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A NOVEL DATASET MEASURING CHANGE IN COPYRIGHT EXCEPTIONS

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Abstract. Copyrights grant creators long periods of market exclusivity during which they or their agents have the exclusive right to reproduce and distribute their works. However, copyright exceptions limit their scope and strength. National laws governing copyright exceptions vary substantially from one country to the next. This paper introduces a novel, survey-based dataset that describes changes to 26 countries' laws on copyright exceptions over time. To explore the data, I construct two indices from subsets of the dataset; one focusing on exceptions related to internet communications technologies (ICTs) and another focusing on exceptions related to educational uses. The indices show that copyright exceptions have grown more robust since 1990, and that wealthier countries tend to have more developed exceptions than poorer ones. Initial empirical tests suggest that exceptions related to ICTs are more robust in countries with larger ICT sectors but less robust in countries with larger copyright sectors. Exceptions for educational uses are more robust in countries with higher educational attainments.

1. Introduction

1.1. **Copyright and Copyright Exceptions.** Intellectual property laws involve a trade-off between the interests of creators and consumers of information goods. Copyrights grant the creators of new literary and artistic works long periods of market exclusivity during which they or their agents have the exclusive right to reproduce and distribute their works. This incentivizes the creation of new works (Landes and Posner, 1989), but it also can lead to high prices for consumers and follow-on creators. For instance, high prices have been shown to lead to piracy in online media markets (Karaganis, 2011), as well as lack of access to scholarly works (Albert, 2006; Adcock and Fottrell, 2008). Copyrights can also have unintended impacts on firms in the information & communications technology (ICT) sector, which sell goods and services that complement information goods. For instance, if internet service providers are liable for infringements made by their customers, they

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face extra litigation risks which can impede investment and innovation in those industries (Lerner and Rafert, 2015).

To mitigate these types of consequences, copyright laws include exceptions to the exclusive rights conferred by copyrights. All countries that are Members of the WTO are required to have both copyright protection for creators and copyright exceptions for consumers, but the laws on both vary greatly from one country to the next.

Some exceptions are very narrow, allowing only specific uses of copyrighted works. For example, the Ukrainian education exception allows a teacher to reproduce a single copy of a work for use in the classroom, but she cannot distribute copies to students to take home, nor can she use copies for her own research purposes (Ukraine, 2017). Other exceptions are very broad. The Indian Copyright Act's educational use exception permits "the reproduction of any work – by a teacher or a pupil in the course of instruction" (India, 2012), and the courts have interpreted this to include copies of full textbooks distributed outside of the classroom.

1.2. **Costs and Benefits of Robust Copyright Exceptions.** There are various costs and benefits associated with broad, open copyright exceptions. These costs and benefits accrue to creators, distributors, and other industries that complement the creation of works. Table 1 summarizes the tradeoffs.

In the short run, more consumers will be able to access copyrighted works without authorization, and without payment, leading to an increase in consumer welfare. Authors, researchers, and others who use existing works as inputs to the creation of new works also gain, because they may be able to obtain those inputs without payment, lowering their overall costs. Finally, there are benefits that may accrue to complimentary industries providing consumers ways to access and share information goods. Often these are in the ICT industries – Blackboard, YouTube, and WeChat are examples. When customers are legally able to copy and share content, the law creates demand for new ways to do this, and firms will step in to meet this demand (Lohmann, 2008).

Table 1: Costs and Benefits of Copyright Exceptions

	Short Run	**Long Run**
Benefits	• Greater access to books, articles, music, and other copyrighted works increases consumer welfare. • Follow-on creators that build upon earlier works can obtain works at lower cost, reducing overall production costs. • Firms that complement the copyright industries (i.e. ISPs that allow people to share works online) able to develop new products and services, or improve existing ones.	• More follow-on works available in the market. • More variety and efficiency in the distribution of copyrighted works.
Costs	• Lower sales of copyrighted works by copyright owners or their licensees. Producer welfare falls. • Declines of sales by firms that distribute copyrighted works (i.e. publishers, record companies). Lower returns to these complementary distributors.	• Less compensation for authors, musicians, other creators. Fewer people relying on creative endeavors for their primary income. • Contraction of distribution sector.

The long run benefits from robust copyright exceptions flow from the short run benefits to creators and complementary firms. If creators who rely upon earlier works to create new ones are able to access those earlier works at a lower cost, it is reasonable to hypothesize that their output may increase. Similarly, as complementary industries emerge to help people reproduce and share content, the distribution market may become more efficient and/or have a larger variety of ways in which consumers can access works.

The costs of robust copyright exceptions are largely borne by the producers and distributors of copyrighted works. They are rather straightforward. If the availability of free copies of articles, books, or other types of copyrighted works cuts into their sales, creators and distributors will experience a reduction in income. In the long run, the number of people able to make a living in the creative industries will fall. The distribution industries

will earn less revenue and employ fewer people. However, there is room for distributors to expand into new types of intermediary services, as the record industry has arguably done (Siwek, 2018).

