

(DE) FUNDING THE ARTS: HOW CHANGES IN PUBLIC FUNDING AFFECT CREATIVITY*

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AUGUST 28, 2023

How do changes in public funding influence creative output in the arts? To investigate this question, we exploit exogenous variation in public funding cuts as a result of Italy's unification. Using theater-level performance data to measure of creative output, we show that exposure to funding cuts reduced the number of new productions and shifted productions towards from avant-garde to popular entertainment. Cuts were felt most strongly in cities with fewer people and less wealth. In the long run, theaters more exposed to funding cuts were more likely to close and to replace life performances with movies.

KEYWORDS: CREATIVITY, INNOVATION, AND PUBLIC FUNDING

JEL CODES: N7, N7, O3, R1, Z1

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Public funding for the arts is a subject of intense debate. Proponents argue that “arts and culture policies and programs increase economic development in states by attracting businesses, creating new jobs, increasing tax revenues and promoting tourism” (NASAA 2017, p. 3). Supporting these claims, economic analyses have found that cultural amenities, such as music venues, museums, and theaters stimulate growth in local economies (Falk, Fritsch and Heblich 2011; Diamond and Moretti 2021). Once established, creativity and innovation may perpetuate across generations as aspiring entrepreneurs learn from older generations (Guiso Pistaferri and Schivardi 2021). Citing such benefits, proponents of public funding argue that investments in the arts create positive spillovers that promote well-being and economic growth (NASAA 2017, p. 2).

The public good nature of these benefits, however, exposes theaters, museums, and other institutions to financial strain (Baumol and Bowen 1966, 161), leaving them heavily dependent on public support. Today a large but declining share of funding for the arts, and especially for theaters, originates from municipal funds and other public sources. In the United States and Europe, theaters draw 53 and 41 percent, respectively, of their resources from state and federal sources (EU Report 2020). Yet, lawmakers “may ask whether government has a legitimate role to play in the arts or whether the arts should receive funds when so many other critical needs are pressing” (NASAA 2017, p.1). This question becomes more pressing when public funds supports arts that taxpayers may find offensive. In the United States, for example, public funding became more restricted after 1989, when financial support for two controversial artists, Robert Mapplethorpe and Andres Serrano, triggered widespread criticism of the National Endowment for the Arts (NEA). These debates culminated in the 1990 Williams/Coleman amendment (20 U.S.C. 954(d)1), requiring the NEA to consider “general standards of decency and respect for the diverse values and beliefs of the American public.”¹

Dwindling public support has left theaters increasingly dependent on donations and ticket sales. This dependency, however, may motivate theaters to perform safe bets that draw a crowd and satisfy

¹ In 1989, the University of Pennsylvania used funding from the National Endowment for the Arts (NEA) to finance an exhibit that included homoerotic photographs by Robert Mapplethorpe. In the same year, the Southeast Center for Contemporary Art used an NEA grant to support Andres Serrano, who had exhibited a photograph of a crucifix submerged in urine. Criticism over public funding for these artists culminated in the Supreme Court affirming these restrictions in 1989 in *National Endowment for the Arts v. Finley* 524 U.S.C. 569 (1998) arguing that, while “the First Amendment protects artists' rights to express themselves as indecently and disrespectfully as they like, [it] does not compel the Government to fund that speech.”

donors, rather than taking the chance to innovate and explore. Institutions that serve poorer populations may be particularly vulnerable to these funding cuts because their donor base is small.

Despite intense debates about public funding, there is little empirical evidence on the causal effects of government funding on creativity. This is due primarily to two empirical challenges. First, it is difficult to find plausibly exogenous variation in public funding in modern settings, when opponents of public funding argue that tax dollars tend to support prominent urban institutions, which already have access to other types of support. Second, measuring the effects of public funding on creativity requires data on changes in creativity and the survival of public institutions in the long run, over decades, and such data do not exist for modern settings.

This paper uses an exogenous episode of cuts in public funding for the arts – as a result of Italy’s unification in the 1860s – to investigate the causal effects of changes in public funding on creativity, measured by the number and by the type of performances in theaters. When Italy unified in 1861, the new Kingdom of Italy inherited the crushing debts that individual states had accumulated during the wars leading up to unification. Faced with this debt, Italy abolished central funding for public theaters in 1867. Funding rules that had been established a century earlier determined exposure to the cuts, ranging between 5 to 87 percent of theater budget. Importantly, variation in exposure was unrelated to the size, age, performance focus, and other theater-level characteristics before the cuts.

Using performance data for all Italian theaters between 1859 and 1914, we show that cuts in public funding reduced the quantity of creative output, measured by theater performances. A 10-percentage point increase in exposure was associated with an 8.2 percent decline in the number of total performances after 1867.

Funding cuts also changed the quality of performances, by reducing their novelty and by shifting performances towards popular work. A 10 percentage points increase in funding cuts reduced the share of premieres – first performances of new works, which theaters had to commission from composers – by 3.1 percent. In addition, an additional 10-percentage point increase in funding cuts reduced the share of new productions – for which theaters had to create sets and costumes - by 1.7 percent. Instead of showing new works and new productions, theaters that were exposed to funding cuts showed repertory work, repeat performances of existing productions. A 10 percent increase in exposure to funding cut is associated with a 4.8 percent increase in repertory work. In addition, theaters that suffered severe cuts also shifted their productions from operas to lighter fare (*commedia*

dell'arte) that enjoyed more predictable demand. For each 10-percent cut in funding, the share of operas and operettas declined by 3.6 while that of *commedia dell'arte* increased by 4.2 percent.

To investigate the timing of these shifts, we exploit the long-run nature of our data, which covers performances for more than 50 years. Importantly, time-varying estimates reveal no differences in performances across theaters in the years leading up to the funding cuts. Following the cuts, however, exposed theaters experienced a persistent change in the quantity and quality of creative output. Relative to performances before the cuts, total productions declined by 29 percent per year for each additional 10 percentage points increase in funding cuts. This effect persisted until 1913, the last year before World War I. In that year, a 10-percent increase in exposure was still associated with a 5.8 percent reduction in performances.

We also find that funding impacted the survival of theaters. Each additional 10 percentage points cut in funding was associated with a 1.7-percent increase in the probability of a theater closing. In addition, theaters that suffered larger funding cuts were also more likely to shift from staging live performances to showing movies.

These effects were felt most strongly outside of wealthy urban centers. Specifically, we find that theaters in provinces with lower GDP per capita and in smaller cities responded more dramatically to funding cuts. Serving poorer populations, these theaters were more vulnerable to cuts because, they received less money from donations.

