Market structure and creative cluster formation: The origins of urban clusters in German literature, 1700-1932

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Abstract

Using yearly data on 153 prominent German authors (1700-1932), we show how changes in the political and economic environment facilitated the formation of literary clusters. Early authors follow general population patterns, leading to geographic dispersion in a patronage system characterized by spatial competition. At the end of the 19th century, authors concentrate in large economic and political capitals. These changes in location patterns mirror trends in political and territorial consolidation and the professionalization of authorship. The last cohort shows large-scale migration into literary centers around the age of 20. Therefore, these literary clusters are not due to changing birth locations.

JEL-codes: N93, R12, Z11

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1 Introduction

Many papers observe two key patterns in the location of creative workers: the attraction of large cities and proximity to other creative workers. However, creative clusters are usually taken as a given, with few studies looking at the origins of creative clusters. Our empirical setting and detailed biographical data on German literary authors allow us to provide new insights into the formation of creative clusters, that is their location and dependence on the market structure in literary publishing and in the labor market for literary writers.

Within Western literature, German literature is a rare case of simultaneously having a long timeline and an initially high degree of geographic dispersion. This allows us to observe a long-term concentration process in the location decision of authors. By comparison, Paris and London long dominated as a location for British and French authors (see, e.g., Mitchell, 2019), while the US has a relatively short literary history. Furthermore, the creative process studied here, literary writing, is a primarily solitary activity without infrastructure requirements like concert halls or studios. Therefore, authors can react to changing economic conditions relatively easily. In addition, during the time frame observed the labor market for German writers changed markedly. At the end of this period, writing could provide a sufficient income, while earlier writers often relied on some form of patronage.

To study location decisions in this empirical setting, we have lifetime biographic, publication, and location data on 153 of the prominent writers associated with German literature from 1700 to 1932 (in total 8146 observations with a known location in Germany). We combine these with various datasets on the development and location of book publishing and trade, as well as on urban population, capitals, independent cities, and university cities. These detailed data and the long time horizon allows us to study changes in the attraction of large cities, proximity to other writers, and ultimately the formation of literary clusters. Importantly, the yearly data allows to distinguish moves at different career stages, which is indicative of the changing opportunities provided, for instance by a university town or capital city.

We postulate two stylized stages in the economic framework of literary writing: a patronage-based labor market and a market dominated system. During the 18th century, most authors relied on patronage for their outcome, which often comes as reward for literary success. This

included stipends but also positions as private tutors, noble courts, or at universities. After the political consolidation during and after the Napoleonic wars and during the early industrialization and urbanization in the first half of the 19th century, employment opportunities were more often found in cities than small university towns and with the new middle classes rather than the more rural nobility. However, writing in itself did not provide a sufficient outcome for almost all writers. As such, this second period falls between the two stylized market conditions. In contrast, writers who were born later in the 19th century, in particular those born after the unification of Germany in 1871, could find employment with newspapers and publishing houses and, if successful, live off the direct income from literary publications.

Our empirical findings are consistent with this stylized framework. We find that, over the 19th and early 20th century, authors become more likely to live in large political and economic capitals. A second concentration process within cities led to half of all authors living in Berlin alone in 1932 (or 2/3 of those living inside Germany). The number of authors in Berlin, and to a lesser extent Munich, at the beginning of the 20th century is much higher than in earlier short-lived clusters that relied on some form of patronage, such as Weimar.

Our main empirical finding, however, relates to the location choice of authors over the life-cycle. Not only do we observe fewer moves into literary clusters for earlier cohorts, 18th century authors moved into clusters and prestigious locations like political capitals late in their career. Therefore, employment in such a location can be seen as a reward for a successful literary career. In contrast, the last cohort moves to Berlin and Munich and other large cities during their twenties, before or around the time of their first literary publication.

Therefore, the late clusters in Berlin and Munich resemble the image of a modern creative cluster more closely. That is a thriving cultural scene that attracts young aspiring artists to live, work, and learn together. In contrast, the geographic distribution of early authors more closely resembles that of modern-day university scientist who, by design, are spatially dispersed at different universities. This similarity is consistent with the spatial competition in the labor market of early authors relying on patrons (including universities) and the labor market of university-based researchers.

The findings add to the historical evidence on migration, in particular high-skilled migration. We can directly compare our results to evidence of the locations and overall migration levels

of other groups of creative workers during the time given by Kelly and O'Hagan [2007] and O'Hagan and Hellmanzik [2008] for visual artists, Borowiecki [2013] for composers, O'Hagan and Walsh [2017] for philosophers, Mitchell [2019] and Kuld et al. [2021] literary writers (both indirectly), and Borowiecki and Dahl [2021] for all creative activity. These studies focus on the clustering of creative workers and show remarkable concentration in key locations. However, by focusing on location choice, we can provide a more complete picture than these studies on aspects such as the link between age and migration and its development over time.

This paper complements large scale historical research on the locations of creative workers (with $n \gg 1000$, see for example, Schich et al., 2014, and Serafinelli and Tabellini, 2022) by providing a more complete picture of individual migration. We show, for instance, that the common empirical restriction to only observe birth and death locations can hide substantial geographic concentration due to life-cycle migration.

Kuld and O'Hagan [2019] use an earlier version of the author panel data in a working paper to show general location, mobility and publication patterns in German literature. O'Hagan [2021] uses these data to focus on the link between mobility frequency and publication patterns over the life-cycle. Both papers also provide a substantial, and partly overlapping discussion of the broader political, economic, and literary development over the time frame. To trace the clustering process over the life-cycle and over time, we add new location information (e.g., universities, political importance, book traders), data on the publishing industry, and missing location data, in particular during the childhood. This allows us to extend the analysis on location choice in the Kuld and O'Hagan [2019] working paper.

This research adds to the literature on how the political and economic environment influences the geography of creative and innovative activity (Audretsch and Feldman, 1996; Feldman, 1994; Audretsch and Feldman, 2004; Carlino et al., 2007, among others) and thereby also urban development (e.g., Stasavage, 2014; Ades and Glaeser, 1995; Davis and Henderson, 2003; Cox and Figueroa, 2021; Wahl, 2019; Michaels and Rauch, 2018). To date, the role of political and economic environment in shaping the geography of creative and innovative activity, particularly in historical contexts, has been relatively unexplored.[1,2] To our knowledge, this paper is the first historical study to focus on how these factors influence cluster formation.

The remainder of the paper is organized as follows. Section 2 provides an overview of the political

and economic environment in Germany from 1700 to 1932. Section 3 discusses theoretical patterns in location choice and cluster formation. Section 4 describes the dataset and provides descriptive statistics. Section 5 presents empirical findings, and Section 6 concludes.

2 Historical background

Until the Napoleonic Wars in the early 19th century, the territory that would later constitute the German Empire had a very decentralized political system composed of around 300 small, effectively independent states [Fullerton, 2015].[3] Large imperial cities often restricted longer-distance, interregional migration and migration from rural areas, while small and medium-sized towns tended to offer more job opportunities and easier migration processes. As a result, immigrants tended to originate from areas within 5 to 10 kilometers of their destination, and rural to urban migration was relatively limited compared to that of countries such as France, Italy or England [Oltmer, 2015].

As a result of the Napoleonic Wars, almost all of the imperial cities, abbeys, and small princely states were annexed into larger states between 1802 and 1815 (the number of German states was reduced from almost 300 to 41). This consolidation extended to universities, a common source of employment for authors. Many of the smaller universities mostly located in small, politically unimportant towns closed, including 13 Catholic universities. The closed universities were partly replaced by newly founded universities in capital cities, such as in Berlin in 1810.

Napoleon's final defeat in 1815 was followed by another political and territorial restructuring with the establishment of the German Confederation. The earlier consolidation and secularization was confirmed in principle though in new shapes reflecting the changed power structure (37 principalities and 4 free states in 1815) [Fullerton, 2015]. This affected migration within and between the new larger states. On the one side, the individual states abolished payments required for emigration [Hitzer, 2015]. On the other side, towns and cities typically continued to limit immigration on the municipal level [Hitzer, 2015]. In addition, German authorities at different administrative levels used the requirement to carry a passport to restrict travel and migration [Fahrmeir, 2015b].

For most citizens, free internal movement and settlement came only with the unification of 1871

[Fahrmeir, 2015a]. While citizens of the German Empire continued to be formally identified by their individual state (e.g., Prussian, Hamburg, or Saxon), their federal citizenship took precedence in migration law. However, it is important to note that the Empire did not introduce the freedom of movement for the entire population and barriers to movement persisted [Oltmer, 2015; Fahrmeir, 2015a]. Overall, an author's ease of migration was specific to time, place, and social status. (Famously, Schiller, who was pushed to become a military doctor, was forbidden to leave the state of Württemberg by penalty of imprisonment.) However, financial constraints were arguably more restrictive than legal restrictions for authors in most cases.

During this time, the book market grew relatively slowly, as illustrated in (see Figure A.1). The German book trade and authorship operated under a patronage system well into the 19th century, lagging other European countries, like the United Kingdom, in the development to a profitable book market [Tatlock, 2010].[4] Under this system, authors competed for a spatially limited number of positions under a patron, including positions in the public administration or at a university, or tutoring the children of nobility and merchants.

By the early 19th century, it was possible to earn a modest income through writing under this system, but few writers before the 1830s were able to make a career solely out of writing. Therefore, it was not uncommon for writers to have secondary employment. In this way, writing could lead indirectly to an income as tutor, teacher, or counselor, but writing was of minor importance for direct income, such as royalties, until at least the 1830s. Johann Wolfgang von Goethe (1749-1832) was one of the first authors who was able to make a living from writing, but he was the exception to the rule [Tatlock, 2010].[5] However, even Goethe worked as an adviser in the political administration of the Duke of Saxe-Weimar, a reward for his literary success.

This low profitability of authorship was due, in part, to lack of copyright protections until the mid-19th century. Because of the decentralized and fragmented political systems, it was difficult to enforce even informal copyright agreements across states. Pirated copies were common, particularly for commercially successful original editions [Moldovanu and Tietzel, 1998]. This lack of copyrights led to legal ambiguity regarding rights to the manuscript that led to conflicts between authors and publishers.[6] Publishers usually did not reveal the true number of copies printed in a given edition or the number of editions printed (Moldovanu and Tietzel, 1998, p. 857), which made it difficult for authors to negotiate payment based on prints, reprints, sales or

to know the extent to which their works were pirated.[7]

However, growing demand from middle-class readership during the first half of the 19th century caused the book market to expand quickly, as illustrated in Figure A.1 [Fullerton, 2015].[8] During the same period, the printing industry saw several major technological advancements in printing technology, starting with the invention of the more durable all-metal press in 1800 [Tatlock, 2010]. Higher demand and lower costs gave authors more bargaining power, which enabled them to negotiate better payments and protections. The first copyright was recognized when Prussia introduced copyright legislation in 1837 but offered limited protections to authors due to the culture of piracy and lack of protection in other German territories [Tatlock, 2010].

The 1870s marked another turning point. The year 1867 saw the end of perpetual publishing rights and the establishment of a general 30 year copyright [Berman, 1983]. The establishment of a German nation-state in 1871 not only shifted and centralized political power but also resulted in a harmonization of the legal systems, which reduced the costs of enforcing author rights and of migration.

Around the same time, rapid urbanization was accompanied by a growth in incomes and a shorter working week [Fullerton, 2015]. The result was an urban population that had more disposable income, more leisure time, and a taste for reading. Fullerton [2015] notes that "Already high in 1871, the rate of literacy increased after that. Statistics on recruits into the Imperial Army show that in 1875, 2.5 percent were illiterate, in 1880, 1.6 percent, in 1889-1890, 1.3 percent, and in 1889-1890 0.51 percent. Only Sweden and Denmark had lower incidences of illiteracy than Germany in the 1880s" (p. 169). Mass book production was made more efficient due to several key advancements in printing technology that reduced printing costs and printing time,[9] the first international copyright laws were introduced just a few years later with the Berne Convention of 1886 [Tatlock, 2010]. The result was a boom in the publishing industry and book trade starting in the early 1870s (see Figure A.1).[10] The number book dealers and retail shops both more than doubled from the mid-1860s to 1890, and the number of book titles published annually increased by 62% over roughly the same period [Fullerton, 2015, p. 138]. This was accompanied by a rapid growth in authorship.