The net impact on total welfare is therefore ambiguous. More robust copyright exceptions may increase consumer welfare and follow on innovation, while decreasing returns to creative industries.

2. Previous Literature

2.1. **Empirical work comparing copyright exceptions in different countries.** The existing empirical literature studying copyright exceptions is thin, though it has been growing in recent years. Previous studies have described the variation in copyright exceptions between one country and the next, including surveys by the World Intellectual Property Organization (Seng, 2021; Crews, 2015; WIPO Secretariat, 2010), and legal academics (Hilty, 2012). However, these studies are static, so they cannot be used to measure the impact of changes to copyright laws.

Another paper that measures copyright exceptions across countries is Handke, Guibault and Vallbé (2021). The authors analyze the law on copyright exceptions for datamining over multiple countries and years. Their data focuses on one specific legal question, whether researchers can reproduce works for text- and datamining without permission from authors.

The main contribution of the current paper is to introduce a dataset[1] that tracks changes in copyright exceptions over time, across countries, and over a wide variety of different exceptions found in nations' laws.

2.2. **Studies of copyright exceptions and copyright protection.** A small body of empirical work has shown relationships between the structure of copyright exceptions and various outcomes. One group of papers focuses on research exceptions for data mining. Some writers have addressed the link between copyright exceptions that explicitly permit

[1]The PIJIP User Rights Database is available at https://www.wcl.american.edu/impact/initiatives-programs/pijip/impact/global-network-on-copyright-user-rights/research/pijip-user-rights-database/

data mining (defined as machine-assisted analysis of large datasets), and research that relies on it. The process of data mining necessitates copying large quantities of content from original sources, and some jurisdictions require require authorization from rightholders before the copies can be made. However, some countries have specific exceptions for data mining, or have broad exceptions that permit the process without authorization. Handke, Guibault and Vallbé (2021) find that in "countries in which data mining for academic research requires the express consent of rights holders, data mining makes up a significantly lower share of total research output." Similarly, Filippov (2014) finds that the structure of copyright law in EU countries has reduced the number of published papers that utilize data mining techniques. Hargreaves et al. (2014) use Filippov's data to find that researchers in the U.S. and Canada produce more articles based on datamining than those in European countries with more restrictive copyright limitations applicable to datamining. Though these studies are narrow in scope, they illustrate that the structure of copyright exceptions in countries' laws can have a measurable impact on the use of copyrighted works.

Other papers have explored potential relationships between copyright exceptions and ICTs. Lerner and Rafert (2015) demonstrate that a court ruling clarifying copyright exceptions for cloud storage increased venture capital funding to American cloud technology firms. Ghafele and Gibert (2014) find that technology hardware firms in Singapore enjoyed faster growth after the nation's introduction of fair use in 2006. Palmedo (2017) finds that technology hardware firms in countries with fair use spent more on research and development and subsequently received more patents than other countries. A white paper published by an ICT trade association lists a number of activities carried out by ICT firms that would be illegal without robust copyright exceptions such as fair use. These uses include internet search, caching, and hosting (Szamosszegi, 2017).

Though there is limited empirical work on copyright limitations, there is a broader empirical literature examining copyright's incentive for the creation of new works. Some researchers have studied the effects of copyright extension. Reichmann (1996), Kuhne (2004), Ku, Sun and Fan (2019) and Png and Wang (2006) find no evidence to suggest that copyright term extensions have led to more production of new works. However,

Rappaport (1998) estimates that laws proposing copyright term extensions would generate $330 million in royalties to rightholders, and states that the net proceeds from the fee would be devoted to promoting the creative arts. Others have studied the effects of piracy on the creation of new works. Telang and Waldfogel (2018) find that high levels of piracy depress the production of new Bollywood films. Hollifield, Vlad, and Becker (2003) find that stronger copyright protection has been associated with the production of more print media. On the other hand, Waldfogel (2012) finds that increased file sharing through Napster decreased the effectiveness of copyright for recorded music in the U.S. – yet it led to no decrease in the creation of musical works. For more comprehensive reviews of empirical copyright literature, see Handke (2011), and the Copyright Evidence Wiki (2022).

3. Measuring Change in Copyright Exceptions

3.1. **Survey and Dataset.** This paper introduces a novel, survey-based dataset, which describes changes to countries' laws on copyright exceptions over time. The dataset is a tool for further econometric research, and it is available online in both coded and "human-readable" form. It was created through a research project at American University Washington College of Law.

The dataset covers 26 countries and 27 years. Half of the countries are currently classified as high income by the World Bank, and half are classified as middle income. (Over the period studied, China, India, Nigeria and Vietnam advanced from low- to middle income status, and Chile advanced from middle- to high income.) The distinction is relevant because legal academics have argued that copyright laws in less wealthy countries tend to have weaker exceptions than copyright laws in wealthy countries – despite the TRIPS Agreement's flexibilities allowing countries to permit certain unauthorized uses (Okediji, 2019; Deere, 2009). Table 2 lists the countries by income group.

