

# U.S. Multinational Investments and Copyright Protection

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The statistical analysis of firm level data on U.S. multinational companies and their foreign affiliates was conducted at the Bureau of Economic Analysis, U.S. Department of Commerce, under arrangements that maintain legal confidentiality requirements. Views expressed in this paper are those of the authors and do not necessarily reflect the official positions of the U.S. Department of Commerce

# Copyrights 101

## Knowledge-Based Economy, International Trade, and Development:

- Art Works, Films, Books, Sound Recordings contribute to the stock of knowledge
- Software, Databases, Journals used in scientific research, R&D
- Copyright-Based Industries account for a significant share of GDP, trade, employment
  - World Intellectual Property Office (WIPO) studies on the contribution of copyright-based industries
  - Caution: Non-causal analyses
- Copyright-related industries account for the majority of U.S. outward global licensing
  - In 2014, shares were: computer software 30.3%, audio-visual & related 14.9%, industrial processes 37.4%, and trademarks 13.0%

# State of Research

Basic Theory (Watt (2000), Landes & Posner (2003), Maskus (2012)):

- Stronger copyright protection and enforcement increases cost of reproduction, reduces imitation, increases return to rights holder, and generates incentives for creation and product launches
- But it increases costs of access and creates transactions costs (burden of clearing rights and/or working around existing rights, especially if limited modes of expression exist)

Empirical Evidence (few):

- Single country (US or Canada)
  - Baker and Cunningham (2006), Ku et al. (2009)
- Single product (books, music, film)
  - Liebowitz (2008), Heald (2008), Png and Wang (2009), Li et al. (2013), Giorcelli and Moser (2015)
- Piracy, File-sharing studies find crowding out is not 1:1
  - Rob and Waldfogel (2006), Oberholzer-Gee and Strumpf (2007), Danaher et al. (2013)
- Limited investigations beyond copyright industry
  - P. Smith et al. (2009) study effect on relevant Infrastructure
  - Lerner (2011) studies effect on cloud computing

# Gaps

- Need to broaden the scope of the potential impact of copyright systems beyond the traditional copyright sector (such as incentives for investment in complementary industries).
- Market Size Effects (Demand Spillovers)
  - *Expansion of Copyright Industries provides incentives for firms in complementary industries to develop or invest in inputs and products related to the production or consumption of creative works.*
- This current study explores U.S. multinational firm data:
  - U.S. companies are the leading holders of copyrighted works
  - Markets for creative works have expanded across the world
  - Copyright reforms have occurred under international agreements and are coordinated inter-governmentally
  - Intellectual property concerns arise especially in developing countries (USTR)
  - Access to creative works is important for global economic development

# Estimating Equations

- How dependent are U.S. copyright firms' FDI, international licensing, and research on **copyright regimes** abroad?

$$\ln(TECH_{int}) = \alpha_i + \alpha_n + \alpha_t + \beta_1 \ln(C_{nt}) + \beta_2 \ln(C_{nt})R_j + \gamma \mathbf{X}_{int} + \varepsilon_{int}$$

- Do expansions in foreign **copyright markets** influence investments by firms in the complementary industries?

$$\ln(TECH_{int}) = \alpha_i + \alpha_n + \alpha_t + \beta_1 \ln(M_{nt}) + \beta_2 \ln(M_{nt})R_j + \gamma \mathbf{X}_{int} + \varepsilon_{int}$$

where TECH denotes technology transfers, C copyright protection, M copyright market size, and X a vector of control variables. R denotes a conditioning factor (e.g., market *rank* based on an industry's overall domestic or global sales during the sample period, normalized by median sales). i indexes firm, t time, n country, and j industry.

# U.S. MNCs

Sixty-three countries

Annual Data: 1989 - 2011

Firms in 2 Industries:

① Copyright-Related Industries

- 223 U.S. Parent Companies

- 212 of them have presence in Developed Countries (North)
- 121 of them have presence in Developing Countries (South)

② Complementary Industries

- 605 U.S. Parent Companies

- 557 of them have presence in Developed Countries (North)
- 309 of them have presence in Developing Countries (South)

Source: BEA

- *Annual Surveys and Benchmark Surveys of USDIA*
- *Quarterly Balance of Payment Surveys of USDIA*
- *Quarterly Survey of Transactions in Selected Services and Intellectual Property with Foreign Persons*
- *Annual Survey of Royalties, Licensing Fees, and Other Receipts and Payments for Intangible Rights between U.S. and Unaffiliated Foreign Persons*

