Public investment in the arts and cultural agglomeration: Evidence from the New Deal

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Abstract

I study the first instance of federal funding to the arts in the US via New Deal programming ($4 billion present-day) to evaluate the long-run impact of artist employment programs on artist population shares of cities. I employ a New Deal spending instrument in an instrumental variables differences-in-differences design. The program increased shares of writers, theater/film workers, and designers (10-30 artists per 10,000 people) enduring to the present-day in a "big-push" manner. Musicians saw increases that lasted 1-2 decades. A variance decomposition demonstrates modest explanatory power (5-15%) of the program in determining subsequent variation of artist shares across cities.

JEL codes: H30, H44, H49, J48, J24, R12

Key words: Agglomeration, arts economics, urban agglomerations, urban sorting, occupational choice, public investment in amenities, urban development

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1 Introduction

Public support to the arts is controversial. On one hand, work in urban economics suggests that higher skilled workers tend to endogenously sort into locations with greater amenities, and that these amenities tend to accumulate over time and benefit from agglomeration economies (Diamond (2016); Kline and Moretti (2013)). Furthermore, the seminal work on the relationship between artistic activity and urban development (Florida (2002)) argues that the development of an artistic class represents a central component to urban growth. Extending funding to the arts could induce positive externalities both to arts practitioners themselves and to the locations that host such activities (Leroux and Bernadska (2014)). On the other hand, critics question the role and efficacy of the government in supporting cultural industries that would otherwise face difficulties in sustaining themselves.

However, as a baseline, evidence on the causal impacts of government spending on the arts is scant. Due to the combined lack of natural experiments and largely non-experimental and non-randomized nature of existing arts policy, studies on the effects of arts funding are forced to make use of observational settings that cannot separate treatment and selection effects (Alper and Wassall (2006); Catteral, Dumais, and Hampden-Thompson (2012)). Behavioral research in laboratory settings and significantly smaller scale experiments represent an exception to this characterization (Bowen and Kisida (2019)), but their relatively stylized settings mitigate their scope to inform our understanding of the policy-relevant causal impacts of arts funding, such as on outcomes like artistic occupational choice.

This paper is the first work to inform this discussion by empirically estimating causal impacts of large-scale arts spending programs on the long-run population shares of artistic professionals across US cities. I estimate the impact of large scale federal funding to the arts in the context of the New Deal on the spatial accumulation of artistic professionals. I ask: how much artistic employment does funding to the arts generate? How persistent are these effects over time? Do the localities that receive a large, unsustained funding shock (i.e. a "big-push") go on to foster flourishing arts environments well-after the funding has ceased?

These questions are key for assessing the value of public investment in the arts. Namely, if artistic activity persists heavily across and within spaces (e.g. cities) over time, then ex-

tending funding to the arts in the short run may generate considerable additional activity over a longer time horizon. This longer-run impact is particularly important to determine in light of policy and popular discussions that seek to revive New Deal arts spending programs (Jacobs (2020)). Additionally, in a world with highly autocorrelated artistic activity within localities over time (Borowiecki (2019)), the location of current "cultural hotspots" may be the result of historical, path-dependent developments. Moreover, could instances of unsustained funding to the arts generate meaningful long-run impacts on artistic activity in a "big-push" manner?

To study these questions, I employ newly digitized data on the New Deal arts spending encompassed under Federal Project Number One ("FPNo1", "Federal One")—the New Deal's primary artistic employment program, managed within the Works Progress Administration. The program was tasked with the employment of local artists for the dual purpose of promoting cultural production as well as extending New Deal employment efforts to white-collar workers. Importantly, the program represents the first instance of substantial centralized funding to the arts—totalling to approximately 4 billion present-day Dollars over five years, or slightly under 0.05% of 1935 GDP per year.

FPNo1 offers a promising opportunity to study the long-run impacts of a funding shock to the arts. Federal funding to the arts had not existed in the US until this point; only Boston and New York to a lesser extent featured publicly available local arts education and programming. Throughout the course of the program's run from mid-1935 to the early months of 1940, the federal government granted approximately USD 4 billion (present-day) to the arts, five times the budget allocated to the National Endowment for the Arts from 2019 to 2023. Today, between the rise of charitable giving to the arts, the variety of arts programs on the state-, local-, and national-levels, and the rise of local arts education in public schools—all in the subsequent decades—potentially render any single arts program less salient for policy-evaluation purposes.[1] Thus, given its size and uniqueness as one of the earliest sources of federal funding to the arts in the US, the program represents a highly

[1]In 2018, the sum of philanthropy to arts, culture, and humanities and public spending on part of federal, state, and local governments totaled to 20.9 billion USD in 2018, with philanthropic giving representing about 90% of this amount (Stubbs and Mullaney-Loss (2019); "Giving USA 2019: The Annual Report on Philanthropy for the Year 2018" (2019)).

unique policy environment to study the long-run impacts of arts funding.

To assess the causal impact of the New Deal arts spending, I exploit the administrative structure of the program to isolate variation in local funding induced through non-arts New Deal funding, exogenous to pre-New Deal trends in city artist shares and local potential outcomes in the arts. My main specification employs a local New Deal spending leave-out instrument that is constructed as the difference between total New Deal spending and New Deal arts spending for a given locality. Importantly, the validity of this instrument relies on precluding any impact of non-arts New Deal spending on local artistic outcomes which would in turn affect artistic activity. I corroborate the validity of the instrument by empirically demonstrating that non-arts New Deal spending had no impact on local population growth and other local economic indicators.

I find positive effects of funding across on local artist shares within their respective disciplines, some of which have endured to the present day. While the program induced large short-run increases in the shares of artists across nearly all disciplines relative to their respective pre-period baselines (typically greater than 100% increases following the *immediate* end of the programs), the persistence of these effects over time vary by the specific field of art.

Funding to writers generated large effects on the local share of individuals identifying as authors that persist to the present-day. In particular, an investment in 1935 of USD 20,000 per incumbent writer (present-day) generated a 20% increase in the population-share of writers relative to non-funded cities in the present-day. However, funding of musicians and visual artists demonstrates large, positive short-run impacts with mixed persistence over time. Namely, the effects of funding musicians on their local worker shares do not endure beyond a single decade, while the persistence of visual arts funding varies by subfield (with photographers and designers demonstrating persistent impacts and artists and painters returning to their pre-period shares after a single decade). Finally, the effects of theater funding are somewhat mixed, with null and weakly negative impacts on local shares of actors, but positive and more persistent impacts on the local share of individuals involved in either the theater or film industries. Overall, my results show that some fields responded in a "big-push" fashion this unsustained funding shock, whereas other fields exhibited a reversion

to pre-shock levels of activity.

2 Related literature

Several works in labor and urban economics aim to quantify the agglomerative tendencies of labor markets and evaluate the scope for public intervention in fostering or inhibiting the development of occupational clusters. Kline and Moretti (2013) represents the most closely related work here, studying the short- and long-run impacts of large localized and sustained investments in manufacturing through the Tennessee Valley Authority Program between 1930 and 1960, finding significant agglomeration of manufacturing jobs in the Tennessee Valley area during and after the primary funding period. Moretti (2019) documents substantial agglomeration economies among inventors within scientific fields and estimates significant productivity premiums to inventors moving to large occupational clusters, as measured by patents. Greenstone, Hornbeck, and Moretti (2010) study the agglomerative spillovers to counties induced by the location of large manufacturing plants, identifying a significant increase in total factor productivity among incumbent plants. Within the creative industries, more recent work finds minimal lasting impact of film-location tax credits on wages, employment, and production in related industries (Button (2019)). In my setting, I similarly seek to quantify the occupational agglomeration to the arts that occurs quasi-experimentally in response to public investment.

There is substantial precedent to frame artistic and cultural activity as phenomena particularly subject to agglomerative forces. A body of work has focused on the spatial clustering of artistic activity as an object of interest in of itself. Borowiecki (2013) uses exogenous variation in the distance from Classical to Post-Romantic composer's birthplaces to major cities to document significant productivity premia to geographic clustering. Kelly and O'Hagan (2007) use a similar approach leveraging variation in visual artists' birthplaces to document the emergence of various cities as artistic clusters between the 13th and 20th centuries. Hellmanzik (2010) demonstrates the geographic shift of location premiums from Paris to New York City between 1850 to 1950 by showing that works produced by artists located in those cities during their respective periods of prominence fetched higher sale prices in auction

settings.

This work also speaks to the research on the agglomeration of amenities as an urban phenomenon and the mutually beneficial relationship between artistic activity and urban development.[2] Florida (2002) is one of the earlier works to frame artistic production explicitly as central in the process of the spatial concentration of high-technology industries and broader urban growth. Leonardi and Moretti (2023) find that removing minimum distance laws for restaurants lead to a sharp increase in the geographic concentration of restaurants in Milan. Diamond (2016) develops and estimates a structural model that describes the endogenous feedback between endogenous amenity accumulation and agglomeration of high-skilled workers across Metropolitan Statistical Areas. The evidence I draw on the lasting impacts of arts funding in the quasi-experimental setting of New Deal arts funding builds upon other work studying the endogenous accumulation of amenities by estimating the impact of exogenous supply shocks of said amenities. In particular, the estimates produced in this work encompass both the short-run effects of exogenous funding to the arts as well as the longer-run endogenous amenity accumulation process.

Finally, I contribute to discussion on the impacts of historical New Deal spending. Work here typically fits into one of two camps: either on evaluating the role of New Deal spending in alleviating the effects of the Great Depression or the effects of specific kinds of New Deal spending in stylized settings. More aggregate-focused, macroeconomic analyses of the Great Depression tend toward finding a more limited role of fiscal spending in bringing an ending the Great Depression (Romer (1992)), documenting low and even negative fiscal multipliers associated with the contemporaneous spending.

3 Context: historical account of Federal One

Federal Project Number One offers a promising opportunity to study the long-run impacts of funding to the arts. As the first instance of substantial federal funding to the arts, this WPA program resulted in the gainful employment of approximately 40,000 artists per year from across the US between 1935 and 1940 across its four sub-programs separated by specific

[2]See overviews of this discussion in Santagata (2006) and Bille and Schulze (2006).

field-of-art. In total, before transitioning to significantly smaller-scale WPA sub-programs and state-led programs, the arts programming under FPNo1 comprised nearly 4 billions dollars of present-day funding over about five years. Moreover, the program's magnitude and scope of activities were unprecedented in the US, and remained so in terms of federal outlays until the mid-1970's—after ten years of operations of the National Endowment for the Arts.

In this section, I give a broad overview of Federal Project Number One. I first describe its historical background and its operations, including the division of its sub-programs between fields of art. I then proceed by detailing the program's political context and administrative structure that lend to causal identification.[3]

3.1 The background and operations of FPNo1

Federal Project Number One represents the first instance of substantial federal funding to the arts in the US. Prior to 1933, federal (as well as state- and local-level) policy was largely silent in the realm of arts programming. Additionally, due the absence of widespread standards in local education curricula, public schools did not universally feature arts programming (Whitford (1923)). In this environment characterized by an absence of popular arts-programming, education, and engagement, historian Howard Zinn describes Federal One as one of the first instances where working-class populations benefited from wide access to the performing arts (Zinn (1980)). Indeed, WPA historian William McDonald characterizes the extant cultural programming prior to Federal One as "conspicuous...by their rarity" (McDonald, 1969). The emergence of federal arts funding through New Deal programming signified an unprecedented development in American arts policy.

On August 2, 1935, New Deal administrator Jacob Baker announced the beginning of Federal One, and its first appropriations shortly followed one month later on September 12th. Harry Hopkins, one of the central architects of Federal One as well as the broader WPA positioned Federal One with a dual mandate: both as a program of white-collar work

[3]For a historical perspective of the context and operations of New Deal Arts programming, I primarily consult New Deal historian William Francis McDonald's comprehensive account, "Federal Relief Administration and the Arts" (McDonald 1968), though I also reference several other more specifically-focused texts.

relief and as a program to promote cultural production.

On the work-relief role of Federal One, McDonald described the prevailing philosophy that,

> "*...in time of need the artist, no less than the manual worker, is entitled to employment as an artist at the public expense; and that the arts, no less than business, agriculture, and labor, are and should be the immediate concern of the ideal commonwealth.*",

and in a letter to WPA general counsel member Lee Pressman dated August 14, 1935, Hopkins emphasized the importance of cultural production as a key area of focus in New Deal programming:

> "*...it should be recognized that since a very large part of the product of this project is in a cultural service for which there is a tremendous unsatisfied demand in the US, there can be no question of excess production.*"

The dual role of arts programming in the New Deal era as both a form of employment-relief and for the promotion of cultural production is clear.

Federal One was implemented with four sub-programs (excluding the shortly-defunct Historical Records Survey), divided by artistic discipline: visual arts, music, theater, and writing. Importantly, these four programs were administered separately. I describe their operations in brief:

The Federal Art Project (FAP) was the primary visual arts program under Federal One. The program engaged in four primary activities: production of individual art works (which encompassed the majority of FAP activity), providing arts education to children and communities, the completion of community art projects (e.g. murals and other group art works), and the performance of arts research. The FAP employed professional visual artists of a wide

variety of media—including easel and mural painting, sculpture, and silk-screen and poster design/printing.[4]

Musicians were employed under the Federal Music Project (FMP). The FMP funded symphony orchestras and other musical ensembles that gave performances for public audiences, administered lessons in instrument performance and music appreciation and commissioned the composition of new pieces by American composers.

The Federal Theater Project (FTP) was tasked with the employment of drama professionals for the writing, production, and performance of plays for popular consumption, as well as the delivery of acting performance and theater appreciation instruction. The program featured a wide performance mandate that included black theater troupes and also catered to different language demographics.

The Federal Writers Project (FWP) employed fiction and nonfiction writers. Most notably, the FWP facilitated the creation of the American Guide Series—a anthology of guide books to states and territories, major cities, and national historical sites. The program produced early oral history collections from formerly enslaved people and also featured a literary wing. Several prominent authors found early support through FWP employment including American novelists John Steinbeck and Ralph Ellison and future playwright and historian Howard Zinn, among many others.[5]

The operations of all the sub-projects continued steadily from September 1935 up until June 1939 with the passage of legislative action that stymied the operation of the Federal One sub-projects and entirely dismantled the Federal Theater Project. Mounting tensions on several margins led to eventual reform to Federal One. In particular, critics of Federal One voiced concern over the projects' purported fiscal unsustainability and inability to "achieve a

[4]Concurrently, the Treasury Relief Art Project (TRAP) also tasked itself with the employment of visual artists for the production of painting and sculpture, but it is important to note that this program is similarly significantly smaller in scope than its homologue under Federal One (respectively, approximately 500,000 USD v. 25,000,000 USD (1935) in federal outlays).

[5]Federal One also featured a fifth sub-program, the Historical Records Survey (HRS), that dealt with the compilation of various historical anthologies and indices, including bibliographies of authors and musicians and lists of newspapers and religious institutions. The HRS was initially installed as a part of the Federal Writer's project, but was re-established as a separate Federal One sub-project in 1936 shortly after its inception. However, the operations of this sub-program were relatively small in comparison to the other sub-programs and was not tasked with artistic production. Moreover, the program was re-organized within the broader WPA for state direction following the reforms and wide dismantling of Federal One in 1939.

non-metropolitan character". The House Appropriations Committee focused more closely on the Federal Theater Project in light accusations from the House Committee on Un-American Activities that the FTP promoted "communist ideals" and politically "subversive artists" (Flanagan (1940)); this political scrunity led to the FTP's complete dismantlement in 1939.

Following Congressional action in 1939, the remaining three artistic sub-programs of Federal One continued operation on a significantly smaller scale, benefiting from substantially less funding than previously. The reform ceased congressional funding of the FMP, transferred the program from federal to state control, and changed its name to the WPA Music Program to reflect this shift. Additionally, the reform included the imposition and enforcement of stricter means-testing policies of artists (which were typically absent during the primary period of Federal One activity), the dismissal from local music units of all musicians on FMP employment rolls for longer than eighteen months and new requirements to generate funds from local sponsorship and concert admission fees.

There exist no precise quantitative accounts that illustrate the magnitude in decrease in activity after 1940, but historians agree on the dramatic decline of arts activity following the reforms. McDonald (1968) writes of the reforms, "As a consequence, performing units were seriously and sometimes fatally injured". After a year of scaling down in activities, by the summer of 1941, all of the state-led music projects were engaged in military and defense support. Following the attack on Pearl Harbor on December 7, 1941 and the US's entrance into World War Two, the programs continued in name only until their *de jure* dismantlement in 1943. The Federal Art and Writer's Projects similarly scaled down in operation following the 1939 reform that limited federal funding until their integration into later war efforts.

Following the full dismantling of Federal Project Number One in 1943, arts programming remained absent from federal policy until 1963 with the creation of the National Council on the Arts and the National Endowment for the Arts two years later.

3.2 The administrative and financial organization of FPNo1

Federal Project Number One sourced its funding from the Works Progress Administration, whose projects were themselves funded via regular congressional appropriation acts with precise recommended allocations determined by the President.

For Federal One, as for the broader WPA, the US President would make a separate recommendation/request for funding for each Federal One sub-project every several months based on discussions with national-level Federal One leadership. Upon this making this request, relevant US Congress committees in the House of Representatives deliberated the amounts, generally fulfilling the entire funding request (typically within only a single percent deviation), after which the committees would pass on the funding allocations to the House of Representatives for approval.

From this point, Federal One sub-project leadership on the national level would allocate funding to states, which maintained their internal operations of their respective Federal One sub-projects. Finally, sub-project units within each state would make funding requests via application which for approval by the state sub-project board. As an illustrative example, the San Francisco unit of the California Federal Writer's Project would make a funding request to the California state-level Federal One administrators; the California state-level FWP has its funds apportioned by the federal-level FWP.[6] The use of applications for individual benefit from and participation in WPA and broader New Deal programming was typical, but relatively little is known on the characteristics of individual take-up and application approval (beyond the imposition of certain requirements, such as means testing for select non-arts New Deal programs).

Unlike other WPA projects, Federal One did not require local sponsorship: for the most part, funding of Federal One activities across all of the sub-programs originated from federal sources. However, strict local sponsorship requirements were put in place after legislative reform in 1939, and even beforehand Federal One projects in the performing arts (music and drama) were permitted to implement admissions fees as additional sources of funding, although such funding represented an insignificant portion of total funding (generally less than 1%). The majority of Federal One performances were free to the public.

Wages were set by the federal-project level administrators on the state- and administrative region-level. While these wages did vary between programs and states based on the cost of living and prevailing wages for each respective field of art, they did not differ widely. Fed-

[6]The current status of these individual funding applications is unknown; neither records of individual applications at the National Archives and Records Administration nor evidence of their physical existence could be determined.

eral One workers benefited from relatively higher wages than other non-white-collar workers under other New Deal programs, typically earning about 90 USD (1935) per month (about 1800 present-day USD), about three times as much earned by Civilian Conservation Corps workers, for example.

4 Data

The central dataset consists of a panel of city-decade observations that combines newly digitized data on New Deal arts spending under FPNo1 with US Census data on individuals aggregated up to the locality-level. In the main specification, I designate the city-level as the primary unit of analysis. I construct my data in order to study how the artistic occupational shares by cities themselves evolve in response to Federal One funding. Importantly, this work studies the artistic characteristics of *locations*, not individuals themselves. For this reason, I structure the data to analyze cities, and the main reduced form specifications feature weighting on all observations equally. [7]

I prefer cities as the relevant geographic panel-unit of study for several reasons. First, sub-state project units almost entirely operated on the city-level, even in less-metropolitan localities where projects operation were conducted in towns, which are frequently assigned city-status in geography-level datasets, such as in the US Census. The study of cities thus allows me to maintain conformity with archival Federal One data sources. Second, arts activity has typically been studied as a metropolitan or urban phenomenon in generating agglomeration of skilled labor to cities (Florida (2002); Diamond (2016)). Third, while de jure and de facto city boundaries change over time, their delineation generally adheres to a temporally consistent and granular definition of city.[8]

I construct a decadal panel of cities by processing and combining data from two main

[7] An idealized design for this research question would study the occupation activity of individuals based on continuous exposure to Federal One treatment. However, this specification requires an infeasibly detailed person-time panel with frequent observations over individuals throughout time in order infer treatment exposure.

[8] The US Census Bureau follows city definitions for cities as incorporated places, described in Chapter 9 of the US Census Bureau Geographic Areas Reference Manual. States define cities based on typically low population thresholds (between 200 and 2000 people), occasionally incorporating population density requirements.

sources. Treatment variables originate from digitized primary data on Federal Project Number One activity and budgeting; outcome and control variables on locality characteristics come from aggregations of full US Census Bureau counts decadally from 1900 to 1940 and from publicly available samples cuts of the subsequent decadal Censuses. I also employ New Deal spending instruments from Fishback, Haines, and Kantor (2007). I detail the data construction process here.

4.1 Census data

Decadal data from the US Census from 1900 to 2020 provide my main outcome variables: city population shares of artistic professionals.[9] City geography-units are observed for places with greater than between 50,000 and 100,000 inhabitants and are consistent with the US Census "place" use. From between 1900 and 1950, I make use of full US Census counts, aggregating up from the individual-level to construct city-level population means (per capita artists by discipline and other geography characteristics).[10] Subsequent to 1950, I construct these per capita occupation levels by stacking independent US Census samples from 1960 to 2012 (which typically vary from between 0.5% and 5% subsamples of the full Census) and adjusting the sampling weights for each year accordingly.[11]

Table B.1 describes the city-panel balance over time. I attribute the observed variability across years to three main sources: Foremost, the full censuses are capable of recording any localities of the jurisdictional denomination "city" regardless of population, whereas the Census samples systematically exclude names of places under specific population (generally from between 50,000 and 200,000 inhabitants); indeed, the number of unique cities observed in a given census year drops off once the full US Censuses become unavailable. Second, localities may in principle move in and out of city-status by population threshold over; lastly, the large variability of smaller Census samples induces greater variability in the presence of

[9] Ruggles et al. (2020)

[10] I use versions of the full count censuses released by IPUMS prior to January 2022. The January 2022 revision of the full count censuses updated previously-illegible occupation entries. However, this update was only applied to years 1910-1930 and differentially affected cities in the sample, resulting in an improper longitudinal comparison with years outside of this range. I make these versions available for replication purposes upon request.

[11] The city-level analysis excludes results from 1970, which features no city-denominated data in available US Census samples.

less-populous city-places between decades.

The primary sample specification excludes all US Census-recognized city units that were absent from *either* US Census years 1930 or 1940 in order to meet the minimum threshold for the research design at the closest pre- and post-treatment periods. This sample specification includes 907 Census-recognized cities. Alternate specifications include varying the threshold for panel continuity—requiring in all publicly available full-count censuses, but these more restrictive specifications disproportionately exclude less-populous localities.

4.2 Federal One activity

A central component of this work consists of digitizing the primary source of data on FPNo1 treatment; nearly all detailed records on localized programmatic funding and activity on part of Federal One are held physically at the National Archives and Records Administration branch in College Park, Maryland.[12] This ambitious digitization procedure resulted in the construction of several novel datasets on federal-, state-, and city-level Federal One spending and activity.

Figure B.1 and Figure B.2 display example images of digitized files. Figure B.1 displays a page from the city-level employment records from the Federal Music Project; depicts an example of the monthly Federal Art Project employment figures by state-unit during Fiscal Year 1939. In this state-level document, note in this example both that, 1) not all states received FAP funding, and 2) the "state"-level employment figures adhere to the programmatic administrative divisions that split California into two units, separated New York City from New York State, and allocated funding to Washington D.C. These documents are representative of the archival tables used to compile city- and state-level employment counts for each Federal One sub-program.

I construct program-city-level employment per month variables as simple averages of all available point-in-time employment counts; I cross-validate the accuracy of these counts by

[12]In broad, the digitization procedure consisted of four parts: 1) visiting the College Park NARA branch during August 2019 where I identified and photographed relevant FPNo1 documentation (approximately 5,600 photographs); 2) organizing and prioritizing the photographs by jurisdictional level and subject matter; 3) transcribing photographs into tractable *.csv* spreadsheets; and 4) post-processing and cleaning the prepared datasets for attachment to geography-denominated data from the US Census Bureau.

aggregating up to the state-level and comparing with independently-produced state- and federal-level employment counts. The Federal Music Project makes use of three employment count compilations in 1937, 1939, and 1940 (shortly before transitioning into the significantly smaller-scale and state-led WPA Music Program). The Federal Theater Project makes use of five sets of counts from 1936 to 1937. The Federal Art Project and Federal Writer's Project featured less of the systematized record-keeping practiced by the Federal Music Project and FTP leadership. These programs feature only a single primary-source of city-level employment counts for three points-in-time that includes only the most prominent recipients of Federal One funding;[13] the Historical Records Survey records featured no sub-state employment or activity counts.[14]

The city-level employment per month counts aggregated to the state- and federal-level resemble the separate state-level counts for each of the four arts sub-programs. Table 1 displays these aggregations. The Federal Art Project, Federal Music Project, and Federal Theater Project city employment records all reproduce state-level program employment with relative reliability, with only the Federal Writer's Project employment count estimates diverging somewhat between state- and city-level. However, even for both visual artists and authors, the imputed expenditure amounts for cities only differ from state records slightly. Importantly, these employment counts illustrate average employment counts over time, not the count of unique individuals employed by each program.

Federal One treatment employed many artists during the program's operations. Table 2 displays tabulations of various parameterizations of Federal One treatment. The Music and Theater Projects reached a wide number of unique cities, whereas Arts and Writer's Projects

[13]To alleviate internal and external validity-related treatment-censoring concerns of possibly analyzing only the largest Federal Writer's and Artist Project outlays, subsequent robustness checks study the impact of Music and Theater spending based on only the top-25 beneficiary cities for each program.

[14]The archival records do not include city-level expense or wage variables. Instead, I impute city-program level monthly expenses by projecting constructed state-level average monthly wages onto city-level employment counts. Specifically, I construct the total expense for sub-program l in city i and state $s(i)$ as

$$Exp._{i,l} := \frac{Total\ Expense_{s(i),l}}{Total\ Person\text{-}Month\ Employment_{s(i),l}} \times Avg.\ Person\ Month\ Emp._{i,l} \times Months\ Active_{s(i),l}.$$

This imputation method aligns with the administrative accounts of Federal One that indicate that wages were indeed set on the state-level (or sub-state- or district- level for Northern and Southern California, Washington D.C., and New York State and New York City).

reached fewer cities as recorded in the sub-state archival data. Conditional on program activity, the cities saw artist employment of around 400 individuals in a given month.

Nonetheless, programmatic activity represented a significant increases to artistic employment in cities relative to their pre-period baseline levels in 1930. To place Federal One activity into context, I construct field-city employment shares by normalizing program employment counts by the number of artists of each respective field and city in 1930.[15] To this end, I pair the Federal Art Project with visual artists, the Music Project with musicians, the Theater Project with actors, and the Writer's Project with authors.[16] Table 2 demonstrates that the amount of Federal One activity represented a large share of pre-existing artistic activity, with the program hiring between 15- and 30% of visual artists and musicians and between 100- and 300% of pre-existing actors and writers in treated cities.