Our findings contribute to a growing field of economic analyses of the arts (e.g., Borowieki 2022; Giorcelli and Moser 2020; Kruger 2019; Aguiar and Waldfogel 2018; Hendricks and Sorensen 2009), reaching back to Rosen (1981) and Baumol and Bowen (1966). While recent analyses have focused on the for-profit segment of the industry, our findings highlight the impact of funding cuts on public institutions. Outlining the fundamental economic characteristics of nonprofits in the performing arts, Baumol and Bowen (1966, p. 497) argue that they are “by their very nature designed to keep constantly on the brink of financial catastrophe” because “the quality of the services which it provides becomes an end in itself.” Our findings suggest that being “on the brink of financial catastrophe” may undermine the mission to encourage creativity.

Our findings also complement existing analyses of the determinants of creativity and innovation, and more specifically, to the role of public funding in encouraging innovation (e.g., Hall

and Lerner 2010).² Myers (2020) show that it takes a large amount of NIH money to motivate scientists to change the direction of their research, because the costs of switching one's research agenda are high. Our research extends these findings by studying the effect of changes in public funding on the level and direction of creativity in the arts. Compared with existing results for science we find that creative output is substantially more responsive to cuts in public funding, which create a large and persistent decline and shift in the creation of new works.

I. FUNDING CUTS FOLLOWING ITALY'S UNIFICATION

The origins of Italy's public theaters reach to the 17th century when the Teatro San Cassiano in Venice in 1637 and the Teatro del Falcone in Genoa in 1652 opened their doors to a paying public (Bassi 2000, p.21). Before, theaters had been privately owned by Europe's nobility, and only their personal guests had access to performances. Demand for entertainment fueled a rapid expansion of theaters. By 1700, around 200 theaters operated in Italy; by 1800 their number had increased to more than 1,000.

Different genres evolved to serve the heterogenous demand for entertainment. Operas and concerti were the most demanding of performers, theaters, and their audience. Performers needed a specialized skills to act and make their voices heard through the entire hall, while theaters had to hire artists and craftspeople to design and construct the stage and to create costumes. New works were most appreciated by an audience who was already familiar with existing work and willing to commit to long performances (Pirootta 1955, p.82). By contrast, *commedia dell'arte* required less skills from actors (who could use masks to represent their characters) and little to no costs for setting the stage. For the audience, *commedia dell'arte* offered more accessible, light-hearted entertainment (Pirootta 1955, p.83).

As the industry developed, each theater became professionally managed by an *impresario* (Bassi 2000, p.26). Within a given budget, the impresario chose the works to be performed and managed the creative process. In the early years of public performances, when production costs were still relatively small, theaters could cover them through ticket sales. Yet, with the increasing complexity of performances in the 18th century, theaters became increasingly dependent on external funding to supplement income from ticket sales (Draghi 2001, p.29).

² In biotech, and industry with a fundamentally different funding structure from the arts, Azoulay, Zivin, Li, and Sampat (2018) show that a \$10 million boost in National Institutes of Health funding is associated with a net increase of 2.7 patents. Using data on applications to the US Department of Energy Small Business Innovation Research (SBIR) program, Howell (2017) finds that grants have large effects on the innovative, financial, and commercial success of small firms.

External funding came from three major sources, which few changes between the early 18th century and unification: First, many theaters received a substantial portion of their funding from the local government, to help compensate for the expenses of performing (Bassi 2000, p.26). These funds, set at the time of theater opening, were renewed every five years, and remained substantially unchanged until Italy's unification in 1866 (Draghi 2001, p.31). Second, theaters received additional revenue from the sale of concessions to sell coffee and food, rent wardrobes, and run the gambling operations that accompanied many shows (Mattiello 2012, p.36). Third, theaters entered private contracts with wealthy families, the *palchettisti*, who paid an annual fee in exchange for the right to attend all performances. Often their privileges included assigned seats, which families treated like personal property, passing them down through generations (Draghi 2001, p.30).

In 1861 the Kingdom of Italy unified nearly all Italian states.³ To improve its standing with other nations, the country's new central government committed almost immediately to repay the debts of pre-unitarian states. This decision, however, placed great strain on public expenditures, further exacerbated by the Third Independence War in 1866. To assess the economic, social, and cultural standing of the peninsula, the national government sponsored in-depth analyses of specific industries, including the performing arts. In spring 1866, the Minister of the Interior ordered local county heads (*prefetti*) to prepare a survey of all 1,132 Italian theaters,⁴ including the year when the theater opened, its precise location, capacity (including seats and standing room), the name of its theater manager, the state of its real estate, and their annual endowment (*dote*) it received from private and public sources.

Given the new country's massive burden of debt, funding 1,132 theaters soon proved impossible. In 1866, when the new country faced additional expenses to move its capital from Turin to Florence and defense spending exploded as a result of Third War of Independence against Austria, debates began to cut funding for public theaters, causing a public outcry. Senator Lazzaro argued that cuts in public funding would force theaters to close: "How can we, at this time, further aggravate the burden of these theaters by asking them to find their own funding? Given the circumstances, it is the same as saying: shut down your theaters!"⁵ Yet, given budget pressures, Italy's central government

³ Other territories became part of Italy after 1861: Veneto (annexed in 1866, with the end of the Third Independence War), the city of Rome (conquered in 1870), and Trentino Alto-Adige and Friuli-Venezia Giulia (annexed in 1919).

⁴ Archivio Centrale dello Stato, Ministero dell'Agricoltura, Industria e Commercio, Div. III, Diritti d'autore, Opere teatrali, b. 1, fasc. 1 "Circolare 31 marzo 1866, n. 2587. Elenco dei teatri nelle diverse provincie".

⁵ Author translation from the Italian: "Oggi, infatti, come possiamo aggravare questi teatri delle spese per il loro finanziamento? Oggi sarebbe lo stesso che dire: chiudete questi teatri!" (AAPP, CD, legislature X, Sessione I 1867, Discussioni, Discussione del bilancio del Dicastero dell'Interno pel 1867, p.1388).

recused itself from funding public theaters, and in 1867 theater funding disappeared from the government budget (Nicolodi 1987, pp. 258-270).

The withdrawal of public funding affected even prominent theaters like Milan's Teatro Alla Scala or the Teatro Carlo Felice in Venice. La Fenice was forced to cancel its Carnival season – the main season for opera – for five years between 1872 and 1897 because budget cuts reduced the theater to a “precarious state.”⁶ Following a dispute with the major in 1877, The Teatro la Pergola in Firenze suffered major cuts “that marked the start of a miserable life.”⁷ Similarly, the Teatro Carlo Felice in Genova was forced to close its doors for 4 years between 1879 and 1883 and lost its famous orchestra (Bianconi and Pestelli 1987, pp.169-70).