To create the survey, American University Washington College of Law hosted a series of workshops with copyright attorneys. The completed survey was administered to law professors in their home countries. Respondents were asked to include information about

changes in both legislated and non-legislated law in their answers to the questions. Examples of non-legislated law include court decisions and administrative rulings. Respondents gave legal citations for all of their answers, and American University law students checked the citations to verify their accuracy.

In order to gauge the level of uncertainty surrounding legal rights of users, respondents answered these questions on a four-point scale running from situations where a copyright exception was "Clearly Not Included" to "Clearly Included." Ambiguity could exist due to differing interpretations of legal texts, or due to judicial interpretations of laws that predate legislative change.

Table 2: Countries in the Dataset

High Income Countries	**Middle Income Countries**
• Australia	• Argentina
• Canada	• Botswana
• Chile	• Brazil
• Finland	• Bulgaria
• Japan	• China
• Korea	• Colombia
• Netherlands	• India
• Portugal	• Mexico
• Singapore	• Nigeria
• Slovakia	• Peru
• Switzerland	• South Africa
• Taiwan	• Ukraine
• United States	• Vietnam

The survey has 129 questions grouped into 20 categories. It is available as a supplementary file along with this article. Table 3 summarizes the survey. The first two columns describe the survey instrument, and the next four present summary statistics for

all countries over the full time period.

Table 3: Industry Groups: Summary of Survey and Descriptive Statistics

(1) Category	(2) Description	(3) Num. of Qs.	(4) Num. of Obs.	(5) Mean Score (0-3)	(6) St. Dev.
General Exception	Openly worded exception that allows a wide range of uses, on the condition that a "fairness" test would be passed. Includes the "fair use" provisions found in the laws of the U.S. and a handful of other countries, as well as the "fair dealing" provisions common in former British colonies.	5	3,455	0.99	1.32
Quotation	Allows the unauthorized reproduction and/or sharing of parts of a copyrighted work for the purpose of quotation.	7	4,825	2.03	1.23
Education	Allows unauthorized reproduction and/or sharing of copyrighted works (or parts thereof) for educational purposes.	8	5,474	1.69	1.30
Research	Allows unauthorized reproduction and/or sharing of copyrighted works (or parts thereof) for research purposes. This may or may not include commercial research.	4	2,764	1.59	1.33
Personal or Private Uses	Allows unauthorized reproduction and/or sharing of copyrighted works (or parts thereof) for personal use. This sometimes includes sharing in small groups such as families or peers.	7	4,837	1.82	1.27
Computer Programs	Allows reproduction and use of copies of computer programs without authorization. This exception may exist for a variety of purposes.	7	4,837	1.40	1.33
Databases or Other Compilations of Non-Original Facts	Allows unauthorized reproduction and/or sharing of databases or other compilations of facts for various purposes. This may take the form of limits to the scope of copyright so that these collections are not eligible for protection in the first place.	4	2,764	0.91	1.24
Text- and Datamining	Allows unauthorized reproduction and use of works by machines in order to mine the works via text-or datamining processes.	5	3,445	0.43	0.88
Library Rights	Allows unauthorized reproduction and/or sharing of copyrighted works (or parts thereof) by libraries, for a variety of purposes.	7	4,146	1.84	1.32
Disability Access	Allows unauthorized reproduction and/or sharing of copyrighted works (or parts thereof) for the purpose of making works available to people with sight or hearing difficulties.	5	3,455	1.25	1.33
Transform-ative Use	Allows the unauthorized transformation of a protected work into a new work with a different purpose and intended audience.	6	4,146	0.65	1.04
Parody and/or Satire	Allows the unauthorized use of copyrighted work (or parts thereof) in the creation of new works of parody or satire.	6	4,146	1.34	1.25

Continuation of Table 3

(1) Category	(2) Description	(3) Num. of Qs.	(4) Num. of Obs.	(5) Mean Score (0-3)	(6) St. Dev.
Incidental Inclusion	Allows the unauthorized inclusion of a copyrighted work when it is incorporated into a new one. For example, a radio playing in the background when a scene is filmed.	6	4,011	1.14	1.35
Panorama Right	Allows the unauthorized reproduction of visual works stored in public spaces, such as architecture and public art.	6	4,134	1.81	1.33
Orphan Works	Allows the unauthorized reproduction and use of works (or parts thereof) for which the rightholder cannot be identified after a reasonable search ("orphan works").	5	4,455	0.70	1.15
National Government Works	Allows the unauthorized reproduction and use of works created by the national government. This exception may come in the form of limitations to the scope of copyright that prevent copyright protection of such works in the first place.	5	3,455	1.38	1.35
Exhaustion of Rights	States that once a rightholder has sold or licensed their work, their commercial rights are "exhausted" and cannot be used to prevent further unauthorized reproductions or uses. (Exhaustion can be national, regional or international. Regional or international exhaustion allows parallel imports.)	4	2,764	1.30	1.32
Safeguards from Secondary/ Intermediary Liability	Protects internet service providers/ intermediaries from liability when their customers or users infringe copyrights (i.e. – when someone posts a copyrighted video on social media). Usually contingent upon good faith efforts by the intermediaries to remove infringing content upon request.	10	6,899	0.61	1.14
Temp. Copies for Tech. Processes	Allows temporary copies to be made to allow for the functioning of technological processes (i.e. - caching content).	1	691	0.98	1.31
Protection Against Supremacy of Contracts	Does not allow voluntary contracts between copyright holders (or their agents) and their customers to override the copyright exceptions found in a country's law.	1	691	0.63	0.90

