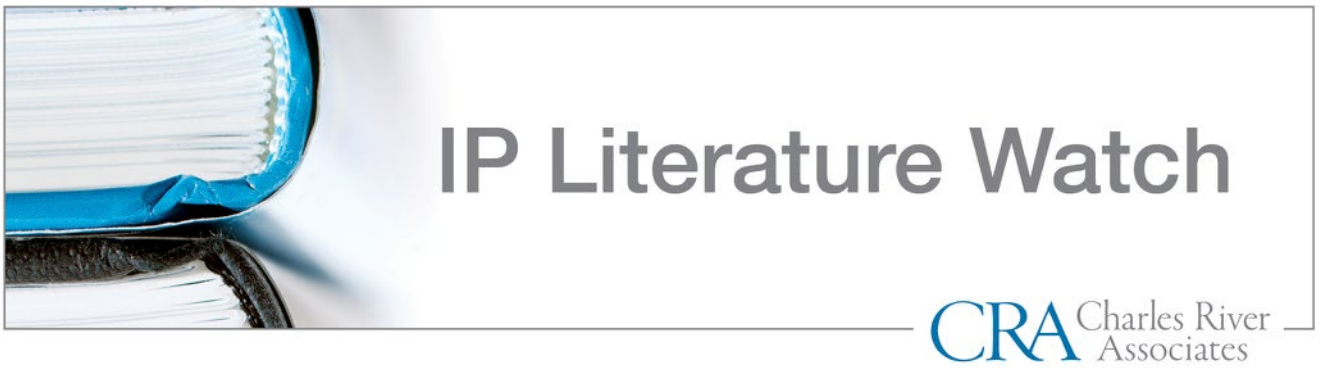

March 2023

This newsletter contains an overview of recent publications concerning intellectual property issues. The abstracts included below are as written by the author(s) and are unedited.

IP & Antitrust

Collective Copyright Licensing and the Ban on Cartels for the Solo Self-Employed

Thomas Hoppner (Technical University of Applied Sciences Wildau; Hausfeld RA LLP)
Original: AfP 1&2/2023 (Kollektives Urhebervertragsrecht und das Kartellverbot für Solo-Selbständige)
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4380497

It has long been disputed in Europe under which conditions collective agreements on the remuneration of copyright holders are compatible with the ban on anti-competitive agreements in Article 101 TFEU. Privileging certain copyright licensing agreements, the European Commission's 2022 guidelines on the application of competition law to collective agreements on working conditions for solo self-employed persons, have reignited the debate. This article discusses the limits of collective bargaining and collective agreements for copyright holders under EU competition law and what the Commission's guidelines mean for practice. The article concludes, inter alia, that because the guidelines are incompatible with the case law of the Court of Justice on the exemption of labor agreements from Article 101 TFEU, the guidelines only bind the Commission partially and have only a limited impact on civil litigation concerning the validity of collective licensing agreements. While focusing on the legal situation in Germany, the main findings apply across Europe.

IP & Licensing

Revisiting the Framework for Compulsory Licensing of Patents in the European Union

Matthias Lamping (Max Planck Institute for Innovation and Competition)
Pedro Henrique D. Batista (Max Planck Institute for Innovation and Competition)
Juan I. Correa (WIPO Academy & University of Turin Master of Laws in Intellectual Property 2017/2018)
Reto Hilty (Max Planck Institute for Innovation and Competition; University of Zurich; Ludwig Maximilian University of Munich (LMU))
Daria Kim (Max Planck Institute for Innovation and Competition)
Peter R. Slowinski (Max Planck Institute for Innovation and Competition)
Miriam Steinhart (Max Planck Institute for Innovation and Competition)
Max Planck Institute for Innovation & Competition Research Paper No. 23-07
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4381959

Within the scope of its initiative on "Compulsory Licensing in the EU", the European Commission launched a call for evidence on 1 April 2022 and a public consultation on 7 July 2022 with the aim of gathering views from stakeholders. The objective of this initiative is to explore the possibility of revising the framework for

compulsory licensing in the EU to make it more “adequately prepared and coordinated to tackle future crises”. The authors of this position paper welcome the Commission’s attempt to reinvigorate the public discourse on this important subject. This paper addresses selected aspects by way of a preliminary, non-exhaustive note on: the proposed reform’s scope and the grounds for a compulsory license; the requirements of prior negotiation and licensing failure; government use; procedural matters; compulsory license for patent applications and products; the relation with other regulations and sui generis regimes (i.e. trade secret protection, regulatory data protection, and supplementary protection certificates); the concept of adequate remuneration; compulsory licenses for European patents with unitary effect; and the exhaustion of products placed on the market under a compulsory license.