In 1883, the *Gazzetta Musicale di Milano* deplored that, after Italy's unification, nothing had been done to support music (“Da che si è costituito il Regno d'Italia nulla si è fatto per la musica”).⁸ In a letter to his friend Giuseppe Piroli, Giuseppe Verdi condemned the damage that these cuts had inflicted on Italy's cultural scene arguing that “Our music, distinctly from Germany's, which could survive in symphony halls and the lodgings of the private quartets, relies on the theater as its principal home.”⁹ In the same year, Verdi wrote to the Minister Baccelli and asked for “government protection, specifically *dote* to theaters and not taxes”, adding that “in the current conditions of all the theaters, the poor impresari cannot meet the needs of the artists and the audience.”¹⁰

II. DATA

To examine the effects of funding cuts on creative output, we have collected archival data on the performances, characteristics, as well as sources of funding between 1859 and 1913 for all 1,132 publicly funded theaters in Italy that were in operation in 1866, the last year before the funding cuts.

Theaters and Their Endowments

⁶ “si ridusse ad uno stato di precarietà” (Bianconi and Pistelli 1987, p. 170)

⁷ “si incamminò verso una vita di stenti” (Bianconi and Pistelli 1987, p. 169).

⁸ Giulio Ricordi, Musica e politica, “Gazzetta Musicale di Milano”, XXVII, 13 maggio 1883, p.181.

⁹ «La nostra musica a differenza della tedesca che può vivere nelle sale con le sinfonie, negli appartamenti coi Quartetti, la nostra, dico, ha il suo seggio principale nel teatro» (Carteggi verdiani, a cura di A. Luzio, 3° e 4° vol., Accademia nazionale dei Lincei, Roma 1947).

¹⁰ “Protezione del governo, cioè Dote ai teatri e non imposte! Nelle condizioni che si trovano attualmente i teatri di ogni genere, i poveri impresario non possono far fronte alle esigenze degli artisti e del pubblico” (Carteggi verdiani, a cura di A. Luzio, 3° e 4° vol., Accademia nazionale dei Lincei, Roma 1947).

First, we collected data on the population of Italian theaters in 1866 from a survey on theaters, the “Circolare 31 marzo 1866, n. 2587. Elenco dei teatri nelle diverse provincie,” commissioned by Italy’s Ministry of Interior. For each publicly funded theater, we know when and where it was founded, its total capacity (including seats and standing room), the name of the theater manager (*impresario*), the annual endowment (*dote*) and the state of the building. For publicly funded theaters, we also know the amount of *dote* from public funding, donations, subscriptions, other ticket sales, and concessions for coffee, food, wardrobes, and gambling. The entry for the Teatro Regio in Turin, for example, reports that it was founded in 1740 by Carlo Emanuele III King of Savoy, and had capacity for 450 people, including 290 in the seated audience and 160 in standing room. The theater’s *dote* was set at the time of its foundation in 1740 and remained unchanged until 1866. In that year 60 percent of the Regio’s *dote* came from the federal government, 30 percent from subscriptions by wealthy families (*palchettisti*), and 10 percent from concessions for coffee and gambling.

The composition of the *dote* was set in the opening year for all theaters and remained unchanged until 1866. The average share of public funding was 44.3 percent, with a standard deviation of 15.2, a median of 44.4, and a range from 5.2 percent to 86.9 percent (Figure 1). The first theater opening in our data is the Teatro San Cassiano in 1637, and the last is the Teatro Toniolo in 1814. The average theater opened in 1733. In total, the Circolare lists 1,164 publicly funded theaters across Italy in 1866.

Performance Data as a Measure of Creative Output

To measure changes in creative output across theaters and over time we collected data on all performances at Italian theaters between 1859 and 1913 from annual reports in the *Annuario Teatrale Italiano* (Ministero degli Interni, 1859-1882) and the *Annuario dello Spettacolo* (Società Italiana degli Autori ed Editori, 1883-1913). For each theater, we know the total number of performances, premieres, new productions, and repertory works per year between 1859 and 1913. The Teatro Regio in Turin, for example, staged a total of 233 pieces in 1896, including 5 premieres (first performances of a new composition), 50 new productions (new stagings of existing compositions), and 15 revivals (repeat performances of existing stagings). For example, Giacomo Puccini’s opera *La Bohème* was a premiere at the Teatro Regio in Turin on 1 February 1896. On March 14, 1897, the Teatro di San Carlo staged its own production of *La Bohème*; it enters our data as a *new production*. In 1897, the Teatro Regio performed *La Bohème* again with the original staging; this enters our data as a *revival*.

Before the funding cuts, between 1859 and 1866, 1,164 Italian theaters produced an average of 98.5 performances per year (Table 1). Among these performances, 13.7 percent were *premieres*, 18.4 percent new productions, and 67.9 percent were repertory works. Separating genres, we find that 69.4 percent of performances were *commedia dell'arte*, followed by concerti (14.9 percent), operas (9.1 percent) and operettas (6.6 percent).

In addition to changes in creative output, we investigate the effects of funding cuts on theater survival. Specifically, we observe whether a theater closed or whether it switched from live performances to recordings in the form of movies after 1900. For instance, the Teatro Sacro Cuore in Modena, opened in 1776 and permanently closed in 1880, while Teatro Spazio Bixio in Vicenza, in operation since 1709 was replaced by a movie theater in 1902.

III. EFFECTS OF FUNDING CUT ON PERFORMANCES AND SURVIVAL

Encouraging creativity is a major motivation for public funding for the arts (NAAPPD 1990), yet there is little empirical evidence on the causal effects of public funding on creative output. Here, we provide such evidence by exploiting exogenous variation in exposure to funding cuts as a result of Italy's unification. Specifically, we examine the effects of funding cuts on the quantity and quality of performances, and on the survival of theaters. We also investigate heterogeneous effects of funding cuts on populations living with less income and in smaller cities.

Identification Strategy

To estimate the causal effects of public funding on the arts we exploit quasi-experimental variation in cuts due to Italy's unification. Publicly funded theaters drew their endowment (*dote*) from three major sources: 1) public funding from their municipality, 2) ticket sales, subscriptions, and donations from wealthy patrons, and 3) concessions for coffee, food, and gambling. Like theaters today, public funding represented the major source of income for theaters, around 58 percent on average, compared with 53 and 41 percent in the United States and Europe in 2020.

The share of public funding in the theater's total *dote* remained stable until 1866 but dramatically declined afterwards (Figure 1, Panel A, using 1866 as a baseline), and remained low until WWI. Cuts in 1867 eliminated public funding but left intact all other sources, creating significant variation in exposure (Figure 1, Panel B). Across theaters, exposure ranged from 0 to 85 percent, with a median of 44.20 percent, an average of 44.47 percent, and a standard deviation of 15.12.

