Artistic creativity and extreme events: The heterogeneous impact of war on composers' production☆

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ABSTRACT

The relationship between extreme events and creativity is rather ambiguous and yet of significance across several disciplines. The following study adds to the debate by analyzing the impact of war on individual artistic output by building on a global sample of 115 prominent composers born after 1800. The study investigates how their productivity changes during various types of war and over their lifetime. Composers' productivity decreases during war, however not so much for those turning 30 or those in late 50s or above. Interestingly, the effect is not negative for all types of war: higher output can be observed during defensive or victorious international wars. This result could be attributable to emotional factors.

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> *There is something suspicious about music, gentlemen. I insist that she is, by her nature, equivocal. I shall not be going too far in saying at once that she is politically suspect.* – Herr Settembrini, ch. 4
> (Thomas Mann, *The Magic Mountain*, Fischer, 1924)

1. Introduction

What is the relationship between extreme events and the creativity of artists? More particularly, how does war affect the artistic output of a person? In a variety of forms and contexts, this question has long intrigued numerous social scientists from various academic disciplines. Historians seem to be unified in the argument that war is destructive and detrimental to the creative process itself. However, over the last decades only limited evidence has been found for the existence of a negative impact of war on the arts or on the number of great artists. Moreover, some studies have revealed a positive impact of conflict on the arts and artists. The ambiguous and counterintuitive relationship between war and the arts that has often been found in previous research remains a puzzle.

Several distinguished scholars provide qualitative discussions of history and claim that war and internal unrest have a negative impact on artists and their artistic creativity. Toynbee (1972) studies the rise and fall of 23 civilizations and describes how the suppression of conflict enables the flourishing of the arts and of great cultures. Only peace and the absence of internal frontiers enable the circulation of ideas and discoveries, whereas military history provides a continuing illustration of the "disastrous effects of relying on an old-fashioned technique instead of pressing on to meet the future with creative innovations." Wright (1942) provides a thorough study of the institution of war, historically, legally and culturally, and concludes "war in itself has never constructed (...) cultural institutions or practises, and it has often destroyed old organizations and customs." The destructiveness of military conflict is also argued by Sorokin (1937), where internal disturbances and wars are defined as the sharpest forms of disorganization of a system of social relationships; a society without balanced fundamental norms and values cannot raise its own culture or create arts.

However, in recent decades, social scientists have usually not succeeded in establishing the negative impact of conflict on artistic creativity or on the number of great artists; despite having used a variety of databases and having followed different methodological approaches. Simonton (1975) studies the impact of war on creativity in Western Civilization from 700 B.C. to 1839 A.D. His sample consists of approximately 5000 creative individuals, grouped in 127 generations, cited in an international collection of about 50 histories, anthologies, and biographical dictionaries. The hypothesis, that the number of creators in one generation is a negative function of the number of wars, is rejected. In a later study, Simonton (1976) studies the correlations between imperial instability (i.e., number of revolts and rebellions in the context of large empire states) and discursive creativity in the field of science, philosophy, literature and classical music. All observations are allotted to 122 generations covering the time period from 540 B.C. to 1900 A.D. The estimated coefficients are found to be positive and indicate that a higher number of creative individuals existed in times of imperial instability – a tentative indication of a positive impact of war on creativity. Simonton (1977) analyzes the role of stress factors for a sample of ten composers, with war being one of the considered stressors. The author concludes that total productivity is free of external influences. More recently, Murray (2003) investigates the impact of war and internal unrest on the number of important European visual artists, writers, composers and scientists. These individuals are grouped by generation and the data set covers the period from 1400 to 1950. In a restricted regression, the variables that characterize war and social unrest have no significant effect on the number of important figures in a generation. The employment of an expanded model, when several other explanatory and control variables are included, suggests that the impact of war on human accomplishment is positive and highly significant. Hellmanzik (2010) studies clustering premiums for visual artists and regresses prices of paintings on artist's age and several control variables, including dummies for both World Wars. The results indicate that artworks painted during World War I and World War II are valued higher by 6.1 per cent and 47.8 per cent, respectively. This finding is even more interesting as the war-premiums exceed, on average, the estimated cluster premiums. Evidence on the existence of a negative effect is rather limited. Borowiecki and O'Hagan (2013) investigate the impact of war on individual life-cycle creativity using a similar sample of composers as employed in the underlying article and find that war decreases annual output of the individuals covered.[1]

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[1] The underlying study, by disclosing that the impact of some wars can be positive, does not contradict the results presented in Borowiecki and O'Hagan (2013). On the contrary, it points out that if one accounted for the few types of wars that are positively associated with creativity, the overall negative impact would be even stronger.

This study attempts to shed some light on this puzzling contradiction in qualitative and quantitative research. This is done by investigating individual creative work by classical composers. The focus is on the *life-cycle* output of an artist, as opposed to its impact on total creative output; although one might expect the two to be linked. This article tries to reconcile the ambiguity in previous research by dividing wars into different types, depending on their extent, initiation or outcome, and studying the heterogeneous impact of war on a composer's productivity. The data on wars is obtained from the Correlates of War (Sarkees, 2000); a source which also provides a range of useful indicators on wars, such as which country was the initiator, what was the outcome or geographic extent of a conflict, etc. This study builds also on annual data on the country of residence of a composer and the number of important compositions written by him in that location.[2] This has been extracted from music dictionaries and encompasses a global sample of 115 prominent composers born between 1800 and 1910.

The methodological approach resembles the identification strategy of Galenson and Weinberg (2000 and 2001) which is extended and applied to composers. To adjust for age effects and to enable a graphical visualization of the results, age-productivity profiles are constructed. This allows for the comparison of how the production of a composer differs depending whether he was composing during years of peace or war. The findings imply that composers' output is lower during civil wars or international wars which were offensive or lost. Interestingly, the results indicate that composers were writing more during defensive or not-lost inter-state conflicts. As argued below, this could be some indication of a specific change in the emotional state of the artist, possibly associated with patriotic motives once the country of residence experiences oppression, or an increased well-being associated with a victorious conflict.

The remainder of this paper is organized as follows. In the next section, a discussion of possible channels through which war could impact a person's creativity is provided. Section 3 describes the data. Section 4 presents and discusses the empirical results. Section 5 provides concluding remarks.

2. Theory

Feldman et al. (1994, p. 2) provide a useful framework for the study of creativity and defines it as "the achievement of something remarkable and new, something which transforms a field of endeavour in a significant way". Of particular interest for the intended study are those factors that concentrate on individual-oriented approaches and especially those theories that attempt to link an individual's state of mind at a particular time to wider conditions and hence to creative output (for a related discussion see also Borowiecki and O'Hagan, 2013).

