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 unexpected answer is trade secrets—what some commentators call “the other IP right.” Precisely because they are secret in nature, empirical research and international trade policy making on trade secrets are in the early stages.

Firms, however, 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 rate trade secrets as more important than all other types of IP protection. In practice, trade secrets have several identified advantages over other types of IP. 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 day one rather than waiting for the government review and approval required for patents and trademarks. And trade secret protections are flexible as

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1 This article represents solely the views of the author and not the views of the United States International Trade Commission or any of its individual Commissioners. This paper should be cited as the work of the author only, and not as an official Commission document. Please direct all correspondence to Katherine Linton, Katherine.linton@usitc.gov.

well; for example, firms need not file a new application to cover modifications, 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. Indeed, a large portion of U.S. IP exports consist of trade-secret-reliant industrial processes and software licensed to affiliates and third parties abroad. Moreover, trade secret laws generally permit independent discovery, reverse engineering, and other fair practices considered critical to innovation. Liability for trade secret misappropriation also is generally limited to cases of wrongful conduct or violation of honest commercial practices.

As the importance of trade secrets becomes better understood, they have become the subject of increased domestic and international policy making. Efforts to strengthen trade secret laws are in process in Europe and the United States. The Trans-Pacific Partnership Agreement (TPP) includes protection that is stronger than the minimum set by the World Trade Organization’s Trade-Related Aspects of Intellectual Property Agreement (TRIPS), requiring that each party provide protections for trade secrets from misappropriation, including by state-owned entities. TPP parties also must provide criminal procedures and penalties for trade secret violations in certain circumstances. These requirements are likely to spur TPP members to strengthen their domestic trade secret laws.

Notwithstanding these policy efforts, 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 firms in developing countries use trade secrets. Similarly, research on the way that changes in legal protections for trade secrets may affect 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.

**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. The information must be protected from disclosure, acquisition, or use by others in a manner that is contrary to honest commercial practices.\(^3\) 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.\(^4\)

The range of intellectual materials that may be considered “trade secrets” is broad. They 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.\(^5\) Trade secrets may be particularly valuable when a work that has potential commercial value is at an early stage of development—and thus does not meet patentability requirements—or when the availability of a patent is unclear because of shifting legal standards. For example, uncertainty about the patentability of biotechnology, business processes, or software inventions under U.S. law may induce firms to rely more on trade secrets.\(^6\)

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\(^3\) TRIPS, articles 39.1 and 39.2.


\(^6\) 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 cover a broader subject matter, they also can last longer. While TRIPS requires that countries limit patent terms to 20 years, trade secret protections may last 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. 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 with a “need to know” it. 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.

On the other hand, trade secrets are narrower than patents in important ways. Trade secrets do not protect against a firm obtaining the subject information through fair and honest means, such as independent discovery or reverse engineering. Instead, the law requires misappropriation—a breach of a duty of confidence (such as the employment relationship), a breach of contract, or another dishonest or wrongful action. 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” is often very difficult; instead, courts may issue injunctions to attempt to limit the damage.\(^7\)

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, 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

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Moreover, the ability to enforce exclusive rights continues regardless of whether the patent is infringed by others.

Table 1 Trade Secrets and Patents Compared

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

Source: Compiled by author.

The Application of Trade Secret Protections to Regulatory Test Data

TRIPS provisions also address the more controversial issue of protections for regulatory test data. Under this language, 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). 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. Most recently, the TPP has extended additional protections to the test data supporting biologics, requiring that each TPP Party provide for an extended term of market protection. Trade policy discussions have tended to concentrate on the

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9 TRIPS, article 39.3.
12 TPP, articles 18.50 and 18.52.
exclusive rights provided to firms that originate regulatory test data. Unfortunately, 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.

**Firms’ Preferences for Trade Secrets**

Firms in a broad range of industry sectors identify trade secrets as the type of IP that is most important to their operations. In 2014, for example, the U.S. International Trade Commission (USITC) surveyed more than 7,000 U.S. firms to study the economic effects of India’s trade and industrial policies. Based on the survey responses, firms were more likely to consider trade secrets “very important” to operations than they were any other type of IP. This was particularly the case for internationally engaged firms: 56 percent considered trade secrets “very important,” compared to 48 percent for trademarks, 37 percent for patents, and 31 percent for copyrights. Even in sectors generally considered patent intensive, such as chemicals and information and communications technology (ICT), firms were more likely to consider trade secrets “very important” than other forms of IP. The importance of trade secrets was hinted at 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.