Column 1 lists the categories of questions, and column 2 gives a brief description of the survey questions in each category. For each category, the survey first asks whether (or to what degree on the four point scale) an exception was included in a country's law in each year from 1970 to present. It then asks additional questions about the qualities of each exception, which describe how widely each can be used. These vary from one category to the next, but they generally include whether the exception can be applied to unauthorized

uses for any type of work, any purpose, any type of user, and whether it can be used for commercial purposes. Some categories also include additional questions. For instance, the category "Computer Programs" includes a question asking whether the exception can be applied to unauthorized reproduction occurring during reverse engineering. The category for libraries includes the question of whether the exception allows unauthorized reproduction to provide copies for other libraries.

Column 3 of shows the number of questions in each category. Column 4 of shows the number of observations in the dataset for each category. The number of observations for each row in Table 3 is the product of the number of answers for each question in the category, times the number of years for which the data was provided, times the number of countries. The data covers the period from 1990 through 2016, when the first batch of surveys were completed. Due to incomplete answers in some of the categories in the earlier years, the number of observations differ between categories with the same number of questions.

The last two columns in Table 3 show descriptive statistics for each category. As stated above, each individual survey question is answered on a four point scale. These answers are coded from 0 to 3, allowing one to construct scores that measure the robustness of copyright exceptions in various ways. Column 5 gives the mean of score for each category of questions (inclusive of all countries in the set and all years from 1990-2016). Column 6 gives the standard deviations.

The descriptive statistics show us that, as analyzed by our respondents, certain copyright exceptions in the countries' laws are generally more robust than others. The mean scores for exceptions protecting quotations, educational uses, and personal or private uses are above 1.5. The category means for these exceptions have lower standard deviations than most of the others in the set. High means and low standard deviations for the quotation, education, and personal/private use categories should be expected because these types of exceptions are well-established in international copyright law. The Berne Convention of 1886 explicitly endorses copyright exceptions for quotation and education. Most

countries have allowed some sort of personal use exception for a long time (Schwartz, 2014).

On the other hand, the copyright exceptions related to ICT technologies tend to be weaker. Respondents stated that the surveyed countries are less likely to have protections for text- and datamining, transformative uses and safeguards for intermediary liability in their law. When national laws do include these types of laws, the exceptions tend to be more restricted in terms of the type of uses they permit. The average scores for each of these types of copyright exceptions are below 1.0. The standard deviations exceed the means, indicating coefficients of variation greater than one and suggesting a greater degree of variation over time and/or across countries. (The idea that most countries lack robust exceptions permitting reproduction for text- and datamining is supported by subsequent research by Flynn et. al. (2022).

3.2. **Indices.** The 20 categories can be used to divide the data into two overlapping thematic subgroups of copyright exceptions based on the type of user activity the exception protects. Below I describe two such subgroups: copyright exceptions for use by ICT firms' activities and those of their consumers; and uses for educational purposes.

Table 4: Copyright Exceptions for Two Types of Uses

Exceptions Related to Internet Communications Technologies	**Exceptions Related to Education**
• General Exception • Quotation • Research • Personal Or Private Uses • Computer Programs • Databases /Compilations of Facts • Text And Data-Mining • Transformative Use • Safeguards From Secondary Liability • Temporary Copies • Supremacy Of Contracts	• General Exception • Education • Research • Personal or Private Uses • Library Rights • Exhaustion of Rights

Table 4 shows the categories of copyright exceptions relevant to each subgroup. The exceptions related to ICTs include those needed for technological processes, such as the making of temporary copies to perform internet search functions and protection from liability when customers post infringing content. This group also includes important exceptions for users of ICTs, such as the quotation right (for people who post clips of articles on social media) and the transformative use right (for people who make mashups online). The exceptions related to education are those used by teachers and students in order to access and share materials for learning and research purposes.

$$Tech_{c,t} = \frac{1}{11}\sum_{j=1}^{11}(\frac{1}{q}\sum_{i=1}^{q}x_{i,j}) \tag{1}$$

$$Edu_{c,t} = \frac{1}{6}\sum_{j=1}^{6}(\frac{1}{q}\sum_{i=1}^{q}x_{i,j}) \tag{2}$$

I create two indices derived from questions from these groups of categories, each potentially affecting different types of users of copyrighted works. The complete list of categories and questions that make up the indices is included as Appendix B. Index scores vary by country c and year t. Each category of questions in listed in Table 4 has a total of q questions.