The literature on the relationship between trauma and creative output is large. Andreasen (2005) studies the association between creativity and psychopathology in living writers, and suggests that mood disorders could possibly be conducive to the creative process. A relevant issue is whether or not mood changes lead to a greater output, or perhaps a lesser but higher-quality output. Slater and Meyer (1959) with this in mind analyzed the output of Robert Schumann. The average number of his works over parts of his life is tracked and it was found that in his years of hypomania his output was five times the average number in his years of depression. The authors approximate then for the quality of Schumann's output and do not find any corresponding increase in the quality of the composer's creativity.

Emery (1993) attempts to illuminate the links between artistic activity and inner resistance to group regression and tyranny, and elaborates the argument that people respond emotionally to trauma through creative production; it could be also perhaps argued that war provides trauma and/or a threatening situation. In the words of Jamison (1989), "creative work can act not only as a means of escape from pain, but also as a way of structuring chaotic emotions and thoughts, numbing pain through abstraction and the rigours of disciplined thought" (p. 123). Kaufman and Baer (2002) argue the existence of an association between creativity and "madness", and point at the case of poetry writing and the incidence of mental illness. Akinola and Mendes (2008) discuss the role of situational factors on creativity: intense negative emotions can create powerful self-reflective thought and

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[2] As the sample used encompasses only male composers, the male form is used throughout the article.

perseverance, leading to increased creativity. They argue that being exposed to a situation that brings about intense negative emotion can result in increased artistic activity.

In a related context, Borowiecki (2014) shows for a group of famous composers how negative emotions, extracted from letters written throughout their lives, affect creativity. In a natural experiment setting, the unexpected death of a family member is used as an exogeneous source of variation in negative emotions of the composer. This identification enables to illuminate the causal impact of negative moods on the composer's creativity at a number of points in life. Borowiecki's findings indicate then that the artistic creativity is causally attributable to negative emotions, in particular to sadness. The so-called mad-genius controversy is further addressed by Simonton (2014) who studies 204 eminent scientists, thinkers, writers, artists, and composers. The author finds curvilinear single-peaked functions for scientists, composers and thinkers, and concludes that scientists exhibit the least psychopathology and the thinkers the most, with the composers falling approximately in the middle.

Simonton (1986) comes closest to the objective of this paper in that he looks at the determinants of aesthetic success in classical music compositions, one of the determining variables being historical circumstances such as wars. His argument as here is that musical composition is often an expression of intense feeling and that as such the timing of great musical compositions is determined by the state of the composer's frame of mind and that wars clearly have an effect on this; and indeed as argued below on the working circumstances, and hence musical output, of the composer. This would suggest that the experience of war does not necessarily increase creative output, quite the opposite in some cases.

For example, in an earlier study Simonton (1980) provides a quantitative time-series analysis of the relationship between war and European scientific output, the first such study using annual rather than generational data. Simonton's findings imply a negative association between scientific technological activity and the incidence of defensive wars fought within Europe. This may be explained by Cerulo (1984), who argues the existence of three possible links between war and individual creativity: direct exposure to the war, destruction of communication networks and social-psychological processes. War generates large-scale disruption and instability of the social fabric, and physical threat, destruction and direct attack are highly counterproductive to creative output.[3] War time may be also associated with the break-down of communication networks and could result in many composers becoming isolated from foreign works due to censorship and broadcasting blackouts. Besides, the adverse effects of war on the music publishing industry may negatively affect the exchange of written material. Furthermore, interpersonal contact is likely to be hindered or may even end, thereby depriving composers of a supportive system and the enforcement by contemporaries of peer review and standards. There are other reasons why war might have had a negative impact on composition. It is possible that wars disrupt the creative output of composers, either in terms of access to instruments/ concert venues or players to "test" their material. Finally, war results in conflict-induced migration flows of music composers (Borowiecki, 2012, 2013) and this geographic dislocation may affect as well their creative processes, agreeably in either way.

3. Data

This study builds upon a unique data set that covers a global sample of 115 prominent classical composers born between 1800 and 1910.[4] The selection of the birth period is done for several reasons. First, data on the lives of composers are available and are relatively reliable, as opposed to, for example, composers of earlier periods. Second, the period chosen covers only deceased composers, and hence an analysis of a whole life output becomes possible. Third, the period encompasses many of the most influential composers of all time. Fourth, it covers wars that significantly shaped most recent

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[3] Anecdotally, Cerulo (1984) points out that Vaughan Williams was a fire-fighter during the bombing of London and often forced to write with his helmet, bucket and pump close at hand. Whereas, Shostakovich composed right through the air raids on Leningrad, leaving his desk only when on shift duty in the rescue brigade.

[4] Note that the cut-off year of 1910 is a consequence of the two used source dictionaries, rather than a subjective choice by the researcher.

history. Fifth, the geographic spread of births is fairly wide and composers' migration intensity is relatively high and hence a study of various types of war in a number of countries becomes possible.

The names of the most important composers are taken from Murray (2003). Murray's work is based on numerous international references and hence the risk of country- or marketing-biases in the selection is negligible. Data on composers' artistic output is taken from Gilder and Port (1978) which provides a qualitative selection of the most important works for 275 prominent classical composers born between 1500 and 1949. Gilder and Port aim to provide a dictionary "of lasting value as a permanent reference (. . .) [that contains] (. . .) complete factual information about who wrote what, and when" (Gilder and Port, 1978, preface). The dictionary is a recognized survey of the most influential classical compositions and served often as a source for composer's output (e.g., Simonton, 1991). Furthermore, if both sources are combined (i.e., Gilder and Port, 1978; Murray, 2003) for the period analyzed a relatively high intersection of 115 composers emerges.

For those composers the birth locations and detailed information on their migration patterns is extracted from the Grove Music Online (2009), the leading online source for music research. This large multivolume dictionary is "a critically organized repository of historically significant information" (Grove, 2009, Preface) and is detailed enough to track the movements of all 115 composers. What results is a time series that records the country of residence for each composer in every year of his life. The focus is on the periods of a composer's life when music-related work was predominant (i.e., when a composer was composing, giving tours, conducting philharmonics, teaching at music schools, managing music institutions, or travelling in search of inspiration). The aim of this restriction is to analyze the life period in which an individual from the sample was in fact a composer. Hence the infancy, education and retirement life periods are excluded as well as periods in which only other professions were practised.

