

# Trade Secrets: International Trade Policy and Empirical Research

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Of all types of intellectual property, trade secrets are important to the operations of the most U.S. businesses. This includes both large and small firms, and spans many industrial sectors. Moreover, trade secrets have become increasingly prominent in domestic and international policy. Newly constructed data sets have allowed more empirical research to be conducted on the effect of policies that increase trade secret protections. And yet, our understanding of trade secrets still contains a number of gaps.

## Introduction

What type of intellectual property (IP) do U.S. businesses care about most? Given all the news about software patent trolls or drug patent headaches, an educated observer might guess patents, at least for certain high-tech industries. Or, given the incidence of piracy and counterfeiting in the digital environment, one might guess copyrights or trademarks, particularly in the information sector. But the answer appears to be trade secrets—what some commentators call “the other IP right.”<sup>1</sup> Precisely because they are secret in nature, research on trade secrets has been difficult to conduct. International trade policy, which often relies on supporting research, is in early stages as well.

Firms are keenly aware of trade secrets’ importance. According to survey evidence from the United States and other developed countries, large and small firms in a wide variety of industry sectors are more likely to rate trade secrets as “very important” than all other types of IP protection. In practice, trade secrets have several identified advantages over other types of IP protection. First, they are broad in scope, covering virtually any type of commercially valuable information that has been subject to reasonable measures to protect secrecy. They are also a “do-it-yourself” IP right; firms can use internal measures (such as contracts and security procedures) to maintain protections from inception rather than waiting for the government review and approval required for patents and trademarks. Trade secret protections are flexible as well—for example, firms need not file a new application to cover modifications to a trade secret, they simply incorporate them into their existing protections.

From a societal standpoint, trade secrets also can be considered “innovation friendly.” They can be shared with employees and commercial partners, so long as firms protect their trade secrets with contracts or other reasonable measures. Moreover, U.S. trade secret laws generally permit independent discovery, reverse engineering, and other fair practices considered critical to innovation. Liability for trade secret misappropriation is generally limited to cases of wrongful conduct or violation of honest

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<sup>1</sup> Pooley, James, “Trade Secrets: the Other IP Right.” June 2013.

commercial practices. For these reasons and others, a large portion of U.S. IP exports consist of trade-secret-reliant industrial processes and software licensed to affiliates and third parties abroad.

As the importance of trade secrets becomes better understood, they have become the subject of increased domestic and international policy. Trade secret laws simultaneously are being strengthened in Europe and the United States. Additionally, the Trans-Pacific Partnership Agreement (TPP), which is under consideration, includes protections that are stronger than the minimum set by the World Trade Organization's Trade-Related Aspects of Intellectual Property Agreement (TRIPS) and bilateral trade agreements. The TPP requires that the parties provide protections from misappropriation, including by state-owned entities, as well as criminal procedures and penalties in certain circumstances.<sup>2</sup> These requirements are likely to spur TPP countries to strengthen their domestic trade secret laws.

Notwithstanding these policy initiatives, the empirical work on trade secrets to date is relatively scarce. Survey evidence on firms' IP and innovation strategies is largely limited to developed countries. There is little research addressing whether and under what conditions domestic and multinational firms in developing countries use trade secrets. Similarly, research on the effects of changes in legal protections for trade secrets on innovation and international technology transfer is in the early stages. To address these gaps, this paper reviews the existing trade secret literature and describes areas where additional research could inform the policy debate on the connections between trade secrets, technology transfer, and innovation.

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<sup>2</sup> USTR, "TPP Full Text," art. 18.78, <https://ustr.gov/trade-agreements/free-trade-agreements/trans-pacific-partnership/tpp-full-text>.

## Trade Secrets Explained

International definitions of trade secrets have converged around the requirements in TRIPS. Member countries must protect trade secrets or “undisclosed information” that is secret; has commercial value because it is secret; and has been subject to reasonable steps to keep it secret.<sup>3</sup> The information must be protected from disclosure, acquisition, or use by others in a manner that is contrary to honest commercial practices.<sup>4</sup> TRIPS does not specify a particular way of protecting trade secrets; in practice, member countries have stand-alone trade secret statutes, incorporate trade secret protections in their unfair competition or contract laws, and/or rely on the common law.<sup>5</sup>

According to TRIPS standards, the range of intellectual materials that may be considered “trade secrets” is broad. It may include confidential business information, such as a firm’s customer lists, price lists, or marketing strategies; know-how, such as facts about manufacturing methods or processes for achieving certain results; and technical information, such as blueprints, algorithms, and chemical formulae.<sup>6</sup>

Trade secrets may be particularly valuable when a work is at an early stage of research and development (R&D)—and thus does not meet requirements for obtaining a patent—or when changing legal standards make the availability of a patent unclear. For example, uncertainty about the patent eligibility of certain biotechnology, business process, and/or software inventions under U.S. law reportedly is inducing firms to rely more on trade secrets.<sup>7</sup>

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<sup>3</sup> TRIPS, arts. 39.1 and 39.2.