These economic and political changes cemented the shift from a patronage system to a market-based system. Authors were finally operating in a modern, competitive market with a growing

demand for books. Author location choice was no longer determined by a high degree of spatial competition, and with the lowering of barrier to migration under German unification, authors had more freedom in terms of location choice. The German territory and population was reduced by around a tenth following World War I, but the German Empire remained a unified nation-state until the rise of the Nazi Party in 1933. Before 1933, the political events did not have a major impact on the book market or author mobility. We end our study in 1932, in the following years the hostile environment of Nazi Germany resulted in emigration of the vast majority of authors in our sample.

3 Theoretical patterns in author location and cluster formation

We contrast two stylized types of labor markets faced by a literary writer: a broadly defined patronage system and a market-based system. A writer's production function is assumed to be the same under both systems as the nature of literary writing did not change significantly over time (e.g., no observed increase in collaborative writing or automated writing). Therefore the basic mechanism for location preference is the same under both regimes: agglomeration forces on the one side, including learning, matching with publishers, but also social aspects of co-location with other writers and artists, and, on the other side, a writer's need to draw an income, either directly from writing, from a non-literary day-job, journalistic/commercial writing, family wealth, or through a patron.

In the patronage system, authors rely and compete for support from patrons, such as nobility, universities, or the wealthy middle class. Conceptually, we include employment, for instance as tutors, lecturers, or civil servants, if given due to literary reputation. Patronage typically limits the location choice for the writer, for instance through the provision of housing or employment. Options might be spatially concentrated or dispersed. For instance, in the UK and France, we see an early convergence of potential patrons in Paris and London, whereas Germany never experienced the same level of centralization. Writers without a patron then mostly rely on non-literary day-jobs with again an unclear spatial distribution.

If we include, reputation-based employment and family support, patronage was the major funding mechanism for European authors in a not yet market-based literary field [van den Braber,

2017]. After 1850, market dominance increased and patronage was marginalized [van den Braber, 2017]. By the end of the 19th century, many more authors than before were able to draw a relevant part of their income from literary writing. In addition, some large cities developed employment opportunities adjunct to literary writing such as journalistic/commercial writing. The combination of a primary income from literary writing and supplementary employment in adjunct industries characterizes our ideal type of a market-based literary system.

In the stylized market system, authors are able to co-locate in order to benefit from agglomeration economies. Following the classification of Duranton and Puga [2004], the agglomeration mechanisms can be classified as, first, *sharing* of infrastructure, including artistic infrastructure such as libraries and cafes, and of general agglomeration benefits, including a large and diversified labor market offering alternative employment. Second, they also likely benefit from *matching* with publishers and other authors to form collaborative circles that facilitated intellectual exchange.[11] Third, agglomerations facilitate *learning*, that is the creation, transmission, and diffusion of knowledge between authors, through spatial and potentially social proximity.

Such agglomeration economies on the production side arise under both a patronage and a market dominated literary regime. Demand side agglomeration economies are less clear cut. Unlike actors and musicians, authors do not need to be close to their final audience geographically. However, agglomerations can improve the matching between authors and intermediaries/gatekeepers, that is book publishers, newspaper editors and critics, and theater directors. For instance, even as a published author, Upton Sinclair had to approach several publishers in New York for his novel *The Jungle* (1906) [Kuld et al., 2021]. This illustrates the high costs of publishing well into the 20th century, but also how being close to publishing houses lowers the search costs. On the other hand, there are endogenous limits to agglomeration economies, where the matching might be improved in a smaller market or a large number of playwrights compete for little demand from local theaters.

It is beyond the scope of this paper to empirically identify and differentiate individual agglomeration mechanisms. Instead, we will postulate several hypotheses for the location choice of German authors over time and life cycle, highlighting the expected difference between the patronage and market regime.

First, in the market system, authors in the periphery will tend to migrate to a literary cluster at

an early career stage and remain there for the duration of their career. The standard economic way to see migration is a function of expected gains and costs of moving. Typically, labor migration peaks during early adulthood; higher age is associated with more social and economic attachments and less cumulative gains from migration [Becker, 1964]. Furthermore, authors show a high level of skill and specialization. These factors are typically linked with higher mobility as, arguably, specialized jobs are less widely distributed and high levels of education can reduce adaption costs. A dense network of publishers, newspapers, magazines, advertising firms, and other industries that require writing skills would provide a large pool of alternative or supplementary labor market opportunities. Therefore, authors are likely migrate to a cluster when they are young because they face lower relocation costs and will receive a higher pay-off, and they are likely to remain in the cluster for the duration of their career.

In contrast, if literary clusters are due to patronage, that is a reward for for publications or at least showing promise, then authors are expected to re-locate to clusters later in their life, typically after their first publications. Clusters are also not supported by a wider literary agglomeration providing adjunct employment for not yet established writers. In addition, publications cannot generate an income to relocate to a cluster. This leads to the first hypothesis.

Hypothesis 1. *In the patronage system, authors who move to a cluster/desirable location, do so at a higher age and are more likely to have published before moving. In a publishing market regime, authors move to clusters at a younger age, often before their first publication.*

While author mobility is not limited by physical infrastructure requirements, firms in related industries (such as book printers, publishing, sellers, editors) do have large physical infrastructure requirements and thus high cost of relocation. Therefore, their patterns of location are likely to persist over time. If authors co-agglomerate with these industries, the location of literary clusters will also tend to persist over time. Furthermore, Mitchell [2019] and Kuld et al. [2021] find these related industry tend to be located in large urban areas that are economic and political centers. As such, literary clusters are likely to develop and persist in large urban areas in a market system.

However, these idealized conditions that facilitate these outcomes were not met for most of the period due to the political and economic factors described in the previous section. These factors likely impacted author mobility in several key ways. First, authors not only competed for

literary patronage but also for a limited number of teaching or advisory positions, this system would reduce the attraction of living near other writers. Therefore, we expect authors to be distributed relatively evenly across territories; although, we would still expect to see a greater concentration of authors in the territories famous for their literary patronage or with wealthy patrons or a university that could support multiple authors.

Second, under the patronage system, authors' employment was linked to a patron rather than to a publishing house. Therefore, authors were not able to fully realize the agglomeration gains associated with co-agglomeration with industries related to book production and book sales. Thus, we do not expect to see a high degree of co-agglomeration until after the decline of the patronage system.

Third, a high degree of competition for a limited number of positions in a given location would increase the rate of migration throughout the career as authors would need to move to another location pursue new employment opportunities. At the same time the absence of large agglomerations makes long-distance migration to these dominating locations less likely. Therefore, during the periods characterized by a patronage system, we expect to see a a high rate of migration over short distances between smaller and medium-sized cities with few or no other authors.

Fourth, due to the spatial competition among authors and a dramatically shifting political environment, we do not expect to observe a stable literary cluster or group literary clusters. Instead, we expect the changes in the location of literary clusters to initially mirror the changes in the political and economic centers, and we expect the location of literary clusters to stabilize with the professionalization of authorship.

Hypothesis 2. *In the patronage system clusters are smaller and short lived in a distribution that mirrors the distribution of patrons, for instance located in capitals and university towns. In the market system, clusters will converge to larger clusters in large urban agglomerations, which persist over time.*

Since political and territorial consolidation, and technological progress decreased the barriers to migration, we would expect migration distance to increase with increased consolidation. However, we do not expect to see a major shift in author mobility or migration patterns until after the book market shifted away from a patronage system and towards a competitive book market in the mid-1800s. Specifically, we do not expect the periods of territorial consolidation

in 1806 and 1815 to have an immediate impact on author mobility, location choice, or clustering intensity because market structure would not support the formation of literary clusters. Instead, we expect these patterns to shift relatively slowly during the period of territorial consolidation and reorganization from 1818 to 1870.

Since the German book market was transitioning to a competitive market during the latter half of the 19th century, we expect to see more rapid changes in author mobility, location choice, and clustering intensity after German Unification in 1871. After this period, we expect that authors will move less frequently and over long distances. Because the market structure enabled authors to benefit from proximity to other authors, we expect to see an increased likelihood of locating in a large city and, as a result, a high degree of clustering intensity in a few, large cities.

Hypothesis 3. *The frequency of moves decreases over time while move distances increase.*

4 Data

Historical data for Germany is often limited. This is partly due to the shifting German borders and subdivisions. For instance, there might be population data on Prussian counties in some years, but this would not be the case for Bavaria or some other smaller states.[12] To address this limitation, we will combine data from a variety of sources in order to outline political and industry developments. However, the coverage remains spotty in several areas. The construction of the dataset and all definitions / classifications used are described in more detail in Supplementary Appendix Section 3.1 (available on GitHub).

4.1 Author data

We use a unique panel dataset on 153 prominent authors associated with German literature and born in the 18th and 19th centuries. We followed the Mitchell [2019] methodology for data collection. The dataset includes biographic and publication data, as well as the place of residence for every year of an author's life (larger part of the year). We use a map of the 1910 German Empire to classify German locations. We identify the longitude and latitude of each location using OSM data by OpenStreetMap contributors [2021]. We calculate all geographic distances based on locality centers.

To track relative changes over the lifespan, we show statistics for three cohorts, 53 writers born between 1700 and 1785, 43 writers born between 1786 and 1830, and 57 writers born between 1831 and 1899. The years 1785 and 1830 were chosen as cut-off points to reflect the political development and birth peaks. A writer born in 1786 would turn twenty after the end of Napoleon's influence in Germany and the political reorganization of hundreds of formerly independent territories into large territorial states. A writer born in 1830 would have spent the formative and typically most productive years of his career before the unification in 1871.

The last group, then consists mostly of authors born toward the end of the 19th century, as the failed 1848 revolution might have led to a lost generation of authors (only four authors were born during the 16 years from 1832 to 1848, compared to, e.g., 23 during the last 16 years of the 19th century). However, these groups should not be seen as inherently distinct, homogeneous entities. The cut-off points for these birth cohorts remain random to some degree. Our empirical findings are robust to changing these cut-off point by several years.

We provide summary statistics of the three birth cohorts in Table A.1. Since we truncate the analysis at 1932, we provide summary statistics for the 1831-1899 birth cohort for their entire lives from birth until death, as well as for their lives up to 1932. On average, authors in the first two birth cohorts live to their early 60s, while the average author in the last birth cohort lives around 7 years longer. Authors across all birth cohorts produce, on average, 11-13 works over the span of their working lives (age 18-65). The average author in the 1700-1785 birth cohort relocated 7 times within their lives, while the 1786-1830 birth cohort relocated the most with around 9 relocations. Relocations/moves are defined as a change in known location between, that is we do not consider unknown locations.

We summarize the top 10 author locations (in terms of author-year observations) for the periods 1700-1805, 1806-1870, and 1871-1932 in Table A.2. It is important to note that these cities represent the cities in which authors lived for many years but do not necessarily represent cities where authors tend to co-locate.[13] Berlin is the most popular location of residence in every period, but a high degree of clustering does not emerge until the later periods.

This can be compared with Figure A.2, which illustrates the share of authors and the share of the urban population in major cities per year. In all periods, authors are more highly concentrated than urban population. Berlin is consistently the most popular destination for authors from the

mid-1800s. By the end of the sample period, Berlin emerges as the only major cluster, with more than 50% of the author sample living in Berlin at its peak. These patterns observed at the end of the sample period are consistent with the findings of Kuld et al. [2021] and Mitchell [2019] regarding the patterns of co-location and clustering intensity of authors in the US and UK, respectively.

4.2 Selection of authors

The data selection is based on Britannica's classification as being linked to German literature. This raises representation issues in two directions, namely the origin and prominence of authors. Geographically, the sample corresponds mostly to the borders of the German Empire 1871-1918. However, 12 authors are included who were born outside, for instance in the Austro-Hungarian and the Russian Empire, but lived within modern-day Germany for parts of their life. This includes Fritz Mauthner, Theodor Däubler, or Lou Andreas-Salomé. Importantly, the data are not a comprehensive representation of literature in the German language, but focused on the concentration process within literary circles in the German Confederation/Empire.