The war data set is based on the *Correlates of War* (COW), which was introduced and described by Sarkees (2000). The COW data set identifies conflicts within states and between states that occurred between 1816 and 1997, and lists a number of records for each war. The available information enables to take account of war heterogeneity and to conduct distinctions between various types of war. First, it will be differentiated between civil wars (*intra-state wars*) and international wars (*inter-state wars*). Second, the inter-state wars will be divided into *defensive* and *offensive* inter-state wars, based on the record whether a participating state has initiated an international war. Third, a division of wars will be conducted with regard to its outcome (*lost* and *not-lost* inter-state wars).[5] Fourth, it will be differentiated between *continental wars* (i.e., wars that occurred on the continent of the participating country), and *colonial wars*, (i.e., wars that occurred on other continents). The composer and war data sets are linked through the country where a composer was located in a given year.[6]

The obtained data is summarized in Table 1.[7] The composers covered were engaged in music-related work during most of their lives (around 46 out of 68 years). France and the Germanic countries (i.e., Germany, Austria and Switzerland) accounted for the highest share of composers births – approximately 20 per cent each, followed by Russia (14 per cent) and Italy and Eastern European countries (each around 10 per cent).[8] One third of the composers were born in the first half of the 19th century, the majority (around 58 per cent) were born in the second part of the 19th century and the remaining (around 8 per cent) artists were born in the first decade of the 20th century. Most of the important compositions are concert works (0.42 works per year), followed by chamber works (0.17 works per year) and theatre works (0.13 works per year), while church compositions play only a marginal role (0.016 works per year). On average the total yearly output is equal to 0.73 and suggests that an artist during his career was composing two important classical works in less than three years.

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[5] The COW data set provides records whether an inter-state war participant was on the winning side, losing side or whether a tie resulted. Inter-state wars that ended with a victory or with a tie are grouped in this study together into *not-lost* conflicts.

[6] Note that for 1816–1918 (for the duration of the Austria-Hungary Union) the COW database aggregates wars in Austria and Hungary. To maintain consistency composers based in either of these countries in that time period are similarly aggregated into the Austria-Hungary Union. In analogy to the COW records, composers working in a part of Germany or Italy before the unification are recorded as based in one of these countries.

[7] A complete list of the included composers along with relevant background information is provided in the Appendix 1.

[8] See Table 1 for details on grouping of countries.

Table 1
Descriptive statistics: Composers' summary (n=115).

	Mean (1)	Standard deviation (2)
A. General characteristics		
Life-span (years)	68.42	14.50
Duration of Career (years)	45.68	14.29
B. Birth country		
British Isles	0.087	0.283
France	0.217	0.414
Germanic Countries	0.191	0.395
Italy	0.096	0.295
Russia	0.139	0.348
Spain	0.026	0.16
Eastern Europe	0.096	0.295
Rest of Europe	0.043	0.205
USA	0.087	0.283
Rest of World	0.017	0.131
C. Birth period		
Born 1800–1849	0.339	0.475
Born 1850–1899	0.583	0.495
Born 1900–1910	0.078	0.270
D. Total works per annum		
Concert	0.420	0.420
Chamber	0.168	0.168
Theatre	0.126	0.126
Church	0.016	0.016
Output (=Concert+Chamber+Church+Theatre)	0.731	0.731
E. Relative works per annum		
Concert	0.566	0.455
Chamber	0.205	0.363
Theatre	0.205	0.380
Church	0.023	0.138
Output (=Concert+Chamber+Church+Theatre)	1.0	–
F. Wars experienced		
Intra-state wars (years)	1.13	2.25
Inter-state wars (years)	8.25	5.85
Defensive inter-state wars (years)	4.86	4.18
Offensive inter-state wars (years)	3.39	3.47
Lost inter-state wars (years)	2.53	3.27
Not lost inter-state wars (years)	5.77	4.72
Continental wars (years)	2.44	3.26
Colonial wars (years)	5.81	6.12

Sources: Data on composers are obtained from Grove Music Online (2009). Number of important compositions is taken from Gilder and Port (1978). War data is employed from the Correlates of War data set (Sarkees, 2000).
Note: 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. *World* relates to composers that do not fit in any of the other categories.

The average composer was located in a country that has been engaged during 1.1 years in intra-state wars and around 8.2 years in inter-state wars. The duration of defensive and offensive international conflict faced by the country of composers' residence was approximately 4.9 and 3.4 years, respectively. The wars in which composers' country of residence was victorious or that ended with a tie lasted 2.5 years and the conflicts lost lasted around 5.8 years. The wars analyzed were fought around 2.4 years on the continent of the participating country and around 5.8 years on other continents.

Table 2
Descriptive statistics: composers' productivity and wars.

	Observations (1)	Total compositions per annum (2)	Difference: wartime − lifetime (3)
Lifetime	5253	0.731 (1.078)	–
War (Intra-state or Inter-state)	1001	0.696 (1.046)	−0.044 (0.037)
Intra-state wars	130	0.461 (0.845)	−0.269* (0.095)
Inter-state wars	949	0.719 (1.059)	−0.012 (0.038)
Defensive inter-state wars	559	0.817 (1.137)	0.086* (0.048)
Offensive inter-state wars	390	0.577 (0.920)	−0.154* (0.056)
Lost inter-state wars	72	0.542 (0.963)	−0.189* (0.128)
Not lost inter-state wars	518	0.822 (1.157)	0.091** (0.049)
Continental wars	281	0.783 (1.124)	0.052 (0.066)
Colonial wars	668	0.692 (1.030)	−0.039 (0.044)

Sources: See Table 1.
Note: Standard deviations are reported in parentheses.
* Indicates estimates significantly different from zero at 95 percent confidence.

Table 2 summarizes composers' annual creative production outcomes, measured as the number of written works, for the entire lifetime as well as for the periods when a certain type of war lasted. The third column presents the differences between the average lifetime production and the observed productivity during a certain type of war. Any type of war (intra-state or inter-state war) is negatively associated with composer's productivity incidence, however the difference lies just outside the typical confidence intervals (p-value < 0.13). Composers were significantly less productive during intra-state wars as well as offensive and lost inter-state wars.[9] It can be also observed that international defensive or not lost conflicts correspond with a significantly higher creative production.

4. Analysis

4.1. Model specification

The aim of the econometric analysis is to provide a robust comparison of composers' lifetime productivity in times of peace and during certain types of war. Based on point estimates age-productivity profiles for composers that have experienced peace or a certain type of war in a given year during their careers are generated.

Building on regression analysis, the number of important compositions written in one year is expressed as a polynomial in the age of the composer, interacted with war dummies. The regression contains also a number of control variables. Taking account of varying levels of productivity of different composers and allowing for the fact that each person may react in a different way to the incidence of a conflict, controls for each individual composer are included. The analysis stretches over a long time period in which composers' working conditions might have substantially changed over time. In order to capture this temporal variation a set of binary indicators for the year a work was composed are introduced. As different working conditions might have also existed between countries, a binary country control is further included.