On the Core of Patent Licensing Games

Satoshi Nakada (School of Management, Department of Business Economics, Tokyo University of Science)
Ryo Shirakawa (University of Tokyo, Graduate School of Economics)
Working Paper
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4370966

This note revisits the impossibility result by Watanabe and Muto (2008), showing that almost all coalition structures cannot be at the core of patent licensing games. In contrast to their result, we demonstrate that if we only allow deviations under the exogenously fixed payment scheme and payment rate, the coalition structures in which the number of licensee firms is at least one-half can be stable. However, such a possibility result breaks down if we allow any small amount of payment rate negotiation.

IP & Litigation

Strategic Regulatory Non-Disclosure: The Case of the Missing Form D

Kathleen Weiss Hanley (Lehigh University - College of Business)
Qianqian Yu (Lehigh University)
Working Paper
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4363027

We document that the majority of venture-capital backed financing rounds are not accompanied by a Form D filing. We show that filing behavior is predictable and is related to both the ability to fly below the radar and the benefits of withholding information. Financing rounds that are harder to hide, larger offerings and those previously covered by media, are more likely file a Form D while financing rounds by firms with greater proprietary information, early stage firms or companies in biotech, pharmaceutical, and high tech industries, are less likely to file a Form D. We document one adverse outcome to the filing of a Form D, patent litigation, and show that protection from this type of litigation through the enactment of anti-patent trolling laws subsequently increases the rate of filing. Firms are less likely to file a Form D once the form is required to be filed on Edgar. Finally, we note that reliance on Regulation D is stronger as the firm nears an exit from the private market. Our results suggests that some firms view even minimal disclosure and regulatory oversight as costly.

IP & Innovation

The Impact of University Patent Ownership on Innovation and Commercialization

Jun Wang (Xiamen University)
Yi Qian (University of British Columbia (UBC))
NBER Working Paper No. w31021
https://www.nber.org/papers/w31021

This paper contributes to the literature on innovation policies and institutional theory on conditions for effective institutional changes. The "three rights" reform of 26 universities and the mixed ownership reform

of Southwest Jiaotong University are important explorations made by China in recent years to promote innovations and the commercialization of patents in universities. The two reforms have adopted different models in the allocation of university patent ownership. The former completely allocated the patent ownership to universities, while the latter allocated 70% of the patent ownership to the inventors. Based on Chinese patent data and university statistical data, we empirically test the effects of these two university-patent ownership allocation models on innovations and the commercialization of patents. We find that the institutional environment caused unexpected effects in both reform models. The "three rights" reform has a significant impact on patent-licensing in 26 universities. The mixed ownership reform has significantly increased the number of patent transfers and patent applications of Southwest Jiaotong University, yet has tilted R&D toward experimental research with relatively low creativity. The findings yield broader implications for organization and innovation.

Local Vibrancy and Innovation Spillover

Ani Manakyan Mathers (Salisbury University - Department of Economics and Finance)
Corey A. Shank (Miami University)
Working Paper
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4390038

We show evidence of local spillover effects in corporate innovation productivity. Specifically, we find that firms' patent counts and patent citations are positively related to the innovation output of other local firms, including those firms in different industries. We rule out exogenous local area shocks and local social capital as the driver of this relationship and instead discuss the importance of local endogenous interactions, described as local vibrancy. Our evidence suggests that the quality of the local labor market is an important aspect of local vibrancy affecting innovation spillover. Specifically, we find that local spillover effects are concentrated in areas with high income, larger populations, greater educational attainment, and a greater concentration of technology-related businesses, suggesting that having a large and educated workforce with transferable technological skills are driving our spillover results.

Leading Patent Breadth, Endogenous Quality Choice, and Economic Growth

Keishun Suzuki (Graduate School of Social Sciences)
Shin Kishimoto (Chiba University - Faculty of Law & Economics)
ISER DP No.1205, 2023
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4390171

O'donoghue and Zweimuller (2004, J. of Econ. Growth), a seminal work, showed that broadening leading breadth in patent protection can stimulate innovation. However, the empirical literature has consistently found skeptical results on the positive effect. To fill the gap, we build another framework where the quality improvement size is derived as an interior solution. In our model, broadening leading breadth can negatively affect innovation because each innovator is incentivized to free-ride the other innovators' quality improvements. As a further analysis, we quantitatively investigate the growth effect of intervention in patent licensing negotiation using two different profit division rules derived from a cooperative game. We find that intervention in patent licensing negotiation increases the growth rate and stabilizes the economy.

