

# COPYRIGHTS AND CREATIVITY EVIDENCE FROM ITALIAN OPERA\*

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The primary purpose of copyrights is to encourage the creation of new content, such as music, film, and literature. Yet, systematic evidence on the effects of copyrights on creativity continues to be scarce, primarily because of a lack of exogenous variation in modern copyrights. To address this issue, we exploit historical differences in the adoption of copyrights within Italy – due to the timing of Napoléon’s military victories – to examine the effects of copyrights on the creation of new operas. Because opera is a public art form, new works are exceptionally well-documented, offering unique opportunities to observe changes in creativity. Difference-in-differences analyses show that basic copyright protection increased the number and the quality of operas, measured by their immediate success and durability. Notably, there is no evidence of comparable benefits for extensions in copyright lengths beyond the life of the composer. Complementary analyses for other types of musical compositions confirm the main results.

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Copyrights protect a broad range of creative goods, including music, movies, literature, and science. The primary purpose of copyrights is to encourage creativity, yet, there is little evidence to prove that copyrights do in fact encourage the creation of new works. Economic analyses of copyrights continue to be rare, mostly due to a paucity of exogenous variation in modern copyright laws. Existing analyses have exploited variation in exposure to piracy but found no significant effects on sales or on the quality of popular music (Oberholzer-Gee and Strumpf 2007, Waldfogel 2012). Starting from low levels of existing protection, shifts towards stronger copyrights have been shown to raise the price of content in literature and science (Li et al. 2018, Biasi and Moser 2019).<sup>1</sup> Analyses of book contracts further suggest that copyrights can increase payments to authors (MacGarvie and Moser 2014). Despite these contributions, however, existing research has been unable to identify the causal effects of copyrights on the creation of new works.

This paper exploits exogenous variation in the adoption of copyright laws – as a result of the timing of Napoléon’s military victories in Italy – to examine the effects of copyrights on creativity. In 1796, Napoléon began his Italian campaign by invading the Kingdom of Sardinia at Ceva. Although he was unable to subdue Sardinia at the time, two other states, Lombardy and Venetia, were annexed and formed the Cisalpine Republic, which adopted French laws. Specifically, in 1801, the Republic adopted France’s copyright laws of 1793, granting composers exclusive rights for the duration of their lives, plus ten years for their heirs (*Legge 19 Fiorile anno IX repubblicano*, Art.1-2). In 1804, France replaced its system of feudal laws and aristocratic privilege with the *code civil*, a codified system of civic laws. The code civil left copyrights intact where they already existed but did not introduce copyrights to states without such laws. As a result, only Lombardy and Venetia adopted copyright laws (Foà 2001, p. 64), while all Italian states spoke the same language, shared a similar culture, and were exposed to French influence.<sup>2</sup>

The empirical analysis examines rich new data on 2,598 operas that composers created across eight Italian states between 1770 and 1900.<sup>3</sup> Operas offer a unique opportunity to examine the effects of copyrights on creativity. First, because opera is a public art form for which output is easily observed, records of newly-created pieces are exceptionally complete. Moreover, because aficionados of operas have created unparalleled archival records on notable performances, it is possible to create alternative measures for quality, capturing variation both in the immediate popularity and in the

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<sup>1</sup> Li et al. (2018) find that extensions in the length of copyrights increase the price of books by improving publishers’ ability to practice intertemporal price discrimination. For music, Scherer (2004, pp.195-196) compares the number of composers across countries with and without copyrights but finds no effects of copyrights on country-level counts of composers.

<sup>2</sup> Acemoglu, Cantoni, Johnson, and Robinson (2011) discuss the broader set of reforms that were associated with the code civil and show that German states that were more exposed to these reforms experienced higher rates of subsequent growth. We control for variation in exposure to French rule in a series of robustness checks.

<sup>3</sup> We chose the beginning and end of our sample based on the periodization of opera: 1770 is the beginning of the *bel canto* period, characterized by a vocal technique that emphasizes beauty of sound over dramatic expression. 1900 is the final year of the *verismo*, a period of realism, associated with composers such as Giacomo Puccini.

durability of operas. These features of opera create an exceptional measure for analyses of creativity that would be impossible to replicate in modern data.

Baseline specifications compare changes in the number of new operas per year after 1801 across Italian states with and without copyrights. OLS estimates show that two states with copyrights (Lombardy and Venetia) created 2.2 additional new operas per year after 1801 compared with six other Italian states without copyrights. Relative to a pre-1801 mean of 1.4 operas per state and year across Italy, this implies a 2.6-fold increase in states with copyrights. Importantly, pre-1801 trends in the creation of new opera are comparable for Italian states with and without copyrights. States with and without copyrights are also similar in terms of the pre-existing demand for opera (measured by the number of theaters and by the number of seats), as well as in terms of population, GDP per capita, and urbanization.

In addition to influencing levels, copyrights may also change the *quality* of creative goods. By granting composers the right to charge for repeat performances, copyright strengthen incentives to create a piece that is successful enough to be performed again.<sup>4</sup> Anecdotal evidence suggests that even the most successful composers were responsive to such incentives. When Rossini felt that theaters in Naples paid too little for his work, he created pieces that had “nothing new in them but the variations” (Beyle 1824, pp. 200-01). Letters from composers to theater managers also show that composers used the right to charge for repeat performances granted by the 1801 law to negotiate for additional pay. By increasing pay for each piece, copyrights may also create wealth effects that allow composers to spend more time on each piece. This mechanism is similar to what the American poet Ezra Pound (1885-1972) expressed intuitively: “The only thing one can give an artist is leisure in which to work. To give an artist leisure is actually to take part in his creation” (Pound and Zinnes 1980, p.147). Both incentive and wealth effects imply that copyrights may influence quality.

Our empirical analyses confirm that copyrights helped to improve the quality of new operas, measured both by their immediate popularity and by their durability. First, we examine variation in the immediate, historical popularity of operas, using a standard reference of notable performances (Loewenberg 1978). Difference-in-differences estimates imply a 5.3-fold increase in the number of historically popular operas, and a 2.9-fold increase in their share. Second, we analyze operas that were popular and durable enough to be performed at least once at the Metropolitan opera house in New York between 1900 and 2014. This analysis indicates 7-fold increase in the number and 3.5-fold in the share of Met operas after the adoption of copyrights. Third, we examine effects on the most durable operas that are still available for purchase on Amazon today. These analyses confirm that copyrights raised both the number and the share of durable operas.

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<sup>4</sup> Performance rights remained composers’ main source of revenue until the mid-19<sup>th</sup> century (Scherer 2004, p. 178). Britain adopted performance rights in 1842, and the United States adopted them in 1870 (Scherer 2004, p. 180).

Composer-level regressions confirm the main results, controlling for composer-level differences in productivity. Composers created twice as many new operas in states with copyrights, and they produced more immediate hits and more durable operas. Importantly, there is no evidence for a brain drain from other Italian states to Lombardy and Venetia after 1801. Instead, composer-level regressions show that return migrants (Italian-born composers who had composed abroad at least once) contributed to the growth of opera in Lombardy and Venetia after 1801. These regressions also show that, even controlling for return migrants, other Italian composers who never worked abroad produced more and better operas with copyrights.

An analysis of copyright adoptions across the rest of Italy confirms that copyrights are associated with more and better operas. Between 1826 and 1840, all remaining Italian states adopted copyrights. Most, if not all of these changes were driven by political processes unrelated to the creation of new operas. Confirming the main results, Italian states with copyrights created more new operas, as well as more popular and durable works.

By comparison, the benefits from copyright *extensions* are less clear. In the United States, the 1998 “Mickey Mouse” US Copyright Term Extension Act increased copyrights from life plus 50 to life plus 70 years.<sup>5</sup> These extensions are set to expire in 2023, setting the stage for discussions on further extensions. In 19<sup>th</sup>-century Italy, extensions in the length of copyright were followed by a decline in the number and quality of new works. These results resonate with recent research on the dynamic costs of long-lived copyrights for downstream innovation. Nagaraj (2017) shows that copyrights discourage the re-use of creative content on Wikipedia. Biasi and Moser (2019) find that copyrights, which increase the price of accessing existing research, discourage the creation of new follow-on science.

To delve more deeply into the mechanisms by which copyrights encourage creativity, we examine interactions between copyrights and the pre-existing demand for opera. Although data on key economic variables such as GDP and population are extremely scarce for pre-unification Italy, excellent data on theaters and theater seats exist at the city level (Antonini, 2000), creating a good proxy for demand. Importantly, these data indicate no significant differences in the level or the trend of demand for states with and without copyrights before 1801. Within states, however, city-level regressions show that cities with a higher pre-existing demand for entertainment benefitted most from copyrights.

A final section investigates the effects of copyrights on a broader set of musical compositions, including symphonies, operettas, and songs. All of these tests confirm our main findings: the adoption of basic copyright laws encouraged the creation of new works. Another series of tests examines the

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<sup>5</sup> From 75 to 95 years for corporate owners. See Pub. L. No. 105-298, 112 Stat. 2827 (1998), codified as amended 17 U.S.C. §§ 108, 203, 301-304.

effects of copyrights on the creation of librettos – the text that forms an important complement to the music of an opera. This analysis shows that both the number of new librettos and the share of operas using new librettos increased in response to copyrights.

The remainder of this paper is structured as follows. Section 1 summarizes the relevant historical background and outlines changes in copyright laws. Section 2 introduces the main data set. Section 3 checks the identifying assumption and presents baseline estimates and robustness checks for changes in the number of new works. Section 4 investigates changes in the quality of music. Section 5 presents composer-level regressions. Section 6 examines copyright adoptions and extensions across all of Italy until 1900. Section 7 investigates interactions with pre-existing infrastructure and demand. Section 8 studies the effects of copyrights on a broader set of musical compositions. Finally, Section 9 concludes.

## 1. HISTORICAL BACKGROUND

Even though the first operas had been “distinctly aristocratic, a *bonne bouche* for cultivated *cognoscenti*” (Apthorp 1901, p. 26), opera soon became a popular art form for the paying public. Venice already had several theaters that presented spoken comedies (*commedia dell’arte*) and became a natural birthplace for public opera (Glixon and Glixon 2006, p. 3). In 1637 the city’s Teatro San Cassiano performed Francesco Manelli’s *L’Andromeda* for a paying audience (Celletti 1959, p.516).<sup>6</sup> Demand for this new type of entertainment was so great that, by the end of the 17<sup>th</sup> century, ten theaters performed opera in Venice alone. Beyle (1824, p.9) describes the scene at a performance of Rossini’s *La Scala di Seta*:

“...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.”

Each theater was managed by a professional agent (*impresario*), who identified a promising story, procured a libretto, and then hired a composer to create a score (Valle 1823, p.155).<sup>7</sup> Glixon and Glixon (2006, pp. 110-11) investigate the business of Venetian operas between 1636 and the late 1670s. In that time, most librettist were “amateurs.” Some were nobles, but many had day jobs,

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<sup>6</sup> Referring to the 1637 performance, Apthorp (1901, p. 26) explains “with it, the Opera was for the first time brought face to face with the great public. Thenceforth, the people, together with but quite as much as crowned heads and affluent nobles – were to be the arbiters of its destiny” (Apthorp 1901, p.26). A more recent analysis by Glixon and Glixon (2006, p. 7), however, discovers a more gradual process of birth. “Public opera did not erupt spontaneously in 1637. Its growth was facilitated by the presence of a number of theaters that presented spoken comedy (*commedia dell’arte*).”

<sup>7</sup> For an in-depth case study of interactions between impresarios, publishers, and composers, see Jensen’s (1989) analysis of the relationship between Giuseppe Verdi and his publisher Giovanni Ricordi.

frequently as attorneys. The librettist Minato, for example, explained “you should know that I am not a poet by profession. My attentions (sic) lie in the courts; to serve who may command me, I have robbed myself of some hours of sleep to give you this drama.”

Notably, copyrights for the libretto and the score were separate (Article 1 of the 1801 Copyright law, reported in Appendix B). Unlike composers, who also received payments for performance rights, librettists relied on the sale of physical copies as their primary source of income, similar to authors of other types of literary work.

Close collaborations between composers and librettist appear to have been the exception, rather than the rule. Referring to interactions between Cavalli and the librettist Nicolo Minato, Glixon and Glixon (2006, pp. 162-3) explain that “Cavallis’s relationship with his two partners may have been closer than the norm.” But they also note that “Unfortunately, we simply do not know how often composer and librettist [...] corresponded during the process of creating the score.” Glixon and Glixon (2006, p. 115) explain that “The physical proximity of librettist and impresarios, as well as the lack of formal contracts for the commissioning of librettos, has left us with almost no written records regarding the selection process for either librettists or librettos.”<sup>8</sup>

Composers typically took four to eight weeks to create a new opera. During this time, they worked closely with singers and the orchestra in the location of the premiere (Valle 1823, p.157 and Moore 1854, p.823). The Teatro Torre Argentina in Rome commissioned Gioacchino Rossini (1792-1868) to compose *Il Barbiere di Siviglia* on December 17, 1815, and *Il Barbiere* premiered in Rome roughly six weeks later, on February 5, 1816 (Panico 2002, p.62). In 1819, Rossini complained: “...you know very well that scarcely six weeks are allowed me to compose an opera” (Moore 1854, p.823).

Before the adoption of copyright laws, composers had no recourse to demand payments for repeat performances (Scherer 2008, p.5), and piracy was rampant.<sup>9</sup> Impresarios 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).

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<sup>8</sup> The contemporary American composer John Adam’s (2008, pp. 221-222) explains why such collaborations are difficult: “Artistic collaboration is never easy. On occasion it has occurred to me that, next to double murder-suicide, it might be the most painful thing two people can do together.” Adams also explains that the composer is necessarily the dominant partner in the creation of an opera: “In making an opera the librettist invariably feels cheated or disrespected. But the composer is responsible for so much more than the librettist. The music is what determines the ultimate form and feel of the piece.”

<sup>9</sup> In 1782, Mozart wrote to his father that he felt indebted to the Baron von Riedesel because Riedesel had bought the score for *Die Entführung aus dem Serail* from him instead of acquiring a cheaper version from a copyist (Scherer 2004 p. 167).

Without payments for repeat performances of their work, composers would “recycle some of the music in another opera and another town” (Rosselli 1996, p.74), suggesting that the absence of copyright protection may have diminished novelty.

