Does Competition Kill?
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Abstract: We investigate the impact of peer competition on longevity using a unique historical data set of classical composers. We measure the geographic concentration of peers by the number of composers located in the same area and the time spent in one of the main geographic clusters for classical music. Using instrumental variables, we find a significant negative effect of geographic concentration. An additional composer based in the same location decreases longevity by 2.3 years, on average. Besides the widely known economic benefits associated with competition, these findings suggest that significant negative welfare externalities exist as well.

JEL Classification: D12, I12, N90, R11, Z19

Keywords: geographic concentration, well-being, mortality, culture

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1. Introduction

Paris has been a very important destination for classical composers; more than half of the prominent composers of the 18^{th} century onwards have visited the French metropolis and almost a third have spent the longest part of their career there (Borowiecki, 2010a). Given the winner-take all economy type of the classical music profession, the resulting fierce competition has been detrimental to the well-being of many artists. For example, the year 1778 that Mozart spent in Paris has been documented as one of the saddest of his life. In a letter to his father he expressed his grief: '*There is no place in the world like Paris. (...) I shall be grateful to Providence if I get away with my natural taste uninjured. I pray to God every day to grant me grace to be firm and steadfast here (...)'*.

Several years later, one of Wagner's rehearsals in Paris, as described in the composer's memoires, was attended by Berlioz, his rival in opera composition. The German composer recalls this encounter as follows: '*What is certain is that at that time I felt like a little schoolboy next to Berlioz; (...) Berlioz (...) remained silent throughout; he neither encouraged nor discouraged me, but only sighed with a weary smile that 'things in Paris were difficult''*.

The fierce competition between peers has often led to depressions or even nervous breakdowns, as it has been the case for Maurice Ravel. The French composer was diagnosed with neurasthenia in 1909, immediately after the gruesome failure of his ballet 'Daphnis et Chloe'. The reason for this: Ravel's performance has been overshadowed by an unrivalled concert ten days earlier of Debussy's 'Prelude to the Afternoon of a Faun'. Paris is not the only city of high concentration of composers and similar negative externalities of peer competition have been also observed in other locations.

In this study we argue that the strive for success, and the stress level this might generate, is *partly* attributed to the concentration of individuals in large geographical clusters, or more generally, in cities. Aspiring individuals tend to locate in cities to take advantage of the positive externalities associated with them, mostly in terms of employment opportunities and productivity gains (e.g. Glaeser and Mare, 2001). We endeavor to measure whether intense competition for a number of limited opportunities influences individuals' well-being, measured here by longevity. Can any systematic difference in the longevity of individuals who face intense competition or locate in geographic clusters be observed? If so, what is the causal relationship between competition and longevity? These questions are important, as increasing urbanization might explain why depression has reached such epidemic proportions (McManus et al., 2000; National Institute of Mental Health, 2007).

We extract data for a global sample of 190 prominent classical composers born between 1750 and 1899 from large music dictionaries. Focusing on this specific group of individuals has several implicit advantages. First, as argued by O'Hagan and Borowiecki (2010), composers were highly mobile individuals with a marked need to cluster in order to exploit economies of scale. Composers needed either a symphony orchestra or opera company together with the complementary infrastructure, such as a concert hall or opera house, in order to practice and perform their symphonies. Second, composers in the period studied were very independent artists with a remarkable entrepreneurial drive (Scherer, 2001); they became market oriented and can be regarded as producers who supply cultural goods (e.g. new compositions) and provide certain services, such as teaching, organising tours, performing etc. (Borowiecki, 2010b).

The identification strategy focuses on composers' longevity and explains it as a function of time spent in a geographic cluster or the experienced concentration rate during the life-time, that is the annual average number of other composers located in the same location. Endogeneity and omitted variables issues are tackled by using exogenous geographic birthplace-cluster distance as an instrument for the incidence of clustering. Borowiecki (2010a) demonstrates that geographic distance is an important determinant for location choice in historical time periods when traveling was constrained. We further instrument for the experienced concentration rate, that is the number of composers situated in a location, with the intensity of wars that affected the regions of composers' residence before he was born; Borowiecki (2010b) shows that military conflict had a strong and long-lasting influence on the creative potential of a country. The instrumental variable identification strategy asserts that the association between the competition measuring variables and longevity is a causal relationship rather than simply a correlation.