I also compute summary statistics of program expense levels and expense-per artist, providing another illustration of the magnitude of Federal One activity: In present-day terms, programs induced funding to cities of between 3- and 30 million USD (present-day) conditional on positive activity. For those hired, expenses per artist-year amounted to around 20,000 USD present-day to artists and musicians—and around 4-5 times more for theater practitioners and writers.[17][18] Figure B.3-Figure B.6 illustrate the spatial variation of various parameterizations of Federal One spending across the US.[19]

[15] $Share_{i,l} = \frac{FPNo1\ Employment_{i,l}}{Employment_{i,l,1930}}$.

[16] I continue this alignment of treatments and outcomes for the reduced form framework.

[17] Although archival and historical sources suggest the outsized magnitude of theater and writer's programming, an additional explanation of the large magnitudes of their Federal One activity parameterizations normalized by pre-existing artist numbers may lie in a systematic under-counting of respective artists as Census-identified professionals (e.g. writers or actors disproportionately responding as having non-arts profession for their primary occupational activity (i.e. moonlighting, Alper and Wassall (2006)).

[18] Measures of expense per artist do not represent wages received by Federal One employment beneficiaries, but rather total programmatic outlays per pre-existing artist: $Per\ artist\ exp_{i,l} = \frac{Expense\ FPNo1_{i,l}}{Emp_{i,l,1930}} = \frac{FPNo1\ Wage_{s(i),l} \cdot FPNo1_{i,l}}{Emp_{i,l,1930}}$. Federal One artists themselves earned approximately 90 USD (1935) per month.

[19] The archival FPNo1 tables also include geographically-delineated data on more detailed program activity: for instance, concerts performed by type (e.g. opera, choral group, etc.) and number in attendance for the concert, plays performed and written, activity by genre and type of performing unit (e.g. drama, comedy; French-language, Yiddish-language; Black-theater, etc.), and number in attendance for performances. I currently do not make use of these more detailed records of programmatic activity, primarily due to relative lack of systematization and comprehensiveness between archival tables.

4.3 Additional data

I also make use of New Deal spending data by county compiled in Fishback, Haines, and Kantor (2007). These data include spending-levels associated with different New Deal programs and serve to instrument for Federal One participation.

5 Empirical framework

To estimate the impacts of arts spending on artist outcomes, I study Federal One in an instrumental variables difference-in-differences framework. I pair up Federal One subprograms with specific field of art. Each of the Federal One sub-programs $l \in \{FAP,\ FMP,\ FTP,\ FWP\} := \mathcal{L}$ corresponds with at at least one occupation/industry (standardized OCC1950/IND1950 variables in the US Census) in a set of labor market activities denoted $\mathcal{A}_l$. In particular, I align **separately** the 1) Federal Art Project with visual arts labor market activities: artists and art teachers, painters, designers, and photographers; 2) Federal Music Project with musicians/music teachers. OCC1950 also reports professional piano tuners; however, this group is discontinued in OCC1950 starting 1960. I include piano tuners as an occupational outcome group within music professionals until and including 1950; 3) Federal Theater Project with actors, theater/motion picture industry workers, and dancers[20]; 4) Federal Writer's Project with authors and publishing industry workers.

In an OLS setting, I identify the correlation between Federal One treatment by subprogram and artist population shares by estimating equations of the following form:

$$y_{ilt} = \alpha_{il} + \sum_{k=1900}^{2020} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=1900}^{2020} \beta_{lk} \cdot FPNo1_{il} \cdot 1\{Year_t = k\} + \varepsilon_{ilt}, \quad (1)$$

for city i in decade t and arts program l and artistic professional share outcome $y_l \in \mathcal{A}_l$. $FPNo1_{il}$ represents an indicator for whether city i received arts funding for field l. Under a parallel trends assumption and a constant treatment effects assumption, $\{\beta_{l,k>1940}\}$ identify the impact of funding a specific field of art on the respective artist population share.

[20]Starting 1930, IND1950 reports professional TV and radio industry professionals. However, due to lack of data available prior to 1930, I omit these professionals from the analysis.

5.1 Endogenous selection into treatment, econometric framework

As is typical in program evaluation settings, there substantial scope for endogenous selection into treatment in a manner that would yield biased estimates of the impact of funding. OLS estimation sees two central concerns. First, there is little reason to suspect treatment would respect a parallel pre-event trends assumption. I.e. Federal One recipient cities might have seen differential pre-reform growth compared to non-recipient cities: $Cov(FPNo1_{il}, \Delta y_{i,1900-1930}) \neq 0$. As a second concern, the impacts of arts funding may have heterogeneous treatment effects based on the selection Federal One participation: $\mathbb{E}[\beta_{il,t>1930}(FPNo1_{il})|FPNo1_{il} = 1] \neq \mathbb{E}[\beta_{il,t>1930}(FPNo1_{il})|FPNo1_{il} =]$.

Figure 1 Panels (a)-(d) illustrate the evolution in mean outcomes over cities by treatment status from 1900 to 1950.[21] Several of the designs demonstrate non-parallel pre-event trends. Additionally, the difference in pre-reform means may pose a concern with respect to the possibility of heterogeneous treatment effects, although it is unclear in which direction non-random selection may bias estimates. Table 3 and Table B.2 illustrate the differences in observable characteristics of Federal One beneficiary and non-beneficiary cities. Indeed, Federal One activity demonstrates a strong positive correlation with pre-existing population shares of artistic professionals, with recipient cities hosting 40% more visual artists per capita, 20% more musicians per capita, and 50% more writers per capita than non-recipient cities. The difference for actors per capita is insignificant. Federal One activity also demonstrated strong, positive correlation with city size in terms of population and income demographic as measured by OccScore.[22]

Table 4 Panels (a) and (b) summarize the results using OLS and city-level fixed effects.[23] The OLS results generally reveal a short-run increase in the share of the population identifying as artistic professionals. The longer run results are estimated with substantial noise

[21] Figure A.1 Panels (a)-(c) present these results for all observable artistic occupation categories.

[22] Income and wages per individual are not directly observable in US Census data prior to 1940. Instead, to infer income demographic characteristics of localities in 1930 and before, I make use of various occupation-score indices. These variables assign geography- and time-invariant scores to occupations based on earnings, education, prestige, and associated socioeconomic status (where OccScore is based on the 1950's median earnings of each occupation). The combined unavailability of income and wage variables in the pre-period of Federal One and the geography- and time-invariant specification of the various occupation score variables precludes the study of Federal One activity on artists' wages.

[23] Figure B.7 Panels (a)-(c) display the OLS event study coefficients.

and reflect a general divergence in the share of the population employed in the arts; which obscures the scale of the 1940 and 1950 changes, which are estimated more precisely given the use of full count census data.[24]

Descriptively, treated cities demonstrate an increase in artist population shares immediately following the end of Federal One by 1940 by between five to ten artists per 10,000 people. Holding population constant, these effects correspond with proportion increases in the number of artists by between 25 and 50% (upwards of 75% for writers), which aligns with information on the scale of Federal One. However, the majority of fields of arts exhibit no sustained increase a decade later by 1950, save for dancers, designer, and photographers. Piano tuners, theater and film industry professionals, actors, and painters exhibit a short run decrease or no short-run increase but the OLS estimates for these fields also exhibit non-trivial pre-trends, illustrating some of the non-random selection present.

Lastly, the long-run OLS estimates show little descriptive evidence of persistence. However, these longer-run OLS estimates broadly represent the correlation between treatment status and the evolution of the arts industries in treated cities, which should not necessarily reflect any causal impacts of Federal One treatment.

5.2 Additional econometric assumptions

Several additional econometric assumptions frame the inference and identification strategy. The *no-interference* component of assumption of Stable Unit Treatment Value Assignment (SUTVA) requires that Federal One treatment of cities does not affect non-beneficiary cities. In particular, hypothetically, If the estimation strategy yields positive coefficient estimates, it naturally follows to ask: from *where* does an increase in the local share of artists arise? An increase in the artistic professional shares in Federal One-treated cities coming at the expense of decreased artistic professional shares in un-treated cities (that is a *mobility* response of artists) could constitute a SUTVA violation.

However, there are several reason why SUTVA violations do not pose a concern in this setting. 1) I focus on cities. While mobility-responses across short distances may indeed be possible in the short-run, a model of cities as islands would assuage this concern. My

[24]Figure B.11 Panels (a)-(c) display solely decadal coefficients for 1900-1950 for clarity of scale.

focus on cities by construction precludes movement between rural or suburban localities and cities. 2) Mobility responses are not relevant for assessing the validity of the longer-run impacts of Federal One funding on local artist population shares (i.e. for $\beta_{dd,t}$ coefficients starting and subsequent to 1950). The longer-run reduced form coefficient estimates will encompass agglomeration effects that outlast the initial short-run impacts of arts funding. 3) Historical accounts of the operations of Federal Project Number One emphasize that programmatic activity generally drew upon *local* artist populations, and sub-state projects generally practiced local operation. FPNo1 featured no restrictions that would disallow non-urban participation.[25]

The validity of the analysis also depends on a final exclusion restriction specific to the empirical strategy that aligns the specific Federal One projects with their respective fields of arts. Namely, 1) the Federal One treatment in one field of art cannot affect outcomes for unrelated fields of art, and 2) outcomes in a fixed field of art also cannot directly affect the outcome of other unrelated fields of art: As an example to illustrate 1), Federal One funding that accrued to musicians through the Federal *Music* Project cannot affect the local share of *writers* in the population. As an illustration of the second restriction, local growth in the share of *visual artists* cannot affect local growth in the share of *theater practitioners*. A substantial body of work within arts and urban economics documents the spatial clustering tendencies of artistic professionals *within* fields (e.g. Borowiecki (2013); Hellmanzik (2010)) as well as the endogenous accumulation of amenities within space over time (e.g. Diamond (2016), but such work does not inform the existence of *cross*-field causal impacts of spatial clustering of artistic professions.

5.3 Causal impacts: IV framework and results

5.3.1 Federal One New Deal spending instrument

To estimate the causal impacts of New Deal arts spending on local artist population shares, I employ an instrumental variables framework that uses locality levels of total New

[25]Section D uses decadally linked census data from the IPUMS Multigenerational Longitudinal Panel (MLP) to study this possibility. This section links individuals across census waves in order to estimate artist mobility and occupation choice responsesto Federal One. I find that artist flows from non-Federal One cities to Federal One cities did *not* increase in response to Federal One.

Deal spending less New Deal arts spending as an instrument for Federal One spending.[26] I construct the New Deal expense arts leave-out instrument for each city i as

$$NDEXP\ LO_i = NDEXP_{c(i)} - \sum_{l \in \mathcal{L}} Expense\ FPNo1_{i,l}, \tag{2}$$

where "NDEXP" signifies "New Deal Expense", "LO" stands for "leave-out" and $c(i)$ refers county c containing city i (as the underlying data from Fishback, Haines, and Kantor (2007) are constructed on the county-level). Importantly, while Federal One represented an unprecedented instance of funding to the arts in the US, the program represented an insignificant portion—less than one percent—of overall New Deal spending.

The mechanism behind this instrument is two-fold. First, a body of historical work emphasizes the targeted rollout of New Deal funds to localities for the dual purposes of targeting relief and recovery and extending political patronage of the FDR Presidential Administration (Fishback, Kantor, and Wallis (2003)). The general flow of New Deal funding from the federal government to states within broader New Deal programming formed New Deal funding networks to localities in which benefiting from New Deal funds/activity for one program would increase the probability of benefiting from New Deal funds/activity for another unrelated program.

Second, many New Deal programs operated based on a funding-allocation process initiating at the federal government level, with funds moving between administrative bodies, eventually terminating with local demand for New Deal activity on the ground-level through applications and local interest. The role of local interest and programmatic activity increasing take-up of New Deal programming across the board further substantiates the New Deal network spending channel, where local recipiency of New Deal funds for one program would increase the probability of receiving additional New Deal funds for other programs—in this case in the form of employment of local artists through Federal Project Number One—unrelated to local artistic propensity that may influence selection into Federal One programmatic funding.

I use this New Deal expense arts leave-out variable as an instrument for Federal One

[26] I use total New Deal spending variables by county as compiled by and used in Fishback, Haines, and Kantor (2007).

activity for each sub-program, estimating the first stage:

$$FPNo1_{i,l} = \beta_{0,l} + \pi_l \cdot \log(NDEXP\ LO_i) + \Gamma_l X_{i,l} + \varepsilon_{i,l}. \tag{3}$$

Table 5 displays results from the cross-sectional regressions of log total Federal One activity by sub-project on the log New Deal expense leave-out instrument. In all cases, the predictive power of the instrument is considerable on both intensive and extensive margins, and the instrument adheres to a monotonicity assumption.

5.3.2 Exclusion restriction validation

The validity of the New Deal arts leave-out spending instrument for studying the impacts of Federal One sub-project activity on the growth of local artist population share is also contingent on the exclusion restriction that total New Deal non-arts spending does not impact local arts scenes. While Federal One spending represents the overwhelming majority of ostensibly arts-related activity on part of New Deal programming, the threat remains that New Deal spending program outside the realm of the arts had impacts on urban environments that in turn affect the agglomerative behaviors of artists within cities. For instance, the case of non-arts related spending inducing significant populations in cities, and these population increases resulting in a greater than one-to-one increase in artist population (i.e. a one percent-increase in city population inducing a greater than one-percentage point increase in artist population share) would constitute an exclusion restriction violation.

Table 6 investigates the relationship between the New Deal arts leave-out spending instrument and population levels as well as income and occupational demographic characteristics of cities in the post-New Deal era, estimating regressions of the form:

$$\tilde{y}_{i,t} = \alpha_i + \sum_{k=1900}^{2010} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=1900}^{2010} \gamma_k \cdot \log NDEXP\ LO_i \cdot 1\{Year_t = k\} + \varepsilon_{i,t}.$$

Socioeconomic and demographic characteristics such as city racial composition, income/wages, education, and literacy are not available prior to 1940 in US Census data. For this reason, I employ more widely available, retroactively constructed indices of socioeconomic status based

on occupation, termed "Occupational Standing" variables by the US Census Bureau.[27] The most widely known of these indices is *OccScore* which measures income based on 1950s national levels of income by occupation. The other indices include occupation-based scores of socioeconomic status, and prestige, earnings and education levels.[28][29][30] The results of Table 6, demonstrate that the earnings composition of cities did not change in response to the instrument. I conclude that the instrument poses no threat of violating the exclusion restriction through any effect affecting on either population, earnings, or educational demographics.

Under a parallel trends assumption, coefficients $\{\hat{\beta}_j^{iv}\}$ estimate the Treatment Effect of Federal One on the Treated (TOT). In the case that the instrumented treatment is uncorrelated with potential outcomes (or if treatment effects are homogeneous), The TOT estimates coincide with the Average Treatment Effect (ATE). Importantly, the New Deal arts leave-out spending instrument also demonstrates little correlation with pre-existing artist populations. Table 7 displays a series of cross-sectional regressions of cities' 1930's artist shares on the New Deal arts leave-out instrument. Nearly all of the twelve artist occupations exhibit insignificant correlation between their pre-period population shares and the instrument, alleviating the concern of potential selection on potential outcomes through pre-event artist population shares. For this reason, I argue that $\{\hat{\beta}_j^{iv}\}$ represents the ATE of Federal One.

5.4 IV results

I proceed to estimate the instrumental variables difference-in-differences design, generating estimates of the causal impacts of arts funding on local artist professional shares. Figure 2 Panels (a)-(d) display the difference-in-difference estimates of the decadal causal impacts on local artist shares of Federal One sub-program activity (as a binary indicator in

[27] See the IPUMS chapter on occupational standardization for a detailed discussion of the construction and use of these variables.

[28] Specifically, each profession in the 1950 Census was assigned a respective level of prestige, earnings, literacy, etc. in a geography-time invariant manner (e.g. an engineer in New York in 1960 has the same prestige designation as an engineer in Las Vegas in 1990). In my setting, a city's score in time t refers to the mean (or median when indicated) score within that city at time t.

[29] Alternate constructions of these indices exist using the 1990 US Census.

[30] For example, the *Education Score* of a given profession consists of the percentage of each person in a said occupation in 1950 with at least one year of college education; *Prestige Score* uses averages of subjective valuations of different professions via survey.

the graphs) of their respective field.[31] Importantly, the design using the instrumented New Deal spending leave-out demonstrates parallel pre-event trends.

The results depict large short-run impacts of public arts investment through Federal One programming on local artistic shares, with variation across fields in the persistence of these effects over the following decades. Table 8 Panels (a) and (b) summarize the reduced form results from the IV difference-in-differences design with city-level fixed effects, aggregating longer-run impacts into a single bin. The table also includes the reduced form estimates that regress outcomes directly on the instrument.[32][33]

Among the different artistic disciplines included in the set of dependent variables, writers and visual artists exhibit the largest, most persistent responses to arts funding via their respective Federal One sub-programs. Relative to their pre-period baseline in treated cities, the Federal Writer's project induced an increase within treated cities of nearly 7 authors and 70 publishing industry workers per ten thousand residents. Importantly, the impacts for authors has persisted to the present-day, increasing by 13 authors per 10,000 people. The impact for publishing industry workers has also endured to the present day, albeit attenuating to an increase of 34 workers per 10,000 people. Put most decisively, funding to authors generated lasting "cultural hotspots" of writers.

Visual artist shares also saw substantial increases in response to Federal Art Project Activity. All visual arts professions increasing substantially in the immediate post-period. Population shares of photographers and designers exhibited increases on the order of 8 and 9 artists per 10,000 residents within Federal Art Project-treated cities. Visual artists/art teachers and painter population shares increased by 17 and 11 professionals per 10,000 (with the estimate for painters only achieving statistical significance by 1950). These impacts largely lasted at least two decades. However, the impacts for these professions except for designers dissipated after two decades starting in 1960. Today, Federal Art Project cities see about 30 designers per 10,000 residents.

The Federal Music Project induced large increases in music professionals share of the

[31] Figure A.2 Panels (a)-(c) present these results for all observable artistic occupation categories.

[32] Figure B.11 Panels (a)-(c) display the estimates only for years 1900-1950 for increased visibility.

[33] For robustenss, Table B.3 estimates an analogous set of Correlated Random Effects models, finding nearly identical results.

population of its respective cities. The program caused a short run increase in musicians as a share of the population by 5 musicians per 10,000 residents (a 30% increase from baseline). The response of piano tuners substantiates this response, increasing mildly in 1940 and more significantly in 1950. However, the impacts on musicians dissipate starting 1950.

Lastly, the impacts on theater/film related industries are more mixed. The Federal Theater Project activity induced steady and sustained positive impacts on the share of theater and film industry workers in treated cities, but the programs effects are not immediately significant on a 5% level. However, the coefficients gradually increase toward a longer-run increase upward of 50 additional theater industry workers per 10,000 individuals. The impacts on dancers are strongly positive and significant in the short-run, increasing by around 2 dancers per 10,000 individuals, but falling back to pre-period levels 1990. The estimated impact is insignificant and ostensibly negative for actors, whose shares among treated cities saw positive pre-reform trends followed by a weak decline in the post-period, although actor shares are missing an additional decade due to absence from the 1970 US Census occupation question to respondees. We can rationalize this more puzzling ostensible decrease in actors based on historical accounts of Federal One, which discuss the presence of substantial conflict between Federal One administrators and local actors and theater unions (McDonald (1968); Flanagan (1940)). These sources make the point that crowd-out and union conflict may have mitigated potentially positive effects of theater activity. Additionally, the House Committee on Un-American Activities targeted theater professionals—particularly those involved in the Federal Theater Project—in light accusations from that the sub-project promoted "communist ideals" and politically "subversive artists" (Ibid.). This force likely further contributed to the stifling of theater activity in Federal Theater Project cities.

On a high level, these results demonstrate that Federal One demonstrated a strong positive impact on the share of individuals identifying with artistic professions in the short-run. Most notably, the results of this estimation procedure imply that the advent of artistic movements such as the Beat Generation in San Francisco and Abstract Expressionism in New York were at least in part caused by Federal One funding. Interestingly, while some of these increases did not endure beyond a single decade, several fields of artistic production demonstrated lasting impacts, very much akin to a "big-push" response in the context of

the program's unsustained funding shock to artistic activity.

5.5 Variance decompositions: A horse race of history versus policy

The IV results in the previous section demonstrate significant, causal impacts of the various artistic Federal One sub-projects on the labor market share of their respective fields of art with varying degrees of persistence over time. This section asks: to what extent can we attribute the subsequent evolution of cities' artistic environments to historic New Deal arts policies?

To evaluate the relative roles of Federal One versus path dependence on incumbent arts scenes in determining urban arts environments, I perform a series of decadal variance decompositions of local artist profession shares between the exogenous component of Federal One activity and artist population shares in 1900 for each respective field of art. I estimate repeated cross-sectional regressions of the form:

$$y_{i,l,\bar{t}} = \beta_1 y_{i,l,1900} + \beta_2 \widehat{FPNo1}_{i,l} + \varepsilon_{i,l,\bar{t}}, \tag{4}$$

for decades $\bar{t}$ from 1910 to 2010 (excluding 1970, which lacks city-denominated census data), city i, and field-of-art l. Here, $\widehat{FPNo1}_{i,l}$ refers to the projection of the respective Federal One activity binary indicator on the log New Deal expense leave-out instrument. This design estimates the share of variation *across* cities in artistic profession shares attributable to initial artistic profession shares in 1900 and Federal One treatment.[34]

Figure 3 Panels (a)-(d) display the resulting variance shares over time. The results from the variance decompositions demonstrate some contrast with the IV difference-in-differences results.[35] Namely, in the post-1940 era, both initial profession levels and Federal One treatment alone explain a relatively small portion of the variation across cities of artistic profession shares—nearly entirely under 20% combined for any given year. For most of the professions, the effect of 1900 artist levels gradually diminishes over time, as expected; however, Fed-

[34]These regressions follow from a simplification of the framework in Allen and Donaldson (2020) to decompose population growth within and across cities between initial populations (and resulting persistence/path dependence), evolution of productivity by geography, and evolution of trade access and migration.

[35]Figure A.3 Panels (a)-(c) present these results for all observable artistic occupation categories.

eral One demonstrates greater temporal persistence as an explanatory component of artist profession shares.

For writers, the field with the largest and most significant recorded causal impact for its respective Federal One subfield, Federal Writer's Project activity tends to account for between 5% and 10% of variation across cities in any given decade after 1940, with even smaller explanatory power for writing and publishing industry shares. However, for both of these cases, 1900 levels of authors and writing/publishing industry workers demonstrates consistently greater predictive power of subsequent variation in their respective fields than does Federal Writer's Project activity.

Federal One activity demonstrates stronger explanatory power for other fields. For visual artists other than painters, Federal Arts Project activity funding strongly dominates initial levels in explaining the evolution and variation of artistic professionals in the visual arts and designer across cities, generally outperforming the variation explained by 1900 levels. This tendency is even stronger for film/theater industry professionals, where the exogenous component of the binary Federal Theater Project activity indicator both accounts for far greater variation in theater and theater-adjacent profession shares than their respective initial levels and increases considerably over time in explanatory power.

The explanatory role of Federal Music Project activity in determining the subsequent variation of musician shares across cities is more mild. In the initial post periods, the overall explanatory power of the Federal Music Project appears negligible, in spite of the significant, short-run causal impact of the Federal Music Project on local musician shares. However, this effect does grow more pronounced relative to that of 1900 musician shares starting 1960.

In the present day, Federal One activity accounts for modest, but non-negligible proportion of the cross-city variation in artistic profession shares. The exogenous component of historic New Deal funding to the arts explains between 5-15% of the post-1940 variation across cities in terms of their artistic profession shares, with theater/film industry workers, designers, and photographers exhibiting greater explanatory dependence on Federal One activity. I.e., for these industries, Federal One funding contributes modestly in explaining which locations across the US are *cultural hotspots*.

6 Discussion and conclusion

This work has produced the first causal long-run estimates of the impact of large-scale public arts investment on the growth of artistic professions over time. In doing so, I have also constructed a novel dataset on Federal Project Number One arts spending across localities. I document large impacts of historical New Deal funding to the arts through Federal Project Number One on the artist population shares of beneficiary cities, with the increases to the population shares several fields of art—typically several fold relative to their respective pre-period baselines. I find that the impacts on several artistic subfields enduring to the present-day.

I find the largest and most temporally persistent impacts of arts funding (within its respective fields) on authors, certain disciplines of visual arts (namely photographers and designers), and theater/film industry professionals. Federal One caused present-day increases in artistic population shares by between 10-30 professionals per 10,000 people depending on the specific discipline. The results of these estimates imply potentially large returns over time of public arts spending in terms of fostering local arts scenes. My results imply that the popular artistic movements such as the Beat Generation in San Francisco and Abstract Expressionism in New York were at least in part caused by Federal One funding. I determine that historical government spending to the arts through the New Deal evidently has influenced the present-day location of such cultural hotspots.

The subsequent variance decompositions demonstrate the explanatory power of this early New Deal funding in determining the variation in artistic professionals across cities in the following decades, and how Federal One's variance account compares to that of 1900 levels of each respective field of art. This horse race of history versus policy illustrates that overall, both components together only explain a relatively small portion of total variance in artistic professionals across cities—typically less than 20% in a given decade. However, for many of the professions, namely those within the visual and theater-performing arts, Federal One sub-program activity proves more important in accounting for the variation in artistic profession shares than do the 1900-levels of each respective field. In the present day, historic New Deal spending on the arts explains between 5- and 10% of variation across *and* cities, and upward

of 15- and 20% for designers and theater/film industry workers.

While the variance decompositions suggest only modest explanatory power of Federal One over the subsequent location of cultural hotspots in the US, this program cost only USD 4 billion (present-day)—less than one-tenth of one percent of annual federal government spending.

Overall, these results suggest that the arts are highly agglomerative industries. However, the substantial variation in the magnitude and temporal persistence of results across fields may reflect different premiums and propensities toward spatial clustering and path-dependence over time.[36] This possibility is evidenced by the large short-and long-run impacts of funding to writers on the share of authors versus the relatively smaller effect on musician shares that did not persist beyond a single decade. It may be the case that the differences in impacts and temporal persistence of these fields reflect differences in start-up costs (i.e. human capital requirements) to occupational participation or in agglomerative propensities/benefits to clustering.

This work informs the discussion surrounding public funding to the arts by providing large, positive, and temporally persistent causal estimates of the impacts of a large unsustained shock to public arts programming on local arts scenes as measured by local labor market concentration of artistic professionals. The results here in combination with other works studying the relationship between urban growth and amenity accumulation (e.g. Diamond (2016)) suggests the potential presence of lasting, positive spillovers to other urban outcomes from extending funding to the arts. Ultimately, the work here substantiates a policy lever through which governments (and non-government actors) can seek to influence this process. Evidently, governments can influence and have influenced the locations of cultural hotspots, even into the long-run.