### *1.1. Napoléon’s Military Campaign in Northern Italy*

Variation in the success of Napoléon’s military campaign brought copyright laws to some parts of Northern Italy in 1801. After taking command of the French “Army of Italy” on March 11, 1796, Napoléon invaded the Kingdom of Sardinia at Ceva on April 11, 1796. Between April 12 and 14, Napoléon defeated Sardinia’s King Vittorio Amedeo III in the battles of Cairo Montenotte, Dego, Millesimo, and Cosseria (in Liguria, a region in the North-West of Italy), and in a decisive victory on April 19, 1796 near the town of Mondovì (in Piedmont, about 50 miles from Turin). As a result of these victories, Sardinia granted Nice and Savoy to France under the Treaty of Paris on May 15, 1796. In his campaign against Austria, Napoléon conquered Verona on April 25, 1797, Venice on May 12, 1797, and Milan on May 14.<sup>10</sup> On June 29, 1797 Napoléon decreed the creation of the Cisalpine Republic (Repubblica Cisalpina) with Milan as the capital. On August 5, Napoléon defeated the Austrian Army at Castiglione, forcing Kaiser Franz to retreat. Austria acknowledged the Cisalpine Republic in the Treaty of Campoformio on October 18, 1797, in exchange for what remained of the Venetian Republic. To curb Napoléon’s grasp on Europe, Piedmont, Austria, England, Russia, Turkey, and Sweden formed the Second Coalition against France on March 12, 1799. Austria was defeated in the battle of Marengo (June 14, 1800) and Napoléon invaded Venetia on June 20, 1800. Venetia officially became part of the French empire with the Peace of Pressburg on December 26, 1805 (Pecout 1999, p.138).

### *1.2. Lombardy and Venetia Became the Only States to Adopt Copyright Laws in 1801*

In 1793, France had passed a copyright law to replace royal privileges, which had been abolished in the French Revolution four years before (Appendix B).<sup>11</sup> On May 9, 1801, Legge n. 423 (Repubblica Cisalpina, 19 florile IX articles 2 and 7) extended this law to Lombardy and Venetia.<sup>12</sup>

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<sup>10</sup> France had declared war on Austria on April 20, 1792, after Austria joined the first coalition against France, which had formed between Great Britain, Prussia, Spain, Holland, and the Kingdom of Sardinia on April 6, 1792.

<sup>11</sup> The 1793 law created exclusive publication rights for the duration of the composer’s life plus 10 years, whereas a 1791 French law, which abolished censorship in the performing arts, had created exclusive performance rights for life plus 5 years. The 1791 law was codified as Article 428 of the *code pénal* of 1810.

<sup>12</sup> Even though Venice and other parts of Venetia had been granted to the King of Austria in the Treaty of Luneville in 1801, and officially remained under Austrian control until the Treaty of Pressburg in 1805, copyrights and other laws of the Cisalpine Republic applied to Venice in 1801. A description of the locations where the laws of the Cisalpine Republic apply in 1801 specifically includes Venice and territories in Venetia (*Raccolta di Tutte le Leggi ossia di Tutti i Proclami, Editti ed Avvisi della Repubblica Cisalpina*, reported in Appendix B). Also see Foà (2001, p. 313) who writes that “after Milan and Venice in 1801, the other major Italian city to adopt a copyright law was Rome in 1826.

The 1801 law granted performance rights to composers for as long as they lived, plus another 10 years for their heirs:

“The authors of any type of writing, composers, painters, and designers who make paintings or drawing, will benefit for the entire duration of their lives from the exclusive right of selling, allowing to sell, and distributing their works in the Cisalpine Territory, and of ceding their property to others (in its entirety or in parts). Their heirs, or assignees, will have the same right for the duration of ten years after the death of the authors.”<sup>13</sup>

Now composers were entitled to royalties for repeat performances of operas that had premiered in Lombardy or Venetia, starting from the premiere (Celletti 1959, p.518).<sup>14</sup>

This change translated into a tangible increase in payments to composers. Writing from Venice in 1803, the composer Stefano Pavesi uses a reference to payments for repeat performances in Venice since 1801 to turn down an offer from the Teatro Regio in Turin:

“It is not that I disregard your offer of 3,000 francs. But it is less than the pay I could get in Venice. There, I receive a sum of 200 francs for each repeat performance of my work since 1801” (Letter from Stefano Pavesi to Giacomo Pregliasco, November 3, 1803, Archivio dello Stato Centrale, Carte Sciolte N. 6253, reported in Appendix Figure 1)

Ubertazzi (2000, pp. 47-48) confirms this as a broader development:

“...while the Teatro Regio in Torino had started to become very famous at the beginning of 19<sup>th</sup> century, it faced no small challenge to attract successful composers, due to the absence of a copyright law compared with La Scala in Milan and La Fenice in Venice.”<sup>15</sup>

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<sup>13</sup> *Legge 19 Fiorile anno IX repubblicano, Art.1-2*. See Appendix B for the original text of all laws and our translations.

<sup>14</sup> Composers could sell or rent these rights to theaters or to publishers. Bellini offered Ricordi the rights to all the works he would write from 1835 to 1838, and Ricordi offered a similar contract to Verdi (Jensen 1989, p. 31). Alternatively, theaters would acquire rights to rent performance materials (“spartiti”) and printing rights (“riduzioni”) from the composer at the time of the premiere, and then market these rights to publishers (Jensen 1989, pp. 8-10). In 1841, La Scala’s impresario Merelli sold the performance rights to Verdi’s first opera *Oberto* to Ricordi to raise the necessary capital for production. As demonstrated in contracts with La Scala, local management could not always find the money to pay the fees of Italy’s favorite composers, and they would turn to the publisher for additional funds” (Jensen 1989, p. 89). Such three-way agreements between the composer, impresario and the publisher became common after 1845, when Ricordi won a comprehensive contract with La Scala (Jensen 1989, pp. 11 and 19-20), but they were less common in the early 1800s, which are the focus of our analysis. Even though the 1801 law also included reproduction rights, performance rights remained composers’ main source of revenues until the 1850s: “...it took the combination of copyright protection, Italians’ love of opera, and the love of money shared by Ricordi and Verdi to carry the reduction enterprise to its height of sophistication...In 1851, Verdi was paid the unprecedented sum of 14,000 francs (£550) for the publication rights, not including performance rental royalties, to *Rigoletto*” (Scherer 2004, p.178).

<sup>15</sup> Authors’ translation from the Italian “mentre il Teatro Regio di Torino iniziò a diventare molto Famoso all’inizio del diciannovesimo secolo, ebbe non poche difficoltà, rispetto ai Teatri La Scala di Milano e La Fenice di Venezia, ad ingaggiare i compositori di maggior successo a causa della mancanza di una legge sul diritto d’autore”.

Operas that had premiered either in Lombardy or in Venetia were protected both in Lombardy and Venetia, but not in other states.

Censors, whose main role was to judge the content of an opera (and eliminate “blasphemous” references to religions) were often the first line of defense against illegal reproductions. “Since the censors had to approve all new publications, anyone could apply directly to them to stop publication of a work” (Jensen 1989, p. 16). In other instances, composers appealed to the Governor or other officials. In a letter to Ricordi, Bellini describes enforcement against piracy of *La Sonnambula*:

“I see that you’re always thinking of the pirates of our Sonnambula: and do you believe that I sleep? I learned for a fact that the impresario in Catania, not being able to have the score [...] from you for a small price, had the score compiled and orchestrated [...] thereby he wanted to present it on the stage in Catania: the Governor, or Intendent of said city has been advised, and not only will he not permit it to be given, but if he is able, he will try to sequester the counterfeit score to punish the criminal for his crime” (Letter from February 18, 1832 cited in Jensen 1989, p. 19).

Performance data, which we describe in more detail below, indicate that enforcement was effective. No opera that had premiered in Lombardy or Venetia after the adoption of copyrights in 1801 was performed by another theater in Lombardy and Venetia after 1801 (Appendix Table A1). But operas that had premiered in Lombardy and Venetia before 1801 (and were therefore not protected under the 1801 law) continued to be performed frequently in the same state. Similarly, operas that premiered in other states after 1801 (and were therefore not protected by the laws of Lombardy and Venetia) continued to be performed in other states, including Lombardy and Venetia. For example, Weinstock (1963, p.353, writes about Donizetti’s *Roberto Devereux*, which had premiered in Naples in 1837: “A pirated version of it was sung at the Teatro Re, Milan, late in 1837 or early in 1838.”<sup>16</sup>

Due to the timing of Napoléon’s military victories, only Lombardy and Venetia adopted French copyright law, while the rest of Italy came under the influence of French institutions *without* copyrights until 1826. Foà (2001, p.62) writes:

“In Italy, the first acknowledgment of ‘the most sacred and precious of all properties’ occurred with the Law of 19 Fiorile anno IX (May 9, 1801) of the Cisalpine Republic; it was followed by the Edict September 23, 1826 for Papal State, the Decree February 5, 1828 for the Kingdom of Two Sicilies, the Decree December 22, 1840 of Maria Luigia for the Duchy of Parma, Piacenza, and Guastalla.”

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<sup>16</sup> In the absence of effective copyright enforcement across jurisdictions within Italy, impresarios relied on personal relationship with colleagues in other states (Jensen 1989, p. 9), and “publishers kept tight control of all full scores and required rental fees for scores which someone wished to perform” (Jensen 1989, p. 14). Publishers and composers worked together to protect their interests. For example, “Bellini and his Milanese publisher (Ricordi) did not enjoy a warm relationship from their first association, but it developed during a joint effort to fight pirated scores and the closely related matter of unauthorized performances” (Jensen 1989, p. 5).

On March 21, 1804, the Parliament of France adopted the (Napoléonic) *code civil*, which was extended to all French dominions, including Lombardy and Venetia. The *code* was agnostic about copyrights; it did not introduce them to states without copyright laws and left them in place for states where copyrights existed already. As a result, Lombardy and Venetia kept their copyright laws, while other Italian states that came under French rule after 1804, adopted the same *code civil*, but without copyrights (Foà 2001, p.64): Sardinia (under French influence in 1804), Parma (1805), Tuscany (1809), Naples (1812), and the Papal State (1812).<sup>17</sup> Lombardy and Venetia’s copyright laws also survived the 1815 Congress of Vienna, which placed Lombardy and Venetia under the rule of Kaiser Franz I of Austria (Figure 1).<sup>18</sup>

Was the introduction of copyrights the only major difference between the laws of the Cisalpine Republic and other states within Italy? To investigate this question, we have examined the complete list of all 414 laws, edicts, and public announcements in the Cisalpine Republic between 1797 and 1805 in the “*Raccolta di Tutte le Leggi ossia di Tutti i Proclami, Editti ed Avvisi della Repubblica Cisalpina*” (1807). None of these laws relate to copyrights or other elements of artistic creativity. Instead, laws such as “Per la Consegnà del Grano Turco,” govern the delivery of corn, wheat, and other crops, and define other elements of public order. We therefore conclude that the 1801 Copyright Law was the only law in the Cisalpine Republic during this period that had a clear connection to opera.

The borders drawn by the Congress of Vienna remained intact until Italy’s unification in 1861. We use them to distinguish eight states within Italy: the Kingdom of Lombardy and Venetia, the Kingdom of Sardinia (for simplicity, Sardinia), the Duchy of Parma and Piacenza (Parma), the Duchy of Modena and Reggio (Modena), the Grand Duchy of Tuscany, the Papal State, and the Kingdom of the Two Sicilies.<sup>19</sup>

### 1.3. Other Italian States Adopt Copyrights Starting in 1826

On September 28, 1826, an edict by Pope Leo XII (Editto n. 433, Stato Pontificio, Appendix B) established exclusive rights in compositions, books, and other types of media for the duration of the composer or author’s life, plus 12 years for heirs. In 1828, a decree of Francesco I (1777-1830), King of the Two Sicilies, created copyrights for the duration of the composer’s life plus 30 years (Regio decreto 5 February 1828, n. 1904, Regno delle Due Sicilie). These were the longest copyright terms in all of Italy. Four other states – Sardinia, Modena, Parma, and Tuscany – continued to offer no

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<sup>17</sup> Tuscany, the Papal States, and the Two Sicilies repealed the *code civil* in 1819 (*Code civil italien* 1866, pp.xxiv).

<sup>18</sup> *Codice civile universale austriaco pel Regno Lombardo-Veneto*, 1815, Regno Lombardo-Veneto. The Austrian civil legislation (*Allgemeines Bürgerliches Gesetzbuch*) reintroduced exceptions to the principle of equality, but left property rights intact (Soresina 2018).

<sup>19</sup> The Congress of Vienna also created the Duchy of Lucca. Because Lucca remained under the influence of Tuscany and was annexed by Tuscany in 1848, we treat Lucca as a part of Tuscany.

protection. Without rules of reciprocity, copyrights from the Two Sicilies were enforceable only in the Two Sicilies, and copyrights from the Papal State were limited to the Papal State.

On June 26, 1840, Sardinia entered into a bilateral copyright treaty with Austria. This treaty granted copyrights for the duration of the composer's life plus 30 years for heirs (*Convenzione Austro-Sarda* 22 May 1840, Regno di Sardegna). Sardinia had emerged as a political leader in Italy's fight for independence (Pecout 1999, p. 158), and within weeks, all other Italian states (with the exception of the Two Sicilies) joined Sardinia's treaty with Austria. This process introduced copyrights to Tuscany, Modena, and Parma, and extended the length of existing copyright terms in Lombardy and Venetia from life plus 10 to life plus 30 and in the Papal State from life plus 12 to life plus 30.<sup>20</sup>

On March 17, 1861, five states – Lombardy, Modena, Parma, Tuscany, and the Two Sicilies – joined Sardinia to form the Kingdom of Italy (Pecout 1999, p. 170). On June 25, 1865, the Kingdom's first copyright law extended copyrights from life plus 30 to life plus 40 years (*Legge* 25 June 1865, n.2337, It, Appendix B). On June 29, 1866, the Kingdom declared war on Austria, beginning the Third War of Independence. With the Peace of Vienna (August 24, 1866), the Kingdom of Lombardy-Venetia dissolved into the Kingdom of Italy, and a decree of King Vittorio Emanuele II extended the Kingdom's laws to Venetia (*Regio Decreto* 4 November 1866, n.3300, It.). On September 20, 1870, after the Breach of Porta Pia, Vittorio Emanuele II annexed the Papal State to the Kingdom of Italy (Pecout 1999, pp. 183-189). A decree on October 9 (*Regio Decreto* 9 October 1870, n.5903, It.) extended the Kingdom's laws to the Papal State. Now all of Italy offered copyrights for the composer's life plus 40 years.

## 2. DATA

Our main data set comprise 2,598 new operas by 705 Italian-born composers between 1770 and 1900, including the title of each opera, the name of its composer, the year and location for its premiere, and two alternative measures for quality.<sup>21</sup> These data cover 8 Italian states with and without copyright laws. To measure variation in copyright laws across these states, we collect information from Franchi (1902) and examine the original texts of the Italian laws (e.g., *Legge* 9 May 1801, n. 423 *Repubblica Cisalpina*). A detailed description of these laws, including the original text and our translations, is available in Appendix B.