Our results suggest that longevity has a significantly negative relationship with composer concentration rate and a positive one with the time spent in one of the main geographic clusters; namely in Paris, Vienna or London. Instrumenting for concentration rate with war intensity and time spent in a cluster with composers' birthplace-to-cluster distance, further emphasises the negative effect higher peer-related competition has on life expectancy. The instrumental variable results indicate that the presence of an additional prominent composer in the same location decreases longevity by over 2.3 years. The positive correlation between time spent in a geographic cluster and longevity disappears when instrumental variables are employed. The findings suggest that locating in a geographic cluster had no causal benefit on longevity and that the experienced concentration rate led to markedly shorter lives of classical composers. Furthermore, we find that the detrimental effect of higher job-related competition influences all artists, independent of their individual characteristics. This indicates that the concentration rate trumps all other potential personal factors in determining the longevity and, in particular, that individuals' background have minimal impact on mitigating the effect of experienced peer pressure.

The rest of this study is structured as follows. In section 2 we review the related literature. Section 3 presents the methodology and data used. The results of our analysis are presented in section 4. Section 5 concludes.

2. Literature Review

A large amount of empirical evidence suggests that the length of a person's life, i.e. longevity, is not solely dependent on genetic factors. There are numerous additional factors with a significant contribution (Veenhoven, 2008), such as (a) life-style traits and individual susceptibility to health-related risk factors (e.g. smoking, drug use, obesity, etc.), (b) environmental conditions (e.g. pollution), and (c) a mixture of socio-economic factors, such social status, also known as status anxiety. There is a large debate in the academic literature on the effects of city clustering on health. On the one hand, proponents of the 'urban health penalty' suggest that the health of individuals living in an urban setting is worse than that of those living in non-urban areas, mainly because of the effects of higher pollution levels (see for example Jedrychowski et al., 1997; Crimi et al., 1999; Freudenberg et al., 2005).

On the other hand, the dynamics of a city allow for a better provision of consumption goods (e.g. restaurants, theatres, sports stadia), public services (e.g. school quality, reduced crime, better provision of health), transportation speed, not only related to time commuted to and from work but also for cost and frequency of social contact[1], and aesthetics (e.g. architectural beauty and the physical setting), thus giving a welfare advantage to urban residents (Glaeser et al., 2001; Sorgaard et al., 2003). Moreover, the high frequency of individual contact within cities foster the spillover of technological advancements, knowledge and news, leading to higher productivity and thus wages (Glaeser et al., 1992; Black and Henderson, 1999; Mori and Turrini, 2005). Jacobs (1969) emphasizes that it is the

[1] See Costa and Kahn (2000) for a relevant overview.

exchange of complementary knowledge across firms and agents which matters the most.

The above-mentioned benefits of agglomeration are especially important for artists, whose product can, arguably, become more accessible to a wider audience given the provision of an appropriate setting, such as galleries, operas, symphony orchestras, etc. Artists can further be inspired by the aesthetics of cities, notably those of Vienna and Paris, where the city additionally offers an appropriate opportunity to interact, collaborate, or even be inspired, by the work of colleagues. Hellmanzik (2010) argues that the quality of output of artists who worked mainly in highly concentrated locations (e.g. Paris) peaked earlier in their career. Borowiecki (2011) demonstrates that classical composers located in geographic clusters were more productive due to interactions with peers. However, we argue that the concentration of such talent might have adverse effects in terms of health and well-being, attributed to the continuous mental strain individuals go through in order to achieve their aspirations. Arguably, this mental strain is even more intense in settings where one's peers thrive.

The literature on well-being has mainly focused on the relationship between socio-economic status (frequently measured in terms of income) and health. Part of this literature argues towards a causal link running through job status and income to health (Ettner, 1996; Attanasio and Emmerson, 2003), evident through the well-known Whitehall studies based on British civil servants which document an inverse relationship between mortality risk and job seniority, with those ranked lower in the ladder facing mortality rates about three times those of more senior individuals (Marmot et al., 1984; Marmot et al., 1991). A similar relationship has been observed when switching the socio-economic variable to education (Feldman et al., 1989; Lahelma and Valkonen, 1990). A coherent pattern arises when focusing at the extreme case of the unemployed, who experience reduced lengths of life (Iversen et al., 1987; Morris et al., 1994). Others argue that causality runs from health to socio-economic status (Smith 1998, 1999; Meer et al., 2003; Cutler et al., 2006).

In fact, little is known on the impact of occupation-related stress - frequently termed as job strain - on mortality. It is important to mention at this point that not all levels of stress are considered to be bad. In fact, stress levels appear to have an inverted-U shape, where at an optimal level individuals are able to balance capabilities and challenges. Further deviations from that point, and especially if accompanied with high duration, i.e. chronic stress, are expected to lead to adverse health outcomes (Selye, 1936; Meglino, 1977; Allen et al., 1982; Garhammer, 2002). Jonas and Lando (2000) find that the presence of anxiety is positively correlated with the occurrence of hypertension. Along the same lines, Steptoe et al. (2005)

suggest that levels of positive stress could lead to a stabilisation of neuroendocrine, inflammatory and cardiovascular activity.