Equations (1) and (2) define the indices. *Tech* is a function of the survey questions within the eleven categories related to ICTs in Table 4. To calculate the value of *Tech* for each county and year, I first take the mean score of the q questions for each of the eleven categories. I then calculate the mean of these category-level averages. *Edu* is created by applying the same function to the six categories related to educational uses in Table 4. In these indices, each category of questions has the same weight. Later in the paper, I test the robustness of the indices by applying random weights to each category.

Figure 1: Mean and Median Index Scores, by Income Group and Year

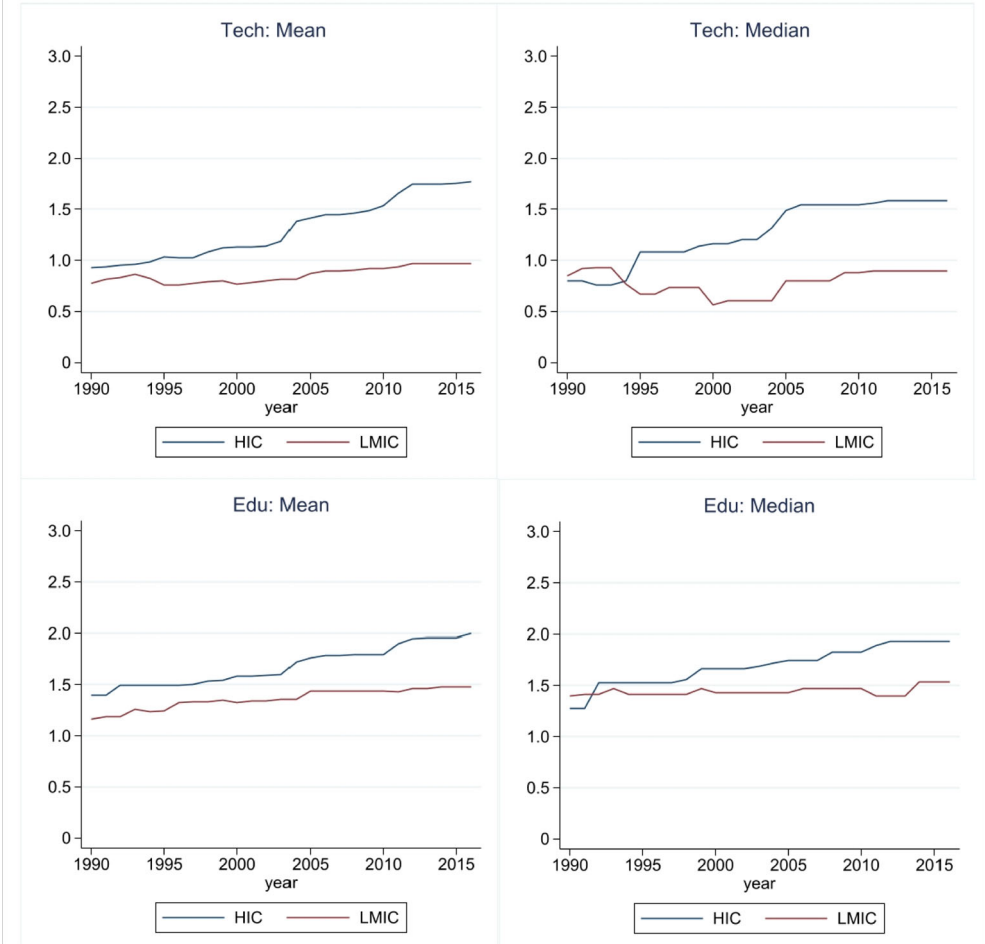

Figure 1 shows graphs of the mean and median index scores for *Tech* and *Edu* by year, disaggregated by income group. Upon casual observation, one can see that both scores for each index have been higher for the high income countries since 1994. One also sees a clear upward trend in both indices for the high income countries. The overall trend is less clear for middle income countries. The mean scores for middle income countries have increased modestly, though the median score for *Edu* has been flat and the median score for *Tech* declined until 2000 before starting to rise. The gap in the scores for high income countries and middle income countries has grown over the period. This supports

the assertions by legal scholars that developing countries have not taken full advantage of TRIPS flexibilities for copyright.

4. Testing Covariates

This section reports the results of empirical tests on covariates. *Tech* and *Edu* are regressed against independent variables in a series of panel regressions, which do not seek to establish causality, but to show correlations between the indices, relevant sectors, and macroeconomic indicators.