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7 Main figures and tables

Table 1: FPNo1 data consistency: city-level versus state-level employment aggregations

	FAP		FMP		FTP		FWP		HRS
	City	State	City	State	City	State	City	State	State
Employment	3360	4330	10917	11626	11702	9779	1647	3709	4228
Ratio of state to city sources	1.29		1.06		0.84		2.25		N/A
Expense (M. USD 1935)	18.74	18.90	51.06	46.80	78.15	59.30	9.25	12.7	12.75
Ratio of state to city sources	1.01		0.92		0.76		1.37		N/A

This table compares employment and imputed expense aggregations on the federal level by subprogram. Aggregations for the city- and state-levels are constructed from independent archival budget and activity tables.

Table 2: FPNo1 treatment comparison

	FAP	FMP	FTP	FWP
Number of "treated" cities	24	191	73	25
Avg. FPNo1 employment	140.0	53.96	158.9	65.89
Med. FPNo1 employment	39	25	37	36
Avg. FPNo1 employment share	0.152	0.321	3.228	1.898
Med. FPNo1 employment share	0.138	0.194	1.176	1.324
Avg. expense (1000s USD 1935)	780.9	267.0	1070	369.9
Med. expense (1000s USD 1935)	194.0	109.6	171.2	211.9
Avg. exp. per artist (USD 1935)	780.0	1454	4147	9885
Med. exp. per artist (USD 1935)	697.2	876.9	5196	6979
Total expense (M. USD 1935)	18.74	50.99	78.12	9.247

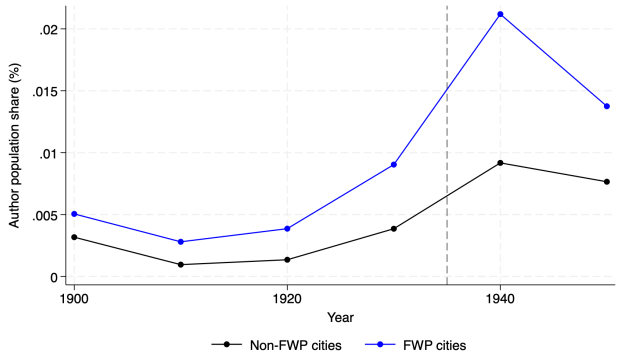
This table displays tabulations of program activity by city conditional on non-zero program activity. The "employment share" for a city-program is calculated as the number of artist professionals in field l in city i employed on part of Federal One divided by the number of individuals of artistic profession l in city i in 1930.

Table 3: Outcome variable city-comparison by any FPNo1 treatment status (1930)

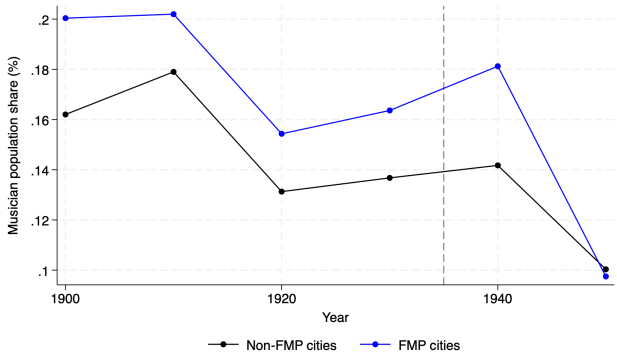
	FPNo1	Non-FPNo1	Total	Difference
Number of cities	210	692	902	
Avg. Pop.	191609	23884	62933	167725.4**
	(568466.9)	(21037.05)	(283425.6)	(39186.06)
Avg. Pop. (2000)	464578	151137	362528	313441.1**
	(980395.7)	(85451.22)	(818455.8)	(106138.5)
Artists per 10k	3.398	2.415	2.644	.983**
	(3.352)	(3.667)	(3.619)	(.27)
Musicians per 10k	16.25	13.63	14.24	2.62**
	(6.066)	(6.487)	(6.483)	(.485)
Actors per 10k	1.466	1.077	1.168	0.389
	(2.881)	(5.283)	(4.833)	(.282)
Writer per 10k	0.542	0.359	0.401	.183*
	(1.015)	(1.458)	(1.369)	(.089)
Avg. age	29.94	29.53	29.62	.413*
	(2.031)	(2.584)	(2.471)	(.171)
Female share	0.509	0.506	0.507	0.00300
	(.017)	(.022)	(.021)	(.001)
White share	0.908	0.926	0.922	-0.0180
	(.12)	(.118)	(.119)	(.009)
Black share	0.0890	0.0720	0.0760	0.0170
	(.121)	(.119)	(.119)	(.009)
English-speaking share	0.984	0.985	0.985	-0.00200
	(.024)	(.033)	(.031)	(.002)
Avg. Occ-score	8.680	8.385	8.454	.294**
	(.634)	(.782)	(.76)	(.053)
Avg. literacy share	0.967	0.966	0.966	0.00100
	(.024)	(.048)	(.043)	(.002)

This table illustrates various 1930 summary statistics of FPNo1-recipient and non-recipient cities and estimates the magnitude and significance of their differences using cross-sectional regressions of the form $y_{i,1930} = \beta_0 + \beta_1 \cdot FPNo1_i + \varepsilon_i$. The regression coefficients in the "Difference" column are estimated with heteroskedasticity-robust standard errors. A city is considered an FPNo1-recipient if it reports non-zero activity on part of *any* of the four Federal One sub-programs.
$*p < .05$, $**p < .01$

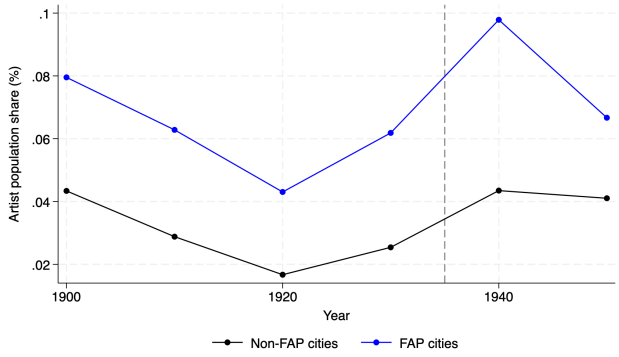
Figure 1: Mean artistic professionals population shares by Federal One program treatment



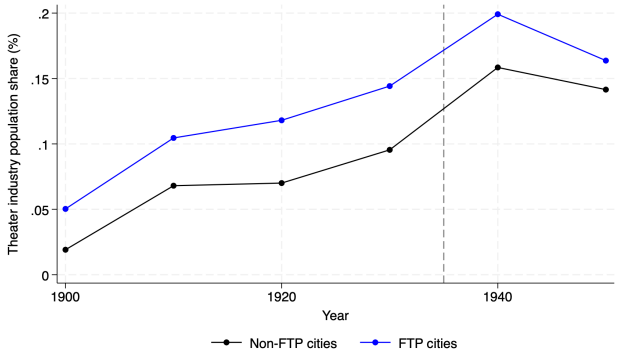
(a) Authors (FWP)



(b) Musicians (FMP)



(c) Visual artists (FAP)



(d) Theater/film ind. workers (FTP)

These figures plot the evolution in the mean artist population share of Federal One treated and untreated cities by subprogram. The vertical gray line at year 1935 indicates the timing of the program. These figures align authors with the Federal Writers Project (FWP), Musicians with the Federal Music Project (FMP), Visual artists and art teachers with the Federal Arts Project (FAP), and film/theater industry workers with the Federal Theater Project (FTP).

Table 4: OLS estimation:
Panel (a): writers and theater practitioners

	(1) Author	(2) Pub. industry	(3) Actor	(4) Theater and film ind.	(5) TV and radio ind.	(6) Dancer
FWP binary × Year 1940	0.0068**	0.035				
	(0.0034)	(0.021)				
FWP binary × Year 1950	0.00085	-0.021				
	(0.0014)	(0.032)				
FWP binary × Year 1960+	0.046***	-0.085*				
	(0.016)	(0.046)				
FTP binary × Year 1940			-0.0046**	-0.0080	0.0037***	0.0047***
			(0.0021)	(0.0069)	(0.0013)	(0.0012)
FTP binary × Year 1950			-0.0081**	-0.026***	-0.0039	0.0017**
			(0.0034)	(0.0069)	(0.0038)	(0.00075)
FTP binary × Year 1960+			-0.0066	0.0033	0.038*	0.0029
			(0.0043)	(0.031)	(0.020)	(0.0023)
Constant	0.0043***	0.45***	0.012***	0.10***	0.0041***	0.0050***
	(0.00076)	(0.0040)	(0.00074)	(0.0031)	(0.0015)	(0.00024)
Treatment mean 1930 (%)	0.009	0.720	0.024	0.144	0.007	0.008
City FEs	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.38	0.71	0.60	0.68	0.48	0.17
N	5245	5245	5119	5245	5245	5245
Number of clusters	907	907	907	907	907	907

Table 4: Panel (b): musicians and visual artists

	(1) Musician	(2) Piano tuner	(3) Artist	(4) Painter	(5) Photographer	(6) Designer
FMP binary × Year 1940	0.013***	0.00010				
	(0.0041)	(0.00042)				
FMP binary × Year 1950	-0.029***	0.00020				
	(0.0045)	(0.00067)				
FMP binary × Year 1960+	0.027	0.00077				
	(0.031)	(0.0020)				
FAP binary × Year 1940			0.018***	-0.0063	0.0082***	0.0061***
			(0.0034)	(0.0054)	(0.0021)	(0.0022)
FAP binary × Year 1950			-0.011***	-0.0082	0.0040**	0.0029
			(0.0029)	(0.0099)	(0.0016)	(0.0023)
FAP binary × Year 1960+			0.019	-0.027***	0.022**	0.10**
			(0.014)	(0.0097)	(0.011)	(0.043)
Constant	0.15***	0.0043***	0.027***	0.065***	0.025***	0.0077***
	(0.0024)	(0.00017)	(0.0011)	(0.0017)	(0.00071)	(0.0018)
Treatment mean 1930 (%)	0.164	0.004	0.062	0.078	0.031	0.014
City FEs	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.50	0.30	0.44	0.59	0.26	0.53
N	5245	4665	5245	5245	5245	5245
Number of clusters	907	907	907	907	907	907

City-clustered standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

This table displays the ordinary least squares difference-in-difference estimated impacts of binary measures of Federal One activity on various artistic occupation shares by city, using 1930 as the leave-out base-period. All of the specifications include fixed effects on the city-level.

Table 5: Instrumental variables first stage
Panel (a): First stage: FTP and FWP

	FTP			FWP		
	Log	Log 1+	Binary	Log	Log 1+	Binary
Log New Deal expense leave-out	0.93***	0.20***	0.044***	0.65***	0.11***	0.028***
	(0.18)	(0.043)	(0.010)	(0.18)	(0.021)	(0.0048)
Constant	-12.8***	-3.05***	-0.64***	-8.40**	-1.73***	-0.43***
	(3.25)	(0.68)	(0.17)	(3.29)	(0.33)	(0.075)
Observations	69	887	887	23	887	887
Adjusted R^2	0.452	0.068	0.049	0.426	0.061	0.056
F	25.9	21.7	17.5	13.6	28.2	32.7

Panel (b): FAP and FMP

	FAP			FMP		
	Log	Log 1+	Binary	Log	Log 1+	Binary
Log New Deal expense leave-out	1.16***	0.12***	0.027***	0.69***	0.28***	0.055***
	(0.25)	(0.024)	(0.0050)	(0.12)	(0.062)	(0.020)
Constant	-17.7***	-1.87***	-0.43***	-8.60***	-3.88***	-0.69**
	(4.69)	(0.37)	(0.078)	(2.01)	(0.97)	(0.31)
Observations	23	887	887	184	887	887
Adjusted R^2	0.682	0.064	0.055	0.340	0.071	0.033
F	21.7	25.3	29.8	30.9	19.9	7.79

State-clustered standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

Note: This table displays the first stage results of cross-sectional regressions of different parameterizations of Federal One employment by sub-program on the log New Deal spending arts-leave-out instrument.

Table 6: IV exclusion restriction validation:
Population and median socioeconomic in confounders

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Log pop.	OccScore	Occ. SES index	Occ. prestige	Earnings score	Education score	Nam-Powers-Boyd score
Log NDEXP. LO. × Year 1940	-0.0094***	-0.016	-0.13	-0.084	-0.11	-0.036	-0.18
	(0.0034)	(0.019)	(0.12)	(0.054)	(0.12)	(0.044)	(0.12)
Log NDEXP. LO. × Year 1950	-0.025***	0.0048		-0.088	0.040	-0.036	-0.030
	(0.0083)	(0.033)		(0.075)	(0.17)	(0.071)	(0.15)
Log NDEXP. LO. × Year 1960+	-0.37***	-0.20**	-1.85***	-0.47**	-0.59	-1.26*	-0.44
	(0.060)	(0.085)	(0.51)	(0.23)	(0.43)	(0.76)	(0.42)
Year 1940	0.22***	0.40	2.00	1.39	1.67	1.14	4.26**
	(0.055)	(0.31)	(2.05)	(0.89)	(1.94)	(0.71)	(1.98)
Year 1950	0.63***	0.56		2.85**	3.20	2.68**	4.93*
	(0.14)	(0.55)		(1.24)	(2.78)	(1.16)	(2.54)
Year 1960+	7.17***	4.37***	44.3***	11.4***	2.99	54.4***	2.27
	(1.03)	(1.46)	(8.76)	(3.87)	(7.32)	(12.9)	(7.14)
Constant	10.5***	23.5***	26.8***	32.7***	44.1***	6.66***	50.6***
	(0.011)	(0.026)	(0.17)	(0.057)	(0.13)	(0.12)	(0.12)
Observations	5118	5114	4248	5114	5114	5114	4554
Adjusted R^2	0.889	0.510	0.780	0.694	0.529	0.756	0.684

City-clustered errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Note This table displays results from the regressions of population and median-level socioeconomic occupational indices on the log New Deal expense arts leave-out instrument by city, using 1930 as the base-period. All of the specifications include fixed effects on the city-level. Note that the Duncan Socioeconomic index is not calculated for 1950 due to unavailability in the data.

Table 7: IV validation: Pre-period artistic shares predicted by the instrument
Panel (a): Theater and Writing

	(1)	(2)	(3)	(4)	(5)	(6)
	Theater ind.	Actor	Dancer	TV ind.	Author	Publishing ind.
Log New Deal exp. leave-out	1.12	0.58	0.045	0.069**	0.13	4.81**
	(0.98)	(0.35)	(0.032)	(0.029)	(0.099)	(2.09)
Constant	-8.45	-8.37	-0.28	-0.74*	-1.67	-36.2
	(15.4)	(5.50)	(0.48)	(0.44)	(1.54)	(32.4)
Observations	887	887	887	887	887	887
Adjusted R^2	0.020	0.026	0.009	0.014	0.015	0.050

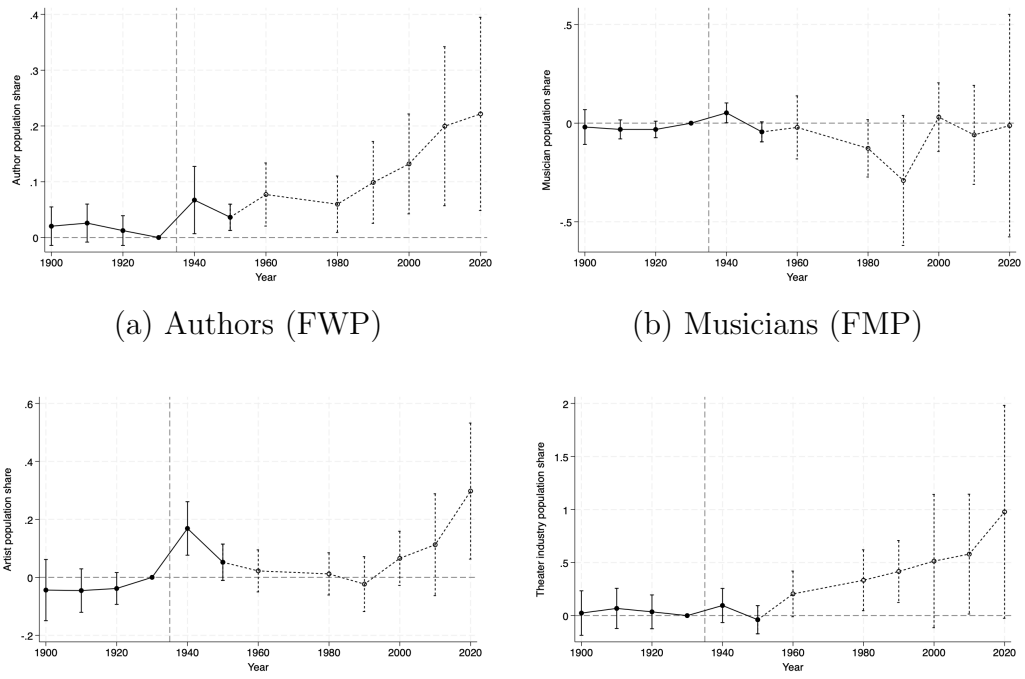
Panel (b): Visual arts and music

	(1)	(2)	(3)	(4)	(5)	(6)
	Artist	Painter	Photographer	Designer	Musician	Piano tuner
Log New Deal exp. leave-out	1.08***	0.083	-0.12	0.25***	0.26	-0.039**
	(0.27)	(0.31)	(0.085)	(0.049)	(0.48)	(0.019)
Constant	-15.2***	4.83	4.44***	-3.54***	9.89	1.07***
	(4.15)	(5.06)	(1.34)	(0.73)	(7.31)	(0.31)
Observations	887	887	887	887	887	887
Adjusted R^2	0.167	-0.001	0.011	0.092	0.002	0.010

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Note: This table displays the results of cross-sectional regressions of cities' 1930-levels of artist population shares on the log New Deal spending arts-leave-out instrument. Dependent variable units are expressed in artists per 10,000 inhabitants.

Figure 2: IV estimation results



(a) Authors (FWP)

(b) Musicians (FMP)

(c) Visual artists (FAP)

(d) Theater/film ind. workers (FTP)

These graphs display the instrumental variables difference-in-differences coefficients $\{\beta_{dd,k}\}$ from a two-stage least squares regression, where the first stage regresses an indicator for local Federal One subprogram recipiency on a local New Deal arts spending leave-out instrument, and the second stage regresses local artist shares on the fitted first stage. Each specification separately aligns (a) authors with the Federal Writers Project (FWP), (b) musicians with the Federal Music Project (FMP), (c) visual artists and art teachers with the Federal Arts Project (FAP), and (d) film/theater industry workers with the Federal Theater Project (FTP). The decadal difference-in-difference coefficients are estimated relative to 1930. The error bars of each plot display 95% confidence intervals around their respective point estimates using standard errors clustered on the city-level. Results for piano tuners stop at 1950, as OCC1950 ceases recording this occupational outcome.

Table 8: IV estimation results:
Panel (a): Writers and theater practitioners

	(1) Author	(2) Pub. industry	(3) Actor	(4) Theater and film ind.	(5) TV and radio ind.	(6) Dancer
FWP binary × Year 1940	0.067**	0.71***				
	(0.031)	(0.23)				
FWP binary × Year 1950	0.036***	0.72***				
	(0.012)	(0.26)				
FWP binary × Year 1960+	0.13***	0.34**				
	(0.041)	(0.15)				
FTP binary × Year 1940			-0.022	0.095	-0.0085	0.020***
			(0.014)	(0.082)	(0.0097)	(0.0066)
FTP binary × Year 1950			-0.047**	-0.038	-0.13***	0.018***
			(0.019)	(0.068)	(0.037)	(0.0060)
FTP binary × Year 1960+			-0.00043	0.50**	0.072	0.0078
			(0.030)	(0.23)	(0.078)	(0.0066)
Treatment mean 1930 (%)	0.009	0.720	0.024	0.144	0.007	0.008
City FEs	Yes	Yes	Yes	Yes	Yes	Yes
N	5118	5118	4997	5118	5118	5118
Number of clusters	887	887	887	887	887	887
Reduced forms						
Log NDEXP. LO. × Year 1940	0.0019**	0.020***	-0.00095	0.0042	-0.00037	0.00089***
	(0.00076)	(0.0044)	(0.00061)	(0.0035)	(0.00042)	(0.00028)
Log NDEXP. LO. × Year 1950	0.0010***	0.020***	-0.0021**	-0.0018	-0.0059***	0.00082***
	(0.00025)	(0.0055)	(0.00084)	(0.0030)	(0.0014)	(0.00023)
Log NDEXP. LO. × Year 1960+	0.017***	0.027**	0.0025	0.076***	0.015	0.00027
	(0.0049)	(0.013)	(0.0035)	(0.025)	(0.011)	(0.00086)

Panel (b): Musicians and visual artists

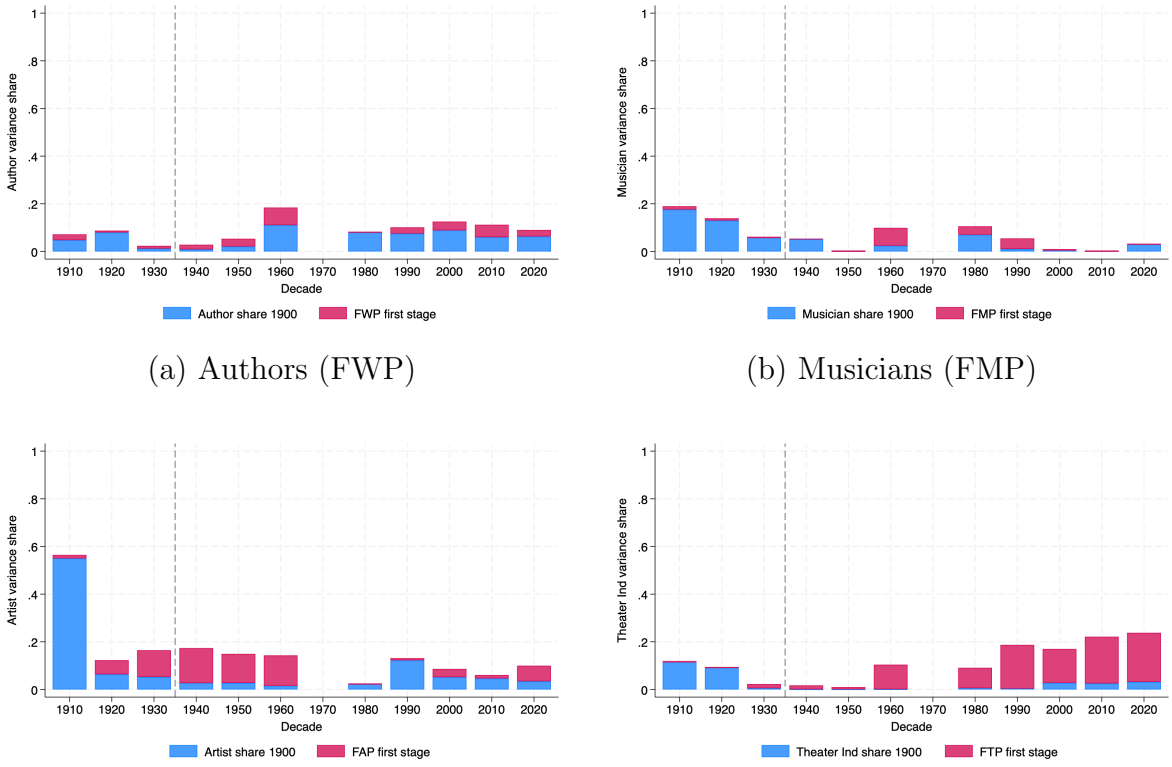
	(1) Musician	(2) Piano tuner	(3) Artist	(4) Painter	(5) Photographer	(6) Designer
FMP binary × Year 1940	0.052**	0.0049				
	(0.026)	(0.0030)				
FMP binary × Year 1950	-0.044*	0.018***				
	(0.026)	(0.0057)				
FMP binary × Year 1960+	-0.083					
	(0.090)					
FAP binary × Year 1940			0.17***	0.11	0.076***	0.093***
			(0.047)	(0.083)	(0.026)	(0.024)
FAP binary × Year 1950			0.052	0.23**	0.070***	0.17***
			(0.032)	(0.10)	(0.022)	(0.043)
FWP binary × Year 1960+			0.070	-0.044	0.076**	0.31***
			(0.048)	(0.048)	(0.034)	(0.099)
Treatment mean 1930 (%)	0.164	0.004	0.062	0.078	0.031	0.014
City FEs	Yes	Yes	Yes	Yes	Yes	Yes
N	5118	4563	5118	5118	5118	5118
Number of clusters	887	887	887	887	887	887
Reduced forms						
Log NDEXP. LO. × Year 1940	0.0028**	0.00027*	0.0046***	0.0031	0.0021***	0.0025***
	(0.0013)	(0.00016)	(0.00087)	(0.0022)	(0.00055)	(0.00041)
Log NDEXP. LO. × Year 1950	-0.0026*	0.0011***	0.0015*	0.0065**	0.0020***	0.0048***
	(0.0015)	(0.00028)	(0.00081)	(0.0025)	(0.00043)	(0.00048)
Log NDEXP. LO. × Year 1960+	-0.011	-0.0013	0.0085	-0.014***	0.0092**	0.038***
	(0.012)	(0.00090)	(0.0053)	(0.0035)	(0.0039)	(0.011)

City-clustered standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

This table displays the results of the instrumental variables difference-in-differences strategy for estimating the causal impacts of binary measures of Federal One activity on various artistic occupation shares by city, using 1930 as the leave-out base-period. All of the specifications include fixed effects on the city-level.

Figure 3: Cross-city variance decomposition: Federal One versus 1900 artists
Visual artists



(a) Authors (FWP)

(b) Musicians (FMP)

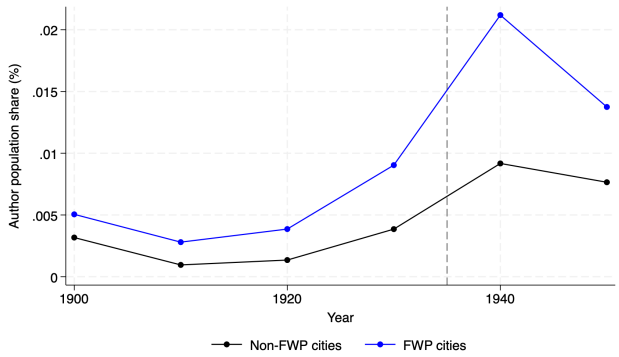
(c) Visual artists (FAP)

(d) Theater/film ind. workers (FTP)

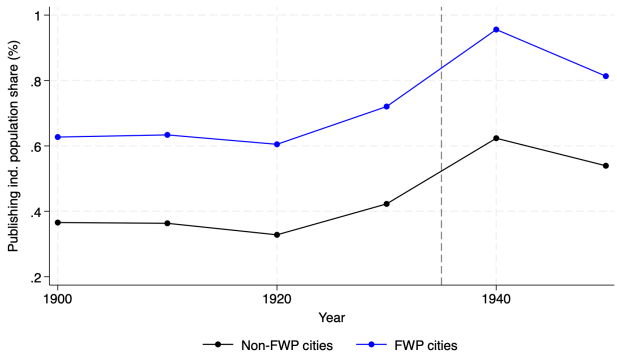
These figures display the repeated cross-sectional variance decomposition over decades of contemporaneous artist shares between the exogenous component of their Federal One activity and their respective 1900 population shares. The height of each individual bar in the above graphs corresponds with the R^2 value from a regression: $y_{i,l,\bar{t}} = \beta_1 y_{i,l,1900} + \beta_2 \widehat{FPNo1}_{i,l} + \varepsilon_{i,l,\bar{t}}$ for fixed time $\bar{t}$, outcome and program pair l, $y \in \mathcal{A}_l$, city i's artist population share in 1900 for outcome y, and exogenous component of Federal One activity (the projection of a binary indicator for city i's recipiency of Federal One subprogram l on the New Deal arts leave-out expense instrument). Each specification separately aligns (a) authors with the Federal Writers Project (FWP), (b) musicians with the Federal Music Project (FMP), (c) visual artists and art teachers with the Federal Arts Project (FAP), and (d) film/theater industry workers with the Federal Theater Project (FTP). The decomposition is absent for 1970 due to unavailability of city-denominated US Census data.