Changing nature of patents in Australia

Sasan Bakhtiari (Government of the Commonwealth of Australia - Department of Industry, Innovation and Science; Australian National University (ANU) - Crawford School of Public Policy)
Working Paper
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4356081

The past decades have seen substantial changes to the innovation system of major economies, not the least due to a paradigm shift caused by the digital revolution. Whether smaller advanced economies such as Australia went through a similar shift or moved to fill the void left by other countries is unclear. I use Australian patent data and show that here has been a similar surge in patenting mainly driven by medical and digital technologies. Australia, however, is showing more strength in a few niche areas. At the same

time, the scope of patents, as one measure of basicness, narrowed over the years. This move was driven by private companies opting for applied research and also refocusing their innovation efforts away from chemical and material technologies and onto digital technologies and other applied areas.

IP Law & Policy

Intellectual Property in the Era of AI, Blockchain and Web 3.0

Timothy T. Hsieh (Oklahoma City University School of Law)
Robert W. Emerson (University of Florida - Warrington College of Business Administration)
Larry D. Foster, II (Prairie View A&M University - College of Business)
Brian A. Link (Pepperdine University - Seaver College)
Cherie A. Sherman (Ramapo College of New Jersey)
Lawrence J. Trautman (Prairie View A&M University - College of Business; Texas A&M University School of Law (By Courtesy))
Working Paper
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4392895

It was over two hundred years ago when the founders provided in the U.S. Constitution that Congress shall have the power, “To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.” During just three decades, the global explosion in Internet usage has enhanced worker productivity and the availability of information to remote and economically disadvantaged global population segments unimagined before. Continued increases in computer processing speeds when combined with decreased production costs has resulted in vast new technological advancements.

Intellectual Property (IP) law, like almost all areas of law, struggles to keep pace with rapidly evolving technologies. Topics unimagined just several decades ago, such as: artificial intelligence (AI); blockchain; non-fungible tokens (NFTs); quantum computing; virtual currencies, and others present novel challenges to IP law. This is the subject matter of our research and this paper. We believe that our coverage of these matters represents a valuable contribution to IP literature.

Report on EU Policy Space in Light of International Framework

Mireille van Eechoud (Institute for Information Law University of Amsterdam - Faculty of Law)
Romy van Es (University of Amsterdam - Faculty of Law)
van Eechoud, Mireille, & van Es, Romy. (2021). D4.2 Report on EU policy space in light of international framework. Zenodo. https://doi.org/10.5281/zenodo.5069608
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4388465

The EU’s primary interest in regulating intellectual property lies in furthering the establishment and functioning of the internal market. The international framework of treaties to a large degree shapes the actual space the EU and its Member States have to legislate copyright and neighboring rights. Viewed from a strictly formal standpoint, the EU could have two sets of norms: one for ‘domestic’ authors, works, performers, etc. geared at optimizing the internal market; and one guaranteeing that non-EU right holders are protected as is required under the international norms that bind the EU. Of course, such a dual system would be unfeasible politically and from the perspective of good law making. The EU, in short, in pursuing its harmonization (and perhaps future unification) efforts must ensure that EU copyright and neighboring rights law complies with international law.

Copyright and related rights remain national at heart, although various “anti-territoriality” mechanisms have been introduced in the EU copyright acquis, especially over the past decade. These can be grouped as limitations to the exercise of distribution rights (exhaustion doctrine); Fictive localization of acts in one particular place (‘country of origin principle’); and Mutual recognition and pan-European licensing. Furthermore, some harmonization of private international law rules relevant to copyright and neighboring

rights has taken place. It is likely that such piece-meal interventions will continue, as harmonization advances ever further and new rights are introduced. Ultimately, the EU may even choose to introduce a EU-wide copyright title, akin to what already has been done for industrial property rights (e.g. EU trademark, Community design rights). This raises the question what limits result from the international intellectual property system, which also recognizes territoriality as an essential feature of copyright and neighboring (related) rights.

