Trade Secrets Protection and Foreign Investment*

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Abstract:

We study the role of trade secrets protection in determining the incidence and intensity of foreign investment flows into the U.S. manufacturing sector. We find states that adopt the Uniform Trade Secrets Act (UTSA), which codify and enhance the protection of trade secrets, experience a reduction in the number and total volume of cross-border mergers and acquisitions (M&A) deals. We show that the decline occurs mainly in intellectual property intensive industries. The effects are more pronounced for deals originating from source countries that are scarce in patents, R&D expenditures, and human capital. Our results demonstrate that access to local, undisclosed information is a significant driver of foreign investment flows into the U.S.

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1. Introduction

Foreign Direct Investment (FDI) is an important component of global financial flows. It can boost local capital stock, and it often involves a transfer of advanced foreign technology and expertise. Cross-border investment is welcomed in developed economies, as well as developing countries, where policy-makers often provide generous incentives to entice foreign multinationals to choose their site for a foreign subsidiary. For example, in the U.S., nearly 7 million workers were employed by foreign-owned multinationals in 2015, and FDI inflows were greater than US $ 300 billion.[1]

There are a number of important factors which affect the incidence and the volume of FDI activity (see, for example, Alfaro (2017)). The size of the local market (as measured by population or GDP), the magnitude of transport costs and import tariffs, local labor and pollution abatement costs are all significant reasons for a multinational company to operate a subsidiary abroad. Another important factor that multinational firms may potentially be considering when they expand abroad is acquiring trade secrets.

Trade secrets are proprietary information unknown to firm's competitors and include not only product and process innovations, but also marketing and management related data (e.g., customer lists). They contain the main components of a firm's intellectual property. The Business R&D and Innovation (BRDI) Survey undertaken in 2012 by the National Science Foundation and the Census Bureau shows that 58.3% of firms with R&D activity consider trade secrets "very important," compared to lower shares for patents, trademarks and copyrights (Linton, 2016).[2] As such, laws governing trade secrets constitute an important form of intellectual property rights protection.[3] In this paper we analyze the impact of trade secrets protection in the

[1]https://www.pewresearch.org/fact-tank/2017/12/14/number-of-u-s-workers-employed-by-foreign-owned-companies-is-on-the-rise/ and UNCTAD World Investment Report 2017 (https://unctad.org/en/PublicationsLibrary/wir2017_en.pdf).

[2] Similar results were found in the surveys carried out by the USITC in 2011 and 2014. See Linton (2016) for details.

[3] In general, trade secrets laws have broader coverage than patents, as trade secret laws protect work-in-progress, and process innovations and not just the final product. Moreover, trade secrets laws can provide protection even when patents are not granted.

host country on foreign investment inflows. In particular, we evaluate the impact of the staggered adoption of the Uniform Trade Secrets Act (UTSA) across U.S. states on the incidence and volume of U.S. inbound cross-border M&A deals. The UTSA provides an enhancement in intellectual property rights protection by providing details on what can be considered a trade secret and detailing the legislative process, as well as the penalties. States that have not adopted the UTSA govern trade secrets by relying on the stock of existing case precedents in their state. As the Act increases the risks and costs of misappropriation, it lowers the incentive to acquire trade secrets.[4]

There is a growing empirical literature on the effects of intellectual property rights (IPR) on FDI and foreign licensing with mixed results— see Noon et al. (2019) for a recent survey. A subset of the literature (e.g., Maskus (2000), Javorcik (2004), Branstetter et al. (2006), Ivus et al. (2016), Ivus et al. (2017)) finds that stronger protection entices foreign investment, as it lowers the risk of the investor's intellectual property from being misappropriated. On the other hand, a few studies (e.g., Mayer and Pfister (2001), Watkins and Taylor (2010)) show a negative or ambiguous effect of IPR protection on FDI. From a theoretical perspective, IPR protection can crowd out FDI as it increases the cost of imitation, leading the firms to increase innovation hence reducing the monopolistic market held by foreign multinationals (Mansfield et al, 1981). Additionally, improvements in IPR protection in developing countries can lower foreign firm's need to keep direct control of their IP-related assets, and therefore might lead them to choose licensing agreements instead of FDI (Braga and Fink (1998), Maskus et al. (2005)).

We conjecture an alternative mechanism that can be at play when the host is an advanced economy. When foreign firms invest in a developed country like the U.S., part of their objective may be to acquire information from local competitors, suppliers or vendors, especially in technology or knowledge intensive industries. As stronger intellectual property rights limit the potential spillovers from domestic firms,

[4] The applicable law in trade secrets protection is the one where the misappropriation happened, i.e. the location of the target when it comes to cross-border M&A deals.

improvements in their protection might lower the foreign firms' incentive to invest in the U.S.

We empirically assess the viability of this mechanism by using data on U.S. inbound cross-border M&A transactions in the manufacturing sector from Thomson Reuter's SDC Platinum dataset.[5] Over our sample period from 1985 to 2015, there were more than 9,000 inbound M&A transaction in the U.S. manufacturing industry, accounting for more than $ 1.8 trillion dollars in foreign investment (see Figure 1). We exploit the staggered timing of the adoption of the UTSA across U.S. states from 1985 to 2015 as a source of exogenous variation in intellectual property protection. We demonstrate that the enhanced trade secrets protection following the passage of the UTSA deter foreign investment in the U.S. Specifically, we find that the incidence (the number of M&A deals) and the volume (dollar amount) of inbound cross-border M&A activity declined by about 20% and 50%, respectively in states that have adopted the law.

The decline in the inbound M&A activity following the UTSA suggests the potential to acquire local, proprietary information is a significant determinant of foreign firms' investment decision. In order to shed light on the importance of access to undisclosed local information, we compare the impact of the UTSA on the cross-border M&A activity in knowledge-intensive industries to non-intensive industries. To define knowledge-intensive industries, we employ the intellectual property (IP) intensive industry classification from a report by the U.S. Department of Commerce Economics and Statistics Administration (ESA) and the U.S. Patent and Trademark Office (USPTO), and the advanced technology product (ATP) from the Census Bureau.[6] We consistently find that foreign investment declines only in the knowledge-intensive (IP-intensive or ATP) industries, confirming our conjecture on the importance of the access to local information.[7]

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[5] Among the two modes via which FDI occurs—cross-border merger and acquisitions (M&A) and green filed investment— the majority of inbound FDI transactions in the U.S. throughout the 1980s and the 1990s were cross-border M&As, and the majority were in the manufacturing sector (see e.g., Kandilov et al. (2016) and Kandilov and Senses (2016)).

[6] See the Data Section for further details.

[7] Similarly, using firm-level data from Eastern Europe and the Former Soviet Union, Javorcik (2004) finds that weak intellectual property protection tends to deter foreign investors in technology-intensive sectors that reply heavily on intellectual property rights.

Moreover, we find that the acquisition of publicly traded firms, who are faced with higher costs of misappropriation even without a state regulation that enhances the protection of IPRs due to the scrutiny they face, are not affected by the UTSA.

We provide supporting evidence on the suggested mechanism by considering the source country's capacity to produce intellectual property assets. To that end, we limit our analysis to the inbound M&A transactions coming from the top 23 countries that invest in the U.S.[8] Focusing on a source country-state-year level analysis not only allows us to analyze the mechanisms that influence foreign investors' responses to changes in states' trade secrets protection, but also allows us to control for country level determinants of cross-border investment, such as income levels and bilateral trade with the U.S. We find that countries with a larger number of granted patents in the U.S., higher levels of R&D spending as a fraction of GDP, and higher levels of education (measured with the fraction of population with completed tertiary education) lower their investment by less after the states adopt the UTSA. Relatively more knowledge scarce countries (with fewer patents, and lower levels of R&D spending and tertiary education) reduce their investments more aggressively, suggesting access to local, proprietary information is a much more crucial motive for them when investing in the U.S.

In addition to the aforementioned literature on FDI and intellectual property rights protection, our study contributes to a growing body of work focusing on the role of investor protection and contracting environments on cross-border M&As. Rossi and Volpin (2004) address the role of differences in laws and regulations across countries in cross-border flows and find evidence that acquirers from countries with better investor protection regimes target firms in countries with poorer investor protection regimes. Chari et al. (2010) present evidence that the gains from cross-border M&As are particularly large when developed country acquirers gain majority control in emerging market targets, with the effect being greater for targets from

[8] Cross-border M&A transactions coming from these top 23 countries account for 88% of the total foreign investment in the U.S.

countries with weaker contracting environments. In a cross-country setting, Erel et al. (2012) consider many of the previously examined factors jointly and document that regulatory regime quality is a good predictor of cross-border investment flows in addition to geography, and bilateral trade. Closest to our study, Alimov and Officer (2017) use data from 50 countries for the 1985-2012 period and show that patent reforms increase the total volume of cross-border M&A inflows.

One advantage of our research design in analyzing the impact of IPR protection on cross-border M&As is that we employ variation in local trade secrets regulation across U.S. states, and thereby implicitly control for a number of potentially confounding host country factors that affect cross-border M&As but are common to all states. By contrast, most papers considering the role of IPR protection in cross-border investment use between country variation in regulations and institutions and face the challenge of not being able to control for unobserved country-level factors that may account for differences in cross border investment flows.

Lastly, our work is also related to the small but growing literature on the UTSA's economic impacts. Most related to our study, Png (2017) shows that the UTSA is associated with higher R&D among larger domestic companies and those in high-tech industries. A number of studies have also shown the importance of the UTSA for domestic firms' financial decisions such as corporate disclosure (Guo et al, 2017; Glaeser, 2018), and financial leverage (Guernsey et al, 2019). To the best of our knowledge, our paper is the first to consider the effects of trade secrets protection through the UTSA on international economic activity, and in particular on foreign investment flows into the U.S.

The rest of the paper is organized as follows. Section 2 provides details on the Uniform Trade Secrets Act and it outlines conceptually how it can affect foreign investment across U.S. states. Section 3 describes the data we employ in our empirical investigation. We provide the details of our econometric strategy in Section 4 and discuss the results in Section 5. Finally, Section 6 concludes.

2. Trade Secrets Protection and Foreign Investment

2.1 Uniform Trade Secrets Act

In order to standardize the regulation of trade secrets protection across U.S. states, in 1979, the Uniform Law Commissioners drafted and proposed the Uniform Trade Secrets Act (UTSA) for state government legislation. Before adopting the UTSA, states governed trade secrets protection by common law, that is, by the stock of existing case precedents in the state (Png, 2017). The definition of a trade secret was codified in a treaty called the Restatement (First) of Torts, which stated that a trade secret "consist(s) of any formula, pattern, device or compilation of information, which is used in one's business, and which gives him an opportunity to obtain an advantage over competitors who do not know or use it."[9] This formalization was not legally binding and produced conflicting practices, and court decisions across the states (Guernsey, et al., 2019).

The UTSA strengthens the protection of intellectual property rights at the state level along three dimensions. First, it increases the coverage of a trade secret to include work in progress (e.g., ongoing R&D activities), information that is not in continuous use, and negative information on the research or effort showing that a process will not work.[10] Second, it provides details on what can be considered misappropriation of a secret, which include acquiring information without the consent of the owner of the information through legal efforts, for example by reverse engineering a production process, and/or through improper means such as espionage or bribery. Finally, the UTSA details the legislative process and the penalties, and provides

[9] Restatement (First) of Torts, section 757, comment b, 1939.