These results are not unique to the targeted surveys the USITC conducts in response to requests from Congress or the U.S. Trade Representative. Similar results were obtained by the primary government survey of the research and development (R&D) activities of U.S. firms, the Business R&D and Innovation (BRDI) Survey undertaken in 2012 by the National Science Foundation and the Census Bureau. The BRDI found that 58.3 percent of firms in industry sectors with R&D activity considered trade secrets “very important,” compared to lower shares for patents, trademarks and copyrights (see table 2). For

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example, in the manufacturing sector, 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, firms in the information industry (including publishing 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; for example, 56.2 percent of small firms in sectors with R&D activity considered trade secrets “very important,” compared to 45.4 percent for patents.15

Table 2 Percentage of firms with R&D activities that consider different IP types “very important,” by selected industries

<table>
<thead>
<tr>
<th>Industry</th>
<th>Trade secrets very important</th>
<th>Patents very important</th>
<th>Trademarks very important</th>
<th>Copyrights very important</th>
</tr>
</thead>
<tbody>
<tr>
<td>All industries</td>
<td>58.3</td>
<td>48.3</td>
<td>43.5</td>
<td>27.4</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>62.1</td>
<td>55.9</td>
<td>50.1</td>
<td>26.1</td>
</tr>
<tr>
<td>Chemicals</td>
<td>69.7</td>
<td>67.6</td>
<td>54.4</td>
<td>26.1</td>
</tr>
<tr>
<td>Machinery</td>
<td>53.0</td>
<td>48.2</td>
<td>41.5</td>
<td>21.9</td>
</tr>
<tr>
<td>Computer and electronic Products</td>
<td>70.6</td>
<td>64.3</td>
<td>49.9</td>
<td>34.4</td>
</tr>
<tr>
<td>Transportation Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonmanufacturing industries</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td>63.6</td>
<td>44.1</td>
<td>57.2</td>
<td>50.9</td>
</tr>
<tr>
<td>Professional, scientific and technical services</td>
<td>49.9</td>
<td>42.1</td>
<td>20.3</td>
<td>20.3</td>
</tr>
</tbody>
</table>


Pioneering academic research, including the 1994 Carnegie Mellon Survey on Industrial R&D in the U.S. manufacturing sector, similarly has 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 firms, who

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are more likely than large firms to forgo the use of patents because of their cost. To shed light on the experiences of small firms, the 2008 Berkeley Patent Survey targeted small technology-oriented start-up companies in the United States. Survey respondents, particularly those in the software sector, reported relying more often on trade secrets because of perceived cost advantages. Many considered patents of limited use because enforcement was too costly and inventing around them relatively easy.

While similar results on the importance of trade secrets to small and large firms have been reported in Europe and Canada, survey evidence from developing countries is rare. 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. Another potentially relevant trend is developed-country firms’ growing reliance on global value chains, in which the range of activities needed to bring a product to market are divided among different locations—often including developing countries—according to local advantages. This development implies a useful role for trade secrets, as information can be shared between locations using measures within the firm’s own control.

Aside from anecdotal evidence, there is little research on the role of trade secrets in global value chains or developing countries. Further research to determine if and how the IP strategies of developing-country firms differ from firms headquartered in developed countries would be extremely valuable. Similarly, the sufficiency of developing-country legal systems to address trade secret misappropriation also merits attention. Legal procedures for the discovery and adjudication of trade secret claims can be complex as the need for sufficient information must be balanced with protections against improper

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16 These results have been reported even 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.
disclosure of the trade secret in case proceedings. There is some evidence to suggest that these procedures often are inadequate.  

**A New Focus on Trade Secrets in Legislation**

U.S. and EU firms assign substantial value to trade secrets and enjoy robust legal protections, even though those legal protections are not completely uniform across all 50 U.S. states or the countries of the European Union. In the United States, only Massachusetts and New York have yet to adopt some form of the Uniform Trade Secrets Act, instead relying on common law and other state statutes. In Europe, a directive to harmonize civil trade secret law throughout the EU is pending before the European Parliament and the Council.