All authors in our sample are demonstrably successful by being remembered past their death and being included in the Encyclopedia Britannica. Therefore, our sample is not representative for the general population of authors. While we do not have comparable statistics for Germany, we know from US data that the concentration process of American authors in New York City is similar if less pronounced for the general author population, that is in the US census compared to authors listed in the Encyclopedia Britannica [Kuld et al., 2021]. This might be partly explained by the relative low income and difficulties to publish even for nowadays prominent authors (see Section 2 and Kuld et al., 2021). If we use other encyclopedias as inclusion criterion, we see that the 102 authors who are included in both, the Britannica and Kindlers Literaturlexikon, have a broadly similar degree of concentration for instance in Berlin in the 1920s. However, subgroups of writers such as unpublished writers (or Bourdieu's private writers) and avant-garde authors probably had different concentration characteristics. As such, we have to be careful when extrapolating our results to other groups of writers and artists.

4.3 Location type data

To understand how the political and economic environment may impact author location choice, we define five broad categories of locations: capital cities, independent cities, large cities, university cities, and centers of book trade. We choose these categories because they represent political and economic centers, centers of intellect (and patronage), clusters of related industry, and population centers. For capital cities and independent cities, we only include cities in which at least one author in the panel dataset resided for at last one year. Therefore, these location type categories do not include an exhaustive list of cities in Germany. We provide a complete description of these data sources, how our location type data was constructed, and fully lists of the cities and the years in which they were in the respective category in the data appendix in Supplementary Appendix 3.

We define an author as living in an independent/capital city if she lives in a city that is an independent/capital city in a given year. The result is a list of 80 cities, most of which permanently lose their status as a capital or independent city by the end of the Napoleonic era in 1815.[14]

We define an author as living in a large city if she lives in one of the 10 most populous cities in a given year based on the Reba et al. [2018] and Bairoch et al. [1988] historic urban population datasets. The result is a list of 20 cities.[15]

We define an author as living in a university city if she lives in a city with an active university in a given year. However, we exclude cities that were included in the list of large cities and capital cities in order to separately estimate the effect of being a large, capital city from being in a smaller city/town with a university. The result is a list of 46 cities.[16]

We define an author as living in a center of book trade if she lives in a city listed in the Fullerton [2015] or Rarisch [1976] tables described in Supplementary Appendix 3.5. As this data is only available for a limited number of years, we define a city as a center of book trade if city was ever included in these lists. We believe this is a reasonable restriction for most of the sample period, as physical infrastructure involved would make it difficult and costly to change location and high upfront investment costs would make it difficult to establish a new book shop in an area without existing economies of scale.[17]

For some analyses, we also separately examine Berlin, Munich, and other large cities (excluding

Berlin and Munich). Finally, we create the category "important city", which we define as any city included in any of location type category lists defined above, that is, any city that was a capital, independent city, large city, center of book trade, or university city in a given year.

In an alternative specification, we use the general population share of a category/city as an offset in the estimation of author shares. The population data are taken from Pfister and Fertig [2010] (Table 1, column 1) and Sensch [2004] for the overall population of 'Germany' and on Bairoch et al. [1988] and Reba et al. [2018] (in turn based on data from Chandler [1987] and Modelski [2003]) for cities/agglomerations. More detail is given in Section 3 of the Supplementary Appendix.

5 Empirical Findings

In our empirical results, we begin by focusing on the location choice and concentration process of authors over time. We then show how the location choice over the life-cycle shifted between cohorts of authors. Finally, we provide evidence that the observed location patterns are not due to systematic differences in the author population with respect to birth location, migration intensity, or publication patterns.

We first estimate the probability that an author lives in a given location type or near other writers, and the distance to other writers for each year from 1700 to 1932. Second, we estimate these outcomes for three different birth cohorts over their life-cycle, i.e. at each age from 0 to 80. These estimates are based on polynomial logit or Poisson regressions and provided as graphs.

$$g\left(\mathbb{E}\left(y_{it}\right)\right) = \sum_{k=1}^{5} \beta_{1,k} t^k + \sum_{k=1}^{5} \beta_{2,k} a_{it}^k + \beta_3 log(n_t + 1) \tag{1}$$

Equation 1 shows the main time regression specification in which we estimate quintic polynomials for year t and age a_{it} and control for the logarithm of the total number of writers per year n_t, if y depends on proximity to other writers. Depending on y, we estimate this relationship using

logit (for binomial outcomes) and Poisson regressions (for count outcomes).

$$g\left(\mathbb{E}\left(y_{it}\right)\right) = \beta_1 b_i + \sum_{k=1}^{5} \beta_{2,k} a_{it}^k b_i + \beta_3 log(n_t + 1) \tag{2}$$

Equation 2 shows the main age/cohort specification in which we interact birth cohort b_i with a quintic age polynomial a_{it} and control for the logarithm of the total number of writers per year n_t, if y depends on proximity to other writers. Depending on y, we estimate this relationship using logit (for binomial outcomes) and Poisson regressions (for count outcomes).

We provide alternative specifications by, first, relaxing the functional form assumptions in the polynomial regressions using splines in generalized additive models. Second, we provide all graphs as simple year or age means. Third, we provide OLS estimates that include the general population share as an offset to control for the general urbanization and other demographic patterns. All main findings are robust to changing the estimation method. However, the means do not account, for instance, for a change in the age structure or the overall number of authors. Therefore, we focus our discussion on outcomes estimated using regression analysis. For details see Section 1 of the Supplementary Appendix. We complement the figures by providing regression tables with dummies for different age groups and birth cohorts.

5.1 Location type and major cities over time

To illustrate the attraction of large urban areas and political and economic centers over time, we predict the probability of a 30 year old author being located in a given location type each year from 1700 to 1932 using data from authors aged 18 to 65. We account for age in our analysis to address changing age structures in our sample over time. However, we do not interact age with other factors. Therefore, a different age would not change the ordering of outcomes or subsequently interpretation of results. (See the Section 1 in the Supplementary Appendix for a detailed description of the estimation method.) We present the yearly point estimates in graphs to illustrate the predicted outcomes over time in Figure A.4. We truncate the graphs due to a limited number of observations before 1750.

In the 18th century, the author population was geographically dispersed, as reflected in the rel-

atively low probability of being located in most location types compared to later years. Authors were mostly located in towns or cities, though no single place dominated. For instance, no city has more than 9% of observations within Germany before 1805 as shown in Table A.2. However, our list of towns and cities accounts for 71% of observations within Germany in the 18th century, almost the same share as between 1800 and 1932 (74%). This is a considerably higher share than in the general population, where as late as 1871 almost two thirds of the population lived in rural locations [Estermann and Füssel, 2013]. With 35% and 25% respectively, capital and university cities are the most popular location categories, accounting together for 57% of observations before 1800. It is important to note that these two categories have very little overlap in the 18th century (2% of observations), before the establishment of universities in capitals in the early 19th century (e.g., Berlin 1810, Munich 1826, Stuttgart 1818/1829).

The geographic dispersion of authors mirrors that of the German printers, publishers, and book sellers, as seen in Figure A.3. The publisher Friedrich Arnold Brockhaus (1772-1823) noted this unusually high geographic dispersion of the book market as he complained about the growing number of authors: "Germany's scribblers write too much and too much of what they write is printed. These excesses are fueled by the fact that there are so many places here which are publishers, in contrast to England and France, where they are confined to London, Edinburgh, and Paris" (as cited in Fullerton, 2015, p. 8).

This geographic distribution of authors is consistent with a model of spatial competition in a patronage system, under which only few positions are available in each location. The relative high share of university and capital cities equally fits this pattern, as courts, nobility and universities were major employers for literary authors. Weimar, the most famous early cluster in German literature, provides an illustrative example for employment and location patterns for successful authors in the 18th century. Weimar's exception is the large number of positions given to a number of authors.

Among the well known authors living in Weimar were Wieland, Goethe, Herder, and Schiller. The first was employed by Duchess Anna Amalia as a tutor for her two sons in 1772, the second given various administrative and ministerial roles by Anna Amalia's son and by then Duke Carl August from 1775, the third given an administrative role due to Goethe's lobbying in 1776 (The Editors of Encyclopaedia Britannica, 2022; Boyle, 2022; Irmscher, 2021). Schiller first moved to

Weimar in 1787 before taking up a professorship at the university in nearby Jena [Witte, 2021]. However, Weimar never became a center of publishing or book trade. And though it kept its reputation for historical cultural significance (e.g., the rationale behind the Weimar Republic), later generations of writers would not settle in Weimar. Therefore, the cultural cluster in Weimar was not by itself sustainable in the way Paris or London remained cultural centers for centuries.

Authors are less likely to be located in smaller capitals and independent cities during and after the Napoleonic wars (1803-1815). As mentioned in Section 2, there were several episodes of political and territorial restructuring during the Napoleonic wars, at which time many cities permanently lost their university, or status as a capital or independent city. Therefore, this finding is due, in part, to cities losing their respective status and not necessarily a large-scale migration of authors. After the defeat of Napoleon and the formation of the German Confederation, authors become increasingly likely to be located in large urban areas, capitals, and centers of book trade.

We observe an increase in the frequency of large cities and centers of book trade (as well as a further increase for capitals) throughout the 19th century and the start of the 20th century. The 1871 formation of the German Empire further consolidated the German territories, which facilitated migration to the now fewer and larger political and economic centers. Importantly, local rulers, for instance the kings of Prussia and, later, Bavaria made an effort to attract writers and artists. This could take different forms such as a direct stipend for Ludwig Tieck in Berlin or by giving professorships at the newly founded universities (e.g., Schelling and Heyse in Munich) [Fromm et al., 2019].

However, this period was also characterized by large-scale urbanization. Therefore, we investigate whether these patterns are associated with large cities or specifically associated with Berlin and, to a lesser degree, Munich. In fact, while we observe a small increase in other large cities at the beginning of the 19th century, the ten largest cities besides Berlin and Munich only account for 12% of observations between 1800 and 1932. The Ruhr, Germany's largest agglomeration in the 20th century and its center of coal mining and steel, had no author living there after 1886. But also other large cities, such as Cologne, Frankfurt or Hamburg were of limited importance as author locations, with overall 0.1% of all German observations in Cologne and 2% in the other two cities. Neither of these three cities were the seat of a secular ruler during the the time

considered. In contrast, Berlin and Munich were the capitals of the two largest German states, Prussia and Bavaria, as we exclude Austria in our analysis.

While other large cities (excluding Munich) decline in popularity from the mid-1800s, the attractiveness of Berlin accelerates. In contrast, Munich was an unimportant location for authors until after the establishment of the German Confederation. Munich's popularity accelerated from the mid-1800s, suggesting that the politic of attracting authors was successful. The persistence of Munich as an attractive location for authors was due, in part, to serendipitous timing — the king's efforts coincided with the professionalization of authorship and transition away from the patronage system.

At the end of the 19th century, the literary market has been transformed. As described earlier, the technical and market innovations, author rights, and a larger demand made is possible for more writers to live directly from publishing. This removes constraints in the location choice for authors, though adds new incentives to settle close to publishing houses, critics, and other writers. The strong concentration of writers at the turn of the century in Berlin and Munich, and later only Berlin, fits this pattern.

Berlin was, besides Leipzig, the center of the publishing industry and, at the same time, an artistic center and the center of the newspaper industry. The observed concentration in Berlin therefore mirrors what has been observed much earlier in Paris and London [Mitchell, 2019], and around the same time in New York [Kuld et al., 2021]. However, Leipzig offers a counter example that shows that publishing house alone are not sufficient to attract authors. This also addresses the concern that the publishing houses might follow the authors' location.

These findings suggest that the concentration process of authors over time is not simply a by-product of urbanization but directed towards specific locations, notably Berlin and Munich, due in part probably to an attractive political, economic, and cultural environment. In fact, most large cities or centers of book trade gained no importance as a location for literary writers. We confirm that general urbanization patterns do not fully account for the observed location choice by authors in Section 2.1 in the Supplementary Appendix. In these estimates, we use each category's yearly population shares as an offset when predicting author shares in a linear model.

If we compare the findings to the results from using generalized additive models and simple averages, we see that the overall trends are robust to different model specifications. (Results not shown in main text; see Figures 1 and 9, respectively, in Supplementary Appendix Section 2.) However, we see some interesting divergences. For instance, we see a large drop of authors in large cities following the failed 1848 revolution looking at the simple averages. While we know that this analysis neglects age imbalances (very few authors are born in the years before in the years leading to 1848), it is still interesting to note that large cities, including Berlin, lost a large share of their author population during a time in which new literature was suspect to mainstream culture (Estermann and Füssel [2013] note that 'culture' was rather shown by reciting the classics during this time period).