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<sup>20</sup> Verdi and his publisher Ricordi used copyrights to levy hefty fees for each performance (of 400 Francs, roughly three months' earnings for a building craftsman). In an 1850 letter to Verdi, Ricordi proposes price discrimination: "It is more advantageous to provide access to these scores for all theaters, adapting the price to their special means, because I obtain much more from many small theaters at the price of 300 or 250 Lire, than from ten or twelve at the price of a thousand" (cited in Scherer 2004, pp.179). Verdi accepted the scheme and Ricordi enforced it through a team of field agents.

<sup>21</sup> We use the term Italy as defined by the country's borders in 1900. Compared with Italy's borders today, this definition excludes Trentino, Alto Adige, Eastern Friuli, Venezia and Giulia, Istria, Zara; these regions had been part of the Austro-Hungarian Empire and became part of Italy in the Treaty of Rapallo in 1920. Italy lost Istria and Zara to Yugoslavia as a result of World War II in 1945; the 1975 Treaty of Osimo affirmed this change.

We chose the beginning and end years for our analysis to match musicologists' periodization of opera. According to the *New Grove Dictionary of Music and Musicians* (2001), 1770 is the beginning of the *bel canto* period of classical music. The term *bel canto* means beautiful singing and denotes a vocal technique that emphasizes beauty of sound over dramatic expression. *Bel canto* composers include Gioacchino Rossini (1792-1868), Vincenzo Bellini (1801-1835), and Gaetano Donizetti (1797-1848). The end year of our sample is 1900, the final year of the Italian *verisimo*. Derived from the Italian root "vero," the *verisimo* was a period of realism, exemplified by Giacomo Puccini (1858-1924).

### 2.1. New Operas across Eight Italian States, 1770-1900

To collect data on the creation of new operas, we search five standard reference books for opera premieres by Italian-born composers. Carlo Dassori's *Opere e Operisti. Dizionario Lirico* (1903) includes 1,353 new operas by 544 Italian-born composers that premiered between 1770 and 1900. We extend these data to include information from Loewenberg's (1978) *Annals of Opera*. Loewenberg focuses on notable performances and lists 254 new operas created by 90 Italian-born composers between 1770 and 1900.<sup>22</sup> A third reference book, Corrado Ambiveri's (1998) *Opere e Operisti Minori dell'Ottocento Italiano* adds information on "minor" operas that were performed by city orchestras; Ambiveri lists 71 premieres by 45 Italian-born composers between 1770 and 1900.

Among these major reference works, Loewenberg (1978) is the most restrictive: 133 of 1,353 operas in Dassori (1903) and none of 71 operas in Ambiveri (1998) are included in Loewenberg. We also search the *New Grove Dictionary of Music and Musicians* (2001) and Treccani's *Enciclopedia Italiana di scienze, lettere ed arti* (2001) for additional works by the 705 composers in our data; this process adds information on another 880 operas. As an additional data check we compare a complete list of 89 composers whose last names begin with B or D in our sample with a list of all entries for B and D in the *New Grove Dictionary of Music and Musicians* (2001). This comparison shows that our sample includes 80 composers who are missing from the *New Grove*.

### 2.2. Measures for Quality

Three complementary measures capture variation in the popularity and durability of operas. First, to quantify differences in the immediate, historical popularity of operas, we use records of notable performances in Loewenberg (1978) *Annals of Opera*. According to *Opera Today* (January 24, 2005), "(t)his volume has long been regarded as the definitive work on the subject...it is a magnificent piece of work, and belongs on the bookshelf of every researcher in the operatic field..." Loewenberg

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<sup>22</sup> Ambiveri includes composers born between 1792 (the year when Rossini was born) and 1900 (the end of the *verisimo*).

records notable premieres and repeat performances of operas between 1597 and 1940. His records include 254 of the 2,598 operas by Italian composers between 1770 and 1900 in our data (9.7 percent).

Our second measure uses a theater chronology for the Metropolitan opera house in New York to identify operas that were popular and durable enough to be performed throughout the 20<sup>th</sup> century. Moser (2012) has used performances at the Met between 1900 and 1950 to examine changes in tastes for German-language opera after World Wars I and II. We extend these data to include performances between 1900 and 2014. 182 of the 2,598 operas in our data (7 percent) were performed at least once at the Met between 1900 and 2014.

A third and final measure identifies the most durable operas in our sample, based on their availability as a complete recording on Amazon today.<sup>23</sup> To collect these data we have searched Amazon for each of the 705 composers' names along with the title of each of the 2,598 operas, and set the Amazon variable to equal one if the opera is still available as a complete recording. For example, a search for Giuseppe Verdi's *La Traviata* shows that it was available as a complete recording in 2008 from Arthaus Musik and in 2012 from Virgin Classics; we therefore record the *Amazon* dummy for *La Traviata* to equal 1. By comparison, a search for Domenico Cimarosa's *Penelope* yields no results and we record the Amazon dummy to equal 0. A total of 156 operas created between 1770 and 1900 (6 percent of the 2,598 operas in our data) were still for sale on Amazon in 2014.

### 2.3. Life Expectancies of Composers

Demographic data on composers' years of birth and death allow us to estimate the expected length of copyrights, by calculating composers' age in the year of the premiere and estimate their remaining years of life (Appendix Table A2). Information on years of birth and death are available for all 705 composers from Dassori (1903), Ambiveri (1998), and the *New Grove Dictionary of Music and Musicians* (2001). The oldest composer in our data is Giovanni Paisiello (1741-1816), and the youngest is Stefano Donaudy (1879-1925). The longest-lived composer was Vincenzo Mela (1803-1897), and the shortest-lived was Nicola Manfroce (1791-1813). The average composer lived to be 59.7 years (with a median of 55 years),<sup>24</sup> and was 33.6 years old at the time of the premiere (with a median of 32 years). Composers of high-quality operas were slightly older, with an average of 35.9 years for operas in Loewenberg (1978, with a median of 36) and 35.6 years for operas on Amazon (with a median of 34).<sup>25</sup>

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<sup>23</sup> [www.amazon.com](http://www.amazon.com), accessed from March 22 to March 28, 2014.

<sup>24</sup> By comparison, the European average for composers was 64.5 between 1650 and 1849 (Scherer 2004, p. 8).

<sup>25</sup> These age distributions are also confirmed by information on composers of Italian opera that were performed at the Metropolitan opera house in New York played between 1900 and 2014. In that year, the average composer was 36.2 years old at the time of the premiere (with a standard deviation of 13.5).

### 3. EFFECTS ON THE NUMBER OF NEW OPERAS

To examine whether copyrights helped to encourage creativity, we exploit differences in the timing of copyright adoptions within Italy that were due to the idiosyncratic outcomes of Napoleon’s military campaign. This approach allows us to control for unobservable factors, such as changes in the interactions between composers, librettists, and impresarios (described in Section 1) that may have influenced the creation of new operas across all of Italy, independently of copyrights.

#### 3.1. Identification Strategy

Summary statistics indicate that composers in Lombardy and Venetia created significantly more operas than composers in other states after 1801. Until 1801, composers in Lombardy and Venetia created 1.6 new operas per state and year (Table 1). After 1801, composers in Lombardy and Venetia produced nearly three times as many new operas, with 4.6 new operas per state and year. By comparison, creative output increased much less in other states, from 1.4 new operas per state and year until 1801, to 2.1 afterwards.

To systematically compare changes in the creation of new operas in states with and without copyrights, we estimate OLS difference-in-differences regressions

$$opera_{it} = \beta \text{Lombardy \& Venetia}_i \times \text{post } 1801_t + \varphi_i + \delta_t + \varepsilon_{it} \quad (1)$$

where the dependent variable,  $opera_{it}$ , counts newly-created operas in state  $i$  in year  $t$ . The variable  $\text{Lombardy \& Venetia}_i$  is an indicator for the two states that adopted copyrights in 1801, and  $\text{post } 1801_t$  equals 1 for years after 1800. State fixed effects  $\varphi_i$  control for variation in output across states that is constant over time, for example as a result of time-invariant cultural differences or as a result of pre-existing differences in the infrastructure to perform operas. Year fixed effects  $\delta_t$  control for variation in output over time that is common across states. Standard errors  $\varepsilon_{it}$  are clustered at the state-year level.<sup>26</sup> Robustness checks estimate standard errors collapsing years for the pre- and post-copyright period (Appendix Tables A3, implementing Bertrand et al. 2004, p.14).

Under the assumption that – without copyrights – changes in the creation of new operas after 1801 would have been comparable in Lombardy and Venetia and other Italian states, the coefficient  $\beta$  estimates the causal effect of copyrights on the creation of new operas.

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<sup>26</sup> Even though our results are robust to clustering both at the state and the state-year level, our preferred specification includes fixed effects for states and for years, with clustering at the level of states and years. Abadie, Athey, Imbens, and Wooldridge (2017) show that there may be harm in clustering at a level that is too aggregate. With only eight states, the number of clusters would be too small to cluster standard errors at the state level (Cameron et al. 2008). Moreover, because only two of eight states are treated, we cannot estimate the  $t$ -wild bootstrap (MacKinnon and Webb 2016). Sub-clustering the wild bootstrap estimate is not appropriate for difference-in-differences estimates because clusters (states) switch from control to treatment (MacKinnon and Webb 2016).

### 3.2. Tests of Identification Assumption

To investigate this identification assumption, we perform a series of tests. First, we compare the time series of new operas for states with and without copyrights until 1801. These comparisons reveal no differences in output trends between the two sets of states before the adoption of copyrights (Figure 2). Until 1801, composers in states with and without copyrights both created 2 new operas per state and year. Afterwards, output increased steadily for states with copyrights, from 4 in 1801 to 7 in 1806, but stayed stable in states without copyrights, at slightly more than 2 new operas per state and year.

States with and without copyrights were also comparable in population, urbanization, and GDP per capita. In 1800, the last year before the adoption of copyright laws, Lombardy and Venetia had a population of 3.2 million people per state compared with 3.0 million for other Italian states. Rates of urbanization were also comparable, with 15.5 cities above 5,000 people in Lombardy and Venetia compared with 15.8 in other states (Table 2, Panel A). This evidence is consistent the findings of Daniele and Malanima (2007, 2011), who show that, at the time of Italy's unification in 1861, states were comparable in terms of GDP and urbanization.

Next, we check whether states with and without copyrights were comparable in terms of their pre-existing infrastructure, as well as proxies for demand (Table 2, Panel B). Between 1781 and 1800, Lombardy and Venetia had 2.1 theaters per state and year, compared with 1.9 for other states (with a  $p$ -value of 0.658, an equality of means test fails to reject the hypothesis that the two values are identical). The two sets of states were also comparable in the total number of theater seats, which we use to proxy the demand for entertainment. Between 1781 and 1800, Lombardy and Venetia had a total of 4,730 theater seats per state and year, compared with 4,284 for other states ( $p$ -value 0.631).

We also compare counts of active opera composers, as a proxy for differences in pre-existing supply. With 0.5 active composers per state and year in Lombardy and Venetia between 1781 and 1800, compared with 0.6 in other states, this difference is not statistically significant ( $p$ -value 0.532).

A related threat to our identification strategy is that composers may have moved from control states to states with copyrights after 1801. To investigate this issue, we construct composer-level data on the number of individuals who had composed at least one opera in one of the six control states and moved to states with copyrights 1801 (Appendix Table A4). These data indicate that only two composers moved within Italy before 1801 (Appendix Table A4, Panel A). After 1801, 16 composers moved within the control group of other Italian states, but not to Lombardy and Venetia (Appendix Table A4, Panel B).

Instead, data on composer migration suggest that the adoption of copyrights stemmed the outflow of Italian composers to other European states with copyrights. Until 1801, prolific composers such as Domenico Cimarosa and Giovanni Paisiello, moved to France to take advantage of French

copyright laws.<sup>27</sup> After 1801, 30 Italian-born composers who had previously created operas in France returned to Italy to compose in Lombardy, and another 25 moved to Venetia. Similarly, 14 Italian-born composers who had composed operas in Austria returned to Italy to compose in Lombardy, and another 9 returned to Venetia.<sup>28</sup> Flows of return migration had been substantially smaller before 1801. Only 5 Italian-born composers returned from France to Italy to compose in Lombardy before 1801, and 4 moved to Venetia; 11 Italian-born composers returned from Austria to Italy to compose in Venetia after 1801 and 6 returned to Venetia. Moreover, the historical records do not document any difference in migration patterns to Lombardy and Venetia for non-composers, compared to the other Italian states (Romani 1955).

Finally, we check whether Lombardy and Venetia had an unusually high number of librettos or librettists leading up to 1801. Librettists complement the work of the composer in an important way, by providing the text of the opera, so that a high pre-existing stock of potential collaborators may have encouraged opera production in Lombardy and Venetia - even without copyrights. A comparison of means, however, shows that the pre-1801 stock of librettists was similar across the two sets of states. Before the adoption of copyrights, Lombardy and Venetia had 2.3 librettists per state and year, slightly less than the 2.5 librettists per state and year in other Italian states. A  $p$ -value of 0.551 fails to reject the null hypothesis of equality in means. Similarly, Lombardy and Venetia had 2.9 librettos per state and year before 1801, compared with 3.0 librettos per state and year in other Italian states. A  $p$ -value of 0.821 fails to reject the null hypothesis of equality in means.

In sum, comparisons of observables yield no evidence against the identification assumption. There are no differences in time trends of creative output for states with and without copyrights before the adoption of copyrights, and the two sets of states shared similar characteristics. There is also no evidence for a decline in the number of active composers, or in the share of movers for control states after 1801, and there is no evidence for higher pre-existing numbers of potential collaborators (librettists) in states with copyrights.

### 3.3. *Baseline Estimates and Time-Varying Effects*

OLS estimates of equation (1) indicate that states with copyrights created 2.2 additional operas per state and year after 1800 compared with other Italian states (Table 3, column 1, significant at 1 percent). Relative to an average of 1.4 new operas per state and year across Italy until 1800, this implies a 2.6-fold increase. Excluding state fixed effects leaves the estimate at 2.1 (Table 3, column 2,

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<sup>27</sup> Vincenzo Bellini (1801-1835), praised the French law for allowing composers to collect royalties from provincial towns (Letter from September 4, 1834, cited in Rosselli, 1996, p.119). In Italy's Two Sicilies, Bellini had unsuccessfully sought performance fees from provincial theaters but, faced with competition from pirated copies of his own work, was unable to extract much revenue (Scherer 2004, p.179).

<sup>28</sup> Nine Italian-born composers who had worked in France and five Italian-born composers who had worked in Austria returned to other Italian states.

significant at 1 percent). We also estimate quasi-maximum likelihood (QML) Poisson regressions as an alternative to address the count data characteristics of the opera data. Average treatment effects of this regression indicate 1.1 additional operas per year (Table 3, column 5, significant at 1 percent).