Appendix A Main graphical results for all artistic occupation categories

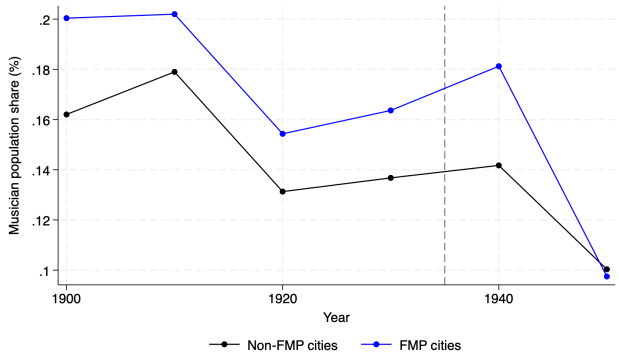
Figure A.1: Mean artistic professionals population shares by Federal One program treatment
Panel (a): Writing and music professions



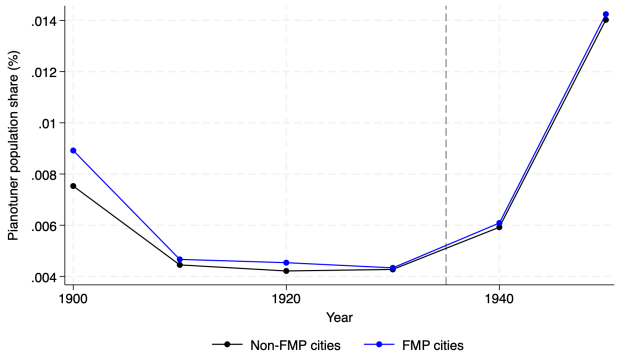
(a) Authors



(b) Publishing industry workers



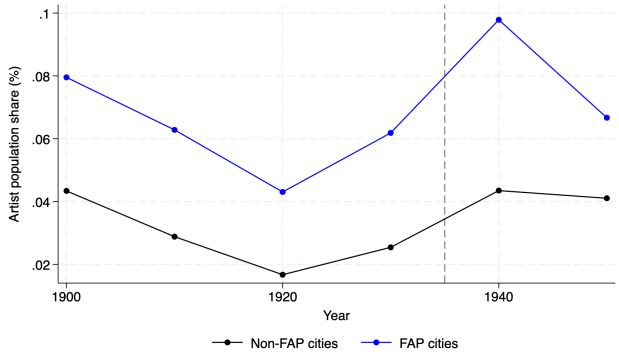
(c) Musicians



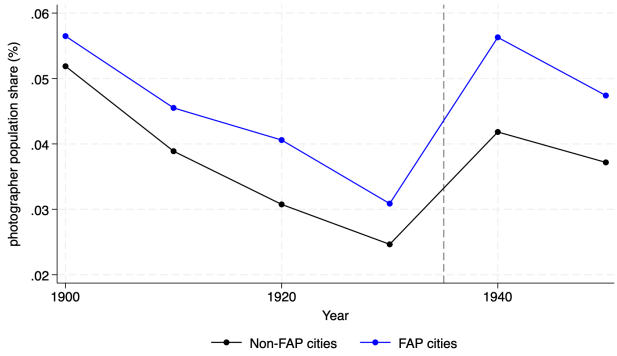
(d) Piano tuners

These figures plot the evolution in the mean artist population share of Federal One treated and untreated cities by subprogram. The vertical gray line at year 1935 indicates the timing of the program. These figures plot authors and publishing industry workers with the Federal Writers Project (FWP) and Musicians and Piano Tuners with the Federal Music Project (FMP).

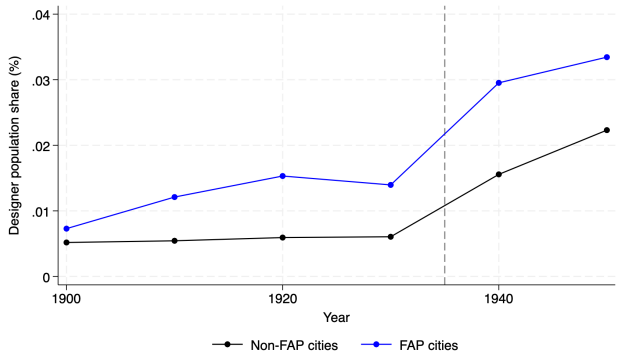
Figure A.1: Mean artistic professionals population shares by Federal One program treatment
Panel (b): Visual artistic professionals



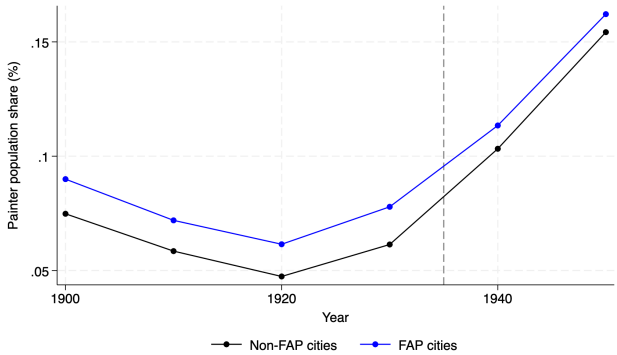
(a) Visual artists



(b) Photographers



(c) Designers

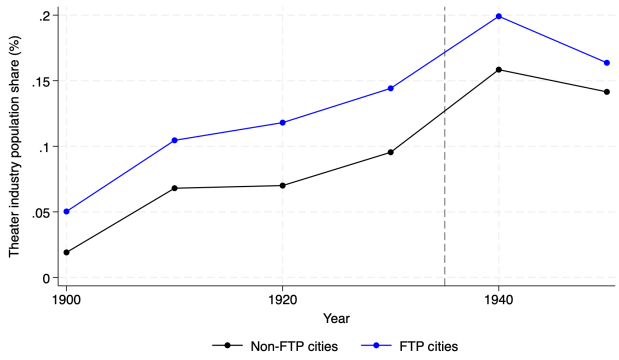


(d) Painters

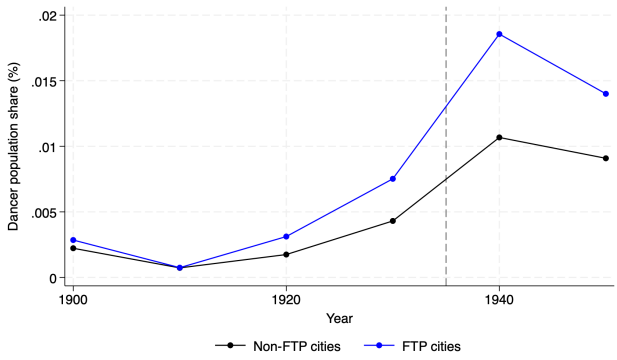
These figures plot the evolution in the mean artist population share of Federal One treated and untreated cities by subprogram. The vertical gray line at year 1935 indicates the timing of the program. These figures plot the evolution of various fields of visual arts based on participation in the the Federal Arts Project (FAP).

Figure A.1: Mean artistic professionals population shares by Federal One program treatment

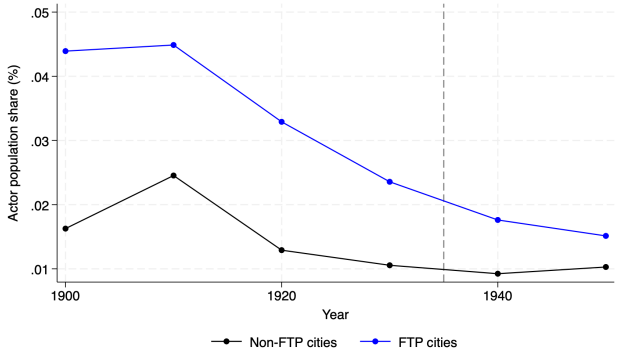
Panel (c): Theater and film professionals



(a) Theater/film industry



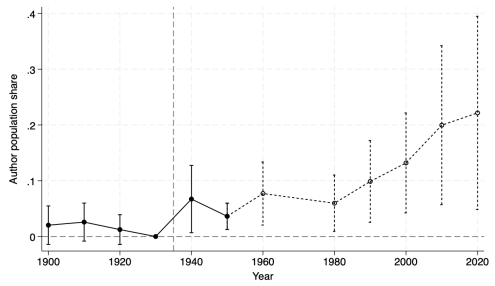
(b) Dancers



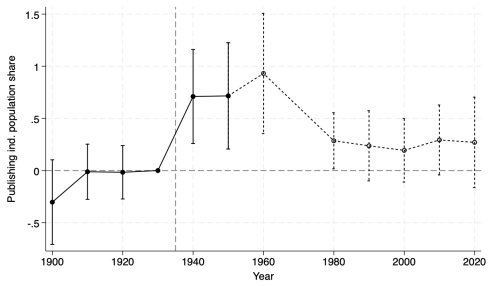
(c) Actors

These figures plot the evolution in the mean artist population share of Federal One treated and untreated cities by subprogram. The vertical gray line at year 1935 indicates the timing of the program. These figures plot the evolution of various fields of film and theater based on participation in the the Federal Theater Project (FAP).

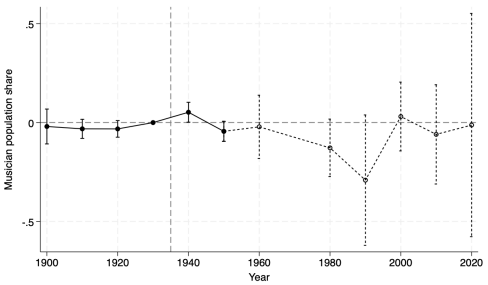
Figure A.2: IV estimation results
Panel (a): Writing and music professions



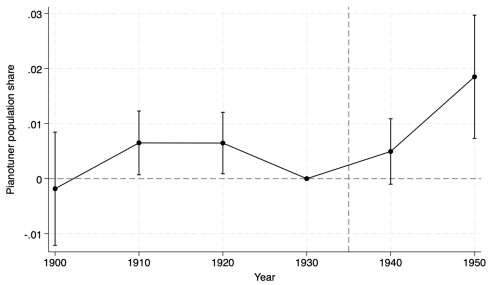
(a) Authors



(b) Publishing industry workers



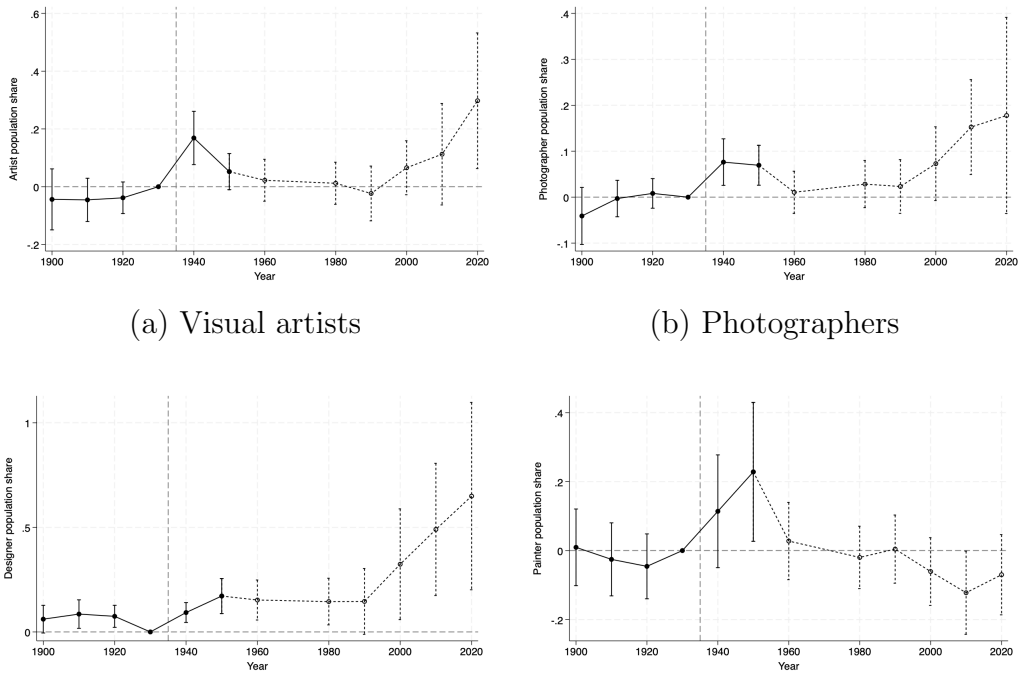
(c) Musicians



(d) Piano tuners

These graphs display the instrumental variables difference-in-differences coefficients $\{\beta_{dd,k}\}$ from a two-stage least squares regression, where the first stage regresses an indicator for local Federal One subprogram recipiency on a local New Deal arts spending leave-out instrument, and the second stage regresses local artist shares on the fitted first stage. The decadal difference-in-difference coefficients are estimated relative to 1930. The error bars of each plot display 95% confidence intervals around their respective point estimates using standard errors clustered on the city-level. Results for piano tuners stop at 1950, as OCC1950 ceases recording this occupational outcome.

Figure A.2: IV estimation results
Panel (b): Visual artistic professionals

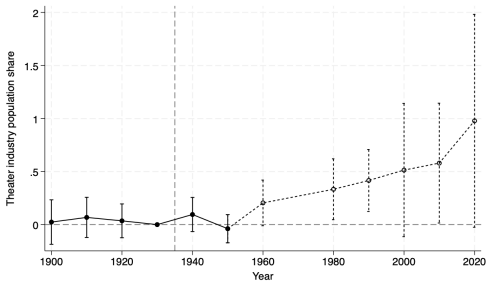


(a) Visual artists (b) Photographers

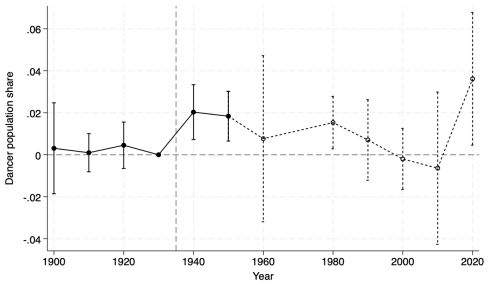
(c) Designers (d) Painters

These graphs display the instrumental variables difference-in-differences coefficients $\{\beta_{dd,k}\}$ from a two-stage least squares regression, where the first stage regresses an indicator for local Federal One subprogram recipiency on a local New Deal arts spending leave-out instrument, and the second stage regresses local artist shares on the fitted first stage. The decadal difference-in-difference coefficients are estimated relative to 1930.

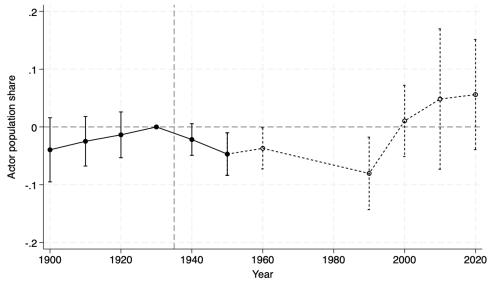
Figure A.2: IV estimation results
Panel (c): Theater and film professionals



(a) Theater/film industry



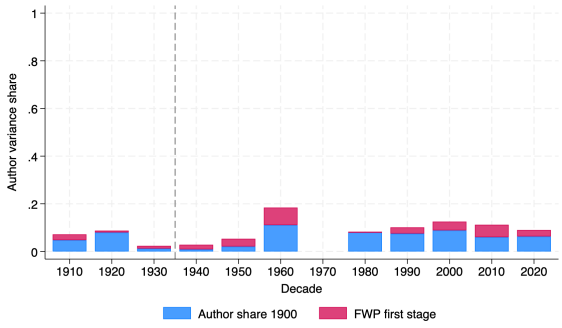
(b) Dancers



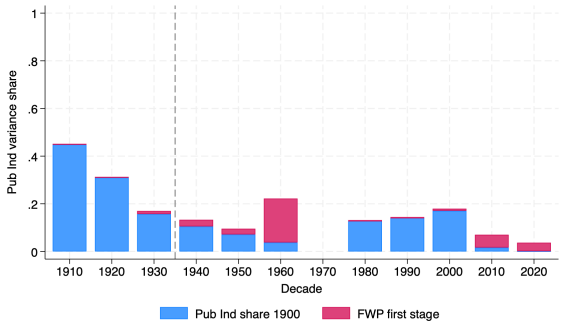
(c) Actors

These graphs display the instrumental variables difference-in-differences coefficients $\{\beta_{dd,k}\}$ from a two-stage least squares regression, where the first stage regresses an indicator for local Federal One subprogram recipiency on a local New Deal arts spending leave-out instrument, and the second stage regresses local artist shares on the fitted first stage. The decadal difference-in-difference coefficients are estimated relative to 1930. The error bars of each plot display 95% confidence intervals around their respective point estimates using standard errors clustered on the city-level.

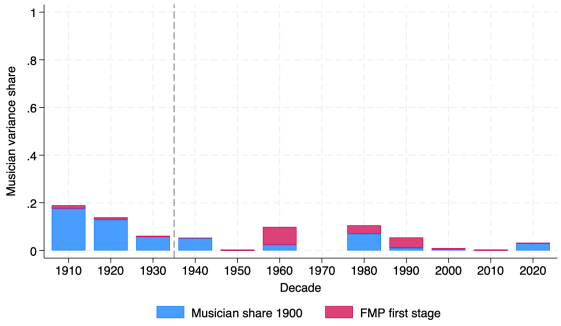
Figure A.3: Panel (a):
Cross-city variance decomposition: Federal One versus 1900 artists
Writers and musicians



(a) Authors



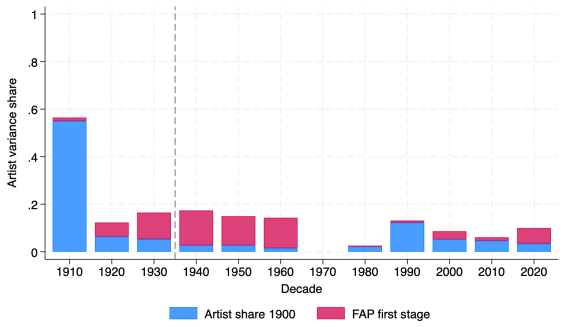
(b) Publishing industry workers



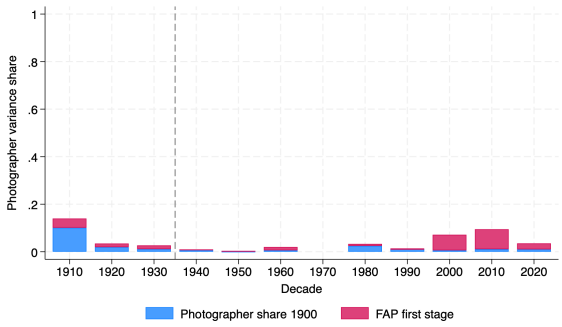
(c) Musicians

These figures display the repeated cross-sectional variance decomposition over decades of contemporaneous artist shares between the exogenous component of their Federal One activity and their respective 1900 population shares. The height of each individual bar in the above graphs corresponds with the R^2 value from a regression: $y_{i,l,\bar{t}} = \beta_1 y_{i,l,1900} + \beta_2 \widehat{FPNo1}_{i,l} + \varepsilon_{i,l,\bar{t}}$ for fixed time $\bar{t}$, outcome and program pair l, $y \in \mathcal{A}_l$, city i's artist population share in 1900 for outcome y, and exogenous component of Federal One activity (the projection of a binary indicator for city i's recipiency of Federal One subprogram l on the New Deal arts leave-out expense instrument). The decomposition is absent for 1970 due to unavailability of city-denominated US Census data.

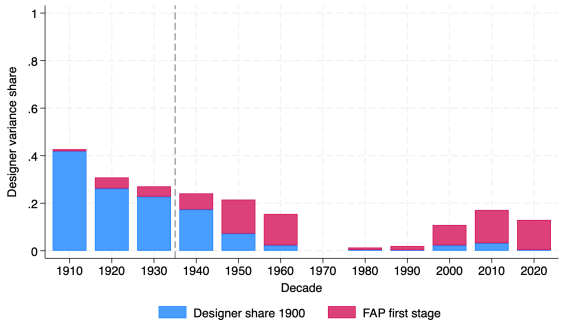
Figure A.3: Panel (b):
Cross-city variance decomposition: Federal One versus 1900 artists
Visual artists



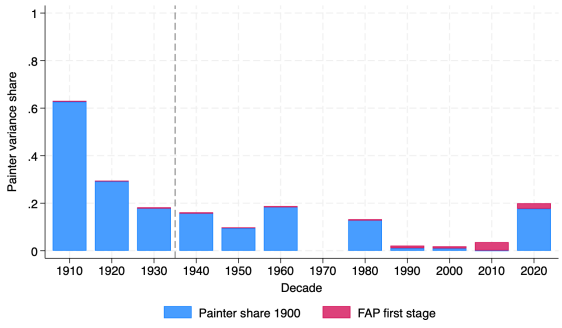
(a) Artists and art teachers



(b) Photographers



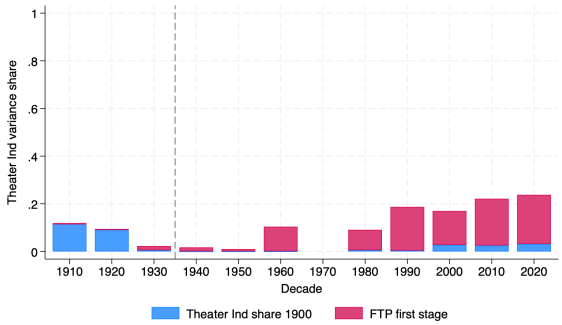
(c) Designers



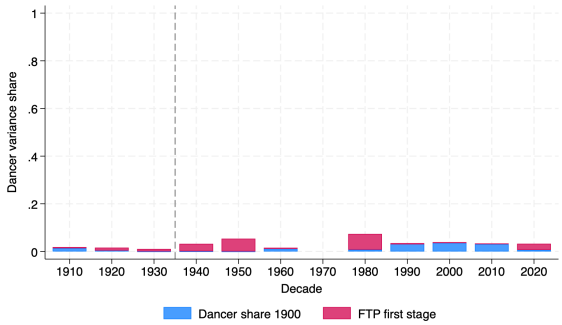
(d) Painters

These figures display the repeated cross-sectional variance decomposition over decades of contemporaneous artist shares between the exogenous component of their Federal One activity and their respective 1900 population shares. The height of each individual bar in the above graphs corresponds with the R^2 value from a regression: $y_{i,l,\bar{t}} = \beta_1 y_{i,l,1900} + \beta_2 \widehat{FPNo1}_{i,l} + \varepsilon_{i,l,\bar{t}}$ for fixed time $\bar{t}$, outcome and program pair l, $y \in \mathcal{A}_l$, city i's artist population share in 1900 for outcome y, and exogenous component of Federal One activity (the projection of a binary indicator for city i's recipiency of Federal One subprogram l on the New Deal arts leave-out expense instrument). The decomposition is absent for 1970 due to unavailability of city-denominated US Census data.

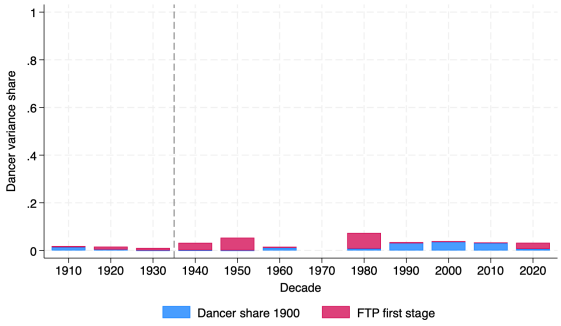
Figure A.3: Panel (c):
Cross-city variance decomposition: Federal One versus 1900 artists
Theater and film



(a) Theater and film industry workers



(b) Dancers



(c) Actors

These figures display the repeated cross-sectional variance decomposition over decades of contemporaneous artist shares between the exogenous component of their Federal One activity and their respective 1900 population shares. The height of each individual bar in the above graphs corresponds with the R^2 value from a regression: $y_{i,l,\bar{t}} = \beta_1 y_{i,l,1900} + \beta_2 \widehat{FPNO1}_{i,l} + \varepsilon_{i,l,\bar{t}}$ for fixed time $\bar{t}$, outcome and program pair l, $y \in \mathcal{A}_l$, city i's artist population share in 1900 for outcome y, and exogenous component of Federal One activity (the projection of a binary indicator for city i's recipiency of Federal One subprogram l on the New Deal arts leave-out expense instrument). The decomposition is absent for 1970 due to unavailability of city-denominated US Census data.

Appendix B Additional graphs, images and tables

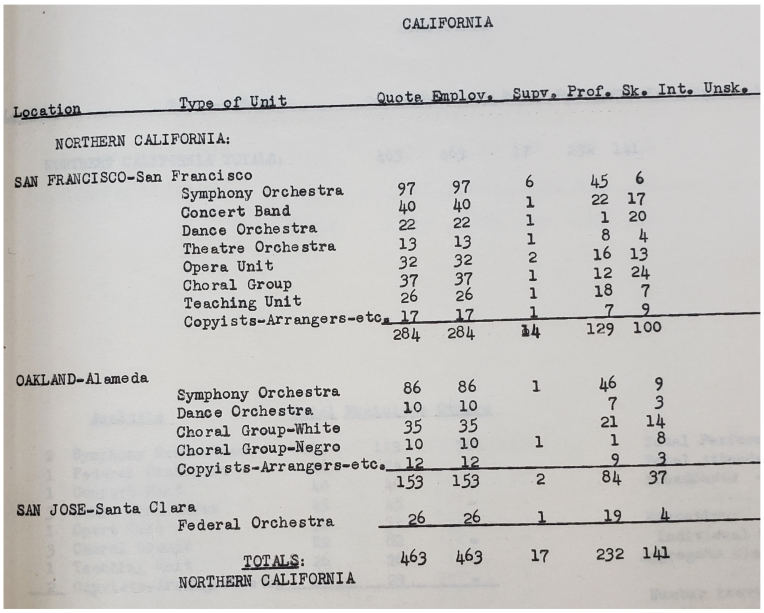
For Online Publication

Table B.1: Number of observed cities by Census year

Year	All	Has 1930 + 1940	Has 1900-1950	Has 1900-2020	Top 100 pop. (1930)	Top 100 pop. (2010)
1900	607	570	461	38	97	65
1910	603	565	461	38	99	69
1920	748	689	461	38	100	73
1930	984	907	461	38	100	78
1940	918	907	461	38	100	78
1950	934	886	461	38	100	83
1960	154	141	124	38	70	42
1970	0	0	0	0	0	0
1980	166	126	105	38	82	81
1990	165	122	95	38	74	80
2000	181	129	99	38	72	100
2010	180	128	98	38	71	100
2020	102	75	63	38	52	51
Unique cities	1129	955	461	38	100	100

This table displays count of the number of unique cities observable for each decadal US Census. Each column refers to a sample balance requirement. The "All" column imposes no restrictions on the sample-presence of cities and thereby reports the number of unique cities identifiable in each US Census year as a baseline. The "Top 100 pop." columns refer to the 100 most populous city in its respective year. Note the absence of city observations in 1970 and the drop-off starting in 1950 in the first two columns.