5.2 The formation of author clusters

We next analyze patterns in proximity to other authors and illustrate the formation of author clusters over time. To this end, we predict the probability of a 30-year old author living in an area with at least one other author within a 30 km radius, the probability of there being two or more other authors living within a 10 km radius, the distance to the nearest author, and the total number of authors within a 10 km radius. See Section 1 in the Supplementary Appendix for a detailed description of the estimation method. We present the yearly point estimates in graphs to illustrate the predicted outcomes over time. As before, we truncate the graphs at 1750. The results are illustrated in Figure A.5.

Before the Napoleonic wars (1806-1815), authors are likely to be located in an area with a low density of authors in their immediate vicinity (within 10km) but with at least one other author within 30km. This suggests that authors during this period are relatively evenly distributed across space with little co-location of authors. We see small and short-lived clusters of authors emerge, for instance in Weimar, and Göttingen, facilitated by the university in Göttingen and the Duke in Weimar. However, neither place offered employment opportunities to larger groups of authors.

The probability of an author being located in a cluster with at least two other authors nearby stayed low (less than 50%) until the second half of the 19th century. So although the territorial and political consolidation at the beginning of the 19th century generated some centripetal

agglomeration forces, the centrifugal forces associated with the spatial competition of the patronage system continued to dominate. One might characterize this phase as a more concentrated patronage system, in which, in particular, the kings in Berlin and Munich were fostering a local art scene.

This began to change around the time of German Unification in 1871. We observe a sharp increase in the probability of being located in a cluster with two or more authors, and the distance to the nearest author begins to decline. However, it is not until the start of the 20th century that we observe an acceleration of these centripetal forces. There was a sharp increase in the number of co-located authors, decrease in the distance to the nearest author, and and a dramatic probability of having at least one other author within 30km. We argue that this dramatic shift in proximity to other authors and the formation for author clusters was only made possible though the combination of economic and cultural agglomerations in relatively few cities and, crucially, the professionalization of authorship.

Again, the results from the alternative estimation techniques largely confirm our findings. The large peak in distance to nearest authors around 1860-1890 in the simple averages is understandable, if we consider the low number of authors born during the 1830s and 1840s. A low number of authors increases the distances all else equal.

5.3 Life-cycle patterns in location choice

Our life-cycle analysis has two main objectives. We show that the location patterns are due to migration and not purely reflective of changing general birth and population patterns. Second, we show that the latest cohorts is able to move to an attractive location or cluster much earlier, that is before becoming a successful author. In contrast, earlier authors move to capitals and (small) clusters much later in their career.

With the territorial and political consolidation, there was a convergence of location types by the end of the sample. That is, there was a reduction in the number of capitals and independent cities, and both the general population and book trade became increasingly concentrated in these areas. We have argued that this convergence of location types (specifically in Berlin) was critical for literary cluster formation. However, the patterns we have presented thus far could

be an incidental phenomena associated with the rapidly increasing urbanization that occurred over the 19th century, and in the latter half of the century in particular though we provide some evidence to the contrary above. Therefore, we examine author location patterns over the life-cycle to show that the change in location patterns and proximity to other authors was due to a change in the choice of location over life-cycle and not only reflective of an increased probability of being born in a large, urban capital.

We again begin the life-cycle cycle analysis with plotted probabilities. We estimate the probability of an author being located in a location type or near another author for every year of their life from birth to age 80. See Section 1 in the Supplementary Appendix for more information about the estimation method. We complement this evidence with a secondary regression analysis based on age dummies and shown in Tables A.3, A.4, and A.5.

5.3.1 Life-cycle patterns in location type and author concentration

The authors in the earliest birth cohort live most (if not all) of their lives in the highly fragmented Holy Roman Empire and spent their careers under the patronage system. The middle birth cohort lived predominantly in the more consolidated German Confederation, and their careers peaked during the early period of professionalization of authorship. They experienced the ends of the patronage system and the early beginnings of a competitive market. The final birth cohort, born after 1830, experienced the transition from the German Confederation to the unified German Empire. Authors were able to make a living directly from their writing at all stages of their careers, and their careers peaked during the era of mass book production.

Across all birth cohorts, authors were highly mobile over the life-cycle (7-9 re-locations on average, see Table A.1). While not all location types were popular destinations, the concentration of authors in specific location types is predominantly due to inward or outward migration of working-age adults. The attraction of, for example, large cities is not due to a high probability of being born there but instead due to authors moving there at some time during their adulthood. The core difference — and a key finding — is how these location patterns over the life-cycle changed across birth cohorts.

We see in Figure A.6, that the earliest birth cohort (born 1700-1785) was most likely to locate in

rural or small towns and cities during the first half of their career. This birth cohort only moved to capitals, large cities, or centers of book trade towards the end of their career. University cities tended to attract authors during early adulthood (likely for study) and late adulthood (likely for employment). This suggests that capital cities, centers of book trade, and large cities were "rewards" for being an established author and did not provide sufficient economic gains to authors in an early stage in their career.

This is mirrored in the estimates in Table A.3. While the first cohort was slightly more likely to be born in a capital (which were also more numerous), these author's odds of living in a capital between 18 and 40 are only a third ($e^{-1.10}$) of the last cohort's odds. We see similar estimates for large cities and the centers of book trade. In contrast, early authors are more likely to spend the years between 18 and 40 in independent cities (mostly small towns and of secondary political importance, most dissolved in 1803-1806) and in small university cities. For both location types, authors in the first cohort are much more likely to live there as adults. Therefore, these location patterns are not due to birth but reflect migration into these location types.

The second birth cohort (born 1786-1830) is broadly similar to the first cohort in the location pattern over the life-cycle. These authors were still often dependent on secondary work for their living; though, these might now be more likely to be in cities than small university towns or minor capitals. This suggests that, while political and territorial consolidation in the early 19th century facilitated migration, the conditions of the literary market ultimately determined author location choice over the life-cycle.

We observe the most substantial shifts in life-cycle location patterns for the last birth cohort (born 1831-1900). This cohort is much more likely to be in a large city, capital city, or center of book trade compared to previous cohorts. This cohort is also less likely to be located in those types of cities during their childhood and in the later stage of their career compared to the early stages of their career (see Table A.3). In addition, this cohort was less likely to be located in a university city across the life-cycle, signaling an end to the reliance on university positions as a form of patronage.

Authors in all three birth cohorts had similarly low probabilities of being born in Berlin or spending their childhood in Berlin, despite substantial urbanization over the 18th and 19th centuries. This suggests that the high concentration of authors in Berlin in the late 1800s

and early 1900s is due to migration into Berlin and not general birth and population patterns. Furthermore, we do not observe similar labor market migration patterns for other large cities. These findings suggest that authors are drawn to large political and economic capitals with a rich cultural milieu rather than large, industrial cities. And, in turn, Berlin was able to accommodate and employ a large number of aspiring and early stage authors, unlike earlier clusters such as Weimar.

Looking at simple means and gam results, we see that the polynomial specifications smooths the steep increase in authors from the last birth cohort moving into large and capital cities, mostly Berlin, around the age of twenty. (Results not shown in main text; see Figures 7 and 11 in the Supplementary Appendix.)

5.3.2 Life-cycle patterns in proximity to other authors

We conclude the life-cycle analysis by looking into the impact of the migration on clusters and generally the geographic distance to other writers. To this end, we estimate the probability of there being at least one other author living within a 30 km radius, the probability of there being two or more other authors living within a 10 km radius, the distance to the nearest author, and the total number of authors within a 10 km radius. Following the same approach as in the previous section, we provide plotted estimates over the life-cycles of the three birth cohorts. The results are shown in Figure A.7 and Table A.5.

We find that authors in the early and middle birth cohorts are likely to be located within 30km authors but not within 10km of two or more other authors. This suggests that authors whose careers peaked before the 1871 unification are more evenly distributed across space with few authors co-locating. Importantly, authors in these cohorts only move closer to other authors or to an area with a higher density of authors at a relatively late stage of their career. We argue that this is evidence of spatial competition due patronage system discussed in Section 3. We also argue that there are no substantial differences between the trends of the first and middle birth cohorts because the centripetal agglomeration forces generated by post-Napoleon territorial and political consolidation were not sufficient to outweigh the centrifugal forces posed by the market structure for authors.

In contrast, the last birth cohort is likely to be around fewer authors and be farther away from authors in their childhood and late adulthood. They move closer to other authors and to an area with a higher density of authors at an early stage of their career and only begin to move away to a lower-density area around age 40. We argue that this substantial shift in proximity to other authors over the life-cycle and the formation for author clusters was only made possible though the combination of sufficiently consolidated political and economic forces and, crucially, the professionalization of authorship.

These last clusters, therefore, resemble the image of a modern creative cluster most closely. That is a vibrant cultural industry that attracts young aspiring artists to live, work, and learn together.

5.4 Migration and publication patterns

In attributing the observed patterns to the shifting political and economic environment, we must address concerns that lives of authors changed systematically over time with respect to their migration patterns or career development. That is, authors may systematically differ over time with respect to the frequency, distance, and probability of migration, the age at which they tend to migrate, or the age at which they begin their careers. The location patterns observed in the previous sections could be a reflection of these systematic differences in authors over time rather than a likely result of the changes in the political and economic environment.

We present predicted outcomes over time in Figure A.8 and predicted outcomes over the life-cycle by birth cohort in Figure A.9 and alternative regressions in Table A.6. We confirm our findings using gams in Figures 5 and 6 and simple means in Figures 13 and 14 in Section 2 of the Supplementary Appendix.

With respect to our concerns, the main finding is that the age of first publication is relatively similar between the three cohorts (see Figure A.9). In fact, the last cohort publishes slightly later than previous cohorts. Therefore, the higher age at moves to capitals and clusters of earlier cohorts cannot be explained by a later career start.

Despite dramatic improvements in printing technology and a growing demand for books over the 18th and 19th centuries, the probability of publishing is only slightly increasing over time.

The strong increase in overall publications is not mainly a reflection of increased individual prolificacy, but is indicative of a market that is able to sustain a larger number of authors.

Relative migration patterns are relatively consistent across cohorts. Authors in all three birth cohorts had the highest probability of migrating at an early stage of their career, indicating that authors across birth cohorts did not exhibit different labor market behavior. However, authors in the last birth cohort were less likely to migrate, a result of arriving early and staying in Berlin, but more likely to move long distances and to locations that are far from their birth location.

6 Conclusion

In this paper, we evaluate how the development of literary clusters in Germany via location choice and clustering intensity was influenced by the transition from hundreds of independent states to a unified empire and from a patronage system to a competitive book market. We find that the geographic concentration of authors increased over time, as authors moved greater distances to be closer to other writers and into large capital cities and centers of book trade. This led, ultimately, to the formation of a dominating literary cluster in Berlin. These trends are not due to systematic differences between author cohorts with respect to migration of publication patterns over the life-cycle. The core difference between cohorts is the choice of location: the type of city, its proximity to other authors, and the distance required to move there.

These findings complement a robust literature identifying patterns of artist migration and the geographic clustering of artistic activity (e.g., Kelly and O'Hagan, 2007; Kuld and O'Hagan, 2019; O'Hagan and Hellmanzik, 2008; O'Hagan and Walsh, 2017; Borowiecki and Dahl, 2021), how these patterns evolve in response to shocks (e.g., Borowiecki and Graddy, 2021; Borowiecki, 2012), and quantifying productivity gains associated with agglomeration economies (e.g., Mitchell, 2019; Kuld et al., 2021; Borowiecki, 2013; Borowiecki, 2015). These papers describe how clusters and urban agglomerations help artists and philosophers improve their creative output and therefore motivate the formation of clusters. In our paper, we focus on the dependence of artistic cluster formation on favorable political and economic conditions. Our findings can be read in connection with O'Hagan [2021] who shows the extensive migration of these authors in more detail.

A growing number of economic studies have shown the importance of institutions, political freedoms, and local autonomy in shaping urban environment and clusters of talent. Our findings suggest that these factors are not sufficient conditions for agglomeration of creative activity to occur. Market structure and economic incentives also play an important role in the shaping of creative clusters. We have seen some evidence for policies successfully creating clusters in Munich and Berlin given the right market conditions. On the other hand, policies to widen the geographic distribution, e.g., in university-based research, might mask advantages from clustering by prohibiting industry agglomeration.

