

Intellectual Property: Effects on Creativity and Innovation

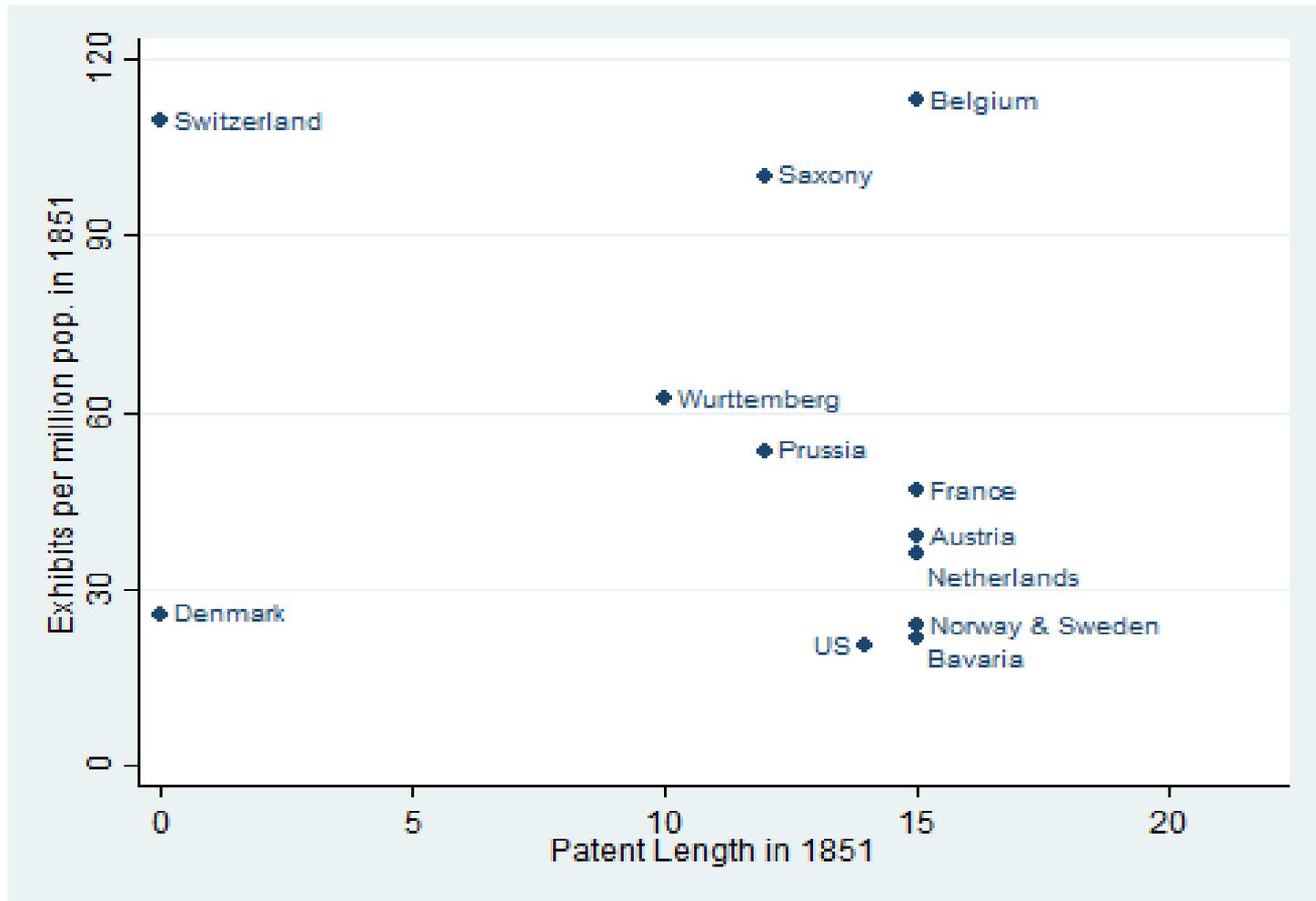
Petra Moser, NYU Stern, CEPR, and NBER

Patents and Innovation

- World fairs
 - London 1851
 - Philadelphia 1876
 - Chicago 1893
 - San Francisco 1915
- Capture innovations with and without patents
 - In countries without patent system
 - In countries w patent system, capture innovations that inventors chose not to patent



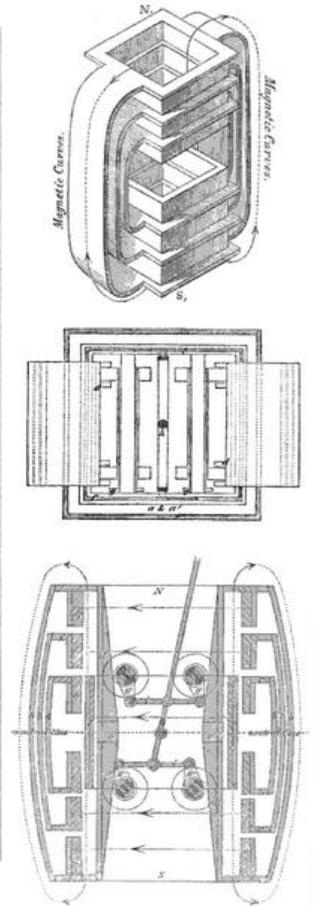
Countries w/o patents produce many innovations



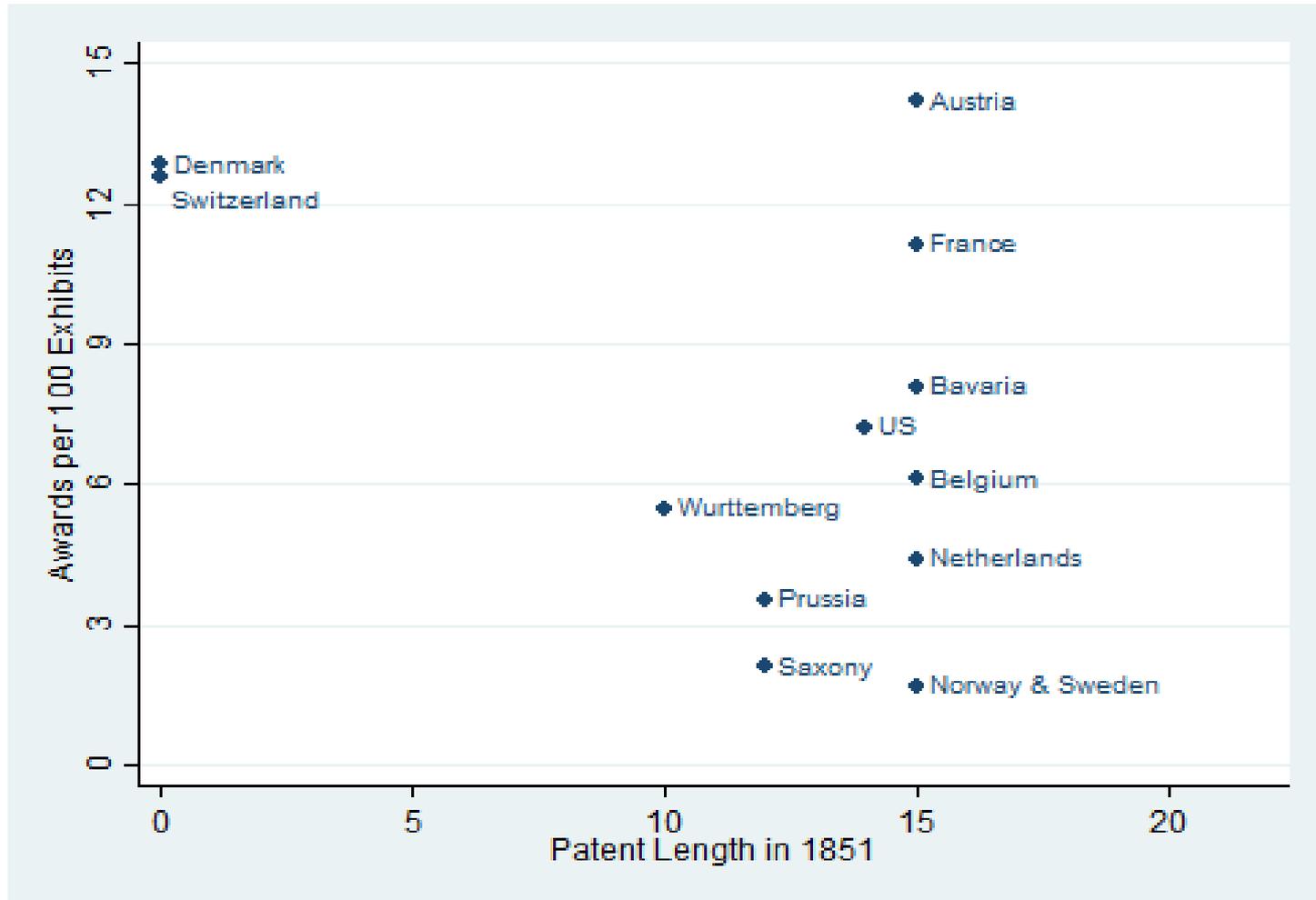
Notes: Exhibits per capita at the Crystal Palace Fair in London in 1851. Data from Moser AER 2005

Denmark had no patent laws in 1851

- Soren Hjorth exhibited *electromagnetic engine with oscillating motion and four inches stroke*
- “The peculiar features of this invention are, that any length of stroke with a direct pull, of a succession of polar extremities, extending to the whole periphery of the acting surfaces, can be produced, and that the destroying effect of the sparks is prevented; the power has been found to increase in a simple ratio to the diameter of the piston”
(*Mechanics Magazine* 1849)



Innovations from countries w/o quality were of high average quality



Notes: Exhibits per capita at the Crystal Palace Fair in London in 1851. Data from Moser AER 2005

How did countries innovate without patents?

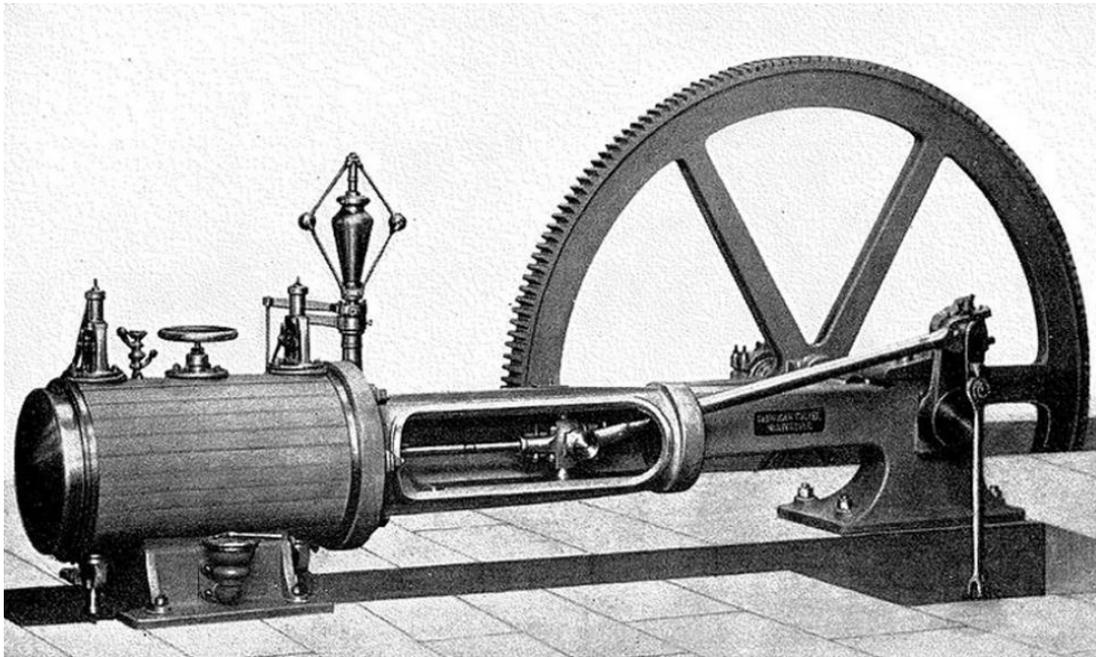
- Piracy
- Alternative mechanisms to protect intellectual property

How did countries innovate without patents?

- Piracy
- Alternative mechanisms to protect intellectual property

Piracy

FIGURE 3.3 – CHARLES BROWN'S VALVE-FITTED STEAM ENGINE 1865

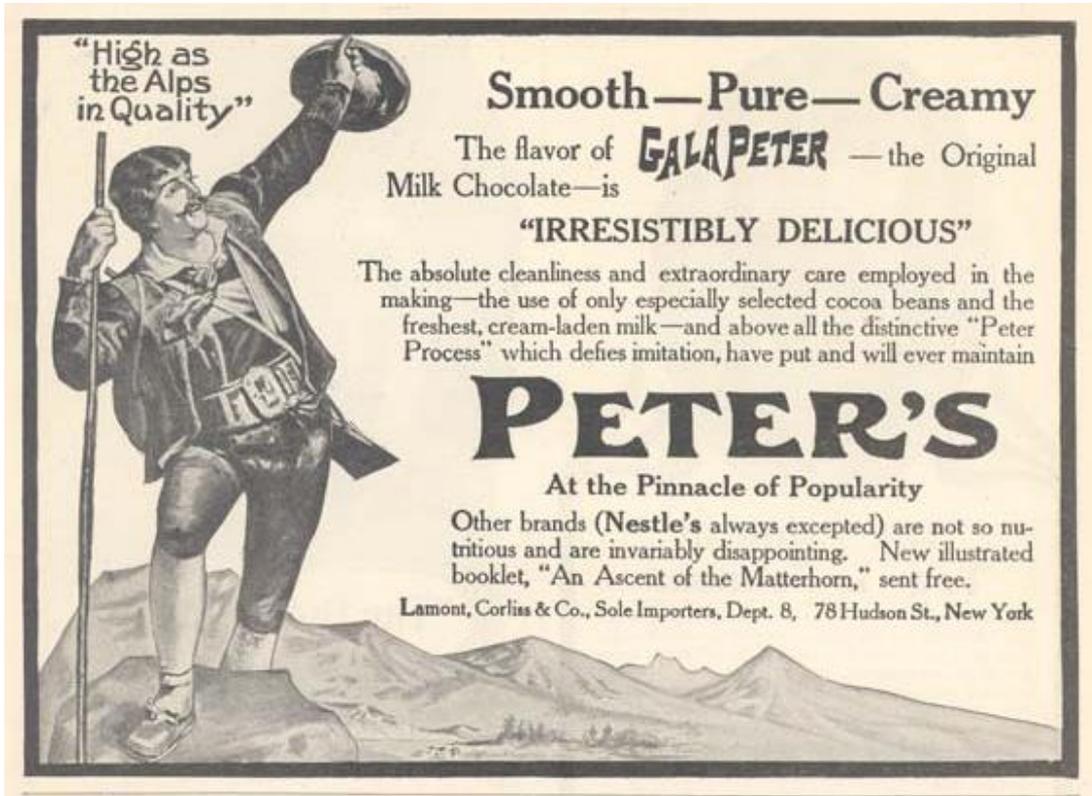


Source: Armin Müller und Judith Wittwer, “Die hundert genialsten Schweizer Erfindungen,” *Handelszeitung*, June 6, 2013

- Johann Jacob Sulzer goes to Britain to learn metal working.
- He Charles Brown, and hires him
- Brown brings blueprints of machines from Maudsley
- Follow-on innovation
- In 1876, Sulzer exhibits a “Model of a new system for reversing gear for valve engine”
- Swiss mountain railways

Piracy

FIGURE 3.5 – UNDATED ADVERTISEMENT FOR PETER DANIEL’S MILK CHOCOLATE

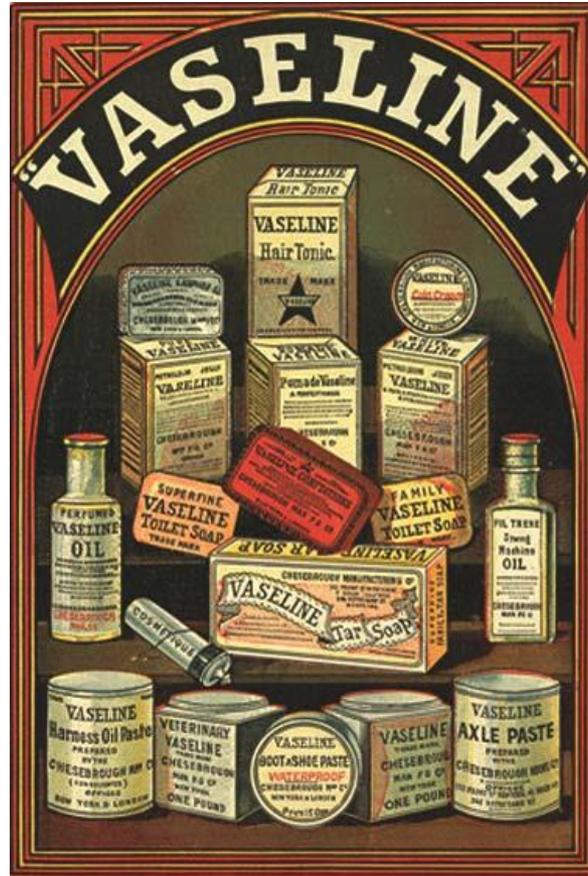


Note: An undated advertisement for Peter Daniel’s Swiss Chocolate in the United States. Note the comment about Nestle. Daniel was friends with Henry Nestle and did not want to compete or hurt his sales. Daniel’s firm eventually merged with Nestle.

- “.... Daniel Peter, in order to learn as much about the chocolate business as he could, worked as an employee of a chocolate factory in Lyon, France, for a few weeks. He spent his time in the evenings and on Sundays documenting the technical questions raised in the manufacture of chocolate
- Dyes, Sandoz, CIBA Geigy Electronics: Philips in the Netherlands

Foreign pressures to adopt patents

FIGURE 3.5 – CHESEBROUGH MANUFACTURING COMPANY PRODUCTS 1884



Note: 1884 Chesebrough Manufacturing Company products including skin and hair cosmetics, soaps, confectionary, boot polish and axle paste. Image from www.cosmeticsandskin.com, accessed February 20, 2017.

How did countries innovate without patents?