<sup>4</sup> “Contrary to honest commercial practices” includes “practices such as breach of contract, breach of confidence or inducement to breach, and includes the acquisition of undisclosed information by third parties who knew, or were grossly negligent in failing to know that such practices were involved in the acquisition.” WTO, TRIPS, Article 39.2 note 10.

<sup>5</sup> Schultz and Lippoldt, “Approaches to Protection,” January 22, 2014, 7-8.

<sup>6</sup> Schultz and Lippoldt, “Approaches to Protection,” January 22, 2014, 8, 12-13.

<sup>7</sup> See, e.g., Aquino, “Attorneys Tell PTO,” September 15, 2015 (representatives of innovators in the field of biopharmaceutical diagnostics state that currently inventors are more likely to rely on trade secrets because of uncertainty about patent eligibility for inventions in the fields of diagnostics and personalized medicine); Barnhard and Klann, “Navigating the Sea Changes,” 2015, 14-30 (describing changes to U.S. patent law that may spur changes in IP protection strategies).

## Trade Secrets and Patents Compared

Despite the potential overlap between trade secrets and patents, the protections provided by each are substantially different (see table 1). Not only do trade secrets typically cover broader subject matter, they also tend to last longer. For example, while patent terms are generally limited to 20 years, trade secret protections may last indefinitely, as long as secrecy is maintained. Moreover, trade secrets do not have to be filed with or reviewed by an administrative agency before they become effective. Whether the information meets the requirements for legal protection is not determined by a patent examiner ahead of time but typically by a judge afterwards in a lawsuit. A firm protects its secrets by carrying out reasonable protection measures—for example, by giving only limited access to the information, and only to employees who “need to know” it.

On the other hand, trade secret protections are narrower than those associated with patents in important ways. Trade secret laws generally do not protect against a firm obtaining the subject information through fair and honest means. Instead, violation of the law requires misappropriation—a breach of a duty of confidence (such as the employment relationship), a breach of contract, or other dishonest or wrongful action. Thus, inventions that can be discovered through reverse engineering—for example, some medicine-related inventions—reportedly cannot be effectively protected by trade secrets.<sup>8</sup> Moreover, unlike patents, once a trade secret is disclosed, protection is often lost forever. A firm may bring suit, but “putting the genie back in the bottle” or proving damages (which in theory may be perpetual) is difficult. Courts may issue injunctions to attempt to limit the damage.<sup>9</sup>

In patent law, by contrast, an inventor who develops an already patented technology without knowledge of the patent generally is liable if the invention falls within the scope of the patent’s claims.

The first-inventor-to-file a successful application is granted the right to exclude others from making,

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<sup>8</sup> WIPO, “Patents or Trade Secrets?” n.d. (accessed June 17, 2016); Novartis AG, “Brief of Novartis AG as *Amicus Curiae*,” April 20, 2016, 21 (the robust generic pharmaceutical industry and growing biosimilars field demonstrate that few medicines are beyond the reach of reverse engineering).

<sup>9</sup> Thomas, John R, “The Role of Trade Secrets,” January 15, 2014, 6.

using, selling or importing the invention during the life of the patent. This exclusive right generally makes the infringer’s innocent intent or fair commercial practices irrelevant to the determination of infringement.<sup>10</sup> Moreover, the ability to enforce exclusive rights continues regardless of whether the patent is infringed by others.

Table 1: Characteristics of Trade Secret and Patent Protections Compared

Element	Trade Secrets	Patents
Subject matter must be patentable, novel, non-obvious and useful	No	Yes
Prior registration and examination by government agency is required	No	Yes
Public disclosure is required	No	Yes
Process of acquiring the right may take years	No	Yes
Has only a defined term of protection	No	Yes
Only dishonest or wrongful conduct is prohibited	Yes	No
Internal controls are required to establish the right	Yes	No

Source: Compiled by author; see also Hall, Helmers, Rogers, and Sena, “The Choice between Formal and Informal,” 2014, 16.