Comparisons of the raw data in Figure 2 indicate no significant differences in pre-trends of creativity across states with and without copyrights. As an additional test to examine whether states with copyrights had begun to create more operas *before* copyrights, we estimate  $\beta$  separately for each year, allowing the coefficient to be different from zero before the adoption of copyrights in 1801:

$$opera_{it} = \sum \beta_r \text{Lombardy \& Venetia}_i \times year_r + \varphi_i + \delta_t + \varepsilon_{it} \quad (2)$$

where the variable  $year_r$  represents an indicator variable for each year between 1791 and 1820. Years between 1781 and 1790 are the excluded category. Estimates of annual coefficients indicate that the opera production before 1801 is not statistically different between Lombardy and Venetia and the other Italian states (Figure 3). The annual coefficients between 1791 and 1800 are close to zero and not statistically significant; they increase to 1 additional opera in 1801 and remain positive and statistically significant all years (but 1806) between 1802 and 1820.

### 3.4. Controls for Pre-Trends, and Exclusion of Major Cities

Regressions with alternative controls for differential pre-trends confirm the main results. Estimates with a common linear pre-trend for Lombardy and Venetia indicate that the two states that adopted copyrights in 1801 produced 2.3 additional operas per year after 1801 (Table 3, column 3, significant at 1 percent). Specifications that allow for a separate linear pre-trend for each state indicate a differential increase by 2.4 additional operas (Table 3, column 4, significant at 1 percent).

In addition, we estimate a de-trended version of equation (1) by estimating a linear pre-trend for Lombardy and Venetia and subtracting the estimated pre-trend from the dependent variable  $opera_{it}$ . De-trended estimates confirm the main estimates, with 2.2 additional operas for states with copyrights after 1801 (Appendix Table A5, column 1, significant at 1 percent).

Milan and Venice were the commercial and cultural centers of Lombardy and Venetia respectively. Is it possible that our results are driven by these two major cities? To examine this question, we perform additional robustness checks that exclude Milan and Venice from the regressions. All of the main specifications are robust to dropping either Milan, or Venice or both (Appendix Table A6). These findings indicate that copyrights encouraged the creation of new operas, even outside the major city centers.

### 3.5. Controls for Exposure to French Rule

We also examine whether exposure to French rule, rather than the adoption of copyrights, triggered the observed increase in creative output. All Italian states had come under French rule by 1812, but the length of their exposure varied according to the timing of their occupation (Foà 2001, p. 64). Acemoglu et al (2011) use variation in institutional reforms created by the French Revolution to estimate the effects of exposure to revolutionary ideas on economic growth in Germany.

To test this hypothesis, we estimate the following equation:

$$opera_{it} = \beta Lombardy \& Venetia_i \times post\ 1801_t + \gamma Length\ of\ French\ Presence_{it} + \varphi_i + \delta_t + \varepsilon_{it} \quad (3)$$

where *Length of French Presence<sub>it</sub>* measures the length of exposure (in years) to French presence in state *i* in year *t*, and all other variables are as defined above in equation (1).

Controlling for French rule leaves the main estimates unchanged, with 2.16 additional new operas per state and year in states with copyrights, compared with 2.20 in the main specifications (Appendix Table A7).

### 3.6. Constructing a Synthetic Lombardy and Venetia with Copyrights

As an additional test, we construct a *synthetic Lombardy without copyright laws* from data for other states that are most similar to Lombardy.<sup>29</sup> We apply these methods to match the characteristics of the real Lombardy as closely as possible through a weighted average of the characteristics of other Italian states with similar characteristics, but *without* copyright laws. Let *J* be the number of available control states without copyright laws and let *W* be a (*J* × *I*) vector of non-negative weights (*w*<sub>1</sub>, *w*<sub>2</sub>, ... *w*<sub>*j*</sub>)' that sum to one. The scalar *w<sub>j</sub>* represents the weight that state *j* is given in constructing the synthetic Lombardy. Let *X*<sub>1</sub> be a (*K* × 2) vector of the number of theater seats in Lombardy (as a measure of demand), and the number of active composers (as measure of supply) in Lombardy and let *X*<sub>0</sub> be a (*K* × *J*) matrix of the values for these same variables in the set of possible controls. Let the (*K* × *K*) matrix *V* be the inverse sample variance-covariance matrix of the matching variables. This is the weighing matrix of the Mahalanobis matching estimator (Rubin 1977, Rosenbaum and Rubin 1983). The vector of weights *W*\* minimizes (*X*<sub>1</sub> - *WX*<sub>0</sub>)' *V* (*X*<sub>1</sub> - *WX*<sub>0</sub>). Each country can be used as a match twice, allowing one replacement.

Figure 4 shows the estimated time path of new opera creation for a counterfactual Lombardy without copyrights. With 1.3 new operas per year, counterfactual output without copyrights, would have been only half the output of the real Lombardy. Matching estimates for Venetia confirm that a

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<sup>29</sup> Abadie and Gardeazabal (2012) estimate a Mahalanobis matching estimator to create a synthetic Basque region without terrorism from the characteristics of other Spanish regions to evaluate the effects of terrorism on GDP growth over time. Abadie, Diamond and Hainmueller (2012) extend the earlier paper to create a synthetic control for California to examine the effects of a large-scale tobacco control program that California implemented in 1988.

counterfactual Venetia without copyrights would have produced fewer operas (66 percent, Appendix Figure A2).

#### 4. POPULAR AND DURABLE OPERAS

Beyond increasing the number of new operas, copyrights may also influence the quality of new works, if composers rely on opera as a source of income. By granting composers the right to charge for repeat performances, the 1801 law raised composers' expected returns from creating popular and durable operas. Anecdotal evidence from composer biographies suggests that composers, who were often cash-constrained, responded to these types of financial rewards. Gioachino Rossini, for example, explained that he purposefully produced lower quality and less innovative pieces if he thought that a theater had underpaid him for his work:

“And, as for those good gentlemen, the *impresarij* (sic), who pretend to pay me handsomely, by giving me for sixteen or eighteen pieces, ...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, pp.200-01).

Copyrights may also have raised quality through wealth effects, by enabling composers who relied on opera as a source of income to compose fewer operas and spent more time developing each piece. In this way, increased pay from copyrights granted composers some additional time for experimentation. Many Italian composers came from families of poor musicians and depended on opera as a source of income. Rossini's biographer Beyle (1824, p. 2) explains:

“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 (Beyle 1824, p.2).<sup>30</sup>

Information on parents' occupations is available for 493 of the 705 Italian-born composers. These data suggest that Rossini's background was fairly typical: 210 fathers (43 percent) were musicians, 141 fathers (29 percent) were composers, and 9 fathers were chapel masters.<sup>31</sup>

Glixon and Glixon (2006, p. 144) describe how composers relied on opera as a lucrative, if strenuous source of revenue. “Except for those fortunate few in the most prestigious and high-paying posts, however, most professional musicians could not live satisfactorily on the wages from their court

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<sup>30</sup> Rossini's letters suggest that he cared deeply about quality and thought that the public was a poor judge of it. “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” (Beyle 1824, pp.199).

<sup>31</sup> We collected these data from the *New Grove* (2001) and Treccani (2001). Among 24 composers with information on the mother's occupation, 8 mothers were spinners, 6 nobles, and 2 singers.

or church job [...] Opera provided another opportunity, one that for composers (as with the lead singers) could be the most rewarding of all, as well as the most demanding.” By increasing composers’ receipts *per opera* copyrights may have relaxed some of these demands and helped to create freedom for experimentation.

Data on 19<sup>th</sup>-century authors show that payments to authors increased in response to stronger copyrights (MacGarvie and Moser 2014). Even though comparable data are not available for operas, anecdotal evidence suggests that copyrights increased the financial rewards of writing operas.<sup>32</sup> Under Sardinia’s 1840 copyright law, Giuseppe Verdi earned substantial income from performance fees and the sale of scores, freeing him from the need to work like a “galley slave” (Scherer 2001, pp.179-180).<sup>33</sup> Income from copyrights enabled Verdi to slow his pace of production and devote time to increasingly complex operatic work.<sup>34</sup>

While aesthetic quality is difficult to measure, we create three complementary measures to capture variation in the popularity and durability of operas. Our measure of historical popular operas is based on records of notable performances between 1781 and 1820 in Loewenberg’s (1978) *Annals of Opera*. Summary statistics indicate that composers produced more historically popular operas after the introduction of copyrights. Between 1781 and 1800, composers in Lombardy and Venetia created 0.1 new operas per year that entered Loewenberg (1978). After 1801 composers in Lombardy and Venetia created 0.6 popular operas per state and year (a 5.8-fold increase). By comparison, the number of new popular operas increased much less in other states, from 0.1 per year until 1801 to 0.2 afterwards (a 100-percent increase).

Re-estimating equation (1) for historically popular operas shows that composers created 0.4 additional popular operas per state and year after 1801 in Lombardy and Venetia compared with other states (Table 4, column 1, significant at 1 percent). Relative to an average of 0.1 new operas per year before 1801, this implies a 5.3-fold increase. Results are robust to alternative specifications. Excluding state fixed effects leaves the estimate at 0.4 (Appendix Table A8, Panel A, column 1, significant at 1 percent). Regressions with a pre-trend for Lombardy and Venetia imply an additional increase by 0.5

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<sup>32</sup> Data on payments to composers are more likely to be available for stars like Rossini, who received the staggering sum of 1,000 French francs per opera (Moore 1854, p.823). To put this payment in perspective, a hectoliter (roughly 25 US gallons) of wheat cost 1.3 francs in 1825 (Dramé et al. 1991). Payments for publication (printing) rights to scores remained modest until the mid-19<sup>th</sup> century. Ricordi, for example, paid Bellini 4,000 Austrian lire (3,489 francs) for the rights to reprint *La Sonnambula* (1831) - only one third of the flat fee that Bellini had received for the performance rights to the same opera (Rosselli 1996, p.75).

<sup>33</sup> Scherer’s reference dates back to a reference to Verdi’s “anni di galera”, in a famous letter by Verdi to his Milanese friend, Clarina Maffei, of 12 May 1858 (Gossett 2009, p. 237).

<sup>34</sup> In the 1840s, Verdi composed 14 operas; in the 1850s he composed 7 operas, including *Rigoletto* (1851), *La Traviata* (1853), and *Simon Boccanegra* (1857). In the 1870s, 1880s, and 1890s Verdi produced only one opera each decade: *Aida* (1871), *Otello* (1887), and *Falstaff* (1893). Whether these later works are of higher quality is a subject of debate (Gossett 2009). Recent research in musicology has highlighted the quality and originality of Verdi’s early works, before the creation of *Luisa Miller* in 1849.

historically popular operas (Appendix Table A8, Panel A, column 3, significant at 1 percent). Regressions with a separate pre-trend for each Italian state imply an increase by 0.4 (Appendix Table A8, Panel A, column 5, significant at 1 percent). Alternative estimates with a de-trended dependent variable confirm an increase by 0.4 historically popular operas (Appendix Table A9, column 1, significant at 1 percent).

Copyrights also raised the *average quality* of operas, measured by the share of high-quality operas among all new operas in state  $i$  and year  $t$ . OLS regressions indicate an additional 10.4 percent increase in the share of historically popular operas per state and year after 1801 for Lombardy and Venetia (Table 4, column 2, significant at 5 percent). Compared with 5.5 in 100 operas until 1800, this implies a 2.9-fold increase in average quality.

An additional complementary measure for historical popularity counts the *number of repeat performances*. This analysis confirms that copyrights helped to increase the quality of operas, measured by their popularity. Operas that composers wrote with copyright protection in Lombardy and Venetia were performed approximately one additional time on average until 1821 (Appendix Table A10, column 1, significant at 5 percent), which implies a 61 percent increase compared with an average of 1.54 repeat performances until 1801. Operas with copyrights were also more likely to be a “hit,” with 9.6 additional performances *in the same year* (Appendix Table A10, column 4, significant at 1 percent), which implies a 4.6-fold increase compared with the pre-copyright average of 2.69 repeat performances in the year of the premiere.

Next, we examine whether copyrights increased the number and the share of operas that were durable and popular enough to be performed at least once at the Metropolitan opera between 1900 and 2014. Summary statistics indicate a 6.3-fold increase in the number of Met operas in states with copyrights after 1801, compared with only a 2.2-fold increase for other Italian states (Table 1). Re-estimating equation (1) for operas at the Met indicates that composers in Lombardy and Venetia produced 0.45 additional operas after 1801, compared to states without copyrights (Table 4, column 3, significant at 1 percent). Relative to an average of 0.075 Met operas per state and year, this implies a 7-fold increase. The share of Met operas also increased by 10.2 percent upon the copyright adoption (Table 4, column 4, significant at 1 percent). All of these results are robust to excluding state fixed effects, controlling for a pre-trend for Lombardy and Venetia, controlling for a pre-trend for each Italian state (Appendix Table A8, Panel B), and to detrending the dependent variable (Appendix Table A9, column 3).

A third and final test for quality examines changes in the creation of new operas that were durable enough to be available on Amazon in 2014. Summary statistics indicate that composers from Lombardy and Venetia produced significantly more durable operas after the introduction of copyrights in 1801. Between 1781 and 1800, composers in Lombardy and Venetia premiered 0.03 durable operas per state and year. Between 1801 and 1820, they produced 0.4 per year (17 times more, Table 1). By

comparison, composers from other parts of Italy created 0.03 durable operas per year until 1800 and 0.2 afterwards (6 times more). Regressions with durable operas as an outcome variable indicate that composers in Lombardy and Venetia created 0.3 additional durable operas per year after 1801 compared with other Italian states (Table 4, column 5, significant at 5 percent). Relative to an average of 0.03 durable operas per year before 1801, this implies a 12.2-fold increase. Excluding state fixed effects leaves the estimate at 0.3 (Appendix Table A8, panel C, column 1, significant at 5 percent). These estimates are robust to controlling for a separate pre-trend for states with copyrights, state-specific linear pre-trends (Appendix Table A8, panel C, columns 4 and 5), or de-trending the dependent variable (Appendix Table A9, column 5).

Estimates for changes in the average quality of new operas indicate a 5.3-fold increase in the share of durable operas in response to the adoption of copyright laws. The share of durable operas among all new operas increased by an additional 6.9 percent per state and year after 1801 in Lombardy and Venetia (Table 4, column 6, significant at 5 percent), compared with a pre-1801 share of historically popular operas of 1.6 percent.<sup>35</sup>

## 5. COMPOSER-LEVEL REGRESSIONS

Regressions at the state level have shown that Lombardy and Venetia produced more and better operas after they adopted copyrights, compared with other states that did not offer copyrights. Here, we repeat this analysis at the level of individual composers, controlling for productivity differences across composers through composer fixed effects. Individual composers, like Rossini, may have produced more and better operas, regardless of copyrights. Composer fixed effects control for such differences in baseline levels of productivity across composers.