- Piracy
- Alternative mechanisms to protect intellectual property

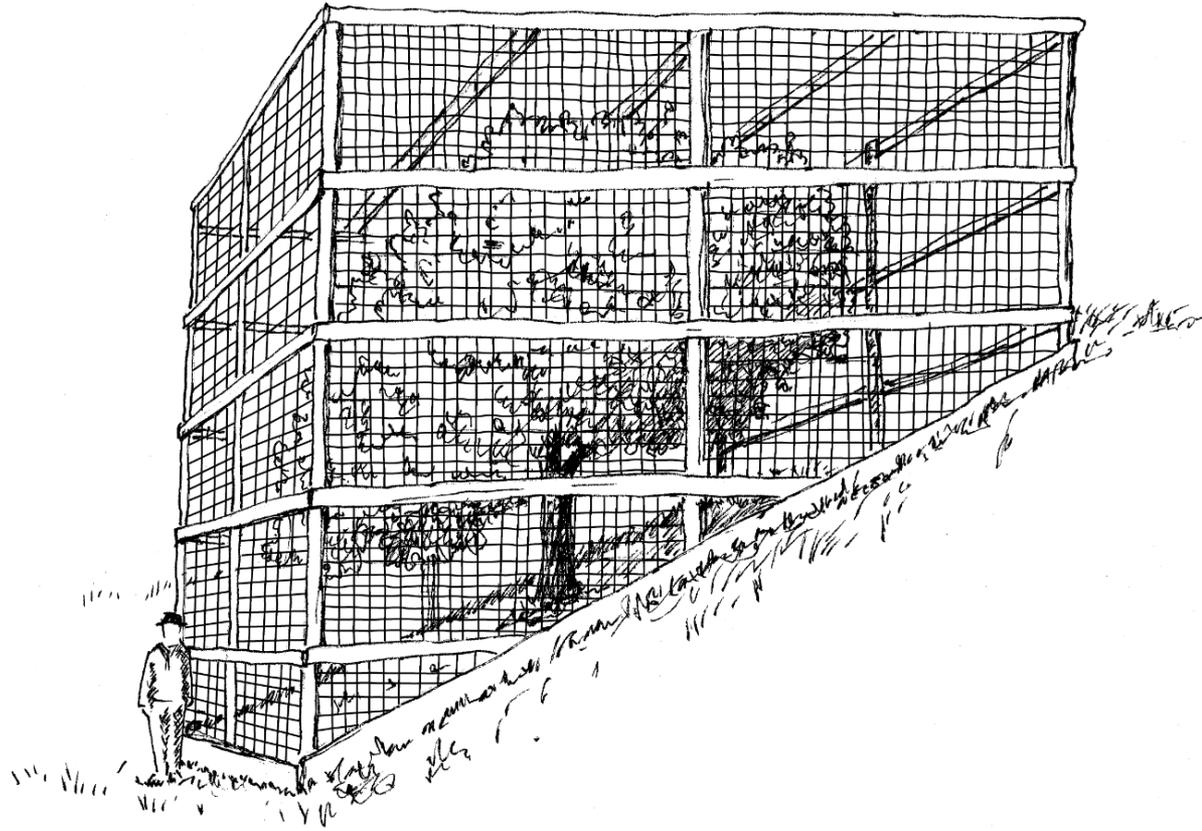
<20% of innovations at the Crystal Palace were patented

TABLE 5.1 – PATENTING RATES FOR BRITISH AND US EXHIBITS IN 1851

	All Exhibits			Award-winning Exhibits		
	All	Patented	Share in %	All	Patented	Share in %
Britain	6,377	708	11.1	1,759	274	15.6
United States	550	84	15.3	112	21	18.8

Some industries depend more on patents than others

FIGURE 6-1 – A CAGE THAT STARK BROTHERS BUILT AROUND ITS GOLDEN DELICIOUS TREE



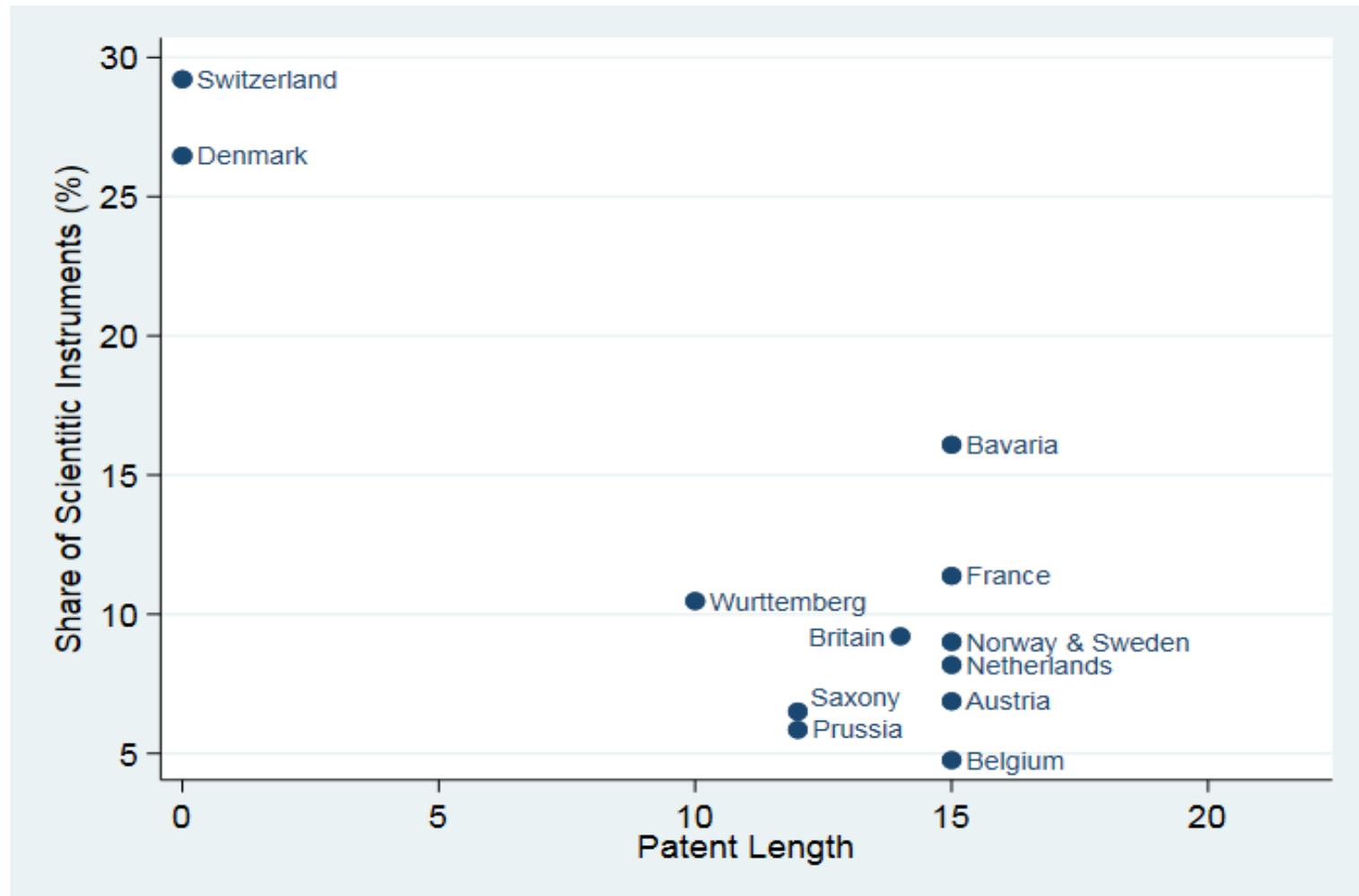
Notes: The cage was built around the Stark Brother's Golden Delicious tree to prevent competitors from stealing shoots of the tree; it was equipped with an alarm. Image from Rossman (1930, p. 395).

Extremely high patenting rates in machinery, but not in instruments

TABLE 6.1: PATENTING RATES: BRITISH VERSUS US. EXHIBITS IN 1851

Industry	Britain		United States	
	(1) Total	(2) % Pat.	(3) Total	(4) % Pat.
Mining and metallurgy	418	5.0%	52	7.7%
Chemicals	136	5.1%	32	0.0%
Food processing	140	7.9%	70	7.1%
Engines	406	24.6%	31	42.0%
Manufacturing machinery	242	29.8%	32	43.8%
Civil engineering	559	13.4%	17	23.5%
Agricultural machinery	261	19.9%	27	37.0%
Scientific instruments	581	9.6%	74	16.2%
Manufactures	1,955	10.2%	98	15.3%
Textiles	1,679	6.8%	117	6.0%
All industries	6,377	11.1%	550	15.3%

Countries w/o patents focuses on industries in which secrecy works



Moser, *American Economic Review*, 2005

Mechanisms that weaken patents: Compulsory Licensing

- License domestic patents by foreign firms to domestic firms without the consent of foreign patent owners
- Permissible under TRIPS and WTO Doha 2001
- Delivers life-saving drugs to millions of patients
 - Kremer 2002, Galvão 2002, Gostin 2006
 - HIV, Malaria, tuberculosis, influenza, cancer
 - Thailand 2007, Brazil 2008 issue CL for Merck's HIV drug efavirenz, Taiwan 2005 issue of Tamiflu for swine flu
- But may reduce access to foreign inventions
 - Weakens property rights of foreign inventors
 - Discourages technology transfer and foreign invention
- What are the effects on domestic invention?

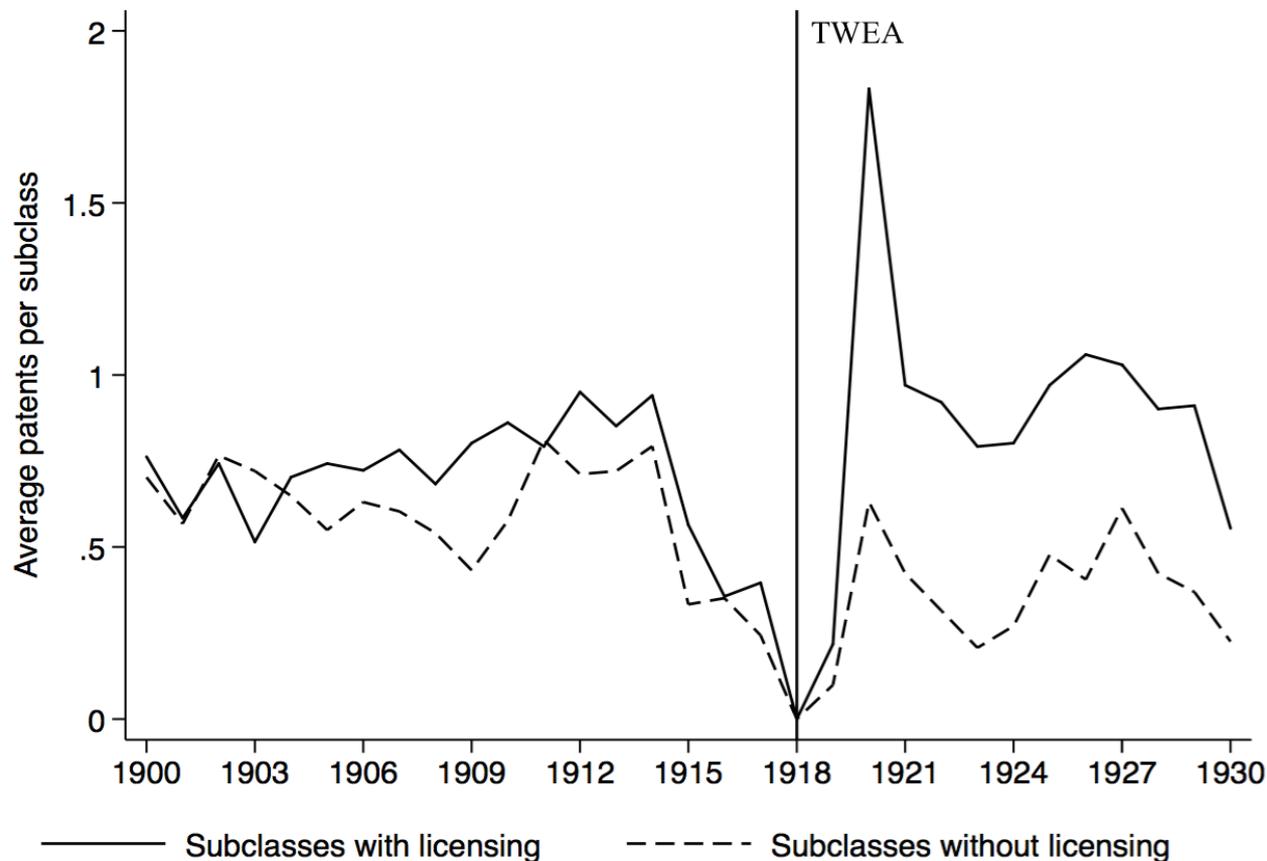
US inventors patented 20% more in fields in which they could license German-owned patents under the 1919 Trading with the Enemy Act (Moser and Voena AER 2012)

FIGURE 6 – ANNUAL TREATMENT EFFECTS: TREATMENT = 1 FOR SUBCLASSES THAT RECEIVED AT LEAST ONE LICENSE UNDER THE TWEA



Notes: For a 95-percent confidence interval of the regression $Patents\ by\ U.S.\ inventors_{c,t} = \alpha_0 + \beta_1 \times TREAT_c \times YEAR_{postTWEA_t} + g \times Z_{c,t} + d_t + f_c + e_{c,t}$, where $TREAT = 1$ if a subclass received at least one license under the TWEA. Data include all 128,963 patents between 1875 and 1939 in 19 USPTO classes that received at least one license. These 19 classes cover 7,248 subclasses, 336 of which are treated.

Inventors whose patents are licensed patent more



Baten, Bianchi, and Moser, *Journal of Economic Development*, 2017

Effects of Patent Laws on Innovation

- Historically, not a necessary condition for innovation
- Countries w/o patents were very innovative (Moser 2017)
- But they focus on a narrow set of industries: patents influence the direction of innovations (Moser 2005)
- Policies that weaken patent protection and allow entry encourage innovation
 - Follow-on innovation in countries that benefit from compulsory licensing (Moser and Voena 2012)
 - Inventors whose patents are licensed invest more in additional improvements (Baten, Bianchi, and Moser 2017)
- How about copyrights?

Copyright and Creativity: Evidence from Italian Operas

with Michela Giorcelli, UCLA

Copyrights

- Establish intellectual property in creative goods
 - Books, music, and film to news, images, and software
- Goal “to create incentives for creative effort”
- Narrowly defined compared with patents
- Increasing importance of copyrightable content
 - Music, news, or film
- Key institution to encourage creativity, innovation, and ultimately economic growth

Do copyrights encourage creativity?

- Difficult to identify due to extensive lobbying
 - 1998 Sonny Bono Copyright Term Extension Act, aka “Mickey Mouse Protection Act”
 - 2011 UK Cliff Richard’s Law
- Exploit variation in exposure to piracy
 - No significant effects on sales or quality of popular music (Oberholzer-Gee and Strumpf 2007, Waldfogel 2012)
- Copyrights may change re-use of online content
 - Wikipedia (Nagaraj 2016) and news (Cagé, Hervé, and Viaud 2016)
- Stronger copyright terms
 - Raise price (Li et al. 2014) and increase payments to authors (MacGarvie and Moser 2014)



Mickey Mouse from
http://en.wikipedia.org/wiki/Mickey_Mouse

Giorcelli and Moser (2017)

Exploit variation in timing of Napoleon's military victories



Battle of Castiglione (1796) from [http://it.wikipedia.org/wiki/Campagna_d'Italia_\(1796-1797\)](http://it.wikipedia.org/wiki/Campagna_d'Italia_(1796-1797))

Due to timing of Napoleon's victories – relative to timing of French legislation – only L&V got copyrights

- 1793 France adopts copyrights for life of author + 10 years
- April 11, 1796: Napoleon invades Sardinia at Ceva
- April 19, 1796: Treaty of Paris. Sardinia grants Savoy to France
- May 12-14, 1797: Napoleon defeats Austria and conquers Verona and Venice
- June 29, 1797: Creation of the Cisalpine Republic, acknowledged by Austria in October 18, Treaty of Campoformio
- March 12, 1799: Formation of the second coalition against France, including Piedmont, Austria, England, Russia, Turkey, Sweden
- June 20, 1800: Napoleon conquers Venetia in 1800
- May 9, 1801: French copyright become law in Lombardy and Venetia
- March 21, 1804: Adoption of the (Napoleonic) *code civil* in France
- 1804: Napoleon controls Sardinia, adoption of code civil w/o copyrights
- 1805: Parma, adoption of code civil w/o copyrights
- 1809: Tuscany, adoption of code civil w/o copyrights
- 1812: Naples and Papal States, adoption of code civil w/o copyrights

In 1801, France extends its 1793 copyright law to French-controlled Lombardy and Venetia (L&V)

- Exclusive rights for authors and composers life + 10
 - Duration of composers lives + 10 years for heirs
- Other states come under French influence after 1804
 - Adopt *code civil* – but without copyrights
- Lombardy and Venetia remain only states with copyrights until 1826
 - “In Italy, the first recognition of intellectual property came with the *Legge 19 fiorile anno IX* (May 9, 1801) of the Cisalpine Republic [of Lombardy and Venetia], followed by the Edict of September, 23 1826 for the Papal State [of Rome], and the Decree February 5, 1828 for the Kingdom of the Two Sicilies” (Treccani 2001, p. 64).
 - Sicily Law of 1811 (*11/07/1811, n.1134*) targets censorship in theaters, no copyrights for composers

FIGURE 1 – MAP OF ITALIAN STATES THAT ADOPTED COPYRIGHT LAW IN 1801



New operas as a measure for changes in level and quality of creative output

- 2,598 new operas premiered in Italy, 1770-1900
 - 705 composers, 3.7 premieres on average
 - Including 478 new operas between 1780-1821
- Compare changes in new operas per state and year
 - In states with copyrights (Lombardy & Venetia) compared with other Italian states
 - Same language, all exposed to *code civil* and French army
 - Only L&V get copyrights in 1801

Opera as popular entertainment

E.g., Beyle (1824) describes the audience for Rossini's *La Scala di Seta* at Teatro San Mosè (Venice)

- “...an immense concourse of people, assembled from every quarter of Venice, and even from the Terra Firma.....who, during the greater part of the afternoon, had besieged the doors; who had been forced to wait whole hours in the passages, and at last to endure the ‘tug of war’ at the opening of the doors.”