To estimate the causal effects of cuts in public funding on creativity, we compare changes in creative output across theaters that were differentially exposed to funding cuts:

$$creative\ output_{it} = \alpha \cdot funding\ cut_i + \beta \cdot (funding\ cut_i \times post_{it}) + \lambda_i + \delta_t + \varepsilon_{it} \quad (1)$$

where $creative\ output_{it}$ measures changes in the number productions of theater i in year t between 1859 and 1913. The variable $funding\ cut_i$ is the share of public funding that theater i received from its municipality until 1867; this is the share of funding that was lost in 1867. The indicator $post_{it}$ equals 1 starting in 1867. Theater fixed effects λ_i control for underlying differences in creative output across theaters. Year fixed effects δ_t control for changes in creative output over time that is shared across theaters, for example, because of secular changes in tastes that are shared across Italy. Standard errors ε_{it} are clustered at the city level.

Under the identification assumption that changes in creative output would have been comparable after 1867 for theaters that suffered larger funding cuts, the coefficient β estimates the causal effects of reducing public funding on creative output.

Tests of the Identification Assumption

To investigate the identification assumption, we first check whether exposure to the funding cuts varies across different types of theaters and cities (Table 2). Reassuringly, there is no correlation between theater characteristics (such as the total number of seats and standing-room tickets), or the traits of locations (such as city size) and exposure to funding cuts. Moreover, measures of theater output before the funding cuts (including the total number of performances, premieres, new productions, repertory works) are similar across theaters with different exposure to the funding cuts.

Second, we test whether theaters with different shares of public funding were on similar time trends in terms of their creative output before 1867. First, we estimate a linear pre-trend for total productions, premieres, new productions, and repertory work between 1859 to 1867, interacted with our measure for variation in exposure to the funding cuts. These estimates are never significantly different from zero (Appendix Table A1, Panel A, columns 1, 3, 5, and 7); all results are robust to controlling for year fixed effects (Appendix Table A1, Panel A, columns 2, 4, 6, and 8). We also estimate a year-specific time trend interacted with the exposure measure. Again, none of these

estimates are statistically significant (Appendix Table A1, Panel B), and we fail to reject the hypothesis that all coefficients are jointly equal to zero.

We may overestimate exposure to the funding cuts – and underestimate the cuts’ effects on creative output – if theaters were able to replace lost public funds through private donations or concessions. Annual data on theater funding, however, indicate no change in the composition of theater funding after 1867. Both the yearly average and the variance of private funding remains substantially unchanged between 1867 and 1913 (Figure A1).

Cuts in Public Funding Reduced the Number of Performances

First, we investigate whether funding cuts reduced the number of performances on the intensive margin, for theaters that remained in operation between 1859 and 1913. Estimating equation (1) with the count of performances as the outcome variable shows that an additional 10 percentage points loss in public funding cut reduced the number of productions by 7.1 per theater and year (Table 2, column 1, significant at 1 percent). Compared with a mean of 86.5 productions in 1866, this implies an 8.2-percent decline in productions for each additional 10 percentage point decline in funding, and a 36.2 percent decline for theaters that experienced funding cut of 44.2.

To investigate the timing of these changes, we re-estimate equation (1) with year-specific interaction terms with *funding cuts*:

$$creative\ output_{it} = \sum \beta_r \cdot (funding\ cut_i \times year_r) + \alpha \cdot funding\ cut_i + \lambda_i + \delta_t + \varepsilon_{it} \quad (2)$$

where the variable *year_r* indicates years between 1859 and 1914, and 1859 is the excluded year. λ_i are theater fixed effects. δ_t are year fixed effects.

Time-varying estimates show that funding cuts led to a negative long-lasting effect on theater productions (Figure 2, Panel A). After the cuts, the number of performances fell by 2.8 performances (or 3.2 percent, relative to the pre-mean average of 86.5 productions) for each additional 10 percentage point decline in public funding. After that, performances recovered slowly, without, however, recovering fully.

Cuts in Public Funding Reduced the Novelty of Performances

In addition to reducing the quantity of performances, funding cuts also reduced their novelty. Estimating equation (1) with premieres as the outcome shows a large and persistent decline in

premieres. For each 10 percentage points decline in public funding, the average public theater produced 0.9 fewer premieres per year (Table 2, column 2, significant at 1 percent). Estimating equation (1) for the *share* of premieres indicates that the share of premieres declined by 3.1 percent for each additional 10 percentage points in exposure (Table 2, column 3, significant at 1 percent). For theaters that experienced the average decline in public funding of 44.2, this implies a 13.53 percent decline in the share of total productions. Time-varying estimates indicate that this decline persisted until the end of our sample in 1913 (Figure 2, Panel B).

In addition to a decline in premieres, the funding cuts also led to a decline in new productions. In absolute terms, cutting the budget by 10 percentage points reduced new productions by 0.51 per year (Table 3, column 4, significant at 1 percent). Compared with the 1866 mean of 13.0 new productions per theater and year, this implies a 3.9 percent decline. Similarly, the share of new productions declines by 1.7 percent for each additional 10 percentage points in budget cuts (Table 2, column 5, significant at 1 percent).

Instead of creating new compositions and productions, theaters shifted towards reruns of existing production of existing compositions (so-called repertory works). Their share increased by 4.8 percent (Table 2, column 7, significant at 1 percent), despite a slight decline in absolute terms (column 6, significant at 1 percent). These performances involved no creativity, but they were cheaper to produce requiring no payments to composers and no expenses for stage designs.

Finally, we investigate whether funding cuts affected the genre of works that a theater produced. To perform this analysis, we estimate equation (1) across genres, distinguishing operas, operettas, and concerti, from *commedia dell'arte*. These estimates show that the funding cuts shifted performances from operas towards more popular works. A 10 percentage points cut in funding in 1867 was associated with a 3.6 percent decline in the share of operas after 1867, and a 4.2 percent increase in the share of *commedia dell'arte* (Appendix Table A2, columns 2 and 8, significant at 1 percent).

Theaters that were More Affected by Funding Cuts were More Likely to Close

In addition to these changes at the intensive margin, funding cuts may have affected theaters at the extensive margin, forcing them to shut down. To investigate this channel, we estimate equation (1) using the probability of shutting down between 1867 and 1913 as dependent variable. Estimates from a probit model indicate that an additional 10 percentage points funding cut increased a theater's risk of failure by 1.7 percent (Table 3, column 1).

In addition to closures, the loss of funding encouraged theaters to shift from live performances towards the medium of film, which required virtually no creative input at the local level. Italy's first movie theater opened in Genova in May 1896. By 1910, 250 cities had opened a movie theater, and by 1913, the last year before World War II, 313 cities had a movie theater. While some new theaters used new construction, most movie theaters replaced an existing theater that had previously staged live performances. Conditional on surviving, theaters that had suffered larger cuts were more likely to be replaced by movie theaters. For each 10 percentage points increase in exposure to the funding cuts, a theater's probability of switching to movies increased by 2.4 percent (Table 3, column 3).