Furthermore, we observe a high degree of mobility over the life-cycle for all cohorts. There is a growing interest in using large-scale historical datasets of notable people to study the economic geography of creativity and innovation (e.g., Serafinelli and Tabellini, 2022). A common approach is to use automatically extract structured data from online databases, which tend to provide only birth and death location. If these patterns of life-cycle mobility that we observe hold for other high skilled workers, studies of the historical clustering of creative and innovative activity could be dramatically underestimating the degree of spatial concentration, particularly for the areas in which people do their most important work.

However, detailed data on the lives and locations of historical scientists, inventors, and other creative and innovative workers is often not available. In this respect, the economic history of the arts may offer important contributions in the future, as the academic interest and study of artists across all artistic domains has generated a breadth of information about their lives. Historical research using individual data on various types of artists could provide valuable insights into creativity over the life-cycle and into innovative activity that lies outside the patent system.

While we have linked long-term descriptive patterns to the changing economic and societal conditions, the history of German literary production provides opportunity for further and more causal research. For instance, catholic writers and areas such as Cologne seem to have been underrepresented in German literature compared to protestant states, in particular Württemberg and Saxony. Second, the failed revolutions of 1848 are followed by a decrease of urban writers and gap of around 20 years with very few new writers emerging. This could be studied with more widely available and denser (more observations per year) publication data (as opposed to biographical data). Third, publication data could be used to study political and cultural shocks

such as the secularization and mediatisation at the beginning of the 19th century.

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Notes

1. A limiting factor for historical studies has been a lack of data on both creative workers and cities. Hanlon and Heblich [2021] provides an excellent discussion of these challenges and an overview of recent innovations in this area.

2. There are several notable exceptions, such as Singh and Marx [2013], Serafinelli and Tabellini [2022], and Borowiecki [2012].

3. These included various types of political territories, including imperial cities, abbeys, small princely states, and other small territorial states.

4. See, for example, St Clair [2004] and Mitchell [2019] for a discussion of the book market in the UK and Ireland.

5. As Tatlock [2010] describes: "Those who tried in the new age of the market to live by the pen struggled; many, like Theodor Storm, for example, wrote and published on the side...Goethe received from Cotta 65,000 thalers for this 'Ausgabe letzter Hand' (final authoritative edition). By contrast Gottfried Keller, they point out, received

for his now canonical novel *Grüner Heinrich* (1853-55; Green Henry) a total of 742 thalers for the five-year span, 1850-55, in which he worked on the novel." (p. 8).

6. Authors usually argued that the fixed fee for a manuscript gave the publisher the right to print a single edition, after which the author could enter into new contractual agreements with other publishers regarding later editions. On the other hand, publishers tended to argue that the payment of the fee implied that they purchased the manuscript itself and thus they had the perpetual right to publish it [Moldovanu and Tietzel, 1998].

7. As Tatlock [2010] notes: "Early in the eighteenth century it was in fact generally the publisher – not the author – who sought privileges from the ruling authorities to prevent pirated copies" (p. 7-8).

8. This rapid market expansion came to a temporary halt with (ultimately unsuccessful) political revolutions in 1848. Economic instability, political suppression of ideas, and censorship affected all aspects of the publishing industry. Many liberal intellectuals left Germany, and many publishers went bankrupt. After years of rapid growth, the number of new book titles and daily newspaper titles saw a decline, and the number of book traders stagnated. (See Figure A.1.) It took more than a decade for the publishing industry to fully recover [Tatlock, 2010].

9. The first rotary press in Germany was constructed in 1873, zinc lithographic plates replaced stone plates shortly after, and type-casting machines replaced hand labor in the early 1880s [Fullerton, 2015].

10. Fullerton [2015] describes this time as "the great divide in the history of the mass book market...Before 1870 or 1871 the market's growth had been steady; after, it was explosive" (p. 168).

11. There is substantial evidence of this. Groups of authors such as *The Inklings* (J.R.R. Tolkien and C.S. Lewis, among others) and the *Bloomsbury Group* (Virginia Woolf, E.M. Forster, Lytton Strachey, and others) met regularly to share ideas, read one another works, provide feedback. See Farrell [2003] for a detailed discussion of these and and a number of other collaborative circles of authors, how these groups interacted, and how authors benefited from these groups.

12. For example, Simone Wegge's extensive work on the economic history of migration and demography in 19th century Germany is primarily limited to Hesse-Cassel (see, for example, Wegge, 2021; Wegge, 2002; Wegge, 1998).

13. For example, a city may have a higher number of author-year observations if two authors lived there for the duration of their lives or if a dozen authors spent their university years there but attended at different times.

14. See Supplementary Appendix Section 3.9 for more information about the construction of this list of capital and

independent cities and Table 8 for a full list of the cities.

15. See Supplementary Appendix 3.7 for more information on the construction of the dataset of the most populous cities. The full list of cities is shown in Table 6 in Supplementary Appendix 3.7.

16. See Supplementary Appendix 3.8 for more information about the construction of this list of university cities and, specifically, Table 7 for the complete list.

17. The list of cities is provided in Table 4 in Section 3.5 of the Supplementary Appendix.

Acknowledgments

We thank Christiane Hellmanzik, John O'Hagan, the participants of the International Conference on Cultural Economics (ACEI 2020+1) and the participants of the Lund FRESH Meeting 2021 for their helpful comments on various drafts. We thank Niamh Corcoran, Adrian Hinse, and Jens Kirsten for their excellent research assistance. We thank John O'Hagan together with the Department of Economics, Trinity College Dublin for the funding of the data collection. We thank two anonymous referees and Joan Roses as the EREH editor for their great comments.

Data Availability

The data and code underlying this article are available in the supplementary appendix. The supplementary appendix (which includes the technical appendix, supplementary results, and data appendix) and the datasets and code used to generate the results are available at the following GitHub repository: https://github.com/lkuld/KuldMitchellEREH.

A Appendix

A.1 Tables

Table A.1: Summary statistics of three birth cohorts

	born 1700-1785	born 1786-1830	born 1831-1899
No. Authors	53	43	57
No. Observations	2960	2381	2805 (2418)
Mean lifespan	61	62	69 (53)
Mean publications (18-65)	11.3	11.9	13.5 (10.4)
Mean no. relocations	7.4	9.2	8.6 (6.5)

Notes: Table only includes observations within the geographic extent of 1910 Germany. The last column lists numbers over the whole life and up to 1932 in brackets. Our analysis ends in 1932 before the Nazi party comes into power.

Table A.2: Top 10 author locations

1700-1805		1806-1870		1871-1932	
Berlin	8.28%	Berlin	14.69%	Berlin	28.28%
Weimar	8.21%	Weimar	4.22%	Munich	12.35%
Hanover	5.53%	Tübingen	3.72%	Paris	2.81%
Leipzig	4.23%	Stuttgart	3.66%	Wroclaw	2.33%
Göttingen	3.60%	Munich	3.63%	Frankfurt	2.23%
Kaliningrad	3.19%	Dresden	3.47%	Wiesbaden	2.16%
Osnabruck	2.78%	Bonn	2.71%	Dresden	1.92%
Frankfurt	2.75%	Wroclaw	2.46%	Hamburg	1.78%
Jena	2.45%	Hamburg	1.86%	Lübeck	1.75%
Darmstadt	2.27%	Hanover	1.83%	Dithmarschen	1.65%
No. author-year obs.	2752		3233		3070

Notes: The table presents the percent of author-year observations per city per period. We include all ages from birth to death. We only include observations with known locations. Wroclaw was formerly known as Breslau. Kaliningrad was formerly known as Königsberg.

Table A.3: Probability of being located in various types of locations by age cohort

	Independent City	Capital City	Large City	University City/Town	Uni, not large/capital Town	Center of book trade	Unimportant town
(Intercept)	-6.87^{***}	0.54^{***}	1.04^{***}	1.10^{***}	-2.89^{***}	1.11^{***}	-3.67^{***}
	(1.00)	(0.07)	(0.07)	(0.07)	(0.14)	(0.07)	(0.21)
under18	4.14^{***}	-1.72^{***}	-1.45^{***}	-1.90^{***}	0.38	-1.67^{***}	1.94^{***}
	(1.01)	(0.11)	(0.10)	(0.11)	(0.19)	(0.10)	(0.23)
birthCohort1700-1785	4.33^{***}	-1.10^{***}	-2.40^{***}	-1.51^{***}	2.01^{***}	-1.97^{***}	1.60^{***}
	(1.01)	(0.09)	(0.11)	(0.10)	(0.16)	(0.10)	(0.23)
birthCohort1786-1830	3.21^{**}	-1.28^{***}	-1.49^{***}	-1.03^{***}	1.56^{***}	-1.23^{***}	0.48
	(1.03)	(0.10)	(0.10)	(0.10)	(0.17)	(0.10)	(0.28)
over40	-11.69^{***}	-0.79^{***}	-0.97^{***}	-0.89^{***}	0.40	-1.04^{***}	-14.90^{***}
	(1.00)	(0.11)	(0.11)	(0.11)	(0.21)	(0.11)	(0.21)
under18:birthCohort1700-1785	-3.44^{***}	1.32^{***}	1.30^{***}	0.33^{*}	-2.12^{***}	0.88^{***}	-2.31^{***}
	(1.02)	(0.14)	(0.15)	(0.16)	(0.24)	(0.15)	(0.28)
under18:birthCohort1786-1830	-3.74^{***}	1.66^{***}	0.42^{**}	0.65^{***}	-1.42^{***}	0.52^{***}	-0.71^{*}
	(1.06)	(0.15)	(0.16)	(0.15)	(0.25)	(0.15)	(0.31)
birthCohort1700-1785:over40	11.83^{***}	1.28^{***}	1.66^{***}	0.87^{***}	-0.77^{***}	1.41^{***}	14.06^{***}
	(1.01)	(0.14)	(0.15)	(0.14)	(0.23)	(0.14)	(0.27)
birthCohort1786-1830:over40	11.46^{***}	1.47^{***}	1.19^{***}	0.69^{***}	-1.56^{***}	1.08^{***}	15.86^{***}
	(1.06)	(0.15)	(0.15)	(0.15)	(0.26)	(0.15)	(0.30)
Num. obs.	7759	7759	7759	7759	7759	7759	7759

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Notes: The table presents regression estimates with standard errors in parentheses. Standard errors are clusters at the author level. The observations are restricted to 1700-1932 and all observations with missing location are removed.

See Section 4 for definitions of location types. The reference categories are authors aged 18-40 and authors born 1831-1900. The results in all columns were estimated using logistic regression. Details to calculations are given in Section 1 of the Supplementary Appendix.

Table A.4: Berlin, Munich, and other large cities, by birth cohort

	Probability of being located in:			Distance
	Berlin	Munich	Other Large	to Berlin
Under 18	-1.54^{***}	-1.04^{***}	0.57^{***}	0.27^{***}
	(0.12)	(0.15)	(0.14)	(0.04)
Over 40	-0.55^{***}	-0.79^{***}	0.02	0.05
	(0.11)	(0.16)	(0.16)	(0.05)
Born 1700-1785	-1.68^{***}	-3.88^{***}	-0.41^{**}	0.17^{***}
	(0.12)	(0.46)	(0.16)	(0.04)
Born 1786-1830	-1.31^{***}	-1.56^{***}	0.51^{***}	0.26^{***}
	(0.12)	(0.18)	(0.14)	(0.04)
Under 18*Born 1700-1785	0.93^{***}	-12.26^{***}	-0.17	-0.15^{***}
	(0.20)	(0.47)	(0.21)	(0.05)
Under 18*Born 1786-1830	0.57^{**}	-0.24	-1.19^{***}	-0.16^{**}
	(0.21)	(0.38)	(0.21)	(0.05)
Over 40*Born 1700-1785	1.03^{***}	2.48^{***}	0.54^{*}	-0.10
	(0.17)	(0.51)	(0.22)	(0.05)
Over 40*Born 1786-1830	1.19^{***}	1.30^{***}	-0.85^{***}	-0.13^{*}
	(0.16)	(0.26)	(0.23)	(0.06)
Constant	-0.29^{***}	-1.38^{***}	-2.07^{***}	5.42^{***}
	(0.07)	(0.08)	(0.10)	(0.03)
Deviance	7042.49	3072.88	5585.26	1300894.50
Num. obs.	7759	7759	7759	7759

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Notes: The table presents regression estimates with standard errors in parentheses. Standard errors are clusters at the author level. The observations are restricted to 1700-1932 and all observations with missing location are removed. See Section 4 for definitions of location types. The reference categories are authors aged 18-40 and authors born 1831-1900. Columns 1-3 were estimated using logistic regression. Column 4 was estimated using a Poisson model. Details to calculations are given in Section 1 of the Supplementary Appendix.