### 5.1. Baseline Estimates

To estimate the effect of copyrights at the composer level, we estimate

$$Operas_{cit} = \beta Lombardy \& Venetia_i \times post\ 1801_t + \lambda_c + \varphi_i + \delta_t + \varepsilon_{cit} \quad (4)$$

where the dependent variable,  $operas_{cit}$ , is the number of new operas that composer  $c$  creates in state  $i$  and year  $t$ . Composer fixed effects  $\lambda_c$  control for differences in base-line levels of productivity across composers. All other variables are defined in equation (1).

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<sup>35</sup> Anecdotal evidence from composers' biographies points to agglomeration externalities (Marshall 1890), as an additional source of quality improvements over time. A 19-year old Rossini appeared on the scene in 1811, 10 years after the adoption of copyrights. In 1824, Beyle (p.249) recognizes that Rossini's work was more original "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, pp.249). Another prominent latecomer is Vincenzo Bellini. Born in Catania (Two Sicilies) in 1801, Bellini moved to Milan in 1827, and premiered most of his operas there (Weinstock 1971, p.134), including *La Norma* in 1831.

Composer-level regressions confirm that the adoption of basic copyright laws helped to encourage the production of more and better operas. Composers in Lombardy and Venetia created 1.0 additional new opera per state and year after 1801 compared with composers in other Italian states (Table 5, Panel A, column 1, significant at 1 percent). Relative to a pre-1801 mean of 1.1 new operas per state, year, and composer this implies that composers produced approximately twice as many operas when they had copyrights. Estimates from QML Poisson regressions confirm these results (Appendix Table 11, column 1, significant at 1 percent). Composers in states with copyrights also created an additional 0.6 historically popular operas per state and year compared with composers in other states (Table 5, Panel A, column 2, significant at 1 percent), 0.4 additional operas performed at New York Met between 1900 and 2014 (Table 5, Panel A, column 4, significant at 1 percent), and 0.4 additional durable operas per composer, state, and year (Table 5, Panel A, column 6, significant at 1 percent).

Finally, to check whether our results may be driven by a small number of exceptionally prolific composers, we repeat the analyses excluding composers in the top 10 percent and 20 percent of opera output. The results further corroborate our findings from the full sample (Table 5, Panels B and C).

## 5.2. Return Migration as a Mechanism

Recent work on superstar patentees has shown that variation in tax rates helps to attract superstar inventors to countries (Akcigit, Baslandze, and Stantcheva 2016) and US states with more favorable tax rates (Moretti and Wilson 2016). In principle, copyrights could play a similar role, by attracting productive composers to states with better copyrights. If copyrights triggered a brain drain to Lombardy and Venetia from other Italian states, these flows would threaten the validity of our baseline estimates. In section 3.1, we have examined this issue by tracing composers' movements within Italy. This analysis reveals no evidence that composers who had been active in other Italian states moved to Lombardy and Venetia after 1801.

In this section, we examine the contribution of migration in greater depth, focusing on return migrants, Italian-born composers who had composed at least once in another European country before returning to Italy. To estimate the differential contributions of such migrants, we first re-estimate equation (4) with an additional interaction for *return migrants \* L&V \* post*.

This analysis indicates that return migrants contributed to the observed boost in productivity, without single-handedly causing it. Controlling for the contributions of return migrants, the main estimate for *Lombardy & Venetia \* post* remains large and significant, at 0.93 additional new operas per composer, state, and year (Appendix Table A12, Panel A, column 1, significant at 1 percent). The estimate for *return migrants \* L&V \* post* is positive, but smaller in magnitude (at 0.290) and not statistically significant (Appendix Table A12, Panel A, column 1, with a *p*-value of 0.310).

Corresponding estimates for high-quality operas yield similar results (Appendix Table A12, Panels B-D, columns 1-2).

A complementary set of regressions examines the effects of copyrights on *stayers*, who only composed in the state where they composed their first opera. Because they were exceptionally immobile, these composers may have been particularly hard hit by negative competition effects.<sup>36</sup> Conversely though they may have benefitted from knowledge spillovers, or other types of positive agglomeration externalities (Marshall 1920, Ciccone and Hall 1999, Kline and Moretti 2014).<sup>37</sup> The negative OLS estimates are consistent with competition effects, but they are imprecisely estimated due to the small number of stayers in our sample (Appendix Table A12, column 3, with a *p*-value of 0.311). Regressions with controls for quality yield similar results (Appendix Table A12, Panels B-D, columns 3-4).

## 6. COPYRIGHT ADOPTIONS AND EXTENSIONS ACROSS ALL OF ITALY

In this section we exploit a broader set of changes in copyrights laws across all of Italy to investigate the effects of copyright adoptions across states, and to compare the benefits of copyright extensions starting from various levels of existing rights.

### 6.1. Copyright Adoption in Other States, 1826-1840

Between 1826 and 1840, all the remaining states within Italy adopted copyright laws as part of a political process towards unification. Many, if not all, of these changes were exogenous to artistic creativity. For example, states that were politically close to Sardinia adopted copyrights for life plus 30 years when they co-signed Sardinia's Bilateral Treaty with Austria in 1840 (Ubertazzi 2000, p.50). With the exception of Sicily, there is little evidence for lobbying. In Sicily, authors (but not composers) lobbied unsuccessfully for copyrights in the 1820s (Pomba et al. 1986, p.86).<sup>38</sup>

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<sup>36</sup> Borjas and Doran (2012) find that native US mathematicians who had to compete with Russian immigrants for journal space published *less* after the collapse of the Soviet Union. Similar to native US mathematicians, stayers in Lombardy and Venetia had to compete with movers for opportunities to perform. In the short run, these opportunities may have been constrained by the existing infrastructure of performance spaces and demand.

<sup>37</sup> Historical evidence suggests that the adoption of copyrights helped to attract prolific composers from other states to Lombardy and Venetia. For example, Beyle (1824, pp.xxv-xxvi) mentions two productive immigrants, the German Simon Mayer and the Austrian Ferdinand Pär. "Mayer, a German, who finished his education in Italy, and has resided for a number of years at Bergamo, has written some fifty operas between 1795 and 1820." The arrival of productive foreign composers, such as Mayer and Pär may have improved the productivity of stayers, for example, by creating opportunities for knowledge spillovers from immigrants to natives. Moser, Voena, and Waldinger (2014) document such effects for German Jewish émigré scientists, whose arrival in the United States increased patenting rates by native US inventors.

<sup>38</sup> Carlo Mele (1792-1841) and Pasquale Stanislao Mancini (1817-1888) had lobbied for protection. Mancini later argued that the Two Sicilies' decision not to join the Bilateral Treaty between Sardinia and Austria contributed to its cultural decline in the 1840s and 1850s (Pomba et al. 1986, p.87). In Germany, parliament (*Bundesversammlung*) received a request for copyrights in 1825 by composers including Johann Nepomuk Hummel, Carl Maria von Weber, and Ludwig van

This broader set of changes enable us to explore the effects of adopting copyright laws in an environment when other states already offer such laws, similar to today. Summary statistics confirm that the introduction of copyrights also encouraged creative work in this setting. Composers in states with copyrights produced 2.07 new operas per state and year, 35 percent more than composers in states without copyrights (Appendix Table A13). To examine these effects more systematically, we estimate

$$opera_{it} = \beta \text{copyright}_{it} + \varphi_i + \delta_t + \varepsilon_{it} \quad (5)$$

where the variable  $\text{copyright}_{it}$  equals 1 if state  $i$  offers copyrights in year  $t$ , and all other variables are as defined above. OLS estimates indicate that composers created an additional 2.7 new operas per state and year in states with copyrights (Table 6, column 1, significant at 1 percent). Relative to a mean of 1.2 new operas per year in states without copyrights, this implies a 3.3-fold increase.

In addition to increasing the number of new operas, the adoption of copyrights also increased the quality of operas – even when surrounding states already offered copyrights as well. OLS estimates indicate that composers in states with copyrights produced 0.2 more historically popular new operas per year (Table 6, column 3, significant at 10 percent). Relative to a mean of 0.1 premieres per year without copyrights, this implies a 2.5-fold increase in the creation of new historically popular operas. Composers with copyrights also created 0.4 additional new operas that continued to be played at the Metropolitan opera between 1900 and 2014 (Table 6, column 4, significant at 1 percent), implying a 6.3-fold increase. Finally, composers in states with copyrights also produced more durable (Amazon) operas (0.5 per year) compared with composers in states without copyrights (0.2 per year). OLS estimates imply that composers in states with copyrights produced 0.3 additional durable operas per year (Table 6, column 5, significant at 1 percent). Relative to an average of 0.1 durable operas per year in states without copyrights, this implies a 4.1-fold increase.

## 6.2. Extensions in the Length of Copyright

We also examine the effects of copyright *extensions* on the number and the quality of 19<sup>th</sup>-century operas. In recent years, such extensions have been a subject of intense debate surrounding the 1998 US Copyright Term Extension Act and the 2018 Music Modernization Copyright Bill. Compared with extensions today, which lengthen copyrights from pre-existing levels of *life+50* or more, historical extensions started from much lower levels of pre-existing protection, at *life+10*.<sup>39</sup>

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Beethoven, who complained that publishers were “getting fat by robbing without penalty their neighbors’ property,” and demanded the right to collect fees for “operas and opera-like works” (Scherer 2002, pp.176-8).

<sup>39</sup> The 1998 Copyright Term Extension Act extended copyrights for privately owned works from the life of the author plus 50 years to the life of the author plus 70 years, and for works of corporate ownership from 75 years to 120 years from the creation or 95 years after the publication (whichever comes earlier). Notably, opera is very different from Mickey Mouse and other fictional characters whose commercial value to the original owner depends on its use in other types of products,

Similar to copyright adoptions, most of these changes were a result of broader politically-motivated changes, independent from lobbying by composers. Lombardy and Venetia first extended their terms from *life+10* to *life+30* in 1840, when they were under Austrian rule, and Austria signed a Bilateral Treaty with Sardinia (Ubertazzi 2000, p. 50). A second extension in 1865, from *life+30* to *life+40*, was a result of the unifications of Lombardy, Venetia, and five other states into the new Kingdom of Italy. In 1870, the Papal State, as the final independent state, extended its copyrights to *life+40* as it was annexed by Italy (Ubertazzi 2000, p.81)

We exploit these changes to investigate the effects of copyright extensions. In contrast to the effects of basic copyrights, there is no evidence for a positive effect of copyright extensions. Under the initial copyright lengths of *life+10*, composers in Lombardy and Venetia created 5.59 new operas per state and year (Figure 5). After copyrights increased to *life+30* in 1840, output stayed unchanged at 5.60 new operas per state and year. After a further extension to *life+40* in 1865, output *declined* to 5.1 new operas per state and year.

We also estimate OLS regressions for copyright extensions across Italy:

$$opera_{it} = \beta_1 adopt_{it} + \beta_2 extend30_{it} + \beta_3 extend40_{it} + \varphi_i + \delta_t + \varepsilon_{it} \quad (6)$$

where the dependent variable counts new operas per state  $i$  in year  $t$  between 1770 and 1900. The variable  $adopt_{it}$  indicates state-year pairs after state  $i$  has adopted copyrights and before it extends its copyrights to *life + 30*.<sup>40</sup> The variable  $extend30_{it}$  equals 1 after a state  $i$  has extended its copyrights to *life + 30* and before it extends copyrights *life + 40*. Finally, the variable  $extend40_{it}$  indicates state-year pairs after state  $i$  has extended its copyrights from *life + 30* to *life + 40*. The difference between  $\beta_1$  and  $\beta_2$  estimates the effect of extending existing copyrights to *life + 30*. The difference between  $\beta_2$  and  $\beta_3$  estimates the effects of further extending copyrights from *life + 30* to *life + 40*.<sup>41</sup>

OLS estimates of  $\beta_1$  confirm that the *adoption* of copyrights was associated with a marked increase in creativity, with 3.2 additional new operas per state and year (Table 7, column 1, significant at 1 percent). Relative to a mean of 1.2 new operas per state and year for states without copyrights, this

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extending from comic books to consumer products, such as t-shirts and mugs, and even theme parks. With such products, copyrights alone are insufficient as a means of protection. Instead, creators need a “convergence of intellectual property rights,” including copyrights, trademarks, and claims of unfair competition (Helfand 2002). In contrast, opera scores, which are the subject of our paper, typically are used “as is,” so that they do not need the same type of protection.

<sup>40</sup> Lombardy and Venetia adopt copyrights for *life + 10* in 1801. The Papal State adopt copyrights with *life + 12* in 1826, and the Sicilies adopt copyright laws with *life + 30* in 1828. Sardinia, Modena, Parma, and Tuscany adopt their own copyright laws with *life + 30* in 1840. See Appendix Table A10 for a complete list of all copyright adoptions and extensions.

<sup>41</sup> The identifying assumption for  $\beta_2$  and  $\beta_3$  is that states with and without copyright extensions would have experienced a comparable change in opera creation per year had there been no copyright extension. This assumption would be violated if composers who were exceptionally productive lobbied successfully for extensions in their state. As we explain above, we have found no evidence for successful lobbying by composers. Instead nearly all changes in Italian copyrights during this time resulted from Italy’s process toward unification.

implies a 3.7-fold increase. *Extensions* in copyrights, however, were followed by a *decline* in creativity. States that extended existing copyrights to *life + 30* created 2.1 fewer operas per state and year afterwards ( $\widehat{\beta}_2 - \widehat{\beta}_1 = 1.07 - 3.19 = -2.12$ , Table 7, columns 1). A Wald-test rejects the hypothesis that  $\beta_2 - \beta_1 = 0$  with a  $p$ -value of 0.000). Estimates for  $\beta_3$  indicate no significant effects for further extensions from *life + 30* to *life + 40*.<sup>42</sup>

Regressions for high-quality operas confirm these results, albeit for a smaller number of observations. Estimates of  $\beta_1$  indicate that states which adopted copyrights experienced an increase in high-quality output, with 0.3 additional popular operas per year (Table 7, column 3 significant at 1 percent). Relative to a mean of 0.1 in states without copyrights, this implies a 4-fold increase. Estimates for copyright extensions are negative, though not statistically significant. Estimates of  $\beta_2$  indicate that copyright extensions were not associated with an increase in the number of popular operas ( $\widehat{\beta}_2 - \widehat{\beta}_1 = 0.24 - 0.30 = -0.06$ , with a  $p$ -value of 0.582). Estimates of  $\beta_2$  imply that further extensions to *life + 40* were associated with 0.28 fewer operas per year ( $\widehat{\beta}_3 - \widehat{\beta}_2 = -0.032 - 0.245 = -0.28$ , with a  $p$ -value of 0.259).