Heterogeneous Effects by Income per Capita and City Size

Proponents of public funding for the arts argue that arts can help improve residents' quality of life in underserved areas, help to diversify employment, and mitigate population flight (NASAA 2017, p.14.). In cities "(t)he arts are unique in their ability to revitalize rundown sections" (Federal Reserve Bank of Atlanta 2015). Yet, these areas may also be more vulnerable to cuts in public funding because they have worse access to private donations and ticket sales.

To better understand these heterogeneous effects of funding cuts, we estimate equation (1) by tertiles of the distribution of income per capita at the province level and by city population in 1861. We measure province income per capita using estimates from Felice and Vecchi (2015),¹¹ and city population from the first census organized by the Italian government, the Population Census of 1861.

Consistent with a disproportionate effect of funding cuts on lower-income regions, we find that theaters in the bottom tertile of GDP in 1861 experienced the most dramatic decline in the creation of new works across all measures. Theaters in the bottom tertile of income per capita lose 1.12 performances per year for each 10 percent loss in funding, more than 7 times more than theaters in the top tertile who just lose 0.16 (Appendix Table A4, column 1, significant at 1 percent). Similarly, theaters in the bottom tertile lose a much larger share of their premieres, with 56 percent compared with just 12 percent of theaters in the top tertile. Smaller cities appear to be the most affected by the budget cut, while the largest suffered significantly less (Appendix Table A5).

¹¹Felice and Vecchi (2015) estimate the regional GDP series from 1861 to 2011. We imputed the province GDP from the regional GDP using provincial employment from 1861 Population Census, following the methodology developed by Daniele, Malanima and Ostuni (2016).

City-Level Regressions

Next, we investigate whether the impact of the funding cuts varied across cities with single vs. multiple theaters. For instance, theaters in cities with a single theater may respond more strongly to the funding cuts because they were the “only game in town,” which reducing the quality of their offerings less costly because theater lovers had no alternatives. To investigate these effects, we estimate city-level regressions with an interaction variable for the number of theaters that were active in given city at the time of the funding cuts.

These confirm that funding cuts had a larger effect on theaters in cities with less competition. A 10 percentage points higher exposure to the funding cut at the city level is associated to a 9.3 decrease in total productions, equivalent to a 10.7 percent reduction (Appendix Table A5, column 1). The decline is of 4.2 total productions or 4.9 percent for cities with two theaters, while the decline is smaller in magnitude and not significant for cities with more than two theaters. Similarly, the decline of new premieres and the switch to repertory works is stronger in cities with a single theater, while the magnitude of the impact declines as the number of city theaters increase (Appendix Table A5, columns 2-8).

IV. CONCLUSIONS

This paper investigates the causal effects of cuts in public funding on creativity and survival in the performing arts. Using changes in the number and the novelty of performances as a measure for creative output we find that public funding significantly reduced both the number and the novelty of creative work. Moreover, we show that theaters that were more affected by funding cuts – due to exogenous variation in exposure determined more than 100 years before the cuts – were more likely to close or be replaced by movie theaters when that technology became available and transformed the industry. Our analyses of the heterogeneous effects suggest that the effects of funding are largest for theaters in smaller cities and serving populations with less income.

While it is difficult to examine the causal effects of arts funding in modern settings, anecdotal evidence suggests that public funding provides a safety net that encourages artists to take creative risks. For instance, Finnish artists argue that public funding for education and the arts gives them the freedom to pursue their creative passions: “It also affects the kind of work that we make, because we don’t have to think about the commercial value of art. So that a lot of what the artists here make is very

experimental.”¹² Reports such as these suggest that public funding continues to encourage novelty today.

If public funding for the arts encourages creativity, cuts in public funding are likely to weaken the positive multiplier effects that arts as an amenity can have on local economies. Moreover, if artistic creativity interacts with entrepreneurship and innovation, reductions in public funding may also indirectly weaken the innovative capacity of locations most affected by these cuts. These effects may be felt especially in rural areas and those with less income, where private funding is less readily available to support investments in the arts.

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¹²“The Finnish Secret to Happiness? Knowing When You Have Enough” *The New York Times*, April 9, 2023. <https://www.nytimes.com/2023/04/01/world/europe/finland-happiness-optimism.html?smid=url-share>

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TABLE 1 – SUMMARY STATISTICS AND PRE-BUDGET CUT BALANCING TESTS

	MEAN	PERCENT ENDOWMENT	
	(1)	(2)	(3)
Year of Foundation	1637	-0.112 (0.408)	-0.110 (0.741)
N Seats	601.37	0.466 (0.961)	-2.509 (2.182)
N Standing Seats	367.10	0.198 (0.595)	-1.932 (1.342)
Total Productions	97.77	0.022 (0.028)	-0.012 (0.050)
Premieres	13.44	0.005 (0.007)	-0.002 (0.013)
Premieres (in %)	13.68	0.000 (0.000)	0.000 (0.000)
New Productions	18.07	0.012 (0.012)	-0.004 (0.020)
New Productions (in %)	18.39	0.000 (0.000)	-0.000 (0.000)
Repertory Works	66.74	0.005 (0.017)	-0.006 (0.031)
Repertory Works (in %)	67.93	0.002 (0.004)	0.005 (0.007)
City FE		NO	YES
Observations	1,164	1,164	1,164

Notes: Column 1 reports the mean in 1866 for public theater characteristics. Columns 2 and 3 report the coefficient of regressing each public theater characteristic on the percent of theater funding coming from public endowment. *Total Productions* is the number of pieces performed by a theater in a given season (excluding the repeat performance of the same piece). *Premieres* capture the first performance of new compositions. *New Productions* are the first performance of a new production (for example with an innovative staging) of an existing composition. *Repertory Works* are re-runs of existing productions.

TABLE 2 – EFFECTS OF ENDOWMENT CUTS ON CREATIVITY

	Total Productions	Premieres		New Productions		Repertory Works	
		Number	Share	Number	Share	Number	Share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Funding Cut x post	-0.709*** (0.062)	-0.090*** (0.013)	-0.306*** (0.010)	-0.051*** (0.008)	-0.172*** (0.006)	-0.568*** (0.043)	0.478*** (0.016)
Theater FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	86.53	21.20	24.49	12.98	15.01	52.34	60.49
Observations	31,964	31,964	31,964	31,964	31,964	31,964	31,964
R-squared	0.891	0.932	0.910	0.919	0.902	0.854	0.938

Notes: *Total Productions* is the number of pieces performed by a theater in a given season (excluding the repeat performance of the same piece). *Premieres* capture the first performance of new compositions. *New Productions* are the first performance of a new production (for example with an innovative staging) of an existing composition. *Repertory Works* are re-runs of existing productions. The *Share* variables indicate the share of a given type of performance as a fraction of the total production. *Funding Cut* is the share of funding that a theater received from the state (instead of from private sources); funding from public sources was cut in 1867. The indicator *post* equals 1 starting in 1867 when funding for public theaters was cut (AAPP, CD, Legislatura X, Sessione I, 1867, Discussioni, Discussione del bilancio del Dicastero dell'Interno pel 1867, tornata del 17 giugno 1867). Standard errors are clustered at the city level.