[10] Officially, the UTSA defines a trade secret as "information, including a formula, pattern, compilation, program, device, method, technique, or process, that (i) derives independent economic value, actual or potential, from not being generally known to, or readily ascertainable by proper means by other persons who might obtain economic value from its disclosure or use; and (ii) is the subject of efforts that are reasonable under the circumstances to maintain its secrecy" (Guernsey, et al., 2019).

remedies for firms whose secrets were misappropriated.[11]

Table 1 lists the years in which each state adopted the UTSA.[12] The adoptions start with Minnesota in 1980 and by 1985 (the first year in our sample) there are 10 states that have adopted the law. The rest of the states pass the law in different years, and by the end of our sample period (2015) five states (Alabama, Massachusetts, New York, North Carolina, and Wisconsin) remain as non-adopters. This staggered adoption of the UTSA provides a quasi-experimental setting for studying the impact of trade secret protection on the foreign investment inflows across the states.

We use the adoption of the UTSA across states and over time as a measure of improved protection of intellectual property. A potential concern is that the timing of the UTSA may be driven by cross-border investment into the state adopting the regulation, rather than the other way around. Png (2017) shows that state enactment of the UTSA was not related to state industrial structure, R&D, policies to support R&D, or any pro-business orientation. Additionally, Guernsey et al. (2019) provide evidence that state's macroeconomic conditions and in-place corporate laws (such as business combination laws, control share laws, fair price laws, and poison pill laws) do not explain states adoption of the UTSA. Building on these previous studies, in the Appendix we present and discuss the results from a random-effects parametric survival-time model, which shows cross-border M&A flows do not impact states' enactment of the UTSA. Moreover in robustness checks (section 5.1), we show that previous year's M&A activity does not predict the UTSA adoption. Hence, the evidence collectively provide support for the use of the UTSA as an exogenous source of variation in the protection of trade secrets.

[11] Remedies put forward by the UTSA include monetary compensation for any loss due to misappropriation, royalty payments, attorney fees, and injunctive relief (obligation for the faulty firm to avoid using the appropriated information; or to return, withdraw, destroy any materials involving the trade secrets).

[12] There are three states (Alabama, North Carolina, and Wisconsin) that enact their own trade secrets act before they adopt the Uniform one. We check the robustness of our results to using the alternative dates when the states adopt their Act in Section 5.1.

2.2 Conceptual Framework

An important motive behind a company's foreign acquisition is access to local resources. While low-wage labor and intermediate inputs or natural resources are often cited examples for targets in developing countries, access to technology, high-skilled labor, managerial expertise, and distribution networks are more likely to be the factors that attract investment into advanced economies. When a firm invests in a target in an advanced economy, it not only acquires the firm-specific assets (such as its technology as well as tangible and intangible assets), but it also gains access to the host country's labor pool, and information that can potentially spillover from other companies.[13]

Improvements in the host country's protection of intellectual property rights can affect foreign companies' cross-border investment decisions in two alternative ways. On the one hand, stronger protection would lower the misappropriation risk of the acquirer's own tangible or intangible assets. Knowing that its technology and intellectual property will be better protected, foreign firms might be more willing to invest in the host country's economy. This mechanism implies that the adoption of the UTSA would make a given state more attractive for foreign investors, and would lead to an increase in the foreign inflows (see, for example, Javorcik (2006)).

On the other hand, strengthening intellectual property rights limits the potential spillovers that can benefit a foreign acquirer investing in the host country. If part of the foreign firm's objective investing in the U.S. is to acquire information from local competitors, suppliers or vendors without them sharing their exclusive knowledge of products, processes or intangible assets, improvements in the protection of such trade secrets would deter foreign investment. Hence, foreign acquisitions would decline in states that enact the UTSA.

As the two mechanisms imply opposing impacts on foreign investment, whether the UTSA reduces or

[13] Some examples of such information can be customer lists, or methods of production, and testing.

boosts the incidence and intensity of cross-border M&As becomes an empirical question. If the incentive of accessing local, private information outweighs the benefits of lower risk of acquirer's own assets' misappropriation, then one would observe a decline in foreign investment following the UTSA. Moreover, one would expect the decline to be greater in industries that are more knowledge (intellectual property (IP) or advanced technology) intensive, as accessing information would be a stronger motive for firms that operate in those industries, especially for those that are from source countries with relatively more limited knowledge/technology producing capacities.[14]

3. Data

3.1 Cross-border M&A Data

In order to assess the impact of enhanced trade secrets protection on foreign investment inflows, we use data on M&A deals from the SDC Platinum database. Our sample contains foreign acquirers investing in targets located across the 48 contiguous states, and covers the 1985-2015 period.[15] We focus on the manufacturing industry, where the majority of the cross-border M&A transactions take place. This leaves us with 9,371 completed transactions over our sample period.

The data on cross-border M&A deals obtained from SDC Platinum include information on the identity of the foreign acquirer, including its country of origin; the target's location (U.S. state); the main 4-digit Standard Industrial Classification (SIC) industry in which the acquirer and the target operate; whether the acquirer or target are publicly traded; and the year the deal was completed. For 5,141 of the deals in our sample SDC Platinum also reports the transaction value. In presenting the results, we provide checks showing the robustness of results to excluding the observations with missing transaction values. Moreover, when we

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[14] Using transaction-level data for the U.S., Harris and Ravenscraft (1991) show that foreign investors choose to acquire targets that are in R&D intensive industries, which is consistent with Markusen (1995).

[15] We choose 1985 as the starting point of our analysis as there is a very small number of cross-border mergers and acquisitions that pass our data filters prior to 1985.

estimate a logistic regression with a dependent variable indicating if the observation has a reported transaction value on a set of independent variables that includes dummies for all transaction covariates (target's U.S. state, year of completion, source country, acquirer industry and target industry), we obtain a pseudo-R2 that is around 0.14, indicating that there is likely little selection on these observables.

To evaluate the impact of enhanced trade secrets protection on the incidence and intensity of cross-border M&A deals, we first construct a state-year level panel dataset counting the total number of foreign M&A deals in each state and every year between 1985 and 2015. If there are no transactions in a given state and year, we record that observation as zero. Subsequently, we end up with a balanced panel of 1,488 observations, out of which 1,201state-year cells have non-zero transaction counts. We also examine the impact of the UTSA on the total volume of cross-border M&A transactions in a given state by summing up the transaction values for all deals in that state during a particular year. As in the case of the cross-border M&A counts, if there are no transactions in a state during a given year, the total value is recorded as zero. Out of the 1,488 observations, 471 state-year cells contain transactions with no recorded values. In estimating the empirical model for the total volume, we handle the missing (but non-zero) observations in two ways— we exclude them from the estimation, or we replace the missing values with zeroes. We obtain very similar results in both cases.

We further expand our empirical analysis by creating a bilateral inbound cross-border M&A panel, where we focus on transactions originating from the top 23 investor countries in our sample, whose transaction volume represents over 88 percent of the total volume of foreign investment flows into the U.S. manufacturing sector.[16] We do so not only to check for robustness, but also to further illuminate the mechanism behind our results. Using bilateral M&A data allows us to control for time-invariant source country specific factors (via including source country specific fixed effects) that are unobservable and can

[16] See the Appendix Table A1 for the list of top investor countries.

affect cross-border M&A activity. We can also directly control for source country covariates, such as real exchange rate depreciation and income per capita. Moreover, using source country level information, we are able to analyze how certain characteristics (e.g., education levels and R&D expenditure) influence foreign investors' responses to changes in the host country's protection of intellectual property rights. To conduct this analysis, we construct a state-source-country-year panel counting the number of foreign M&A deals for each state, originating from each of the 23 source countries, for every year between 1985 and 2015. In this case, our panel contains 34,224 observations, out of which 4,763 are non-zero state-source-country-year cells. As in the state-year panel, we sum up the transaction values to construct the total volume of M&A transactions originating from each of the 23 source countries.

Table 2 presents the summary statistics for the number of transactions and the total value of M&A inflows in both of the panel data sets we construct for our analysis. Panel A shows that on average there were 6.3 transactions in a given state per year over the 1985-2015 period. The maximum number of cross-border investments a state received was 99 (California in 2015). Panel B disaggregates this information to the source country level showing the average number of investments from a particular country, into a state during a year was 0.24, while the maximum was 37 (Japanese investments in California during 1990). In terms of the total values, a state received foreign investment averaging a total of 1.36 billion USD (2010 USD) per year, and the maximum value was about 60.7 billion USD. While the average annual total investment from a source country in a state was 50 million USD, there was a significant variation with the maximum value being 55 billion USD (German investments in Michigan during 1998), and the minimum non-zero value being 930 thousand (South Korean investment in Alabama during 2009).

3.2 Intellectual-Property and Knowledge Intensity Measures

As we discussed in section 2, our main hypothesis suggests access to local, undisclosed information is an important incentive for foreign acquirers. They are more likely to invest in locations where trade secrets are easier to obtain, improving their competitive advantage both in the host market, and potentially in the global market. This incentive will be greater for firms that operate in more knowledge intensive industries. To analyze this potential mechanism, we first classify industries into two groups: intellectual-property intensive (IP-intensive) and non-IP-intensive industries. This classification comes from a report by the U.S. Department of Commerce Economics and Statistics Administration (ESA) and the U.S. Patent and Trademark Office (USPTO).[17] Using administrative data on intellectual property items (i.e., patents, copyrights, trademarks), as well as industry size measures, the report ranks industries based on their reliance on patent, copyright, or trademark protection and defines all industries with above average IP-intensity measure as IP-intensive industries. For the manufacturing sector, the measure mostly reflects the reliance of firms on patents and trademarks within an industry.

The report provides a list of the IP-intensive industries based on the 4-digit NAICS industry classification. Because the SDC Platinum data provide information on the target and acquirer's industries based on the SIC classification, we use the concordance provided by the Census Bureau to identify the IP-intensive industries in our sample. The list of 4-digit NAICS industries that are classified as IP-intensive and the corresponding SIC codes are reported in Appendix Table A2.

Given previous work by Markusen (1995), it is not surprising that the majority of the cross-border M&A transactions in our sample occur in target industries that are IP-intensive. More specifically, out of the 9,371 transactions between 1985 and 2015, 7,741 are in IP-intensive industries. To verify that UTSA has a larger impact on cross-border M&A activity in IP-intensive industries, we construct an IP-intensive panel, where we count only the transactions in IP-intensive industries that take place in a given state during a given year. Similarly, we construct a non-IP-intensive panel using the subsample of transactions in non-IP-intensive industries. The descriptive statistics for these two subsamples are reported in Table 2.

[17] The report can be found at
http://www.uspto.gov/sites/default/files/news/publications/IP_Report_March_2012.pdf.

Because the ESA-UPTSO report identifies the IP-intensive industries based on trademark intensity in addition to patent intensity, the set covers relatively basic manufacturing such as dairy products, as well as the research and technology intensive industries such as the medical equipment manufacturing industry. To check the robustness of the results on the importance of knowledge intensity, we consider two additional classifications: advanced technology products (ATP) and high-technology industries (Hi-tech). We obtain both of these classifications from Goldschlag and Miranda (2016). The list of advanced technology products, defined as goods containing a significant amount of leading-edge technology, is compiled by the Census Bureau. The Hi-tech categories are identified by Hecker (2005) as industries, where the proportion of STEM workers are significantly larger than the average for all industries.[18] Industries in both classifications are listed in Appendix Table A2. As in the case for IP-intensive industries, for both ATP and Hi-tech classifications, we construct technology-intensive panels, where we count only the transactions in ATP or Hi-tech industries. We also create the non-intensive counterparts, and show that the improvements in intellectual property rights protection, i.e., adoption of UTSA, impacts foreign investment only in the technology intensive industries.

3.3 Additional Control Variables

In all of our empirical specifications we control for state-level factors that affect inbound cross-border M&A activity. These state-specific controls include (the natural logarithm of) gross state product, (the natural logarithm of) the average wage rate, the state statutory corporate tax rate, and (the natural logarithm of) the state's population. Definitions for all variables included in our specifications and their data sources can be found in the Data Appendix. Summary statistics for all variables included in our analysis are presented in Table 2.