Estimates for operas that were performed at least once at the New York Met between 1900 and 2014 confirm these results (Table 7, column 4). States that had adopted basic copyright protection created 0.5 additional Met operas per state and year. States that had extended their copyrights to *life+30* produced 0.70 *fewer* durable operas per state and year ( $\widehat{\beta}_2 - \widehat{\beta}_1 = -0.227 - 0.474 = -0.701$ , with a  $p$ -value of 0.00). Further extensions from *life+30* to *life+40* produced fewer operas per state and year ( $\widehat{\beta}_3 - \widehat{\beta}_2 = -0.393 - (-0.227) = -0.17$ , with a  $p$ -value of 0.007).

Results for durable operas confirm the direction of these estimates (Table 7, column 5). States that had adopted basic copyright laws created 0.40 additional durable operas per state and year. States that had extended their copyrights to *life+30* produced 0.24 fewer durable operas per state and year ( $\widehat{\beta}_2 - \widehat{\beta}_1 = 0.162 - 0.403 = -0.24$ , with a  $p$ -value of 0.02). Further extensions from *life+30* to *life+40* produced no additional operas, fewer operas per state and year ( $\widehat{\beta}_3 - \widehat{\beta}_2 = 0.109 - 0.162 = -0.05$ , with a  $p$ -value of 0.453).

Why did extensions in copyrights fail to encourage creativity? Intuitively, extensions in copyright length should only affect pieces that are still played after the original terms expire. To examine how long operas continued to be performed, we use data on notable performances in Loewenberg (1978). These data estimate an upper bound on durability because they only include popular works. Even in this subsample of popular works, however, few pieces are performed after the first 20 years (Figure 6 and Appendix Figure A3).

To estimate the expected length of copyrights under *life+10*, *life +20*, and *life+30*, we use data on years of birth and death, which are available for all 705 composers, to construct demographic life

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<sup>42</sup> The difference between  $\widehat{\beta}_3$  and  $\widehat{\beta}_2$  is 1.3, but a Wald test fails to reject  $\widehat{\beta}_3 - \widehat{\beta}_2 = 0$  with a  $p$ -value of 0.407.

tables for Italian-born composers of operas between 1770 and 1900 (Appendix Table A2). Life table estimates imply that a composer who was of the average age at the time of the premiere (33.6 years) could expect to live another 29.3 years. For a copyright term of *life+10*, this implies an expected length of 39.3 years. Less than one third of operas (27 of 173 in Loewenberg) were still performed after 39 years.<sup>43</sup> Another 24 operas (13.9 percent) were still performed after 59 years, the expected term under *life+30*. Only 20 operas (11.6 percent) still played after 69 years, the expected term under *life+40*.

Taken together, these findings suggest that only a small fraction of operas, and composers, stood to gain from copyright extensions beyond the composer's life. Analyses of payments to 19<sup>th</sup>-century authors indicate that publishers increased upfront payments to authors after Britain lengthened its copyright terms in 1814. In the same way, publishers of musical scores may have increased payments to composers in response to longer copyright terms. For 19<sup>th</sup>-century literature, copyright extensions increased payments to the average authors, even though they disproportionately benefitted super star authors, such as Sir Walter Scott (MacGarvie and Moser 2014). Impresarios, however, only paid composers for performance rights to last one season. They are therefore less likely to have increased payments to composers in response to longer terms. Then, the heirs of composers of exceptionally durable operas, such as Gioacchino Rossini's "Il Barbiere di Siviglia" would have benefit disproportionately from such extensions, without any obvious benefits for creativity.

## 7. INTERACTIONS BETWEEN COPYRIGHTS AND DEMAND

A final test exploits variation *within states* (mapped in Appendix Figure A4) to examine how copyrights interact with pre-existing differences in infrastructure and demand. Importantly, we find that both Lombardy and Venetia experienced a clear increase in output after they had adopted copyrights. In Lombardy, the number of new operas increased by a factor of three; in Venetia output more than doubled. Within Lombardy, however, opera output increased substantially more in Milan, than in Mantua, Brescia, and Bergamo.<sup>44</sup> One notable characteristic of Milan was its sheer size, with a population of 124,000 in 1800 (Malanima 2015, p.4). By comparison, Brescia (the next largest city) had 38,000 people, Bergamo had 36,000, and Mantua 25,000. City size in turn is correlated with the density of skilled performers and with the demand for shows. Both these factors increase the payoffs from creating more and better music, which, theoretically, should amplify the effects of adopting copyrights.

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<sup>43</sup> The number of repeat performances is similar for new operas between 1781 and 1800 that premiered in Lombardy and Venetia and other states (Appendix Figure A3). On average 165 operas in Loewenberg's *Annals* were performed 10 times, including 7.5 times within the first 40 years (the expected length of copyrights under *life+10*) and 2.8 times afterwards.

<sup>44</sup> In his study of Giuseppe Verdi's (1813-1901) relationship with the publishing house Ricordi, Jensen (1989, p. 3) explains that "Napoleon's campaigns brought a large part of Italy together with Milan as the headquarters. Italy's intellectuals and artists flowing into this center, and even after Napoleons' vision of Italy collapsed and it fragmented once again, Milan remained a magnet for Italy's best human resources, becoming a rich and important province under Austrian rule." City-level data for Venetia also indicate some geographic concentration, albeit at a smaller scale.

To proxy for city-level variation in demand and in the infrastructure to perform, we examine historical data on theaters that were large enough to perform operas. Antonini (2000, p.23) records such data for theaters that had staged at least one opera by 1800 and explains that theaters needed around 100 seats to play operas.

Until 1801, trends in theater construction were comparable in Lombardy and Venetia and the rest of Italy (Appendix Figure A5). In 1770, 9 cities in Lombardy and Venetia had on average 0.3 theaters that were large enough to perform operas, and 16 cities in other Italian states had on average 0.3 such theaters. By far the greatest expansion in theater construction occurred with the unification of 1861, which increased demand for opera across Italy (Morelli 2012).

To systematically examine interactions between copyrights and pre-existing differences in theater infrastructure and demand, we estimate differential effects for cities with two or more theaters in 1800. Only Venice (Venetia) and Florence (Tuscany) had three theaters in 1800 that were large enough to stage operas. Another four cities had two theaters in 1800: Milan (Lombardy), Naples (Two Sicilies), Turin (Sardinia), and Ferrara (Papal State, Appendix Figure A6, Panel A).

OLS regressions interact *Lombardy & Venetia \* post* with an indicator for cities that had two or more theaters in 1800. These estimates show that cities with two or more theaters created 2.1 additional operas per year in response to the adoption of copyright laws (Table 8, column 1, significant at 1 percent). Relative to a pre-1801 mean of 0.3 new operas per city and year, this implies a 9-fold increase. Controlling for a separate linear pre-trend for cities with two or more theaters leaves the estimate to 2.1 (Table 8, column 2, significant at 1 percent).

Cities with two or more theaters before 1801 also experienced a larger increase in high-quality operas after they had adopted copyrights. Cities with two or more theaters in 1800 created 0.3 additional popular operas per year with copyrights (Table 8, column 3, significant at 5 percent). Controlling for a separate linear pre-trend for cities with two or more theaters leaves this estimate nearly unchanged at 0.3 (Table 8, column 4, significant at 5 percent). Cities with two or more theaters also created 0.3 additional Met operas (Table 8, column 5, significant at 1 percent), and 0.4 additional durable operas per year after 1800 (Table 8, column 7, significant at 10 percent).

Alternative specifications with the number of seats further confirm these results. For example, cities with 1,000 or more seats in 1800 produced 2.0 additional operas after 1800 (Appendix Table A14, column 1, significant at 1 percent).

## 8. OTHER MUSICAL COMPOSITIONS AND LIBRETTOS

Operas are the focus of our analysis because they provide exceptionally rich empirical measures for the quantity and quality of creativity. To complement the analysis of operas, this section presents results for a broader set of musical compositions, including symphonies, operettas, and songs,

as well as librettos. All tests confirm our main findings that the adoption of basic copyright laws encouraged the creation of new works.

### 8.1. Other Musical Compositions

We start by examining data from *Opening Night! Operas and Oratorio Premieres*, a crowd-sourced data base of more than 42,000 musical compositions, maintained by the Stanford University Library.<sup>45</sup> Compared with our main data set, which is limited to operas, *Opening Night* covers a broader range of musical compositions, including operettas, oratorios, and serenades. *Opening Night* includes 5,949 premieres of such works in Italy between 1770 and 1900. Estimating equation (1) with this broader set of compositions confirms that the adoption of copyright laws encouraged the creation of new works. With the adoption of copyrights, musical output in Lombardy and Venetia increased by an additional 3.4 works per state and year compared with other Italian states without copyrights (Appendix Table A15, column 1, significant at 1 percent).

A second test examines the effects of copyrights on the creation of new symphonies and songs, using information on scores from the *International Music Score Library Project* (IMSLP, also known as the Petrucci Music Library).<sup>46</sup> This IMSLP covers the entire history of symphonies and songs, starting with anonymous folk songs from Ancient China and Greece. By the time of our data collection in 2018, it covered 139,837 works by 17,003 composers, including 2,398 symphonies and nearly 5,600 songs that premiered in Italy between 1770 and 1900.

Re-estimating our main equation with the IMSLP data on symphonies and songs corroborates the positive link between copyrights and creativity. With the adoption of copyrights, musical output in Lombardy and Venetia increased by 3.4 additional symphonies and 5.9 additional songs per state and year (Appendix Table A15, columns 3 and 5, significant at 1 percent). Taken together, results from *Opening Night* and the IMSLP indicate that the adoption of basic copyrights encouraged the creation of new music –beyond the creation of operas.

### 8.2. Librettos

While most of our analysis is focused on scores – the music of the opera – we also examine effects on librettos – the text that forms an essential part of the entire composition. Importantly, librettos were a literary composition with separate copyrights, under Article 1 of the 1801 Copyright Law (Appendix B).

Although many librettists were “amateurs” (Glixon and Glixon 2006, pp. 110-11), they came to expect some type of financial recognition for their efforts. The sale of physical copies of the libretto as

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<sup>45</sup> We accessed these data at <http://operadata.stanford.edu> on September 20, 2018.

<sup>46</sup> We accessed these data at <https://imslp.org> on November 4, 2018.

a memento for a visit to the opera, became an important source of revenue to the authors. “For this purpose, the practice was introduced of leaving to the author of the drama, as payment for his efforts, everything that was taken from the sale of the librettos, printed at his own expense...” (Glixon and Glixon 2006, p. 130). In eighteenth-century Italy, some librettists were paid directly by the impresario (Glixon and Glixon 2006, p. 130). If copyrights helped to increase these revenues, the 1801 law may have also encouraged the creation of librettos, similar to the creation of musical scores.

To measure changes in the creation of new librettists, we first collect the names of all 648 librettists who were active in Italy between 1770 and 1900 from Dassori (1903) and Treccani (2001). We then use the *New Grove Dictionary of Music and Musicians* (2001) to retrieve all librettos that these authors created in Italy. This process yields 1,091 librettos that were created in Italy between 1770 and 1900. We use this new data set to re-estimate the baseline specifications with new librettos as the outcome variable. OLS estimates indicate that the adoption of copyrights led to a substantial increase in the creation of librettos per state and year. Lombardy and Venetia produced an additional 2.6 new librettos per state per year after 1801 compared with other Italian states (Appendix Table A16, column 1, significant at 1 percent). Relative to a pre-1801 mean of 1.4 new librettos per state and year, this implies a 186 percent increase.

A complementary test investigates whether the adoption of copyrights was associated with an increase in the use of new librettos, instead of recycling existing librettos, as had become a custom in the late 17<sup>th</sup> century (Glixon and Glixon 2006, “New Libretto or Old?” p. 117). This analysis shows that the adoption of copyrights was associated with a substantial increase in the share of operas that used a new libretto. Until 1801, only 16.5 percent of new operas used a new libretto. After Lombardy and Venetia adopted copyrights in 1801, the share of operas that used a new libretto increased by an additional 0.533 in Lombardy and Venetia compared with other Italian states (Appendix Table A16, column 3, significant at 1 percent).

Taken together, these results suggest that the adoption of basic copyrights encouraged the creation of new librettos, as the literary component of operas, above and beyond the effects on musical scores.

## 9. CONCLUSIONS

This paper has used variation in copyright laws across eight Italian states – as a result of the timing of Napoléon’s military victories in Italy – to examine the effects of copyrights on creativity. Comparing changes in the number of new operas across Italian states with and without copyrights, we find that states with copyrights experienced a 2.6-fold increase in the creation of new operas. Our analyses also suggest that copyrights increased the quality of operas, measured both by their immediate popularity (as a contemporary “hit”) and by their longevity in sales and repertoires today. These results are confirmed by complementary tests of other types of musical compositions and librettos. Taken

together, these findings suggest that basic levels of copyright protection help to raise both the quantity and the quality of new works.

There is, however, an important tradeoff between the positive incentive effects of copyrights, and their potentially negative effects on down-stream creativity and innovation. The same mechanism that raises composers' income from creative work also increases the costs for consumers and, more importantly perhaps, later generations of creative individuals. Recent research indicates that the downstream costs of long-lived copyrights may be particularly severe for science (Biasi and Moser 2019), and other fields in which creativity depend critically on access to existing work. Developing a better understanding of these long-term tradeoffs is an important topic for future research.

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TABLE 1 – NEW OPERAS PER STATE AND YEAR ACROSS EIGHT STATES WITHIN ITALY, 1781-1820

	LOMBARDY & VENETIA	OTHER STATES
<u>All operas (N=677)</u>		
1781-1820	3.063	1.717
1781-1800	1.575	1.350
1801-1820	4.550	2.083
<u>Historically popular operas in Loewenberg (1978, N=62)</u>		
1781-1820	0.363	0.121
1781-1800	0.125	0.083
1801-1820	0.600	0.158
<u>Operas performed at the Metropolitan, 1900-2014 (N=55)</u>		
1781-1820	0.365	0.108
1781-1800	0.100	0.067
1801-1820	0.625	0.150
<u>Durable operas on Amazon today (N=42)</u>		
1781-1820	0.225	0.088
1781-1800	0.025	0.025
1801-1820	0.425	0.150

*Notes: Lombardy & Venetia* adopted copyright laws in 1801. *Other States* include Sardinia, Modena and Reggio, Parma and Piacenza, Tuscany, the Papal State, and Sicily. *Historically popular operas* include 62 operas created between 1781 and 1820 and are listed in Loewenberg’s (1978) *Annals of Opera*, a compendium of notable performances between 1597 and 1940. *Operas performed at the Metropolitan* include 55 operas that were performed at the Metropolitan Opera House in New York at least once between 1900 and 2014. *Durable operas* include 42 operas created between 1781 and 1820 that were available for sale on Amazon in March 2014.