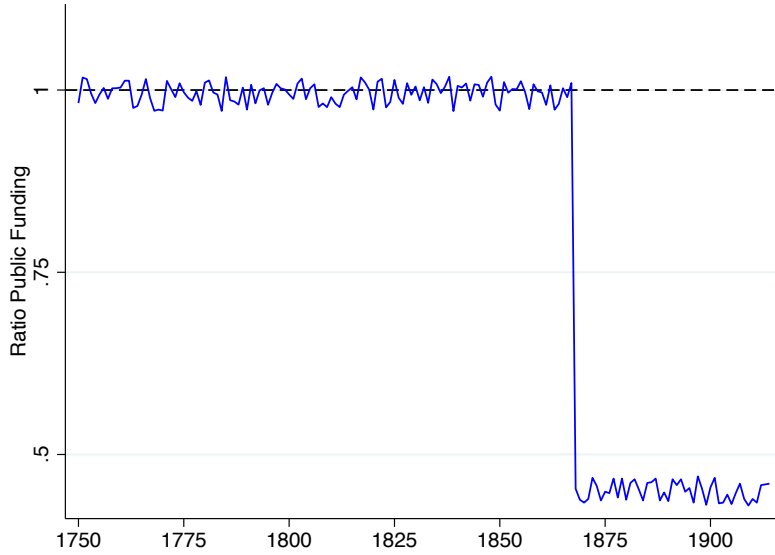
TABLE 3 – PROBABILITY OF SHUTTING DOWN AND REPLACEMENT BY MOVIE THEATERS

	Pr (Shut Down)		Pr (Replaced by Movie Theater)	
	(1)	(2)	(3)	(4)
Funding Cut	0.017*** (0.005)	0.018*** (0.004)	0.024*** (0.003)	0.025*** (0.005)
Year FE	Yes	Yes	Yes	Yes
City FE	No	Yes	No	Yes
Observations	1,164	1,164	1,164	1,164

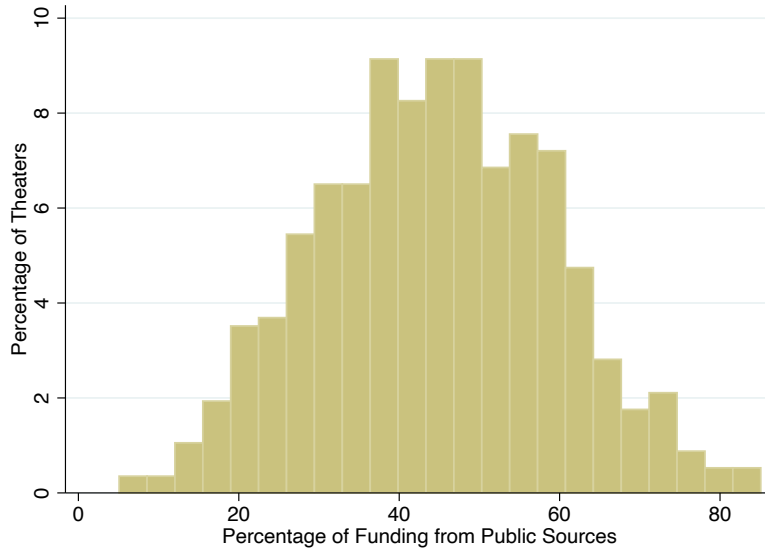
Notes: *Pr (Shut Down)* is an indicator for theaters that closed between 1867 and 1914. *Pr (Replaced by Movie Theater)* is an indicator for theaters replaced by a movie theater after the emergence of this medium between 1900 and 1914. Data include 1,164 publicly funded theaters that operated in Italy in 1859. Standard errors are clustered at the city level. *** denotes 1%, ** denotes 5%, and * denotes 10% significance.

FIGURE 1 – INCIDENCE OF FUNDING CUT ON THEATER SHARE OF PUBLIC ENDOWMENT

PANEL A: DISTRIBUTION IN THE SHARE OF PUBLIC ENDOWMENT OVER TOTAL FUNDING IN 1866

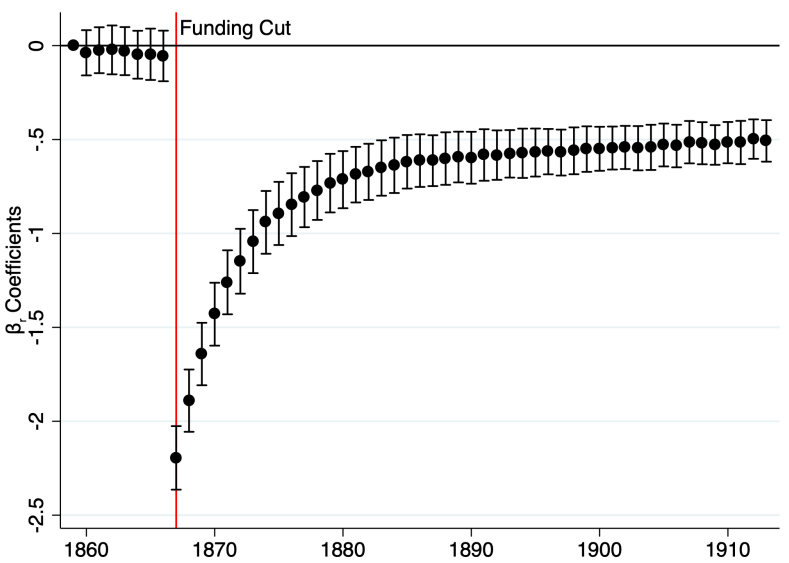


PANEL B: RATIO OF PUBLIC ENDOWMENT RELATIVE TO 1866 VALUE, 1750-1914

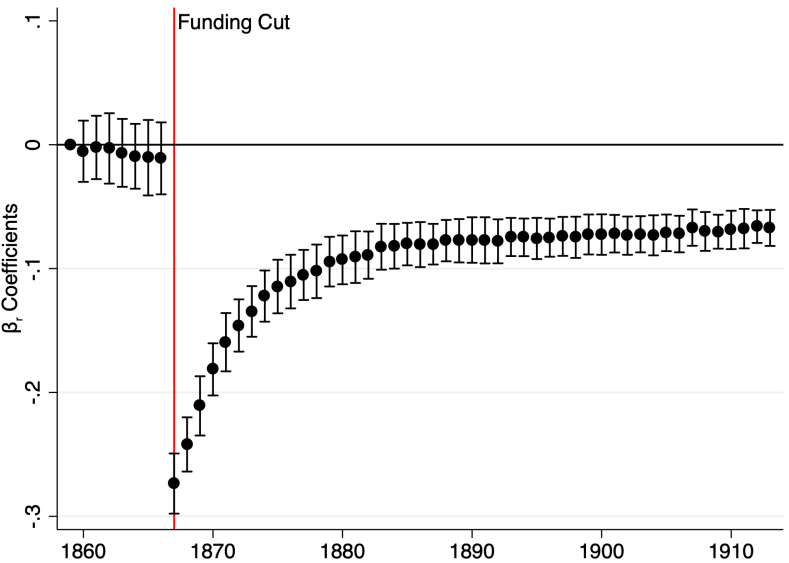


Notes: Panel A shows the average ratio of public funding endowment in each year between 1750 and 1914, relative to its 1866 value. Panel B shows variation in the dependence on public funding, measured by the share of public funding in 1866 a theater's endowment (*dote*).