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[9] Since the outcome of a war is unknown ex-ante, the productivity outcome reported for lost or not-lost inter-state wars are only for the last year of the war.

Formally, the specification is given by:

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\begin{aligned}
composition_{it} &= (\beta_1 age_{it} + \beta_2 age_{it}^2 + \beta_3 age_{it}^3 + \beta_4 age_{it}^4)\left(peace_{it} + \sum_{k=1}^{K} war_{kit} \right) \\
&+ \sum_{l=1}^{115} \psi_l I(i=l) + \sum_{m=1824}^{1992} \rho_m I(t=m) + \sum_{n=1}^{24} \mu_n I(country_{it}=n) + u_{it},
\end{aligned}
\tag{1}
$$

where $composition_{it}$ denotes the number of important works written by composer i in year t and age_{it} indicates the age of composer i in year t; $peace_{it}$ is a binary variable equal to one if the country of residence of composer i was not engaged in war in the year t; war_{kit} is an indicator function that is equal to one for the type of war to be considered k that occurred in the country of residence of composer i in year t; Ψ_l indicates a set of dummy variables for individual composers ($I(i=l)$ is an indicator function equal to one if $i=1$); ρ_m denote a set of controls for each year and μ_n a set of control variables for each country ($I(t=m)$ is equal to one if the considered annual productivity occurred in the year m and $I(country_{it}=n)$ is equal to one if the considered annual productivity was written in country n). This methodology bears some similarity to the way Galenson and Weinberg (2000 and 2001) calculated cohort effects, whereas here the age effect is moderated by war rather than a cohort indicator.

Several remarks are in order. First, the estimations are conducted with a fourth-order polynomial in the composer's age. The degree has been chosen based on a test for the significance of higher-order terms.[10] The useful implication of the fourth-order polynomial is that it allows for single- and double-peaked career cycles. Second, the war variable will vary depending on the criteria of war segmentation imposed. Wars will be divided into intra-state and inter-state wars. Furthermore, account will be taken of the heterogeneous nature of inter-state wars by differentiating international wars based on the initiation (defensive or offensive wars), outcome (lost or not lost wars) and geographic extent (continental or colonial wars). Third, reverse causality is unlikely to be an issue, as war influences artistic output, if at all, and not the other way round. However, the war effect could be transmitted through changes in some other, unobservable variables, for example, related to the psychological well-being of the artist. It is however beyond the scope of this paper to quantitatively identify and assess the role of precise channels. Fourth, in the model proposed all types of classical compositions are treated as equal. In a robustness test, it will be later shown that the results are robust if compositions were disaggregated into a specific type of work (e.g., $concertwork_{it}$, $chamberwork_{it}$). Furthermore, some models include also an indicator variable for the city where the work was composed.[11] To estimate Eq. (1) a negative binomial regression model is employed; this is motivated by the fact that the dependent variable is a nonnegative count variable.

4.2. Econometric results

Using the previously introduced data and methodology, one can quantitatively study the association between a composer's productivity in times of peace and during any type of war (intra-state or inter-state wars). The estimated coefficients are reported in Table 3. The age polynomials are calculated precisely and the models fit the data well. The regression estimates for all specifications are quite similar and provide consistent results; therefore, the further conducted estimations of the productivity profiles over age are based on the estimates from the first specification.[12] Fig. 1 shows the

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[10] The fourth-order polynomial was chosen by including fifth-order terms in age and testing for their joint significance. An F-test of the hypothesis that the fifth-order terms were jointly zero yielded a p-value of 0.51. The p-value for the F-test that the fourth-order terms were jointly zero was equal to 0.014. The results are consistent for all specifications discussed in this paper.

[11] The specific local demand and cultural infrastructure could lead, for example, to the composition of predominantly chamber works in Vienna, concert works in London or theatre works in Italian cities. Note that composers also often specialized in a certain type of composition (e.g., Georges Bizet in opera works), hence including composer fixed effects already takes account to some extent of the heterogeneity of compositions.
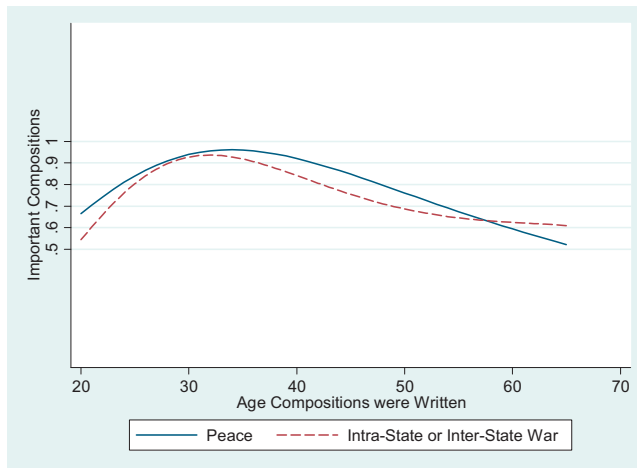
[12] Note that the specifications in Column 2 or 3 deliver minor differences in peak ages and, as the controls included vary over a composer's lifetime (i.e., year, country and location controls), the age-productivity profiles contain more noise. The significance, size and direction of the differences in productivity remain however consistent (also throughout all further reported estimations).

Table 3
Composers' lifetime productivity during war. Dependent variable: COMPOSITIONS$_{it}$.

Explanatory variable	Negative binomial regression		
	(1)	(2)	(3)
Peace*age	0.331***	0.344***	0.439***
	(0.0754)	(0.0799)	(0.0836)
Peace*age^2	−0.00931***	−0.00976***	−0.0123***
	(0.00253)	(0.00252)	(0.00261)
Peace*age^3	0.000109***	0.000106***	0.000138***
	(3.57e−05)	(3.55e−05)	(3.67e−05)
Peace*age^4	−4.80e−07***	−4.12e−07**	−5.56e−07***
	(1.79e−07)	(1.78e−07)	(1.84e−07)
Intra-state war*age	0.00929	0.0317	0.0319
	(0.0296)	(0.0296)	(0.0299)
Intra-state war*age^2	−0.000795	−0.00236	−0.00256
	(0.00177)	(0.00176)	(0.00178)
Intra-state war*age^3	1.68e−05	4.86e−05	5.35e−05
	(3.36e−05)	(3.34e−05)	(3.39e−05)
Intra-state war*age^4	−1.01e−07	−3.04e−07	−3.37e−07
	(2.04e−07)	(2.03e−07)	(2.06e−07)
Composer controls	Yes	Yes	Yes
Year controls		Yes	Yes
Country controls		Yes	Yes
Location controls			Yes
Observations	5253	5253	5253

Note: Standard errors are in parentheses. The regressions are estimated by the means of a negative binomial regression model. ***/**/* indicate estimates that are significantly different from zero at 99/95/90 per cent confidence.