To obtain these exclusive rights, however, the patent applicant must disclose the invention in “clear, concise, and exact terms” and set forth the best mode of carrying out the invention.”<sup>11</sup> These disclosures are intended to have beneficial societal effects including increasing the public storehouse of knowledge and promoting incremental innovation; facilitating efficient bargaining by clarifying property rights; and limiting the scope of patents by preventing over-claiming.<sup>12</sup> While there is debate about the extent to which disclosures have these effects,<sup>13</sup> trade secrets do not permit public disclosures at all. Instead, they are meant to incentivize firms to make the investments necessary for innovations by

<sup>10</sup> Cotropia and Lemley, “Copying in Patent Law,” 2009, 1421-66.

<sup>11</sup> See 35 U.S.C. § 112.

<sup>12</sup> See, e.g., Devlin, “The Misunderstood Function,” 2010, 402; and Hall, Helmers, Rogers, and Sena, “The Choice between Formal and Informal,” 2014, 16 (the role of disclosure is to prevent duplication and allow rapid diffusion once the patent has expired).

<sup>13</sup> See, e.g., Devlin, “The Misunderstood Function,” 2010, 403-04 (patent disclosures often are ineffective at transmitting knowledge to others because the information disclosed is quite limited, search costs often outweigh likely gains, and because the fact of searching may be used to support a claim for willful infringement); and Hall, Helmers, Rogers, and Sena, “The Choice between Formal and Informal,” 2014, 42-43 (describing survey data showing that most firms do not conduct a prior art search before starting new R&D or product development).

increasing the likelihood the fruits of the investments will not be disclosed without authorization. Patent and trade secret laws thus take different approaches to the policy goal of incentivizing innovation.<sup>14</sup>

## Trade Secrets and Regulatory Test Data

TRIPS provisions on trade secrets also address the more controversial issue of protections for regulatory test data. Under Article 39.3 of TRIPS, if a country requires the submission of undisclosed data that requires considerable effort to originate as a condition for the marketing of a new pharmaceutical or agricultural chemical product, then it must protect such data against unfair commercial use or disclosure, except where necessary to protect the public. Moreover, regulatory test data provisions have been strengthened beyond the minimum required by TRIPs via provisions of U.S. and EU free trade agreements (FTAs).<sup>15</sup> U.S. FTAs generally mandate the protection of regulatory test data for specific lengths of time (5 years for new pharmaceuticals and 10 years for new agricultural chemicals). During these time periods, the firm originating the data has the exclusive right to rely on it.<sup>16</sup>

Most recently, the TPP has extended additional protections to the test data supporting biologics, requiring that each TPP party provide at least 8 years of protection or 5 years plus “other measures” to deliver a “comparable outcome.”<sup>17</sup> Trade policy discussions have tended to concentrate on the exclusive rights provided to firms that originate regulatory test data. This focus has eclipsed recognition of the importance of ensuring standard trade secret protections to firms in a wide range of industry sectors, as set forth below.

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<sup>14</sup> Thomas, “The Role of Trade Secrets,” January 15, 2014, 4.

<sup>15</sup> Roffe and Spennemann. “The Impact of FTAs,” 2006, 75-93.

<sup>16</sup> Akhtar and Fergusson. “Intellectual Property Rights” April 2014, 23.

<sup>17</sup> Biologics are defined as, at a minimum, products that are or contain proteins produced using biotechnology processes for use in human beings for the prevention, treatment, or cure of a disease or condition. TPP, arts. 18.50 and 18.52.

## Firms' Preferences for Trade Secrets

U.S. government surveys consistently show that firms are more likely to identify trade secrets as “very important” to their operations than other types of IP. In 2014, for example, the USITC surveyed more than 7,000 U.S. firms to study the economic effects of India’s trade and industrial policies on their business operations. Based on the survey responses, 56 percent of internationally-engaged firms considered trade secrets “very important,” compared to 48 percent for trademarks, 37 percent for patents, and 31 percent for copyrights. Moreover, even in sectors generally considered patent intensive, such as chemicals or information and communications technology, firms were more likely to consider trade secrets “very important” than patents.<sup>18</sup> The importance of trade secrets was also identified in an earlier survey the USITC conducted of approximately 5,000 U.S. firms regarding their IP experiences in China. There, firms listed their top IP concern as stolen trade secrets, ahead of lost sales, damage to their brands, and the costs of IP enforcement.<sup>19</sup>

These results are not unique to the surveys the USITC conducts in response to requests from Congress or the U.S. Trade Representative. Similar results are reported in the primary government survey of the R&D activities of U.S. firms, the Business R&D and Innovation Survey (BRDIS) undertaken by the National Science Foundation (NSF) and the Census Bureau.<sup>20</sup> According to the 2012 BRDIS, 58.3 percent of U.S.-based firms considered trade secrets “very important,” compared to lower shares for patents, trademarks and copyrights (see table 2). For example, in the manufacturing sector, U.S. firms in the chemical, computer and electronic products, machinery, and transportation equipment industries were more apt to consider trade secrets “very important” than they were patents, trademarks, or copyrights. Similarly, in the non-manufacturing sector, U.S. firms in the information industry (including publishing

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<sup>18</sup> USITC, *Trade, Investment, and Industrial Policies in India*, 2014, 140, 145.