Outline

- Historical background
- Data
 - New operas in Italy, 1770-1900
 - Quality: popular and durable operas
 - Demographic data on composers
- Changes in creative output after 1801
 - Difference-in-differences, 1770-1820
 - Time-varying effects and controls for pre-trends
 - Quality controls
- Mechanism
 - Migration
 - Infrastructure
- Changes in creative output for all of Italy, 1770-1900
 - Copyright introductions
 - Copyright extensions
- Conclusions

8 states within Italy between 1770 and 1900

- Italy of 1900
 - Exclude parts of Austria that became Italy under 1920 Treaty of Rapallo (Trentino, Alto Adige, Eastern Friuli, Venezia Giulia, Istria, Zara)
- 8 states as defined by Congress of Vienna in 1815
 - Sardinia, Lombardy, Venetia, Parma & Piacenza, Modena & Reggio, Tuscany, Papal State, Two Sicilies
 - Unchanged until unification in 1861
- Copyright laws
 - From original text of copyright laws and Franchi (1902)



Source: Italian states, 1815-1870,

<http://www.historyhome.co.uk/europe/italymap.htm>

Until 1800 composers had no legal rights to get paid when theaters performed their work

1770-1800



- Until 17th century composers need sponsors
 - Compose for small audiences of nobles
 - “*bonne bouche* for cultivated *cognoscenti*” (Apthorp 1901)

In 1637 first performance for paying audience

- Teatro San Cassiano in Venice performed Manelli’s *Andromeda*

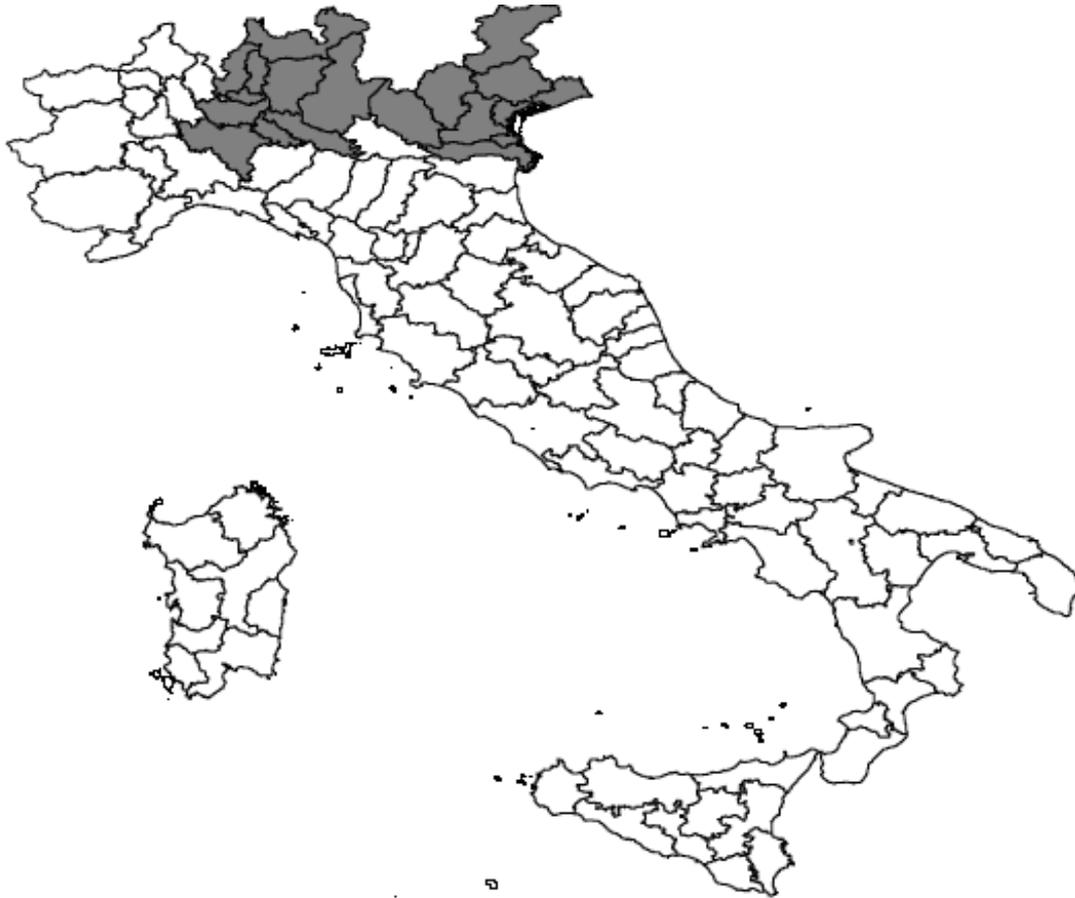
Composers get single payment at completion

- Theater agents hire composers
- No payments for repeat performances

Once opera was out, any theater could play it and composers would recycle

- Impresarios and publishers would
 - “...either steal an authentic score (as a rule by bribing a copyist) or pirate it by getting a minor composer to work up a new orchestral setting from the printed vocal score....An impresario who wanted to give a recent opera would commonly try to knock down the cost of hiring the authentic score by pointing out that he could get one elsewhere at half the asking price” (Rosselli 1996, p. 74).
- Composers would hope to “recycle some of the music in another opera and another town” (Rosselli 1996, p. 74)

L&V adopt French copyright laws in 1801



1801 L&V adopts French copyright law of 1793

- *Life + 10*
- Enforceable in Lombardy and Venetia

France adopts (Napoleonic) code civil in 1804

States conquered after 1804 get code civil *w/o copyrights*

- Sardinia (1804, the Kingdom of Piedmont, excluding the island of Sardinia)
- Parma (1805)
- Tuscany (1809, (including the Kingdom of Naples))
- Papal State (1812, Latium)

Enforcement:

Without copyrights, other theaters could freely perform operas created in L&V

PANEL A: 1781-1800

Performed in:	Sardinia	Modena	Parma	Tuscany	Lombardy	Venetia	Rome	Sicily
Premiered in:								
Sardinia	0	0	0	0	0	0	0	0
Modena	0	0	0	0	0	0	0	0
Parma	4	0	0	0	2	3	0	5
Tuscany	0	0	0	1	0	2	2	4
Lombardy	0	0	0	0	0	0	0	0
Venetia	3	1	4	6	7	3	1	10
Rome	1	0	0	3	0	5	4	8
Sicily	6	7	0	4	0	2	5	11

After 1801, operas created in L&V are protected in L&V

PANEL B: 1801-1820

Performed in: Premiered in:	Sardinia	Modena	Parma	Tuscany	Lombardy	Venetia	Rome	Sicily
Sardinia	2	0	0	4	0	0	2	4
Modena	0	0	0	0	0	0	0	0
Parma	0	0	0	0	0	0	0	0
Tuscany	0	0	0	0	0	0	0	0
Lombardy	0	0	0	1	0	0	2	1
Venetia	2	0	0	1	0	0	0	1
Rome	3	0	4	0	0	0	0	3
Sicily	2	0	5	0	0	0	2	4

New operas that premiered in Italy, 1770-1900

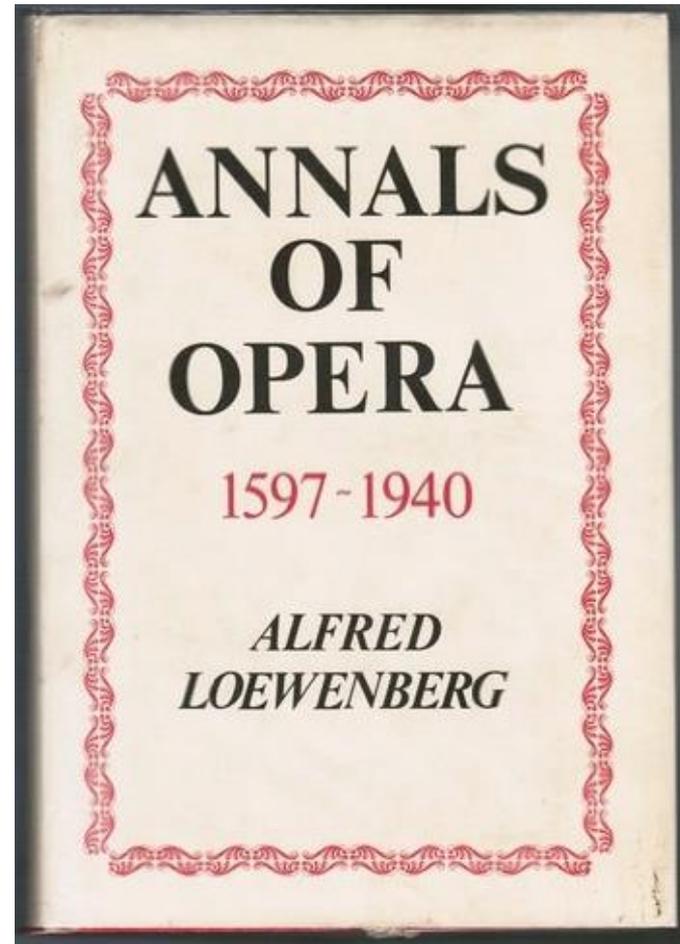
- 2,598 new operas by 705 composers in 8 states, 1770-1900
 - Including 478 new operas by 64 composers, 1780-1821
- 1,718 new operas by 705 composers
 - *Annals of Opera* (Loewenberg, 1978) 294 premieres
 - *Opere e Operisti* (Dassori, 1903) 1,353 premieres
 - *Operisti Minori dell'Ottocento Italian* (Ambiveri, 1998) 71 premieres
- More inclusive than standard sources, such as *New Grove*
 - *New Grove Dictionary of Music and Musicians*
 - Cross-check 89 composers whose last name begins with letter B, 46 composers whose last name begins with D
 - Our data include 80 (55 with B, 25 with D) additional composers, without missing any composer
- 880 additional works by these 705 composers
 - *New Grove Dictionary of Music and Musicians* (2001) 554 premieres
 - *Treccani Encyclopedia* (2001) 326 premieres

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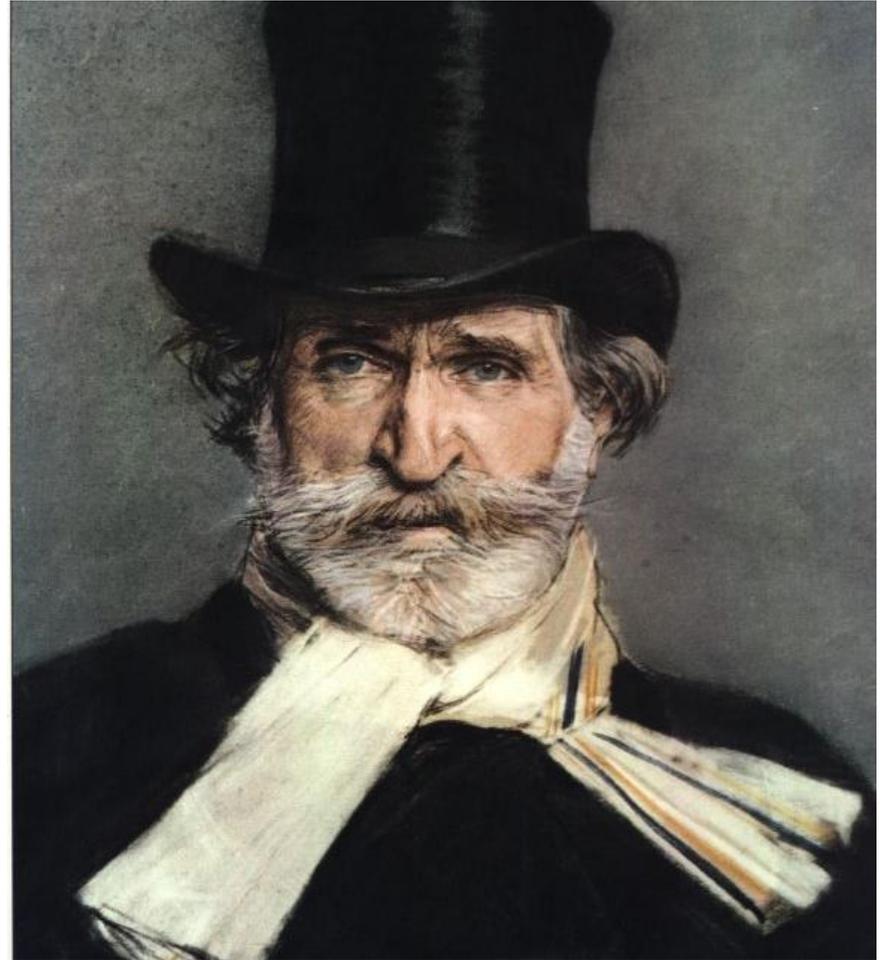
Quality – Historically popular operas

- Notable historical performances
- Alfred Loewenberg 's (1978) *Annals of Operas (1597-1949)*
 - “definitive work on the subject...it is a magnificent piece of work, and belongs on the bookshelf of every researcher in the operatic field (*Opera Today* January 24, 2005)
- 254 new operas 1770-1900, 62 new operas 1780-1821



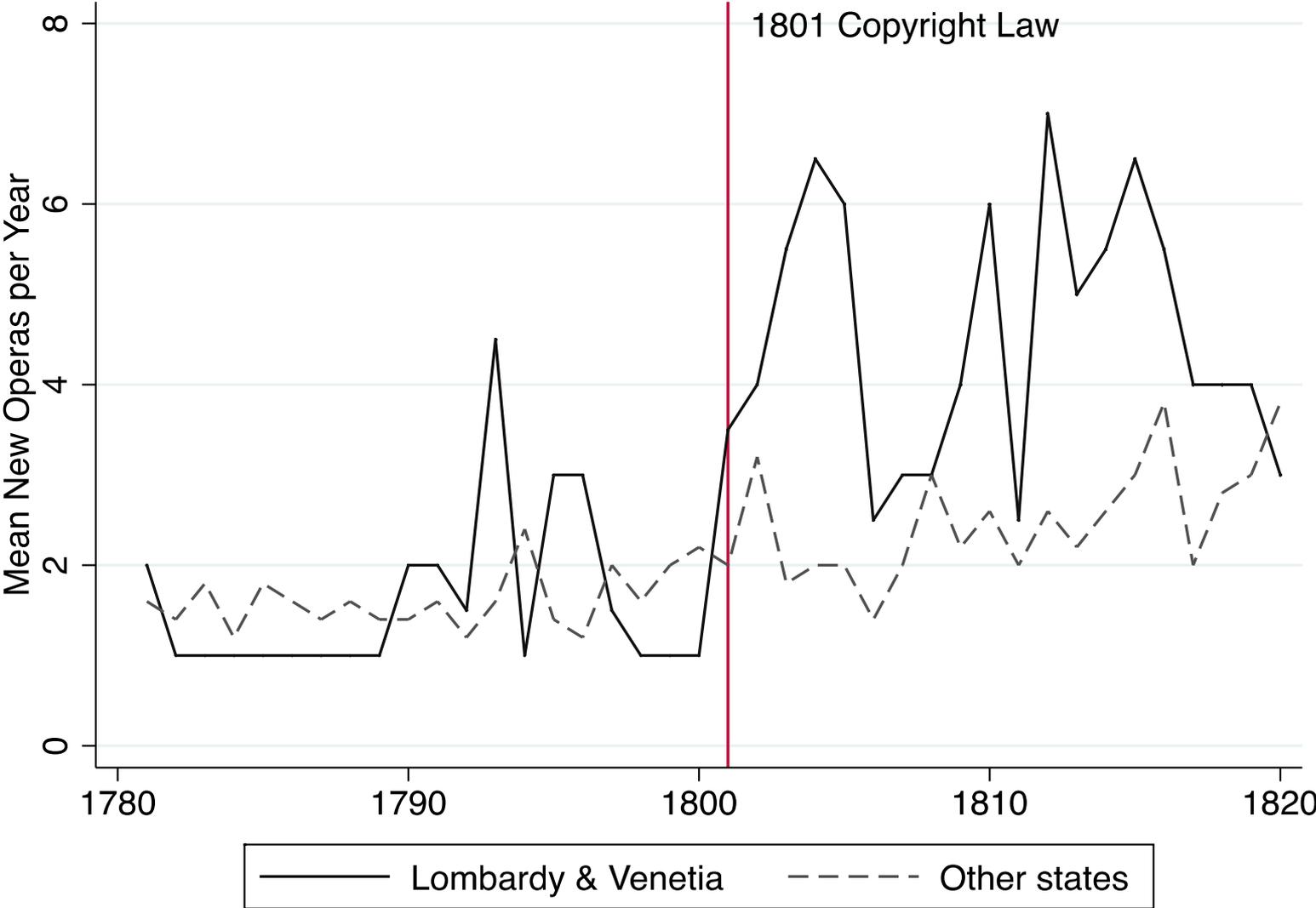
Quality - Long-lived (durable) operas

- Available for sale as complete recordings on Amazon in 2014
- For example,
 - Giuseppe Verdi's *La Traviata*: Complete 2008 recording by Arthaus Musik and 2012 Virgin Classics
 - Domenico Cimarosa's *Penelope*: no results
- 155 new operas 1770-1900
- 42 new operas 1780-1821



Giuseppe Verdi (1813-1901) in 1886 by Giovanni Boldini

FIGURE 2 – NEW OPERAS PER STATE AND YEAR IN ITALY, 1781-1820



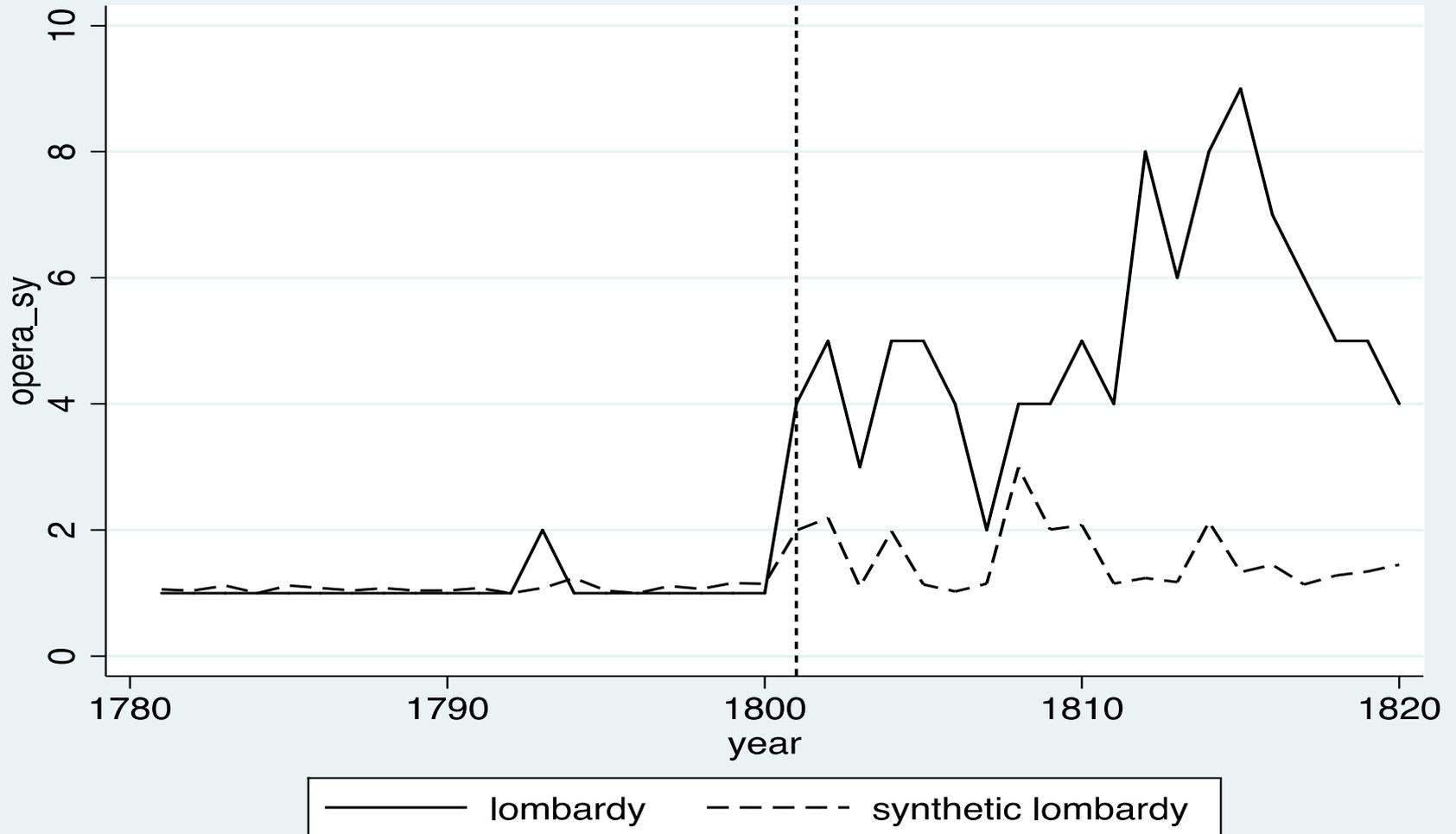
L&V create 2.2 additional operas per state and year after 1801
(150% more compared with mean of 1.4 until 1800)

TABLE 2 – OLS AND QML POISSON REGRESSIONS,
DEPENDENT VARIABLE IS NEW OPERAS PER STATE AND YEAR, 1781-1820

	(1)	(2)	(3)	(4)	(5)
		OLS (1-4)			Poisson ATE (5)
Lombardy & Venetia *post	2.201*** (0.404)	2.147*** (0.422)	2.263*** (0.472)	2.430*** (0.470)	1.061*** (0.329)
Lombardy & Venetia		0.320 (0.238)			
State FE	Yes	No	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Linear pre-trend for Lombardy & Venetia	No	No	Yes	No	No
State-specific linear pre-trend	No	No	No	Yes	No
Pre-1801 mean	1.406	1.406	1.406	1.406	1.406
N (year-state pair)	320	320	320	320	320
R-squared	0.800	0.726	0.800	0.819	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Without copyrights, Lombardy would have created fewer operas



Did copyrights increase quality?