The objective of this paper is to analyze the space that the international system allows the EU to take measures overcoming territoriality problems. In order to do that, we first recapitulate what those current mechanisms are. In chapter 2 we describe the position of the EU and its Member States in the field of international intellectual property, and the key features of the main treaties. For a better understanding of the landscape, in chapter 3 we map the most important grounds of competence of the EU relevant to copyright and neighboring rights. Chapter 4 analyzes the current 'anti-territoriality' mechanisms identified in Deliverable 4.1 against the background of the international treaties. The concluding Chapter 5 summarizes the findings and elaborates issues to consider should the EU proceed with more far-reaching measures. This work ultimately feeds into the third stage of Recreate's work package on territoriality.

Three Major Challenges for the Intellectual Property Agenda in the Face of Artificial Intelligence and Other Frontier Technologies

Michelle Azuaje Pirela (Universidad Alberto Hurtado - School of Law)
Working Paper
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4378436

This paper identifies and raises three challenges for the current intellectual property agenda in the face of artificial intelligence and other cutting-edge technologies in the framework of the World Intellectual Property Organization dialogues on intellectual property and cutting-edge technologies: ii) Authorship and ownership of algorithmic creations; ii) Algorithmic transparency and strategies to promote it; iii) The metaverse.

The European Patent with Unitary Effect. Opportunities and Limitations for Innovative Projects

Szymon Rubisz (Faculty of Organization and Management, Silesian University of Technology)
Organization & Management Scientific Quarterly, Forthcoming
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4382005

In 2023 organizations can apply for a European patent with unitary effect in 25 European Union countries. The system brings many simplifications to obtaining protection, but it also comes with some limitations. The aim of the paper is to explore the possibilities and limitations that a European patent with unitary effect can potentially give to organizations concerning the innovative solutions they obtain within their projects. The procedure of obtaining a unitary patent will be faster, simpler, and cheaper, as translations into the official languages of all granting countries will no longer be necessary. A Unified Patent Court will be one institution to decide patent cases, so a unified and consistent line of jurisprudence can also be expected. However, there are some significant flaws in the system – there is a complicated construction, peculiar language discrimination in registration and court proceedings, the problem of equal access to the court, and arguments about the system's cost-effectiveness, mainly for entities from rich and technologically advanced member states. Taking advantage of the unitary patent will require a rethink, increased vigilance, and caution from innovation project managers, as well as a calculation of potential gains and losses.

Copyright Law

A Scanner Darkly: Copyright Infringement in Artificial Intelligence Inputs and Outputs

Andrés Guadamuz (University of Sussex)
Working Paper
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4371204

The question of artificial intelligence and copyright is starting to gain considerable momentum in the last few years. One area of study has been the authorship of computer-generated works, but perhaps a more interesting question, is that of infringement. AI needs to be taught how to paint, compose music, or write. The process by which artificial intelligence "learns" to do something, particularly to generate works that emulate human creativity often relies on having access and analyzing large numbers of those works, learning patterns to create its own versions. To do this, the computer program must have copies of works to analyze and produce new results.

So, two very interesting copyright questions arise from the above, one for the inputs, and one for the outputs. From the perspective of inputs, is the act of accessing, reading, analyzing, and mining data an act of copyright infringement, and if so, are there any applicable defenses? From the perspective of the outputs, could the copyright owner of one of the works used to teach the computer sue the maker for copyright infringement from the resulting derivative works? This article explores both questions.

Bracing Scarcity: Can NFTs Save Digital Art?

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Ofer Tur-Sinai (Ono Academic College)
Working Paper
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4378570

Rebecca creates an artwork. David mints an NFT that links to Rebecca's work. Is David making a copyright infringement? This question — probably the most fundamental one at the intersection between copyright and the technology of non-fungible tokens (NFT) — is the focus of this Article. As surprising as this may sound, the answer is not at all obvious under the extant copyright law. This Article argues that from a policy standpoint, the answer must be positive. Expounding this issue is imperative in order for the NFT technology to fulfill its potential for creative works markets.

In this Article, we analyze the markets for digital artworks and show that NFTs could potentially address the most pressing and long-lasting dilemma of art and the digital world: how to maintain the incentive to create digital art without overshadowing the big promise of the internet — to maximize access to content. This incentive-access friction was so far perceived as a necessary trade-off in copyright theory, and the internet presented a powerful manifestation of it. It has become a truism: the more enhanced the access to works has become online, the less likely artists were to benefit from their works. Everyone had to pick a side or draw the line somewhere on this incentive-access continuum.