In addition to the state-level covariates, when we analyze the bilateral M&A panel at the state-source-

[18] Hecker (2005) groups industries into three high technology levels. For the first level the proportion of STEM workers is at least 5 times the average; for the second and the third they are 3-4.9 and 2-2.9 times the average, respectively. We group levels 1 and 2 together, and call those industries "Hi-tech".

country-year level, we control for a number of previously established source-country determinants of cross-border M&As. These include the natural logarithm of real gross domestic product per capita for the source country, which is commonly included in gravity models of trade and investment (see, for example, Head and Mayer (2014)); the extent of trade links between the source country and the U.S., measured with bilateral imports and exports; exchange rate depreciation, calculated as the change in the logarithm of the real exchange rate measured as the foreign country's foreign currency per one USD (adjusted by the two countries' CPIs), to capture wealth and valuation effects (Froot and Stein (1991)).

4. Econometric Strategy

We start our empirical analysis of the impact of the UTSA on foreign investment inflows to the U.S. by estimating the effect of the Act on the frequency of inbound M&A transactions. Subsequently, we analyze the influence of the law on the overall deal volume (the aggregate dollar value).

4.1 Number of Cross-border M&A Transactions

To evaluate the impact of the UTSA on the frequency of new inbound cross-border M&A transactions, we specify the following negative binomial model, which is frequently used for count data (see, e.g., Cameron and Trivedi, 1998)

$$P(N_{st} = n) = \frac{\Gamma(n+\nu)}{n!\Gamma(\nu)} \left(\frac{\nu}{\nu+\mu_{st}}\right)^{\nu} \left(\frac{\mu_{st}}{\nu+\mu_{st}}\right)^{n}, \quad \text{for } n = 0, 1, 2, \ldots, \qquad (1)$$

where N_{st} is the number of all completed, inbound, cross-border M&A transactions targeting a U.S. firm in state *s* and in year *t* = 1985…, 2015. When computing the total number of cross-border M&A deals we include all observations, counting observations with missing transaction values as well. The mean of the outcome variable is $E(N_{st}) = \mu_{st}$, and the variance is $Var(N_{st}) = \mu_{st}(1 + \nu^{-1}\mu_{st})$, where ν^{-1} denotes the dispersion parameter. Note that the negative binomial regression reduces to a Poisson regression, which is also frequently used for count data, in the limit when $\nu^{-1} \rightarrow 0$, and it displays over-dispersion when $\nu^{-1} > 0$. We opt for the negative binomial regression model instead of the Poisson model, precisely because of the latter's restricting property of mean-variance equality, which often ignores over-dispersion in the data and can lead to biased standard errors of the estimates. As typical, the mean of the outcome variable is assumed to follow a log link

$$\mu_{st} = \exp(\beta_1 UTSA_{st-1} + \boldsymbol{X}_{st}\gamma + \omega_s + \tau_t + TimeTrend_t * \omega_s). \qquad (2)$$

The indicator variable $UTSA_{st-1}$ takes on the value of one if the UTSA is in effect in year *t-1* and afterwards in state *s*, and it takes on the value of zero otherwise. We use a one year lag because the impact of the UTSA on an outcome such as cross-border M&A activity is likely to be delayed, in part because it typically takes a non-trivial period of time (up to a year or more) from decision to announcement, to completion of a cross-border M&A transaction. The main coefficients of interest β_1 measures the average impact of the Act on the number of new, completed, inbound, cross-border M&A transactions. A negative (positive) estimate of β_1 suggests that the adoption of the UTSA by a given state is associated with a decline (an increase) in the number of new, cross-border M&A deals in that state.

Our econometric model also includes state dummies, ω_s, to control for any time-invariant, state-specific factors, such as geographic location and state-specific regulations that do not change over the sample period, which may affect investment decisions of foreign-owned firms. We also include year dummies, τ_t, to control for economy-wide changes in macroeconomic conditions, as well as changes in the federal laws, and state-specific linear time trends, $TimeTrend_t * \omega_s$, to allow for differences in productivity growth across states that may lead to differential time trends in the frequency of new cross-border M&A transactions across the U.S. Similar to Kerr and Nanda (2009), to obtain population estimates of the treatment effects, we weight equation (1) by the average (calculated over 1977-1985) state-level manufacturing employment in foreign multinationals.[19,20] Following Bertrand, Duflo, and Mullainathan (2004), we compute heteroscedasticity robust standard errors that are clustered at the state level to account for the possibility of serial correlation within state over time.

Equation (1) also includes an array of time varying state-specific characteristics, $\boldsymbol{X_{st}}$, that are important in the determination of cross-border M&A activity and have previously been used to explain inbound foreign direct investment (FDI) across U.S. states, which may be correlated with both inbound, cross-border M&A deals and the timing of adoption of the UTSA by states.[21] Specifically, we include gross state product (GSP) and population as controls for market size; wages to capture factor productivity and the cost of production; and the average corporate tax rate to control for state-level fiscal policies that affect foreign investment. GSP and the average wage also proxy for local labor market conditions. Summary statistics for these variables are reported in Table 2.

In order to analyze some of the source country characteristics in determining the impact of trade secret protection in the target country on cross-border M&A transactions, and to provide additional robustness checks, in later specifications we change our unit of analysis form the *state-year* level to the more granular *source country-state-year* level. In latter analysis, we modify the econometric strategy to additionally include source country dummies, which absorb time-invariant source country characteristics that may affect cross-border M&A activity. Moreover, we also control for some source country determinants of foreign investment, including the exchange rate, GDP per capita, and bilateral trade with the U.S.

[19] We use weights that are calculated using data prior to the beginning of our sample period to eliminate any bias arising from the potential impact of the adoption of the UTSA on employment levels later in the sample.

[20] Data on state level employment in foreign multinationals come from the Bureau of Economic Analysis.

[21] See, for example, Kandilov, Leblebicioglu, and Petkova (2016, 2017).

4.2 Volume of Cross-border M&A Transactions

In the second part of our empirical analysis, we assess the impact of the UTSA on the (state-level) volume of inbound cross-border M&A deals. To this end, we sum up the all reported deal values from cross-border M&A transactions targeting firms in state *s* during year *t* to construct the dependent variable of interest, V_{st}. As we discussed in the Data Section, around 40 percent of the deals do not have reported transaction values. However, using the count regressions and the count data, we find that there are negligible differences in the regression estimates when we use counts for all transactions, including those with missing value, and when we use counts only for transaction with non-missing values. This suggests that missing values are likely random, and therefore we either drop them from our analysis of total volume, or we assign a value of zero for transaction that do not have a reported value.

Typically, the econometric model for the volume of cross-border M&A flows is similar to that of the gravity model for international trade (see, for example, Di Giovanni, 2005; Head and Mayer, 2014). Hence, in our set-up, the econometric equation can be represented in its log-linear form as:

$$\log \mathrm{V}_{st} = \delta_1 UTSA_{st-1} + \boldsymbol{X}_{st}\lambda + \omega_s + \tau_t + TimeTrend_t * \omega_s + \varepsilon_{st}. \qquad (3)$$

Equation (3) above is a log-linearized version of the theoretically-founded multiplicative relationship between cross-border M&A activity (or bilateral trade, or foreign direct investment in general) and its state-level (or country-level) determinants. There are a number of potential issues in estimating gravity-type models such as equation (3). First, not every state has experienced an inbound cross-border M&A deal each year. Because the dependent variable in equation (3) is in logarithmic form, the zeros have to be omitted from the econometric analysis of the log-linearized model (3) above. This issue can lead to selection bias, as valuable information is excluded from the analysis. A second problem arises from the transformation of the multiplicative form of the gravity equation. In order to use Ordinary Least Squares (OLS), researchers often log-linearized it. If, however, the original multiplicative error is heteroscedastic, which is often the case with cross-country data, then the parameters of the log-linearized model estimated by OLS produce biased estimates of the true elasticities (Head and Mayer, 2014; Santos Silva and Tenreyro, 2006). To address these two estimation issues, Santos Silva and Tenreyro (2006) propose a tractable Poisson pseudomaximum-likelihood estimator (PPML), which we employ as our baseline specification in this context. As in the case for count regressions, we extend these specifications to the *source country-state-year* level, and estimate the model with source country fixed effects and covariates, in addition to the year effects, and state fixed effects, trends, and covariates.

5. Results

We start by analyzing the number of cross-border M&A deals across U.S. states. Within subsection 5.1 we also present evidence supporting the causal interpretation of our estimates of the UTSA's impact. We do so by demonstrating that reverse causality and omitted variable bias do not drive our results. Further, we show that there are no pre-existing trends in cross-border M&A activity prior to the passage of the UTSA. After we consider a number of industry and transaction characteristics that help illuminate the link between trade secrets protection and foreign investment, we present the results from our analysis of total volume of cross-border M&A flows in subsection 5.2. In the final part of the results section, we embark on the more detailed source country-state-year level analysis, and show that the results are robust to controlling for source country determinants of cross-border M&As, as well. We conclude by providing evidence on certain country traits that influence the response of foreign investors to the passage of the UTSA.

5.1 Impact on the Number of Cross-border M&A Transactions

Baseline results and Robustness

Table 3 presents the results from estimating the negative binomial model in equation (1) using the number of cross-border M&A deals across U.S. states as the dependent variable. Column (1) reports the estimate from the baseline model that includes the UTSA indicator, state-covariates, a full set of state and year effects, as well as a full set of state trends that capture the differential trends in cross-border M&A activity. The coefficient on the UTSA indicator is negative and it is statistically significant at the 1% level, and at -0.237, it implies that the number of cross-border M&A transactions declines by 21.1% following the UTSA.[22] Given the sample average of 6.3 (see Table 2), this reduction corresponds to 1.3 fewer transactions in each state after the adoption of the Act.

Among the covariates, only state population is significant. The positive coefficient on it is expected – foreign multinationals tend to locate closer to consumers, i.e. all else the same, foreign investors are more likely to acquire subsidiaries in more populous states. The positive coefficient on real gross state product (GSP) also captures the market size effect; however, it is not statistically significant. While the real wage is negative – albeit insignificant – in column (1), it suggests that higher labor costs can deter foreign investment. We do not obtain an economically nor statistically significant coefficient on state corporate tax rate, most likely because there is little variation in corporate tax rates within a state, over time.[23]

In columns (2) and (3) of Table 3, we demonstrate that the baseline results are robust to using alternative measures of trade secrets protection. First, in column (2), we take into account the fact that three states enacted their own trade secrets act (TSA) before they adopted the UTSA. North Carolina (in 1981), Wisconsin (in 1986), and Alabama (in 1987) formulated trade secrets acts, which did not fully conform to the UTSA, and the latter two later adopted the Uniform version. Not surprisingly, when we change the adoption dates for those states to their TSA adoption dates (keeping all other states' dates the same), we obtain very

[22] Because the indicator variable changes discontinuously, the effect of UTSA is calculated as ($e^{-0.237}$-1) = -0.211. For estimated coefficients that are small in magnitude, this procedure makes little difference. Also, note that estimating the baseline binomial model in equation (1) without state-specific time trends, results in a very similar estimate of the coefficient on the UTSA at -0.173 with a standard error of 0.061.

[23] The estimated effect of the UTSA without controlling for any of the state-level covariates in column (1) is quite similar to that reported in column (1), indicating that the covariates do not drive the results.

similar results. Next, we consider the trade secret protection indexes constructed by Png (2017), who constructs a state-level index measuring the additional increase in the legal protection due to UTSA. We present the results with that index in column (3). As in the previous columns, we obtain a negative and significant reduction in M&A activity due to the adoption of the UTSA.[24]

The estimates in column (4) of Table 3 shows that the results are further robust to controlling for the staggered adoption of the Inevitable Disclosure Doctrine (IDD) by the U.S. state courts. By prohibiting workers from seeking employment at a rival firm, the IDD limits the acquisition of trade secrets through employees' mobility across similar firms. Incorporating the two laws into the specification simultaneously, we find IDD to be insignificant, and that the coefficient on the UTSA remains almost unchanged. These results potentially suggest that providing a broader coverage than employee mobility, the UTSA provides a stronger protection of firm's trade secrets, and therefore matters more for foreign investment.