# Industry Coverage and Copyright Sales

NAICS code	Copyright-related Industries	Domestic Market Sales*
5111	Newspaper, periodicals, books, and directories	1.152
5112	Software publishers	2.823
5121	Motion picture and video industries	0.701
5122	Sound recording industries	0.672
5151	Radio and television broadcasting	1.315
5152	Cable and other subscription programming	2.141
5171	Wired telecommunications carriers	0.518
5172	Wireless telecommunications (excluding satellite)	1.056
5175	Cable and Other Programming	2.285
5179	Other Telecommunications	0.950
5181	Internet Service Providers, Web Search Portals	1.018
5182	Data processing	0.115
5191	Other Information Services	1.075

NAICS code	Complementary Industries	Global Market Sales*
3341	Computer and peripheral equipment	1.71
3342	Communications equipment	2.98
3343	Audio and video equipment	3.81
3344	Semiconductors, other electronic components	4.51
3345	Navigational, measuring, control instruments	1.13
3346	Making, reproducing magnetic/optical media	0.03
3351	Electric lighting equipment	0.06
3359	Other electrical equipment and components	0.27

\* Ratio of Mean of Middle 9 to Overall MM9

# Measurement of Copyright Strength and Markets

## Index of Copyright Strength

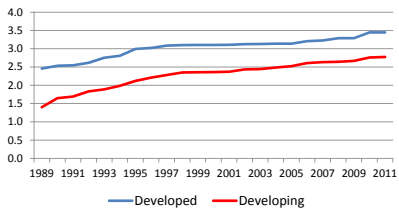
- Park (2005) and Reynolds (2003), updated
- Index covers 120 countries from 1965 – 2013 (annually, where available)
- Four Components (measuring strength of protection):
  - ① Duration (Copyrights and Related Rights)
  - ② Usage (Private Use, Collective Licensing)
  - ③ Enforcement (Injunction, Criminal Penalties, Anti-circumvention)
  - ④ International Agreements/Treaties/Conventions
- Overall Index varies from 0 – 4.
- Source of Information: Statutes, Case Laws, and Commentaries

## Copyright Market Size

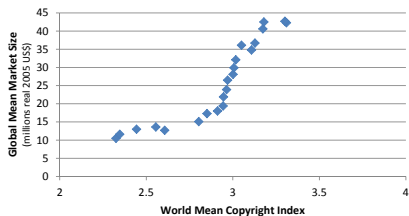
- Sales of Media Firms, Software companies (total by country x year)
- Source: Thomson Datastream

# Trends in Global Copyrights

### Index of Copyright Protection



### Global Copyright Market and World Copyright Index, per year

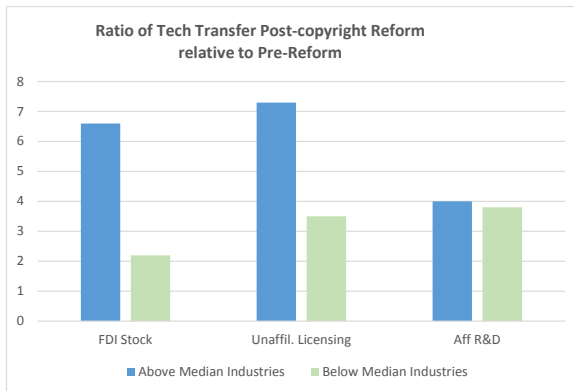


# Descriptive Statistics

	Copyright-Related Industries		Complementary Industries		
	All Countries	Share in Developing Countries	All Countries	Share in Developing Countries	Ratio: Copyright to Complem Indus
Parent R&D/Sales	6.3%		9.4%		0.67
FDI Stock	727	9.4%	680	31.2%	1.07
Unaffiliated Licensing	91	18.8%	33	23.3%	2.74
Affiliate R&D	15	8.4%	106	14.5%	0.14
Affiliate Sales	1560	10.0%	9460	22.1%	0.16

Sample period: 1992-2011. Figures are in billions of real 2005 PPP\$ and represent industry totals.

# Preview



*Note: Median refers to the mean domestic sales of middle 9 companies in the copyright sector*

# Impacts of Copyrights

A. Copyright Reform and Tech Transfer						
DEP VAR	(1) FDI	(2) FDI	(3) ULic	(4) ULic	(5) Aff R&D	(6) Aff R&D
Copyright Reform	0.963** (0.393)	1.237* (0.704)	0.011 (0.090)	-0.113 (0.236)	-0.031 (0.172)	-0.405* (0.233)
Copyright Reform x Indus Rank		-0.199 (0.384)		0.090 (0.149)		0.272** (0.134)
Control Variables	Included	Included	Included	Included	Included	Included
Observations	7,245	7,245	7,245	7,245	7,244	7,244
Adj R-sq	0.427	0.427	0.783	0.783	0.447	0.448