NFTs may open a way to move past the incentive-access paradigm. NFT transactions occur on the blockchain — a separate, parallel platform — and they do not affect the availability of the work outside of the platform. Thus, NFTs can revive scarcity and authenticity in the digital sphere, while at the same time not harming a bit the access to the works. While this could feature a dramatic improvement, this potential can only be realized if copyright law awards exclusive rights over minting to rightsholders. If all can mint NFTs, scarcity is lost again, and artists cannot benefit from art sales.

This Article offers at least three novel contributions to the literature. First, it establishes the case for exclusive minting-rights to authors based on an analysis of art markets and the attributes of the NFT technology. It also shows that exclusive minting-rights to authors can promote other crucial objectives such as distributive justice and cultural diversity in art markets. Second, it analyzes the legal mechanisms that

can effectuate the desired result of exclusive minting rights. Third, this Article's analysis of NFTs illustrates more generally different approaches to the design of copyright law amid emerging technologies, which is a contentious and hotly debated issue.

Copyright of NFT Works in China: Infringement, Liability, and Remedies

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Hong Wu (NingboTech University (formerly known as Ningbo Institute of Technology, Zhejiang University))
Working Paper
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4373248

Non-fungible tokens (NFTs) are a striking Web 3.0 innovation. Concomitant with their rise, the existence of NFT works that constitute copyright infringement has become increasingly commonplace. However, the existing research based on European and American copyright law concerning NFT works is very limited. To contribute to the scholarly literature in this field, this article analyzes typical recent cases worldwide, especially the world's first case, in which a final judgment has been rendered in China. The article presents original arguments regarding the core issues of copyright for NFT works. Specifically, this article argues that the existence of NFT works that constitute copyright infringement systematically impacts the existing copyright order, necessitating the re-examination and reformation of the copyright system based on the theoretical idea of a balance of interests. Regarding the legal nature of minting and trading NFT works, this article argues that the authors of NFT works have the right to information network dissemination and that the principle of exhaustion of rights is difficult to apply to copyright for NFT works. The article also examines the legal status and liabilities of minters of NFT works and NFT trading platforms. It argues that they should bear heavier legal obligations in avoiding copyright infringement. Remedies for NFT copyright infringement involve technical elements.

Trademarks, Own Brand Manufacturing, and Firm Growth at Different Stages of Development in Korea

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Keun Lee (Seoul National University - School of Economics; CIFAR)
Seoul Journal of Economics, Vol. 36, No. 1, 2023
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4372461

This study attempts to verify the linkages between trademark registration and firm growth based on the different stages of development and two groups of sectors by using Korean firm data. Two different paths of firm growth in Korea are identified. In the trademark-dominant group, trademarks serve as a useful device for firm growth at the early stage of development, with technology at a low level, and then firms execute technological innovations to file more patents. In the patent-dominant group, utility models serve as a useful device for firm growth at the early stage of development, in which technology advancement is a prominent feature. Then, the sales growth of firms becomes positively associated with both patents and trademarks, the latter representing the effects of their brand power or the full transition to own brand manufacturing. Combined with the findings from the literature, this study finds that various types of intellectual property rights (IPRs) manifest differently for firms, from innovation to business growth, at different stages of economic development. A key lesson for catching-up economies is for conventional patents to not only consider the IPR type at the early stage of development in certain sectors but also take into account other IPRs, such as trademarks and utility models, to recognize and stimulate imitation and/or innovation. Innovation policy should be tailored not only toward the different stages of development and capabilities but also toward sectoral heterogeneity.

IP & Trade

FTAs' Contribution Towards a More Flexible Copyright Space: Possibilities and Limits

María Vásquez Callo-Müller (University of Lucerne)
American University International Law Review, Vol. 38, Forthcoming
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4382049

Free Trade Agreements (FTAs) have often been considered instruments for heightened intellectual property rights protection, thereby in detriment of a more flexible copyright space. However, since the adoption of the Comprehensive and Progressive Agreement for Trans-Pacific Partnership, some FTAs have been incorporating a clause on the "Balance in Copyright and Related Rights Systems." Among these, the Regional Comprehensive Economic Partnership Agreement and, more recently, the 2021 Australia-U.K. FTA contain such a clause. In addition, more discrete FTAs, such as the Australia-Peru FTA, also incorporate similar provisions. This article considers what incorporating such clauses in FTAs means for the interpretation of the three-step test embedded in Article 13 of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement), which is key for enabling a more flexible copyright space. This article seeks to understand whether FTAs clauses on "Balance in Copyright and Related Rights Systems" can support a more flexible interpretation of the three-step test in the context of the World Trade Organization dispute settlement system.