In the last two columns of Table 3, we additionally present the results from a test for potential diversion and spillover effects from the adoption of the Act by neighboring states on the number of cross-border M&A transactions in a given state. For example, if the state of Kentucky adopts stricter trade secrets protection by passing the UTSA, foreign multinationals may divert their investment to the neighboring state of Tennessee, since, keeping everything else constant, it could be less costly to locate in a neighboring state due to potential similarities in, among other factors, production costs, proximity to consumers, and industrial composition. It is also possible that the UTSA's adoption in Kentucky leads investors to leave the region altogether for other regions in the U.S., or for other countries. This would be the case if investors perceive it

[24] Note that Png's index is available only up to 2008. Consequently, the specification in column (3) is estimated for the 1985-2008 subsample. Further, we also consider another state-level trade secret protection index constructed by Png (2017), which represents the strength of the legal protection of trade secrets under common law, based on the substantive law, civil procedures, and the remedies for misappropriation. When we include this common law index along with the UTSA indicator, i.e. when we control for the level of protection common law provides, adoption of the UTSA continues to have a negative impact, similar to that estimated in column (1), on the number of cross-border M&As.

more likely that once the Act is adopted in a given state, the neighbors will also follow suit. Similarly, adoption in Kentucky may reinforce or weaken the impact of the UTSA if or when adopted in Tennessee. In order to test for these possibilities, we extend our baseline equation (1) by including an indicator for neighbors' adoption of the UTSA, which turns to one in the earliest year of the UTSA adoption by a neighboring state, along with an interaction between the state's own adoption indicator and that of its neighbors.

First, in column (5) of Table 3, we present a model with both own UTSA adoption and the neighbors' UTSA adoption indicators. The coefficient on the own UTSA adoption (-0.239, st. error of 0.085) is negative, statistically significant, and of similar magnitude to the baseline effect presented in column (4) of Table 3. The estimated effect of the neighbors' UTSA adoption on the state's number of cross-border M&A (0.111, st. error of 0.095) is small and statistically insignificant, implying that neighbors' adoption of stricter trade secrets protection does not have much of a direct impact on a given state. Once we additionally include an interaction term between the two UTSA adoption indicators in column (6), we find that both the state's own UTSA adoption and the neighbors' adoption have negative effects on the state's cross-border M&A transactions. This implies a diversion of cross-border M&A activity from the region where both states are located if both of them have passed the UTSA. At the same time, the positive interaction term suggests neighboring states' adoption tends to reduce the negative impact of the state's own UTSA passage.

The decline in the number of transactions suggests that by increasing the costs of misappropriation, the UTSA lowers the potential of obtaining trade secrets. The limited opportunity to benefit from a target's propriety information in turn lowers the foreign acquirer's incentive to invest in a state that has adopted the UTSA. Before we provide evidence on the importance of access to information as a mechanism that derives our results, we perform two robustness checks to validate our causal inference. The first one deals with the issue of reverse causality and the second one tackles the potential omitted variable problem. Because both issues may undermine the causal interpretation of our estimates, the results from these tests can reinforce confidence in our identification strategy.

We begin these checks in Figure 2, where we provide visual representation of the estimates from an expanded version of our baseline specification. Specifically, we check for pre-existing trends in cross-border M&A transaction in our baseline model (1), which could potentially be a sign of reverse-causality, by including interactions of the treatment (adoption of the UTSA) with annual indicator variables tracing over time the passage of the Act, from 4 years prior to adoption to 4 years following it. The omitted category is the year prior to adoption. If there are negative trends in the cross-border M&A activity leading to adoption of the UTSA, then the lead year indicators (4+, 3, and 2 years prior to adoption) would be large, negative, and statistically significant. The estimates presented in Figure (2) demonstrate that all of the coefficients on the lead indicators are close to zero and statistically insignificant, suggesting that reverse causality (or common trends) is likely not an issue. On the other hand, we find that all of the annual indicators, including 1, 2, 3, and 4+ years following the adoption of the UTSA, are large, negative and statistically significant, demonstrating that the Act depressed the number of inbound cross-border M&A transactions. The estimates also show that the response of cross-border M&As to the increase in trade secrets protection likely declined over time following the passage, i.e. it was greatest immediately following adoption and the reached a long-term equilibrium within 4 years.

The causal interpretation of our baseline results in Table 3 could be also undermined by an omitted variables problem. Specifically, unobservable shocks that are correlated with the passage of the UTSA could drive our results. To address this concern, we follow previous work by Guernsey et al. (2019), as well as Cornaggia et al. (2015), and we conduct a placebo test which checks if the estimated impact of the UTSA goes away when we randomly match states to UTSA adoption status and year of passage according to the empirical distribution of the Act's adoption (see Table 1) we observe in practice. Hence, we maintain the distribution of the UTSA adoption years from our baseline specification, but not the correct assignment of adoption years to states. This approach allows unobservable shocks correlated with the passage of the Act to remain in our empirical setting and affect the estimates. If there are no unobserved shocks, the estimated effect of the UTSA on inbound cross-border M&A deals is expected to be negligible under the random assignment. We perform this placebo test 500 times and then plot the estimated coefficients on the UTSA indicator in a histogram, which is presented in Figure 3. The red, vertical line represents the coefficient we estimate with the real data. The average UTSA coefficient over all 500 simulations is practically zero at 0.006 (with a standard deviation of 0.110), which is much greater than -0.237, the coefficient obtained with the real data. In fact, only 3 out of the 500 coefficients obtained when we randomize the UTSA's adoption is smaller than 0.237. The rest of the 497 coefficients, almost the entire distribution, are to the right of our benchmark estimate with the real data. This evidence supports the conclusion that the true impact is indeed negative and economically meaningful. Hence, both this and the previous test for endogeneity bolster our confidence in our baseline estimate and support its causal interpretation. Before we continue, we also note that we have estimated a more formal empirical model, a random-effects parametric survival-time model that aims to explain the timing of the UTSA's adoption across states (see, for example, Ribstein and Kobayashi (1996) and Png (2017)). The results, which are described in the Appendix (and presented in Appendix Table A4), provide further evidence that cross-border M&A flows do not affect the timing of passage of the UTSA.

Mechanisms

In Table 4, we start by providing evidence that access to information is a mechanism through which adoption of the UTSA affects the number of cross-border M&A deals. To that end, we consider the three alternative knowledge-intensity classifications for industries described in the Data section. The first two columns focus on the IP-intensity classification based on the ESA-UPTSO report; columns (3) and (4) show the results using the ATP classification; and the last two columns show that the conclusions are robust to using the Hi-tech industry classification of Hecker (2005).

In column (1), we evaluate the impact of the UTSA on the number of transactions in IP-intensive industries alone. As we previously discussed, we do so by counting the number of inbound cross-border M&A

transactions in each state and year for which the target company operates in an IP-intensive industry. In column (2) we estimate the impact of UTSA on transactions for which the target is in a non-IP-intensive industry. As in the case for our baseline specification in Table 3, state-year cells with no transactions (IP-intensive or otherwise) have a count of zero, i.e. the panel is strongly balanced. Although both estimates are negative, we find that the negative impact in IP-intensive industries in column (1) is far greater in magnitude and statistical significance compared to the estimated impact in non-IP intensive industries presented in column (2).

The differences across the knowledge-intensive and non-intensive subsamples become starker when we consider the ATP classification. As we discussed in the Data section, EPO-USPTO report classifies IP-intensive industries based on trademark, copyright, and patent intensities, and therefore includes a variety of products with different sophistication levels (see Appendix Table A2). Advanced technology products make up the subset of the IP-intensive goods that contain a significant amount of leading-edge technology. The results in columns (3) and (4) show that the impact of the UTSA on ATP-industries is more than twice as big in size compared to the impact on the number of cross-border M&A deals in non-ATP industries, and it is significant only for the former. Moreover, as shown in columns (5) and (6), we obtain similar results when we use Hecker's (2005) Hi-tech industry classification, confirming that these findings are not sensitive to alternative classifications.[25]

Taken together, these results provide support for the idea that part of the foreign firm's objective when investing in the U.S. is the acquisition of information from local competitors, suppliers or vendors. When intellectually property rights protection is enhanced, foreign firm's incentive to invest in the U.S. declines. Since potential spillovers from local firms are much more valuable in knowledge intensive industries, better protection through the UTSA reduces the number of investments particularly in knowledge-intensive

[25] There is a large over-lap in the list of ATP and the Hi-tech industries, but there are a few industries that are classified as knowledge-intensive based on one categorization, but not the other. See Appendix Table A2 for details.

industries. We show in the following sub-sections that knowledge-intensity also matters for the total value of foreign investments. For brevity, we focus on IP-intensity classification to illustrate this point going forward, as IP-intensity has a broader coverage of intellectual assets including trade-marks, as well as the technological products.

Next, we consider whether the adoption of the UTSA affects the number of cross-border M&As that involve publicly traded target companies differently than the number of M&As with private targets. Since public firms are required to disclose more information related to their typical operations, they are, in general, easier to scrutinize than are private targets. As such, in the absence of regulations that enhance the protection of intellectual property rights, the risks and costs of misappropriation are potentially higher for private targets. Therefore, one would expect a smaller decrease in the foreign firm's incentive to invest in public targets vis-a-vis private companies following the adoption of the UTSA. The results in columns (1) and (2) of Table 5 confirm our expectations; the number of cross-border transactions that involve the acquisition of public U.S. firms indeed do not change much post-UTSA. By contrast, there is a statistically and economically significant reduction in the number of cross-border acquisitions targeting private U.S. firms. Additionally, separating M&A deals in private firms operating in IP-intensive industries from the ones in non-IP-intensive industries (presented in columns (3) and (4)), once again demonstrates that the reduction in the number of transactions is significantly greater for the IP-intensive industries.

Before we assess the impact of the UTSA on the volume of cross-border M&A activity, we report yet another sub-sample analysis. Specifically, we evaluate if trade secrets protection affects horizontal and vertical FDI in a comparable manner. Vertical FDI takes place when multinationals fragment the production process internationally, locating each stage of production in the lowest cost location. On the other hand, horizontal

FDI occurs when multinationals engage in similar production activities across multiple locations).[26] Conceptually, some facets of the UTSA, such as limiting the opportunity to obtain customer lists, may have larger negative effects on horizontal cross-border investments, whereas others, such as limiting the opportunity to gain information on intermediate suppliers, would likely have a greater effect on vertical investments. While the bulk of FDI is horizontal, vertical FDI, sometimes referred to as offshore outsourcing, has increased in importance over the last two decades.[27] Hence, it may be beneficial (to policy-makers and researchers alike) to know if the UTSA has differential effects on horizontal versus vertical cross-border M&A investment.

Similar to previous work (e.g. Rappoport, Ramondo, and Ruhl (2016); Alfaro and Charlton (2009)), we classify a cross-border M&A investment transaction as horizontal if the target and the acquirer operate in the same three-digit SIC industry, and as vertical if the target and the acquirer operate in the different three-digit SIC industry but same two-digit SIC industry. The results from our empirical analysis are presented in Table 6. Columns (1) and (4) show that the UTSA has a negative impact on the number of both horizontal and vertical cross-border M&A transactions. However, the estimated magnitudes of -0.181 and -0.308 suggest that the negative effect of trade secrets protection is greater in magnitude for vertical M&As. Consistent with the earlier results, columns (2) and (3), as well as columns (5) and (6), show that the negative effects on either horizontal or vertical cross-border M&A transactions are driven by investments in IP-intensive industries.