Fig. 1. Age-productivity profiles in times of war and peace. *Note*: Important compositions are calculated from a quartic in age when the composition was written interacted with incidence of war controlling for composer fixed effects. Estimates are based on regression results in Column 1, Table 3.

age-productivity profiles for years of peace and for periods of any war (i.e., without disaggregating yet wars by its type). Composers' productivity in times of peace increases up to the mid-30s before declining; the calculated peak occurs at 33.8 years and implies 0.96 compositions written per year. The age-productivity profile in times of war is more volatile and, considering the entire lifetime, it is lower by 0.04 works per annum. The difference is small in magnitude, however statistically highly significant at the 99 confidence interval. Especially the youngest composers and those aged from their 30s to mid-50s are most affected by war and compose substantially less. There exist also a period later in life of a
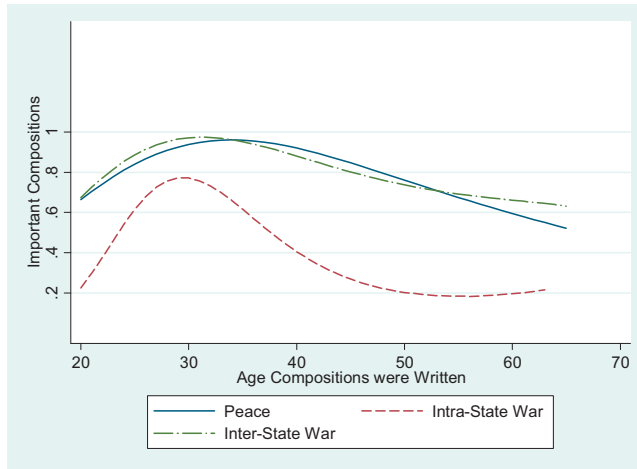
Fig. 2. Age-productivity profiles: Intra- and inter-state wars. *Note*: Important compositions are calculated from a quartic in age when the composition was written interacted with incidence of war controlling for composer fixed effects. Estimates are based on regression results in Column 1, Table 4.

composer (i.e., aged above 58), where the production is actually higher during war than in times of peace.

Next, the available information from the COW database is used in order to take account of various types of war. First, the listed wars are divided into intra-state and inter-state wars. Fig. 2 (based on the model from Column 1, Table 4) plots the age-productivity profiles for years of peace and for periods of intra- or inter-state wars. The age-productivity profile in times of intra-state wars stops increasing at 29 years and it lies significantly below the productivity level corresponding with periods of peace for composers' entire lifetime. Productivity during inter-state wars is statistically indifferent at the 5 percent level from years of peace.[13]

Second, inter-state wars are sorted by their initiation and a set of regressions is reported in Columns 1–3, Table 5. Fig. 3 (based on the model from Column 1, Table 5), plots the age-productivity profiles for times of peace and for the duration of defensive or offensive inter-state wars. The plot indicates that during defensive wars composers are significantly more productive and peak at 33.2 years. The number of compositions written during offensive wars is significantly lower than during years of peace. The difference increases from the mid-20s, is particularly marked for composers in their 40s and converges by the age of 61.5 (Fig. 4).

Third, inter-state wars are differentiated by the outcome. The obtained point estimates are reported in Columns 4–6 of Table 5 and the age-productivity profiles are visualized in Fig. 5 (based on the estimates from Column 4, Table 5). The results imply significantly higher productivity rates during wars that ended with victory or tie; the maximum occurs relatively early at 29.7 years. The estimated productivity during lost wars is significantly lower, especially during the 40s and early 50s. Since the outcome of a war may not be known until the later stages of the conflict, one could alternatively model productivity outcomes during only the last year of a war. Considering only the final year of a war delivers more volatile age-productivity profiles (due to the lower number of observations), however the significant differences and derived conclusions remain consistent (not reported).

Finally, Columns 7–9 of Table 5 present estimations for inter-state wars sorted by their geographic extent (i.e., continental or colonial conflicts). The results presented in Fig. 5 (based on the model from Column 7, Table 5) imply that the productivity during times of continental wars was higher during the 20s and 30s, and also later in live in the 60s. Productivity rates during colonial wars are found to be insignificantly different from times of peace if the whole lifetime is considered.

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[13] The *p*-value for the *t*-test that the productivity is higher in times of inter-state wars than in times of peace was above 0.057.

Table 4
Composers' lifetime productivity during intra- and inter-state wars. Dependent variable: $COMPOSITIONS_{it}$.

Explanatory variable	Negative binomial regression		
	(1)	(2)	(3)
Peace*age	0.309***	0.323***	0.419***
	(0.0773)	(0.0816)	(0.0853)
Peace*age^2	−0.00863***	−0.00910***	−0.0117***
	(0.00258)	(0.00258)	(0.00267)
Peace*age^3	0.000100***	9.74e−05***	0.000129***
	(3.63e−05)	(3.62e−05)	(3.74e−05)
Peace*age^4	−4.39e−07**	−3.73e−07**	−5.16e−07***
	(1.82e−07)	(1.81e−07)	(1.87e−07)
Intra-state war*age	−0.140	−0.118	−0.119
	(0.0929)	(0.0930)	(0.0941)
Intra-state war*age^2	0.00923	0.00796	0.00775
	(0.00613)	(0.00612)	(0.00619)
Intra-state war*age^3	−0.000198	−0.000173	−0.000164
	(0.000126)	(0.000126)	(0.000127)
Intra-state war*age^4	1.30e−06	1.14e−06	1.07e−06
	(8.14e−07)	(8.11e−07)	(8.18e−07)
Inter-state war*age	0.0202	0.0364	0.0390
	(0.0311)	(0.0311)	(0.0314)
Inter-state war*age^2	−0.00134	−0.00258	−0.00288
	(0.00185)	(0.00184)	(0.00185)
Inter-state war*age^3	2.61e−05	5.25e−05	5.91e−05*
	(3.50e−05)	(3.47e−05)	(3.51e−05)
Inter-state war*age^4	−1.55e−07	−3.29e−07	−3.69e−07*
	(2.12e−07)	(2.10e−07)	(2.12e−07)
Composer controls	Yes	Yes	Yes
Year controls		Yes	Yes
Country controls		Yes	Yes
Location controls			Yes
Observations	5253	5253	5253

Note: Standard errors are in parentheses. The regressions are estimated by the means of a negative binomial regression model. ***/**/* indicate estimates that are significantly different from zero at 99/95/90 per cent confidence.