Legislation to provide a federal civil trade secrets cause of action in the United States has been proposed. Most recently, bipartisan members of the House and Senate introduced the “Defend Trade Secrets Act of 2015.” The legislation seeks to make the standards for trade secret misappropriation consistent and to provide uniform remedies that are similar to those for other IPR violations (including injunctive relief, compensatory damages, and punitive damages and attorneys’ fees in cases of willful misappropriation). The legislation has received strong support from industry and legal representatives.

The United States offers federal criminal protection via the Economic Espionage Act (EEA) of 1996. The EEA criminalizes two forms of trade secret theft: theft for the benefit of a foreign entity (economic espionage) and the intentional theft of a secret placed in interstate commerce with the intent to convert

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23 A “who’s who” of leading multinational manufacturing and services firms and trade and professional associations support the legislation. See Hatch, “Senators Hatch, Coons Urge Passage,” October 8, 2015.

the trade secret and injure the owner.\textsuperscript{25} According to U.S. Department of Justice guidelines, the EEA is not intended to criminalize every theft; relevant factors in deciding whether to initiate a criminal case include the involvement of a foreign agent, the degree of injury, and the effectiveness of civil remedies.\textsuperscript{26} Prosecutions under the EEA have been relatively infrequent.\textsuperscript{27}

Trade secret protection in EU member states comprises a patchwork of varying protections. In November 2013, the European Commission proposed a draft directive that would replace the current country-by-country approach with uniform guidelines. The guidelines harmonize the definitions of “trade secret” and “misappropriation,” and provide common civil procedures and remedies. The draft directive does not, however, include criminal penalties, which are available under certain circumstances in some but not all member states.\textsuperscript{28} Although the U.S. and EU legislative processes could take time, each has cited the ongoing Transatlantic Trade and Investment Partnership (TTIP) negotiations as an impetus for strengthening trade secret protections at home.\textsuperscript{29}

A New Focus in Trade Policy Making

Despite differences in domestic laws, the TPP suggests that trade agreements are moving the dial forward on trade secret policymaking. It requires, at a minimum, that countries’ definitions of trade secrets be consistent with TRIPS Article 39.2. It further requires that countries provide protections against the disclosure, acquisition, or use of trade secrets by others, including state-owned entities, in a manner contrary to honest commercial practices. And, for the first time in a trade agreement, the TPP requires that criminal procedures and penalties be available for trade secret misappropriation under

\textsuperscript{25} Thomas, “The Role of Trade Secrets,” 2014, 8-9.
\textsuperscript{26} U.S. Dept. of Justice, U.S. Attorneys’ Manual, Title 9-59.100.
\textsuperscript{27} Pooley, “The Myth of the Trade Secret Troll,” 2016; Yeh, “Protection of Trade Secrets,” September 15, 2014, 20 (during the 1996-2013 period, there have been approximately 125 indictments and 10 convictions under the EEA.).
\textsuperscript{28} European Commission, Growth, “Trade Secrets,” n.d.
\textsuperscript{29} Akhtar and Jones, “Transatlantic Trade and Investment Partnership (TTIP) Negotiations,” February 4, 2014, 34.
certain circumstances. While U.S. industry representatives have praised this enhancement of trade secret protections in the TPP, they also have urged stronger protections and greater harmonization in future agreements.

U.S. bilateral trade policy making also reflects the importance of strong trade secret protection for U.S. firms doing business internationally, particularly in China and India. 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 trade secrets owners in China. In India, both sides have had discussions on enhancing trade secrets protections, which is particularly important given the absence of a standalone trade secret law in India. These efforts are buttressed by a shared sense that improved trade secret protections are mutually beneficial. Empirical research on the 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 through trade in high-technology goods, foreign direct investment (FDI), and licensing. Based on recent economic studies, IP strengthening—in particular, patent reforms—has shown strong positive effects in each of these areas.