[26] Multinationals undertake horizontal FDI (market-seeking FDI) to serve new markets abroad thus avoiding potential transport costs and tariffs associated with exports (Markusen and Venables, 2000). In contrast, the goal of vertical FDI (efficiency-seeking FDI) is to reduce production cost (Helpman, 1984); Helpman and Krugman, 1985; Bowen et al., 2012). The knowledge-capital model of the multinational firm is the overarching conceptual model in the literature that incorporates both horizontal and vertical FDI as special cases (Markusen et al., 1996; Brainard, 1997; Markusen, 1997; Carr et al., 2001; Markusen and Maskus, 2002).

[27] There is a large and growing empirical literature on vertical FDI – see, for example, Hanson, Mataloni and Slaughter (2005); Yeaple (2006); Nunn and Trefler (2008); Chor, Foley and Manova (2008); Bernard, Jensen and Schott (2009); and Costinot, Oldensky and Rauch (2011); Rappoport, Ramondo, and Ruhl (2016).

5.2 Impact on the Volume of Cross-border M&A Transactions

We next focus our attention on the total volume of cross-border M&A transactions and estimate the impact of the staggered adoption of the UTSA across U.S. states on the volume of inbound cross-border M&A deals. As we discussed in the earlier section detailing our econometric strategy, we employ the PPML methodology advanced by Santos Silva and Tenreyro (2006). We estimate our model using two different samples. First, we exclude state-year observations (184 observations out of the total of 1,488) for which cross-border M&A transactions are reported but their values are not disclosed, i.e. the data on the overall M&A volume for these observations is missing. We construct the second sample by assuming that these observations have zero M&A flows, which allows us to use the entire sample in the estimation. As it turns out, following either of the approaches delivers very similar results, which are presented in Table 7.

Our baseline estimates from the PPML specification excluding observations with missing data are reported in column (1). The effect of the UTSA on the total volume of inbound cross-border M&A deals is -0.884, an estimate that is both economically important and statistically significant at the 5% level. The magnitude implies that all else equal, the state's passage of the UTSA leads to a 58.7% decline in the volume of inbound cross-border M&As. [28] Given an average of $1.36 billion annually (see Table 2), the passage of the UTSA is associated with a decline in the volume of cross-border M&A activity down to about $0.56 billion (2010 USD). The total volume of inbound M&A deals appears to be more sensitive to the UTSA compared to the number of M&A deals. Recall from the previous section that the estimated impact on the number of M&A transactions is -21.1%, whereas the impact on total volume implied by our estimates in Table 7 is more than double that at -58.7%. The greater impact suggests that the UTSA not only lowered cross-border M&A activity at the extensive margin (the number of new transactions), but also at the intensive margin (the total volume of cross-border M&A activity) by lowering the average transaction value.

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[28] Because the indicator variable changes discontinuously, the effect of $UTSA$ is calculated as ($e^{-0.884}$-1) = -0.587.

In columns (2) and (3) of Table 7, we estimate the impact of the UTSA on the total volume of inbound cross-border M&A deals separately for the IP-intensive and non-IP-intensive industries, as previously defined, using the sample without missing observations on deal values. The results for the IP-intensive industries in column (2) suggest that the effect on these industries is about as large as the overall effect which is not surprising given that the majority of transactions, especially large transactions, are in the IP-intensive industries (see Table 2). The impact of UTSA is also estimated to be negative for non-IP-intensive industries, but the coefficient is imprecisely estimated, so reliable inferences are problematic. The larger coefficient of -1.48, which implies a reduction of 77%, also reflects the fact that the initial average volume of non-IP-intensive transactions is low, and the estimates imply that it declines by 0.21 billion USD following the passage of the UTSA, as opposed to the 0.65 billion decline for the IP-intensive sectors.

In columns (4)-(6) of Table 7, we re-estimate the specifications from columns (1)-(3), but we use the entire sample including observations with missing total volume of inbound cross-border M&A deals, assuming that the missing transaction values are zeros. The results in the last three columns are very similar to those in the first three columns, suggesting that our estimates are not sensitive to sample selection.

5.3 Bilateral Cross-border M&A Transactions from the Top Investors

Lastly, we evaluate the impact of the UTSA on bilateral inbound cross-border M&A transactions from the top 23 investor countries in our sample. We have two main goals in carrying out this empirical analysis. First, we check the robustness of our results to including time-invariant source country determinants of cross-border M&A activity—such as physical and cultural distance between the two countries—, as well as the time-varying determinants such as income, bilateral trade, and exchange rate movements. Second, using additional source country level information on patent counts, education levels, and R&D expenditure, we further analyze the mechanisms that influence foreign investors' responses to changes in the host country protection of intellectual property rights.

The first three columns of Table 8 present the results for the number of cross-border M&A transactions originating from each of the top 23 investor countries. As in the case of the state-year level analysis we have reported thus far, here, we also find a negative and statistically significant impact of the UTSA. The coefficient of -0.246 in column (1) suggests that the number of transactions originating from a particular country and targeting a given state declines by 21.8% after the state adopts the UTSA. Similar to the aggregate results, this impact emerges mainly for the IP-intensive industries. Columns (4) - (6) show that the results for the total volume of inbound foreign investments are also robust to accounting for source country covariates. Different from the aggregate results, in this case we find a statistically significant decline only for the volume of IP-intensive investments. While the impact of the UTSA on the volume of non-IP-intensive transactions is negative, it is smaller and not statistically significant.

In terms of the source country determinants of cross-border M&A, we find that both bilateral imports and exports bolster foreign investment, although the impact of bilateral exports to the U.S. is significant only for the number of transactions. As expected, we find a positive impact of real income per capita on the number and total volume of cross-border M&A inflows. While this effect is significant for the total and IP-intensive transactions, it is not significant for the non-IP-intensive sample. With these source country determinants, real exchange rate depreciation does not seem to further impact foreign investment flows into individual states.

Finally, we consider three country characteristics that can influence foreign firms' response to changes in trade secrets protection in the host country. We focus on three features that capture the source country's capacity to innovate and produce intellectual property assets: the number of patents the source country obtained in the U.S. in a given year, the source country's R&D spending as a fraction of GDP, and the fraction of population with completed tertiary education.[29] We include these country characteristics, along with their

[29] See the Data Appendix for the sources of data.

interactions with the UTSA indicator, in the specifications for the total count and the total volume of cross-border M&A transactions.

The first country characteristic we consider is the number of U.S. patents granted to a source country in a given year. The number of patents varies significantly in the cross-section, from one source country to another, and it varies considerably from the beginning to the end of the sample period. While the average number of patents was 1,065 (with a minimum of 1 and a maximum of 11,317) in 1985, by 2015 it had increased to 8,241 (with a minimum of 160 and a maximum of 61,983). As expected, the emerging markets in the sample (China, Mexico, and India) have fewer patents compared to the advanced economies. Column (1) of Table 9 reports the results for the specifications using the total number of inbound M&A transactions as a dependent variable, and additionally controlling for the number of source country patents granted in the U.S. Again, we find a negative overall impact of the UTSA. Additionally, we find that as the number of patents source countries are granted grows, the number of their M&A investment transactions declines. However, we obtain a positive and significant interaction term, which suggests that foreign firms in countries with greater capacity to produce intellectual property, lower their investment in the U.S. less aggressively when trade secret protection is strengthened following the adoption of the UTSA. Quantitatively, we find that if a country with a number of patents equal to the mean (4,239) would lower the number of cross-border deals by 24% following the adoption of the UTSA; whereas a country with a number of patents equal to one standard deviation (9,516) above the mean would reduce them by 17%. Moreover, the estimates also indicate an increase in the number of M&A deals following the passage of the UTSA when the number of patents surpasses 34,556, which is consistently achieved only by Japan after 1999.

The results for the total volume specifications with additional control for source country patents are presented in column 4 of Table 9. While the overall impact of the UTSA is still negative, we document a positive and significant coefficient on the number of patents and a negative, albeit insignificant, interaction term between the two. The positive impact of patents on the total volume of M&A inflows, combined with the negative impact we found on the number of transactions, suggest that as a source country's intellectual capacity to obtain a higher number of patents in the U.S. improves, they invest in fewer but larger projects.

Next, we evaluate the role of a source country's R&D spending (as a fraction of GDP)— an important determinant of capacity to generate intellectual property assets— in mediating the impact of the UTSA on cross-border M&A flows. Similar to the patent results, we uncover a negative overall impact of the UTSA, and a positive and significant interaction term with R&D spending. Specifically, we find that a country with R&D spending equal to the sample average (1.91% of GDP) lowers the number of transactions by 21% following the adoption of the UTSA. [30] Alternatively, if we compare a country with an R&D intensity equal to the 25th percentile (e.g., Italy, on average) to a country with an R&D intensity equal to the 75th percentile (e.g., Germany, on average), we find that the former reduces cross-border M&A deals by 26%, and the latter only by 17%. In contrast to the patents, higher levels of source country R&D is associated with a larger number of M&A transactions. We obtain qualitatively similar results in column (5) for the total volume of cross-border M&As.

The last country characteristic we consider is the percentage of population with tertiary education. The results in column (3) show that a country with a tertiary education level equal to the sample average (12.7% of the population) reduces the number of transactions by 23% following the passage of the UTSA. The impact is equal to 28% for a country with the tertiary education percentage equal to the 25th percentile (7.55%, e.g., Mexico in the late 1990s), and it is lower at 18% for a country with the tertiary education percentage equal to the 75th percentile (16.48%, e.g., Belgium or Netherlands). In the last column, we see that these effects qualitatively hold for the total volume of cross-border M&A, as well.

[30] We choose to focus on the quantitative results from the specification for the number of transactions since we observe the full set of transactions that occurred in a state, but we only observe the transaction values for approximately 60% of the deals.

The results we present in Table 10 reinforce the mechanism we discussed in the previous sub-sections. All three variables—the number of patents, R&D intensity, and the level of tertiary education— determine a country's potential to produce intellectual-property intensive products. Firms in a country with a limited capacity to innovate such products likely rely more on imitation and knowledge spill-overs. Therefore, those firms have a greater incentive to invest in other countries in order to acquire information from local competitors, suppliers or vendors. By strengthening intellectual property rights and trade secrets protection, the UTSA lowers the foreign firm's incentive to invest in a state that adopts it. Consequently, it reduces both the number and the volume of foreign investment transactions in such states.

6. Conclusion

Intellectual property rights protection continues to be an important issue in international policy debates. Economists and policymakers alike are interested in understanding whether strengthening IPR promotes cross-border business activity. We contribute to this discussion by studying the role of trade secrets protection in determining the incidence and intensity of cross-border M&A flows into the manufacturing sector across U.S. states. Theoretically, trade secrets protection can have either positive or negative impact on foreign investment. To empirically assess the impact of enhanced intellectual property rights protection, we use data on U.S. inbound cross-border M&A transactions and exploit the staggered timing of adoption of the Uniformed Trade Secrets Act across U.S. states from 1985 to 2015. We demonstrate that enhanced trade secrets protection following the passage of UTSA significantly deters foreign investment in the U.S. Specifically, we find that the incidence (the number of M&A deals) and the volume (dollar amount) of inbound cross-border M&A activity declined by about 20% and 50%, respectively in states that adopted the Act.

We conjecture that part of the foreign firm's goal when investing in the U.S. is to acquire undisclosed information from local competitors, suppliers or vendors, especially in technology or knowledge intensive industries. As such, strengthening trade secrets protection, would lower foreign firms' incentive to invest in the U.S. By comparing the impact of the UTSA on cross-border M&A activity in knowledge-intensive industries to that in non-knowledge-intensive industries, we demonstrate that foreign investment declines only in the knowledge-intensive industries, confirming our conjecture of the importance of access to local information. Moreover, our results suggest that countries with higher capacity to produce intellectual assets, proxied by the number of patents granted in the U.S., by R&D intensity, and by the level of higher education, do not lower their investment as much following the passage of the UTSA. On the other hand, knowledge scarce countries reduce their investments more aggressively, suggesting access to local, proprietary information is a more crucial motive for their mergers and acquisitions in the U.S.