See Notes below

B. Copyright Intensity and Tech Transfer						
DEP VAR	(1) FDI	(2) FDI	(3) ULic	(4) ULic	(5) Aff R&D	(6) Aff R&D
Copyright Protection	3.014*** (0.928)	3.912** (1.508)	0.021 (0.470)	-0.892 (0.586)	-0.643 (0.577)	-1.817** (0.722)
Copyright Protection x Indus Rank		-0.664 (0.758)		0.676*** (0.203)		0.869** (0.377)
Control Variables	Included	Included	Included	Included	Included	Included
Observations	7,245	7,245	7,245	7,245	7,244	7,244
Adj R-sq	0.427	0.427	0.783	0.783	0.448	0.449

Robust standard errors in parentheses, clustered by country

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1, Year Cntry Effects included

Controls: Host GDP, Wages, Tax Rate, Property & Legal Rights, Parent & Affil Sales

# Impacts of Copyrights

C. Copyright Reform and Tech Transfer: Developing Countries						
	(1)	(2)	(3)	(4)	(5)	(6)
DEP VAR	FDI	ULic	Aff R&D	FDI	ULic	Aff R&D
Copyright Reform	1.627*	-0.501	-0.741**	0.966	-0.460	-0.758**
	(0.931)	(0.330)	(0.346)	(0.927)	(0.301)	(0.355)
Copyright Reform x Indus Rank	-0.580	0.404*	0.369	-0.397	0.368*	0.356
	(0.391)	(0.214)	(0.235)	(0.414)	(0.214)	(0.225)
Control Variables	Included	Included	Included	Included	Included	Included
Observations	1,799	1,799	1,799	1,479	1,479	1,479
Adj R-sq	0.451	0.826	0.599	0.465	0.814	0.561

Robust standard errors in parentheses, clustered by country

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1, Year Cntry Effects included

Controls: Host GDP, Wages, Tax Rate, Property & Legal Rights, Parent & Affil Sales

# Cross-Market Impacts

## Parent Company in the Copyright-Related Industry:

	Number of Affiliates in Complementary Indus.	FDI in Complem Indus. (relative to pre-reform)	Affiliate Sales in Complem (relative to pre-reform)
Before Copyright Reform	44	1	1
Post Copyright Reform	123	1.8	2.8

## Parent Company in the Complementary Industry:

	Number of Affiliates in Copyright-related Indus.	FDI in Copyright Indus. (relative to pre-reform)	Affiliate Sales in Copyright (relative to pre-reform)
Before Copyright Reform	71	1	1
Post Copyright Reform	318	2.7	7.8

*Post-reform FDI Stock and affiliate sales are normalized by pre-reform values*

# Cross-Market Impacts

Market Effects on Complementary Industries					
DEP VAR	(1) FDI	(2) Aff R&D	(3) ULic	(4) ULic IP	(5) ULic Soft
Market Size Copy	-0.131 (0.098)	-0.042 (0.118)	-0.020 (0.044)	-0.022 (0.036)	-0.022 (0.014)
Market Size Copy x Mkt Share	0.074** (0.028)	0.058** (0.025)	0.063** (0.028)	0.066*** (0.023)	0.034*** (0.007)
Control Variables	Included	Included	Included	Included	Included
Observations	17,984	17,979	17,984	17,984	17,984
Adj R-sq	0.482	0.393	0.365	0.327	0.320

Robust standard errors in parentheses, clustered by country

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Year Cntry Effects included

Controls: Host GDP, Wages, Tax Rate, Property & Legal Rights, Parent & Affil Sales

## Market Entry

Extensive Margin: Count Data Analysis						
DEP VAR Industry	(1) FDI INFO	(2) LIC INFO	(3) RD INFO	(4) FDI COMPLE	(5) LIC COMPLE	(6) RD COMPLE
Copyright Reform	-0.060 (0.117)	-0.617*** (0.064)	-2.576*** (0.486)			
Copyright Reform x Indus Rank	0.228*** (0.047)	0.408*** (0.028)	1.374*** (0.165)			
Copyright Mkt Size				0.110 (0.073)	0.085 (0.083)	0.114* (0.066)
Copyright Mkt Size x Mkt Share				0.019*** (0.004)	0.066*** (0.003)	0.040*** (0.003)
Control Variables	Included	Included	Included	Included	Included	Included
Signif. Overdispersion	Yes	Yes	No	No	Yes	Yes
Observations	10,627	10,627	10,627	4,124	4,124	4,124
r2_mfadj	0.228	0.0806	0.343	0.117	0.313	0.168
Robust s.e. in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Year, Country Effects Included Controls: Host GDP, Wages, Tax Rate, Property & Legal Rights						

# Recap

- Copyright-related works comprise a significant share of *knowledge* goods and international technology transfer
- Copyright reforms and protection are positively associated with U.S. multinational tech transfer in the *copyright-related industries* (e.g., information industries)
- Market size of copyright-related works is positively associated with tech transfers and investments in *complementary industries* (e.g., computer equipment, electronics, communications)
- Future work could examine the role of *limitations and exceptions* to copyrights (e.g., Fair Use, Fair Dealing)