Figure B.1: Excerpt from FMP employment tabulations: July 1939

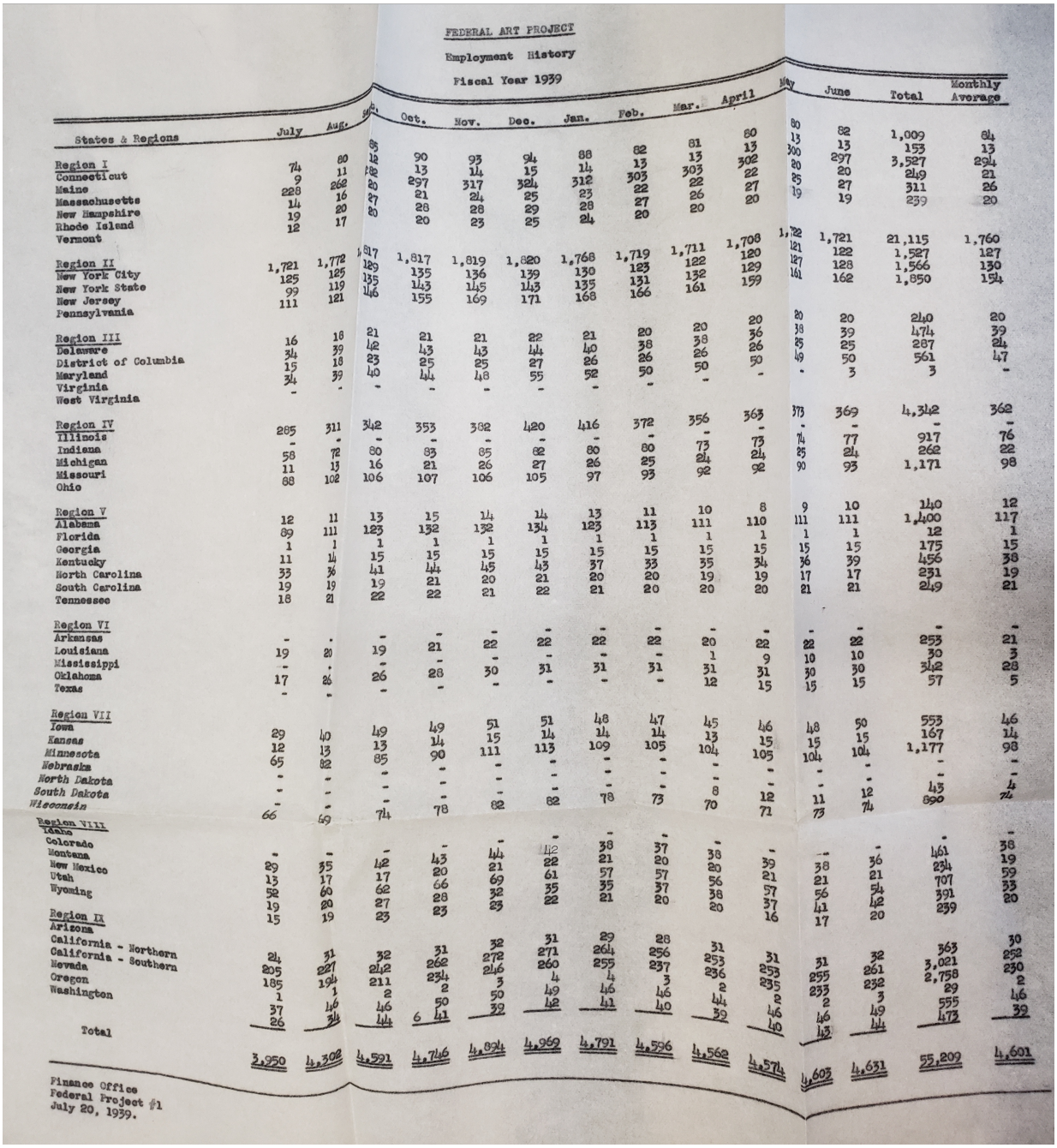


CALIFORNIA

Location	Type of Unit	Quota	Employ.	Supv.	Prof.	Sk.	Int.	Unsk.
NORTHERN CALIFORNIA:								
SAN FRANCISCO-San Francisco	Symphony Orchestra	97	97	6	45	6		
	Concert Band	40	40	1	22	17		
	Dance Orchestra	22	22	1	1	20		
	Theatre Orchestra	13	13	1	8	4		
	Opera Unit	32	32	2	16	13		
	Choral Group	37	37	1	12	24		
	Teaching Unit	26	26	1	18	7		
	Copyists-Arrangers-etc.	17	17	1	7	9		
		284	284	14	129	100		
OAKLAND-Alameda	Symphony Orchestra	86	86	1	46	9		
	Dance Orchestra	10	10		7	3		
	Choral Group-White	35	35		21	14		
	Choral Group-Negro	10	10	1	1	8		
	Copyists-Arrangers-etc.	12	12		9	3		
		153	153	2	84	37		
SAN JOSE-Santa Clara	Federal Orchestra	26	26	1	19	4		
	TOTALS: NORTHERN CALIFORNIA	463	463	17	232	141		

This image serves as an example of typical city-level employment counts by city. I do not distinguish between the different types of musical groups (e.g. Concert Band, Choral Group), but rather focuses on the employment totals for each city displayed below each horizontal line.

Figure B.2: Federal Art Project state employment aggregates, Fiscal Year 1939



FEDERAL ART PROJECT

Employment History

Fiscal Year 1939

States & Regions	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	Total	Monthly Average
Region I														
Connecticut	74	80	85	90	93	94	88	82	81	80	80	82	1,009	84
Maine	9	11	12	13	14	15	14	13	13	13	13	13	153	13
Massachusetts	228	262	282	297	317	324	312	303	303	302	300	297	3,527	294
New Hampshire	14	16	20	21	24	25	23	22	22	22	20	20	249	21
Rhode Island	19	20	27	28	28	29	28	27	26	27	25	27	311	26
Vermont	12	17	20	20	23	25	24	20	20	20	19	19	239	20
Region II														
New York City	1,721	1,772	1,817	1,817	1,819	1,820	1,768	1,719	1,711	1,708	1,782	1,721	21,115	1,760
New York State	125	125	129	135	136	139	130	123	122	120	121	122	1,527	127
New Jersey	99	119	135	143	145	143	135	131	132	129	127	128	1,566	130
Pennsylvania	111	121	146	155	169	171	168	166	161	159	161	162	1,850	154
Region III														
Delaware	16	18	21	21	21	22	21	20	20	20	20	20	240	20
District of Columbia	34	39	42	43	43	44	40	38	38	36	38	39	474	39
Maryland	15	18	23	25	25	27	26	26	26	26	25	25	287	24
Virginia	34	39	40	44	48	55	52	50	50	50	49	50	561	47
West Virginia	-	-	-	-	-	-	-	-	-	-	-	3	3	-
Region IV														
Illinois	285	311	342	353	382	420	416	372	356	363	373	369	4,342	362
Indiana	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Michigan	58	72	80	83	85	82	80	80	73	73	74	77	917	76
Missouri	11	13	16	21	26	27	26	25	24	24	25	24	262	22
Ohio	88	102	106	107	106	105	97	93	92	92	90	93	1,171	98
Region V														
Alabama	12	11	13	15	14	14	13	11	10	8	9	10	140	12
Florida	89	111	123	132	132	134	123	113	111	110	111	111	1,400	117
Georgia	1	1	1	1	1	1	1	1	1	1	1	1	12	1
Kentucky	11	14	15	15	15	15	15	15	15	15	15	15	175	15
North Carolina	33	36	41	44	45	43	37	33	35	34	36	39	456	38
South Carolina	19	19	19	21	20	21	20	20	19	19	17	17	231	19
Tennessee	18	21	22	22	21	22	21	20	20	20	21	21	249	21
Region VI														
Arkansas	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Louisiana	19	20	19	21	22	22	22	22	20	22	22	22	253	21
Mississippi	-	-	-	-	-	-	-	-	1	9	10	10	30	3
Oklahoma	17	26	26	28	30	31	31	31	31	31	30	30	342	28
Texas	-	-	-	-	-	-	-	-	12	15	15	15	57	5
Region VII														
Iowa	29	40	49	49	51	51	48	47	45	46	48	50	553	46
Kansas	12	13	13	14	15	14	14	14	13	15	15	15	167	14
Minnesota	65	82	85	90	111	113	109	105	104	105	104	104	1,177	98
Nebraska	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Dakota	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South Dakota	-	-	-	-	-	-	-	-	8	12	11	12	43	4
Wisconsin	66	49	74	78	82	82	78	73	70	71	73	74	890	74
Region VIII														
Idaho	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Colorado	-	-	-	-	-	42	38	37	-	-	-	-	461	38
Montana	29	35	42	43	44	22	21	20	38	39	38	36	234	19
New Mexico	13	17	17	20	21	61	57	57	20	21	21	21	707	59
Utah	52	60	62	66	69	35	35	37	56	57	56	54	391	33
Wyoming	19	20	27	28	32	22	21	20	38	37	41	42	239	20
Region IX	15	19	23	23	23				20	16	17	20		
Arizona	24	31	32	31	32	31	29	28					363	30
California - Northern	205	227	242	262	272	271	264	256	31	31	31	32	3,021	252
California - Southern	185	194	211	234	246	260	255	237	253	253	255	261	2,758	230
Nevada	1	1	2	2	3	4	4	3	236	235	233	232	29	2
Oregon	37	46	46	50	50	49	46	46	2	2	2	3	555	46
Washington	26	34	44	6 41	32	42	41	40	44	46	46	49	473	39
									39	40	43	44		
Total	3,950	4,398	4,591	4,746	4,834	4,969	4,791	4,596	4,562	4,574	4,603	4,631	55,209	4,601

Finance Office
Federal Project #1
July 20, 1939.

This figure serves as a representative image of state-level employment counts. In this case, the archival table displays employment counts by each state-month for the 1939 fiscal year. Dashed entries refer to zero-employment (program inactivity), rather than missing data.

Figure B.3: FPNo1 total employment, thousands per month (excl. HRS)

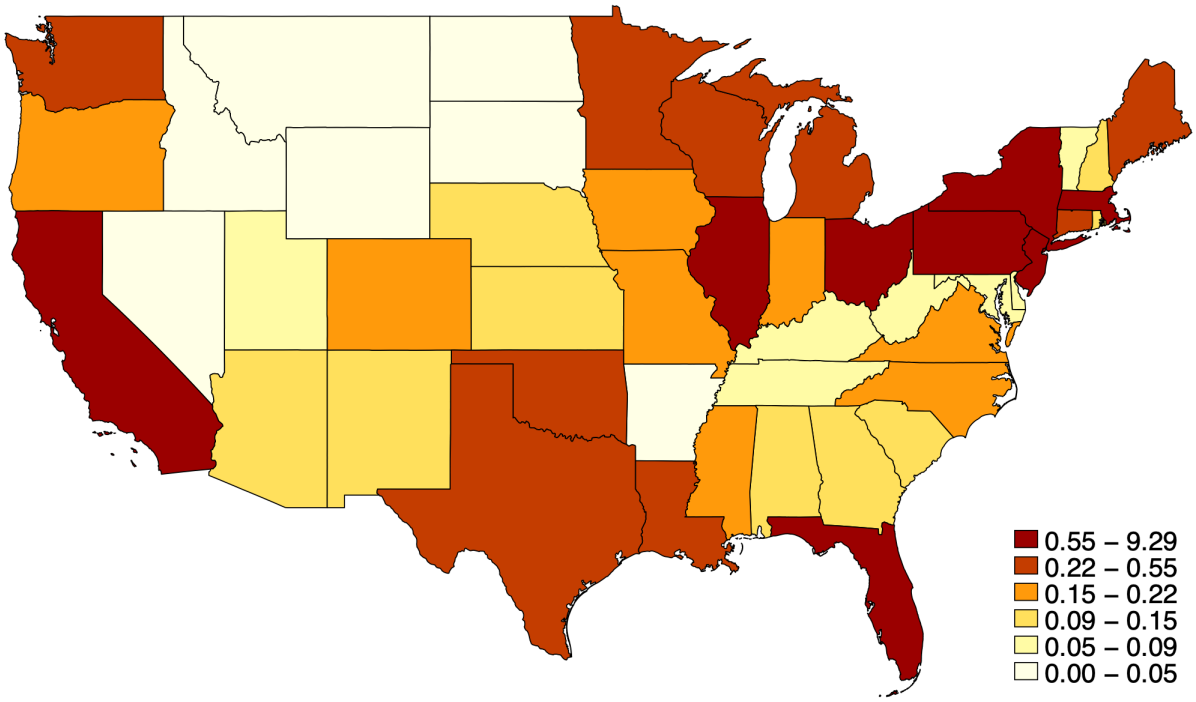


Figure B.4: FPNo1 total employment per 100000 people per month (excl. HRS)

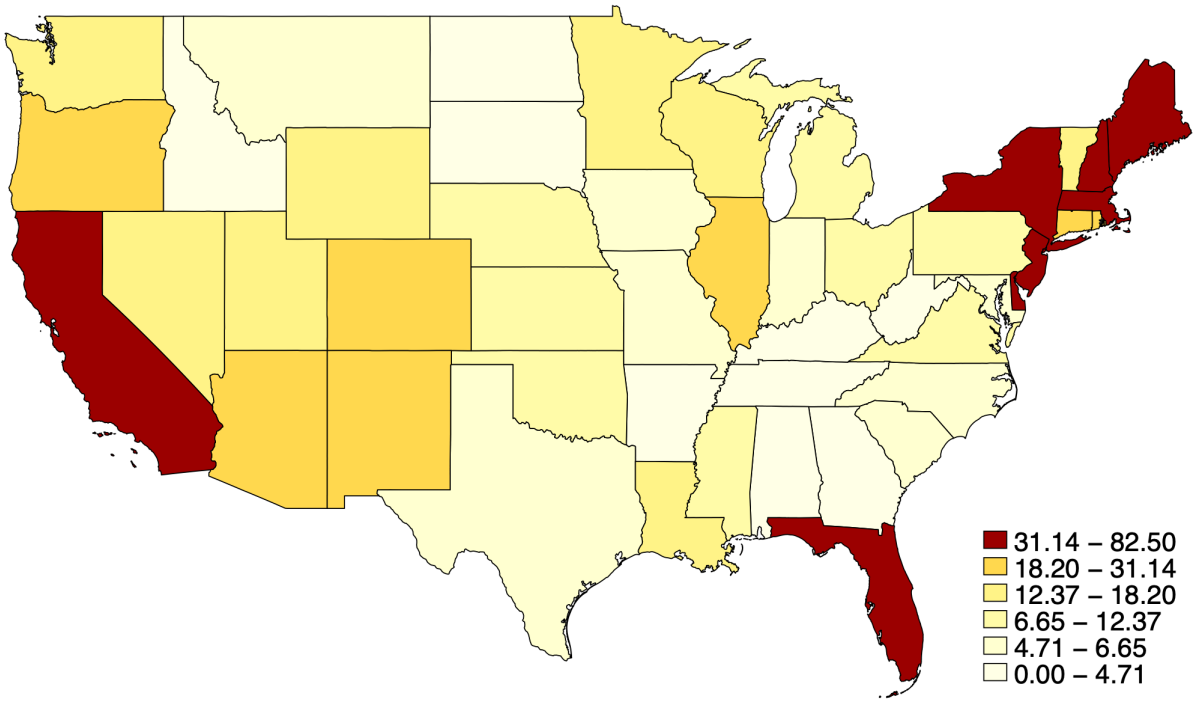


Figure B.5: FPNo1 total expense, millions 2020 USD (excl. HRS)

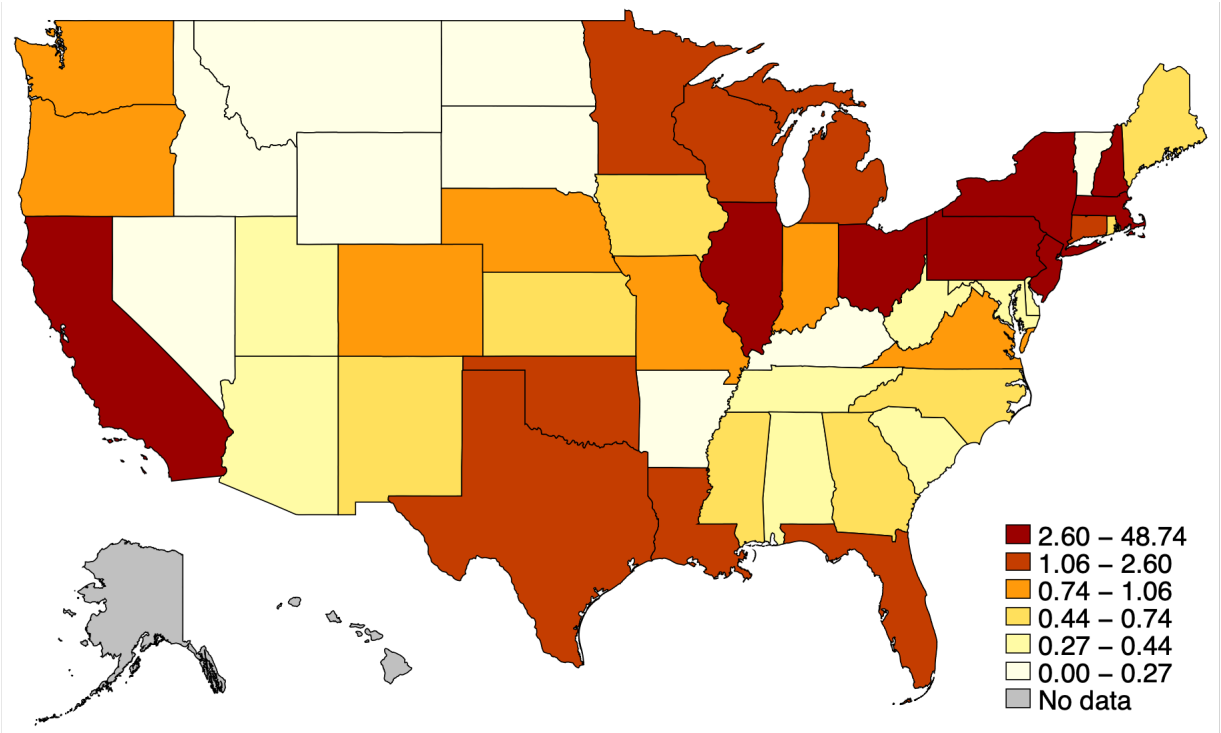


Figure B.6: FPNo1 total per capita expense (excl. HRS)

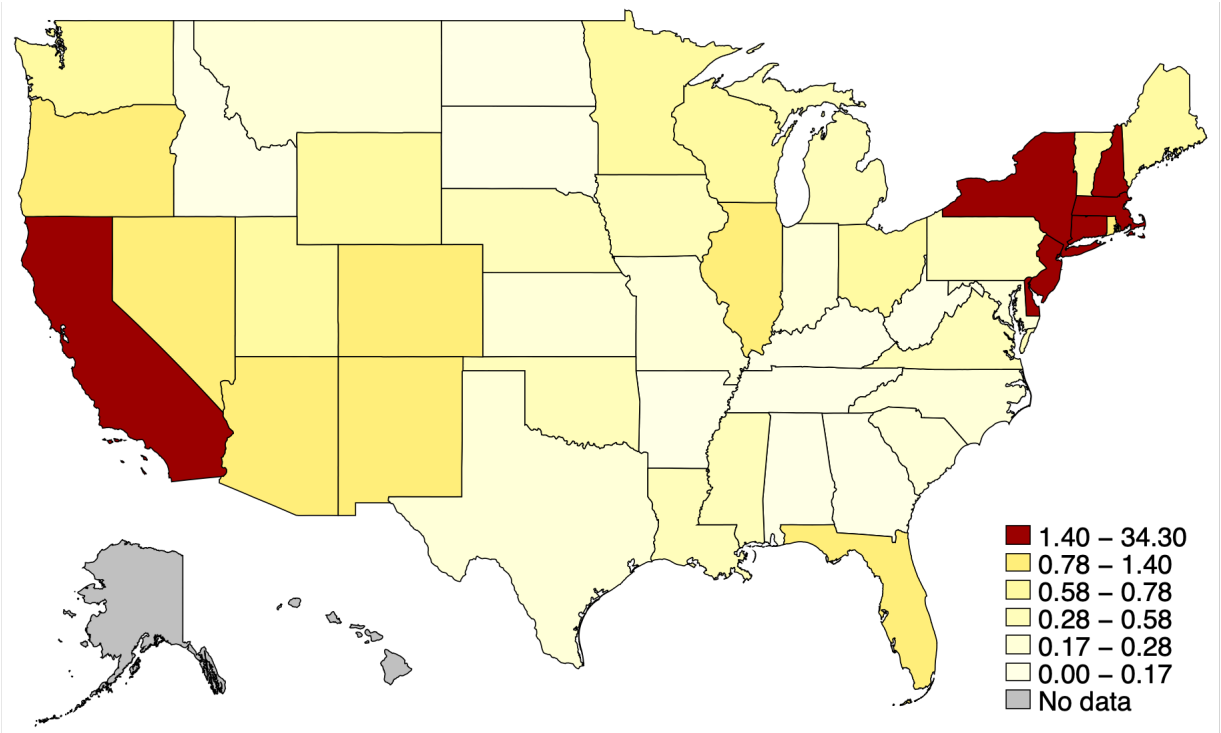


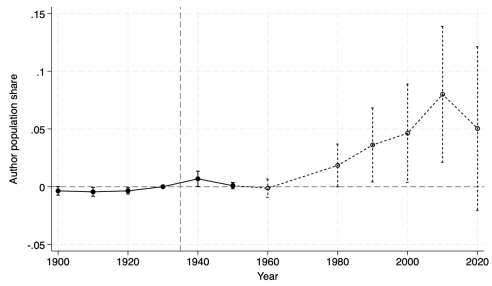
Table B.2: Comparisons of 1930 artist shares (%) by Federal One Sub-project treatment status

Occupation	FPNo1 Sub-Project	Treated	Non-treated	Difference
Writer	FWP	0.00900	0.00390	.0052**
		(.011)	(.014)	(.002)
Publishing industry	FWP	0.720	0.423	.2976***
		(.194)	(.291)	(.036)
Artist	FAP	0.0618	0.0254	.0364***
		(.027)	(.036)	(.005)
Painter	FAP	0.0779	0.0614	.0165***
		(.038)	(.078)	(.006)
Photographer	FAP	0.0309	0.0246	0.00620
		(.013)	(.015)	(.003)
Designer	FAP	0.0140	0.00610	.0079***
		(.01)	(.012)	(.002)
Musician	FMP	0.164	0.137	.0269***
		(.06)	(.066)	(.005)
Actor	FTP	0.0236	0.0106	.013***
		(.046)	(.048)	(.003)
Dancer	FTP	0.00750	0.00430	.0032***
		(.006)	(.006)	(.001)
TV industry	FTP	0.00680	0.00360	.0031***
		(.006)	(.008)	(0)
Theater and film industry	FTP	0.144	0.0955	.0487***
		(.112)	(.102)	(.009)
Piano tuner	FMP	0.00430	0.00430	0.000100
		(.004)	(.006)	(0)

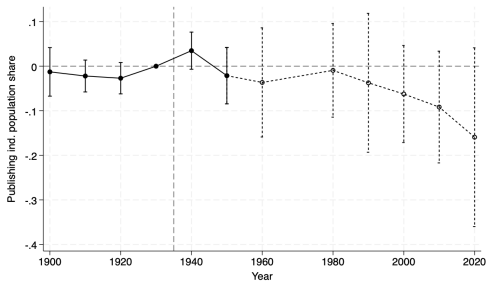
This table illustrates various summary statistics of pre-period outcomes by Federal One-recipiency status by city and estimates the magnitude and significance of their differences using cross-sectional regressions of the form $y_{i,1930} = \beta_0 + \beta_1 \cdot FPNo1_{i,l} + \varepsilon_i$ for binary treatment variable $FPNo1_{i,l} = l \in \{FAP,\ FMP,\ FTP,\ FWP\}$. The regression coefficients in the "Difference" columns are estimated with heteroskedasticity-robust standard errors clustered on the state-level. Outcome point estimates represent percentage point population shares (i.e. "0.0619" represents "0.0619 percent of the population").
$**p < .05$, $***p < .01$

B.1 OLS estimation results

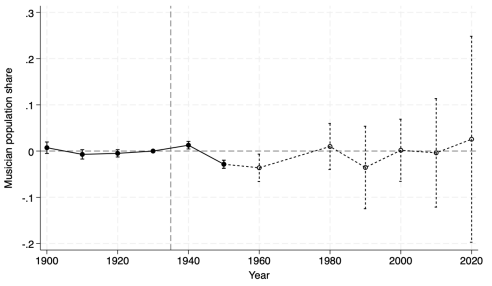
Figure B.7: Panel (a): OLS results on writing and music professions



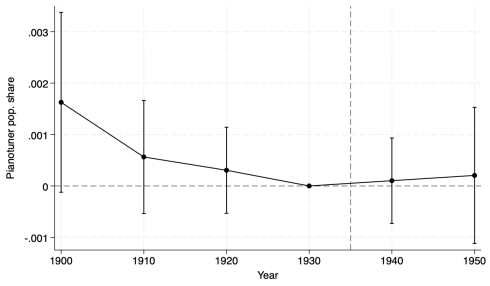
(a) Authors



(b) Publishing industry workers



(c) Musicians



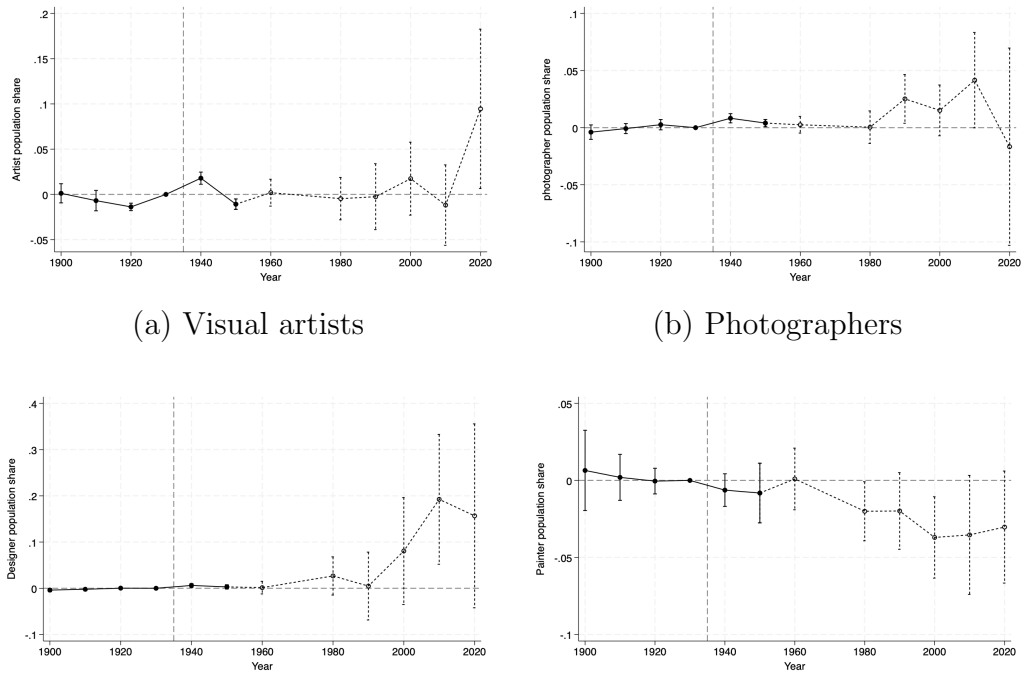
(d) Piano tuners

These graphs display the difference-in-differences coefficients $\{\beta_{dd,k}\}$ from regressions of the form

$$y_{ilt} = \beta_0 + \beta_1 \cdot 1\{FPNo1_{il} > 0\} + \sum_{k=1900}^{1950} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=1900}^{1950} \beta_{dd,lk} \cdot 1\{FPNo1_{il} > 0\} \cdot 1\{Year_t = k\} + \varepsilon_{ilt}.$$

Each panel displays the coefficients from regressions of a given artistic profession on its respective Federal One subprogram. The decadal difference-in-difference coefficients are estimated relative to a 1930's baseline. The error bars of each plot display 95% confidence intervals around their respective point estimates using standard errors clustered on the city-level. The graphs includes three separate specifications of these regressions: one including city-level fixed-effects and two correlated random effect (CRE) models of pre-existing artist population shares (in 1930) and leading decadal local profession growth trends.