FIGURE 2 – TIME-VARYING ESTIMATES OF THE EFFECTS OF FUNDING CUTS ON CREATIVE OUTPUT
 PANEL A: ALL PERFORMANCE



PANEL B: PREMIERES



Notes: 95% confidence intervals for β_r 's coefficients in the OLS regression $creative\ output_{it} = \sum \beta_r \cdot (funding\ cut_i \cdot year_r) + \alpha \cdot funding\ cut_i + \lambda_i + \delta_t + \varepsilon_{it}$, where the dependent variable is the total number of yearly performance (Panel A) and the number of yearly premieres (Panel B). The variable $year_r$ indicates years between 1860 and 1914, where 1859 is the excluded year. λ_i are theater fixed effects. δ_t are year fixed effects. Standard errors are clustered at the city level.

ONLINE APPENDIX
NOT FOR PUBLICATION

TABLE A1 –TEST FOR PRE-TRENDS, 1859-1866

PANEL A: LINEAR PRE-TREND

	Total Productions		Premieres		New Productions		Repertory Works	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Funding Cut x Linear Pre-Trend	0.003	0.003	0.001	0.001	0.001	0.001	0.002	0.002
	(0.012)	(0.012)	(0.003)	(0.003)	(0.002)	(0.002)	(0.007)	(0.007)
Linear Pre-Trend	3.805***		0.943***		0.534***		2.329***	
	(0.552)		(0.140)		(0.088)		(0.328)	
City FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	No	Yes	No	Yes	No	Yes
Mean Dep. Var.	86.53	86.53	21.20	21.20	12.98	12.98	52.34	52.34
Observations	4,645	4,645	4,645	4,645	4,645	4,645	4,645	4,645
R-squared	0.700	0.703	0.684	0.687	0.578	0.580	0.687	0.690

Notes: Test for linear pre-trend for 587 public theaters between 1859 and 1866. *Total Productions* is the number of pieces performed by a theater in a given season (excluding the repeat performance of the same piece). *Premieres* capture the first performance of new compositions. *New Productions* are the first performance of a new production (for example with an innovative staging) of an existing composition. *Repertory Works* are re-runs of existing productions. *Funding Cut* is the share of funding that a theater received from the state (instead of from an endowment, the *dote*); funding from public sources was cut in 1867. The indicator *post* equals 1 starting in 1867 when funding for public theaters was cut (AAPP, CD, Legislatura X, Sessione I, 1867, Discussioni, Discussione del bilancio del Dicastero dell'Interno pel 1867, tornata del 17 giugno 1867). Standard errors are clustered at the city level.

PANEL B: YEAR SPECIFIC PRE-TREND

	Total Productions (1)	Premieres (2)	New Productions (3)	Repertory Works (4)
Funding Cut x Year 1859	-0.035 (0.072)	-0.008 (0.018)	-0.006 (0.012)	-0.020 (0.044)
Funding Cut x Year 1860	-0.035 (0.072)	-0.010 (0.018)	-0.010 (0.013)	-0.014 (0.043)
Funding Cut x Year 1861	-0.045 (0.075)	-0.012 (0.019)	-0.003 (0.011)	-0.030 (0.046)
Funding Cut x Year 1862	-0.048 (0.078)	-0.012 (0.020)	-0.007 (0.012)	-0.029 (0.047)
Funding Cut x Year 1862	-0.043 (0.076)	-0.009 (0.019)	-0.012 (0.012)	-0.023 (0.046)
Funding Cut x Year 1864	-0.027 (0.075)	-0.007 (0.018)	-0.008 (0.013)	-0.012 (0.045)
Funding Cut x Year 1865	-0.030 (0.079)	-0.006 (0.020)	-0.002 (0.012)	-0.023 (0.048)
<i>p</i> -value of <i>F</i> -test	0.460	0.617	0.721	0.363
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Mean Dep. Var.	86.53	21.20	12.98	52.34
Observations	4,645	4,645	4,645	4,645
R-squared	0.700	0.687	0.581	0.691

Notes: Test for year specific pre-trend for 587 public theaters between 1859 and 1866. Year fixed effects are included but not reported. *Total Productions* is the number of pieces performed by a theater in a given season (excluding the repeat performance of the same piece). *Premieres* capture the first performance of new compositions. *New Productions* are the first performance of a new production (for example with an innovative staging) of an existing composition. *Repertory Works* are re-runs of existing productions. *Funding Cut* is the share of funding that a theater received from the state (instead of from an endowment, the *dote*); funding from public sources was cut in 1867. The indicator *post* equals 1 starting in 1867 when funding for public theaters was cut (AAPP, CD, Legislatura X, Sessione I, 1867, Discussioni, Discussione del bilancio del Dicastero dell'Interno pel 1867, tornata del 17 giugno 1867). *p*-value of *F*-test reports the *p*-value for jointly testing the equality of all coefficients to zero. Standard errors are clustered at the city level.

TABLE A2 – EFFECTS OF FUNDING CUT ON GENRE OF PERFORMANCE

	Operas (1-2)		Operettas (3-4)		Concerti (5-6)		Commedia dell'Arte (7-8)	
	Number	Share	Number	Share	Number	Share	Number	Share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Funding Cut x Post	-0.114***	-0.357***	-0.062***	-0.205***	-0.177***	0.144***	-0.356***	0.418***
	(0.010)	(0.011)	(0.006)	(0.006)	(0.016)	(0.025)	(0.033)	(0.024)
Funding Cut	-0.004	0.014	-0.005	0.004	-0.010	-0.002	-0.021	-0.016
	(0.011)	(0.011)	(0.006)	(0.007)	(0.016)	(0.030)	(0.033)	(0.029)
Theater FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	12.99	15.00	7.35	8.49	22.07	25.50	44.12	50.99
Observations	31,964	31,964	31,964	31,964	31,964	31,964	31,964	31,964
R-squared	0.848	0.732	0.844	0.741	0.862	0.101	0.865	0.246

Notes: *Operas*, *operettas*, *concerti*, and *commedia dell'arte* are, respectively, is the number of operas, operettas, concerti and commedia dell'arte premiered by a theater in a given season (excluding the repeat performance of the same piece). The *Share* variables indicate the share of a given type of performance as a fraction of the total production. *Funding Cut* is the share of funding that a theater received from the state (instead of from private sources); funding from public sources was cut in 1867. The indicator *post* equals 1 starting in 1867 when funding for public theaters was cut (AAPP, CD, Legislatura X, Sessione I, 1867, Discussioni, Discussione del bilancio del Dicastero dell'Interno pel 1867, tornata del 17 giugno 1867). Standard errors are clustered at the city level.