In turn, it has been documented that hypertension has adverse effects in terms of mental well-being, is positively correlated with depression and negatively correlated with self-reported happiness (Ostir et al., 2001; Joynt et al., 2003; Blanchflower and Oswald, 2008; Steptoe et al., 2008). Huppert and Whittington (1995) estimate that those with lower general health (as indicated by General Health Questionnaire scores) are far more likely to be deceased over a 7-year period. Similar evidence is provided for females in Gardner and Oswald (2004). Depression, and psychological distress in general, have been found to be significant determinants of coronary hearth disease and type II diabetes, amongst other health outcomes (Golden et al., 2004; Everson-Rose and Lewis, 2005). We, thus, have a substantial amount of empirical evidence to argue that stress levels are inversely related to longevity.

To the extent that stress is exacerbated in cities, this might be partly supporting the empirical evidence suggesting that life satisfaction of individuals living in large cities deteriorates compared to that of those living in rural areas (Hudson, 2006; Gerdtham and Johannesson, 2001; Hayo, 2004). Furthermore, knowledge on causality is very limited and the research on the geography of well-being is hindered by a lack of adequately disaggregated data.

In a context similar to ours, You (1987) provides the first investigation of differences in the longevity of writers, painters and composers over the period 1300-1920, focusing on differences in life expectancy before and after 1700. Kaun (1991) focuses on 160 writers (including novelists and poets) born during the 1800's, comparing their longevity with that of individuals in other artistic professions (architects, cartoonists, composers, conductors, dancers, musicians, singers, painters and photographers). In line with the anecdotal evidence cited in his study, he concludes that writers' duration of life is significantly shorter than that of other artistic occupations; a difference which is especially larger when focusing on a European sub-sample.

The impact of social status on wellbeing is also studied by Redelmeier and Singh (2001a), who compare the longevity of Oscar winning actors and actresses versus that of their nominated peers. Their results suggest that winners are expected to live for an additional 3.6 years.[2] Further causal evidence running from socio-economic status to health is also provided in Rablen and Oswald (2008), who find that Nobel Prize winners live about 1.5 years more,

[2] In the contrary, the same authors find that Oscar winning screenwriters live significantly less compared to their nominated peers (Redelmeier and Singh, 2001b).

compared to their nominated peers. Trivially, the results of both studies can also be interpreted in reverse. That is, rather than prolonging the life of winners, missing out an Oscars or a Nobel Prize leads to premature mortality. The plausible effects of peer competition in each of these groups of professionals, measured here by the recognition surrounding the corresponding award, are relatively more obvious when interpreting the results as such. A potential weakness of all those studies however is the failure in estimating a causal relationship. The Nobel Prize is clearly not awarded on a random basis to the nominees and the presence of unobserved characteristics influencing both the longevity and winning the Prize are rather likely.

3. Data and Methodology

In order to investigate the association between composers' experienced concentration rates during their lifetime, the time spent in a cluster location and longevity we use the following pooled cross-sectional model:

$$Longevity = \beta_0 + \beta_1 Concentration + \beta_2 ClusterTime + \beta_3 TBirth + \beta_4 CBirth + \sigma \qquad (1)$$

That is, we regress composer's longevity on a measure of the experienced concentration rate (*Concentration*), the time spent in a geographic cluster (*ClusterTime*) and a set of control variables, which include dummy variables indicating the half-century birth period of a composer (*TBirth*) and a set of region of birth fixed effects (*CBirth*). The coefficients of prime interest are β_1 and β_2. *Concentration* measures the annual average number of other composers based in the same location. For this exercise we count all composers recorded in the data set located in each city and calculate the life-time average for each composer, given the locations visited by him. *ClusterTime*, on the other hand, quantifies the duration (number of years) a composer spent in a geographic location that is in one of the predominant destinations for classical composers for the analyzed period; i.e. Paris, London and Vienna.

Using ordinary least squares (OLS) method to estimate equation (1), however, leads to biased results due to the potential endogeneity of the concentration and clustering duration variables. There are two reasons why this could be so. First, geographic clusters might attract composers of higher quality who potentially have superior access to health care or better nutrition. Second, omitted variables, such as the overall life quality in the cluster locations, could drive the incidence/intensity of clustering and longevity.

In order to address these concerns we implement an instrumental variable (IV) regression. For the *Concentration* variable we instrument with the total number of civil war years (*WarIntensity*) that affected the country of each location. Borowiecki (2011b) demonstrates that the incidence of intra-state wars has a large and very persistent impact on the number of composers located in a region. War also impacts the composer stock in a location - where reverse causality is clearly less plausible here - and the incidence of conflict is a sufficiently exogenous incidence. Therefore, the instrument seems to be as good as randomly assigned.