<sup>19</sup> USITC, *China: Effects of Intellectual Property Infringement*, 2011, 3-21.

<sup>20</sup> The target population for the BRDIS consists of for-profit corporations with five or more paid employees in the United States that have at least one U.S. establishment in business during the survey year and are classified within a specific set of industry sectors, with a particular focus on those companies that perform R&D in the United States. Detailed information on the sampling methodology and responses are available in the 2012 BRDIS technical notes. NSF and National Center for Science and Engineering Statistics (NCSES), *BRDIS: 2012*, October 29, 2015.



and software) and the professional, scientific, and technical services industries also favored trade secrets. Moreover, it's not just large firms that care about trade secrets; 56.2 percent of U.S. firms with less than 500 employees considered trade secrets "very important," compared to 45.4 percent for patents, 37.8 percent for trademarks, and 25.6 percent for copyrights.<sup>21</sup>

Table 2: Percentage of U.S. firms that consider different IP types "very important," selected industry sectors

Industry	Trade secrets	Patents	Trademarks	Copyrights
<b>All industries</b>	58.3	48.3	43.5	27.4
<i>Manufacturing</i>	62.1	55.9	50.1	26.1
Chemicals	69.7	67.6	54.4	26.1
Machinery	53.0	48.2	41.5	21.9
Computer and electronic Products	70.6	64.3	49.9	34.4
Transportation Equipment	47.8	42.8	38.5	22.1
<i>Nonmanufacturing</i>	54.3	40.1	36.5	28.7
Information	63.6	44.1	57.2	50.9
Professional, scientific and technical services	49.9	42.1	20.3	20.3

Source: NSF and NCSES, *BRDIS: 2012*, October 2015, Tables 53-57.

Academic research, including the 1994 Carnegie Mellon Survey on Industrial R&D in the U.S. manufacturing sector, has similarly found that firms consider trade secrets and other informal mechanisms, such as lead time and first-mover advantages, to be the most effective means for protecting returns on innovative products and processes. This is particularly true for small U.S. firms, who are more likely than large firms to forgo patents because of their cost.<sup>22</sup>

To shed additional light on the experiences of small firms, the 2008 Berkeley Patent Survey targeted small high-tech start-up companies in the United States.<sup>23</sup> The cost of getting and enforcing patents was the most common reason cited by all survey respondents for not patenting major technologies. Other reasons included the belief that particular innovations were not patentable, that trade secret protection was adequate, and a reluctance to disclose commercially valuable information. Reasons for not

<sup>21</sup> National Science Foundation (NSF), National Center for Science and Engineering Statistics (NCSES). Business Research and Development and Innovation: 2012, 2015, tables 53-57.

<sup>22</sup> Similar results have been obtained for firms in the pharmaceutical industry, often considered the most patent-reliant. Cohen, Nelson and Walsh, "Protecting their Intellectual Assets," 2000, 25 and tables 1 and 2.

<sup>23</sup> Graham, Merges, Samuelson, and Sichelman, "High Technology Entrepreneurs," 2009, 1260.

patenting varied by industry sector—for example reluctance to disclose and the sense that trade secret protections were sufficient were top reasons for small firms in the biotechnology sector, while cost concerns dominated in the software sector.<sup>24</sup>

The fact that trade secrets may be protected without governmental help, as well as their attractiveness to resource-constrained firms, suggest that they may play an important role in the innovation strategies of developing-country firms. However, while there is a substantial body of survey evidence on the use of trade secrets in developed countries, there is little survey information from developing countries.<sup>25</sup>

Information on how developing-country firms use trade secrets generally is limited to case studies.

These studies cover numerous industry sectors (including food and drinks, household products, clothing, software and biotechnology) and countries (including Trinidad and Tobago, Thailand, China, Myanmar, Brazil, the Philippines and Colombia).<sup>26</sup> This qualitative evidence suggests that there may be demand for strengthening trade secret protections in developing countries.

## New Trade Secret Protections in the United States and Europe

The United States and Europe enacted new trade secrets legislation in May of 2016 (only 15 days apart).