- Rights to charge theaters for repeat performances
 - So-called performance rights established by the 1801 Law
 - Increased expected revenue for composers from more popular or durable operas
- Intrinsic preference for high quality works
 - Additional revenue from copyrights relaxed budget constraint enough to allow to substitute quality for quantity
 - Verdi earned substantial income from score sales and performance fees under Sardinia's 1850 copyright law, no longer needed to be a "galley slave" (Scherer 2001)

Opera was an important source of income

- Giaocchino Rossini (1792-1868)
- “His mother,...was a *seconda donna* of very passable talents. They went from town to town, and from company to company ; the husband playing in the orchestra, and his wife singing on the stage. Poverty was of course the companion of their wanderings ; and their son Rossini, covered with glory, and with a name that resounded from one end of Europe to the other, faithful to his paternal poverty, had not, before his arrival two years ago at Vienna, for his whole capital, a sum equal to the annual pay of an actress on the stage of Paris or Lisbon” (Beyle 1824)



Rossini as a young man, unknown artist, public domain.

Composers adjust quality in response to payments

- Giaocchino Rossini (1792-1868)
- “And, as for those good gentlemen, the *impressarj*, who pretend to pay me handsomely, by giving me for sixteen or eighteen pieces, for the first characters, the same as they gave my predecessors for four, or six pieces at the most, I know a way of being even with them. In every fresh opera, I will serve up three or four of these pieces, which shall have nothing new in them but the variations.” (Beyle 1824)



Rossini as a young man, unknown artist, public domain.

Intrinsic preference for quality

- “The theatres are filled with performers, who **have learned music from some poor provincial professor**. This mode of singing violin concertos, and variations without end, tends to destroy, not only the talent of the singer, but also to **vitiate the taste of the public**” (Rossini quoted in Beyle 1824)

L&V create 0.4 additional popular operas per state and year after 1800 (5.6-fold increase compared with mean of 0.09)

TABLE 3 – OLS: HISTORICALLY POPULAR AND LONG-LIVED NEW OPERAS PREMIERED PER YEAR AND STATE, 1781-1820

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Historically popular operas (1-4) <i>Annals of Operas</i>				Long-lived operas (5-8) <i>Amazon</i>			
	Number (1-2)		Share (3-4)		Number (5-6)		Share (7-8)	
Lombardy & Venetia * post	0.407*** (0.152)	0.401*** (0.153)	0.104** (0.047)	0.101** (0.047)	0.280** (0.129)	0.275** (0.130)	0.069** (0.033)	0.067** (0.033)
Lombardy & Venetia		0.041 (0.067)		-0.015 (0.035)		-0.000 (0.028)		-0.014 (0.014)
State FE	Yes	No	Yes	No	Yes	No	Yes	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pre-1801 mean	0.094	0.094	0.055	0.055	0.025	0.025	0.051	0.051
N (year-state pair)	320	320	320	320	320	320	320	320
R-squared	0.342	0.297	0.245	0.217	0.360	0.299	0.297	0.224

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Copyrights also increased average quality

10.4% increase in share of popular quality (1.9 fold increase compared with 5.5 popular in 100 operas until 1800)

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State FE	Yes	No	Yes	No	Yes	No	Yes	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pre-1801 mean	0.094	0.094	0.055	0.055	0.025	0.025	0.051	0.051
N (year-state pair)	320	320	320	320	320	320	320	320
R-squared	0.342	0.297	0.245	0.217	0.360	0.299	0.297	0.224

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Operas with copyrights performed more frequently:
0.93 additional performances after 1800 (165% more)

TABLE A6 –OLS AND QML POISSON REGRESSIONS WITH COUNTS OF REPEAT PERFORMANCES
DEPENDENT VARIABLE IS NUMBER OF REPEAT PERFORMANCES 1781-1820

	(1)	(2)	(3)	(4)	(5)	(6)
	Total Count of Repeat Performances (1-3)			Repeat Performances in the Year of the Premiere (4-6)		
	OLS (1-2)	Poisson ATE (3)	OLS (4-5)	Poisson ATE (6)		
Lombardy & Venetia *	0.933** (0.439)	1.110** (0.457)	2.661*** (0.000)	9.577*** (2.181)	9.122** (2.358)	1.715*** (0.000)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pre-1801 mean	1.54	1.54	1.54	2.69	2.69	2.69
N (year-state pair)	320	320	320	320	320	320
R-squared	0.888	0.852		0.990	0.988	

More likely to be a “hit”:

Operas with copyrights had 9.6 additional performances in their first year (3.8 fold increase compared with mean of 2.7)

TABLE A6 –OLS AND QML POISSON REGRESSIONS WITH COUNTS OF REPEAT PERFORMANCES
DEPENDENT VARIABLE IS NUMBER OF REPEAT PERFORMANCES 1781-1820

	(1)	(2)	(3)	(4)	(5)	(6)
	Total Count of Repeat Performances (1-3)			Repeat Performances in the Year of the Premiere (4-6)		
	OLS (1-2)		Poisson ATE (3)	OLS (4-5)		Poisson ATE (6)
Lombardy & Venetia *	0.933** (0.439)	1.110** (0.457)	2.661*** (0.000)	9.577*** (2.181)	9.122** (2.358)	1.715*** (0.000)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pre-1801 mean	1.54	1.54	1.54	2.69	2.69	2.69
N (year-state pair)	320	320	320	320	320	320
R-squared	0.888	0.852		0.990	0.988	

With copyrights, operas become more durable

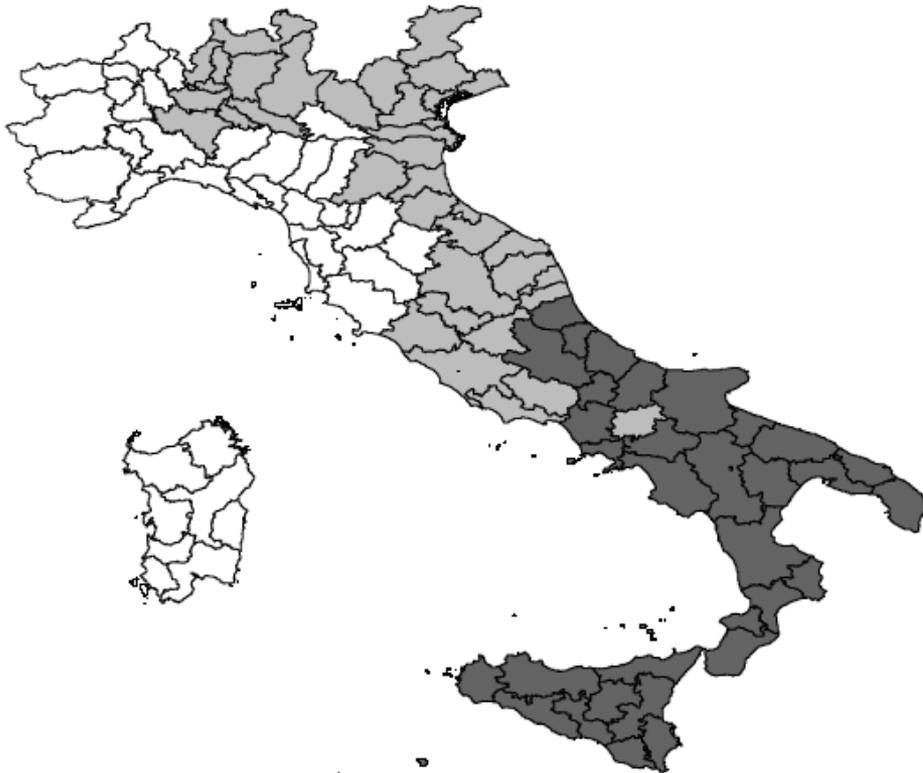
Under copyrights, L&V created 0.3 additional long-lived operas per year (10-fold increase)

TABLE 3 – OLS: HISTORICALLY POPULAR AND LONG-LIVED NEW OPERAS PREMIERED PER YEAR AND STATE, 1781-1820

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Historically popular operas (1-4) <i>Annals of Operas</i>				Long-lived operas (5-8) <i>Amazon</i>			
	Number (1-2)		Share (3-4)		Number (5-6)		Share (7-8)	
Lombardy & Venetia * post	0.407*** (0.152)	0.401*** (0.153)	0.104** (0.047)	0.101** (0.047)	0.280** (0.129)	0.275** (0.130)	0.069** (0.033)	0.067** (0.033)
Lombardy & Venetia		0.041 (0.067)		-0.015 (0.035)		-0.000 (0.028)		-0.014 (0.014)
State FE	Yes	No	Yes	No	Yes	No	Yes	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pre-1801 mean	0.094	0.094	0.055	0.055	0.025	0.025	0.051	0.051
N (year-state pair)	320	320	320	320	320	320	320	320
R-squared	0.342	0.297	0.245	0.217	0.360	0.299	0.297	0.224

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Papal State and Two Sicilies adopt copyrights in 1826 and 1828



■ Life+30
■ Life+10
■ No copyright

- September 28, 1826, edict of Pope Leo XII (Editto n. 433, Stato Pontificio)
 - life + 12
- 1828 Decree of King Francesco Two Sicilies
 - life + 30

Other states adopted copyrights between 1826 and 1840

TABLE A8 – LENGTH OF COPYRIGHT AND COUNTS OF NEW OPERAS CREATED PER STATE AND YEAR, 1770-1900

	1770-1800	1801-1825	1826-1827	1828-1839	1840-1864	1865-1869	1870-1900
Sardinia	no copyright 0.45 operas	no copyright 1.52 operas	no copyright 1.00 operas	no copyright 2.50 operas	life+30y 2.96 operas	life+40y 2.80 operas	life+40y 4.06 operas
Modena	no copyright 0.03 operas	no copyright 0.20 operas	no copyright 2.00 operas	no copyright 0.33 operas	life+30y 0.48 operas	life+40y 0.00 operas	life+40y 0.48 operas
Parma	no copyright 0.23 operas	no copyright 0.28 operas	no copyright 0.00 operas	no copyright 0.42 operas	life+30y 0.36 operas	life+40y 0.60 operas	life+40y 0.45 operas
Tuscany	no copyright 0.19 operas	no copyright 0.92 operas	no copyright 2.00 operas	no copyright 2.58 operas	life+30y 2.08 operas	life+40y 2.40 operas	life+40y 2.71 operas
Lombardy	no copyright 0.23 operas	life+10y 5.04 operas	life+10y 6.00 operas	life+10y 6.17 operas	life+30y 4.96 operas	life+40y 5.60 operas	life+40y 5.03 operas
Venetia	no copyright 1.16 operas	life+10y 3.44 operas	life+10y 2.00 operas	life+10y 2.92 operas	life+30y 2.52 operas	life+40y 0.60 operas	life+40y 1.77 operas
Papal State	no copyright 0.65 operas	no copyright 3.4 operas	life+12y 3.00 operas	life+12y 1.91 operas	life+30y 2.60 operas	life+30y 3.20 operas	life+40y 3.65 operas
Sicily	no copyright 2.06 operas	no copyright 4.60 operas	no copyright 12.00 operas	life+30 17.08 operas	life+30y 9.28 operas	life+40y 4.80 operas	life+40y 4.55 operas

Adopt copyright as part of political process towards unified Italy

- States politically close to Sardinia adopted *life+30* when they co-signed Sardinia's Bilateral Treaty with Austria in 1840
- In Sicily authors – and not composers – lobbied for the adoption of copyrights for *life+30* in 1828

States with copyrights created 2.7 new operas per state and year (2.3-fold increase compared with mean of 1.2)

TABLE 4 – ALL OF ITALY, 1770-1900, DEPENDENT VARIABLE IS NEW OPERAS PER STATE AND YEAR

	(1)	(2)	(3)	(4)
	OLS	Poisson ATE	Historically popular <i>Annals of Operas</i>	Long-lived operas <i>Amazon</i>
Copyright	2.683*** (0.436)	0.952*** (0.149)	0.188* (0.098)	0.327*** (0.111)
State FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Pre-copyright mean	1.173	1.173	0.123	0.105
Observations	1,048	1,048	1,048	1,048
R-squared	0.706		0.370	0.350

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

What are effects of copyright extensions?

- Copyright *extensions*
 - Longer copyright terms, beyond initial adoptions
- Debated topic of copyright policies today
- E.g., Sonny Bono Copyright Term Extension Act
 - Aka Mickey Mouse Protection Act
 - From life + 50 to life+70 years for individuals
 - From 75 to 95 years for corporate owners

FIGURE 4 – PERFORMANCES IN THE FIRST 100 YEARS AFTER THE PREMIERE OF AN OPERA FOR ALL 8 STATES AND OPERAS THAT PREMIERED 1781-1800

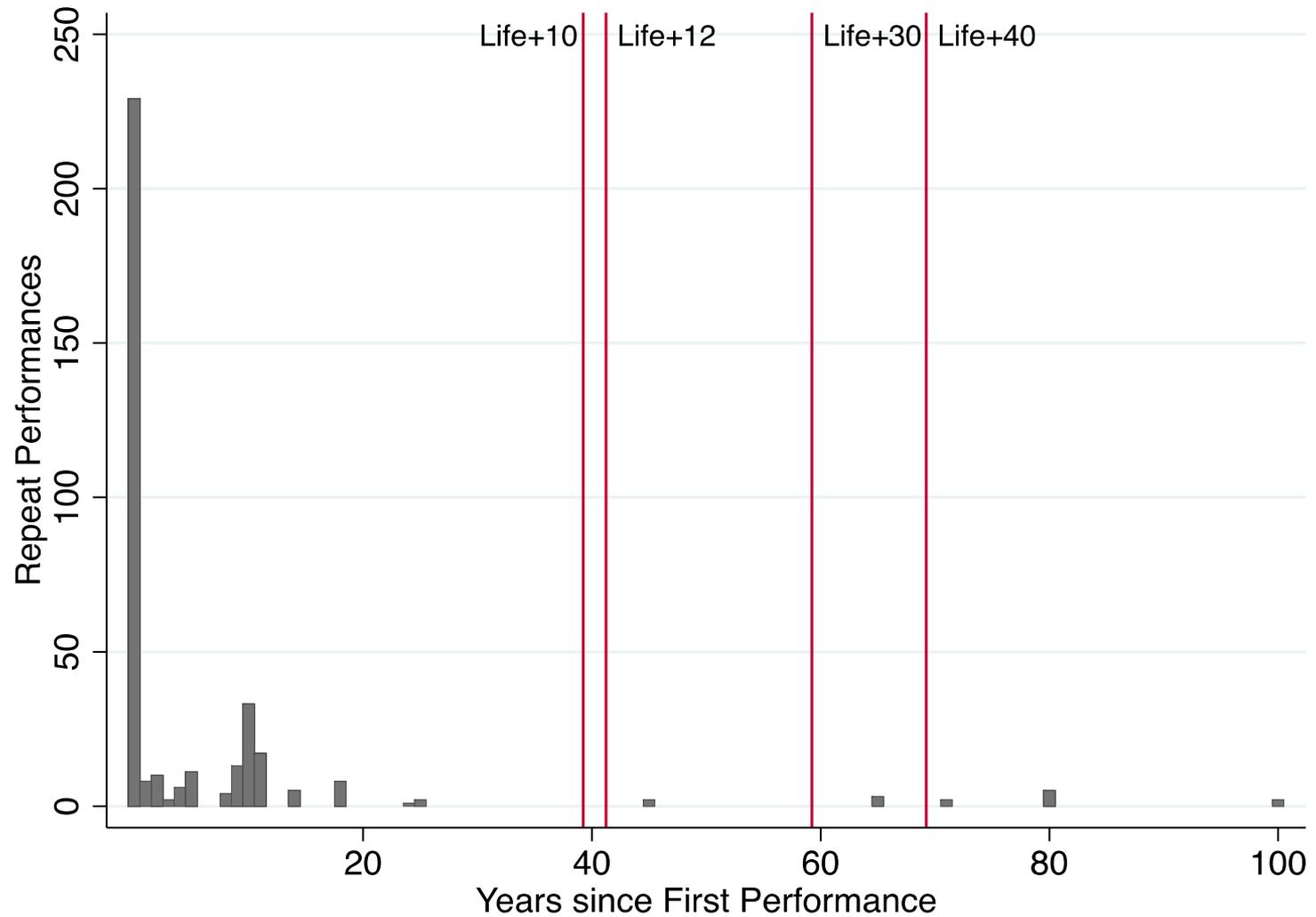
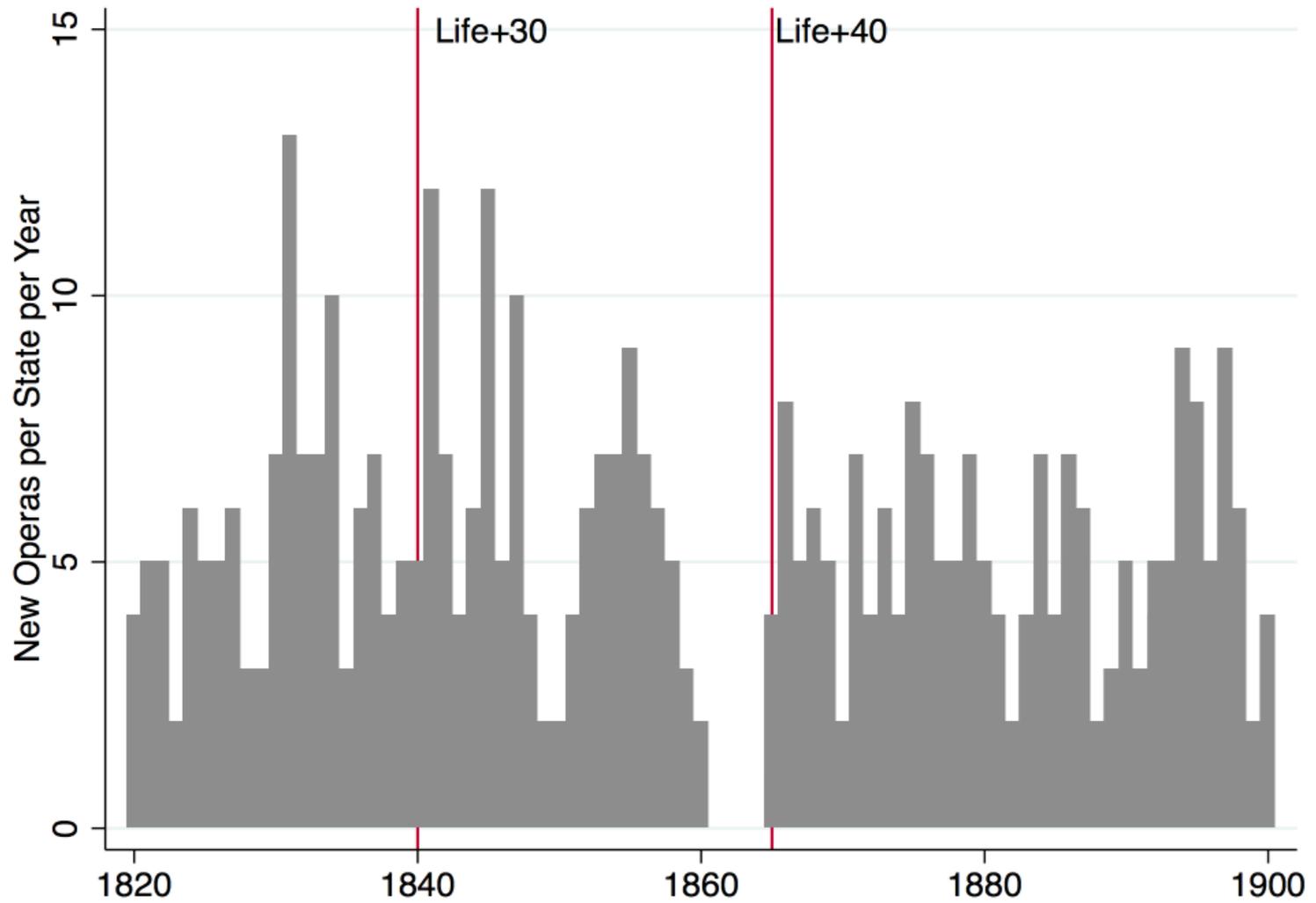