Arguably though, war intensity could directly impact composers' longevity as well, due to the harsh nutritional and health conditions associated with wars. This concern is somewhat mitigated by the inclusion of all wars that occurred in the analyzed time period; that is, including wars that affected the country prior to the composer's birth. In this case, the instrument would only be invalid if wars affected living conditions for several years after their occurrence. In the later part of this study we run as a robustness test a reduced form model and find that the war intensity measure has no significant relationship with longevity, hence providing an important indication for the validity of the instrument.

Our analysis also instruments for the *ClusterTime* variable. In analogy to Borowiecki (2011a), we use geographic distance between composers' birthplace and the cluster location. The analysis is conducted during roughly the occurrence of the industrial revolution, that is, in a time-period when travelling, although being fairly possible, was still very constrained and markedly expensive in terms of price and time; therefore, distance mattered. In fact, as demonstrated by Borowiecki (2011a), geographic distance mattered the most in the historical time period under investigation in this study and it was not until more recent decades that it decreased in importance. Furthermore, for the validity of the instrument it is required that composers' longevity depends on the time spent in a geographic cluster, and the birthplace-cluster distance impacts composers' longevity only through its impact on clustering. It might be the case that composers who locate not directly in a cluster, but in its vicinity, might experience some externalities resulting from proximity, for example, because of better access to health care. To prevent this kind of proximity-effect we treat all locations within a radius of 50-miles from Paris, Vienna or London as the geographic cluster itself.

Finally, the condition of a random assignment of the instrument needs to be satisfied. It is obvious that the birth location cannot be influenced by the individual after he was born and that births are almost uniformly dispersed over geographic space. Moreover, as empirically demonstrated by Borowiecki (2011a), there is relatively little parental choice over location of birth, perhaps due to the nature of the time period when migration was difficult. The two first-stage specifications are summarized by the following two equations:

$$Concentration = \theta_0 + \theta_1 WarIntensity + \theta_2 TBirth + \theta_3 CBirth + \mu \tag{2}$$

$$ClusterTime = \lambda_0 + \lambda_1 BirthplaceClusterDistance + \lambda_2 TBirth + \lambda_3 CBirth + \varepsilon \tag{3}$$

There are a few points to note about equations (1) to (3). They all control for fixed birth period effects and birth country effects. Controlling for the birth period is necessary to allow for changes in longevity due to overall improvements in life conditions. Similarly, the inclusion of country of birth controls is important to account for longevity differences between nations. Given the size of the available sample we group all countries into one of eight geographic regions, in analogy to the categorization in O'Hagan and Borowiecki (2010). We do not include any further composer characteristics, such as their quality, in our main estimations, as these are potentially endogenous to their longevity. It could be, for example, that composers of higher quality may be wealthier and thus can afford a better health, and longer living artists have a greater chance of producing a masterpiece, which will consequently rank them higher. Such characteristics are however included in an additional specification as a robustness test. All specifications contain robust standard errors (δ, μ or ε).

The sampling technique aims at assuring maximum objectivity and reliability. As a result of data availability issues we focus on prominent individuals and take the names of the most important composers from Murray (2003). Murray's work is based on numerous international references, hence the risk of country- or marketing-biases in the selection is minimal. The study of human accomplishment is conducted for several fields, including classical music, and for each outstanding individual in every discipline an index score is determined, based on the amount of space allocated to her or him in the reference works. The index score is normalised for all individuals listed in each discipline so that the lowest score is one and the highest score is 100. For a total of 190 composers, born between 1750 and 1899, we extract background information from Grove Music Online (2009), the leading online source for music research.

4. Empirical Results

4.1 Summary Statistics

Table 1, panel A, offers some summary statistics on composer longevity and career duration, as well as composer's music-related education/training and music-related engagement of family members. We also report the mean Murray Index Score. Half of the composers of our sample were born in the second half of the 19th century, as evident in panel B. A similar proportion of them was born in France and in Germanic countries – see panel C.

In panel D statistics on the experienced concentration and clustering are presented. The average composer was based in locations where another 6 composers have been located and has spent 19.2 years in one of the three predominant locations, that is Paris, Vienna or London. The selection of the main destinations for classical composers is founded on a ranking that we have conducted in accordance to a number of criteria and based on all locations visited by the encompassed classical composers. The most important destinations are ranked in Table A1 in the Appendix. Similar to Borowiecki (2011a), we find Paris to be consistently the single most important location throughout the entire time-period and at least twice as important as any other location. We also observe that both Vienna and London were significant locations as well. Henceforth, by geographic cluster we mean one of the three predominant locations, that is Paris, Vienna or London, and by measuring the time spent in a geographic cluster (*ClusterTime*), we will primarily consider those three locations.