4.3. Robustness analysis

This sub-section presents an overview of some robustness tests and provides relevant discussion. One might worry that compositions are not homogeneous. Different types of compositions might require, for example, various production times or access to specific infrastructure (e.g., concert hall) and hence could potentially disclose a different relationship with the incidence of war. Therefore, in additional estimations, each composition is categorized into concert, chamber, theatre or church works (see Table A1). The emerging age-productivity profiles, estimated separately for each category of work are presented in Figs. A1.1–A1.4.[14] The findings are consistent for concert and chamber pieces as well as mostly for church works – the composition intensity of these three types of works during peace and war correspond with the patterns for the aggregated output variable. The differences in the composition intensity of theatre works in times of peace and war are rather small and mostly statistically insignificant. A possible explanation for the absence of an immediate effect could be that theatre works require usually longer production times.

We turn our attention next to the issue of the timing of the war effect. One could study the persistency of war influence and construct age-productivity for a period after the war has ended. The

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[14] Note that the imposed sorting criteria lead to a loss of many observations and hence the generated age-productivity profiles are based on a lower number of point-estimates. As a result the productivity profiles contain more noise and sometimes are estimated to lie in the negative area. Moreover, no church work was written in times of intra-state wars, and hence no profile can be constructed for this category of composition and war.

Table 5
Composers' lifetime productivity during various types of inter-state wars. Dependent Variable: *COMPOSITIONS$_{it}$*.

| Explanatory variable	Sorting criterium								
	By initiation			By outcome			By geographic extent		
	War(A): Defensive inter-state wars			War(A): Lost inter-state wars			War(A): Continental inter-state wars		
	War(B): Offensive inter-state wars			War(B): Not lost inter-state wars			War(B): Colonial inter-state wars		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Peace*age	0.327***	0.330***	0.419***	0.330***	0.328***	0.418***	0.344***	0.357***	0.445***
	(0.0758)	(0.0803)	(0.0840)	(0.0752)	(0.0798)	(0.0833)	(0.0763)	(0.0809)	(0.0847)
Peace*age^2	−0.00919***	−0.00927***	−0.0116***	−0.00929***	−0.00930***	−0.0117***	−0.00975***	−0.0102***	−0.0125***
	(0.00254)	(0.00254)	(0.00263)	(0.00252)	(0.00252)	(0.00260)	(0.00256)	(0.00256)	(0.00265)
Peace*age^3	0.000107***	9.92e−05***	0.000128***	0.000109***	9.94e−05***	0.000130***	0.000115***	0.000112***	0.000141***
	(3.59e−05)	(3.57e−05)	(3.69e−05)	(3.56e−05)	(3.55e−05)	(3.66e−05)	(3.61e−05)	(3.60e−05)	(3.72e−05)
Peace*age^4	−4.72e−07***	−3.80e−07**	−5.10e−07***	−4.79e−07***	−3.82e−07**	−5.16e−07***	−5.08e−07***	−4.42e−07**	−5.69e−07***
	(1.80e−07)	(1.79e−07)	(1.85e−07)	(1.79e−07)	(1.78e−07)	(1.83e−07)	(1.81e−07)	(1.80e−07)	(1.86e−07)
War(A)*age	−0.00816	0.0110	0.00471	−0.0162	−0.00399	−0.0163	0.0706	0.0818	0.0518
	(0.0371)	(0.0378)	(0.0384)	(0.0604)	(0.0592)	(0.0588)	(0.0598)	(0.0592)	(0.0605)
War(A)*age^2	0.000956	−0.000515	−0.000406	−0.000166	−0.000912	−0.000453	−0.00459	−0.00557	−0.00415
	(0.00215)	(0.00216)	(0.00220)	(0.00366)	(0.00357)	(0.00355)	(0.00369)	(0.00364)	(0.00371)
War(A)*age^3	−2.53e−05	6.44e−06	6.13e−06	1.89e−05	3.24e−05	2.65e−05	9.54e−05	0.000118	9.59e−05
	(4.00e−05)	(4.01e−05)	(4.10e−05)	(7.00e−05)	(6.80e−05)	(6.77e−05)	(7.32e−05)	(7.20e−05)	(7.35e−05)
War(A)*age^4	1.92e−07	−1.70e−08	−1.95e−08	−1.93e−07	−2.78e−07	−2.52e−07	−6.34e−07	−7.92e−07*	−6.84e−07
	(2.39e−07)	(2.39e−07)	(2.45e−07)	(4.27e−07)	(4.14e−07)	(4.12e−07)	(4.66e−07)	(4.59e−07)	(4.69e−07)
War(B)*age	0.0942*	0.0998*	0.107**	0.0350	0.0550	0.0628*	0.00768	0.0303	0.0479
	(0.0526)	(0.0514)	(0.0511)	(0.0350)	(0.0351)	(0.0356)	(0.0351)	(0.0352)	(0.0355)
War(B)*age^2	−0.00677**	−0.00717**	−0.00766**	−0.00183	−0.00331	−0.00386*	−0.000686	−0.00228	−0.00341
	(0.00326)	(0.00317)	(0.00316)	(0.00207)	(0.00206)	(0.00209)	(0.00206)	(0.00206)	(0.00209)
War(B)*age^3	0.000142**	0.000150**	0.000159***	2.89e−05	5.99e−05	7.00e−05*	1.43e−05	4.68e−05	6.74e−05*
	(6.38e−05)	(6.18e−05)	(6.15e−05)	(3.91e−05)	(3.87e−05)	(3.95e−05)	(3.86e−05)	(3.84e−05)	(3.92e−05)
War(B)*age^4	−9.11e−07**	−9.67e−07**	−1.02e−06***	−1.30e−07	−3.30e−07	−3.88e−07	−8.08e−08	−2.88e−07	−4.04e−07*
	(3.97e−07)	(3.83e−07)	(3.81e−07)	(2.37e−07)	(2.33e−07)	(2.39e−07)	(2.31e−07)	(2.30e−07)	(2.35e−07)
Composer controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year controls		Yes	Yes		Yes	Yes		Yes	Yes
Country controls		Yes	Yes		Yes	Yes		Yes	Yes
Location controls			Yes			Yes			Yes
Observations	5253	5253	5253	5253	5253	5253	5253	5253	5253