Figure B.7: Panel (b): OLS results on visual artistic professionals



(a) Visual artists

(b) Photographers

(c) Designers

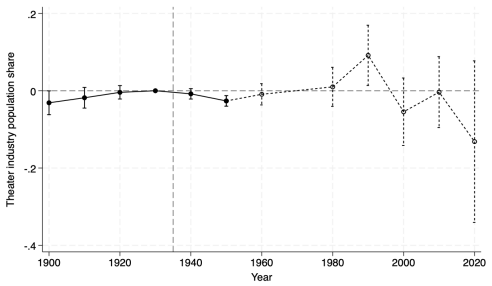
(d) Painters

These graphs display the difference-in-differences coefficients $\{\beta_{dd,k}\}$ from regressions of the form

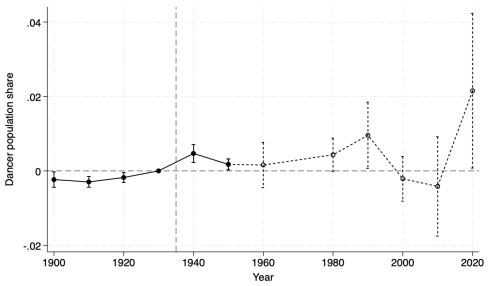
$$y_{ilt} = \beta_0 + \beta_1 \cdot 1\{FPNo1_{il} > 0\} + \sum_{k=1900}^{1950} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=1900}^{1950} \beta_{dd,lk} \cdot 1\{FPNo1_{il} > 0\} \cdot 1\{Year_t = k\} + \varepsilon_{ilt}.$$

Each panel displays the coefficients from regressions of a given artistic profession on its respective Federal One subprogram. The decadal difference-in-difference coefficients are estimated relative to a 1930's baseline. The error bars of each plot display 95% confidence intervals around their respective point estimates using standard errors clustered on the city-level. The graphs includes three separate specifications of these regressions: one including city-level fixed-effects and two correlated random effect (CRE) models of pre-existing artist population shares (in 1930) and leading decadal local profession growth trends.

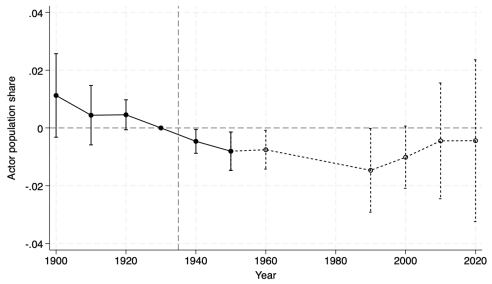
Figure B.7: Panel (c): OLS results on theater and film professionals



(a) Theater/film industry



(b) Dancers



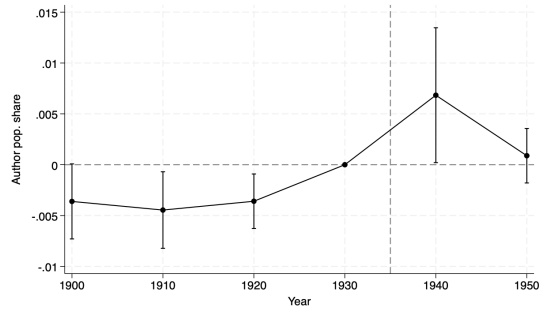
(c) Actors

These graphs display the difference-in-differences coefficients $\{\beta_{dd,k}\}$ from regressions of the form

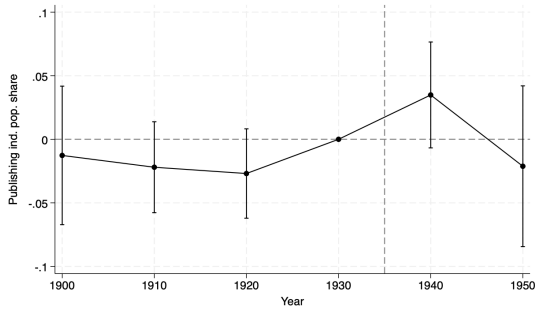
$$y_{ilt} = \beta_0 + \beta_1 \cdot 1\{FPNo1_{il} > 0\} + \sum_{k=1900}^{1950} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=1900}^{1950} \beta_{dd,lk} \cdot 1\{FPNo1_{il} > 0\} \cdot 1\{Year_t = k\} + \varepsilon_{ilt}.$$

Each panel displays the coefficients from regressions of a given artistic profession on its respective Federal One subprogram. The decadal difference-in-difference coefficients are estimated relative to a 1930's baseline. The error bars of each plot display 95% confidence intervals around their respective point estimates using standard errors clustered on the city-level. The graphs includes three separate specifications of these regressions: one including city-level fixed-effects and two correlated random effect (CRE) models of pre-existing artist population shares (in 1930) and leading decadal local profession growth trends.

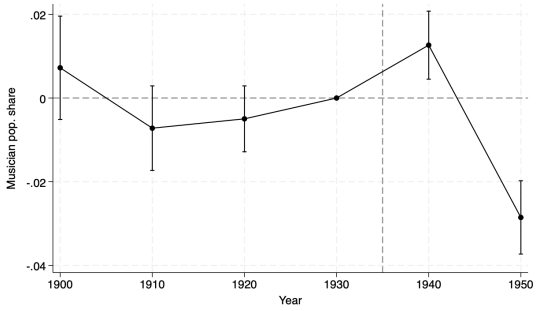
Figure B.8: Panel (a): Short run OLS results on writing and music professions



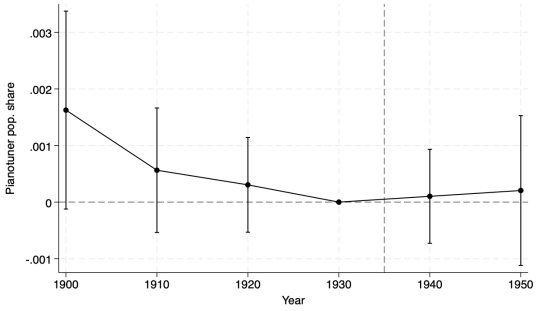
(a) Authors



(b) Publishing industry workers



(c) Musicians



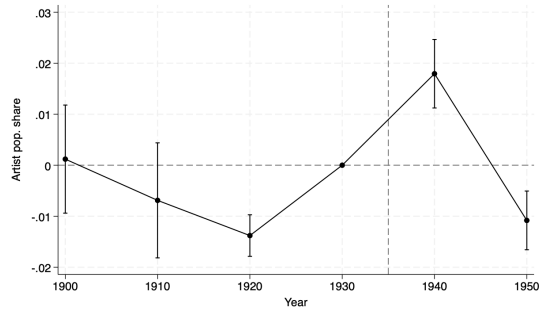
(d) Piano tuners

These graphs display the difference-in-differences coefficients $\{\beta_{dd,k}\}$ from regressions of the form

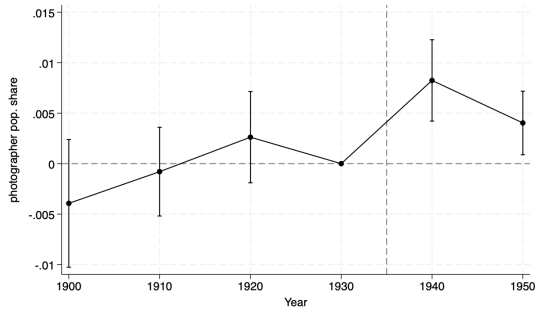
$$y_{ilt} = \beta_0 + \beta_1 \cdot 1\{FPNo1_{il} > 0\} + \sum_{k=1900}^{1950} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=1900}^{1950} \beta_{dd,lk} \cdot 1\{FPNo1_{il} > 0\} \cdot 1\{Year_t = k\} + \varepsilon_{ilt}.$$

Each panel displays the coefficients from regressions of a given artistic profession on its respective Federal One subprogram. The decadal difference-in-difference coefficients are estimated relative to a 1930's baseline. The error bars of each plot display 95% confidence intervals around their respective point estimates using standard errors clustered on the city-level. The graphs includes three separate specifications of these regressions: one including city-level fixed-effects and two correlated random effect (CRE) models of pre-existing artist population shares (in 1930) and leading decadal local profession growth trends.

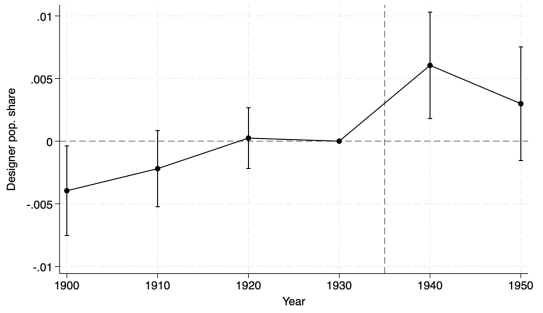
Figure B.8: Panel (b): Short run OLS results on visual artistic professionals



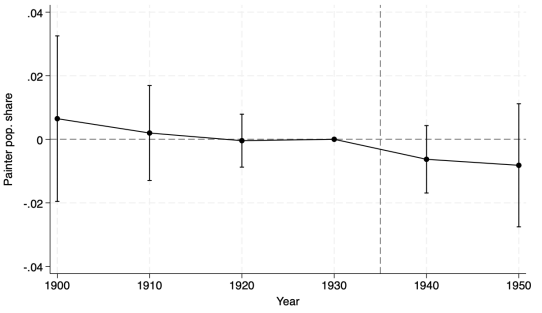
(a) Visual artists



(b) Photographers



(c) Designers



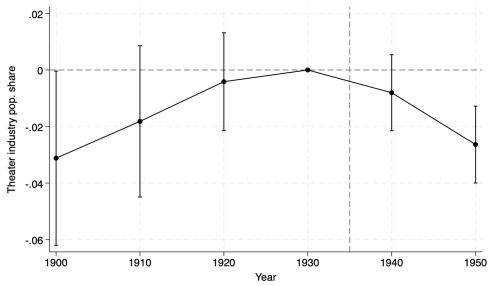
(d) Painters

These graphs display the difference-in-differences coefficients $\{\beta_{dd,k}\}$ from regressions of the form

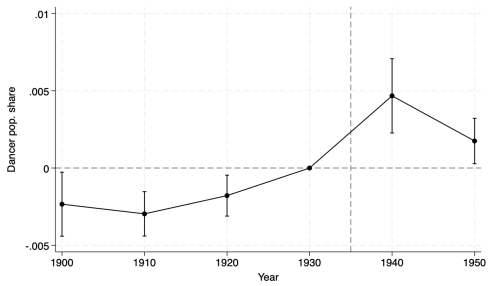
$$y_{ilt} = \beta_0 + \beta_1 \cdot 1\{FPNo1_{il} > 0\} + \sum_{k=1900}^{1950} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=1900}^{1950} \beta_{dd,lk} \cdot 1\{FPNo1_{il} > 0\} \cdot 1\{Year_t = k\} + \varepsilon_{ilt}.$$

Each panel displays the coefficients from regressions of a given artistic profession on its respective Federal One subprogram. The decadal difference-in-difference coefficients are estimated relative to a 1930's baseline. The error bars of each plot display 95% confidence intervals around their respective point estimates using standard errors clustered on the city-level. The graphs includes three separate specifications of these regressions: one including city-level fixed-effects and two correlated random effect (CRE) models of pre-existing artist population shares (in 1930) and leading decadal local profession growth trends.

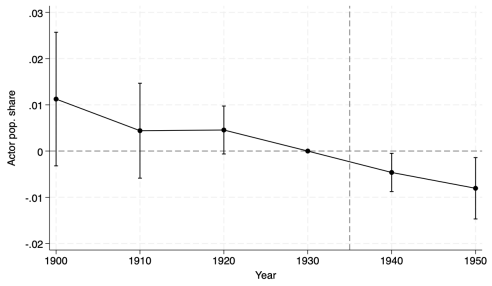
Figure B.8: Panel (c): Short run OLS results on theater and film professionals



(a) Theater/film industry



(b) Dancers



(c) Actors

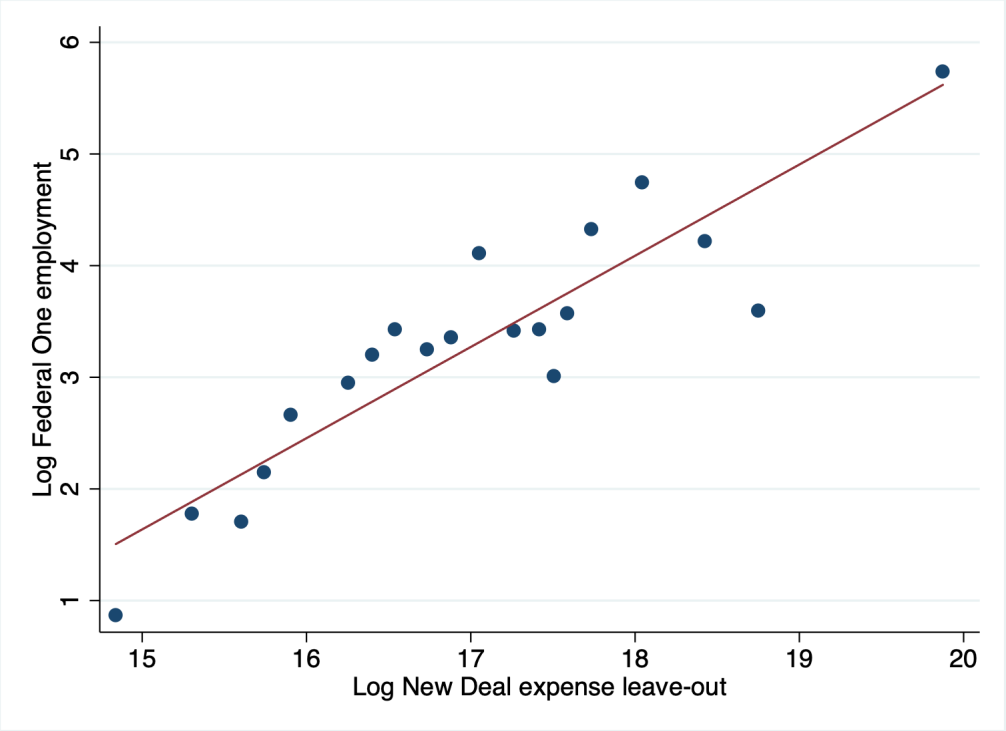
These graphs display the difference-in-differences coefficients $\{\beta_{dd,k}\}$ from regressions of the form

$$y_{ilt} = \beta_0 + \beta_1 \cdot 1\{FPNo1_{il} > 0\} + \sum_{k=1900}^{1950} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=1900}^{1950} \beta_{dd,lk} \cdot 1\{FPNo1_{il} > 0\} \cdot 1\{Year_t = k\} + \varepsilon_{ilt}.$$

Each panel displays the coefficients from regressions of a given artistic profession on its respective Federal One subprogram. The decadal difference-in-difference coefficients are estimated relative to a 1930's baseline. The error bars of each plot display 95% confidence intervals around their respective point estimates using standard errors clustered on the city-level. The graphs includes three separate specifications of these regressions: one including city-level fixed-effects and two correlated random effect (CRE) models of pre-existing artist population shares (in 1930) and leading decadal local profession growth trends.

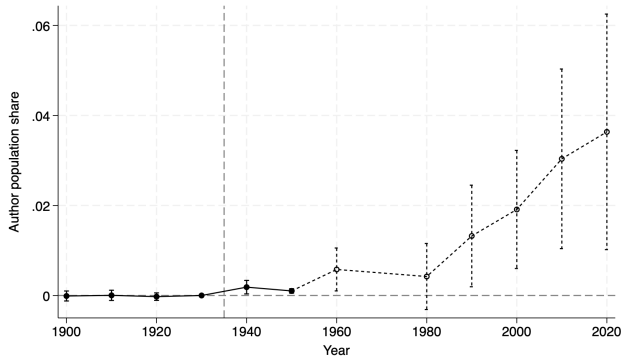
B.2 Instrumental variables results

Figure B.9: First stage: Log New Deal exp. leave-out on log Federal One employment

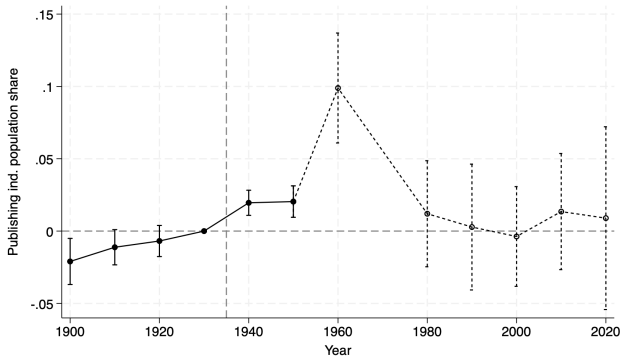


Note: This graph displays the binned scatter plot of the log New Deal expense arts leave-out instrument on log total Federal One employment in the cross-section.

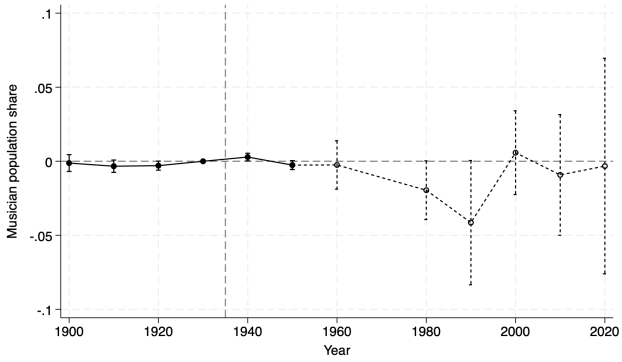
Figure B.10: Panel (a): Reduced form IV results on writing and music professions



(a) Authors



(b) Publishing industry workers



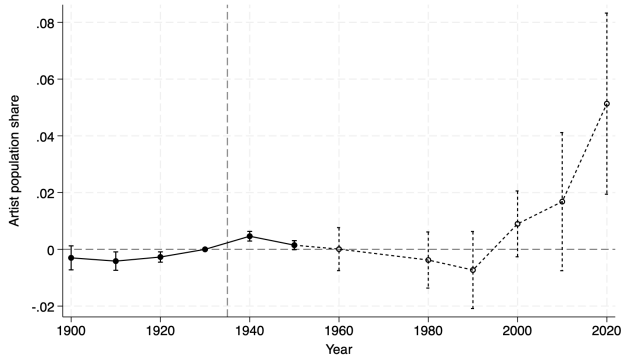
(c) Musicians

These graphs display the difference-in-differences coefficients $\{\beta_{dd,k}\}$ from the reduced form regression:

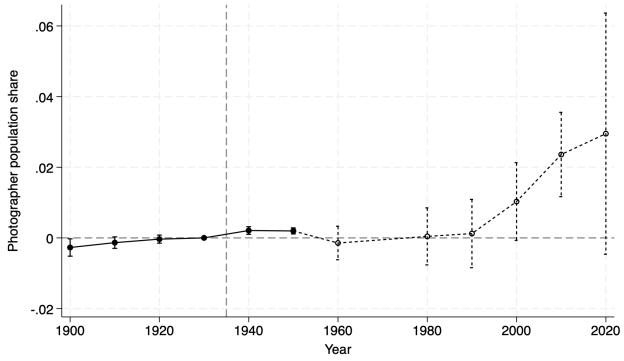
$$y_{ilt} = \alpha_i + \sum_{k=1900}^{2010} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=1900}^{2010} \gamma_{rf,lk} Log(NDEXP\ LO_{i,l}) \cdot 1\{Year_t = k\} + \varepsilon_{ilt}.$$

. The decadal difference-in-difference coefficients are estimated relative to a 1930's baseline. The error bars of each plot display 95% confidence intervals around their respective point estimates using standard errors clustered on the city-level.

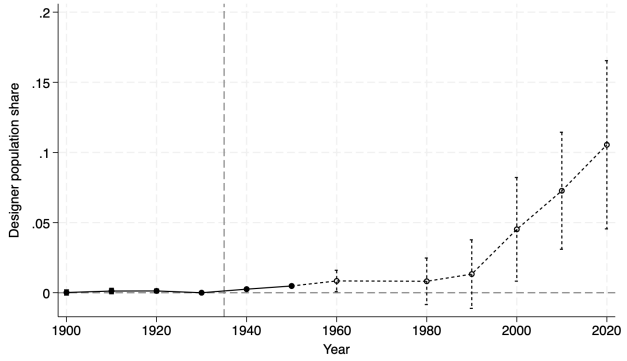
Figure B.10: Panel (b): Reduced form IV results on visual artistic professionals



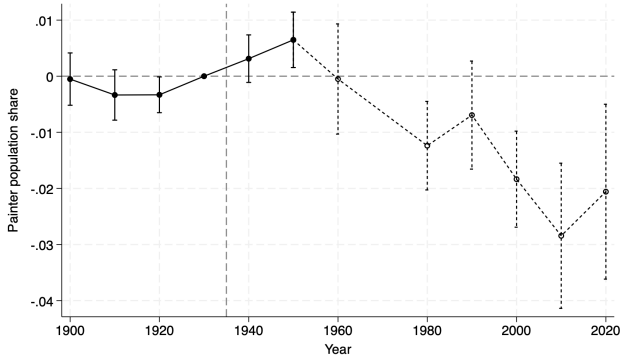
(a) Visual artists



(b) Photographers



(c) Designers



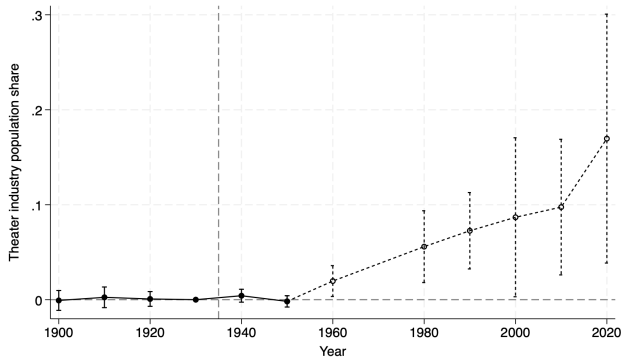
(d) Painters

These graphs display the difference-in-differences coefficients $\{\beta_{dd,k}\}$ from the reduced form regression:

$$y_{ilt} = \alpha_i + \sum_{k=1900}^{2010} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=1900}^{2010} \gamma_{rf,lk} Log(NDEXP\ LO_{i,l}) \cdot 1\{Year_t = k\} + \varepsilon_{ilt}.$$

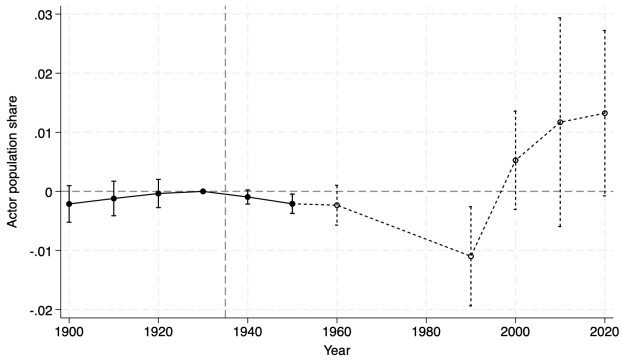
. The decadal difference-in-difference coefficients are estimated relative to a 1930's baseline. The error bars of each plot display 95% confidence intervals around their respective point estimates using standard errors clustered on the city-level.

Figure B.10: Panel (c): Reduced form IV results on theater and film professionals



(a) Theater/film industry

(b) Dancers



(c) Actors

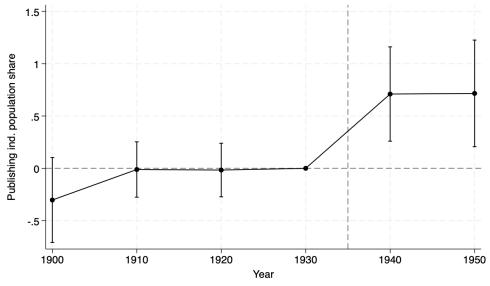
These graphs display the difference-in-differences coefficients $\{\beta_{dd,k}\}$ from the reduced form regression:

$$y_{ilt} = \alpha_i + \sum_{k=1900}^{2010} \delta_k \cdot 1\{Year_t = k\} + \sum_{k=1900}^{2010} \gamma_{rf,lk} Log(NDEXP\ LO_{i,l}) \cdot 1\{Year_t = k\} + \varepsilon_{ilt}.$$

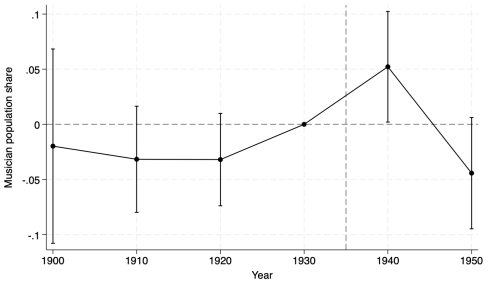
. The decadal difference-in-difference coefficients are estimated relative to a 1930's baseline. The error bars of each plot display 95% confidence intervals around their respective point estimates using standard errors clustered on the city-level.