In Table 2 we present some descriptive statistics based on these three main city clusters. The significance of Paris is clearly visible from these, with Paris being the primary destination for 57 composers, compared to 19 and 10 for Vienna and London, respectively. A composer spent more than 13 years of his musical career, on average, in Paris, compared to just about 3 years in any of the other two locations.

4.2 Main Results

The main result of our study is presented in Table 3. The first two columns estimate the effect of the concentration rate and the composer's duration in alternate specifications. Both have the expected sign, although the coefficient of concentration of Column (1) is not statistically significant at the conventional levels (with a *p*-value of 0.169). Column (3) presents the OLS coefficients based on the estimation of equation (1). The signs of the coefficients of the two main variables of interest, i.e. the composer concentration rate and the time spent on the cluster, still hold their expected sign and are both significantly different from zero. Concentration rate is negative, indicating that composer longevity decreases by a sizeable margin the higher the number of peer composers is within a certain location. An additional composer decreases longevity by about 1.7 years. This result partly justifies the effects of aspirations and job strain, which are especially magnified by the presence of peer competition, and is in line with the anecdotal evidence on the pressure composers experienced in various stages of their career, presented in the introduction. On the other hand, the amount of time spent in a certain location is positive, which reflects either the notion that composers who lived longer had more time to spend in any of the three predominant locations. See Table A2 in the appendix for a city-specific analysis.[3]

Columns (4) and (5) present the results once we, alternately, instrument for concentration rate and duration of stay within a specific location using instrumental variables as given by equations (2) and (3). The estimated coefficient on the concentration rate is now significant and, since we have instrumented for it, it represents the causal effect. Another composer situated in the same location leads to shorter longevity by almost 1.8 years. We also note that the positive correlation between longevity and the years spent in Paris, London or Vienna, disappears, suggesting no causal effect. Column (6) presents the estimated coefficients once we account for both the endogeneity of the concentration rate and the time spent in one of the three cluster locations. We directly note that none of the two coefficients of interest exhibits any sign reversals. However, the estimated coefficient of the time spent in the cluster (that is in Paris, Vienna or London) variable decreases in size and is statistically insignificant. Furthermore, we observe that the concentration rate coefficient holds its statistical significance. This estimate has now substantially increased, implying that the corresponding OLS result of column (3) underestimates the relationship between longevity and concentration rate. An additional composer based in the same location decreases longevity by about 2.3 years, if one controls additionally for the time spent in the three main geographic clusters.

Table 4 presents the IV first-stage results, corresponding to our main estimation instrumenting for both endogenous variables (i.e. Column (6), Table 3). War intensity is significantly correlated with composer concentration. Similarly, the estimated coefficient of the distance between the composer's birthplace and cluster location is significantly negative. This is in accordance to our a priori expectations, due to the reasonably expensive nature of

[3]Results of this specification are in accordance with those in Table 3. Namely, all intensity variables are negative significant, whereas all time variables are positive significant.

distance travelling during the sample period. We employ only the distance term between composers' birthplace and Vienna, as opposed to including three distance terms to all analyzed cluster locations (i.e. Paris, Vienna and London). In particular, we choose the distance to Vienna as it is the most central geographic location and is best suitable for substituting the other terms. Focusing only on one distance variable allows to overcome the risk of overidentification or a possible multicollinearity bias caused by a correlation between the distance terms. Note that in our two-endogenous variables two-instrumental variables model the estimated coefficients of the instruments are orthogonal, implying that each instrument is significantly correlated with only one endogenous variable at a time. This decreases the risk of a bias caused by multicollinearity of the instrumental variables. Finally, the F-statistic exceeds the conventional critical values, therefore worry of a bias due to weak instruments is unfounded.[4]

The identification strategy would be invalid if any of the instrumental variables had a direct or indirect impact, e.g. through a third unobserved variable, on the dependent variable. This could also be the case if, for example, the influence of the instrument on the regressor would vary over time across birth regions, as such variation would not be captured in the first stage leading to invalidity of the exclusion restriction. As already pointed out in the identification section, it is unlikely that war intensity affects living conditions and hence the longevity of individuals who were not yet born, several years after the incidence of war. Also the classification of all locations within a radius of 50-miles of a geographic cluster, as the cluster location itself, prevents any externalities in its proximity. Nonetheless, we investigate this concern by estimating a reduced form model. The point estimates are presented in Table A3 in the Appendix. The estimation delivers consistent significant coefficients on the concentration rate and the time spent in a geographic cluster. It can be also observed that the war intensity variable and the birthplace-cluster distance have no significant relationship with the dependent variable. While this is not a perfect test for the fulfillment of the exclusion restriction of instrumental variables, it provides important support for their validity.