Table A.5: Distance to other authors by birth cohort

	1+ authors within 30km	2+ authors within 10km	Distance to nearest author	# authors within 10km
Under 18	-1.18^{***}	-1.34^{***}	0.57^{***}	-1.00^{***}
	(0.10)	(0.10)	(0.08)	(0.07)
Over 40	-0.60^{***}	-0.85^{***}	0.69^{***}	-0.29^{***}
	(0.11)	(0.10)	(0.10)	(0.06)
Born 1700-1785	-0.47^{***}	-1.33^{***}	0.17	-1.56^{***}
	(0.10)	(0.10)	(0.09)	(0.06)
Born 1786-1830	-0.67^{***}	-1.32^{***}	0.21^{*}	-1.35^{***}
	(0.11)	(0.10)	(0.10)	(0.06)
Born 1700-1785*Under 18	0.97^{***}	1.19^{***}	-0.47^{***}	0.81^{***}
	(0.14)	(0.15)	(0.11)	(0.10)
Born 1700-1785*Over 40	0.91^{***}	1.15^{***}	-1.02^{***}	0.58^{***}
	(0.15)	(0.14)	(0.13)	(0.09)
Born 1786-1830*Under 18	0.84^{***}	0.05	-0.23	0.10
	(0.15)	(0.17)	(0.12)	(0.12)
Born 1786-1830*Over 40	1.14^{***}	1.52^{***}	-1.12^{***}	0.87^{***}
	(0.16)	(0.15)	(0.13)	(0.09)
log # authors per year	0.78^{***}	0.81^{***}	-0.61^{***}	0.72^{***}
	(0.06)	(0.07)	(0.03)	(0.05)
Constant	-1.46^{***}	-2.08^{***}	12.17^{***}	-0.42^{*}
	(0.22)	(0.25)	(0.13)	(0.19)
Deviance	9774.98	9229.26	541310964.90	34546.23
Num. obs.	7744	7759	7744	7744

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Notes: The table presents regression estimates with standard errors in parentheses. Standard errors are clusters at the author level. The observations are restricted to 1700-1932 and all observations with missing location are removed. The reference categories are authors aged 18-40 and authors born 1831-1900. Columns 1 and 2 are estimated using logistic regression. Column 3 and 4 are estimated using a Poisson model. Details to calculations are given in Section 1 of the Supplementary Appendix.

Table A.6: Migration patterns by birth cohort

	Probability of Move	Distance of Move	Distance to Birth Location	Probability of Publishing
Born 1700-1785	0.15	-0.75^{***}	0.03	-0.26^{**}
	(0.09)	(0.20)	(0.07)	(0.08)
Born 1786-1830	0.45^{***}	-0.64^{***}	-0.44^{***}	-0.13
	(0.09)	(0.19)	(0.03)	(0.09)
Age	-7.58	28.05	57.59^{***}	161.58^{***}
	(4.63)	(15.44)	(5.25)	(7.25)
Age^2	-74.78^{***}	-101.18^{***}	-39.80^{***}	-140.00^{***}
	(4.55)	(12.49)	(4.35)	(6.41)
Age^3	54.25^{***}	43.92^{**}	14.18^{***}	59.07^{***}
	(4.05)	(15.17)	(3.00)	(4.34)
Constant	-2.61^{***}	4.13^{***}	5.27^{***}	-2.80^{***}
	(0.08)	(0.18)	(0.04)	(0.09)
Deviance	4972.78	3226986.18	3378709.76	5363.47
Num. obs.	7759	7617	7759	7759

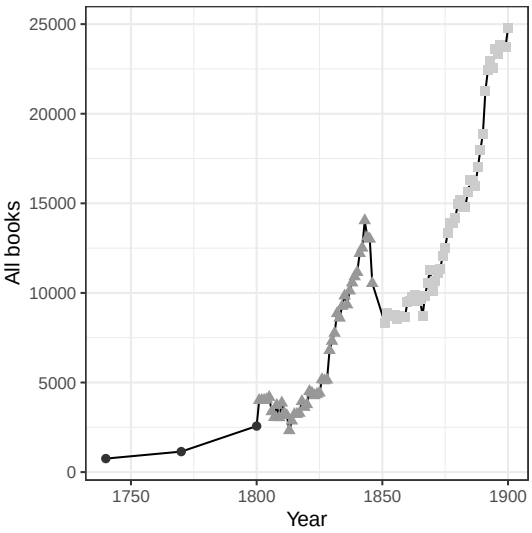
$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Notes: The table presents regression estimates with standard errors in parentheses. Standard errors are clusters at the author level. The observations are restricted to 1700-1932 and all observations with missing location are removed. The reference categories are authors aged 18-40 and authors born 1831-1900. Columns 1 and 3 were estimated using logistic regression. Columns 2 and 3 were estimated using a Poisson model. Details to calculations are given in Section 1 of the Supplementary Appendix.

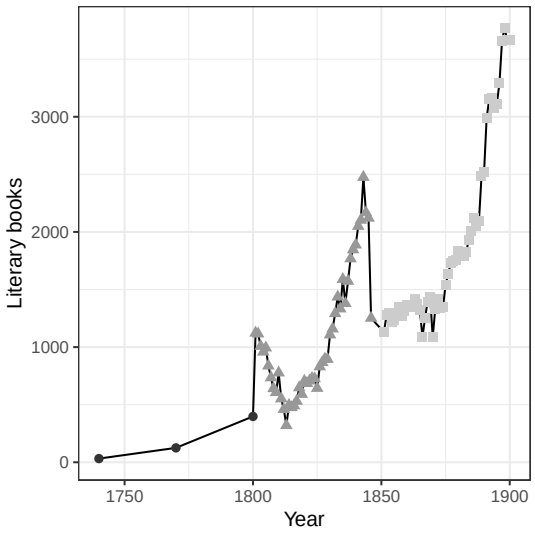
A.2 Figures

Figure A.1: Growth in German publishing and book trade

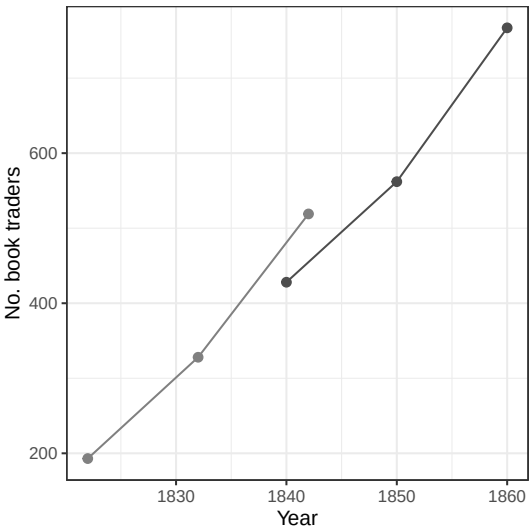
(a) No. book titles



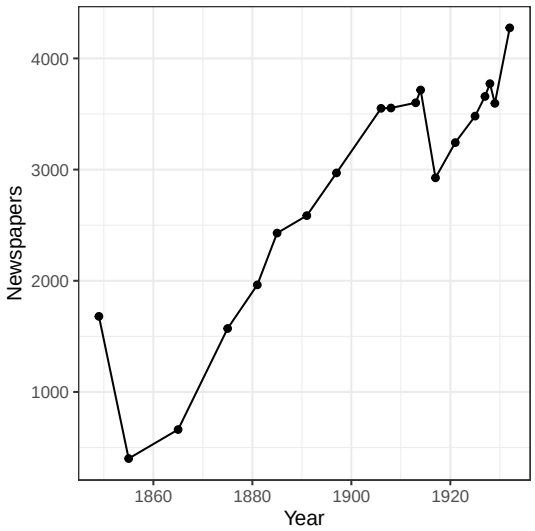
(b) No. literary book titles



(c) No. book traders in major cities

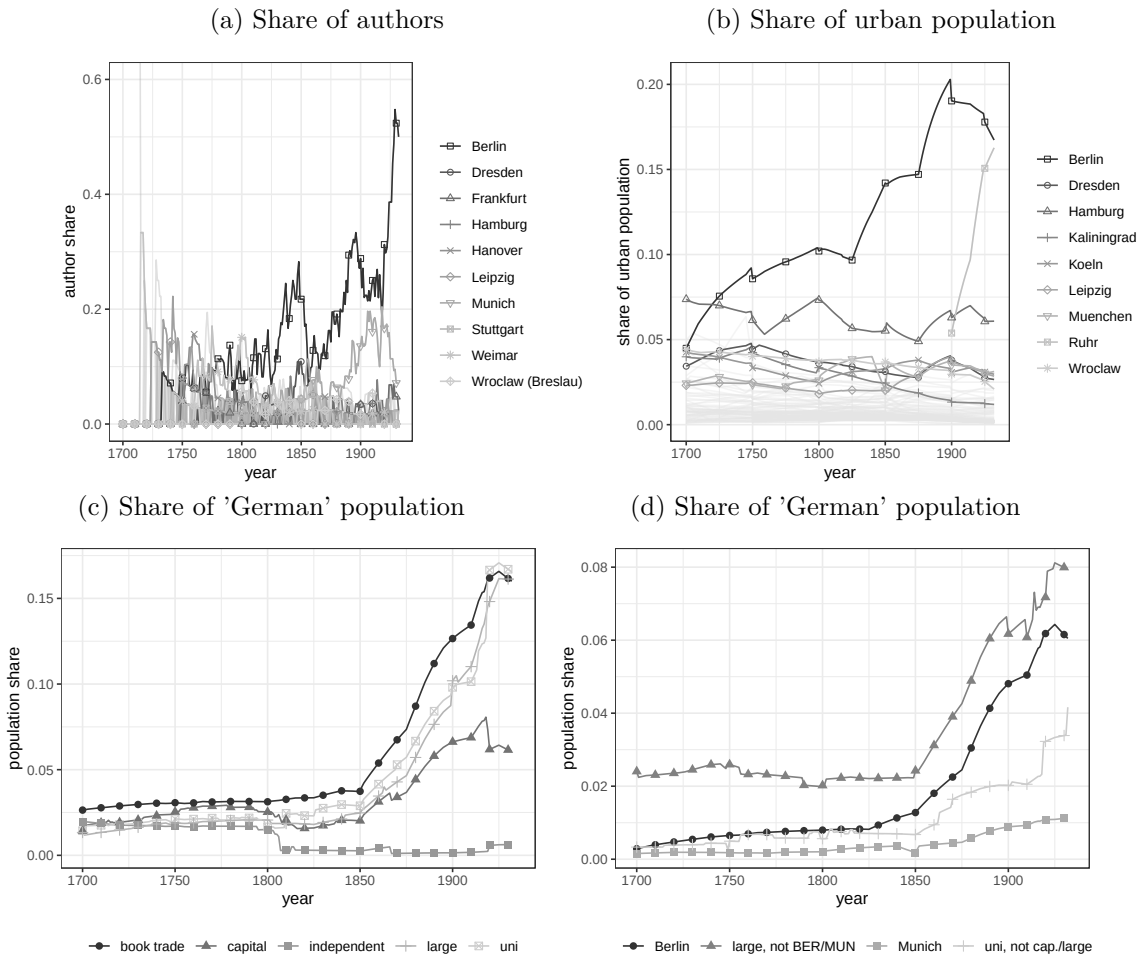


(d) No. newspaper titles



Sources: See Supplementary Appendix Section 3.2 for Figures (a) and (b); Section 3.4 for Figure (c); Section 3.3 for Figure (d).
Notes: Figures (a) and (b) shows the number of unique titles published within the area of the German book trade. Figure (a) includes all titles; Figure (b) only includes poetry, prose, and novels. Figure (c) shows the number of book traders in major cities. Figure (d) shows the number of daily newspaper titles published within the German Confederation / German Empire.