Note: Standard errors are in parentheses. The regressions are estimated by the means of a negative binomial regression model. ***/**/* indicate estimates that are significantly different from zero at 99/95/90 per cent confidence.
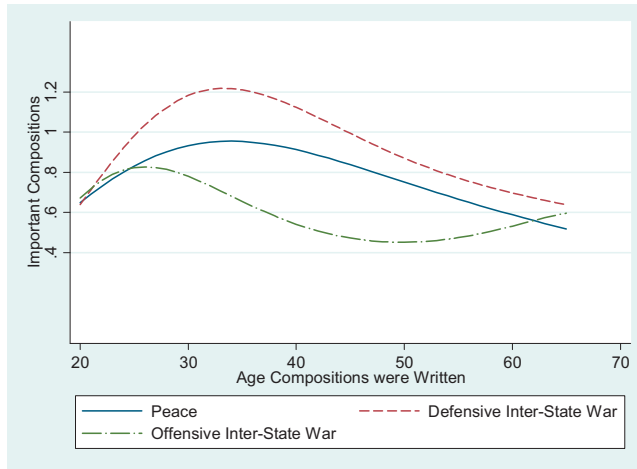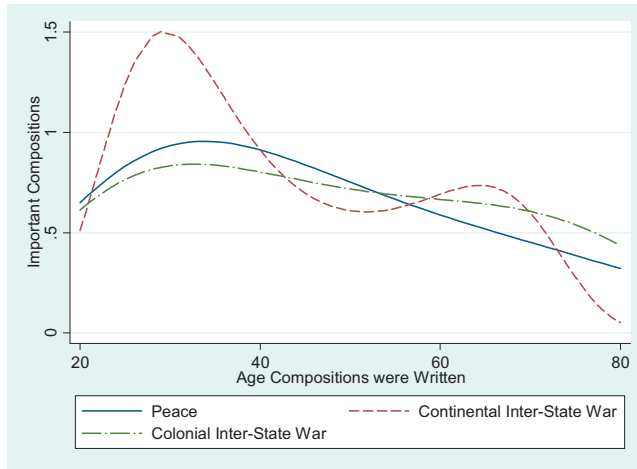
Fig. 3. Age-productivity profiles: By initiation of inter-state wars. *Note*: Important compositions are calculated from a quartic in age when the composition was written interacted with incidence of war controlling for composer fixed effects. Estimates are based on regression results in Column 1, Table 5.
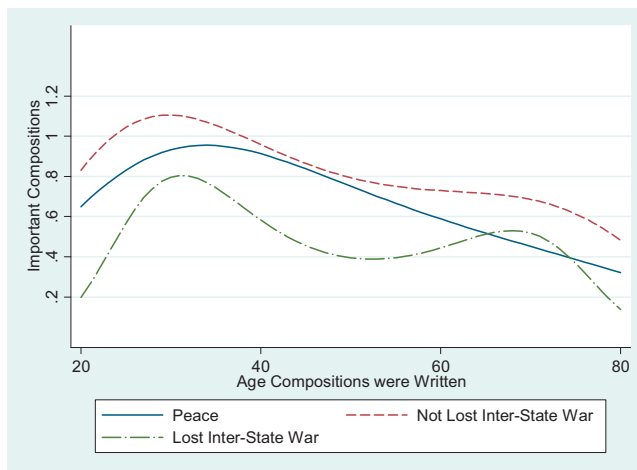
Fig. 4. Age-productivity profiles: By outcome of inter-state wars. *Note*: Important compositions are calculated from a quartic in age when the composition was written interacted with incidence of war controlling for composer fixed effects. Estimates are based on regression results in Column 4, Table 5.

figures depicting composers' productivity 2 years after the war are presented in Fig. A2.1 and imply a general convergence of the productivity functions. The convergence is especially lagged for offensive and colonial inter-state wars: composers' productivity decreases even further over the next one or two years after these types of wars have finished. Within a period of 5 years, however, all differences lose their significance and the productivity levels during times of war and peace remain statistically undistinguishable. Since the impact of war becomes statistically unobservable a few years after the war, it is very likely that the previously disclosed differences in the age-productivity profiles appear to be related to the incidence of a war. This constitutes strong support for the main findings.

The covered composers exhibit remarkable migration intensity: 77 per cent have been engaged during their lives in a music-related activity abroad and have spent on average around 23 per cent of

Fig. 5. Age-productivity profiles: By geographic extent inter-state wars. *Note*: Important compositions are calculated from a quartic in age when the composition was written interacted with incidence of war controlling for composer fixed effects. Estimates are based on regression results in Column 7, Table 5.

their careers abroad. The worry of a meaningful bias of the estimated war-impact decreases somewhat if one considers that only a marginal share of the time spent abroad occurred when the host country was engaged in war (3.7 per cent). This is consistent with Borowiecki (2012) who shows a strong negative relationship between the incidence of war and composers' choice of residence country – artists were found to be avoiding regions engaged in warfare. As such, the previously disclosed war-productivity relationship is almost entirely based on composers working in their mother countries and hence their productivity levels should come close to the productivity patterns of the entire sample. Fig. A3.1 shows this to be the case. The only exception appears for lost inter-state wars, during which productivity does not decrease for composers located in their mother countries.

The sample size of composers living abroad in a country engaged in warfare is in general too small in order to reliably estimate age-productivity profiles for immigrant artists. One could nonetheless try to calculate productivity functions for the case of defensive inter-state wars. This is potentially the most interesting case, as one of the possible drivers of higher productivities in times of defensive wars is a patriotic motive and this mechanism should work only for composers located in their country of birth and not for foreign residents. Fig. A3.2 depicts the levels of creative production for composers located in their country of birth and abroad. As hypothesized, productivity during defensive wars is higher only for home based composers while immigrant artists' productivity appears unaffected. The difference is statistically significant only for home based composers.[15]

Finally, one might suspect that the results are driven by extreme observations, for example, by exceptionally productive composers. The bias would be present if wars were not evenly spread across all composers and if the most productive artists experienced more wars than the average creative individual. This possibility is investigated by dropping the most productive ten per cent composers and then reconstructing the age-productivity profiles for the remaining individuals. The results are presented in Fig. A4 and indicate robustness of the main findings.[16]

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[15] Note that there are no observations for composers aged below 32, who lived abroad in a country engaged in a defensive war.
[16] A range of similar sub-sampling exercises for the most and/or least productive composers at various cut-off points (5, 10 or 20 per cent) have been conducted and deliver very similar results (not reported).