Figure B.11: Panel (a): IV results on writing and music professions

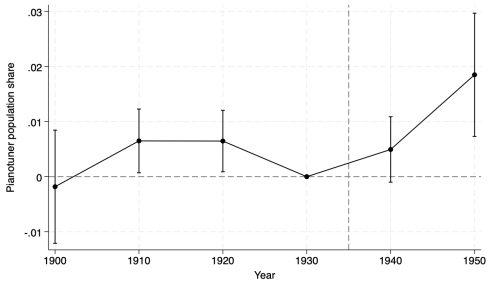
(a) Authors



(b) Publishing industry workers



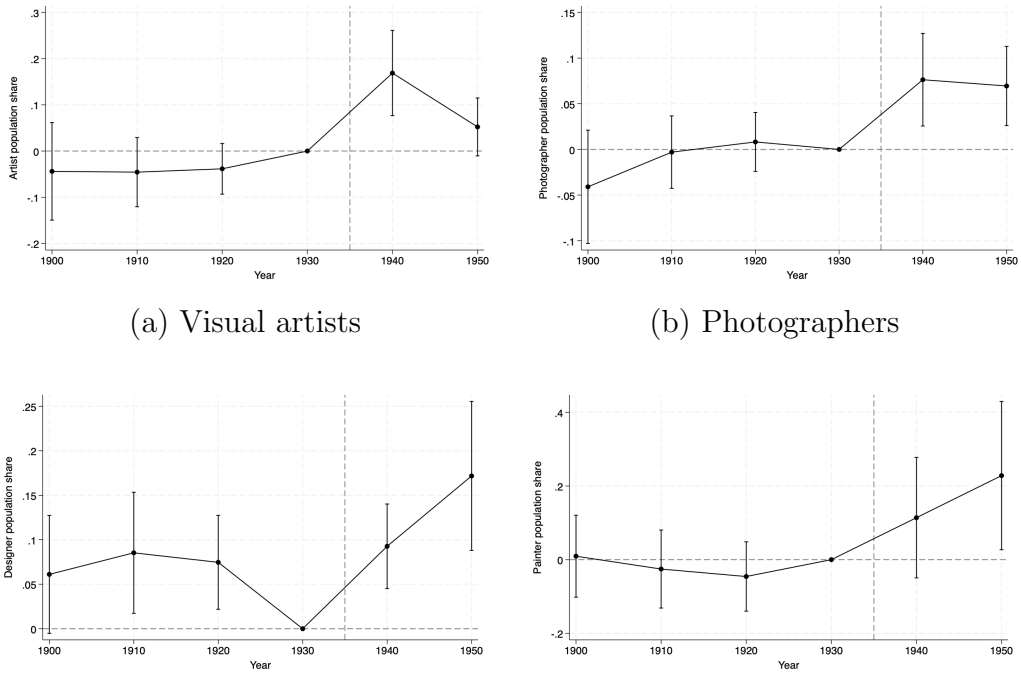
(c) Musicians



(d) Piano tuners

These graphs display the instrumental variables difference-in-differences coefficients $\{\beta_{dd,k}\}$ from a two-stage least squares regression, where the first stage regresses an indicator for local Federal One subprogram recipiency on a local New Deal arts spending leave-out instrument, and the second stage regresses local artist shares on the fitted first stage. The decadal difference-in-difference coefficients are estimated relative to a 1930's baseline. The error bars of each plot display 95% confidence intervals around their respective point estimates using standard errors clustered on the city-level. Results for piano tuners stop at 1950, as OCC1950 ceases recording this occupational outcome.

Figure B.11: Panel (b): IV results on visual artistic professionals



(a) Visual artists

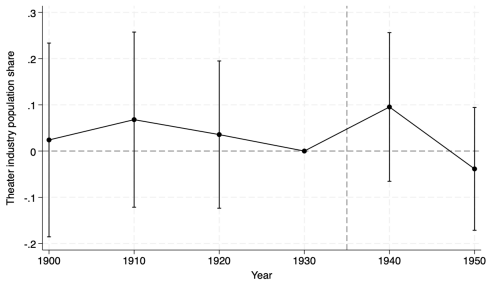
(b) Photographers

(c) Designers

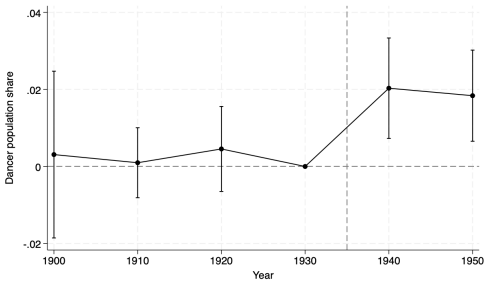
(d) Painters

These graphs display the instrumental variables difference-in-differences coefficients $\{\beta_{dd,k}\}$ from a two-stage least squares regression, where the first stage regresses an indicator for local Federal One subprogram recipiency on a local New Deal arts spending leave-out instrument, and the second stage regresses local artist shares on the fitted first stage. The decadal difference-in-difference coefficients are estimated relative to a 1930's baseline. The error bars of each plot display 95% confidence intervals around their respective point estimates using standard errors clustered on the city-level.

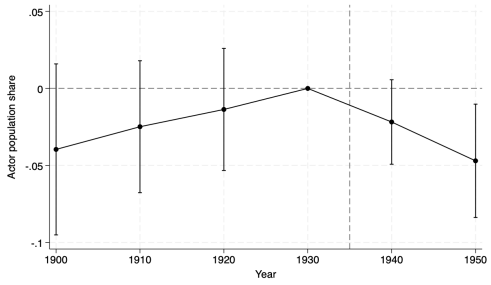
Figure B.11: Panel (c): IV results on theater and film professionals



(a) Theater/film industry



(b) Dancers



(c) Actors

These graphs display the instrumental variables difference-in-differences coefficients $\{\beta_{dd,k}\}$ from a two-stage least squares regression, where the first stage regresses an indicator for local Federal One subprogram recipiency on a local New Deal arts spending leave-out instrument, and the second stage regresses local artist shares on the fitted first stage. The decadal difference-in-difference coefficients are estimated relative to a 1930's baseline. The error bars of each plot display 95% confidence intervals around their respective point estimates using standard errors clustered on the city-level.

Table B.3: IV estimation results (Correlated Random Effects):
Panel (a): Writers and theater practitioners

	(1)	(2)	(3)	(4)	(5)	(6)
	Author	Pub. industry	Actor	Theater and film ind.	TV and radio ind.	Dancer
FWP binary × Year 1940	0.067**	0.71***				
	(0.031)	(0.23)				
FWP binary × Year 1950	0.037***	0.72***				
	(0.012)	(0.26)				
FWP binary × Year 1960+	0.12***	0.098				
	(0.037)	(0.11)				
FTP binary × Year 1940			-0.022	0.095	-0.0085	0.020***
			(0.014)	(0.082)	(0.0097)	(0.0066)
FTP binary × Year 1950			-0.047**	-0.042	-0.13***	0.018***
			(0.019)	(0.067)	(0.037)	(0.0060)
FTP binary × Year 1960+			-0.012	0.43**	0.092	0.0047
			(0.026)	(0.19)	(0.071)	(0.0057)
Constant	-0.0068***	0.067***	-0.0082***	-0.018	-0.025***	0.00065
	(0.0016)	(0.016)	(0.0020)	(0.014)	(0.0040)	(0.00056)
Treatment mean 1930 (%)	0.009	0.720	0.024	0.144	0.007	0.008
CRE (1930)	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.33	0.64	0.57	0.46	0.44	0.17
N	5118	5118	4997	5118	5118	5118
Number of clusters	887	887	887	887	887	887

City-clustered standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

Panel (b): Musicians and visual artists

	(1) Musician	(2) Piano tuner	(3) Artist	(4) Painter	(5) Photographer	(6) Designer
FMP binary × Year 1940	0.052**	0.0049				
	(0.026)	(0.0030)				
FMP binary × Year 1950	-0.042	0.019***				
	(0.026)	(0.0057)				
FMP binary × Year 1960+	-0.11	-0.0063				
	(0.10)	(0.011)				
FAP binary × Year 1940			0.17***	0.11	0.076***	0.093***
			(0.047)	(0.083)	(0.026)	(0.024)
FAP binary × Year 1950			0.048	0.23**	0.072***	0.17***
			(0.031)	(0.10)	(0.022)	(0.042)
FWP binary × Year 1960+			-0.0017	-0.085**	0.13***	0.23***
			(0.037)	(0.040)	(0.037)	(0.088)
Constant	0.021***	0.0013**	-0.0071**	0.026***	-0.0055***	-0.022***
	(0.0075)	(0.00059)	(0.0030)	(0.0078)	(0.0017)	(0.0047)
Treatment mean 1930 (%)	0.164	0.004	0.062	0.078	0.031	0.014
CRE (1930)	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.47	0.15	0.31	0.43	0.23	0.50
N	5118	4563	5118	5118	5118	5118
Number of clusters	887	887	887	887	887	887

City-clustered standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

This table displays the results of the instrumental variables difference-in-differences strategy for estimating the causal impacts of binary measures of Federal One activity on various artistic occupation shares by city, using 1930 as the leave-out base-period. All of the specifications make use of a correlated random effects (CRE) model that includes 1930 city-shares of artists as covariates.

Appendix C Model and theoretical foundation

To illustrate the theoretical mechanisms underpinning the long-run responsiveness of the arts to unsustained funding shocks of funding, such as in the New Deal setting, I develop a simple model of supply and demand for artistic services that incorporates agglomerative gains to supply. The model features a coordination problem where atomistic producers take agglomeration benefits as exogenous. In the aggregate, the agglomeration benefits from the aggregate activity of atomisticly-behaving self-employed artists induce non-monotonicities in the aggregate supply curve and possibly generate multiple equilibria. In this case, at the lowest level of equilibrium production, the market can accommodate higher-equilibrium values of production, but individual producers cannot unilaterally deviate. A central planner can induce permanent movement to a greater Nash equilibrium level of equilibrium provision through setting aggregate production in excess of an unstable equilibrium for a single period, e.g. through an unsustained shock to supply.

The results of this model can be understood similarly to other "big-push" models (e.g. Murphy, Shleifer, and Vishny (1989), Matsuyama (1992)) however in a partial equilibrium setting. The model here relies on additively separable costs to producers that benefit from agglomeration monotonically, but where agglomeration benefits are relatively stronger at lower levels of production and are asymptotically overtaken by standard convexly increasing cost specifications. Rodrik (1996) and Rodríguez-Clare (1996) both develop similar environments that result in a coordination problem; however, their source of agglomeration originates from benefits of increased production of intermediate goods. Allen and Donaldson (2020) develop a model environment of spatial path dependence through a temporal dependence structure of previous period labor and amenities provision.[37] However, these other models do not feature any independence of agglomeration benefits from total production costs, resulting in agglomeration benefits operating through supply curve shifts. Independence of agglomeration benefits from standard variable production costs as in my environment generates non-monotonicities in marginal cost that characterize aggregate supply.

Individuals artists produce arts and cultural goods/services atomistically, indexed on

[37] See Duranton and Puga (2004) for an overview of other microfoundations of emergent agglomeration economies and spatial agglomeration.

a set of measure one. They enter and exit the market at zero cost and share identical production technology. For simplicity, take their production costs as characterized by the difference of two additively separable pieces: $C(q_i) = f(q_i) - g(q_i, Q)$.[38]

First, a variable function $f(q_i)$ exhibits standard cost characteristics: i.e. $f'(q_i) > 0$ and $f''(q_i) > 0$.

The second piece represents agglomeration benefits, here reflected as decreases in costs that depend on the overall activity of other producers. The agglomerative component is defined on the same domain as the standard production component f. Individual production aggregates up linearly, i.e. that

$$Q = \int_0^1 q_i di$$

For simplicity, let $g(q_i, Q)$ be multiplicatively separable in q_i and Q, $g(q_i, Q) = a(q_i)b(Q)$ and linear in q_i: $g(q_i) = \gamma q_i b(Q)$. Artists produce atomistically and therefore observe aggregate production as exogenous. Importantly, these benefits are eventually dominated by individual variable costs encompassed by $f(q_i)$ asymptotically, but bring monotonic decreases to costs. Namely, $\frac{\partial g(q_i,Q)}{\partial Q} > 0$ and has second derivative such that $\lim_{q\to\infty} f(q_i) - g(q_i, Q) = \infty$; I.e. eventually, variable costs increase at a faster rate than are brought down by agglomeration benefits.

Individual producers are price takers, where prices are set according to aggregate production, as scaled up linearly from individual producers, and aggregate demand:

$$P = F'(Q) - G'(Q).$$

Similar to as on the individual level, aggregating of agglomeration benefits may induce non-monotonicities in the inverse supply curve.[39] For instance, assume functional forms such that $F'(Q) - G'(Q) = 0$ for at least three distinct $Q_1, Q_2, Q_3 \in R_+$. For a continuous function $G(\cdot)$, it is necessarily the case that for at least one of these points, say Q_1, that $G''(Q_1) < 0$ and for at least one other, say Q_2, that $G''(Q_2) > 0$. The aggregate inverse supply curve

[38]Slightly less simple but yielding similar results, one can express production costs as the product of standard variable cost function $f(q_i)$ and a piece reflecting efficiency gains from agglomeration $(1 - g(Q))$ for a function $g(Q) \in [0, 1)$.

[39]The microfoundations of aggregate supply here depend on the linear aggregation of agglomeration benefits in individual production.

features at least one local minimum and local maximum before diverging to infinity.

This specification of supply illustrates the how the competitive forces of standard production costs and agglomerative benefits vary at different scales of production. At low levels of aggregate production the agglomeration benefits are low and standard production costs dominate, but the cost benefits of agglomeration increase quickly enough to induce net decreases in marginal costs. However, the cost benefits of agglomeration are eventually drowned out by the convexly increasing production costs at large enough scale.

Assuming isoleastic demand, in general, there will exist at least one equilibrium where aggregate supply and demand intersect. However, the special case may exist where the demand curve and supply curve intersect at multiple equilibria. Namely, given a monotonically decreasing aggregate demand curve, there can exist at most $N + 1$ distinct equilibria for N unique local extrema of the aggregate supply curve.[40]

Figure C.1 illustrates the different cases characterized by three unique equilibria and different respective "big-push"-style policies: At each of these points, because individual firms are price takers, they see no benefit by deviating from an equilibrium provision due to increases in their own costs at no change in price. For instance, take an aggregate equilibrium value where $Q_1^* = A_1^*$, with resulting price P_1^*. Individuals symmetrically produce q_1^*. Because $Q_1^* = \int_0^1 q_1^* d1$, we can see that

$$P_1^* q_1^* - f(q_1^*) + \gamma q_1^* g(Q_1^*) = 0,$$

and that unilaterally switching to a higher level of production results in no additional profit.

This model framework allows us to study how equilibrium provision evolves in response to a large, unsustained shocks. From this figure, we can observe that only two of the equilibria are stable, due to the zero profit condition. In particular, shocks located at a point of disequilibrium will see subsequent movement toward one of the stable equilibria as producers either enter or exit the market in response to the relationship between demand-determined prices and production costs.

[40]Solutions will feature with up to $2K - 1$ possible unstable and stable equilibria combined, with $K \leq N/2 + 1, \in \mathcal{N}$ (except for tangential intersections).

C.1 Consistence of the model foundation and empirical results

The framework illustrates that there are three parameters that matter for determining the long run impacts of an unsustained positive shock to supply: the magnitude of the shock, the location of the initial equilibrium, and the location of the unstable equilibrium. In order for a shock (in either direction) to induce a permanent change in equilibrium provision, the shock must cause movement past the unstable equilibrium or move from the unstable equilibrium itself (itself, a knife-edge case). Shocks that do not cause net movement from the initial equilibrium past the unstable equilibrium result in a post-shock reversion back to the initial equilibrium.

Exploring the following shocks, assume only positive movements to some $\tilde{Q} > Q_0^*$, the initial equilibrium value.

For example, in Figure C.1 Panel (a) government spending moves the initial provision of artistic goods and services to some $\tilde{Q}$ between A_1^* and A^*2. At this point, production cost in excess of willingness to pay induces producer exit through negative profits, and thus a reduction in supply back toward initial equilibrium A_1^*.[41]

In the second case of Panel (b), government spending locates short-run supply at some $\tilde{Q}$ less than A_3^* and greater than A_2^*. At this point, demand dominates supply, and producers earn positive profits, inducing firm entry that increases production to close profits to zero toward higher equilibrium value A_3^*.

In the last case, depicted in Panel (c), government spending generates a supply to the right of A_3^*. Similarly to as in the first case, cost in excess of demand produces negative profits and induces firm exit. This causes a reduction in quantity provided toward the highest equilibrium value A_3^*.

This model illustrates the mechanisms that explain the empirical results. Artistic goods and services are characterized by agglomeration economies that introduce non-monotonicities into the supply curve. Under certain conditions, demand and supply can intersect at multiple equilibria. This setup can give rise to a coordination problem where all producers can cooperatively increase supply and move to a higher equilibrium, but cannot individually deviate, themselves.

[41] Alternatively, a case with a unique equilibrium also fails to generate movement to a new equilibrium.

In this case, a central planner can possibly coordinate movement to a higher equilibrium by inducing a large enough shock in order to adjust individual cost perception due to agglomeration benefits. The empirical results reflect the different possible outcomes; both large increases in artist shares in 1940 that were sustained into a permanently higher equilibrium into the long-run as well as large short run shocks that attenuated either in the decade immediately after or gradually in the subsequent decades.

Do these scenarios rationalize the empirical results? Table 2 illustrates that in relative terms the writers and theater projects saw the largest Federal One shocks in terms of New Deal employment relative to pre-existing artist population (over 150%). In contrast, musicians and artists saw only modest increases relative to their pre-existing populations (under 30%). However, parameterizing the relative size as the shock as the share of incumbent artistic professionals employed, Figure C.2 Panels (a)-(c) demonstrate little differential response among cities that received relatively smaller shocks and those that received larger relative shocks.

The model is grounded in the caveat that, empirically, the location of the unstable equilibrium, i.e. the tipping point, may vary substantially between fields. The difference in response between two fields that saw similar shocks—for example, designers and visual artists, where the former saw a permanent increase in employment share and the latter did not—can be attributed to differences in the field-specific unstable equilibrium point(s) in a non-easily falsifiable manner.[42]

Moreover, while the model can tractably rationalize the empirical results—the lack or presence of long-run persistence in a given artistic field—the model doesn't explain *why* such differences exist between fields. For instance, *why* is the unstable equilibrium located farther away from the lower equilibrium in artistic fields than in writing-related fields? (given that both fields saw large shocks). *Why* might the scale shifter of aggregate demand be too high or too low so as to only generate a single equilibrium in a specific industry? Moreover, this model does not explain the reasoning behind the location of the initial incumbent equilibrium.

Importantly, there no factors that preclude this agglomerative non-monotonic supply framework from application to other industries in a partial equilibrium setting. For this reason, we can rationalize other industries that are not typically associated with agglomerative tendencies as characterized by too high or low value of a scale demand shifter (i.e. so that the aggregate supply and demand intersect at only a single point). This setting thus features some flexibility in allowing for more general non-monotonicites in supply without generating multiple equilibria due to the specific interaction of supply and demand.

As another caveat, other model environments may incorporate the benefits of agglomeration in different ways that lead to fundamentally different interpretation of how these effects operate. Here, I ascribe the benefits of agglomeration entirely to producers and as strictly pecuniary—in the form of lower costs of operation. This interpretation of agglomeration differs from others, such as in Moretti (2019) that describes non-pecuniary agglomerative benefits to scientists as manifesting the form of higher quality production or productivity

[42]Alternatively, one could argue that Federal One treatment itself was allocated hetereogeneously by subfield *within* each sub-project. For example, the model implications would align with a scenario where the Federal Art Project allocated more funds/employment to design-like activities than to painting (which is actually unlikely to be the case in reality). However, the granularity of the Federal One archival data does not permit decomposing city-program employment counts to sub-program activity in a comprehensive manner. The archival documentation *do* occasionally include such finer disaggregations, but this is not typical within the data.

shifters. Similarly, an alternate model design might specify artists that maximize utility over discrete locations that depend positively on the presence/activity of other artists.

Additionally, the model here does not deeply engage with the possibility of demand-side effects. There are two possible implications for demand in particular that the model does not immediately accommodate. First, demand may also feature agglomerative non-monotonicities, notably in the form of network effects. For example, individuals may be more willing-to-pay for artistic goods and services that others consume, which may indeed be the case for the consumption of status-conveying goods such as contemporary art). Such demand-side agglomeration (e.g. network benefits) could result in a similar multiple equilibria framework through non-monotonicities—as operating through aggregate demand.

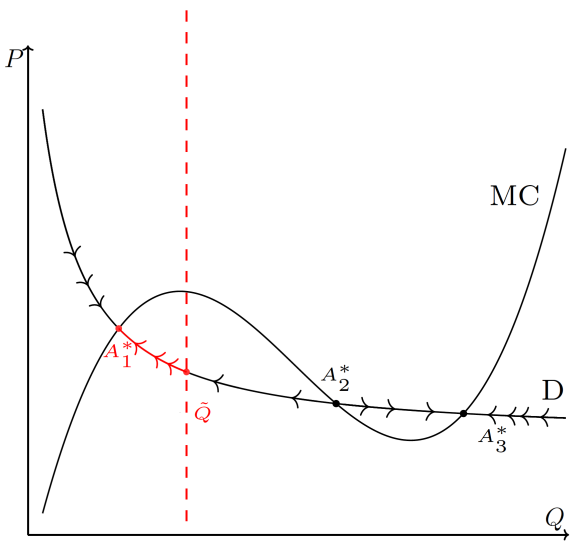
Relatedly, It may be the case that future demand of artistic goods and services depends on present equilibrium provision, and that an unsustained shock could induce a permanent or sustained shift in demand. As an example, McCain (2006) describes a process of learning-by-consuming that informs future consumption of the arts. Similarly, Murphy, Shleifer, and Vishny (1989) describe a simple model environment that combines demand and supply externalities where the positive profits of a single firm induce positive spillovers to other firms' demand and technological investment exhibit increasing returns to scale; they show that this setup (combined with other conditions) can also generate a "big-push" type industrial environment. In my case, the unsustained shock to the provision of artistic goods and services via Federal One may have influenced local tastes in a manner that could similarly induce a permanent shift in equilibrium production. However, this simpler story of path-dependent demand shifters does not readily accommodate the heterogeneity in persistence across subfields as does the supply-side agglomeration model.[43]

Importantly, while both of these alternate possibilities may undermine a supply-side agglomeration story, they do support the possibility of a "big-push" effect; that an unsustained shock may indeed continue propagate toward a permanent equilibrium shift. While I cannot empirically distinguish these channels, there is little empirical evidence or even anecdotal suggestion that the locations that received more Federal One activity indeed saw positive

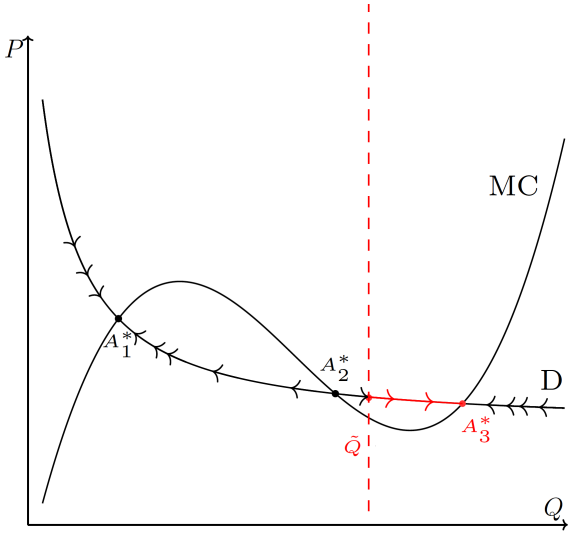
[43]One could explain the heterogeneity in persistence over artistic subfield by specifying on a more ad-hoc basis the quantitative nature of persistence in demand, but such an explanation would not generate a "big-push" tipping point that determines whether shocks result in a permanent equilibrium shift.

demand-side responses (e.g. people in San Francisco exhibiting greater willingness-to-pay for books than people in Cleveland in response to the increase in writing activity), suggesting the plausibility of supply-side agglomeration.

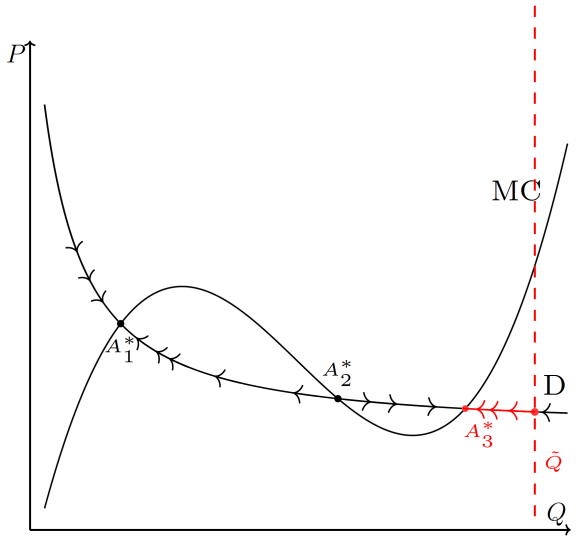
Figure C.1: Special case of aggregate supply and demand
Shocks, equilibria, and convergence



(a) Case 1



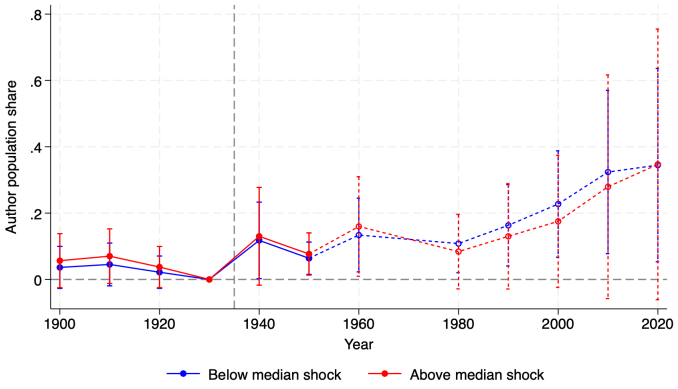
(b) Case 2



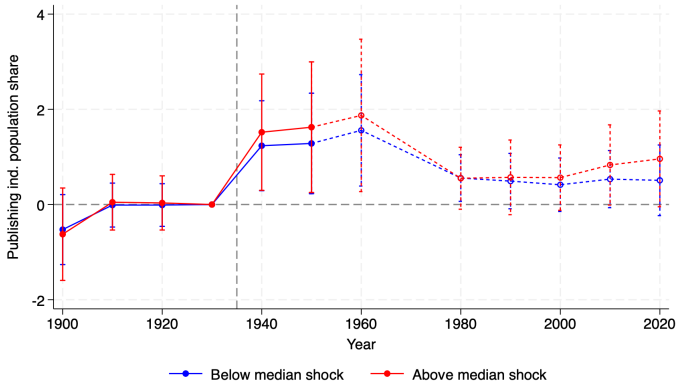
(c) Case 3

These figures illustrate the effects of different unsustained positive shocks to provision of artistic services on long-run equilibria and their respective transitions in the context of a three-equilibrium special case of isoelastic demand and non-monotonic aggregate supply due to agglomeration economies. Panel (a) corresponds with a positive shock that places the provision of artistic goods and services below the unstable equilibrium; the figure depicts the large initial shock followed by convergence back down to the initial, stable equilibrium. Panel (b) corresponds with a shock that places short-run provision in disequilibrium slightly below the higher stable equilibrium provision; the figure depicts the large initial shock followed by convergence increasing to a higher, stable equilibrium. Panel (c) corresponds with a shock that places short-run provision in disequilibrium slightly above the higher stable equilibrium provision; the figure depicts the large initial shock followed by convergence down to the higher, stable equilibrium.