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Figures

Figure 1. Inbound Cross-border M&A Flows in the U.S., 1985-2015.

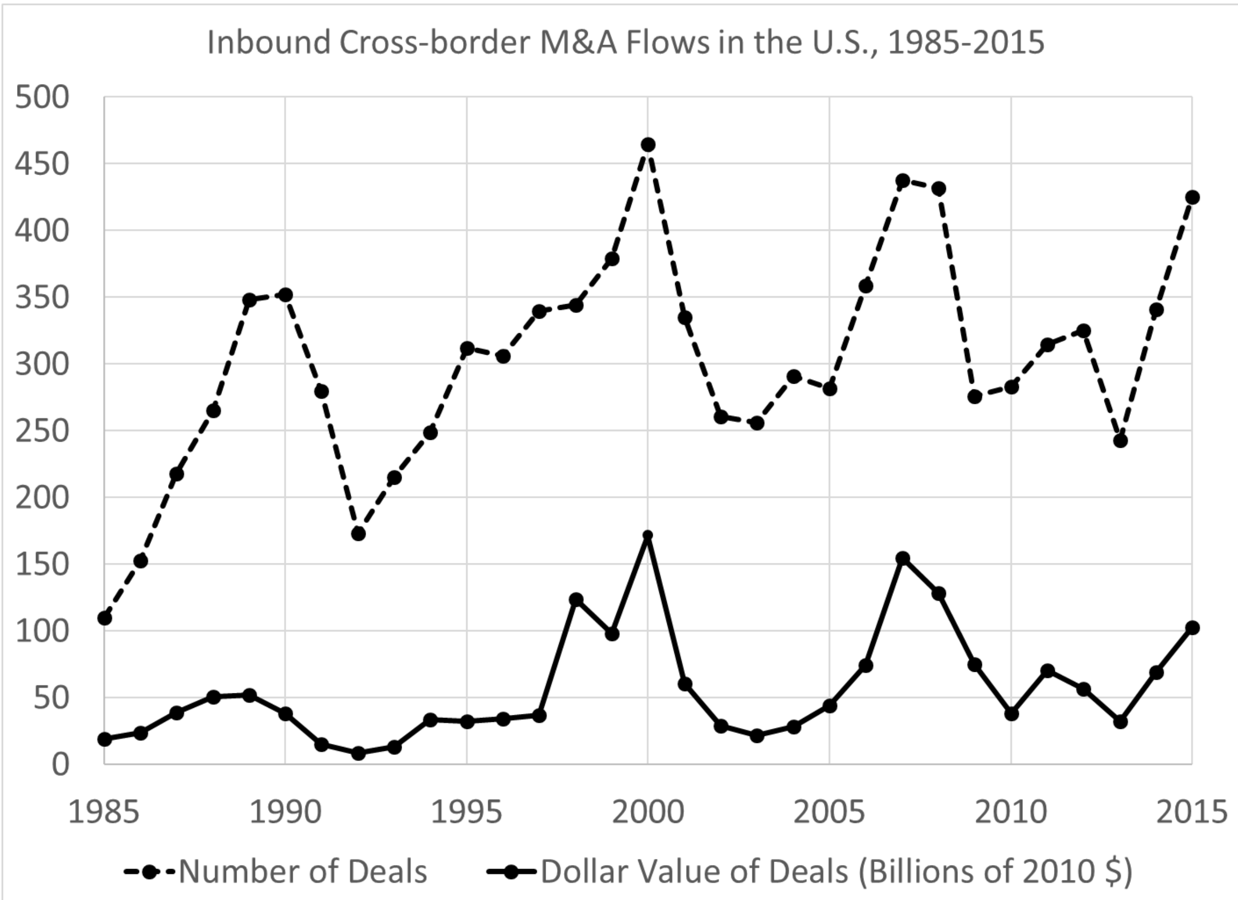
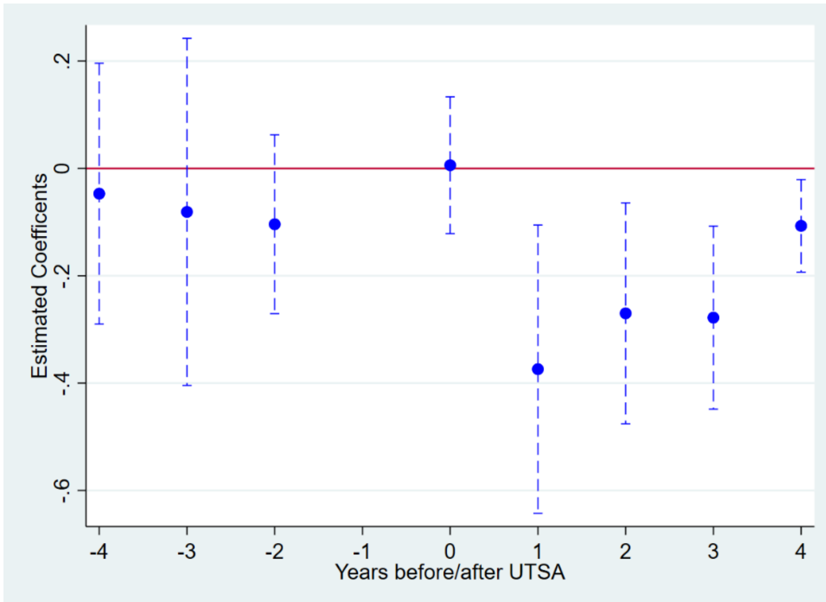
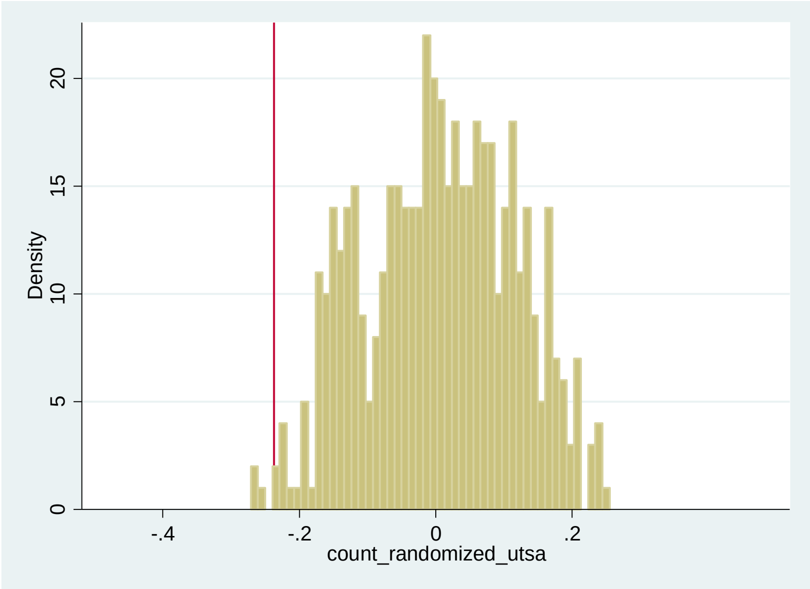


Figure 2. Dynamics of the Number of Cross-border M&A Deals around the Time of UTSA's Adoption



Note: The figure plots the coefficients and the 95% confidence intervals (clustered by state) from a regression of the number (count) of new inbound cross-border M&A deals on a series of indicator variables extending from 4+ years before the adoption of UTSA (year 0) to 4+ years afterward. The indicator variable for the year prior to adoption is omitted, so that coefficients are measured relative to that year. Covariates, state and year effects, as well as state trends are included in the regressions.

Figure 3: Distribution of the Coefficients on UTSA with Simulated Data (Random Assignment of UTSA)



Note: The dependent variable is the state-level number (count) of new inbound cross-border M&A deals. The vertical line indicates the coefficient obtained with real data.

Tables

Table 1: UTSA Adoption Years by State

State	UTSA Adoption Year	State	UTSA Adoption Year
Alabama		Montana	1985
Alaska	1988	Nebraska	1988
Arizona	1990	Nevada	1987
Arkansas	1981	New Hampshire	1990
California	1985	New Jersey	2012
Colorado	1986	New Mexico	1989
Connecticut	1983	New York	
Delaware	1982	North Carolina	
Florida	1988	North Dakota	1983
Georgia	1990	Ohio	1994
Hawaii	1989	Oklahoma	1986
Idaho	1981	Oregon	1988
Illinois	1988	Pennsylvania	2004
Indiana	1982	Rhode Island	1986
Iowa	1990	South Carolina	1992
Kansas	1981	South Dakota	1988
Kentucky	1990	Tennessee	2000
Louisiana	1981	Texas	2013
Maine	1987	Utah	1989
Maryland	1989	Vermont	1996
Massachusetts		Virginia	1986
Michigan	1998	Washington	1982
Minnesota	1980	West Virginia	1986
Mississippi	1990	Wisconsin	
Missouri	1995	Wyoming	2006

Notes: This table reports the years in which states adopted the Uniform Trade Secrets Act (UTSA). Missing date means that the state had not adopted UTSA as of 2015, the last year in our sample. Sources: Png (2017) up to 1998 and states' legislature websites after that.

Table 2. Summary Statistics

Panel A: Summary Statistics for State-Year Panel

Variable	Min	Mean	St. D.	Max
Count	0	6.30	10.32	99
Count, IP-intensive	0	5.20	9.23	89
Count, non-IP-intensive	0	1.10	1.65	11
Count, ATP	0	3.29	6.69	67
Count, non-ATP	0	3.00	4.23	34
Count, Hi-tech	0	2.90	6.17	64
Count, non-Hi-tech	0	3.40	4.80	49
Real value	0	1.36	4.34	60.71
Real value, IP-intensive	0	1.15	3.95	55.98
Real value, non-IP-intensive	0	0.28	1.38	34.78
Real value, inflated	0	1.19	4.09	60.71
Real value, IP-intensive, inflated	0	0.98	3.67	55.98
Real value, non-IP-intensive, inflated	0	0.21	1.21	34.78
UTSA	0	0.74	0.44	1
Log real wage	10.58	0.16	10.21	11.03
Log real GSP	11.91	1.05	9.63	14.67
Corporate tax	0	6.52	2.89	12.25
Log population	13.03	15.11	0.99	17.48

Note: This table presents the summary statistics for the cross-border M&A counts, total volumes, and the covariates for the state-year panel. The number of observations for the counts and the covariates is 1,488. The number of observations for state-year cells with reported total real values for the full sample, IP-intensive and non-IP-intensive subsamples are 1,304, 1,267, and 1,141. Inflated real values refer to the total volume observations, where the missing value transactions are reported as zero. All real values are reported in 2010 USD billions.

Panel B: Summary Statistics for Source Country-State-Year Panel

Variable	Min	Mean	St. D.	Max
Count	0	0.24	0.89	37
Count, IP-intensive	0	0.20	0.80	34
Count, non-IP-intensive	0	0.04	0.23	4
Real value	0	0.05	0.73	55.14
Real value, IP-intensive	0	0.04	0.67	55.14
Real value, non-IP-intensive	0	0.01	0.24	34.47
Log real GDP per capita	6.18	10.08	1.06	11.25
Real exchange rate depreciation	-0.33	-0.003	0.09	0.37
Log real exports to the U.S.	7.46	9.99	1.23	13.00
Log real imports from the U.S.	6.63	9.73	1.15	12.57

Note: This table presents the summary statistics for the cross-border M&A transactions from the top 23 investor countries. The number of observations for the source country-state-year panel is 34,224. The number of observations for with reported total real values is 32,252. All real values are reported in 2010 USD billions.