4.1. **Regressions on Tech.** First, I present the results of regressions on *Tech*, which varies by country c and year t. It is regressed using variations of the following equation:

$$Tech_{c,t} = \alpha + \beta_1 CS_{c,t} + \beta_2 CR_{c,t} + \beta_3 GDPpc_{c,t} + \beta_4 FTA_{c,t} + \beta_5 S301_{c,t} + FE + \epsilon$$

These regressions draw on the framework of potential costs and benefits presented in the first section of this paper. Computer services firms that complement the copyright industries – such as internet service providers and web hosts – theoretically benefit from robust copyright exceptions, so one would expect a positive correlation with *Tech*. Conversely, the copyright industries themselves – print, sound and multimedia publishers that distribute copyrighted works – may face lower sales if more people can access works free, so one would expect a negative correlation with *Tech*. The variables used to test these relationships – *CS* and *CR* – are the ratio of each of these sectors' value added to that country's GDP in a given year. The values are small, with means of 1.5% and 0.8%, respectively.

The data on sector shares are drawn from the EU PREDICT dataset[2], the most comprehensive set of computer services- and copyright industry-share data over time available. This source contains data from "official sources (such as National Accounts ... from Eurostat and OECD)" for all EU countries, as well as 12 other comparator countries. The set of countries overlaps with 15 of the countries in PIJIP's Copyright User Rights Database:

[2]The PREDICT database is available through the European Commission's EU Science Hub: https://joint-research-centre.ec.europa.eu/predict_en

Australia, Brazil, Bulgaria, Canada, China, Finland, India, Japan, Korea, the Netherlands, Portugal, Slovakia, Switzerland, Taiwan, and the United States. The countries from PIJIP's dataset which are not represented in the PREDICT dataset are the smaller non-European economies plus Mexico and Nigeria. Annual data is available from 1995 on.

GDPpc is the logged constant GDP per capita in U.S. dollars, obtained from the World Bank's dataset of development indicators. While Figure 1 shows that the high income countries in the set tend to have higher index scores than middle income countries, this variable tests whether countries tend to further develop their copyright exceptions as they become wealthier. It tests for the relationship within panels, rather than across them.

FTA is the first of two variables related to trade policy. It is equal to 1 for the years in which a country has a bilateral or regional free trade agreement (FTA) with the U.S. in force.[3] When a country enters into a trade agreement with the U.S., it must strengthen intellectual property protection in its law to meet its FTA obligations. If the country is under pressure to implement its obligations in a way that favors rightholders, it may be incentivized to weaken copyright exceptions (Deere, 2008). On the other hand, countries often amend their copyright laws in ways that both strengthen copyright protections and enhance exceptions at the same time, as lawmakers try to balance competing interests for the greater good (Guibault et. al., 2009). Therefore, implementation of a trade agreement may lead to more robust copyright exceptions by necessitating amendments to countries' laws. Australia provides an example – it strengthened its copyright exception allowing temporary copies for technological processes when it implemented the US-Australia Free Trade Agreement in 2004 (Weatherall and Burrell, 2007).

S301 accounts for negative trade pressures on a country, intended to force them to strengthen the protection of intellectual property rights. It is equal to 1 for country-year observations when a country was included in the U.S. Trade Representative's annual Special 301 Report, which lists countries alleged to provide inadequate protection of intellectual property. Inclusion in the report indicates that a country is facing pressure from the U.S. government to strengthen intellectual property protection. If the report

[3]Observations from the U.S. are dropped in the regressions that include this variable.

identifies a country as a "Priority Foreign Country", this designation triggers a Trade Act investigation that, in turn, can lead to sanctions (Congressional Research Service, 2020). A country may also be placed on watch lists, indicating that the U.S. will further engage with it regarding its alleged intellectual property shortcomings. Inclusion in the report can be an incentive for a country to weaken copyright exceptions if doing so addresses requests by the U.S. government to strengthen intellectual property protection, so *S301* is expected to have a negative relationship with *Tech*.

Table 5: Dependent Variable: Tech

	(1)	(2)	(3)	(4)	(5)
CS	0.315***		0.302***	0.128	0.169**
	(0.0654)		(0.0573)	(0.0846)	(0.0656)
CR		-0.713*	-0.514**	-0.605**	-0.440*
		(0.336)	(0.234)	(0.203)	(0.209)
GDPpc				0.520*	0.372**
				(0.251)	(0.170)
FTA					0.471***
					(0.0816)
S301					-0.0904**
					(0.0418)
Constant	0.947***	1.965***	1.359***	-3.437	-2.261
	(0.0985)	(0.256)	(0.194)	(2.371)	(1.581)
N	330	330	330	330	308
adj. R^2	0.322	0.064	0.354	0.469	0.599

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5 shows the results of the tests. Columns (1-3) show the results with just the two independent variables measuring sector shares, and columns (4-5) include the addition of other controls. The coefficient on *CS* is positive in each of the four specifications where it is included, and significant in three of them. This supports the idea that copyright exceptions beneficial to ICT firms are stronger in countries with larger ICT sectors. The coefficient on *CR* is negative and significant in all four specifications that include this

variable, supporting the idea that exceptions are weaker in countries with larger copyright sectors.