Next, we use all available individual records and investigate heterogeneity in the observed influences of the concentration rate. To achieve this, we interact composers' characteristics with the concentration rate. The available records allow us to account for composer quality using Murray's index, parental music-related background and composer music-related education/training time. In analogy, we generate interaction terms between

[4] Instrumental variable estimations with two endogenous regressors and two instruments require usually the F-statistic to be equal to at least 7.03. In the specification presented in Table 4 it clearly exceeds the critical value.

those characteristics and the war intensity variable in order to obtain the required instrumental variables and endogenise the interaction terms. The results are presented in Table 5.

Notably, the negative IV-coefficient on the concentration rate remains consistent in sign, size and significance throughout all conducted estimations. It is also interesting to observe that none of the interaction terms have any significant influence. The simplest reading of these findings is that the concentration rate trumps all other potential personal factors in determining longevity and, in particular, that individuals' background have minimal impact on mitigating the effect of experienced peer pressure. Nonetheless, it is important to note that the limited availability of individual level variables means that this finding may not be generalizable.

Finally, we perform a series of robustness checks of the main findings. First, in an attempt to reduce composer heterogeneity in relation to mortality, we control for composer characteristics, including his education/training (in years), parental and any other family member's music-related engagement, and Murray's index score. Second, we control for composer long-term illnesses. Third, we control for large epidemics that might have affected longevity, such as the cholera outbreak in Paris in 1832, which lead to thousands of deaths. Fourth, as some composers served in the army during periods of war, we additionally control for the effect this might have had to their corresponding longevity. Fifth, we estimate our models using the exact date of birth of the composer instead of controlling for a set of 50-year-interval time of birth dummies.

The results from the robustness tests are reported in Table 6. In all cases the statistical significance of the coefficients related to concentration rate and time spent on the cluster remains unaffected, whereas the estimates change only marginally. Moreover, the IV results consistently stress the negative effect of the concentration rate. For the first three robustness regressions, illness, the occurrence of pandemic diseases and compose participation in war are not statistically significant. In the last specification, year of birth is positive and significant, implying that composers born later in time live longer; mirroring the progression of medicine and the provision of healthcare.[5]

[5] We further estimated our regressions by entirely excluding all observations that fall under any of the illness, pandemic disease, or war participation (22 observations). Results are still robust at conventional levels of statistical significance.

5. Conclusion

This study provides an important contribution to the literature on the spatial aspects of well-being. We provide an analysis of the relationship between longevity and location in highly concentrated centers, where job aspirations and competition between peers are arguably intensified. The lack of adequately disaggregated data on the geography of well-being is overcome by focusing on historical data of location of individuals belonging to a specific profession; namely, classical composers. The use of instrumental variables allow us to illuminate the causal relationship between geographic clustering and longevity of these creative individuals. Furthermore, it mitigates challenges encountered in previous studies that did not assess baseline physical health and could therefore not rule out the possibility that greater longevity of the initially most content individuals is due to their better initial physical health.

It is well established that peer effects associated with geographic clusters have positive externalities, such as, for example, knowledge spill-over effects as usually observed in the economics literature. Conventional economic wisdom also implies that competition is believed to be the first fundamental theorem of welfare economics and is indispensable in producing pareto-optimal outcomes. This research however discloses that peer competition incorporates a large negative externality in terms of a decreased state of health and premature death. It is further unveiled that the allocative advantages associated with competition could come at a non-negligible cost of a shorter life. This study offers a lower bound of the negative externality associated with intense concentration of peers. It is possible that numerous other composers died young and never reached their aspired level of success, hence remained unobserved in this research. The possibility that composers were well aware of the potential negative effects of relocation on longevity cannot be overlooked either. It might well be the case that these individuals were predominantly driven by their aspirations and work-related enthusiasm, who also discounted future states of health very highly (Fuchs, 1982).

While we do not advocate against the fostering of geographic clustering, nor against competition, we stress out that caution is required in such endeavors and underline the importance of appropriate policies that mitigate potential competition-related side-effects. In particular, the elaboration of a cost-benefit analysis of geographic clustering, the design of effective preventive policies for its negative externalities, as well as the configuration of efficient supportive policies for the involved agents is open for future research.

Table 1: Summary Statistics on Composers (N=190)

	Mean	*Standard Deviation*
	A: Background Information	
Life span (in years)	67.55	15.20
Duration of Career (in years)	44.84	15.35
Education or training time (in years)	8.02	3.20
Father's music-related engagement	0.35	0.48
Mother's music-related engagement	0.21	0.41
Music-related engagement of any other family member	0.22	0.42
Murray's Index Score	8.18	12.71
	B: Birth Cohort	
Birth cohort 1750-1799	0.22	0.41
Birth cohort 1800-1849	0.28	0.45
Birth cohort 1850-1899	0.51	0.50
	C: Birth Country	
British Isles	0.05	0.22
France	0.24	0.43
Germanic Countries	0.24	0.43
Italy	0.11	0.31
Russia	0.11	0.31
Eastern Europe	0.09	0.29
Rest of Europe	0.05	0.22
Rest of World	0.08	0.28
	D: Peer Competition	
Concentration rate (in composers)	6.07	5.34
Cluster time (in years)	19.20	21.08

