

KAROL J. BOROWIECKI

WHAT MAKES A GREAT COMPOSER? A DATA-DRIVEN EXPLORATION OF MUSIC HISTORY

I am really thankful to Centro Einaudi, Fondazione CRT, and the Departments of Economics of the University of Turin, Cognetti De Martiis and ESOMAS, for giving the opportunity to open this year's Giorgio Rota Conference dedicated to Art, Culture and Heritage.

My presentation is an account of the principal arguments and findings of my research, developed with Marc T. Law and forthcoming with Princeton University Press. It is an expansive, data-driven framework for understanding artistic greatness across nearly a millennium of Western classical music. Drawing on biographical dictionaries, archival correspondence, thematic catalogues, and large-scale historical datasets, the authors investigate the determinants of creative productivity, stylistic influence, emotional well-being, gender asymmetries, financial pressures, and the consequences of migration and war.

1. CONCEPTUALIZING AND MEASURING GREATNESS

To start with, *what constitutes artistic greatness?* Greatness arises from the interaction between **quality** – the enduring cultural significance of a composer's oeuvre – and **quantity** – the volume of creative output over a lifetime. Because the measurement of quality poses well-known challenges, the study triangulates across several imperfect yet collectively informative indicators: expert rankings, the length of dictionary entries, measures of stylistic influence derived from musical-theme similarity, and contemporary popularity on streaming platforms such as Spotify (Borowiecki, Law forthcoming).

This multifaceted measurement strategy departs from traditional musicological approaches, which typically focus on a narrow canon of celebrated composers. Such selectivity undermines generalizability and precludes causal inference. By contrast, we compile data on thousands of composers active between 1100 and the twentieth century, thereby capturing the variation necessary for econometric analysis (*ibidem*).



2. MIGRATION, CLUSTERING, AND THE GEOGRAPHY OF CREATIVITY

A major theme of the project concerns the geographical dynamics of creative activity. Classical composers historically exhibited high mobility, often relocating repeatedly in search of patronage, audiences, and intellectual community. By extracting detailed biographical information from the *Grove Music Dictionary*, we map these movements and document the emergence of musical ‘clusters’ such as Paris, Vienna, and London.

Two empirical findings are particularly noteworthy.

First, clustering exerts a substantial positive effect on productivity. Using an instrumental-variable strategy designed to address endogeneity – especially the concern that productive composers may self-select into cultural centres – the study exploits geographic distance from major clusters for composers born between 1750 and 1899, a period during which travel costs conferred an exogenous constraint. The results indicate that time spent in a top cluster increases output markedly, amounting to roughly one additional influential work for every three years in cities such as Paris or Vienna (Borowiecki 2013).

Second, the productivity effect arises not from generic urban scale but from the concentration of other artists. Placebo tests involving large but musically peripheral cities (e.g., Amsterdam), as well as historically significant but no longer active centres (e.g., Venice), reveal no comparable benefits. The findings thus align with longstanding theories of agglomeration – Marshallian knowledge spillovers, Jacobsian diversity externalities, and Porter’s competitive dynamics (Marshall 1890; Jacobs 1969; Porter 1990).

At the same time, clustering imposes costs. Qualitative evidence from correspondence and memoirs depicts the psychological pressures faced by composers in competitive environments; quantitative evidence shows that increased peer density reduces longevity (Borowiecki, Kavetsos 2015). The duality of clustering – productive yet psychologically taxing – embodies the complex relationship between creativity, competition, and well-being.

3. HUMAN CAPITAL FORMATION AND THE TRANSMISSION OF STYLE

A further contribution of the project lies in its analysis of compositional lineages and pedagogical influence. Across centuries, composers have developed within robust teacher-student networks, ranging from the extensive Bach family to pedagogical chains linking Salieri, Beethoven, Schubert, and Liszt. To quantify stylistic inheritance, we apply computational analysis to over 17,000 musical themes drawn from thematic dictionaries, constructing similarity measures based on N-grams, key signatures, and time signatures (Barlow, Morgenstern 1975; 1976).



The empirical results support long-held qualitative claims within musicology. Students' compositional styles resemble those of their teachers significantly more than they resemble plausible counterfactual mentors (Borowiecki 2022). Moreover, stylistic influence persists into subsequent generations, suggesting durable transmission of musical ideas. The analysis also indicates that teachers of high quality exert especially strong influence and that more intensive pedagogical relationships amplify stylistic similarity. These findings illuminate the mechanisms by which artistic traditions persist and evolve, underscoring the centrality of apprenticeship to cultural continuity.

4. EMOTIONAL WELL-BEING AND THE CREATIVE PROCESS

I turn now to the emotional foundations of creativity, engaging with the longstanding conjecture – dating back to Aristotle – those negative emotions, including melancholy or depression, may enhance artistic achievement. To move beyond speculative claims, we analyse approximately 1,400 letters written by Mozart, Beethoven and Liszt, employing linguistic software to detect positive and negative emotional expressions (Borowiecki 2017). This dataset provides exceptionally rare longitudinal evidence of historical well-being.

Several findings emerge. **First**, composers' emotional reactions to life events resemble those observed in the general population: illness or bereavement increase negative emotional expression sharply, whereas activities such as touring and completing major works increase positive effect (*ibidem*). **Second**, by exploiting the quasi-random timing of unexpected deaths of family members, the analysis identifies a causal effect of negative emotional shocks on creative productivity. **Third**, the study demonstrates that letters themselves offer a credible measure of contemporaneous emotional states, thereby opening new methodological possibilities for economic history and historical psychology. Our research has broader implications, having been featured in the *UN World Happiness Report* as a methodological innovation in studying well-being using historical textual sources.