The other control variables are all significant as well. The coefficients on *GDPpc* imply a weakly significant positive relationship between a country's wealth and the robustness of its copyright exceptions. The positive coefficient on *FTA* supports the notion that countries will tend to expand exceptions when they revisit their copyright laws to comply with trade agreements. The negative coefficient on *S301* indicates that countries facing U.S. pressure to strengthen IP rights are less likely to further develop copyright exceptions.

The most complete specification, shown in Column (5) shows significant associations with all of the covariates. The coefficients on *CS* and *CR* have the expected signs. A one-percentage point increase in the computer service industries' share of value added in a country's GDP is associated with a 0.17 unit increase in *Tech*. A one-percentage point increase in the copyright industries' share of GDP is associated with a 0.44 unit decrease in *Tech*.

4.2. **Regressions on Edu.** I turn now to the tests of *Edu* and its covariates. The index is regressed using the following equation.

$$Edu_{c,t} = \alpha + \beta_1 School_{c,t} + \beta_1 CR_{c,t} + \beta_3 GDPpc_{c,t} + \beta_4 FTA_{c,t} + \beta_5 S301_{c,t} + FE + \epsilon$$

As in the previous subsection, the main independent variables of interest are based on expected costs and benefits to users and producers of copyrighted works. Robust copyright exceptions for educational uses benefit students, teachers and educational establishments by increasing the availability of articles and books for learning – so I expect that societies which place a higher emphasis on education to have robust educational exceptions. I use data on the average years of schooling attained by individuals in a given year/country, taken from the Barro-Lee Educational Attainment dataset,[4] as an indicator of social emphasis on education. It is included as the variable *School*, which is expected have a positive coefficient.

[4]The dataset is available at http://www.barrolee.com

Regressions on *Edu* also include *CR* as an independent variable, which again measures the share of the copyright industries' value added to a nation's GDP in a given year. I assume that stronger copyright exceptions may lead to losses for the copyright-intensive industries, so the coefficient on *CR* is expected to be negative.

Table 6: Dependent Variable: Edu

	(1)	(2)	(3)	(4)	(5)
School	0.0977***		0.108**	0.0817*	0.0839*
	(0.0291)		(0.0370)	(0.0420)	(0.0399)
CR		-0.400*	-0.168	-0.206	-0.185
		(0.202)	(0.151)	(0.157)	(0.157)
GDPpc				0.122	0.0877
				(0.109)	(0.0872)
FTA					0.242***
					(0.0233)
S301					-0.0199
					(0.0566)
Constant	0.620**	2.028***	0.763**	-0.154	0.0624
	(0.289)	(0.154)	(0.346)	(0.887)	(0.760)
N	309	330	213	213	197
adj. R^2	0.225	0.067	0.275	0.292	0.387

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6 reports the regression results. Columns (1) and (2) present the results when *School* and *CR* are the sole regressors. The coefficients on each are significant and have the expected sign. In Column (3), the two are tested together, and only the coefficient on *School* is significant. The last two columns add the same control variables used in the regressions on *Tech*. In these specifications, the only significant coefficients are those on *School* and *FTA*.

Overall, the *Edu* does not correlate with the covariates as well as *Tech*. However, the final specification estimates that one additional year of schooling is associated with a 0.08 unit increase in *Edu*. It also estimates that having a free trade agreements with the U.S. is associated with a 0.27 unit higher value of *Edu* than otherwise.

5. Robustness Tests

Tech and *Edu* are the unweighted averages of the category means for the categories that build each index. Literature evaluating statistical indices based on multiple components has noted that unweighted averages of components are really equally weighted averages, which carry the assumption that the each of the components are equally important (Dörffel and Schuhmann,2022). This may or may not be true. In the OECD's *Handbook on Constructing Composite Indicators*, Nardo et. al. (2008) recommend testing the robustness of multi-component indicators by adjusting the weights.

Table 7: Descriptive Statistics for Randomly Weighted Tech and Edu Variables

Variable	Mean	St. Dev.
Tech	1.108	0.588
Tech_RW1	1.129	0.601
Tech_RW2	1.109	0.600
Tech_RW3	0.995	0.617
Tech_RW4	1.169	0.616
Edu	1.526	0.645
Edu_RW1	1.527	0.654
Edu_RW2	1.547	0.651
Edu_RW3	1.549	0.683
Edu_RW4	1.507	0.639

This section tests whether the regressions results rely upon this even weighting of each category; or whether they are robust to random variation in the weights. First, four randomly weighted ("RW") variables are created for both *Tech* and *Edu* using weights generated from values drawn from a uniform distribution within 0.01, 0.02, 0.3 and 0.04 standard deviations of each of the category scores' mean weight in the original variables. (The last weight for each is equal to 1 minus the sum of the other weights.) Table 7 shows the randomly weighted variables' descriptive statistics. All of the randomly weighted versions of both variables have a similar mean and standard deviation to the original version. None of the randomly weighted variables are significantly skewed.