TABLE A3 – HETEROGENOUS EFFECTS BY INCOME PER CAPITA

	Total Productions	Premieres		New Productions		Repertory Works	
		Number	Share	Number	Share	Number	Share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Funding Cut x post x top tertile	-0.156*** (0.045)	-0.040** (0.011)	-0.122*** (0.034)	-0.045*** (0.009)	-0.109*** (0.026)	-0.282*** (0.030)	0.151*** (0.009)
Funding Cut x post x middle tertile	-0.830*** (0.085)	-0.090*** (0.034)	-0.251*** (0.034)	-0.100*** (0.022)	-0.148*** (0.027)	-0.520*** (0.063)	0.452*** (0.010)
Funding Cut x post x bottom tertile	-1.124*** (0.042)	-0.140*** (0.030)	-0.558*** (0.036)	-0.159*** (0.016)	-0.222*** (0.028)	-1.097*** (0.029)	0.943*** (0.010)
Theater FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	86.53	21.20	24.49	12.98	15.01	52.34	60.49
Observations	31,964	31,964	31,964	31,964	31,964	31,964	31,964
R-squared	0.862	0.913	0.877	0.897	0.844	0.824	0.833

Notes: *Total Productions* is the number of pieces performed by a theater in a given season (excluding the repeat performance of the same piece). *Premieres* capture the first performance of new compositions. *New Productions* are the first performance of a new production (for example with an innovative staging) of an existing composition. *Repertory Works* are re-runs of existing productions. The *Share* variables indicate the share of a given type of performance as a fraction of the total production. *Funding Cut* is the share of funding that a theater received from the state (instead of from private sources); funding from public sources was cut in 1867. The indicator *post* equals 1 starting in 1867 when funding for public theaters was cut (AAPP, CD, Legislatura X, Sessione I, 1867, Discussioni, Discussione del bilancio del Dicastero dell'Interno pel 1867, tornata del 17 giugno 1867). Tertiles of income per capita in 1861 are computed using the province GDP level, imputed from the regional GDP series of Felice and Vecchi (2015) using provincial employment from 1861 Population Census. Standard errors are clustered at the city level.

TABLE A4 – HETEROGENOUS EFFECTS BY CITY SIZE

	Total Productions	Premieres		New Productions		Repertory Works	
		Number	Share	Number	Share	Number	Share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Funding Cut x post x top tertile	-0.528*** (0.040)	-0.031*** (0.010)	-0.151*** (0.043)	-0.025*** (0.005)	-0.099*** (0.031)	-0.413*** (0.028)	0.271*** (0.012)
Funding Cut x post x middle tertile	-0.723*** (0.046)	-0.131*** (0.011)	-0.499*** (0.045)	-0.055 (0.006)	-0.244*** (0.035)	-0.610*** (0.031)	0.486*** (0.013)
Funding Cut x post x bottom tertile	-0.996*** (0.039)	-0.151*** (0.010)	-0.602*** (0.046)	-0.074*** (0.014)	-0.336*** (0.036)	-0.956*** (0.028)	0.685*** (0.013)
Theater FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	86.53	21.20	24.49	12.98	15.01	52.34	60.49
Observations	31,964	31,964	31,964	31,964	31,964	31,964	31,964
R-squared	0.855	0.873	0.854	0.850	0.876	0.851	0.853

Notes: *Total Productions* is the number of pieces performed by a theater in a given season (excluding the repeat performance of the same piece). *Premieres* capture the first performance of new compositions. *New Productions* are the first performance of a new production (for example with an innovative staging) of an existing composition. *Repertory Works* are re-runs of existing productions. The *Share* variables indicate the share of a given type of performance as a fraction of the total production. *Funding Cut* is the share of funding that a theater received from the state (instead of from private sources); funding from public sources was cut in 1867. The indicator *post* equals 1 starting in 1867 when funding for public theaters was cut (AAPP, CD, Legislatura X, Sessione I, 1867, Discussioni, Discussione del bilancio del Dicastero dell'Interno pel 1867, tornata del 17 giugno 1867). Tertiles of city size distribution are computed from the Population Census of 1861. Standard errors are clustered at the city level.

TABLE A5 – CITY-LEVEL RESULTS BY NUMBER OF THEATERS HETEROGENEITY ACROSS CITIES WITH ONE, TWO OR MORE THEATERS

	Total Productions	Premieres		New Productions		Repertory Works	
		Number	Share	Number	Share	Number	Share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Funding Cut x post x 1 theater	-0.928*** (0.040)	-0.131*** (0.010)	-0.055*** (0.015)	-0.156*** (0.028)	-0.351*** (0.043)	-0.236*** (0.034)	-0.091*** (0.012)
Funding Cut x post x 2 theaters	-0.423*** (0.046)	-0.091*** (0.011)	-0.035*** (0.006)	-0.110*** (0.031)	-0.299*** (0.045)	-0.198*** (0.035)	0.086*** (0.013)
Funding Cut x post x 2+ theaters	-0.096 (0.099)	-0.021** (0.010)	-0.014 (0.011)	-0.056** (0.028)	-0.032 (0.046)	-0.036 (0.036)	0.035* (0.023)
Theater FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	86.53	21.20	24.49	12.98	15.01	52.34	60.49
Observations	31,964	31,964	31,964	31,964	31,964	31,964	31,964
R-squared	0.855	0.873	0.854	0.850	0.876	0.851	0.853

Notes: *Total Productions* is the number of pieces performed by city in a given season (excluding the repeat performance of the same piece). *Premieres* capture the first performance of new compositions. *New Productions* are the first performance of a new production (for example with an innovative staging) of an existing composition. *Repertory Works* are re-runs of existing productions. The *Share* variables indicate the share of a given type of performance as a fraction of the total production. *Funding Cut* is the share of funding that a theater received from the state (instead of from private sources); funding from public sources was cut in 1867. The indicator *post* equals 1 starting in 1867 when funding for public theaters was cut (AAPP, CD, Legislatura X, Sessione I, 1867, Discussioni, Discussione del bilancio del Dicastero dell'Interno pel 1867, tornata del 17 giugno 1867). Tertiles of city size distribution are computed from the Population Census of 1861. Standard errors are clustered at the city level.