Sources: Data on composers are obtained from Grove Music Online (2009).
Notes: The British Isles include composers from England, Scotland, Ireland and Wales. Eastern Europe relates to composers born in any of the Eastern Europe countries as classified by United Nations Statistical Division, with the exclusion of Russia. The Germanic Countries relate to the three German-speaking countries of Germany, Austria and Switzerland. Rest of Europe covers composers from all other European countries. Rest of World relates to composers that do not fit in any of the other categories.

Table 2: Summary Statistics on Geographic Clusters

	Paris	Vienna	London
Primary destination (in composers)	57	19	10
Visits during musical career (in composers)	95	50	46
Births (in composers)	19	8	2
Years spent in cluster during musical career	13.09	3.58	2.53
	(20.07)	(10.38)	(8.82)
Birthplace-cluster distance (in 1000 mile)	0.87	0.90	0.92
	(1.14)	(1.25)	(1.06)

Sources: See Table 1.
Note: Standard deviations reported within parentheses.

Table 3: Competition and Longevity

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	*OLS*	*OLS*	*IV*	*IV*	*IV*
Dependent Variable:	*Longevity*	*Longevity*	*Longevity*	*Longevity*	*Longevity*	*Longevity*
Concentration	-0.445		-1.687***	-1.783*		-2.324**
	(0.322)		(0.339)	(0.974)		(1.158)
Cluster Time		0.302***	0.479***		0.108	0.279
		(0.062)	(0.068)		(0.28)	(0.324)
Constant	73.23***	54.01***	68.99***	91.24***	62.54***	86.32***
	(5.31)	(4.12)	(4.677)	(13.43)	(12.40)	(12.99)
Time of Birth Effects	Yes	Yes	Yes	Yes	Yes	Yes
Country of Birth Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	190	190	190	190	190	190
R^2	0.105	0.262	0.262	0.262	0.262	0.184

Notes: Robust standard errors are reported in parentheses. Concentration measures the average number of composers situated in the same location. Cluster Time measures the number of years a composer spent in Paris, Vienna or London. In the IV results we instrument for Concentration and Cluster Time with the war intensity that occurred in the country of each location and with the composers' birthplace to Vienna distance, respectively. Columns (3) and (4) present the IV first-stage results. *** p<0.01, ** p<0.05.

Table 4: IV First Stage Results

Dependent Variable:	(3) *Concentration*	(4) *Duration*
War Intensity	0.097***	0.167
	(0.028)	(0.118)
Birthplace-Cluster Distance (Vienna)	-0.168	-3.385***
	(0.131)	(0.873)
Constant	9.251***	57.10***
	(1.976)	(10.42)
Time of Birth Effects	Yes	Yes
Country of Birth Effects	Yes	Yes
Observations	190	190
R^2	0.758	0.560
F-statistic of Instrument	50.64	20.63

Notes: IV first-stage results corresponding to Column (6), Table 3.
*** p<0.01

Table 5: Competition and Longevity (Additional Specifications)

Dependent Variable:	(1) IV *Longevity*	(2) IV *Longevity*	(3) IV *Longevity*	(4) IV *Longevity*	(5) IV *Longevity*
Concentration	-2.315*	-2.198*	-2.28**	-2.187*	-2.327*
	(1.218)	(1.157)	(1.145)	(1.162)	(1.39)
Cluster Time	0.278	0.259	0.267	0.276	0.279
	(0.324)	(0.321)	(0.325)	(0.323)	(0.333)
Concentration x Murray's Index	-0.001				
	(0.014)				
Concentration x Father Music Engagement		-0.304			
		(0.367)			
Concentration x Mother Music Engagement			-0.439		
			(0.398)		
Concentration x Family Music Engagement				-0.424	
				(0.391)	
Concentration x Composer Education Time					0.001
					(0.045)
Constant	86.33***	86.67***	87.18***	85.77***	86.32***
	(12.96)	(12.99)	(12.98)	(12.85)	(13.16)
Time of Birth Effects	Yes	Yes	Yes	Yes	Yes
Country of Birth Effects	Yes	Yes	Yes	Yes	Yes
Observations	190	190	190	190	190
R^2	0.184	0.177	0.166	0.184	0.184

Notes: Robust standard errors are reported in parentheses. The instrumental variable for Cluster Time is birthplace-Vienna distance. The instrument variable for Concentration is War Intensity and for the interaction terms, War Intensity interacted with the appropriate explanatory variable. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Competition and Longevity (Robustness Checks)