TABLE 2 – PRE-COPYRIGHT CHARACTERISTICS  
 LOMBARDY & VENETIA COMPARED WITH OTHER ITALIAN STATES

	L&V (1)	OTHER STATES (2)	DIFFERENCE (3)
PANEL A: POPULATION, URBANIZATION, AND GDP IN 1800			
Population (in millions)	3.18	2.98	0.199 (0.101)
Cities with > 5,000 people	15.50	15.80	-0.500 (0.972)
Urbanization rate	17.50	16.90	0.599 (0.932)
GDP per capita (in millions)	1,450	1,386	64.000 (50.903)
PANEL B: PROXIES FOR THE DEMAND FOR NEW OPERAS			
Theaters	5.56	5.55	-0.056 (1.248)
Theaters performing opera	2.12	1.88	-0.236 (0.526)
Theater seats	4,730.10	4,284.30	-445.861 (917.827)
Composers	0.54	0.64	0.974 (0.628)
Librettos	2.88	2.98	-0.100 (0.442)
Librettists	2.30	2.53	-0.225 (0.376)
Theaters/city	1.22	0.88	-0.347 (0.382)
Theaters performing opera/city	0.44	0.31	-0.132 (0.240)
Theater seats/city	1,046.67	695.81	-350.854 (432.890)

*Notes: Lombardy & Venetia* adopted copyrights in 1801. *Other States* within Italy include Sardinia, Modena and Reggio, Parma and Piacenza, Tuscany, the Papal State, and Sicily. Data in Panel A on *Population*, *Cities with > 5,000 inhabitants* and *Urbanization rate* (population in cities/ population elsewhere) are drawn from Malanima (2015). Data on *GDP per capita* are in 1990 PPP USD and drawn from Romani (1982), Felloni (1959) and Ostuni (1992). Column 3 reports a *t*-test for the equality of means between *Lombardy & Venetia* and *Other States*.

TABLE 3 – EFFECTS OF COPYRIGHTS ON THE CREATION OF NEW OPERAS  
 DEPENDENT VARIABLE IS OPERAS CREATED PER STATE AND YEAR, 1781-1820

	(1)	(2)	(3)	(4)	(5)
		OLS (1-4)			Poisson (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 L&V	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 (state-year pairs)	320	320	320	320	320
R-squared	0.800	0.726	0.800	0.819	

Standard errors clustered at the state-year level in parentheses

*Notes:* The indicator variable *Lombardy & Venetia* equals 1 for Lombardy and Venetia, which adopted copyrights in 1801; the indicator *post* equals 1 for years after 1800. The *pre-1801 mean* reports the average number of new operas created per state and year until 1800. State fixed effects control for variation in the creation of new operas that is constant over time. Year fixed effects control for variation in opera output over time that is shared across states. Columns (1-4) are estimated using OLS; column (5) reports the average treatment effect of a quasi-maximum likelihood Poisson regression with conditional fixed effects.

TABLE 4 – EFFECTS OF COPYRIGHTS ON THE QUALITY OF NEW OPERAS, 1781-1820

	(1)	(2)	(3)	(4)	(5)	(6)
	Historically popular operas in Loewenberg (1978, 1-2)		Operas performed at the Metropolitan 1900-2014 (3-4)		Durable operas on Amazon today (5-6)	
	Count	Share	Count	Share	Count	Share
L&V * post	0.407	0.104	0.448	0.102	0.280	0.069
	(0.152)	(0.047)	(0.144)	(0.044)	(0.129)	(0.032)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pre-1801 mean	0.094	0.055	0.075	0.041	0.025	0.016
N (state-year pairs)	320	320	320	320	320	320
R-squared	0.342	0.245	0.371	0.274	0.360	0.297

Standard errors clustered at the state-year level in parentheses

*Notes:* The dependent variable measures the count or share of historically popular operas (1-2), Met operas (3-4) or durable operas (5-6). For example, share in column 2 measure the number of new operas that were *historically popular* (appearing in Loewenberg 1978) divided by the total number of new operas in state *i* and year *t*. Share in column 4 reports same share for operas that were performed at the Metropolitan Opera House in New York at least once between 1900 and 2014. Share in column 6 report the share for *durable* operas that were still available as a complete recording on Amazon in 2014. The indicator *Lombardy & Venetia* equals 1 for Lombardy and Venetia, which adopted copyright laws in 1801. The indicator *post* equals 1 for years after 1800. The *pre-1801 mean* reports the average number / share of high-quality operas per state and year before 1801. State fixed effects control for variation in the creation of new operas that is constant over time. Year fixed effects control for variation in opera creation over time that is shared across states.

TABLE 5 – COMPOSER-LEVEL REGRESSIONS,  
DEPENDENT VARIABLE IS NEW OPERAS PER STATE AND YEAR BY COMPOSERS, 1781-1820

	(1) All operas Count	(2) Historically popular operas in Loewenberg (1978, 2-3) Count	(3) Share	(4) Operas performed at the Metropolitan 1900-2014 (4-5) Count	(5) Share	(6) Durable operas on Amazon today (6-7) Count	(7) Share
<u>Panel A. All Composers</u>							
L&V* post	1.043 (0.337)	0.589 (0.138)	0.248 (0.071)	0.372 (0.131)	0.169 (0.075)	0.430 (0.125)	0.184 (0.067)
<u>Panel B. Excluding Top 10%</u>							
L&V* post	1.356 (0.526)	0.532 (0.159)	0.170 (0.032)	0.430 (0.107)	0.137 (0.031)	0.279 (0.136)	0.076 (0.037)
<u>Panel C. Excluding Top 20%</u>							
L&V* post	1.109 (0.601)	0.375 (0.216)	0.126 (0.053)	0.387 (0.116)	0.182 (0.039)	0.133 (0.056)	0.078 (0.025)
Composer FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pre-1801 mean	1.147	0.056	0.036	0.046	0.038	0.048	0.032
Standard errors clustered at the state-year level in parentheses							

*Notes:* The dependent variable measures the count or share of all operas (1), historically popular operas (2-3), Met operas (4-5) or durable operas (6-7). For instance, the share in column 3 measure the number of new operas that were *historically popular* (based on notable performances in Loewenberg’s (1978) *Annals of Opera*) divided by the total number of new operas in state *i* and year *t*. Share in column 5 reports same share for operas that were performed at the Metropolitan Opera House in New York at least once between 1900 and 2014. Share in column 7 report the share for *durable* operas that were still available as a complete recording on Amazon in 2014. The indicator *L&V* equals 1 for Lombardy and Venetia, the two states that adopted copyrights in 1801. The indicator *post* equals 1 for years after 1800. *Return Migrant* equals 1 for composers who composed in Italy after composing at least one opera abroad.; *stayers* equals 1 for composers who worked exclusively in the state where they premiered their first opera. The *pre-1801 mean* reports the average number of new operas created per state and year until 1800. Panel A includes all the composers; Panel B and C exclude, respectively, composers in the top 10 percent and 20 percent of opera output.

TABLE 6 – ALL OF ITALY, 1770-1900, DEPENDENT VARIABLE IS NEW OPERAS PER STATE AND YEAR

	(1) All Operas	(2)	(3) Historically popular operas in Loewenberg (1978)	(4) Operas performed at Metropolitan 1900-2014	(5) Durable operas on Amazon today
	OLS	Poisson	OLS	OLS	OLS
Copyright	2.683 (0.436)	0.952 (0.149)	0.188 (0.098)	0.396 (0.113)	0.327 (0.111)
State FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Pre-copyright mean	1.173	1.173	0.123	0.075	0.105
N (state-year pairs)	1,048	1,048	1,048	1,048	1,048
R-squared	0.706		0.370	0.353	0.350

Standard errors clustered at the state-year level in parentheses

Notes: *Copyright* is an indicator that equals 1 if state  $i$  offers copyrights in year  $t$ . *Pre-copyright mean* reports the mean of the dependent variable for state-year pairs *without* copyrights. Column (2) presents average treatment effects from a quasi-maximum likelihood Poisson model with conditional fixed effects.

TABLE 7 – EFFECTS OF EXTENSIONS IN THE LENGTH OF COPYRIGHTS, 1770-1900, DEPENDENT VARIABLE IS NEW OPERAS PER STATE AND YEAR

	(1) All Operas	(2)	(3) Historically popular operas in Loewenberg (1978)	(4) Operas performed at Metropolitan 1900-2014	(5) Durable operas on Amazon today
	OLS	Poisson	OLS	OLS	OLS
Adopt	3.188 (0.515)	1.078 (0.129)	0.303 (0.103)	0.474 (0.071)	0.403 (0.122)
Extend to life+30	1.074 (0.381)	-0.021 (0.180)	0.245 (0.075)	-0.227 (0.084)	0.162 (0.066)
Extend to life+40	-0.265 (0.753)	-0.266 (0.250)	-0.032 (0.249)	-0.393 (0.072)	0.109 (0.053)
State FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Pre-copyright mean	1.173	1.173	0.123	0.075	0.105
N (state-year pairs)	1,048	1,048	1,048	1,048	1,048
R-squared	0.710		0.378	0.327	0.354

Standard errors clustered at the state-year level in parentheses

Notes: The indicator *adopt* equals 1 if state  $i$  has adopted basic copyrights in year  $t$  but not extended lengths to *life* + 30. The indicator *extend30* equals 1 after a state  $i$  has extended its copyrights to *life* + 30 and before it extends copyrights *life* + 40. The indicator *extend40* represent state-year pairs after state  $i$  has extended copyrights to *life* + 40. *Pre-copyright mean* reports the mean of the dependent variable for state-year pairs *without* copyrights. Column (2) presents average treatment effects from a quasi-maximum likelihood Poisson model with conditional fixed effects.

TABLE 8 – 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)	(7)	(8)
	All Operas (1-2)		Historically popular operas in Loewenberg (1978, 3-4)		Operas performed at the Metropolitan 1900-2014 (5-6)		Durable operas on Amazon today (7-8)	
L&V * post	0.412 (0.128)	0.414 (0.183)	0.021 (0.024)	0.011 (0.028)	0.028 (0.030)	0.032 (0.034)	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)	0.341 (0.099)	0.367 (0.091)	0.392 (0.229)	0.388 (0.226)
City FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Linear pre-trend for L&V	No	Yes	No	Yes	No	Yes	No	Yes
Pre-1801 mean	0.266	0.266	0.021	0.021	0.013	0.013	0.007	0.007
N (city-year pairs)	1,050	1,050	1,050	1,050	1,050	1,050	843	843
R-squared	0.589	0.589	0.315	0.315	0.342	0.381	0.331	0.331

Standard errors clustered at the city-year level in parentheses

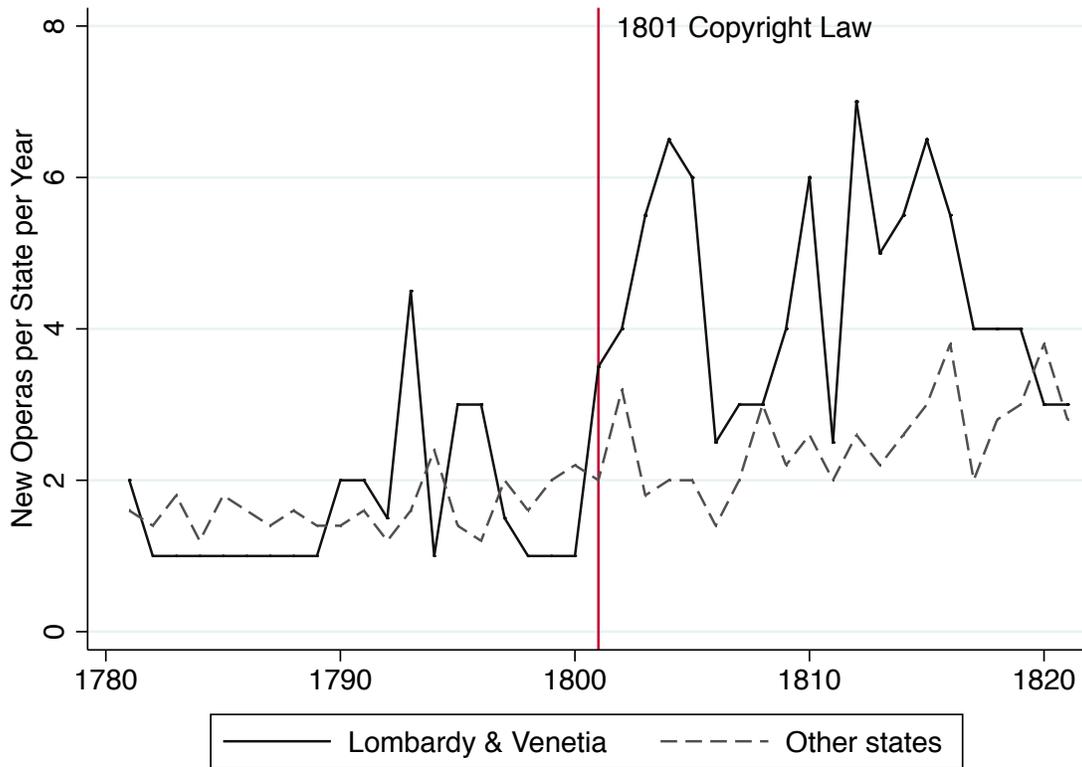
*Notes: Lombardy & Venetia* equals 1 for cities in Lombardy and Venetia, which adopted copyright laws in 1801. The indicator variable *post* equals 1 for years after 1800. The indicator variable *2 theaters* equals 1 for city *i* if that city had two or more theaters before 1801. The variable *Lombardy & Venetia* equals 1 for Lombardy and Venetia, the two Italian states that adopted copyrights in 1801. *Pre-1801 mean* reports the count new operas created per city and year until 1800.