The U.S. Defend Trade Secrets Act of 2016 (DTSA)<sup>27</sup> and the EU's "Directive on the protection of undisclosed know-how and business information (trade secrets) against their unlawful acquisition, use and disclosure" (the EU Directive)<sup>28</sup> should make protections within and across the two markets more uniform.<sup>29</sup> U.S. and EU government representatives have cited the ongoing Transatlantic Trade and

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<sup>24</sup> Graham, Merges, Samuelson, and Sichelman, "High Technology Entrepreneurs," 2009, 1310-1314.

<sup>25</sup> Hall, Helmers, Rogers, and Sena, "The Choice between Formal and Informal," 2014, 6-13; Baker & McKenzie. "Study on Trade Secrets," April 2011, 101-102.

<sup>26</sup> See, e.g., World Intellectual Property Organization (WIPO), IP Advantage database, [http://www.wipo.int/ipadvantage/en/search.jsp?ins\\_protection\\_id=537&focus\\_id](http://www.wipo.int/ipadvantage/en/search.jsp?ins_protection_id=537&focus_id) (accessed June 15, 2016).

<sup>27</sup> See DTSA, Public L. No. 114-153, May 11, 2016.

<sup>28</sup> European Commission, "Trade Secrets," n.d. (accessed June 16, 2016).

<sup>29</sup> In the United States, the new law already is in effect and lawsuits have been brought based on its provisions. By contrast, in Europe, the member states will have two years from publication of the Directive to implement it into

Investment Partnership (TTIP) negotiations as one impetus for harmonizing and strengthening trade secret protections at home.<sup>30</sup>

The DTSA creates a federal civil cause of action for trade secret misappropriation. Before this, civil trade secret protections generally were governed by state law, with almost every state (excepting New York and Massachusetts) relying on a version of the Uniform Trade Secrets Act.<sup>31</sup> The DTSA seeks to make the standards for trade secret misappropriation more consistent and to provide uniform remedies similar to those for other IPR violations (including injunctive relief, seizure of misappropriated information, compensatory damages, and punitive damages and attorneys' fees in cases of willful misappropriation).<sup>32</sup> In recognition of the international dimensions of the problem, the DTSA also requires the Attorney General to prepare biannual reports on the size and scope of theft of U.S. trade secrets abroad; the involvement of foreign governments; legal and enforcement protections available abroad; and identifying countries where problems are significant.<sup>33</sup>

The U.S. and EU legislation harmonize approaches to trade secret protections by similarly defining trade secrets and the requirements for a finding of misappropriation. They also take similar approaches to civil remedies and the protection of trade secrets during litigation. An important difference, however, is the availability of criminal liability.<sup>34</sup> The DTSA amends the U.S. Economic Espionage Act of 1996, which criminalizes: theft for the benefit of a foreign entity (economic espionage) and the intentional theft of a

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their national legislation. See Molinski and Heath, "Early Returns," June 22, 2016, and European Commission, "Trade Secrets," n.d. (accessed June 16, 2016).

<sup>30</sup> Akhtar and Jones, "Transatlantic Trade and Investment Partnership (TTIP) Negotiations," February 4, 2014, 34.

<sup>31</sup> The Uniform Trade Secrets Act is a model law prepared by the Uniform Law Commission in an effort to harmonize common law standards and remedies for trade secret misappropriation. See National Conference of Commissioners on Uniform State Laws, "Uniform Trade Secrets Act with 1985 Amendments," August 1985, [http://www.uniformlaws.org/shared/docs/trade%20secrets/utsa\\_final\\_85.pdf](http://www.uniformlaws.org/shared/docs/trade%20secrets/utsa_final_85.pdf), and Bombard, "Three Key Distinctions," 2016, 23.

<sup>32</sup> DTSA, Public L. No. 114-153, May 11, 2016, <https://www.congress.gov/bill/114th-congress/senate-bill/1890> (accessed June 16, 2016); see also Hatch, "Senators Hatch, Coons Urge Passage," October 8, 2015 (listing numerous associations and firms supporting the DTSA).

<sup>33</sup> DTSA, Public L. No. 114-153, May 11, 2016.