Table 8: Dependent Variable: Tech, With and Without Random Weights

	(1) Unweighted	(2) RW1	(3) RW2	(4) RW3	(5) RW4
CS	0.169**	0.171**	0.175**	0.239**	0.173**
	(0.0656)	(0.0660)	(0.0692)	(0.0909)	(0.0667)
CR	-0.440*	-0.464**	-0.468*	-0.408	-0.487**
	(0.209)	(0.213)	(0.222)	(0.244)	(0.217)
GDPpc	0.372**	0.434**	0.410**	0.405*	0.495**
	(0.170)	(0.172)	(0.188)	(0.201)	(0.175)
FTA	0.471***	0.461***	0.517***	0.522***	0.452***
	(0.0816)	(0.0691)	(0.1000)	(0.0605)	(0.0593)
S301	-0.0904**	-0.0866*	-0.0905*	-0.103*	-0.0829
	(0.0418)	(0.0443)	(0.0441)	(0.0540)	(0.0471)
Constant	-2.261	-2.798	-2.619	-2.713	-3.336*
	(1.581)	(1.611)	(1.755)	(1.865)	(1.641)
N	308	308	308	308	308
adj. R^2	0.599	0.620	0.619	0.509	0.637

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

I test these randomly weighted versions of *Tech* using the final specification from the previous section. Table 8 presents the results, with Column (1) showing regression results using the original, unweighted *Tech*, and columns (2) through (5) showing the results based on the randomly weighted versions. The coefficients on all variables keep the expected algebraic signs. The coefficients on *CS* are significant at the 95% level of confidence in each of the tests, while the coefficients on *CR* are significant at the 90% level or higher in four of the five. All coefficients on the control variables remain significant as well.

Next, I regress the randomly weighted versions of *Edu*, again using the final specification from the previous section. Table 9 reports the results, with the first column showing results from regressions on the unweighted *Edu* and columns (2) through (5) showing the randomly weighted variables. The coefficients on *School* are significant at the 90% level of confidence across all specifications, the coefficients on *FTA* are significant at the 99% level, and the other coefficients are nearly all insignificant. Again, the regressions on *Edu*

do not fit as well as those on *Tech*, but the results are consistent when the random weights are applied.

Table 9: Dependent Variable: Edu, With and Without Random Weights

	(1) Unweighted	(2) RW1	(3) RW2	(4) RW3	(5) RW4
School	0.0839*	0.0758*	0.0790*	0.0536*	0.0715*
	(0.0399)	(0.0354)	(0.0372)	(0.0276)	(0.0367)
CR	-0.185	-0.228	-0.217	-0.307**	-0.143
	(0.157)	(0.146)	(0.152)	(0.137)	(0.155)
GDPpc	0.0877	0.0865	0.0873	0.0851	0.0895
	(0.0872)	(0.0758)	(0.0811)	(0.0542)	(0.0808)
FTA	0.242***	0.269***	0.275***	0.307***	0.279***
	(0.0233)	(0.0199)	(0.0213)	(0.0128)	(0.0214)
S301	-0.0199	-0.00899	-0.0125	0.0256	-0.0168
	(0.0566)	(0.0483)	(0.0521)	(0.0349)	(0.0488)
Constant	0.0624	0.169	0.150	0.448	0.100
	(0.760)	(0.681)	(0.723)	(0.541)	(0.697)
N	197	197	197	197	197
adj. R^2	0.387	0.408	0.401	0.395	0.409

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Overall, the relationships found in the regressions on the evenly weighted *Tech* and *Edu* variables tend to hold when their elements are randomly weighted.

6. Conclusion

This paper has presented a novel dataset designed to measure changes in 24 nations' laws on copyright exceptions over time. The dataset is unique among sources of information comparing copyright exceptions because others are static or focused on exceptions related to very specific activities.

The data shows that copyright exceptions have grown more robust over time in the sample's high-income countries, which have consistently had more robust copyright exceptions on average than middle-income ones. The gap between the two subgroups has grown since 1990. Empirical test show that copyright exceptions useful to ICT firms tend to grow stronger when countries have larger ICT sectors, but weaker when they have larger

copyright sectors. On average, these types of exceptions grow stronger as individual countries' incomes rise. Copyright exceptions useful for education are more robust in countries with higher educational attainments.

There are plenty of avenues for further research on this topic. Changes to copyright exceptions may impact other industries or groups of consumers. The impact may be different in countries with different legal traditions, histories, or technologies. The level of copyright enforcement in a given country may impact the usefulness of copyright exceptions. It is my hope that researchers can use the dataset to add to the relatively small body of empirical research in this area.

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