FIGURE 5 – NEW OPERAS PREMIERED PER STATE AND YEAR
IN LOMBARDY AND VENETIA, 1820-1900



Migration

- In the absence of copyrights, Italian composers moved abroad
 - Domenico Cimarosa and Giovanni Paisielli
- Lower tax rates help to attract superstar inventors to countries (Akcigit, Baslandze, and Stantcheva 2016) and US states with more favorable terms (Moretti and Wilson 2016)
- Lombardy and Venetia was not a recipient of significant migration between 1750 and 1850 (Romani 1955)
- But biographical evidence for individual composers suggests that immigrants made significant contributions to opera in Lombardy and Venetia after 1801

Saverio Mercadante: born in Altamura (Sicily) in 1795

- Moved to Naples in 1819
 - First opera *L'apoteosi di Ercole* (1819)
- Moved to L&V where he composed:
 - *Elisa e Claudio* (Milan, 1820)
 - *Il Posto Abbandonato* (Milan, 1821)
 - *Andronico* (Venice, 1821)



Vincenzo Bellini: b in Catania (Sicily in 1801)

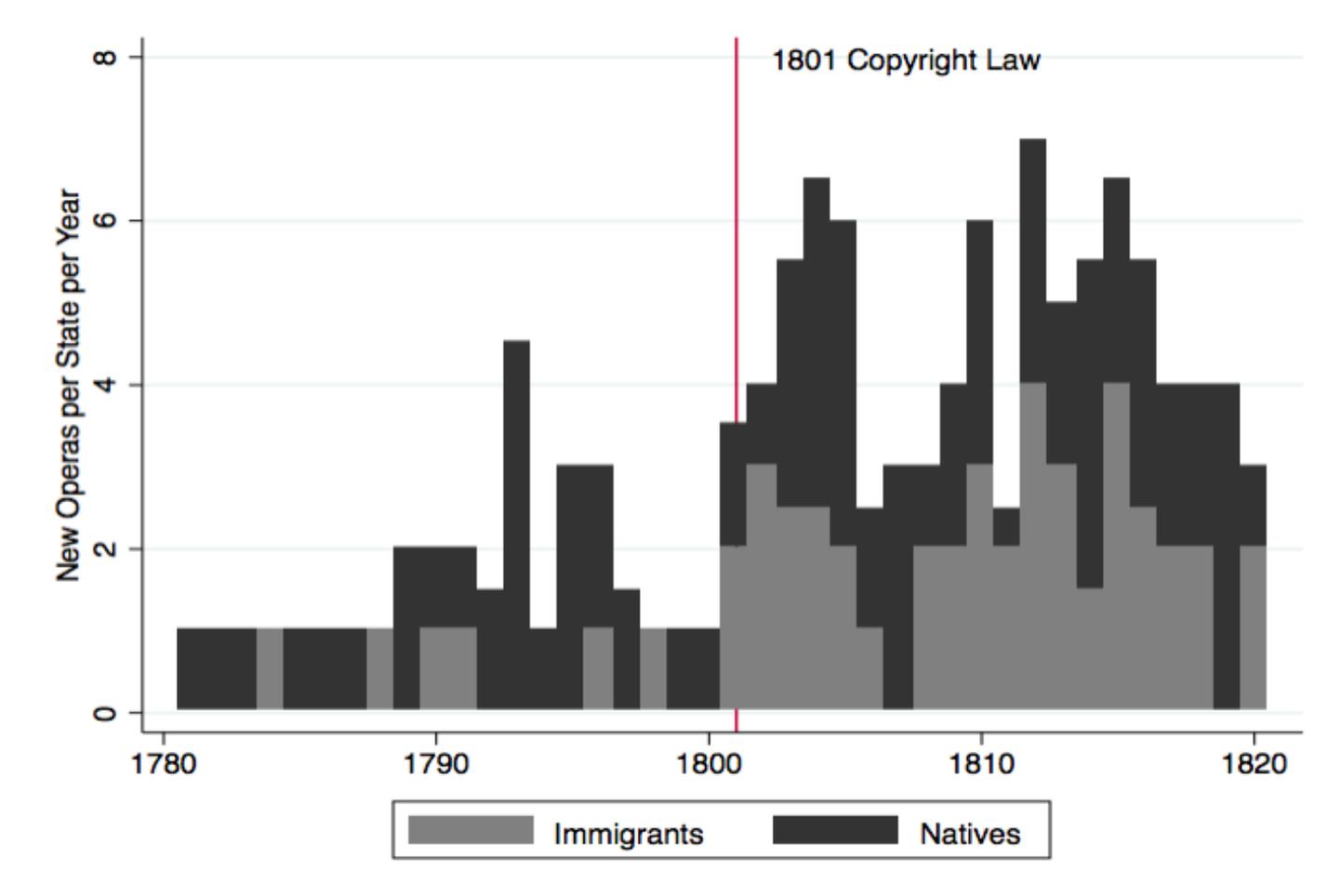
- Moved to Naples where he composed his first opera *Adelson e Salvini* (1824)
- Moved to Milan in 1825:
 - *Il Pirata* (1827, L A)
 - *La Straniera* (1829 L A)
 - *I Capuleti e I Montecchi* (1830 L A) premiered in Venice
 - *La Sonnambula* (1831 L)
 - *La Norma* (1831 L)



In L&V output by immigrants

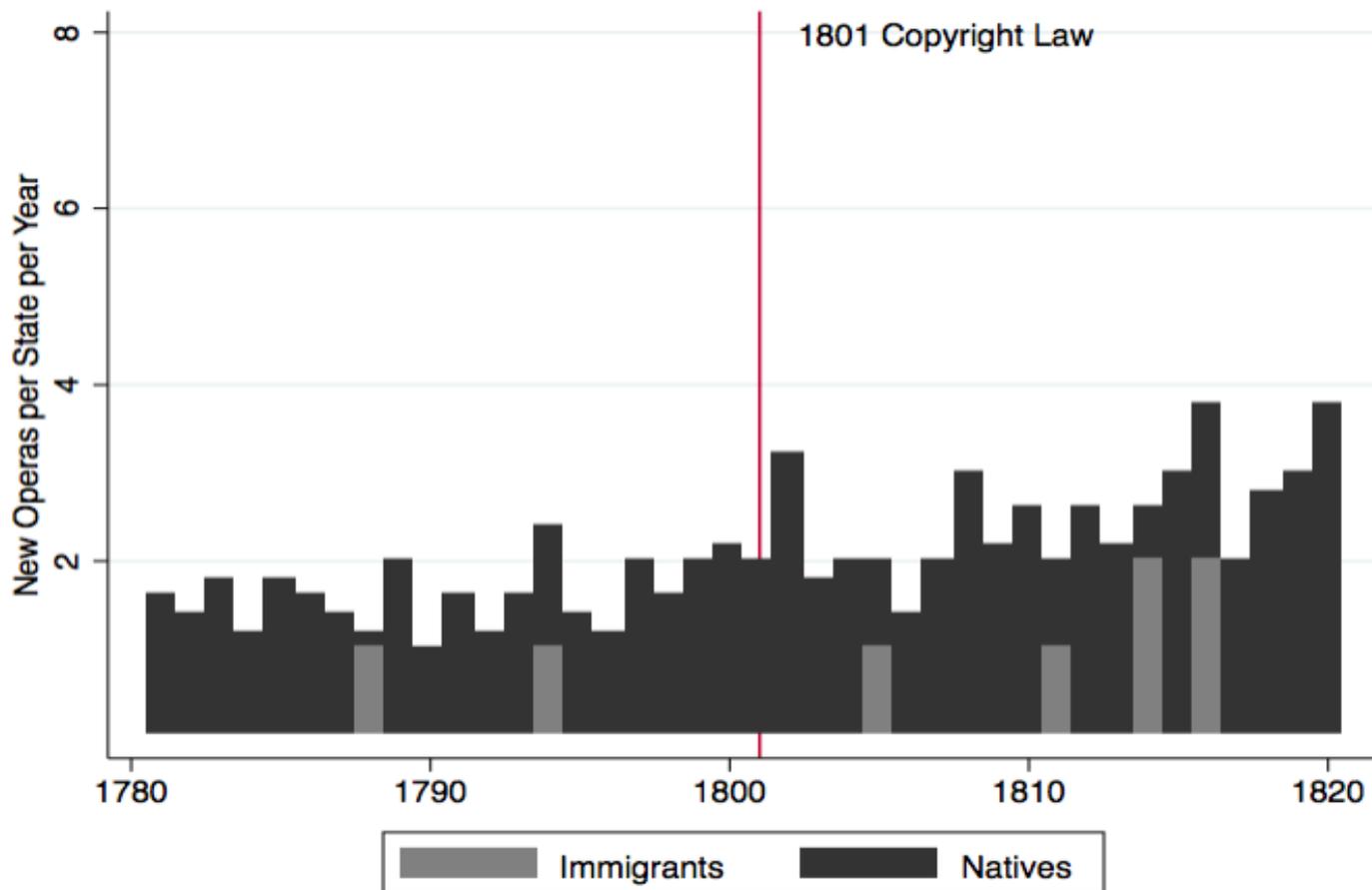
increased 7.4-fold to 2.1 new operas per state and year

FIGURE 6 – NEW OPERAS PER STATE PER YEAR, IMMIGRANTS VS NATIVES, 1780-1821
PANEL A: LOMBARDY AND VENETIA



In other states output by immigrants increased 1.7-fold (to 0.3 new operas per state and year)

FIGURE 6 – NEW OPERAS PER STATE PER YEAR, IMMIGRANTS VS NATIVES, 1780-1821
PANEL B: OTHER STATES

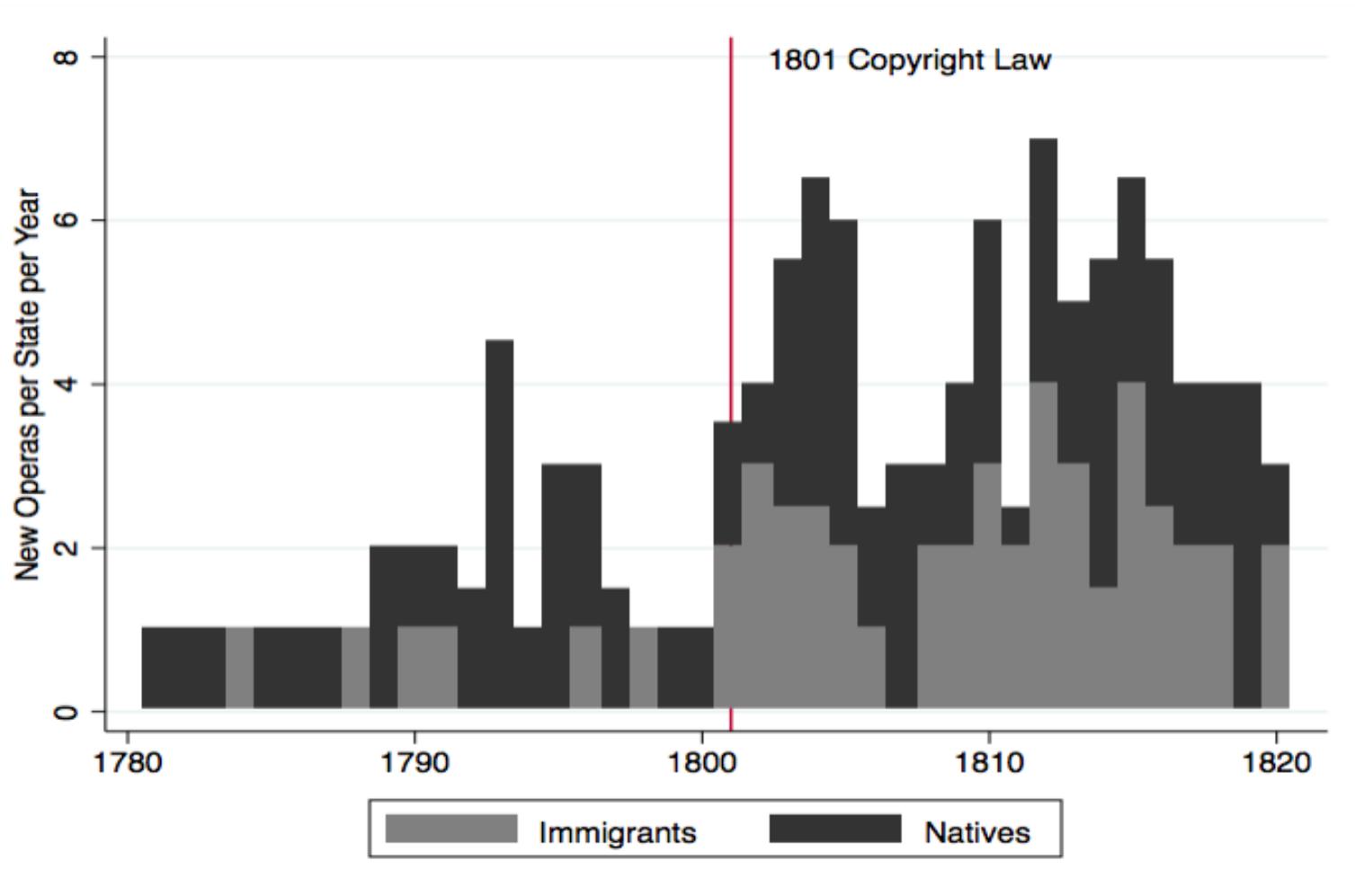


Native composers were exposed to both positive and negative productivity shocks

- + Copyright laws strengthened incentives to create more and better work
- + Arrival of immigrants may have created knowledge spillovers and other agglomeration externalities (e.g., by increasing the supply of trained musicians)
- Natives had to compete with immigrants for opportunities to perform

In Lombardy & Venetia opera by natives increased 2.8 fold to 4.5 new operas per state and year

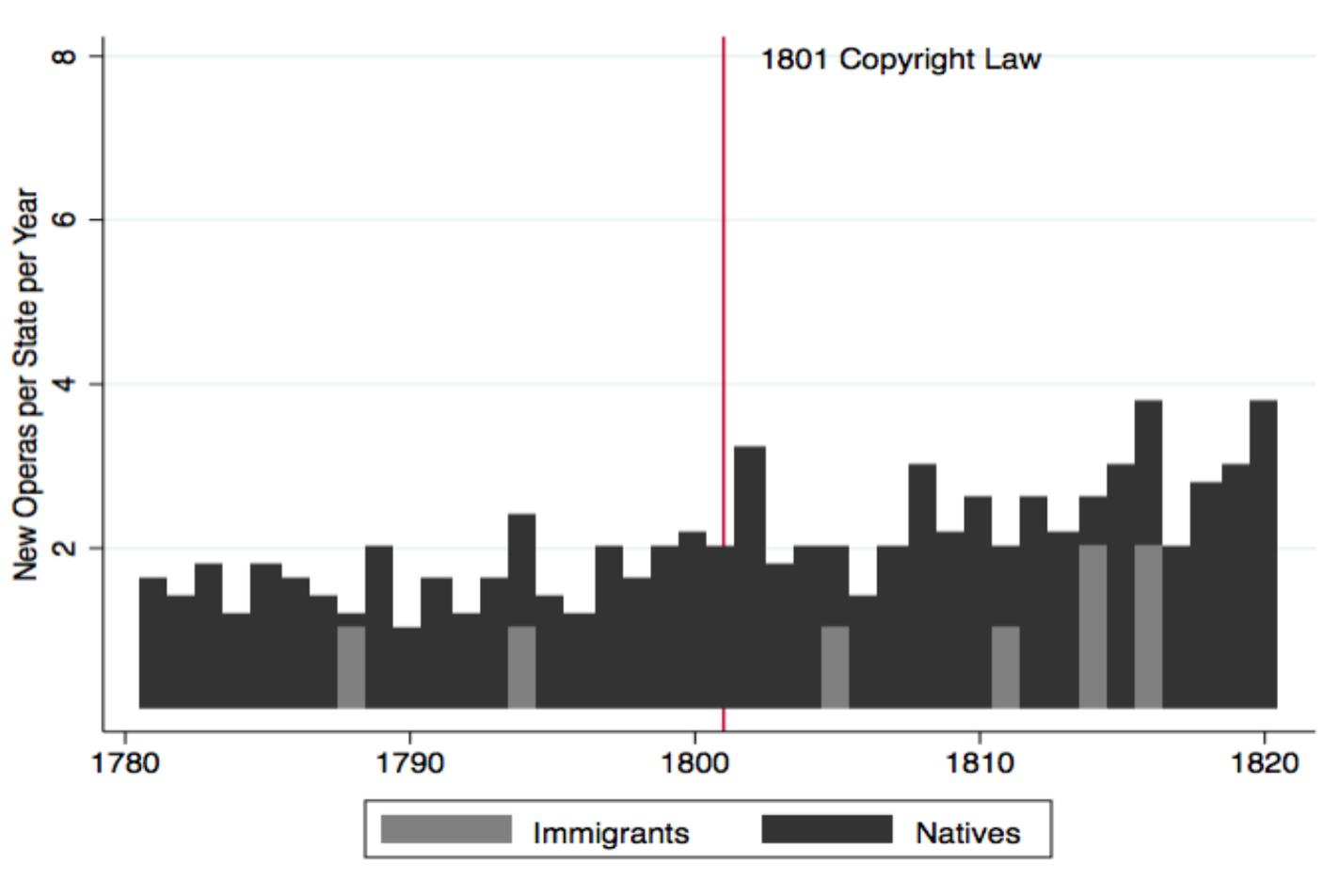
FIGURE 6 – NEW OPERAS PER STATE PER YEAR, IMMIGRANTS VS NATIVES, 1780-1821
PANEL A: LOMBARDY AND VENETIA