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30 TPP, Article 18.78.
34 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); Cepeda, Lippoldt, and Senft, “Policy Complements,” 2010 (increases in IP protection are associated with increased FDI, trade, and domestic innovation in developed and developing countries).
Many empirical studies rely on the Ginarte and Park Index (GP Index), which measures the strength of patent protection in a large sample of countries over time.\textsuperscript{35} One concern raised about the GP Index, however, is that it measures the absence or presence of particular aspects of a country’s patent law but does not take into account whether the laws are effectively enforced. Some researchers address this concern by combining the GP Index with measures of the effectiveness of legal institutions.\textsuperscript{36} Similar indices have been developed to measure the strength and effects of copyright and trademark protections; to date, however, they have not been as substantially explored in the literature.\textsuperscript{37}

Until recently, there was no index measuring changing levels of trade secret protections over time and for a broad sample of countries. This changed with pioneering work published by Lippoldt and Schultz in 2014. Their Trade Secret Protection Index (TSPI) includes five elements that reflect the scope of trade secret protections and remedies, and that mesh 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, although part of the last element includes the effectiveness of legal institutions.\textsuperscript{38}

Lippoldt and Schultz test the hypothesis that increasing the protection of trade secrets promotes (1) expanded domestic innovative activities, as measured by R&D expenditures and intensity, and (2) 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

\textsuperscript{37} Economic assessments by the USITC of the potential effects of improvements in IP protection in China and India have used the Economist Intelligence Unit’s IP index, which relies more on the qualitative opinions of its network of experts than quantitative measures. This index has been chosen in an attempt to measure protection “on the ground” rather than “on the books.” USITC, China: Effects of Intellectual Property Infringement, 2011, chapter 4; USITC, Trade, Investment, and Industrial Policies in India, 2014, 89-93.
\textsuperscript{38} Lippoldt and Schultz, “Uncovering Trade Secrets,” 2014, 11-12, 23.
domestic and international innovation indicators, particularly FDI inflows and imports of IP services.\textsuperscript{39}

Their research offers an excellent jumping-off point for further analysis of the relationship between trade secrets protection and innovation.

**New Areas for Research**

Further research on trade secrets could provide a stronger foundation for legislation and policymaking.

In short, there is substantial room to improve our understanding of the links between trade secrets, innovation, and trade and investment to support best practices in trade policymaking. Possible topics are explored below (box 1).

\textsuperscript{39} Lippoldt and Schultz, “Uncovering Trade Secrets,” 2014, 16.
Box 1 Topics for further trade secrets 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 wide range of industry sectors. However, there is little evidence about the IP strategies of developing-country firms and, in particular their use (or not) of trade secrets. These strategies may differ, for example, based on firm size, industry sector, international engagement, or whether the firm participates in global value chains.

What types of innovations are protected by trade secrets?

One limitation of surveys is that they typically provide aggregated firm-level data rather than data at the level of a particular invention or product. Aggregated data can obscure the fact that a single invention often is 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 could enable a better understanding of how these different mechanisms complement and/or substitute for each other. Case studies also could shed light on the interactions between IP strategies and the product life cycle.

Case studies or empirical research could also highlight innovation patterns in developing-country firms and the use or nonuse of trade secrets. The different scope, coverage, and liability provisions of trade secret and patent law may have different advantages and disadvantages for firms in developing and developed countries. In this regard, studies that explore the potential value of utility models or petty patents in developing countries may be informative, given that they may incentivize inventions that do not meet strict patentability standards.

What relationships are visible between trade secrets and trade and investment indicators?

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, 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 and trends in 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, a large portion of trade in IP services is for industrial processes and software—two categories that are believed to substantially rely on trade secrets (although more research is needed here as well). Currently, IP services trade involves mainly high-income countries; however, receipts and payments for IP services in middle-income countries, particularly China, are growing rapidly. Trade trends in IP services could be compared to those in non-IP services, including the potential relationship to trade secret protection levels. With regard to FDI, trade secret protections also may assist firms that structure their value chains to locate design, production, marketing, and service functions based on local comparative advantages. Further study of how the size, scope, and location of FDI are affected by trade secret protection levels also is warranted.

How does the effectiveness of legal institutions impact firms’ trade and investment decisions?

Unlike patents, trade secrets do not require strong institutions at the outset; firms protect their trade secrets themselves through internal measures. They do, however, require strong institutions 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 impose and enforce appropriate remedies. There is little research on whether countries’ legal institutions are meeting the challenge of adjudicating trade secret cases.

To take into account the importance of effective legal institutions, it may be appropriate to modify the TSPI or interact it with measures that capture trade secret protections “on the ground.” Moreover, further research can shed light on how the legal environment affects firms’ decision making, including choices between exports, FDI, and licensing.

Bibliography