FIGURE 1 – MAP OF ITALY  
WITH BORDERS ESTABLISHED BY THE CONGRESS OF VIENNA (1815)



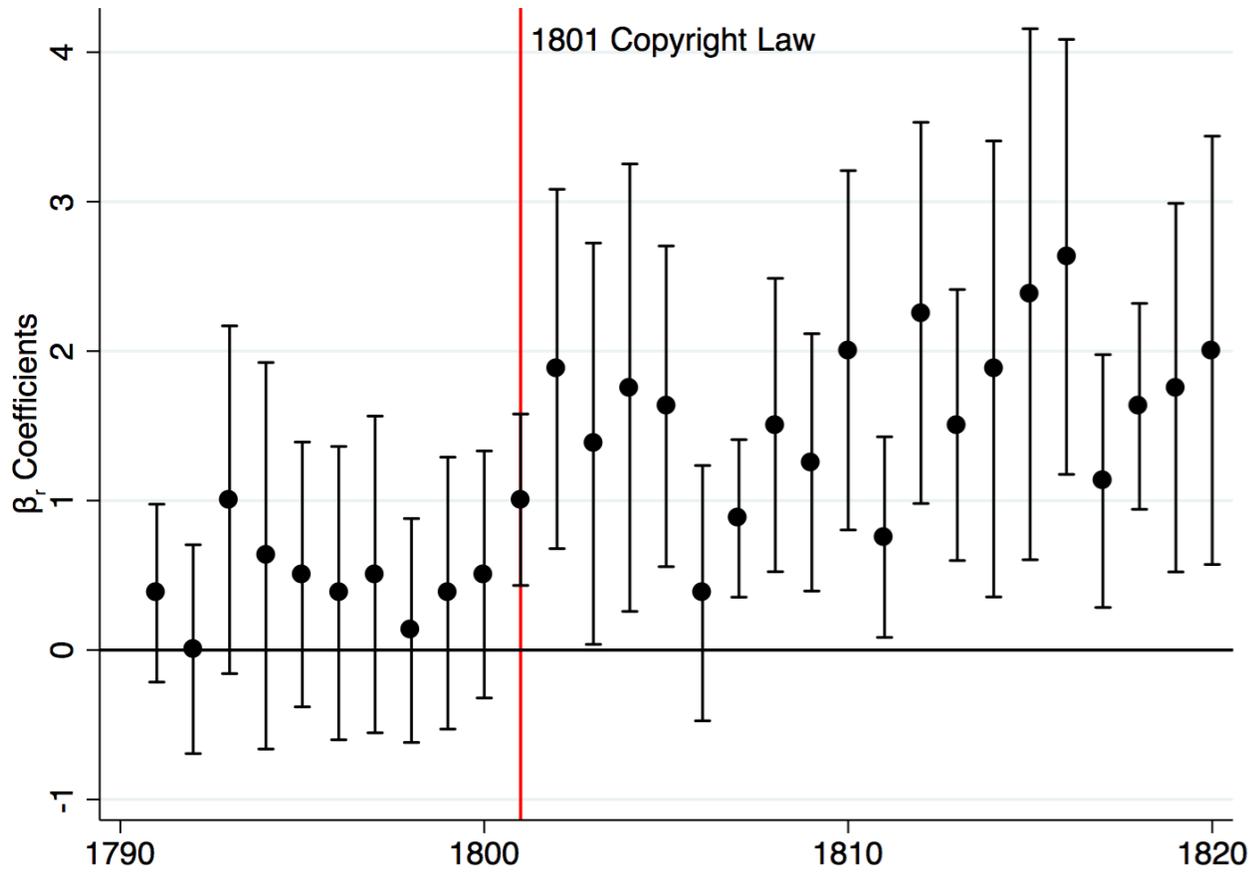
Notes: The source of the map is <https://www.age-of-the-sage.org>

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



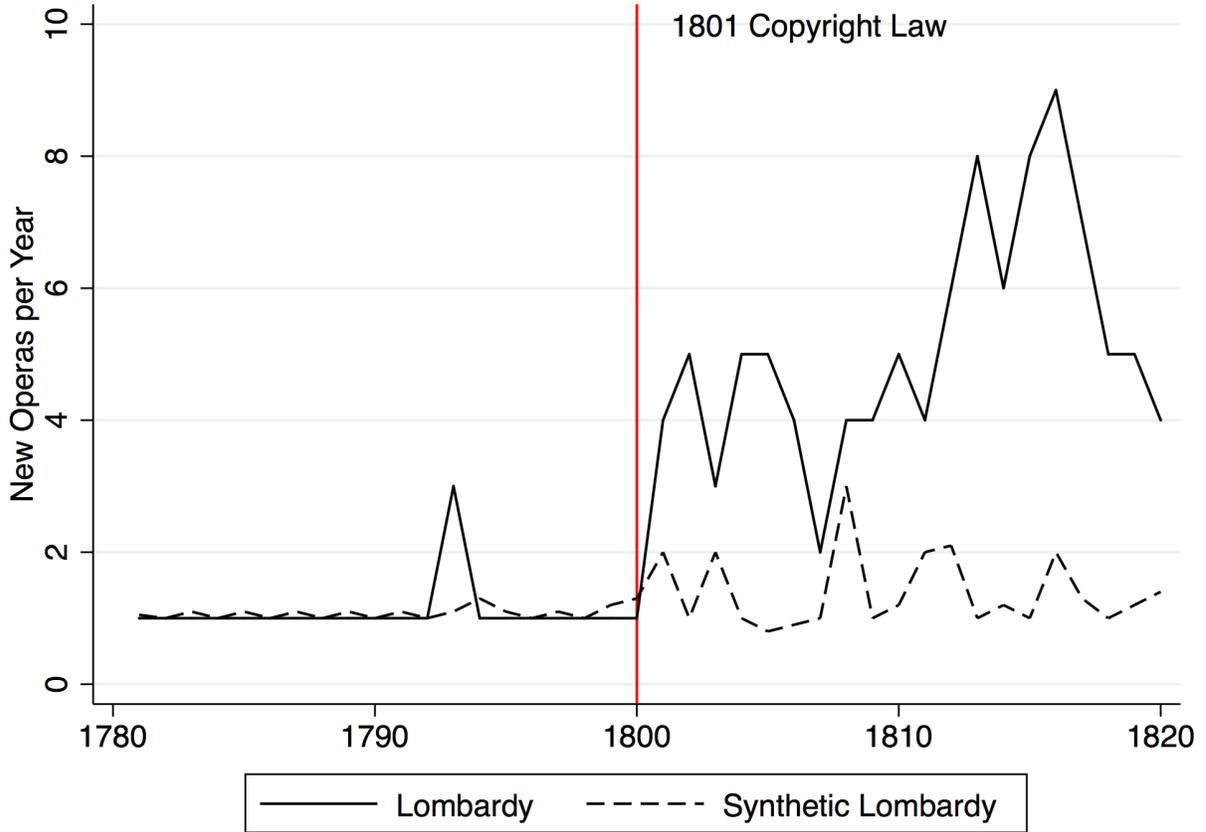
Notes: Data include 677 operas created in state  $i$  and year  $t$  between 1781 and 1820. *Lombardy & Venetia* adopted copyright laws in 1801. The control group *Other States* includes sic remaining Italian states without copyrights: Sardinia, Modena and Reggio, Parma and Piacenza, Tuscany, Papal States and Sicily.

FIGURE 3 – TIME-VARYING ESTIMATES FOR EFFECTS OF COPYRIGHTS ON NEW OPERAS CREATED PER STATE AND YEAR



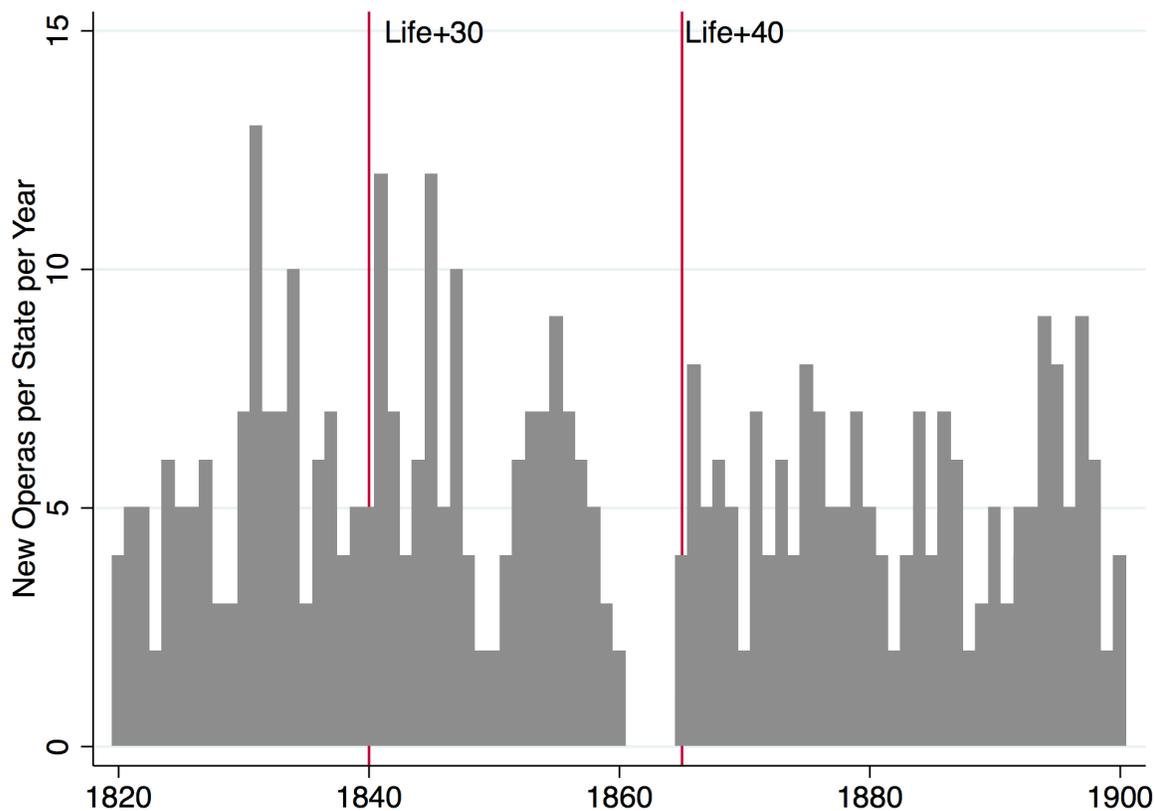
Notes: 95% confidence intervals for  $\beta_r$ 's coefficients in the OLS regression  $opera_{it} = \sum \beta_r Lombardy \& Venetia_i \times year_r + \varphi_i + \delta_t + \varepsilon_{it}$  where the dependent variable counts new operas in state  $i$  and year  $t$ . The variable  $year_r$  indicates years between 1791 and 1820; years between 1781 and 1790 are the excluded period.  $\varphi_i$  are state fixed effects and  $\delta_t$  are year fixed effects.

FIGURE 4 – NEW OPERAS CREATED PER STATE AND YEAR  
IN A SYNTHETIC LOMBARDY WITHOUT COPYRIGHTS



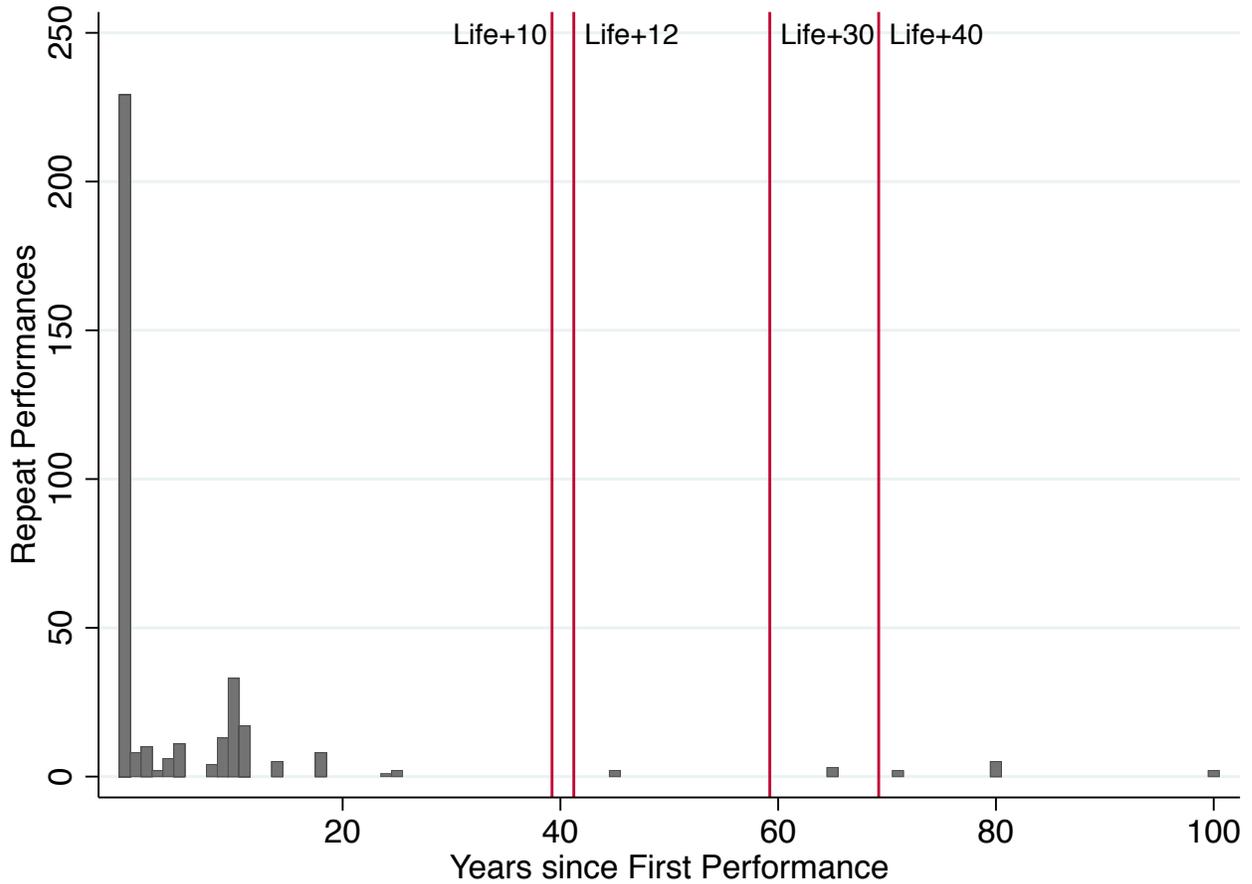
Notes: The solid line for *Lombardy* plots the observed number of operas per year in Lombardy. The interrupted line for the *Synthetic Lombardy* plots operas per year for a counterfactual (synthetic) Lombardy *without copyrights*, using propensity score matching (as in Abadie and Gardazabal 2003).

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



Notes: Lombardy & Venetia adopted copyright laws in 1801, after they had fallen under Napoleonic rule. The vertical lines correspond to the bilateral treaty between Kingdom of Sardinia and Austria of 1840 that extended copyright length from *life+10* to *life+30*, and to the Italian copyright law of 1865 that extended copyright length from *life+30* to *life+40*. Data include 580 new operas that premiered between 1781 and 1820 across eight Italian states within the year 1900 borders of Italy.

FIGURE 6 – PERFORMANCES IN 100 YEARS AFTER CREATION



*Notes:* Performances per year for the first 100 years since the premiere for 165 operas that premiered across Italy between 1781 and 1820 and entered Loewenberg's (1978) *Annals of Operas*. Performances to the left of the vertical line would be on copyright under a regime of *life + 10*, which Lombardy and Venetia began to offer in 1801. The expected length of copyright under *life + 10* equals 39.23 years: 10 years plus the expected remaining years of a composer of the average age at the time of the premiere (See Appendix Table A1 for life table calculations)