	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Dependent Variable:	Longevity	Longevity	Longevity	Longevity	Longevity	Longevity	Longevity	Longevity	Longevity	Longevity
Concentration	-1.453***	-2.021***	-1.785***	-2.374**	-1.687***	-2.385**	-1.676***	-2.319**	-1.633***	-2.022*
	(0.36)	(1.103)	(0.333)	(1.200)	(0.338)	(1.122)	(0.342)	(1.170)	(0.334)	(1.137)
Cluster Time	0.46***	0.249	0.508***	0.289	0.477***	0.285	0.479***	0.272	0.472***	0.225
	(0.071)	(0.322)	(0.064)	(0.335)	(0.068)	(0.317)	(0.068)	(0.325)	(0.066)	(0.323)
Long-Term Illness			12.91	8.613						
			(9.190)	(12.70)						
Pandemic Disease					0.942	2.992				
					(3.597)	(5.378)				
War Participation							3.419	2.053		
							(5.419)	(4.634)		
Birth Year									0.145***	0.141***
									(0.029)	(0.03)
Constant	70.56***	86.96***	68.41***	86.12***	68.75***	85.85***	68.93***	86.59***	-194.8***	-172.4***
	(4.677)	(12.26)	(4.724)	(13.08)	(4.853)	(12.92)	(4.729)	(12.94)	(54.67)	(56.06)
Time of Birth Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Country of Birth Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Composer Characteristics	Yes	Yes	No	No	No	No	No	No	No	No
Observations	190	190	190	190	190	190	190	190	190	190
R^2	0.302	0.225	0.272	0.190	0.262	0.184	0.264	0.182	0.292	0.209

Notes: Robust standard errors are reported in parentheses. The composer characteristics are a set of variables that control for individual level differences: we include three indicator functions for musical background of the father, mother and any other family member, the Murray's index score as a measure of composer's quality and a measure of the duration of composers music-related education or training time. For IV columns, cluster intensity and cluster time are instrumented with the war intensity that occurred in the country of each location variable and with the composers' birthplace to Vienna distance, respectively. *** p<0.01, ** p<0.05, * p<0.1.

APPENDIX

Table A1: Important Cities for Classical Composers

Primary destination (in composers)		Births (in composers)		Aggregated time spent during musical career (in years)		Concentration Rate	
Paris	57	Paris	19	Paris	2487	Paris	14.59
Vienna	19	Vienna	8	Vienna	681	Vienna	3.84
London	10	Berlin	3	London	481	London	3.31
Moscow	8	Moscow	3	New York	422	New York	2.97
Berlin	6	London	2	St. Petersburg	407	St. Petersburg	2.34
Milan	5	Venice	2	Berlin	330	Berlin	2.12
Leipzig	5	Hamburg	2	Moscow	233	Moscow	1.68
Prague	5	Cologne	2	Prague	225	Prague	1.52
Rome	4	Rome	1	Milan	205	Rome	1.32
Budapest	3	Naples	1	Rome	177	Milan	1.30
Copenhagen	3	Leipzig	1	Venice	114	Budapest	0.88
Naples	2	Prague	1	Copenhagen	112	Copenhagen	0.71
Venice	2	Copenhagen	1	Budapest	112	Boston	0.67
Dresden	1	Stockholm	1	Boston	100	Venice	0.63
Stockholm	1			Leipzig	95	Los Angeles	0.54

Source: Own calculations.

Table A2: City-Specific Competition and Longevity

	(1)	(2)	(3)
Dependent Variable:	OLS *Longevity*	OLS *Longevity*	OLS *Longevity*
Cluster Intensity: Paris	-1.919***		
	(0.397)		
Cluster Time: Paris	0.690***		
	(0.121)		
Cluster Intensity: Vienna		-7.909***	
		(1.034)	
Cluser Time: Vienna		0.883***	
		(0.106)	
Cluster Intensity: London			-3.904**
			(1.526)
Cluster Time: London			0.567***
			(0.145)
Constant	63.45***	67.96***	66.86***
	(4.158)	(2.959)	(3.029)
Time of Birth Effects	Yes	Yes	Yes
Country of Birth Effects	Yes	Yes	Yes
Observations	190	190	190
R^2	0.250	0.184	0.115

Notes: As in Table 3. *** p<0.01, ** p<0.05.

Table A3: Competition and Longevity (Reduced-Form)

	OLS
Dependent Variable:	*Longevity*
Concentration	-1.422***
	(0.433)
Cluster Time	0.491***
	(0.073)
War Intensity	-0.123
	(0.086)
Birthplace-Cluster Distance (Vienna)	0.871
	(0.973)
Constant	65.85***
	(8.456)
Time of Birth Effects	Yes
Country of Birth Effects	Yes
Observations	190
R^2	0.277

Notes: *** p<0.01.

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