In other states

opera output by natives increased 1.6-fold into 2.5

FIGURE 6 – NEW OPERAS PER STATE PER YEAR, IMMIGRANTS VS. NATIVES, 1780-1821
PANEL B: OTHER STATES



Based on a small sample,
diff-in-diff estimates suggest negative effects

TABLE 6 – OLS AND QML POISSON REGRESSIONS,
DEPENDENT VARIABLE IS NEW OPERAS PER STATE AND YEAR BY IMMIGRANTS AND NATIVES, 1781-1820

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Immigrants (1-4)				Natives (5-8)			
	OLS (1-3)			Poisson ATE (4)	OLS (5-7)			Poisson ATE (8)
Lombardy & Venetia * post	2.240*** (0.318)	2.035*** (0.461)	1.928*** (0.445)	1.231*** (0.206)	-1.580* (0.940)	-1.634 (1.751)	-1.106 (3.320)	-0.486*** (0.000)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Linear pre-trend for L&V	No	Yes	No	No	No	Yes	No	No
State-specific linear pre-trend	No	No	Yes	No	No	No	Yes	No
Pre-1801 mean	1.133	1.133	1.133	1.133	2.057	2.057	2.057	2.057
N (year-state pairs)	291	291	291	291	87	87	87	87
R-squared	0.844	0.844	0.859		0.879	0.879	0.880	

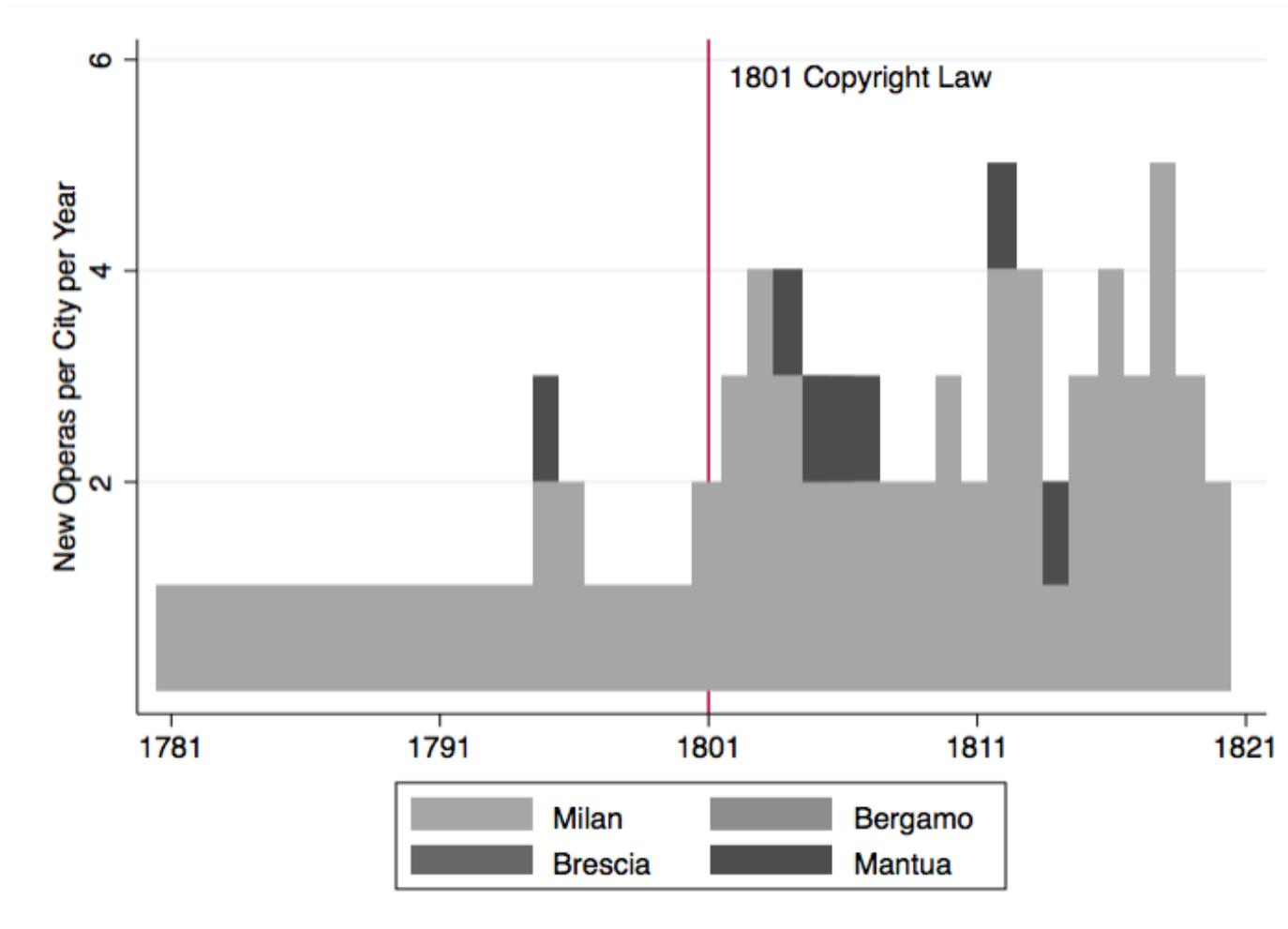
Robust standard errors. *** p<0.01, ** p<0.05, * p<0.1

Outline

- Historical background
- Data
 - New operas in Italy, 1770-1900
 - Historically popular operas
 - Durable operas
- Results
 - L&V vs. other Italian states
 - Time-varying effects and controls for pre-trends
 - Controlling for quality
 - OLS regressions for all of Italy, 1770-1900
 - Effects of Copyright Extensions
- Migration
- Interactions between copyrights and demand
- Conclusions

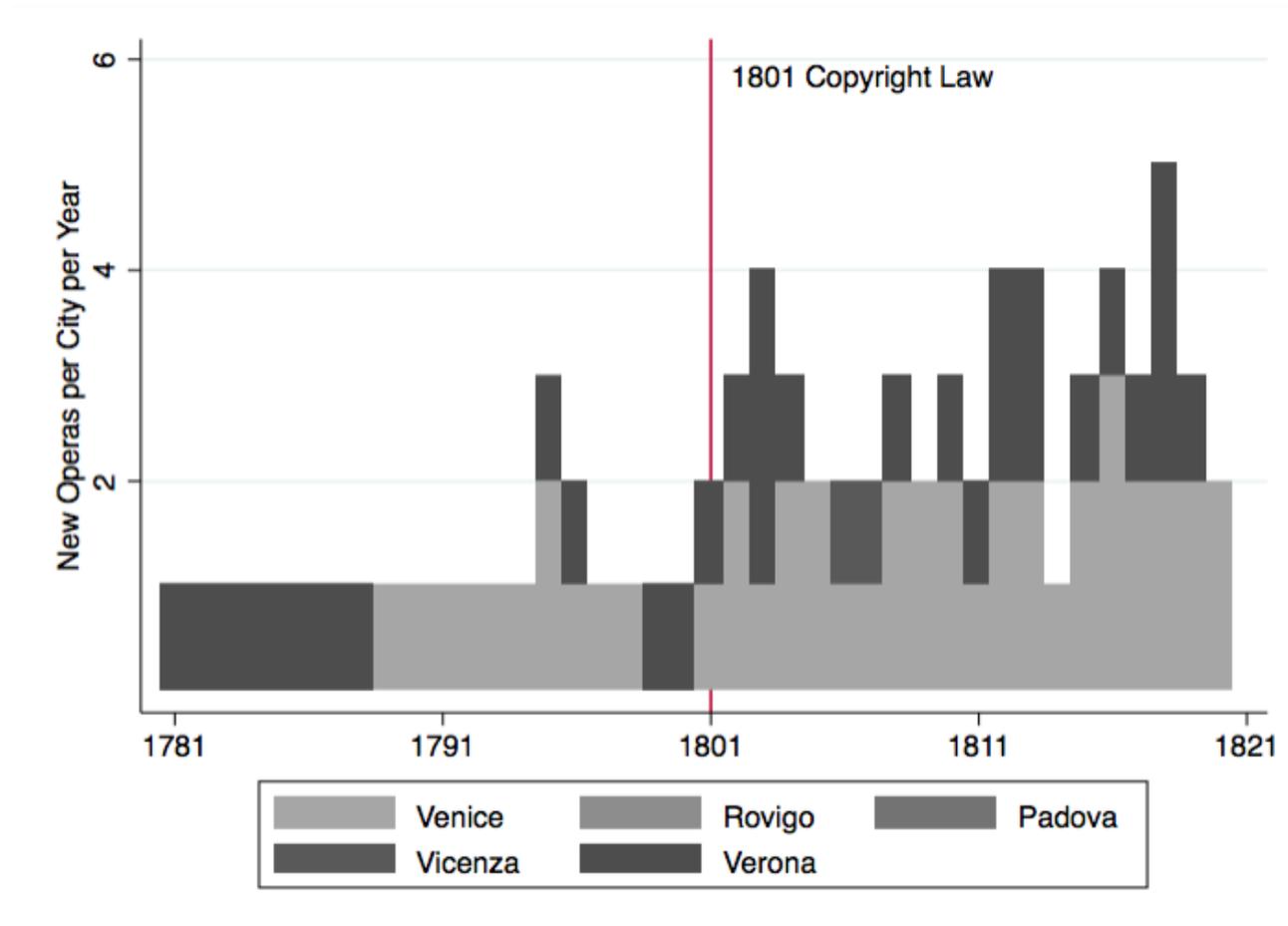
Within Lombardy, increase in opera production was concentrated in Milan

FIGURE 7 – NEW OPERAS PER CITY AND YEAR, 1781-1820
PANEL A: LOMBARDY



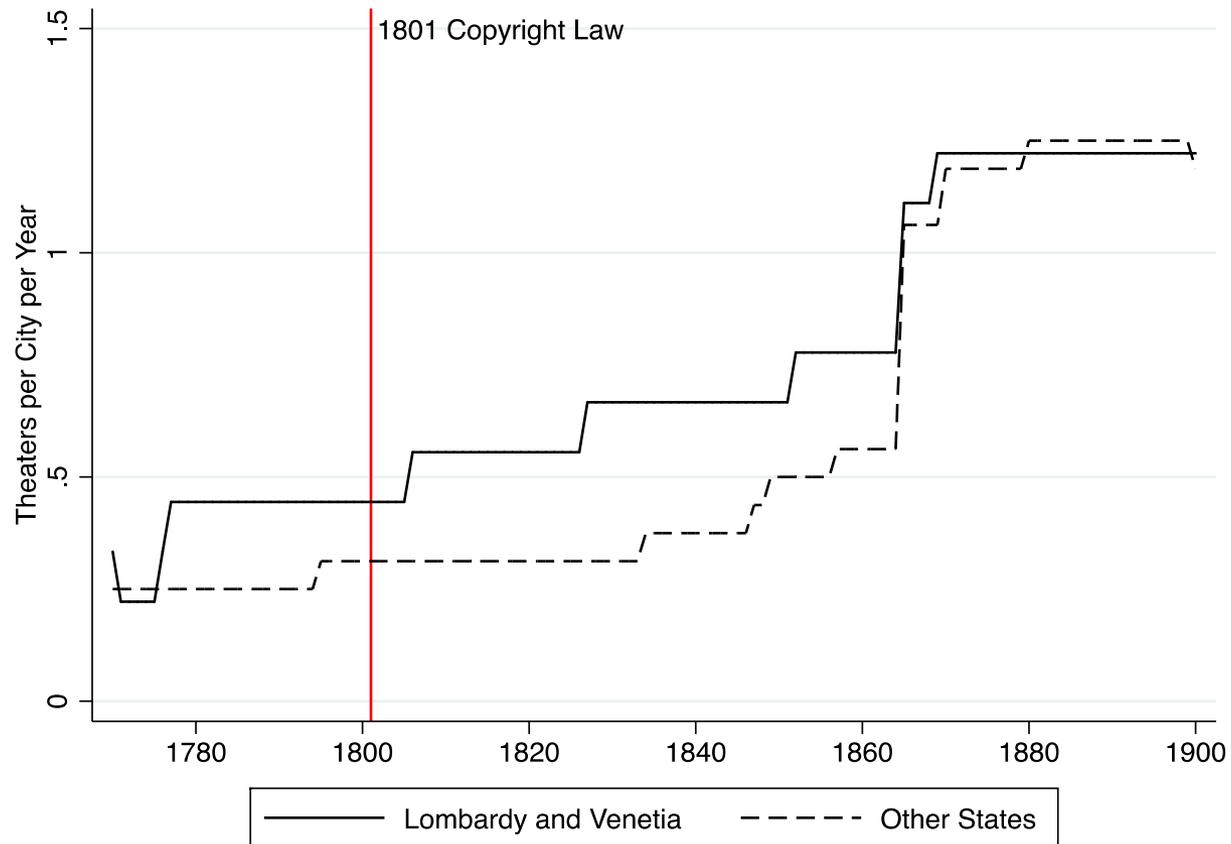
City-level data for Venetia also indicate geographic concentration, albeit at a smaller scale

PANEL B: VENETIA



Theaters and theater seat as a proxy for demand

FIGURE 8 – AVERAGE NUMBER OF THEATERS PER CITY PER YEAR, 1770-1900



Cities with 2+ theaters in 1800 created 2.1 additional operas per year in response to copyrights (7-fold increase)

TABLE A10 – CITY-LEVEL REGRESSIONS WITH INTERACTIONS FOR THEATERS' SEATS IN 1800
DEPENDENT VARIABLE IS NEW OPERAS PER CITY AND YEAR, 1781-1820

	(1)	(2)	(3)	(4)	(5)	(6)
	All Operas (1-2)		Historically popular operas <i>Annals of Opera</i> (3-4)		Long-lived operas <i>Amazon</i> (5-6)	
Lombardy & Venetia	-0.260*** (0.067)	-0.258** (0.130)	-0.025 (0.019)	-0.038 (0.023)	-0.022 (0.021)	-0.012 (0.023)
Lombardy & Venetia * post	2.016*** (0.301)	2.016*** (0.301)	0.240 (0.163)	0.240 (0.163)	0.251* (0.144)	0.251* (0.144)
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Linear pre-trend for L&V	No	Yes	No	Yes	No	Yes
Pre-1801 mean	0.253	0.253	0.017	0.017	0.007	0.007
N (year-city pair)	1,050	1,050	844	844	841	841
R-squared	0.632	0.632	0.237	0.237	0.294	0.294

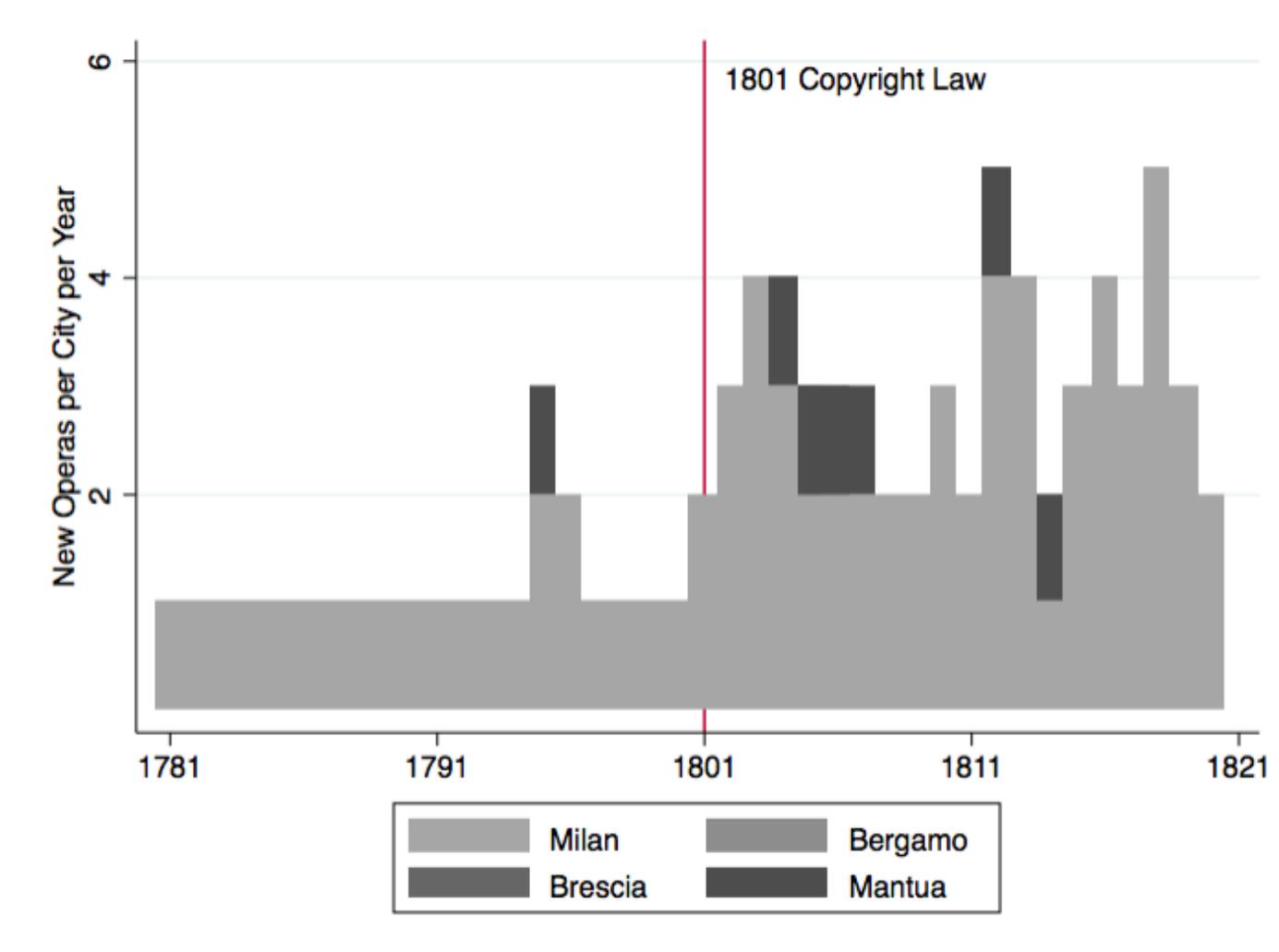
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Conclusions