<sup>34</sup> Patel, Pade, Cundiff and Newman, "A Quick Guide," June 2016.

secret placed in interstate commerce with the intent to convert the trade secret and injure the owner.<sup>35</sup>

By contrast, criminal liability is a matter for the EU Member States, with some countries providing for criminal penalties under certain circumstances and others not at all.<sup>36</sup>

## A New Focus in Trade Policy

Notwithstanding some differences in domestic laws, the pending TPP suggests that trade agreements involving the United States may be more focused on trade secret protections than they have been in the past. The TPP's trade secrets provision begins by reiterating the requirements of TRIPS Article 39.2 that countries provide a legal means for protecting "undisclosed information" or trade secrets. It further requires that countries provide protections against the disclosure, acquisition, or use of trade secrets by others, explicitly including state-owned entities, in a manner contrary to honest commercial practices.<sup>37</sup> Additionally, for the first time in a trade agreement, the TPP requires that criminal procedures and penalties be available for trade secret misappropriation under certain circumstances.<sup>38</sup> While U.S. industry representatives have praised the enhancement of trade secret protections in the TPP, they have urged even stronger protections and greater harmonization in future agreements.<sup>39</sup>

U.S. trade policy vis-à-vis important trade partners, such as China and India, also reflects the growing importance of trade secret protection for U.S. firms doing business internationally. Recent meetings of the U.S.-China Joint Commission on Commerce and Trade, for example, have resulted in outcomes that focus on upgrading substantive and procedural protections for owners of trade secrets in China.<sup>40</sup> In India, bilateral discussions also have focused on enhancing trade secrets protections, which is

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<sup>35</sup> The law was revised in 2012 to expand the jurisdictional element of the trade secret provision and to increase available penalties. See Theft of Trade Secrets Clarification Act of 2012, Pub. L. No. 112-236, amending 18 U.S.C. §1832(a) and Foreign and Economic Espionage Penalty Enhancement Act of 2012, Pub. L. No. 112-269, amending 18 U.S.C. §1831(a), (b).

<sup>36</sup> Baker & McKenzie. "Study on Trade Secrets," April 2011, 61-66.

<sup>37</sup> TPP, art. 18.78.

<sup>38</sup> TPP, art. 18.78.

<sup>39</sup> Intellectual Property Rights Industry-Trade Advisory Committee (ITAC-15), "Report on the Trans-Pacific Partnership Agreement," December 3, 2015, 25-26.

<sup>40</sup> USTR, "U.S. Fact Sheet," November 2015.

particularly important given the absence of a standalone trade secret law in India. These efforts reportedly are buttressed by a shared understanding in India and the United States that improved trade secret protections are mutually beneficial.<sup>41</sup> Empirical research on the potential economic effects of strengthening trade secrets protections could guide these and future efforts.

## Emerging Research on the Effects of Strengthening Trade Secret Protections

A major argument made in favor of TRIPS by the United States and other developed countries was that a stronger and better-harmonized global IP system would improve incentives for technology transfer and contribute to economic development through trade in high-technology goods, foreign direct investment (FDI), and licensing.<sup>42</sup> A number of economic studies have looked at the impact of patent reform, which strengthens one type of IP protection, and have found positive effects on high-tech trade, FDI, and licensing.<sup>43</sup>

Research has tended to focus on patents largely because of data availability. Two researchers, Juan Ginarte and Walter Park, constructed a dataset which indexes the strength of patent protection in a large sample of countries over time (the GP Index).<sup>44</sup> One potential limitation of the GP Index, however, is that it measures the absence or presence of particular aspects of a country's patent law but does not explicitly take into account whether laws are effectively enforced. This limitation may be particularly salient as the legal reforms required by TRIPS are completed but concerns about effective enforcement persist.<sup>45</sup> Some researchers address this limitation by combining the GP Index with measures of the

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<sup>41</sup> USTR, "United States and India Joint Statement," October 2015.

<sup>42</sup> Maskus, "The New Globalisation," 2014, 276.

<sup>43</sup> See, e.g., Maskus, "The New Globalisation," 2014, 276 (more than 15 recent economic studies establish the positive effects of patent strengthening on inward trade in high-tech goods, FDI, and licensing); Maskus, *Private Rights and Public Problems*, 2012, 73-81 (summarizing the literature).

<sup>44</sup> See Ginarte and Park, "Determinants of Patent Rights," 1997, 283; and Park, "International Patent Protection," 2008, 761.

<sup>45</sup> See, e.g., USTR, *2016 Special 301 Report*, April 2016, 29-63 (noting ongoing enforcement challenges in countries identified as having substantial IP problems).

effectiveness of legal institutions, such as the legal system and property rights index published by the Fraser Institute.<sup>46</sup>

Until recently, there was no index measuring trade secret protections over time and in a broad sample of countries. Pioneering work published by Douglas Lippoldt and Mark Schultz in 2014 addresses this gap. Their Trade Secret Protection Index (TSPI) measures the level of trade secret protections in 37 countries for every 5 years from 1985 to 2010. TSPI includes five elements that reflect the scope of trade secret protections and remedies, and that correspond well with TRIPS and TPP requirements. The elements are: (1) definitions and coverage; (2) specific duties and misappropriation; (3) remedies and restrictions on liability; (4) enforcement, investigation and discovery, and test data exclusivity; and (5) system functioning and related regulation. Like the GP Index, it is structured to enable scoring based primarily on objective criteria. However, it also specifically includes measures of enforcement and the effectiveness of legal institutions.<sup>47</sup>