Figure A.2: Share of authors and urban population in major cities

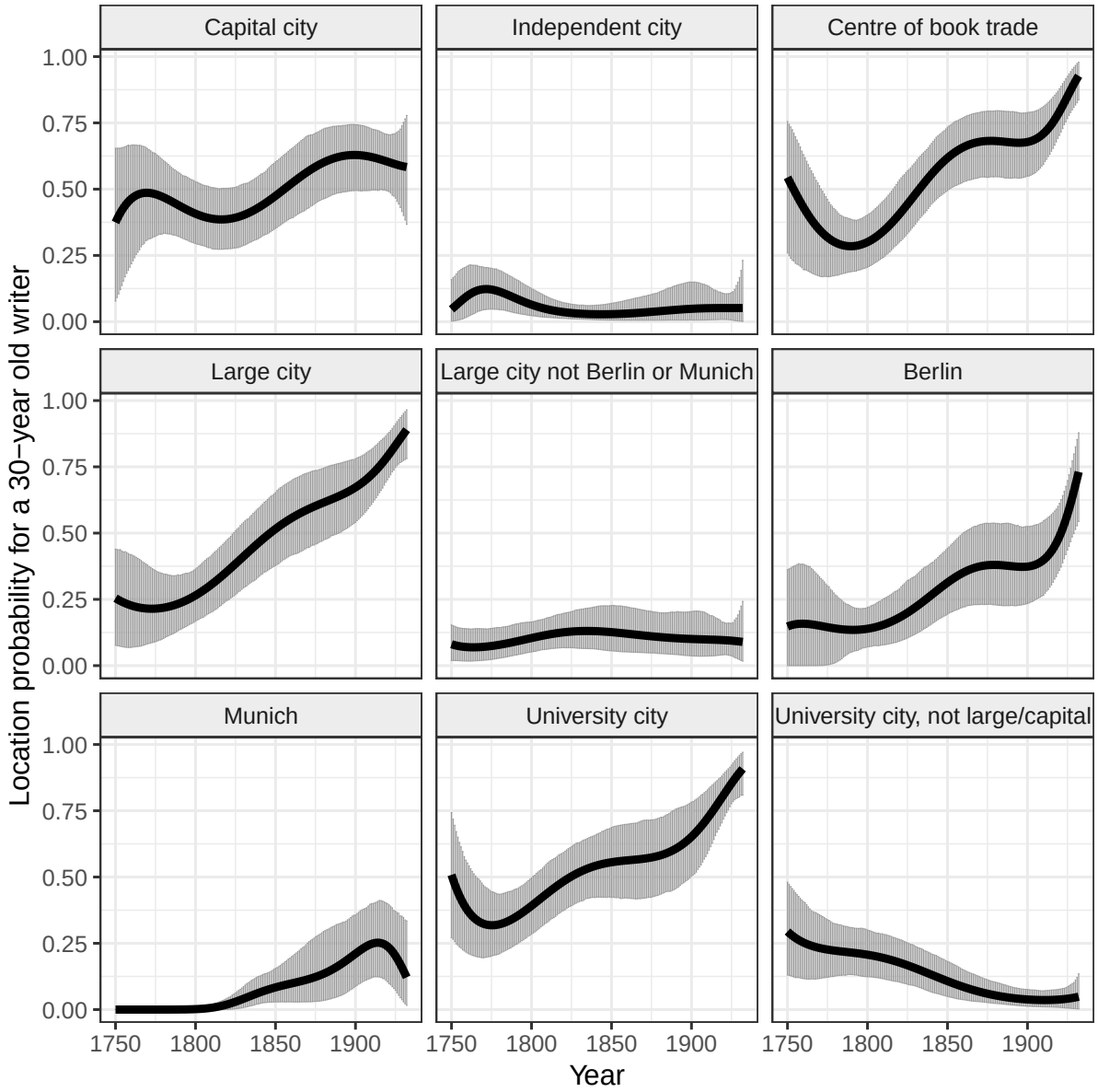


Source: See Sections 3.1 and 3.7 in the Supplementary Appendix.

Figure A.3: Centers of book trade and publishing

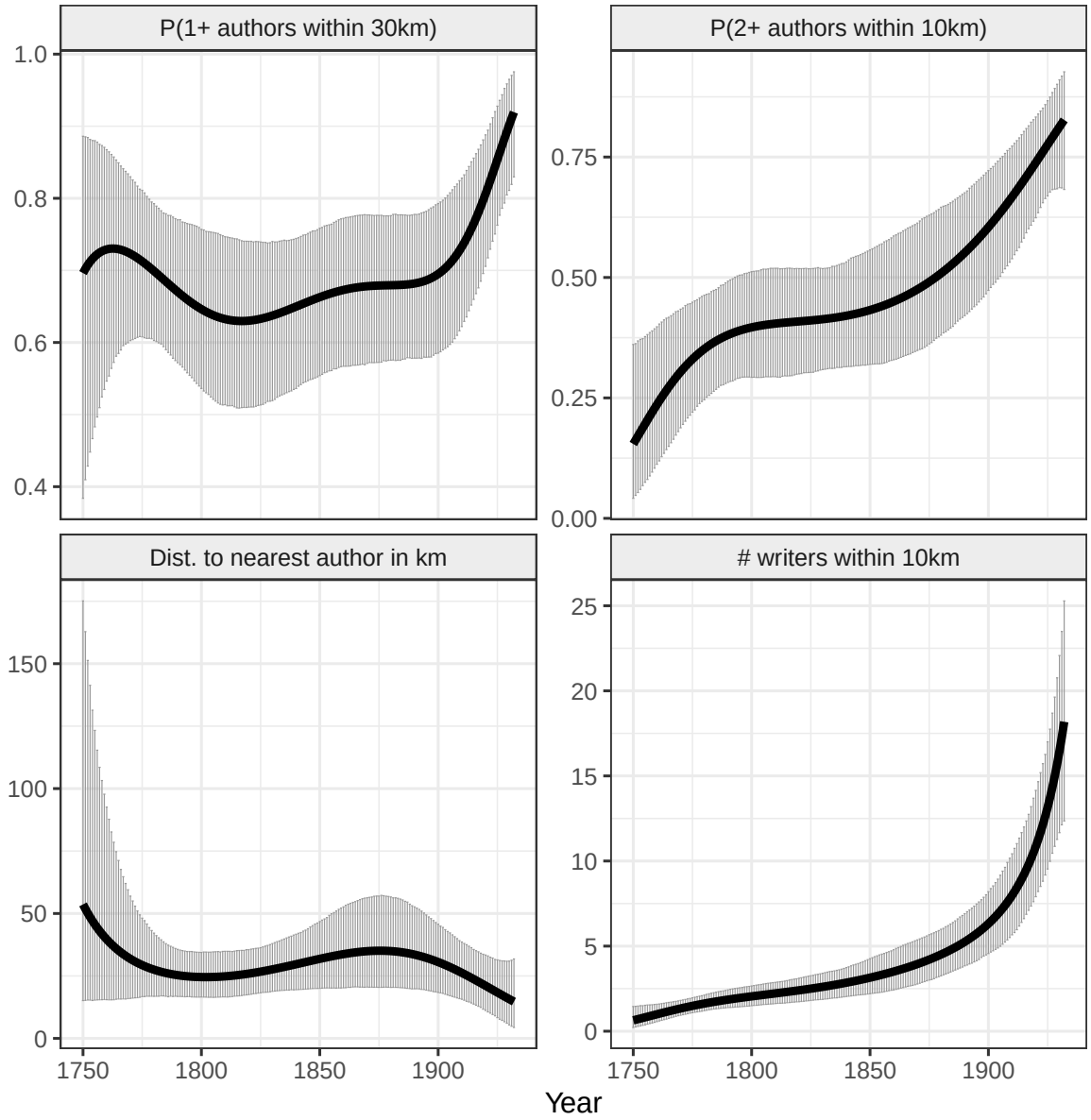
Source: See Supplementary Appendix Section 3.5 for Figure (a) and Section 3.6 for Figure (b).
Notes: Figure (a) shows the number of book traders by city (main cities in color). Figure (b) shows the city and year of establishment of literary book publishers active in the German empire (after 1870).

Figure A.4: Probability of various location types over time



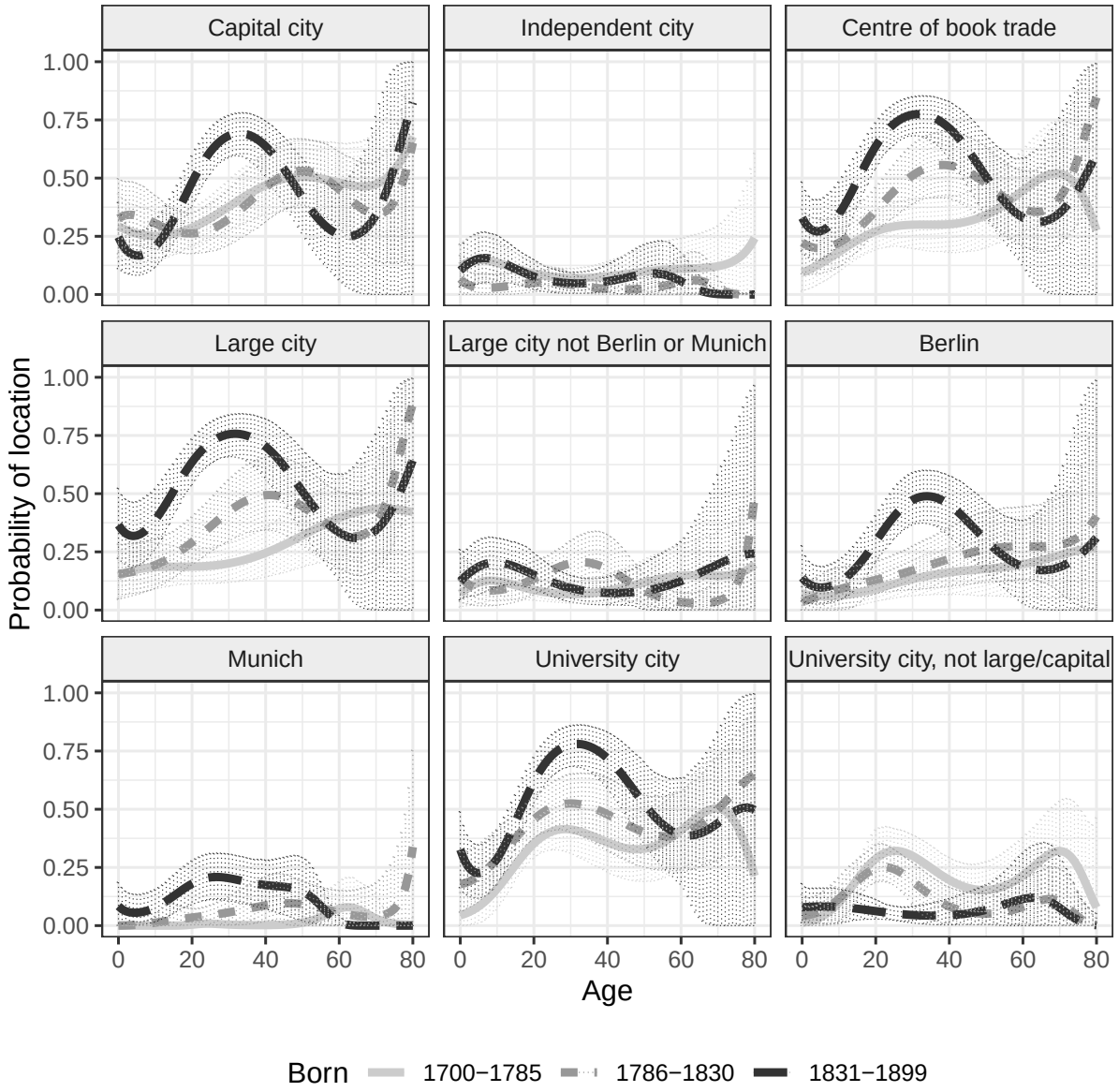
Notes: Probability is estimated for a 30-year old writer. Lighter colored lines represent 95 percent confidence intervals. Details to calculations are given in Section 1 of the Supplementary Appendix.