- Adoption of copyrights can encourage creativity
 - 150% more new operas
 - 4.4- fold increase in historically popular operas: 10-fold increase in durable operas
- By comparison, much weaker benefits from copyright extensions
- Existence of copyrights helped to attract productive immigrants
 - Mitigate outmigration
- Cities with more pre-existing demand benefitted more
- Copyright as an alternative type of IP
 - Encourage creativity whereas patents do not
 - Key difference: narrow property right

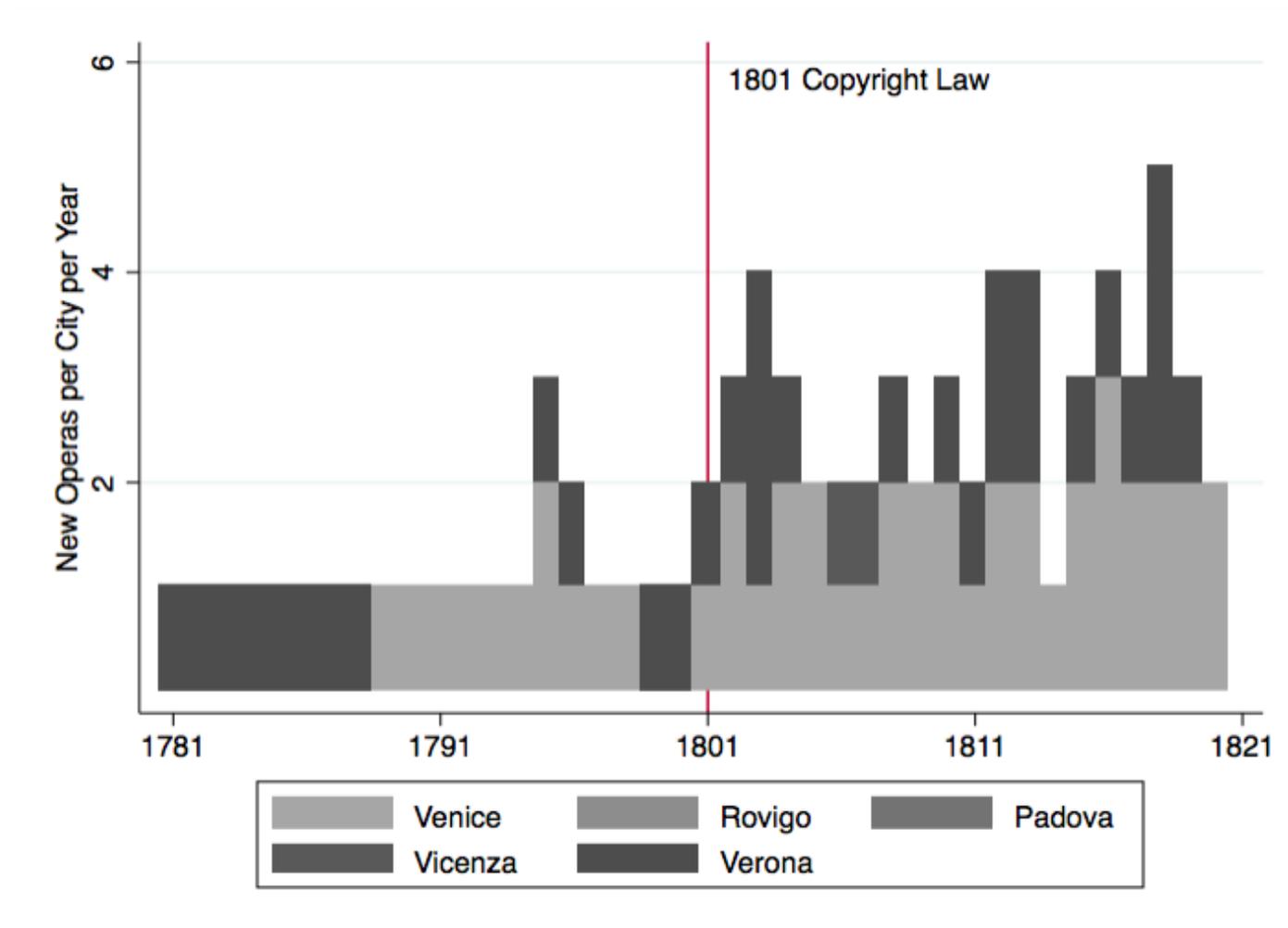
Lombardy: Significant increase in output after 1801 – concentrated almost exclusively in Milan

FIGURE 7 – NEW OPERAS PER CITY AND YEAR, 1780-1821
PANEL A: LOMBARDY

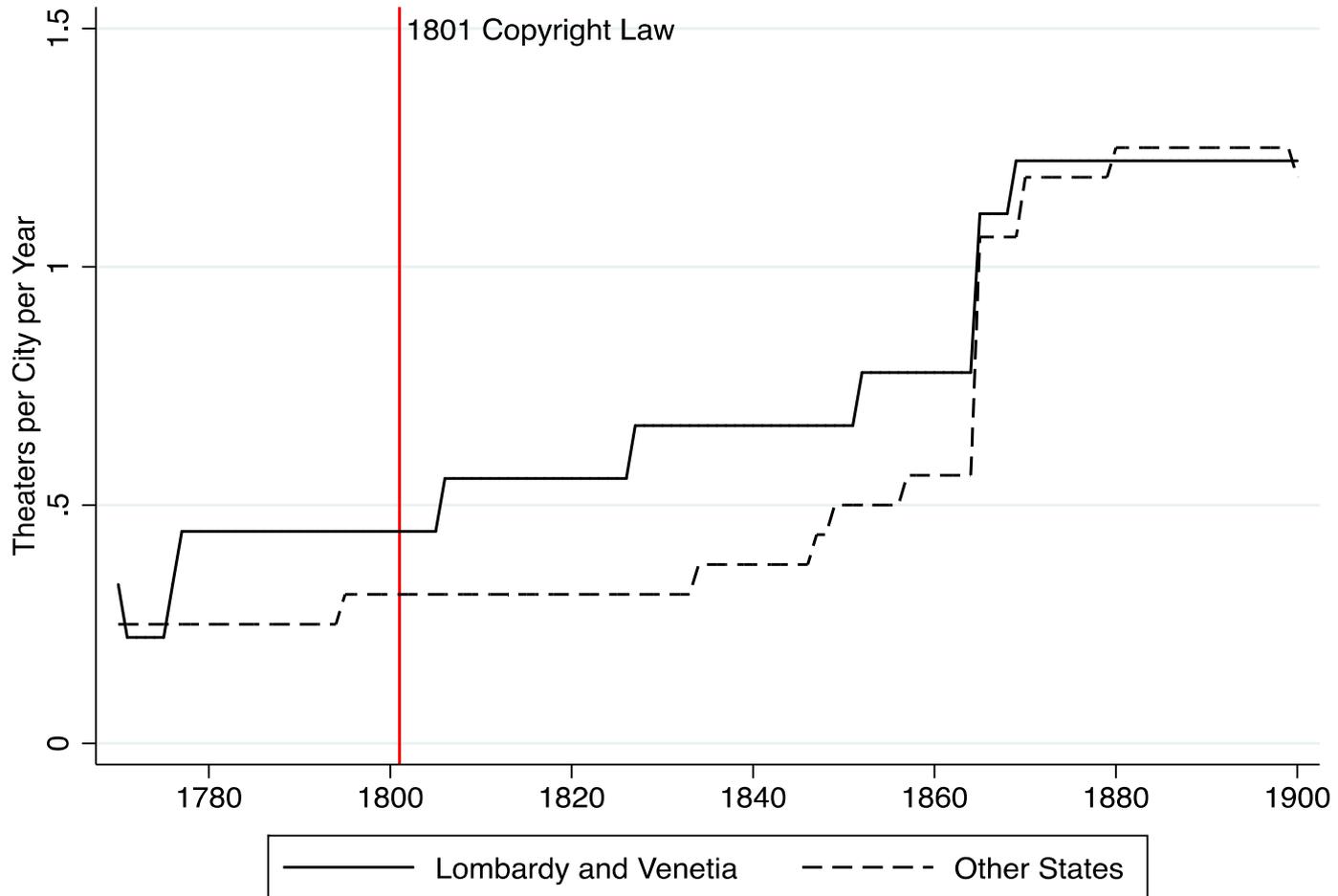


Venetia: Significant increase in output after 1801 - concentrated in Venice

FIGURE 7 – NEW OPERAS PER CITY AND YEAR, 1780-1821
PANEL B: VENETIA



Theaters as a proxy for demand: Significant changes after unification in 1861



Cities with more than two theaters produce on average
2.1 operas per year more than city with one or no
theaters (a 8-fold increase)

TABLE 7 – CITY-LEVEL REGRESSIONS WITH INTERACTIONS FOR PRE-EXISTING INFRASTRUCTURE
DEPENDENT VARIABLE IS NEW OPERAS PER CITY AND YEAR, 1781-1820

	(1)	(2)	(3)	(4)	(5)	(6)
	All Operas (1-2)		Historically popular operas <i>Annals of Opera</i> (3-4)		Long-lived operas <i>Amazon</i> (5-6)	
Lombardy & Venetia*post	0.412*** (0.128)	0.414** (0.183)	0.021 (0.024)	0.011 (0.028)	0.036 (0.029)	0.041 (0.036)
L&V * post * 2 theaters	2.120*** (0.321)	2.118*** (0.328)	0.289** (0.227)	0.298** (0.120)	0.392* (0.229)	0.388* (0.226)
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Linear pre-trend for L&V	No	Yes	No	Yes	No	Yes
Pre-1801 mean	0.266	0.266	0.021	0.021	0.007	0.007
N (year-city pair)	1,050	1,050	846	846	843	843
R-squared	0.589	0.589	0.315	0.315	0.331	0.331
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						

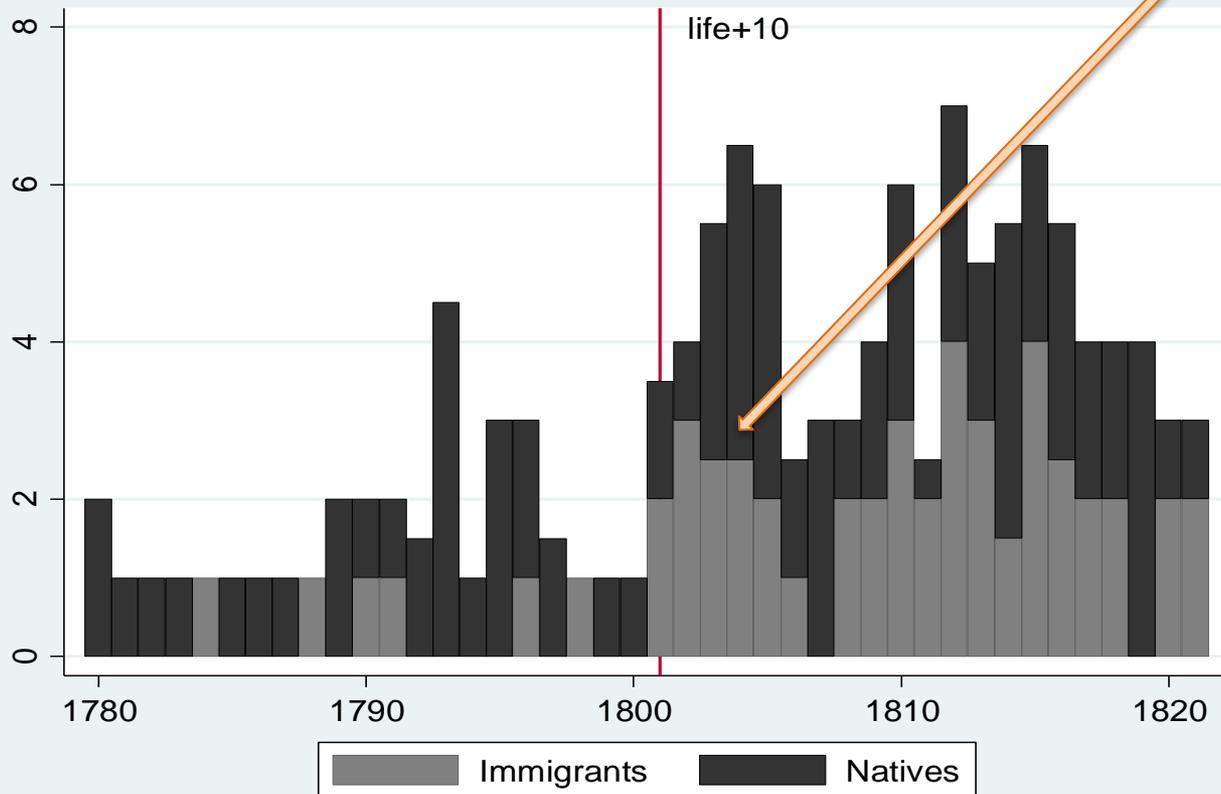
Conclusions

- Adoption of copyrights can encourage creativity
 - 150% more new operas
 - 4.4- fold increase in historically popular operas: 10-fold increase in durable operas
 - No evidence for differential increase in demand in L&V
- No significant effect of copyright extensions
- Mechanisms by which copyrights raise quantity and quality
 - Increased output by domestic (native) composers
 - Migrant composers move into states with copyrights
 - Property rights in repeat performances encourage quality
 - Composers who prefer quality produce fewer, better operas
 - Cities with better pre-existing infrastructure benefit more
- Copyright as an alternative type of IP
 - Encourage creativity whereas patents do not
 - Key difference: narrow property right

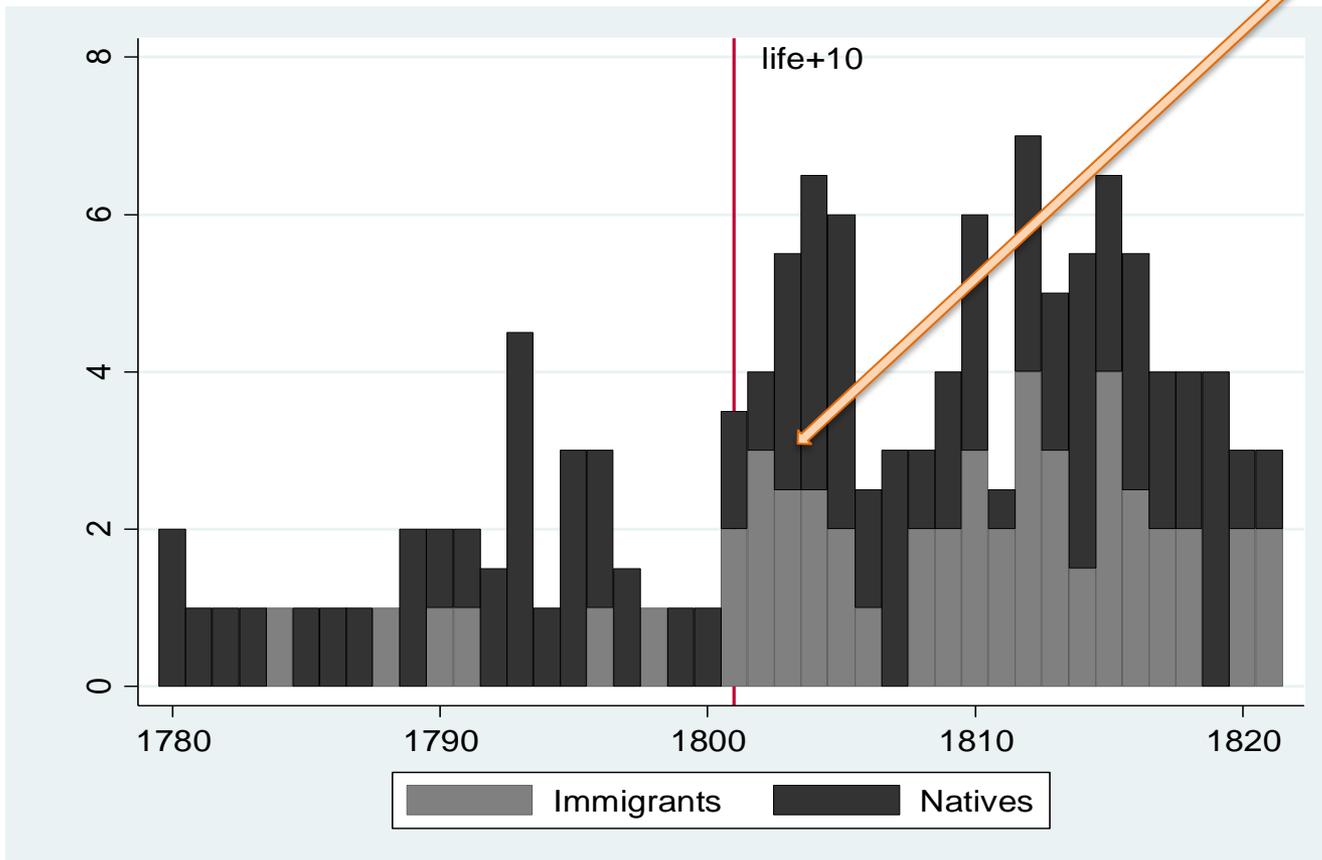
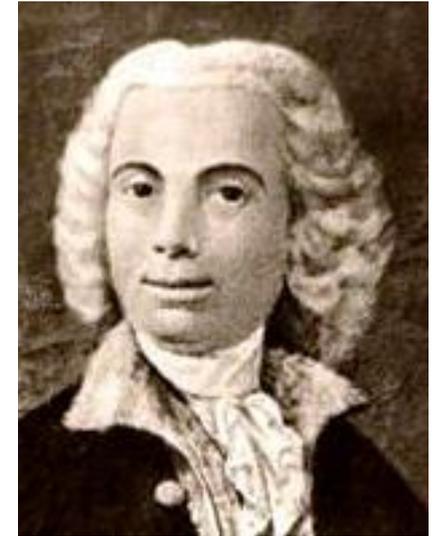
Pietro Generali

(b Masserano, K. Sardinia 1773, d. in 1832)