Table 3: The Impact of UTSA on the Number of Cross-Border M&A Transactions (Total Count)

Dependent Variable	(1) Total count	(2) Total count	(3) Total count	(4) Total count	(5) Total count	(6) Total count
UTSA	-0.237***			-0.241***	-0.239***	-0.689***
	(0.084)			(0.082)	(0.085)	(0.177)
TSA		-0.240***				
		(0.084)				
UTSA index			-0.282**			
			(0.126)			
IDD				0.070		
				(0.059)		
Neighbor UTSA					0.111	-0.251*
					(0.095)	(0.132)
UTSA* Neighbor UTSA						0.518***
						(0.198)
Log real GSP	0.352	0.368	0.050	0.320	0.391	0.488
	(0.448)	(0.446)	(0.607)	(0.440)	(0.446)	(0.455)
Log population	2.940***	2.935***	3.532***	3.295***	2.124**	2.031*
	(0.909)	(0.895)	(0.768)	(1.012)	(0.859)	(1.046)
Corporate tax rate	0.012	0.011	0.016	0.013	0.012	0.012
	(0.020)	(0.020)	(0.030)	(0.020)	(0.020)	(0.019)
Log real wage	0.561	0.529	0.795	0.482	0.711	0.672
	(1.090)	(1.085)	(1.135)	(0.995)	(1.043)	(1.074)
Number of obs.	1,488	1,488	1,200	1,488	1,488	1,488
Pseudo R2	0.343	0.343	0.347	0.343	0.343	0.345

Note: Robust standard errors are clustered at the state level, and are reported in parentheses. ***, **, * refer to significance at the 1%, 5%, and 10% level, respectively. All specifications include state trends, state and year fixed effects.

Table 4: Impact of UTSA on the number of cross-border M&A transactions – Knowledge Intensity

Dependent variable	(1) IP-int. count	(2) Non-IP-int. count	(3) ATP count	(4) Non-ATP count	(5) Hi-tech count	(6) Non-Hi-tech count
UTSA	-0.267***	-0.158	-0.349***	-0.136	-0.297**	-0.187
	(0.073)	(0.173)	(0.111)	(0.128)	(0.118)	(0.134)
Log real GSP	0.004	2.026***	-0.300	1.149*	-0.160	1.090*
	(0.483)	(0.700)	(0.622)	(0.680)	(0.475)	(0.618)
Log population	2.641**	4.298*	2.918	2.443	3.069	1.393
	(1.249)	(2.403)	(2.383)	(1.756)	(2.052)	(1.267)
Corporate tax rate	0.002	0.044	0.010	0.011	-0.006	0.021
	(0.020)	(0.047)	(0.019)	(0.028)	(0.029)	(0.022)
Log real wage	0.943	-2.031*	1.064	0.211	-0.705	1.651
	(1.214)	(1.129)	(1.292)	(1.366)	(1.157)	(1.237)
Observations	1,488	1,488	1,488	1,488	1,488	1,488
Pseudo R2	0.351	0.243	0.355	0.297	0.364	0.301

Note: This table reports the results for number of cross-border M&A transactions in knowledge intensive vs non-intensive industries. The knowledge intensity measure in the first two columns are IP-intensity from the ESO-USPTO report; in columns (3) and (4) it is the advanced technology product classification (Census Bureau); and in columns (5) and (6) it is the high-technology industry classification of Hecker (2005). The unit of observation is state-year. Robust standard errors are clustered at the state level, and are reported in parentheses. ***, **, * refer to significance at the 1%, 5%, and 10% level, respectively. All specifications include state trends, state and year fixed effects.

Table 5: Impact of UTSA on the number of cross-border M&A transactions – Public vs Private Targets

VARIABLES	(1) Public Firm, Total count	(2) Private Firm, Total count	(3) Private Firm, IP-int. count	(4) Private Firm, non-IP-int. count
UTSA	-0.177	-0.258***	-0.283***	-0.213
	(0.149)	(0.090)	(0.082)	(0.171)
Log real GSP	-1.928	1.142***	0.649	2.808***
	(1.194)	(0.432)	(0.483)	(0.917)
Log population	4.344**	1.628	1.118	7.201**
	(1.952)	(1.221)	(1.609)	(2.915)
Corporate tax rate	0.045	0.006	-0.006	0.048
	(0.046)	(0.019)	(0.020)	(0.048)
Log real wage	2.762***	-0.263	0.601	-4.901***
	(0.787)	(1.308)	(1.485)	(1.447)
Observations	1,488	1,488	1,488	1,488
Pseudo R2	0.362	0.335	0.342	0.236

Note: Robust standard errors are clustered at the state level, and are reported in parentheses. ***, **, * refer to significance at the 1%, 5%, and 10% level, respectively. All specifications include state-specific time trends, state and year fixed effects.

Table 6: Impact of UTSA on Horizontal and Vertical Cross-border M&As

Dependent variable	(1) Horizontal count	(2) Horizontal IP-int. count	(3) Horizontal non-IP-int. count	(4) Vertical count	(5) Vertical IP-int. count	(6) Vertical non-IP-int. count
UTSA	-0.181**	-0.188**	-0.095	-0.308***	-0.311***	-0.295
	(0.091)	(0.093)	(0.248)	(0.106)	(0.103)	(0.303)
Log real GSP	-0.770	-0.816	-0.558	1.515**	0.791	4.380**
	(0.683)	(0.642)	(1.966)	(0.754)	(0.891)	(1.990)
Log population	4.960**	4.494**	12.202	4.186	2.033	14.516**
	(1.937)	(1.866)	(9.622)	(3.098)	(2.893)	(7.195)
Corp. tax rate	0.015	0.006	0.061	-0.043	-0.060	0.024
	(0.024)	(0.020)	(0.084)	(0.044)	(0.051)	(0.109)
Log real wage	0.102	0.231	-0.930	-2.669	-2.555	0.513
	(2.293)	(2.355)	(2.813)	(2.634)	(2.611)	(4.814)
Observations	1,488	1,488	1,488	1,488	1,488	1,488
Pseudo R2	0.326	0.335	0.207	0.276	0.282	0.230

Note: Robust standard errors are clustered at the state level, and are reported in parentheses. ***, **, * refer to significance at the 1%, 5%, and 10% level, respectively. All specifications include state-specific time trends, state and year fixed effects.

Table 7: Impact of UTSA on Total Volume of Cross-border M&As

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent var.:	Total volume	IP-int. volume	non-IP-int. volume	Total volume, imputed	IP-int. volume, imputed	non-IP-int. volume, imputed
UTSA	-0.884**	-0.846**	-1.480*	-0.896**	-0.814**	-1.375*
	(0.399)	(0.400)	(0.772)	(0.405)	(0.394)	(0.774)
Log real GSP	-1.726	-0.976	-5.377	-1.643	-0.620	-5.303
	(2.795)	(2.842)	(5.751)	(2.839)	(2.771)	(5.795)
Log population	11.114**	11.389*	12.829	10.928**	10.936*	9.697
	(5.355)	(6.266)	(9.704)	(5.158)	(5.816)	(8.976)
Corporate tax rate	0.047	0.006	0.166*	0.042	0.005	0.150*
	(0.087)	(0.117)	(0.085)	(0.087)	(0.120)	(0.079)
Log real wage	13.214***	10.305***	31.704*	12.996***	9.945**	33.237**
	(4.320)	(3.968)	(16.565)	(4.359)	(3.942)	(15.097)
Observations	1,304	1,267	1,141	1,488	1,488	1,488
Log-likelihood	-3.840e+10	-3.700e+10	-1.120e+10	-3.940e+10	-3.880e+10	-1.270e+10

Note: Robust standard errors are clustered at the state level, and are reported in parentheses. ***, **, * refer to significance at the 1%, 5%, and 10% level, respectively. All specifications include state-specific time trends, state and year fixed effects.

Table 8: Cross-border M&As from the Top 23 Investor Countries

Dependent variable	(1) Total count	(2) IP-int. count	(3) non-IP-int. count	(4) Total volume	(5) IP-int. volume	(6) non-IP-int. volume
UTSA	-0.246***	-0.288***	-0.109	-0.845**	-0.787*	-0.360
	(0.067)	(0.065)	(0.159)	(0.388)	(0.407)	(0.623)
Log real GSP	-0.126	-0.677	2.462**	-3.150	-1.488	-10.238**
	(0.589)	(0.629)	(0.978)	(2.647)	(2.618)	(5.198)
Log population	3.637***	3.672***	4.465	18.109***	16.066***	28.117*
	(1.175)	(1.367)	(2.859)	(4.958)	(5.453)	(16.612)
Corporate tax rate	0.001	-0.008	0.041	0.051	-0.005	0.300**
	(0.017)	(0.019)	(0.053)	(0.092)	(0.130)	(0.143)
Log real wage	0.030	0.115	-1.253	16.894***	14.012***	50.820***
	(1.187)	(1.298)	(1.459)	(4.787)	(4.295)	(11.504)
Log real GDP per capita	0.695***	0.831***	-0.174	1.792***	1.753***	0.946
	(0.122)	(0.094)	(0.347)	(0.323)	(0.471)	(2.017)
Real exchange rate deprc.	0.041	0.103	-0.081	0.022	0.043	0.762
	(0.165)	(0.208)	(0.276)	(0.505)	(0.778)	(1.815)
Log real exports to the U.S.	0.547***	0.576***	0.556**	0.531	0.497	0.375
	(0.068)	(0.062)	(0.259)	(0.349)	(0.393)	(0.984)
Log real imports from the U.S.	0.466***	0.488***	0.473*	1.014***	0.874***	3.039
	(0.090)	(0.069)	(0.243)	(0.292)	(0.329)	(1.888)
Observations	34,224	34,224	34,224	32,323	32,252	32,252
Pseudo R2	0.283	0.290	0.218			
Log-likelihood				-1.680e+11	-1.510e+11	-3.070e+10

Note: Robust standard errors are clustered at the state level, and are reported in parentheses. ***, **, * refer to significance at the 1%, 5%, and 10% level, respectively. All specifications include state, source country and year fixed effects, as well as state trends.

Table 9: The Impacts of Source Country Characteristics

Dependent variable:	Total count			Total volume		
	(1)	(2)	(3)	(4)	(5)	(6)
UTSA	-0.311***	-0.427***	-0.447***	-0.792**	-0.946**	-1.538***
	(0.080)	(0.163)	(0.122)	(0.364)	(0.476)	(0.504)
UTSA*(Patent count/1000)	0.009***			-0.008		
	(0.003)			(0.012)		
UTSA*R&D		0.099**			0.028	
		(0.051)			(0.141)	
UTSA*Education			0.015***			0.047**
			(0.005)			(0.022)
Patent count/1000	-0.020***			0.019**		
	(0.006)			(0.009)		
R&D		0.207**			0.645***	
		(0.092)			(0.180)	
Education			-0.019***			-0.062
			(0.006)			(0.061)
Log real GSP	-0.060	0.090	0.033	-3.254	-3.109	-2.454
	(0.600)	(0.626)	(0.583)	(2.689)	(2.610)	(2.624)
Log population	2.924***	2.794**	3.608***	18.041***	29.652***	18.304***
	(1.041)	(1.191)	(1.188)	(4.868)	(9.303)	(4.810)
Corporate tax rate	-0.000	-0.002	0.002	0.051	0.071	0.052
	(0.018)	(0.014)	(0.018)	(0.093)	(0.088)	(0.093)
Log real wage	0.138	-0.658	-0.249	16.881***	17.870***	15.652***
	(1.225)	(1.011)	(1.177)	(4.818)	(5.540)	(4.529)
Log real GDP per capita	0.788***	0.238	0.719***	2.057***	1.082	1.979***
	(0.162)	(0.186)	(0.123)	(0.349)	(0.695)	(0.563)
Real exchange rate	-0.062	-0.001	0.038	-0.014	1.058	0.065
Depreciation	(0.193)	(0.186)	(0.164)	(0.561)	(0.985)	(0.475)
Log real exports	0.490***	0.553***	0.550***	0.579*	0.553	0.578*
	(0.070)	(0.125)	(0.069)	(0.339)	(0.339)	(0.342)
Log real imports	0.352***	0.587***	0.475***	1.126***	1.049**	1.056***
	(0.118)	(0.094)	(0.091)	(0.322)	(0.468)	(0.303)
Observations	32,736	28,656	34,224	30,857	26,913	32,323
Pseudo R2	0.283	0.280	0.284			
Log-likelihood				-1.67e+11	-1.37e+11	-1.68e+11

Note: Robust standard errors are clustered at the state level, and are reported in parentheses. ***, **, * refer to significance at the 1%, 5%, and 10% level, respectively. All specifications include state, source country and year fixed effects, as well as state trends. Patent count is the number of new patents the source country obtains in the U.S. R&D refers to source country's R&D spending as a fraction of GDP. Education refers to source country's fraction of population with tertiary education.