Figure A.5: Proximity to other authors over time



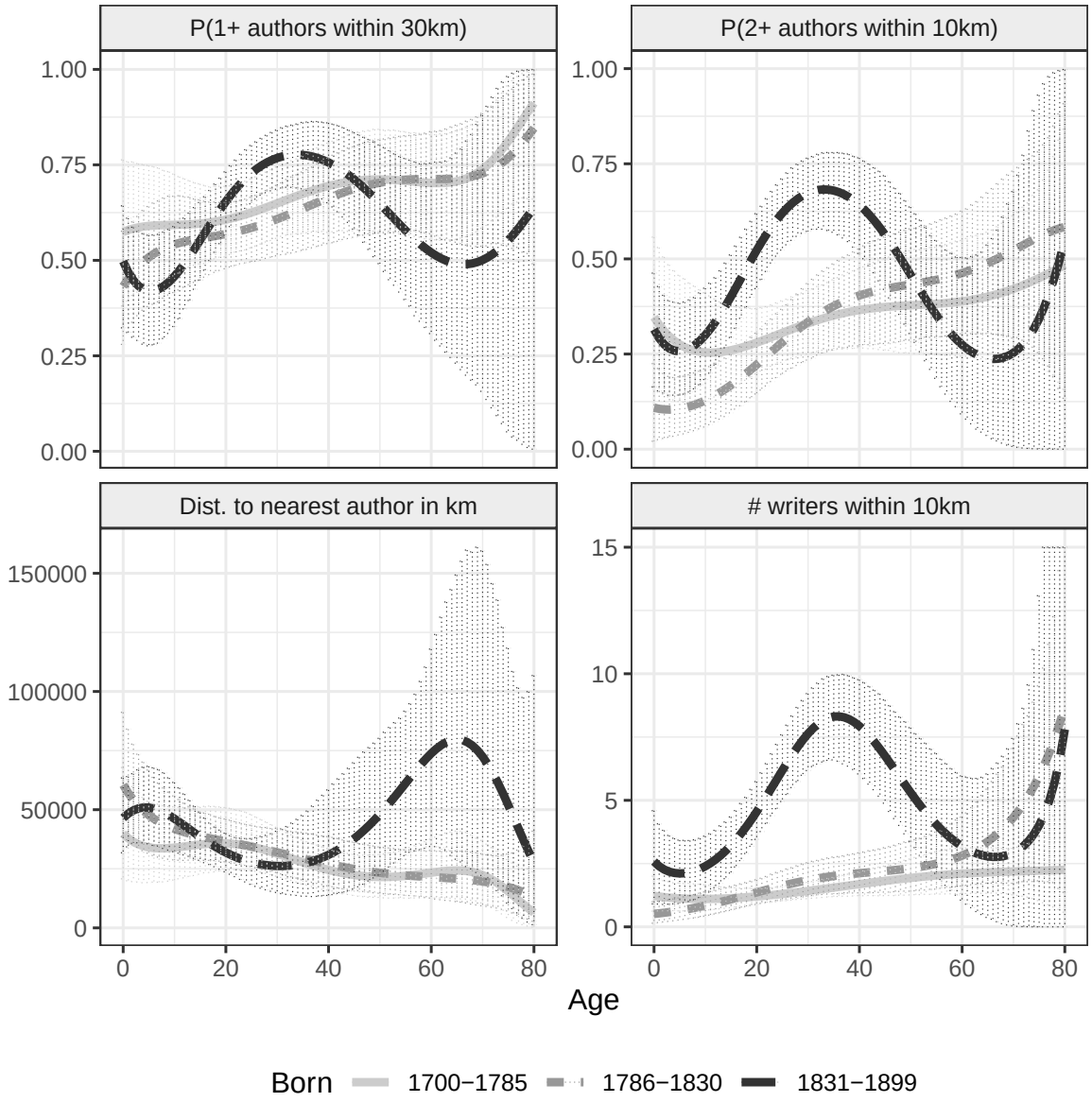
Notes: Probability is estimated for a 30-year old writer. Distances are in meters. Lighter colored lines represent 95 percent confidence intervals. Details to calculations are given in Section 1 of the Supplementary Appendix.

Figure A.6: Probability of various location types by birth cohort



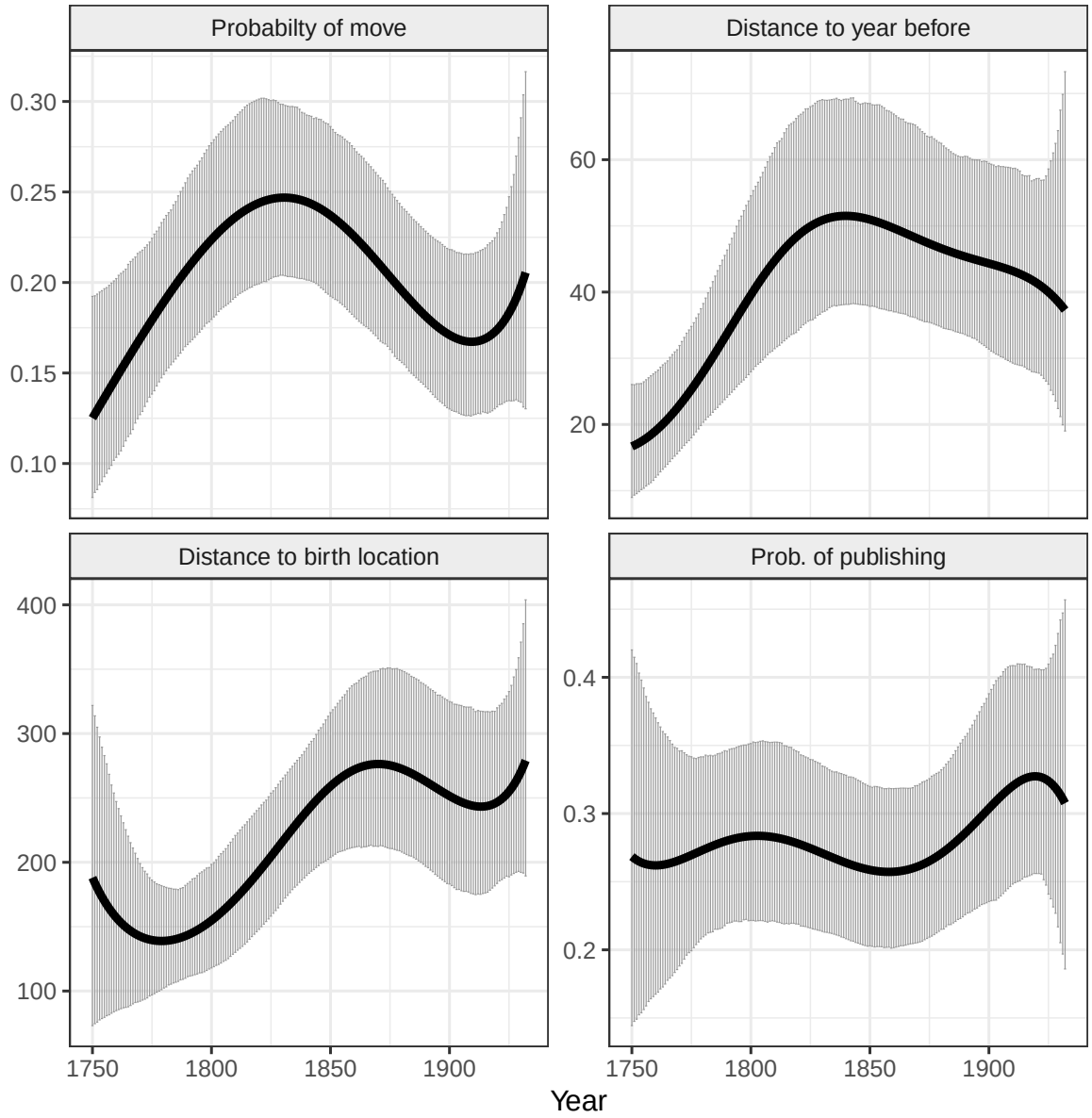
Notes: Lighter colored lines represent 95 percent confidence intervals. Details to calculations are given in Section 1 of the Supplementary Appendix.

Figure A.7: Proximity to other authors over life-cycle



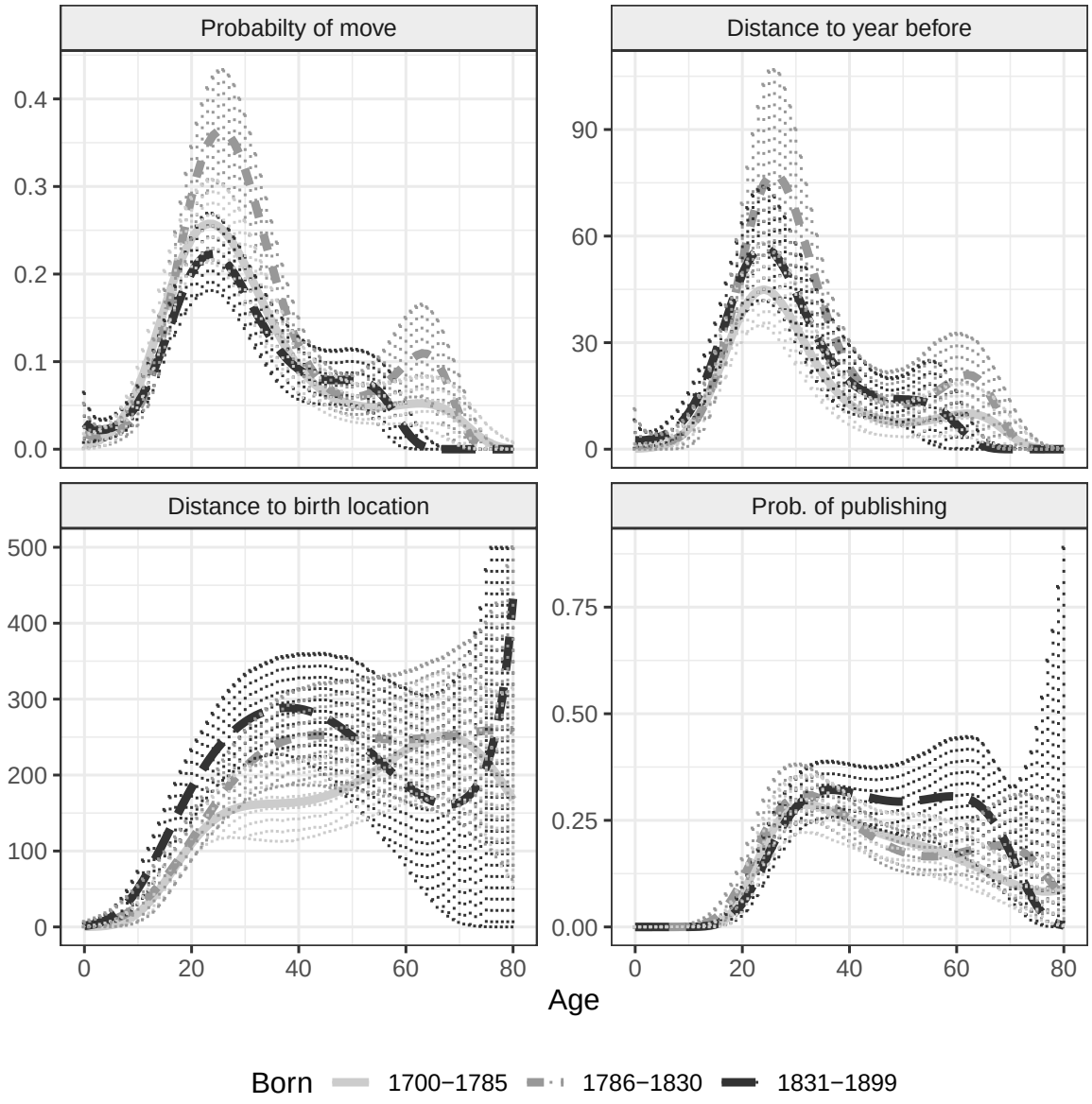
Notes: Distances are in meters. Lighter colored lines represent 95 percent confidence intervals. Details to calculations are given in Section 1 of the Supplementary Appendix.

Figure A.8: Migration and publication trends over time



Notes: Probability is estimated for a 30-year old writer. All distances are in kilometers. Lighter shaded area represent 95 percent confidence intervals. Details to calculations are given in Section 1 of the Supplementary Appendix.

Figure A.9: Migration and publication trends over life-cycle



Notes: Distance is in kilometers. Lighter colored lines represent 95 percent confidence intervals. Details to calculations are given in Section 1 of the Supplementary Appendix.