Lippoldt and Schultz use their index to test the hypothesis that increasing the protection of trade secrets promotes expanded domestic innovative activities, as measured by R&D expenditures and intensity, and expanded international activities, including more goods and services imports, imports of IP services, and FDI inflows. They find a positive relationship between the stringency of trade secret protection and domestic and international innovation indicators, particularly FDI inflows and imports of IP services.<sup>48</sup> Their research offers a basis for further quantitative analysis of trade secrets protection.

For example, the USITC used both the GP Index and the TSPI in a series of regressions to examine the relationship between legal protections for patents and trade secrets and the income that U.S. firms receive for the use of their intellectual property abroad (IP receipts).<sup>49</sup> The USITC's analysis found a

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<sup>46</sup> See, e.g., Zhang, Du, and Park, "How Private Property Protection," 2015, 4-5; Maskus and Yang, "The Impacts of Post-TRIPS Patent Reforms," April 2013.

<sup>47</sup> Lippoldt and Schultz, "Uncovering Trade Secrets," 2014, 11-12, 23.

<sup>48</sup> Lippoldt and Schultz, "Uncovering Trade Secrets," 2014, 16.

<sup>49</sup> USITC, *TPP Agreement*, 2016, 477, 786-87.

statistically significant positive relationship between patent reforms and IP receipts , but not between trade secret protections and IP receipts.<sup>50</sup> Possible explanations for this non-finding are discussed below.

## Areas for Further Research

There is substantial room to improve understanding of the links between trade secrets and indicators of innovation, trade, and investment to provide support for trade policy. Below are unanswered questions that warrant further research.

### Who uses trade secrets?

Substantial survey evidence from developed countries confirms the central importance of trade secrets to large and small firms in a range of industry sectors. However, there is little evidence about the IP strategies of firms in developing countries and, in particular, their use (or not) of trade secrets. These strategies may differ, for example, based on firm characteristics including size, industry sector, whether the firm is involved in creating new products and/or processes, and whether the firm is internationally-engaged through trade, investment, and/or licensing.

Moreover, survey evidence from the United State and other developed countries points to the relative importance of trade secrets when compared to other types of IP. The reasons for this preference—including potential cost advantages and the broad scope and subject matter of trade secrets—suggest that they may play an important role in developing countries as well. Although there is case study evidence on developing country firms’ use of trade secrets in certain circumstances, survey information could provide a more robust basis for policy.

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<sup>50</sup> In the USITC model, the amount of IP receipts the United States receives from a particular country in a particular year is determined by the country’s level of patent and trade secret protection (measured by the GP Index and the TSPI), the size of the economy of the foreign country (measured by its GDP), many other country factors that do not vary over time (represented by a set of country fixed effects), and U.S. factors that do not vary over time (represented by a series of year fixed effects).

## Are trade secrets complements or substitutes of other types of IP protections?

Much of the research on IP and innovation has focused on patents because they are more visible through data on applications and grants and thus more readily lend themselves to measurement.

Moreover, the economic literature often assumes that patents and trade secrets are substitutes; that is, a firm can choose one or the other but not both.<sup>51</sup> In practice, however, there are many examples of firms using both strategies. For example, trade secrets may be used to protect the know-how needed to implement a patented invention, acting as complements rather than substitutes.

From an innovation policy perspective, understanding the relationship between trade secrets and patents (as well as other types of IP) is critical to predicting how changes in one policy domain may affect others. In cases in which patents and trade secrets are substitutes, changes that make patents more difficult to obtain (for example for biotechnology or software inventions) may make trade secrets more desirable. Strengthening trade secret laws could similarly be expected to discourage patenting. By contrast, when patents and trade secrets are used as complements, they may be expected to respond similarly to policy changes.

One limitation of surveys in this regard is that they typically provide aggregated firm-level data rather than data at the level of a particular product or process innovation.<sup>52</sup> Aggregated data can obscure the fact that a single invention may be protected differently at different stages of the product life cycle. For example, different aspects of a software program may be protected initially by trade secrets; further on, by patents or copyrights; and at later commercialization stages, trademarks may be added to the mix. Collecting survey data at the product level—for example, seeking identification of all IP strategies used in connection with a particular innovation—could shed light on how different IP mechanisms

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<sup>51</sup> Hall, Helmers, Rogers, and Sena, “The Choice between Formal and Informal,” 2014, 14.

