034	0.133	0.025	0.047	0.096	0.004	0.249	0.231	0.207
Firm size	-0.036	-0.138	-0.096	0.015	-0.067	0.059	0.080	-0.003	0.311	0.146	0.362
Market-to-book	-0.037	-0.216	-0.157	0.121	0.061	0.078	0.104	0.085	-0.002	-0.060	0.003
Past stock return	-0.001	-0.352	-0.264	0.103	0.103	0.041	0.103	0.116	0.183	0.128	0.162
Geographic dispersion	-0.007	0.045	0.043	-0.103	-0.111	-0.088	-0.087	-0.085	-0.241	-0.175	-0.235

	High tech	Rnd_sale	Sga_sale	Patent count	Firm size	Market-to-book
Rnd_sale	0.240					
Sga_sale	0.241	0.260				
Patent count	0.205	0.084	0.023			
Firm size	0.004	-0.038	-0.101	0.348		
Market-to-book	0.198	0.124	0.199	0.051	0.2304	
Past stock return	-0.217	-0.109	-0.115	-0.054	0.204	-0.057

Appendix A3. Court ruling of IDD and state characteristics

This table presents the relationship between the court decision on the IDD and time-varying state characteristics using OLS regressions. The dependent variables are the timing of IDD decision in general and IDD adoption and rejection separately. We control for lagged state characteristics, state fixed effects, and year fixed effects in all regressions. The analyses are conducted using yearly data covers the period from January 1960 to December 2014, and the analyses using political balance data covers a period from January 1992 to December 2014. Detailed description of the variables is presented in Table A1 of the Appendix. All dollar values are in 2014 constant dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Robust standard errors are clustered at the state level and are shown in parentheses. *, ** and *** denote an estimate that is significantly different from zero at the 10%, 5%, and 1% levels, respectively.

Dep. Var.:	IDD decision dummy		IDD adoption dummy		IDD rejection dummy	
Per capita state income $_{t-1}$	-0.003	0.010	-0.004	0.015	0.001	-0.005
	(0.009)	(0.062)	(0.008)	(0.055)	(0.006)	(0.025)
Total state income $_{t-1}$	0.038	0.043	0.025	-0.063	0.013	0.106
	(0.025)	(0.093)	(0.020)	(0.072)	(0.012)	(0.067)
Total state income growth $_{t-1}$	-0.028	-0.226	0.054	0.105	-0.082**	-0.331*
	(0.044)	(0.208)	(0.041)	(0.103)	(0.036)	(0.179)
Political balance		-0.009		-0.018		0.009
		(0.015)		(0.016)		(0.005)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	2,805	1,122	2,805	1,122	2,805	1,122
Adj. R^2	0.005	-0.001	0.004	-0.006	-0.005	-0.010