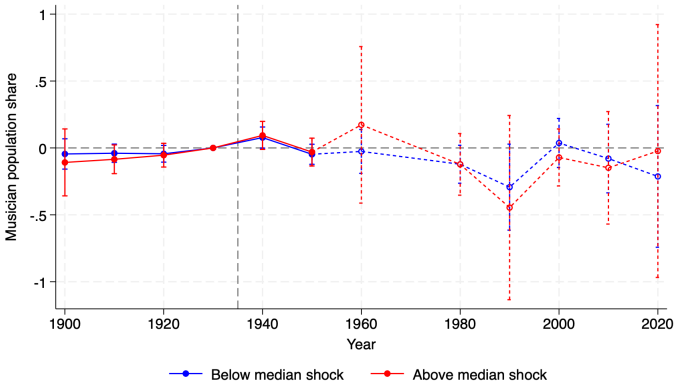
Figure C.2: IV estimation results above/below median shock
Panel (a): Writing and music professions



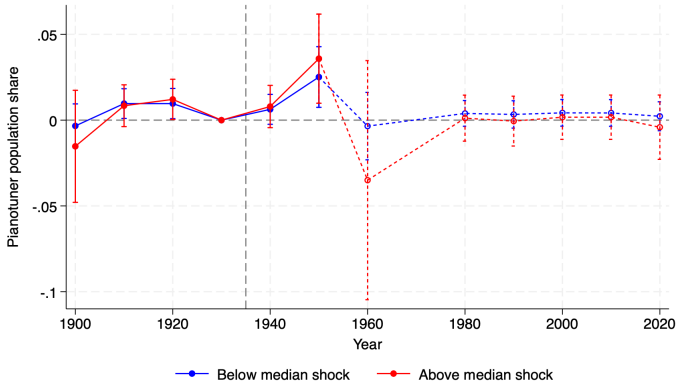
(a) Authors



(b) Publishing industry workers



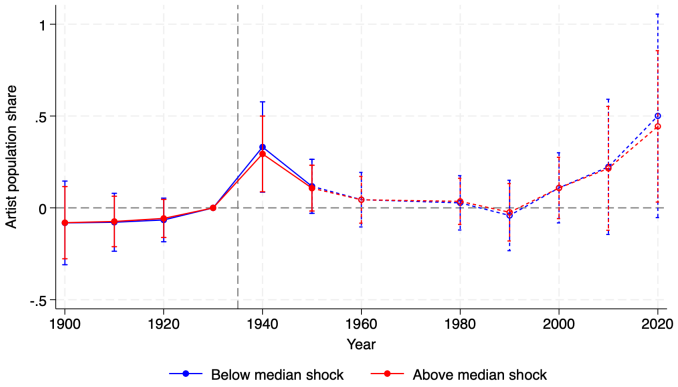
(c) Musicians



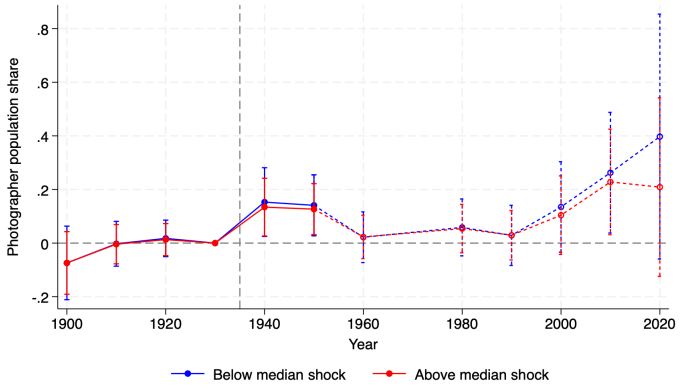
(d) Piano tuners

These graphs display the instrumental variables difference-in-differences coefficients $\{\beta_{dd,k}\}$ from a two-stage least squares regression, where the first stage regresses an indicxator for local Federal One subprogram recipiency on a local New Deal arts spending leave-out instrument, and the second stage regresses local artist shares on the fitted first stage. The two sets of coefficients correspond with an interaction of year, Federal One sub-project treatment status, and an indicator for whether the treated city constituted the bottom or upper half of the distribution of the ratio of Federal One sub-project employment to the incumbent artist population. Both groups are compared against the same group of untreated cities that constitute the control group. The decadal difference-in-difference coefficients are estimated relative to 1930. The error bars of each plot display 95% confidence intervals around their respective point estimates using standard errors clustered on the city-level. Results for piano tuners stop at 1950, as OCC1950 ceases recording this occupational outcome.

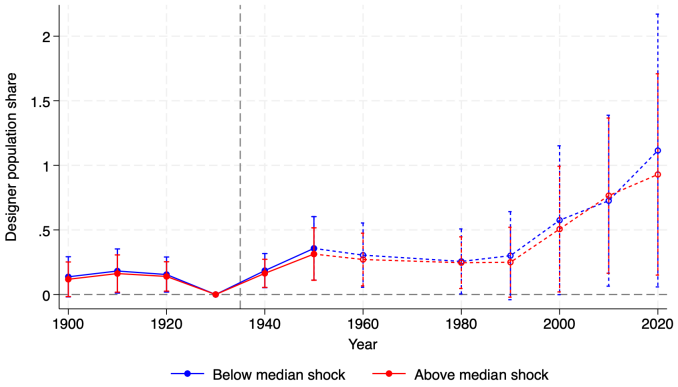
Figure C.2: IV estimation results above/below median shock
Panel (b): Visual artistic professionals



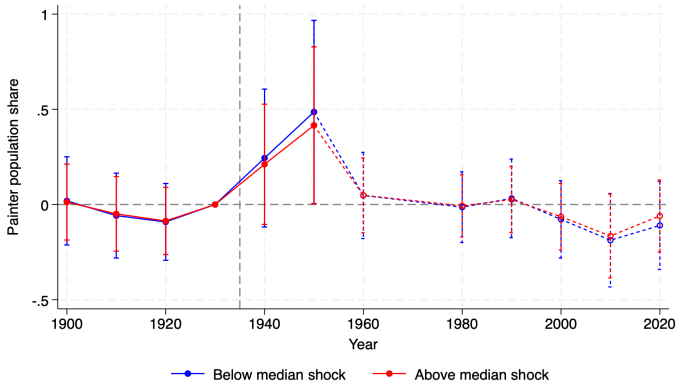
(a) Visual artists



(b) Photographers



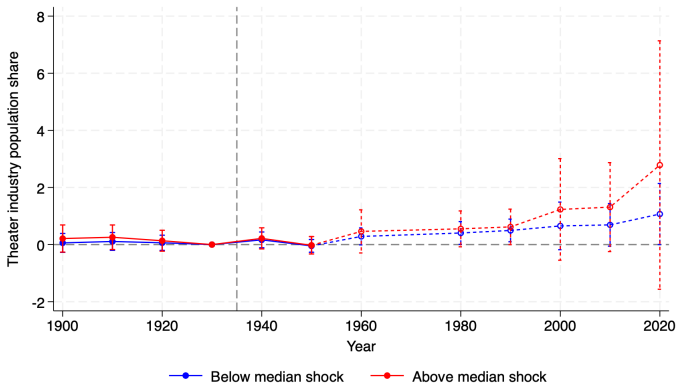
(c) Designers



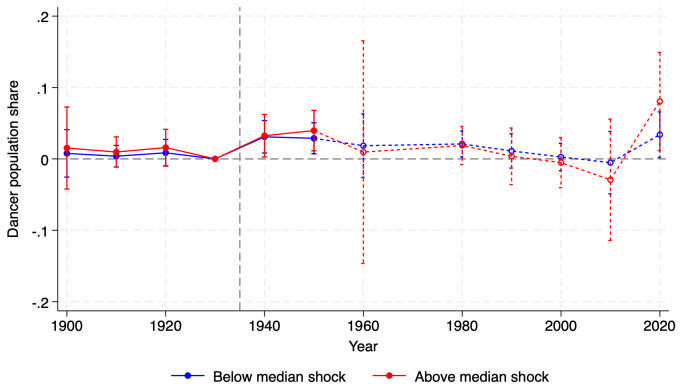
(d) Painters

These graphs display the instrumental variables difference-in-differences coefficients $\{\beta_{dd,k}\}$ from a two-stage least squares regression, where the first stage regresses an indicator for local Federal One subprogram recipiency on a local New Deal arts spending leave-out instrument, and the second stage regresses local artist shares on the fitted first stage. The two sets of coefficients correspond with an interaction of year, Federal One sub-project treatment status, and an indicator for whether the treated city constituted the bottom or upper half of the distribution of the ratio of Federal One sub-project employment to the incumbent artist population. Both groups are compared against the same group of untreated cities that constitute the control group. The decadal difference-in-difference coefficients are estimated relative to 1930.

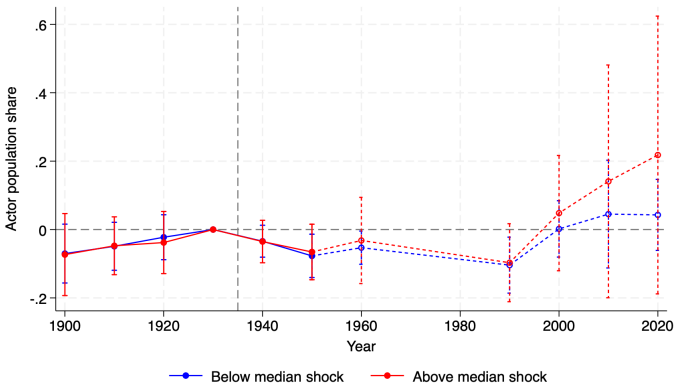
Figure C.2: IV estimation results above/below median shock
Panel (c): Theater and film professionals



(a) Theater/film industry



(b) Dancers



(c) Actors

These graphs display the instrumental variables difference-in-differences coefficients $\{\beta_{dd,k}\}$ from a two-stage least squares regression, where the first stage regresses an indicator for local Federal One subprogram recipiency on a local New Deal arts spending leave-out instrument, and the second stage regresses local artist shares on the fitted first stage. The two sets of coefficients correspond with an interaction of year, Federal One sub-project treatment status, and an indicator for whether the treated city constituted the bottom or upper half of the distribution of the ratio of Federal One sub-project employment to the incumbent artist population. Both groups are compared against the same group of untreated cities that constitute the control group. The decadal difference-in-difference coefficients are estimated relative to 1930. The error bars of each plot display 95% confidence intervals around their respective point estimates using standard errors clustered on the city-level.

Appendix D Evidence on mobility and occupation change from the Multigenerational Longitudinal Panel

This section investigates the possibility of mobility responses of artists to Federal Project Number One. Mobility responses have important implications for the validity of the central research design. Namely, if artists living in non-FPNo1 cities before the program move to FPNo1-treated cities, the IV difference-in-differences design is susceptible to SUTVA violations. That is, FPNo1 treatment would enact externalities on the artist shares of untreated cities.

To investigate this possibility, I make use of linked historical census data from the Multigenerational Longitudinal Panel (MLP). These data are also provided by IPUMS USA. They link individuals across decadal US censuses, and are available from 1850 to 1940.[44][45] These data typically identify around 15-20% of the population that can be connected between two consecutive full census waves.

Within each city-decade, I construct a set of variables pertaining to migration and occupation changes of artists. These variables aim to capture whether artists migrated from non-Federal One cities and whether artists previously held non-arts occupations in order to assess whether Federal One treatment induced migration or occupation choice changes. They are shares of artist in year t (1) located in a non-Federal One city in year $t-10$, (2) located in a non-Federal One city and identify tagged as artists by occupation status in year $t-10$, (3) located in an opposite Federal One treatment-status city in year $t-10$, (4) located in an opposite Federal One treatment-status city and identify tagged as artists by occupation status in year $t-10$, and (5) observed as non-artists by occupation status in year $t-10$.[46]

[44] As of May 10, 2024, the MLP portal states that the MLP includes the 1950 census. However, these data are not actually available.

[45] The data here consists of four stacked sets of consecutive decade pairs (i.e. 1900-1910, 1910-1920, 1920-1930, and 1930-1940), because the linked MLP data only include individuals that appear in all specified waves.

[46] For example, the "new artist" share (the share artists of observed previously as non-artists by occupation status in year $t-10$) is constructed for city i in year t as $\frac{\sum_{j \in i} 1\{Occupation_{j,t}=Artist\} \cdot 1\{Occupation_{j,t-1} \neq Artist\}}{\sum_{j \in i} 1\{Occupation_{j,t}=Artist\}}$, for individuals j in city i.

of [47]

Conceptually, observed changes in local artist populations can be decomposed between changes in (a) artists changing geography (movers), (b) entry from other careers, (c) exit to other careers, (d) first entry into the census as artists (e.g. moving to the US or first entry into the labor force), and (e) exit from the census (e.g. death or leaving the US). The data allow me to partially observe changes in geography and changes in occupation among people that are observed and matched across censuses. However, by construction, I cannot make direct inference on individuals entering the census for the first time as artists or individuals permanently exiting the census (groups (d) and (e)). I observe only partially groups (a)-(c) for two reasons: first, as mentioned, only around 15-20% of individuals are successfully linked across two consecutive censuses. Second, I only focus on cities in my setting, so I do not observe migration between non-cities and cities (which would not constitute a SUTVA violation).

I estimate a set of analogous decadal IV-difference-in-differences regressions to the estimating equation in the main design that compares Federal-One treated and untreated cities as instrumented by non-arts New Deal spending. Table D.1 displays the OLS and IV results from this estimation procedure for the union of *all* types of artists observable in the census by either occupation or industry. The results indicate that increases in artist populations in Federal One treated cities did *not* come at the expense of artists from non-Federal One cities. The OLS results actually broadly indicate a decrease in migration of artists from non-Federal One cities to Federal One cities, while the IV results are uniformly insignificant.

Figure D.1 and Figure D.2 disaggagrate these responses by specific field of art for the share of new artists and for movers across Federal One treatment status. The impacts on the share of "new" artists are insignificant across both OLS and IV specifications, whereas mobility responses are more consistently negative. The second specification tests mobility of artists between cities of Federal One treatment status. A positive coefficient would indicate that there was an increase in mobility of artists from Federal One untreated cities in 1930 to

[47]Specifications (3) and (4) represent more properly-formulated comparisons of mobility compared to variables (1) and (2), which estimate mobility specifically from non-Federal One cities. Moving Federal One treatment status features a symmetry for treated and untreated cities, whereas comparing mobility originating from non-Federal One cities may likely captures asymmetric migration flows for treated and untreated cities.

treated cities in 1940 relative to movement in the opposite direction. However, the observed response weakly indicates the opposite to have occurred: a noisy *decrease* in mobility from untreated cities to treated cities. I interpret this result to corroborate the validity of the main design: that the design features no SUTVA violation.

Table D.1: Mobility and occupation choice: all arts professions

	(1) From non-FPNo1	(2) From non-FPNo1 and artist	(3) Moved FPNo1 status	(4) Moved FPNo1 status and artist	(5) New artist
OLS					
FPNo1 binary × Year 1940	-0.15***	-0.044***	-0.12***	-0.013***	-0.021**
	(0.014)	(0.0069)	(0.015)	(0.0045)	(0.0086)
Constant	0.92***	0.22***	0.082***	0.026***	0.76***
	(0.0022)	(0.00087)	(0.0021)	(0.00058)	(0.0011)
Adj. R-squared	0.83	0.52	0.23	0.10	0.09
N	2957	2957	2957	2957	2957
Number of clusters	957	957	957	957	957
Instrumental variables					
FPNo1 binary × Year 1940	0.029	-0.033	-0.14	-0.014	-0.0069
	(0.16)	(0.060)	(0.10)	(0.048)	(0.064)
Adj. R-squared	0.24	0.29	-0.32	-1.39	-0.29
N	2878	2878	2878	2878	2878
Number of clusters	940	940	940	940	940
Treatment mean 1930 (%)	0.249	0.043	0.249	0.043	0.729
City FEs	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes

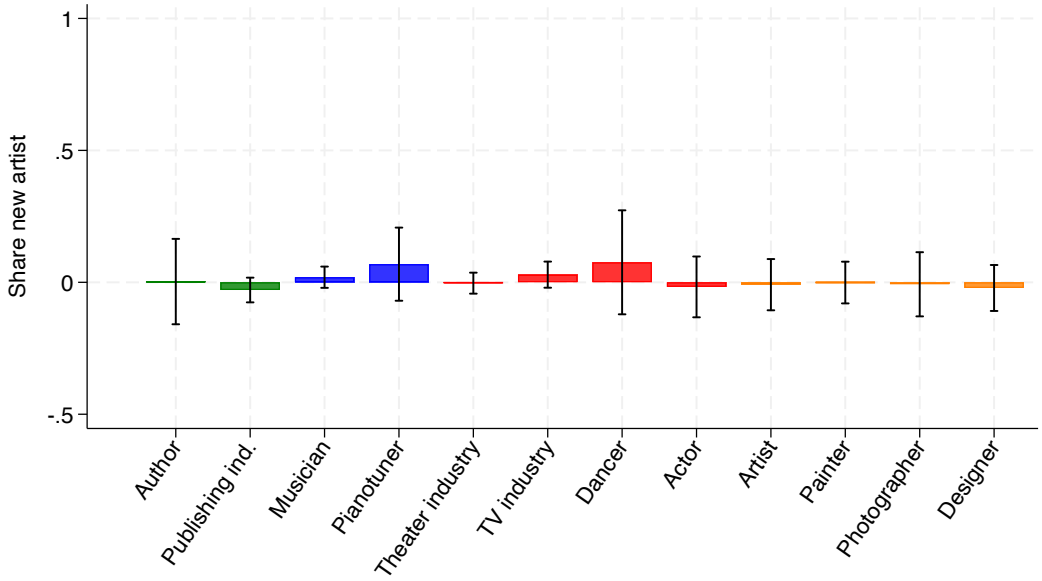
City-clustered standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

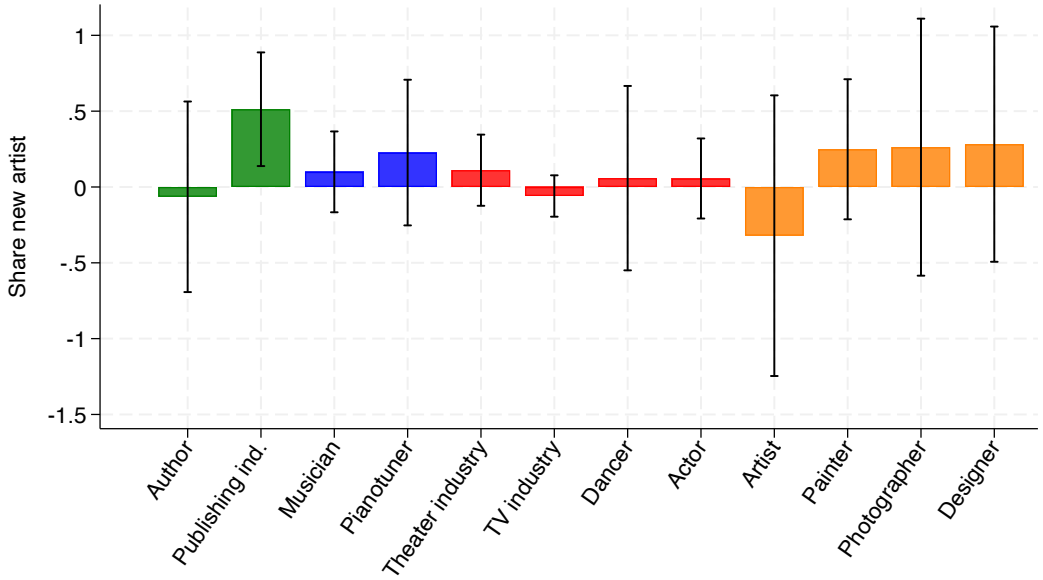
This table displays the difference-in-differences coefficients for artist mobility/occupation change shares on Federal One treatment status. The coefficients are estimated relative to the average difference from 1910-1930. The IV specification instruments Federal One treatment status using the logarithm of non-arts New Deal spending. All of the specifications include fixed effects on the city- and year-level.

Figure D.1: Federal One impact on the share of "new" artists

Panel (a): OLS



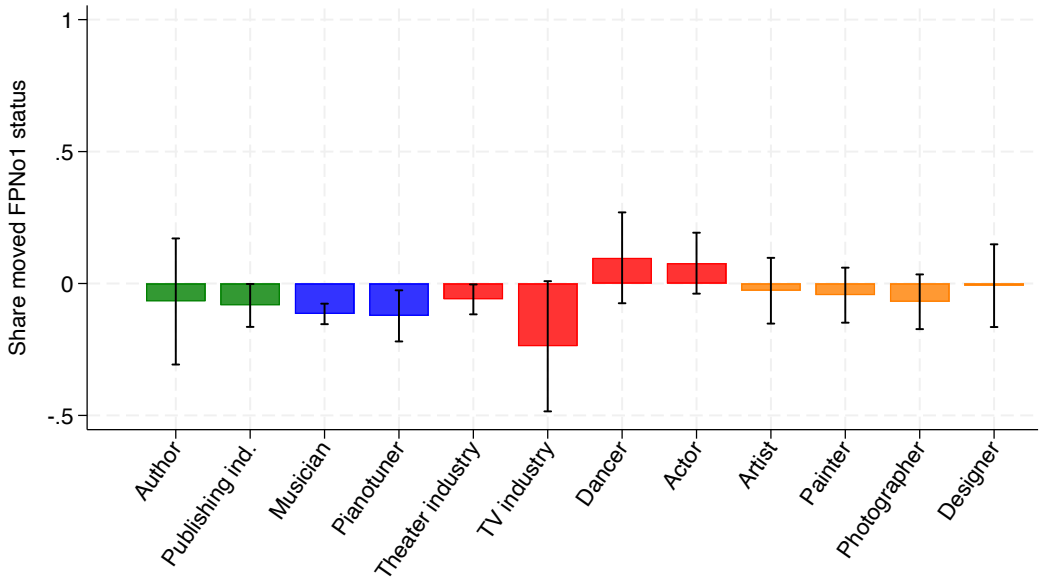
Panel (b): Instrumental variables



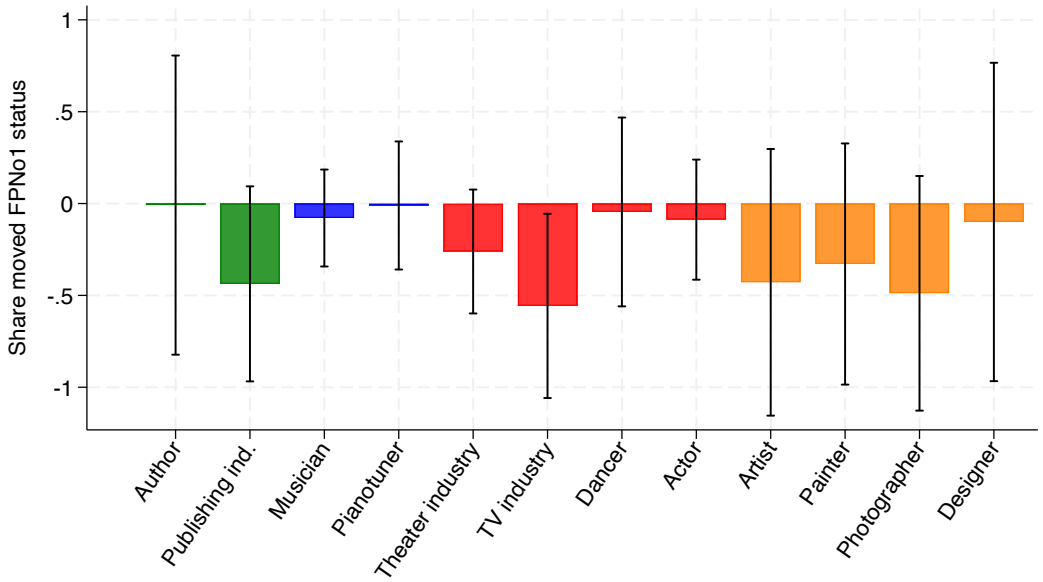
Note: these figures show the difference-in-difference regression coefficients of the share of artists in city i in 1940 that was observed in the 1930 census with a non-arts occupation. Each bar corresponds with the coefficient $\hat{\beta}_d d$ from a regression $y^l_{it} = \alpha_i + \delta_t + \beta^l_{dd} FederalOne^l_i \mathbb{1}\{Year_t \geq 1940\} + \varepsilon_{it}$.. Panel (a) plots the OLS difference-in-differences coefficients; Panel (b) instruments Federal One treatment status with the logarithm of non-arts New Deal spending.

Figure D.2: Federal One impact on the share of artists observed in prior census living in a city of opposite Federal One treatment status

Panel (a): OLS



Panel (b): Instrumental variables



Note: these figures show the difference-in-difference regression coefficients of the share of artists in city i in 1940 that was observed in the 1930 census living in a city of opposite Federal One treatment status. Each bar corresponds with the coefficient $\hat{\beta}_d d$ from a regression $y_{it}^l = \alpha_i + \delta_t + \beta_{dd}^l FederalOne_i^l \mathbb{1}\{Year_t \geq 1940\} + \varepsilon_{it}$.. Panel (a) plots the OLS difference-in-differences coefficients; Panel (b) instruments Federal One treatment status with the logarithm of non-arts New Deal spending. This specification