<sup>52</sup> Hall, Helmers, Rogers, and Sena, “The Choice between Formal and Informal,” 2014, 41.



complement and/or substitute for each other. Case studies also could be useful to illustrate the use of different IP strategies throughout the life cycle of an innovation.

## **What is the relationship between trade secrets and trade?**

The empirical evidence reviewed here provides an untested basis for understanding the international activities of trade-secret-intensive industries. For example, using the NSF survey data, U.S. industry sectors could be categorized according to whether or not they are trade-secret-intensive. Goods trade data for these sectors could be used to explore and compare trade patterns in trade-secret and non-trade-secret -intensive industries, and the potential relationship of these patterns to the strength of trade secret protection as measured by the TSPI.

On the services side, trade in intellectual property involves mainly high-income countries; however, receipts and payments for IP services in middle-income countries, particularly China, are growing rapidly.<sup>53</sup> Trade trends in IP services could be compared to those in non-IP services, including the potential relationship to trade secret protection as reflected in the TSPI.

As suggested by the USITC's work, however, several issues may complicate the analysis. For example, intellectual property trade data includes receipts for all types of intellectual property and not just trade secrets. Additionally, some firms might not be reporting trade secret revenue under intellectual property at all. While BEA's surveys include trade secrets in the definition of rights related to industrial processes, some firms may include revenue from trade secrets under professional services, such as R&D services.<sup>54</sup> Firms' varying approaches to the categorization of trade secrets would create "noise" in the data, making it harder to isolate the impact of the TSPI. Another potential issue is "omitted-variable

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<sup>53</sup> The World Bank, "World Bank Open Data" (charges for the use of intellectual property reported for high, middle, and low income countries, 2006-14) (accessed June 19, 2016).

<sup>54</sup> BEA, "BE-120, Benchmark Survey of Transactions," 12-2006, 19.

bias,” as tax regimes affect intellectual property trade, but no variable for them is included in the regression.<sup>55</sup> Alternative specifications that exclude tax havens could address this issue.

With regard to FDI, further study of how the size, scope, and location of FDI are affected by trade secret protection levels is warranted. For example, the availability of trade secret protections may influence the way in which relationships are structured in global value chains. When trade secret laws are lax, a multinational corporation may rely on a wholly-owned affiliate rather than a non-affiliated entity because it can exert greater control over sensitive information. By contrast, joint venture partnerships, which generally rely on enforceable contractual relationships, may be facilitated by robust trade secret protections. Additionally, the role that trade secret protections may play in the composition of FDI (for example, whether it is in manufacturing and R&D rather than simply distribution) warrants further study.

## Are legal institutions effectively protecting trade secrets?

Unlike patents, trade secrets do not necessarily require strong institutions *ex-ante*; firms protect their trade secrets themselves through internal measures. They do, however, require strong institutions *ex-post* in the event of a misappropriation. A judge must be able to identify the trade secret (without improperly disclosing it to third parties); order appropriate discovery, subject to confidentiality restrictions; determine if there has been a misappropriation; and, if there has, must be able to impose and enforce appropriate remedies.

Research on whether countries’ legal institutions are meeting the substantial challenge of protecting trade secret is limited. There is anecdotal evidence of inadequate and non-deterrent remedies; a lack of injunctive relief; difficulties protecting trade secrets during legal proceedings; and insufficient

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<sup>55</sup> Hebus and Johannesen, “At Your Service!” June 2015, 2-6 (documenting the prominent role of tax havens in international services trade, particularly intellectual property transactions).

mechanism for participation between courts and government agencies within and across countries.

These concerns have been noted with regard to China, India, and other markets.<sup>56</sup> Further research on the adequacy of legal protections in different countries is warranted.

To take into account the relationship between effective legal institutions and trade and investment, it may be appropriate to modify the TSPI to capture more information about the effectiveness of trade secret protections “on the ground.” Moreover, further research can shed light on how firms’ evaluations of countries’ legal environments affect decision making, including choices between serving the market through exports, FDI, and/or licensing. Given the documented importance of trade secrets to firms and new domestic and international policy in this domain, there is a substantial need for further research on the relationships between trade secrets, innovation, trade and investment.

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<sup>56</sup> See, e.g., U.S. Chamber of Commerce. “The Case for Enhanced Protection,” 2014, 13-18; Bai and Da, “Strategies for Trade Secret Protection, 2011, 351; Brant and Lohse, “Trade Secrets,” 2014, 17-18; USTR, 2016 Special 301 Report, April 2016, 20.

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