Appendix

The Impact of Foreign Investment in the U.S. on the timing of adoption of UTSA

Our goal is to estimate the impact of UTSA on inbound cross-border M&A flows in the U.S. A potential threat to the causal interpretation of our results would be the issue of reverse causality, where cross-border M&A flows affect the timing of the passage of UTSA. To show that cross-border M&A flows do not appear to influence states' adoption of UTSA, we follow previous work by Png (2017), among others, and estimate a random-effects parametric survival-time model, with the conditional distribution of the response given the random effects assumed to be an exponential. Our model evaluates the potential contribution of different factors that may affect each state's year of adoption of UTSA. Note that our empirical analysis is designed to only capture the most important factors that were shown in previous work to have some impact on the timing of the passage of the Act. For a comprehensive analysis of the reasons why states enact UTSA, interested readers are referred to Ribstein and Kobayashi (1996) and Png (2017).

Our results from the random-effects parametric survival-time model are presented in Appendix Table 5. In the first column, we seek to explain the year of adoption using a set of macroeconomic variables, such as population, gross state product, output in the manufacturing industry, as well as two of its subsectors – other transportation equipment as well as electronics and electrical equipment, which have been shown by Png (2017) to have an impact on the timing of UTSA adoption. Note that Png's (2017) analysis uses data from 1979 to 1997, whereas we use a significantly longer and more recent sample period from 1985 to 2015. Our estimates imply that adoption of UTSA is positively affected by gross state product and negatively affected by population. Although, neither estimate is statistically significant in Png (2017), both estimates are economically and statistically significant in our analysis. None of the three sectoral output variables – manufacturing, other transportation, or electronic and electrical equipment – appear to significantly affect the timing of the passage of UTSA.

In column (2) of Appendix Table 5, we additionally include an indicator variable showing if at least one of the neighboring states have adopted UTSA. The estimated coefficient on the neighbor adoption is positive, economically and statistically significant, implying that having a neighbor that has adopted UTSA significantly speeds up passage of the Act. In columns (3) and (4), we successively add the state's number of cross-border M&A transactions and the total value of cross-border M&A, the dependent variables from our main analysis, to check if they exert any influence on the timing of

UTSA adoption. None of the two estimated coefficients are economically or statistically significant. In column (5), we add the number of large transactions (deals greater than $100 million (2010 constant dollars)) to the list of explanatory variables, to check if large foreign investors can influence local adoption of UTSA. The estimated impact on the number of large deals is quite small economically and statistically insignificant. Finally, the last specification in column (6) includes an additional control for statewide employment in foreign-owned firms, to capture another measure of possible foreign influence. The estimated effect is negligible and statistically insignificant. Overall, the results from the random-effects parametric survival-time model imply that foreign investment in the U.S. is unlikely to have affected the timing of the passage of UTSA across U.S. states.

Appendix Tables

Appendix Table A1: Top 23 Investor Countries

Source country	Number of transactions	Percentage of total
United Kingdom	1804	19.25
Canada	1541	16.44
Japan	890	9.50
Germany	642	6.85
France	517	5.52
Switzerland	337	3.60
Sweden	292	3.12
Netherlands	280	2.99
Australia	235	2.51
Ireland-Rep	213	2.27
Italy	198	2.11
Israel	137	1.46
China	129	1.38
Hong Kong	127	1.36
India	122	1.30
South Korea	117	1.25
Finland	115	1.23
Singapore	107	1.14
Taiwan	104	1.11
Denmark	104	1.11
Belgium	102	1.09
Spain	95	1.01
Mexico	90	0.96

Notes: This table reports the number of transactions and the percentage of transactions for the top 23 investor countries in our sample, ranked by the number of transactions. The total number of transactions for the full sample (1985-2015) is 9,371.

Appendix Table A2: List of IP-intensive industries (source: ESO-UPTSO report and Goldschlag and Miranda (2016))

Industry Title	SIC code
Grain and oilseed milling	2034, 2041, 2043, 2044, 2046, 2074, 2075, 2076, 2079
Sugar and confectionery products	2061-2064, 2066, 2067, 5441
Dairy products	2021-2024, 2026
Other food manufacturing	2015, 2032, 2052, 2068, 2082, 2087, 2095, 2096, 2099, 5149
Beverages	2083, 2084-2086, 2097
Footwear	3021, 3142, 3143, 3144, 3149
Pulp, paper, and paperboard mills	2611, 2621, 2631
Converted paper products	2652, 2653, 2655-2657, 2671-2679
Printing and related activities	2396, 2732, 2752, 2754, 2759, 2761, 2771, 2782, 2789, 2791, 2796, 3993, 7334
Basic chemicals*,[2]	2812, 2813, 2816, 2819, 2861, 2865, 2869, 2895, 2899
Resin, rubber, and artificial fibers[2]	2821-2824
Agricultural chemicals	2873-2875, 2879
Pharmaceuticals and medicine*,[1]	2892, 2893, 3087, 7389
Paint, coating, and adhesives	2851, 2891
Soap, and cleaning compounds	2841-2844
Plastic products	3081-3086, 3077, 3996
Cutlery and hand-tools	3421, 3423, 3425, 3469, 3496, 3914
Other fabricated metal products*	3291, 3429, 3431, 3432, 3482-3484, 3489, 3491, 3492, 3494, 3497-3499, 3543, 3562
Ag., construction, and mining machinery	3523, 3524, 3531-3533, 3533
Industrial machinery*,[2]	3552-3556, 3559
Commercial and service industry machinery[2]	3581, 3582, 3589, 3827, 3861, 3999
HVAC and commercial refrigeration	3433, 3443, 3444, 3564, 3569, 3585
Metalworking machinery*	3541, 3542, 3545, 3547, 3549
Turbine and power transmission equip.	3511, 3519, 3566, 3568
Other generational purpose machinery	3531, 3534-3537, 3546, 3563, 3565, 3567, 3586, 3593, 3594, 3596, 3599, 3743, 3799
Computer and periphery equipment*,[1]	3571, 3572, 3575, 3577, 3578
Communications, audio and video equipment*,[1]	3661, 3663, 3669, 3679, 3651
Semiconductor and electronic component*,[1]	3671, 3672, 3674-3678
Electronic instruments*,[1]	3495, 3579, 3812, 3822-3826, 3873, 3915
Magnetic media manufacturing*,[2]	3652, 3695, 7372, 7819
Electric lighting equipment	3641, 3645, 3646, 3648, 3699
Household and appliances	3631-3635, 3639
Electrical equipment	3548, 3612, 3613, 3621, 3625, 7694
Other electrical equipment*	3357, 3624, 3629, 3643, 3644, 3691, 3692
Motor vehicles and parts	3711, 3728
Household and institutional furniture	2434, 2499, 2511, 2512, 2514, 2515, 2517, 2519, 2531, 2541, 2542, 2599, 3952, 5712
Medical equipment and supplies*	3069, 3089, 3821, 3829, 3841-3845, 3851, 5955, 8072

Note: Advanced technology product (ATP) industries are marked with asterisk (*), and Hecker (2005) high-technology industries are marked with superscripts 1, 2, and 3 according to their levels. There are two additional ATP and high-technology industries not listed above: boiler, tank and shipping container manufacturing, and aerospace product and parts. Hecker (2005) additionally classifies petroleum and coal products manufacturing as high-technology (level 3).

Appendix Table A3: Description of Variables (This table describes the sources and the construction of the variables used in our analysis.)

Variable	Description
No. of cross-border M&A deals	The total number of cross-border M&A deals (Nst) in which the target is located in state s, and the transaction is completed in year t. Source: SDC Platinum Database.
UTSA	An indicator taking on a value 1 starting from the year in which a state adopts the Uniform Trade Secrets Act, and zero otherwise.
State Population	Source: Bureau of Economic Analysis
Real Gross State Product	Gross state product deflated by the consumer price index (2010 base year). Source: U.S. Bureau of Economic Analysis and World Development Indicators (WDI).
Average State wages	Average nominal state wages deflated by the consumer price index. Source: Current Population Survey, U.S. Census Bureau and World Development Indicators (WDI).
State corporate tax rate	In percentages. Source: World Tax Database, Office of Tax Policy Research, University of Michigan
GDP per capita (2010 USD)	Real GDP per capita in constant 2010 US Dollars. Source: World Development Indicators (WDI).
Real exchange rate/100	Real exchange rate defined as the foreign currency per US Dollar nominal exchange rate adjusted by the 2010 constant USD consumer price indexes. The source for the nominal exchange rates and the price indexes is IFS.
Max (Import, Export)	The maximum of imports and exports between the US and the source country deflated by the CPI. Source: Census Bureau.
R&D expenditure	Source country's R&D expenditures as a fraction of GDP. Source: World Development Indicators (WDI).
Tertiary education	Percentage of population with completed tertiary education. Source: Barro and Lee Educational Attainment Data
Patent count	Number of patents granted to a source country. Source: United States Patent and Trademark Office

Appendix Table A4: Random-effects Parametric Survival-time Model Explaining the Passage of UTSA across U.S. States

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)
ln(Population)	-1.114***	-1.084***	-0.934***	-0.971***	-0.975***	-1.037***
	(0.329)	(0.327)	(0.308)	(0.328)	(0.327)	(0.350)
ln(Gross State Product)	1.185***	1.072***	0.931***	0.976***	0.979***	0.947***
	(0.266)	(0.265)	(0.254)	(0.273)	(0.273)	(0.257)
ln(Manufacturing)	-0.187	-0.138	-0.158	-0.179	-0.179	-0.182
	(0.146)	(0.145)	(0.133)	(0.139)	(0.139)	(0.139)
ln(Other Transportation)	-0.035	-0.023	-0.013	-0.006	-0.006	0.003
	(0.063)	(0.062)	(0.059)	(0.063)	(0.063)	(0.062)
ln(Computer and Electronic Equipment)	-0.017	-0.016	0.000	0.005	0.005	0.012
	(0.059)	(0.060)	(0.057)	(0.064)	(0.064)	(0.062)
Neighbor UTSA Adoption		0.600**	0.580*	0.643**	0.636**	0.611*
		(0.285)	(0.311)	(0.321)	(0.322)	(0.329)
M&A Transaction Count (lag)			-0.005	-0.005	-0.004	-0.008
			(0.006)	(0.006)	(0.006)	(0.007)
M&A Transaction Volume (lag)				0.001	0.004	0.004
				(0.003)	(0.003)	(0.004)
M&A Large Transaction Count (lag)					-0.049	-0.049
					(0.034)	(0.032)
Employment in Foreign-owned Establishments (lag)						0.001
						(0.001)
Observations	1,488	1,488	1,267	1,267	1,267	1,267
Log-likelihood	-9,794	-9,791	-9,669	-8,323	-8,322	-8,322