5. GENDER INEQUALITY IN MUSIC COMPOSITION

My presentation addresses the marked historical underrepresentation of female composers, too. While women have long participated in musical life, they faced substantial structural barriers, including restrictions on education, patronage and public musical participation – a fact noted by contemporaries from John Stuart Mill to modern

scholars such as Richard Taruskin (Mill 1869; Taruskin 2010). Our quantitative evidence elucidates several mechanisms underlying this persistent disparity.

Parental musical background strongly influences the likelihood of becoming a prominent composer, with mothers exerting a particularly significant effect on their children's musical trajectories. However, they do not appear to favour daughters over sons (Borowiecki, Kristensen, Law 2025). Teachers, similarly, do not diminish gender inequality, although male and female instructors are equally effective. Perhaps most importantly, the rise of conservatories and other formal institutions of musical education significantly increased female representation, reducing reliance on informal networks that had historically disadvantaged women. Nonetheless, the gender gap remains pronounced in measures of canonical status and public recognition.

6. FINANCIAL CONSTRAINTS, WAR, AND EXTERNAL SHOCKS

FINANCIAL CONDITIONS

Our study also examines the role of financial stability in shaping creative output. Drawing on biographical information found in *Grove Music Online* for 172 composers or historical income series – most notably those reconstructed for Mozart – and linguistic indicators of financial anxiety extracted from composers' letters, we show that low income is associated with markedly lower quantity, quality, and originality of output, especially among composers lacking family wealth (Baumol, Baumol 1994; Borowiecki 2022). These findings challenge romanticized narratives of the impoverished genius, suggesting instead that financial stability supports, rather than inhibits, creative development. The results have contemporary policy implications, underscoring the importance of public or philanthropic support for the arts.

WAR AND MIGRATION

Wars exert heterogeneous but often deleterious effects on creative production. While certain conflicts stimulate artistic responses – Elgar's *Polonia* or Shostakovich's *Leningrad Symphony* – wars also disrupt careers, displace artists, and weaken cultural ecosystems. Our studies indicate that international wars increase the probability of a composer's emigration by approximately seven percent, typically with suboptimal consequences for career development (Borowiecki 2012; O'Hagan, Borowiecki 2010). This war-induced migration diminishes the long-run creative capacity of affected countries. Productivity patterns also differ between wartime and peacetime, reflecting both emotional strain and institutional disruption (Borowiecki 2014). These findings underscore the vulnerability of artistic communities to geopolitical shocks.



7. BROADER IMPLICATIONS

I intend to conclude here by reflecting on the broader relevance of our findings. Although the project centers on classical music, the identified mechanisms – agglomeration economies, pedagogical transmission, emotional determinants of productivity, structural inequality and the consequences of financial volatility – extend far beyond this domain. They resonate with research on scientific creativity, invention, entrepreneurship, and the knowledge economy more generally. Moreover, the findings invite reflection on the role of physical proximity in an increasingly digital world: while digital dissemination has transformed access to music, the evidence suggests that creative collaboration and tacit knowledge exchange remain fundamentally rooted in face-to-face interaction (Currid 2007; Christopherson, Scott 2009).

REFERENCES

- Barlow, H., Morgenstern, S. (1975), *A Dictionary of Musical Themes*, New York, Crown;
 – (1976), *A Dictionary of Opera and Song Themes*, New York, Crown.
- Baumol, W.J., Baumol, H. (1994), *On the Economics of Musical Composition in Mozart's Vienna*, «Journal of Cultural Economics», 18, pp. 171-198.
- Borowiecki, K.J. (2012), *Are Composers Different? Historical Evidence on Conflict-Induced Migration (1816-1997)*, «European Review of Economic History», 16, 3, pp. 270-291.
- (2013), *Geographic Clustering and Productivity: An Instrumental Variable Approach for Classical Composers*, «Journal of Urban Economics», 73, 1, pp. 94-110.
- (2014), *Artistic Creativity and Extreme Events: The Heterogeneous Impact of War on Composers' Production*, «Poetics», 47, pp. 83-105.
- (2017), *How Are You, My Dearest Mozart? Well-Being and Creativity of Three Famous Composers Based on Their Letters*, «Review of Economics and Statistics», 99, 4, pp. 591-605.
- (2022), *Good Reverberations? Teacher Influence in Music Composition since 1450*, «Journal of Political Economy», 130, 4, pp. 991-1090.
- Borowiecki, K.J., Kavetsos, G. (2015), *In Fatal Pursuit of Immortal Fame: Peer Competition and Early Mortality of Music Composers*, «Social Science & Medicine», pp. 30-42.
- Borowiecki, K.J., Kristensen, M.H., Law, M.T. (2025), *Where Are the Female Composers? Human Capital and Gender Inequality in Music History*, «European Economic Review», 117, pp. 104893.
- Borowiecki, K.J., Law, M.T. (forthcoming), *What Makes a Great Composer? A Data-Driven Exploration of Music History*, Princeton, Princeton University Press.
- Christopherson, S., Scott, A.J. (2009), *The Cultural Economy*, London, Sage.



- Currid, E. (2007), *The Warhol Economy: How Fashion, Art, and Music Drive New York City*, Princeton, Princeton University Press.
- Jacobs, J. (1969), *The Economy of Cities*, New York, Random House
- Marshall, A. (1890), *Principles of Economics*, London, Macmillan
- Mill, J.S. (1869), *The Subjection of Women*, London, Longman
- O'Hagan, J., Borowiecki, K.J. (2010), *Birth Location, Migration and Clustering of Important Composers: Historical Patterns*, «Historical Methods», 43, pp. 81-90.
- Porter, M. (1990), *The Competitive Advantage of Nations*, New York, Free Press.
- Taruskin, R. (2010), *The Oxford History of Western Music*, vol. 3, Oxford, Oxford University Press.