42 total operas, moved to Venice in 1804

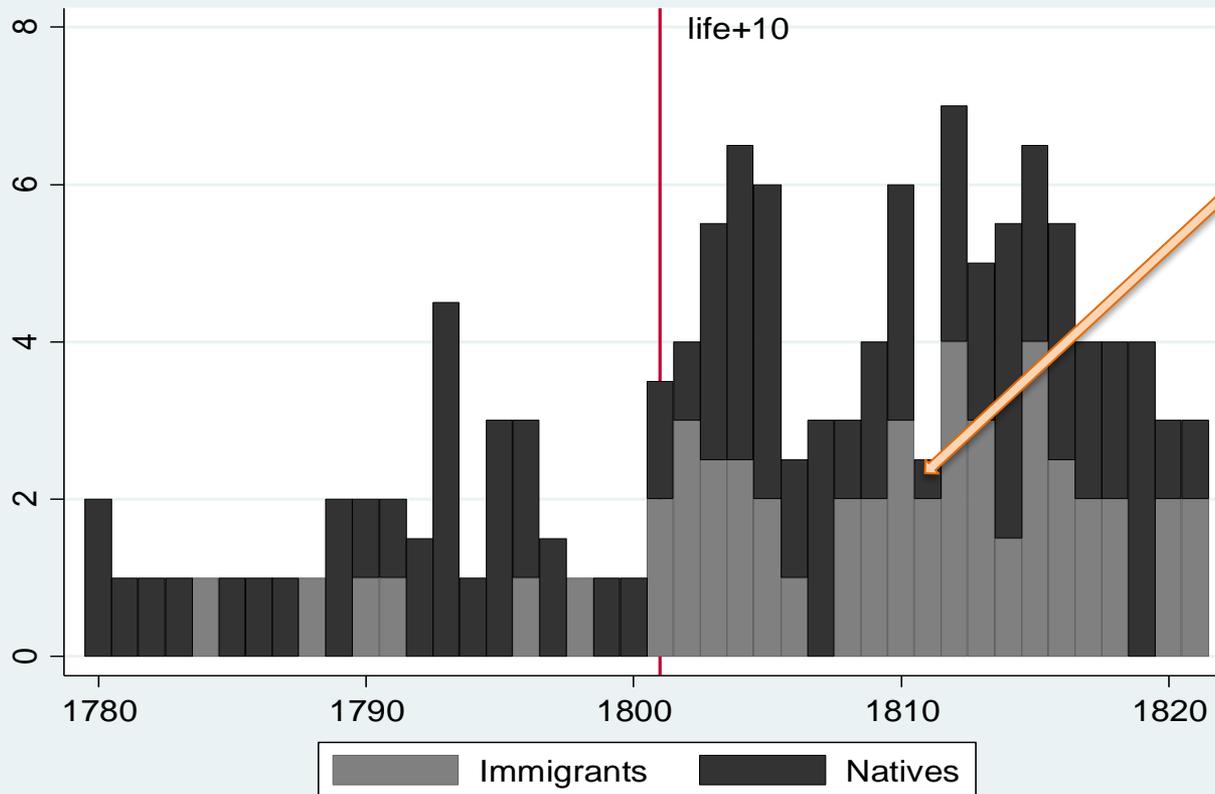


Giuseppe Farinelli (b. Este, Papal State 1769, d. 1836),
36 operas, moved to Venice in 1803



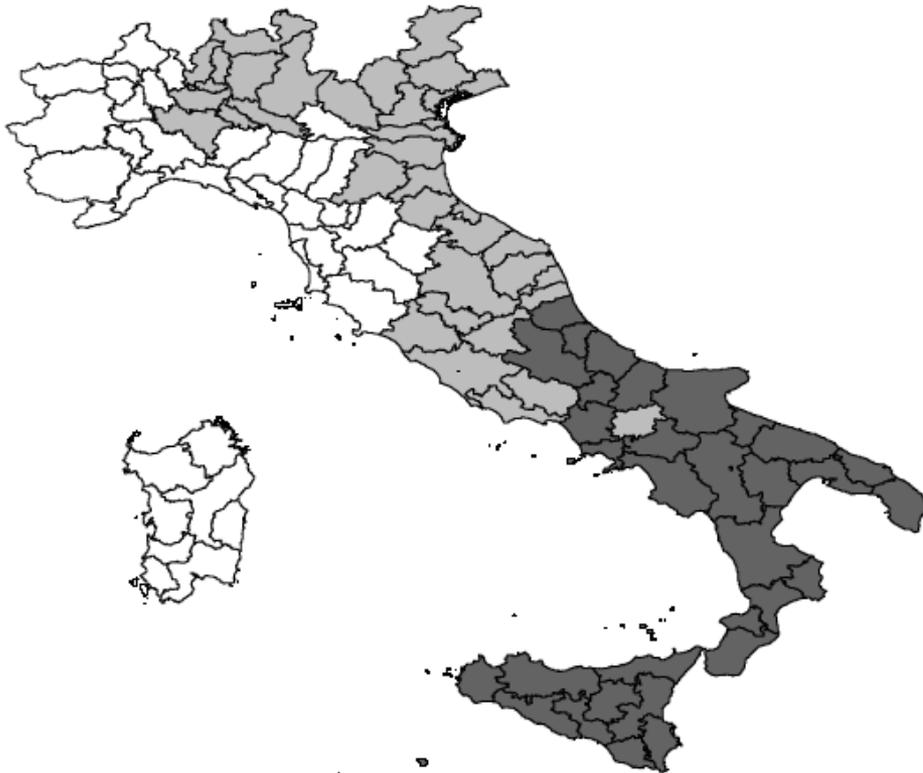
Gioacchino Rossini (b. Pesaro, Papal State, 1792, d. 1869)

32 total operas, moved to Milan in 1811



“Paisiello saw, perhaps, some twenty or thirty principal pieces of his hundred and fifty operas meet with general favour. Rossini could easily reckon upon a hundred in his thirty operas, really different from each other.” (Beyle 1824, p. 249)

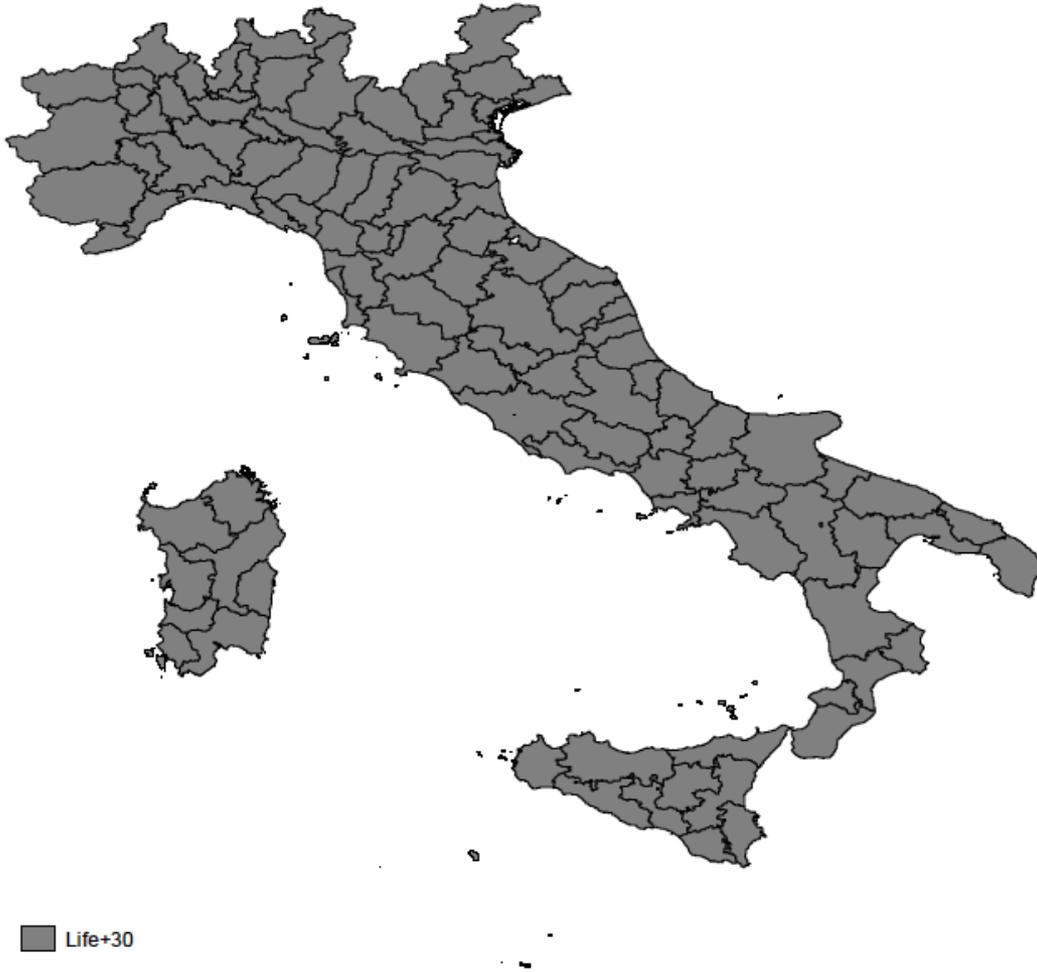
Papal State and Two Sicilies adopt copyrights in 1826 and 1828



■ Life+30
■ Life+10
■ No copyright

- September 28, 1826, edict of Pope Leo XII (Editto n. 433, Stato Pontificio)
 - life + 12
- 1828 Decree of King Francesco Two Sicilies
 - life + 30

Sardinia enters bilateral treaty w Austria in 1840



- Sardinia enters a copyright treaty with Austria on June 26, 1840
 - *Life + 30*
- Lombardy & Venetia, Papal State, Tuscany, Modena & Reggio, Parma & Piacenza join within weeks

States with copyright created 2.7 additional new operas per state per year (118 % more than states w/o copyrights)

TABLE 4 – ALL OF ITALY, 1770-1900, DEPENDENT VARIABLE IS NEW OPERAS PER STATE AND YEAR

	(1)	(2)	(3)	(4)
	OLS	Poisson ATE	Historically popular <i>Annals of Operas</i>	Long-lived operas <i>Amazon</i>
Copyright	2.683*** (0.436)	0.952*** (0.149)	0.188* (0.098)	0.327*** (0.111)
State FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Pre-copyright mean	1.173	1.173	0.123	0.105
Observations	1,048	1,048	1,048	1,048
R-squared	0.706		0.370	0.350

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Copyright extensions

TABLE 5 – EXTENSIONS OF COPYRIGHT LENGTH, 1770-1900

	(1)	(2)	(3)	(4)
	OLS	Poisson ATE	Historically popular <i>Annals of Operas</i>	Long-lived operas <i>Amazon</i>
Copyright Adoption	3.188*** (0.515)	1.078*** (0.129)	0.303*** (0.103)	0.403*** (0.122)
Extension beyond <i>life+10</i>	1.074*** (0.381)	-0.021 (0.180)	0.245*** (0.075)	0.162** (0.066)
Extension beyond <i>life+30</i>	-0.265 (0.753)	-0.266 (0.250)	-0.032 (0.249)	0.109** (0.053)
State FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Pre-copyright mean	1.173	1.173	0.123	0.105
Observations	1,048	1,048	1,048	1,048
R-squared	0.710		0.378	0.354

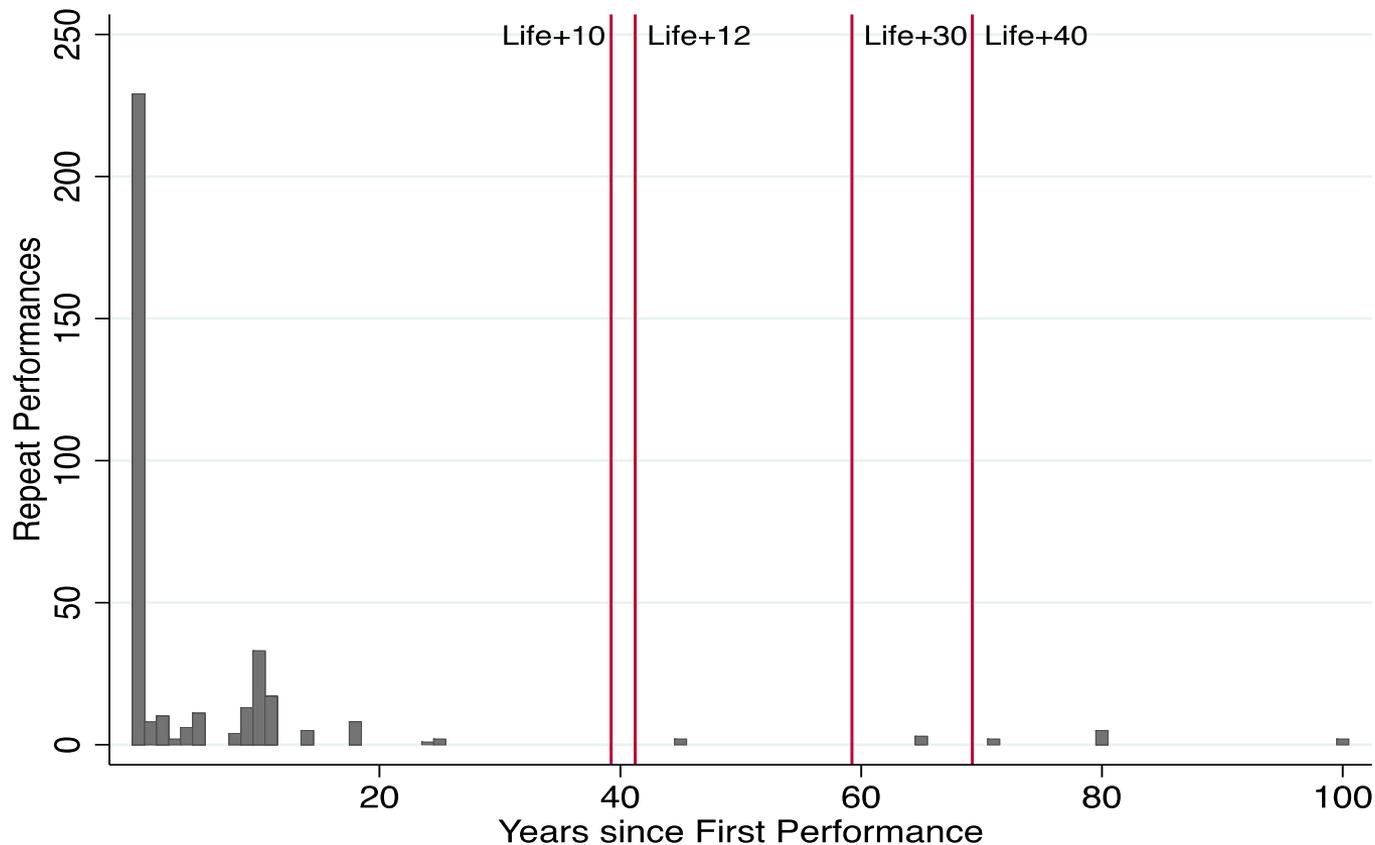
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Do copyright extensions encourage creativity?

- (Sonny Bono) Copyright term extension Act of 1998
 - Mickey Mouse Protection Act
- Between 1840 and 1900 all states move from some copyrights to *life + 40*
- E.g., Lombardy & Venetia
 - *Life + 10* in 1801
 - *Life + 30* in 1840
 - *Life + 40* in 1864

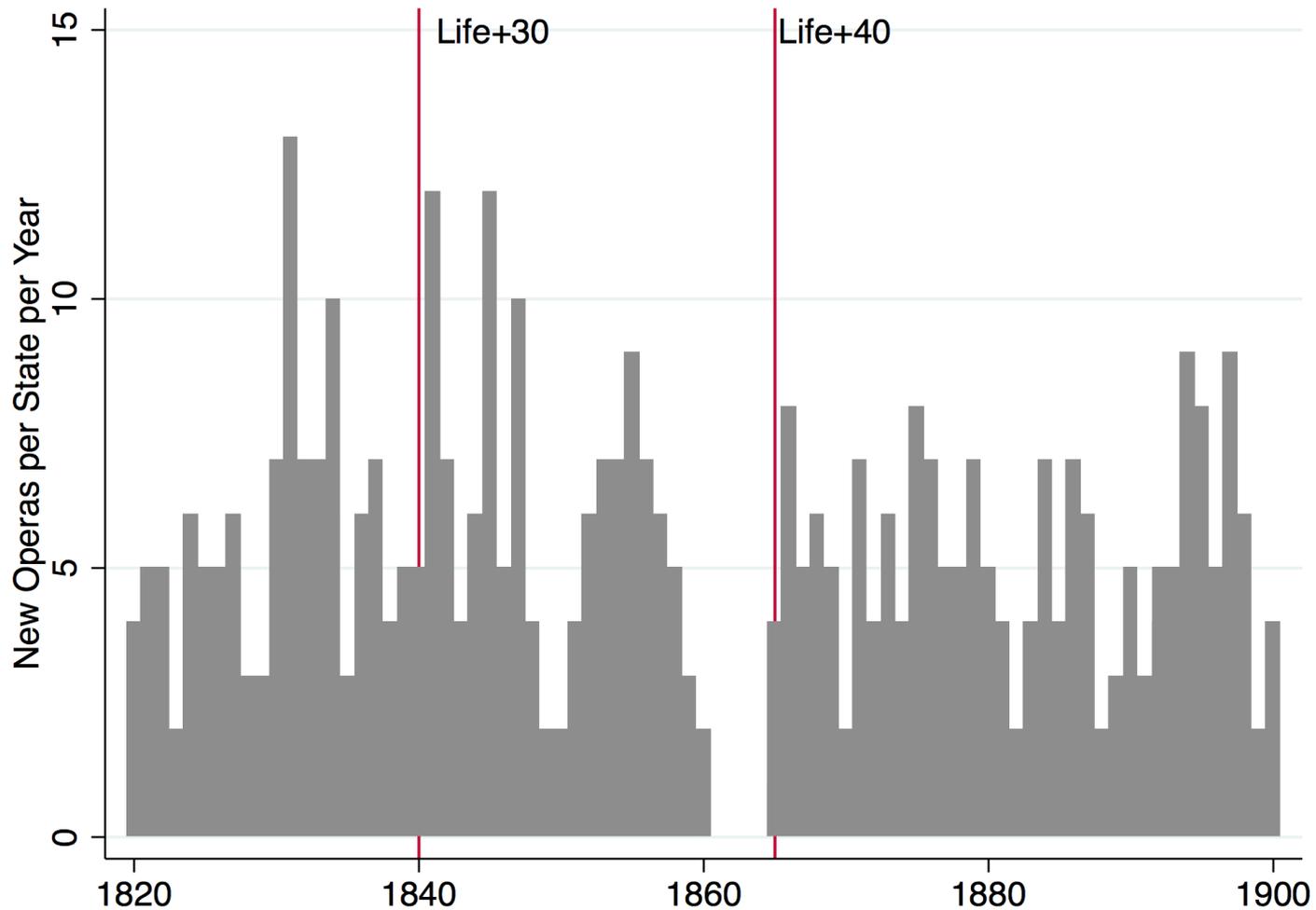
Even among high-quality operas, 30% performed once, 49% only within first 5 year

FIGURE 4 – PERFORMANCES IN THE FIRST 100 YEARS AFTER THE PREMIERE OF AN OPERA FOR ALL 8 STATES AND OPERAS THAT PREMIERED 1780-1800



No clear increase in response to copyright extension in Lombardy and Venetia

FIGURE 5 – MEAN NEW OPERAS PREMIERED PER STATE AND YEAR IN LOMBARDY AND VENETIA, 1820-1861



Conclusions (1/2)

- Adoption of copyrights can encourage creativity
 - 150% more new operas
 - 4.4- fold increase in historically popular operas, 10-fold increase in durable operas
- No significant benefits copyright extensions
- Mechanisms
 - Property rights in repeat performances encourage quality
 - Composers who prefer quality produce fewer, better operas
 - Copyrights stop outflow of Italian composers
 - Cities with better pre-existing infrastructure benefit more

Conclusions (2/2)

- Copyright as an alternative type of IP
 - Encourage creativity whereas patents do not
 - Key difference: narrow property right
- Important to weigh costs on follow-on creativity
 - Copyrights increase price
 - Higher prices reduce access, and lower rates of follow-on innovation in science (Biasi and Moser 2017, and later this week!)

Thank you!