A Scholars' Look at International IP — Idealistic and Pragmatic

Justin Hughes (Loyola Law School Los Angeles)
Ruth Okediji (Harvard Law School)
Loyola Law School, Los Angeles Legal Studies Research Paper No. 2023-03
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4398822

In this chapter, Professors Okediji and Hughes discuss ways in which legal academics understand -- and sometimes misunderstand -- the negotiating environment in Geneva in which international intellectual property legal norms are developed. The chapter recognizes the insights of Professor Rochelle Dreyfuss and agrees with much of her analysis as to the best forum for developing new legal norms and the virtues of diversity and experimentation at the national level.

Other Topics

Internationally Driven, but Domestically Aware, Legislation in Troubled Times: The First Copyright Statute in China

Jyh-An Lee (The Chinese University of Hong Kong (CUHK) - Faculty of Law)
Yangzi Li (The Chinese University of Hong Kong (CUHK) - Faculty of Law)
Chinese Journal of Comparative Law, Volume 11, Issue 1, Oxford University Press
The Chinese University of Hong Kong Faculty of Law Research Paper No. 2023-07
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4380914

We use the 1910 Copyright Code of the Great Qing Dynasty (the Qing Copyright Code) as a lens to understand China's initial encounter with international intellectual property norms, examine the dynamic political economy in which the law was enacted, and provide an overview of the structure and important provisions of the Qing Copyright Code. We argue that although foreign pressure was an important factor shaping the Qing Copyright Code, the Code was designed not to protect the economic interests of foreigners in China but to achieve a pair of distinct goals: advance China's national interests in accessing Western knowledge and incentivize the production and dissemination of knowledge in the country. This argument is substantiated by not only the political economy of the legislation but also the later implementation of the law.

The Green Innovation Premium: Evidence from U.S. Patents and the Stock Market

Markus Leippold (University of Zurich; Swiss Finance Institute)
Tingyu Yu (University of Zurich - Department of Banking and Finance)
Swiss Finance Institute Research Paper No. 23-21
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4391444

This paper investigates if firms' green innovation efforts are reflected in their stock market prices. Firms with a higher proportion of green patents experience lower stock returns than those with a lower percentage. A long-short portfolio based on green patent shares has an average annual return of 8%, which remains significant when we control for common risk factors. However, firms with high green patent shares outperform their counterparts after events that increase climate concerns and strengthen environmental regulations. Moreover, firms with green innovation attract more institutional ownership and can weakly decrease their future carbon intensity and incident involvement.

Acquisitions by Business Group and Technology Transfer

Young Gak Kim (Senshu University - School of Economics)
Sadao Nagaoka (Hitotsubashi University - Institute of Innovation Research)
Seoul Journal of Economics, Vol. 36, No. 1, 2023
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4372465

Two important opportunities for accelerating the growth of newly established firms are initial public offerings and acquisitions. This study focuses on the acquisition of a firm and its subsequent transformation into a subsidiary by business groups and investigates how such governance facilitates technology transactions (i.e., transfer of patent rights) and firm growth in Japan. The analysis reveals that such acquisitions can lead to increased technology transactions even when the transactions directly related to the acquisition are excluded and the transactions with firms outside the business group are included. However, the increase in technology transactions is limited mainly to wholly owned subsidiaries. The transfer of patent rights to a subsidiary is accompanied by an improvement in its sales, R&D, and productivity, controlling for the increase in its capital base. The sales and other performance of the business group also improve with the number of acquisitions.

Knowledge as Output and as Input: Artificial Intelligence and Quantum Computing

Daniel F. Spulber (Northwestern University - Kellogg School of Management)
Xizhao Wang (Northwestern University)
Working Paper
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4382480

This paper explores the contributions of Artificial Intelligence (AI) and Quantum Computing (QC) knowledge capital to the production of knowledge and the production of output within firms. Using the Artificial Intelligence Patent Dataset from the USPTO, the study matches AI and QC patents with firm R&D and output data from the CRSP/Compustat Merged database to quantify the AI and QC knowledge adoption and the impact of these forms of knowledge capital on firms. The findings indicate that both AI and QC knowledge stocks are positively associated with their own knowledge production, with QC knowledge stocks positively associated with AI innovation but not vice versa. The impact of the two forms of knowledge capital on firm productivity and growth differs, with AI potentially positively correlating with firm output while QC is more of an investment not impacting output immediately.

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