5. Conclusion

This study investigates whether war, an example of extreme events, has an impact on the creative production of artists. While this question has been much debated interdisciplinarily, primarily by psychologists and historians, a definite answer has remained unestablished. Most of the qualitative research posits that creativity is lower during wars, however those hypotheses find only limited quantitative support. The underlying research suggests the existence of a heterogeneous impact of conflict, depending on the type of war. Based on a large sample of composers, the underlying study addresses this "old" question by using econometric methods and calculating age-productivity profiles for times of peace and for various types of war.

The presented results indicate that war does impact creativity and that it does so in a very heterogeneous way, depending on the stage of life of the artist, as well as on the type of war. Composers are typically negatively affected by war, however those in their late 20s and early 30s do not appear to suffer much in times of war, and those above their late 50s may become even more productive. The emerging findings further indicate that international wars that ended with a victory or a tie, as well as defensive or continental inter-state wars, correspond with a significantly higher productivity. The results, which indicate that some types of war have a positive impact on high-profile creativity, may be possibly attributable to emotional changes of the creator: the shocking incidence of war may stimulate negative emotions which may constitute fertile ground upon which composers could draw (Andreasen, 2005; Borowiecki, 2014). Related to emotional determinants are patriotic motivations. We have observed that productivity can be higher in times of defensive wars, especially for composers located in their country of birth. For example, the writing of the 'Symphony No. 7' (also 'Leningrad Symphony') by Shostakovich within a month after the Nazis invaded Russia in the year 1941, may have well been a piece motivated (at least partly) by the composer's willingness to contribute to the defence of the country. After all, Shostakovich described the work to be 'about terror, slavery, and oppression of the spirit' and the composition became an icon of the resistance, suffering and hopes of the Russian people.

However, overall, wars have been detrimental to the creative process; particularly offensive, lost or continental (albeit marginally) inter-state wars, or civil wars. Again, it is possible that war impacts emotional state in a non-linear way and some wars may result in a psychological blockade of the creative process. Furthermore, composers' productivity also depends on non-psychological aspects, such as artistic freedom, circulation and dissemination of ideas or suitable market conditions, which could be negatively affected by war. It is also possible that when capital and labour are transferred from art patronage to expensive warfare (i.e., during offensive or colonial wars), a lower productivity might possibly occur because of a decrease in incentives for creative production.

These findings add to a recent study by Borowiecki and O'Hagan (2013), who for a similar sample of composers disclose the presence of a persistent negative effect of war on creativity. The results disclosed in the underlying paper seem to be coherent: if all wars were considered the association would be negative as well (see, for example, the impact of intra- or inter-state wars, Table 2). However, this study also demonstrates a heterogeneous impact of wars, which helps to consolidate some of the ambiguity of previous research. If the heterogeneity of certain types of war was taken into account, the results of Borowiecki and O'Hagan (2013) would be even stronger.

The question arises: How representative is the sample used? The selection is non-random and this research covers artists who are regarded today as successful. However, these individuals were hardly born as great achievers, but rather, were building their reputations throughout their careers, which would mean that parts of their lives possibly resembled that of an average composer. Furthermore, many of the composers covered have not been regarded as "great" during their lifetimes, and sometimes became prominent even decades after their death. In any case, it is likely that even a prominent composer is to some extent representative of the profession of classical composers in general, or perhaps even of other groups of creative individuals. Visual artists, writers or even entrepreneurs may have responded in the past similarly to the incidence of various types of war. Even if one does not want to accept the representativeness of a prominent person, the covered creators are those whose achievements constitute groundbreaking and

timeless contributions towards the classical music canon and hence our cultural heritage; their legacy is of remarkable cultural and economic value, and is therefore of a large enough significance to motivate this research.

All in all, this paper supports the importance of exogenous conditions for a person's creativity. Extreme events, such as the emergence of war, might have a significant impact on the achievements of creative individuals and hence have considerably shaped not only the lives of the creators but also their creative work. However, the precise identification of the mechanisms at play, with a particular focus on the role of psychological determinants, remains a fairly open question for future research. Another interesting avenue for future studies could be the identification of the overall lifetime productivity (or more generally, the number of great achievers) as a function of various types of war.

Appendix 1
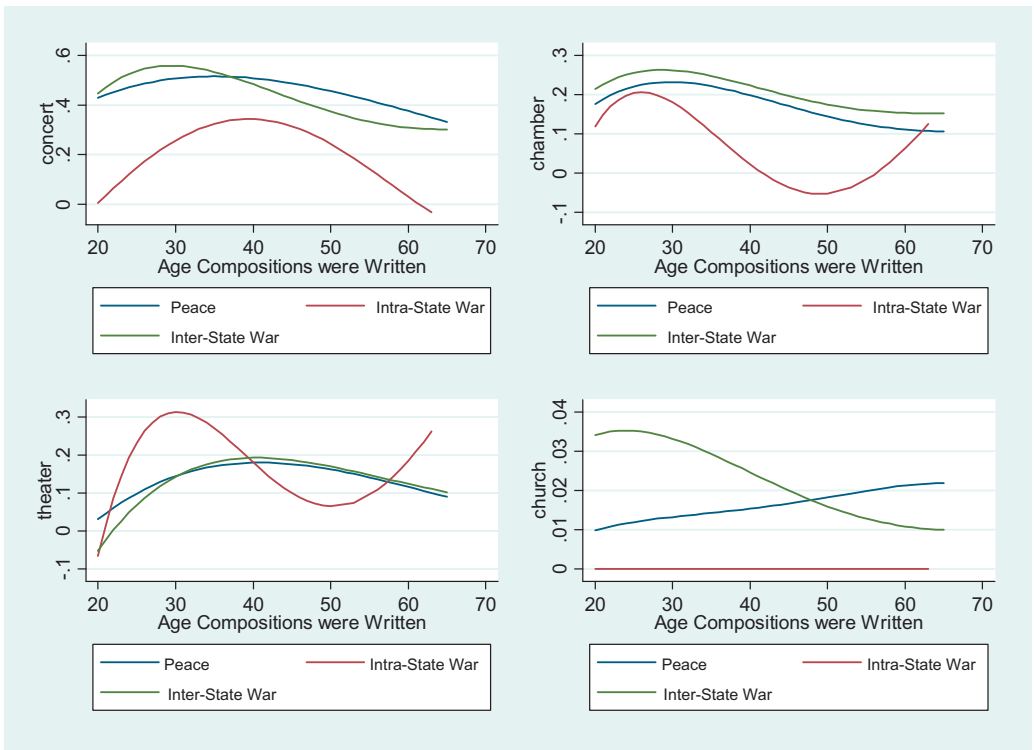
Fig. A1.1. Age-productivity profiles: Intra- and inter-state wars by type of work.
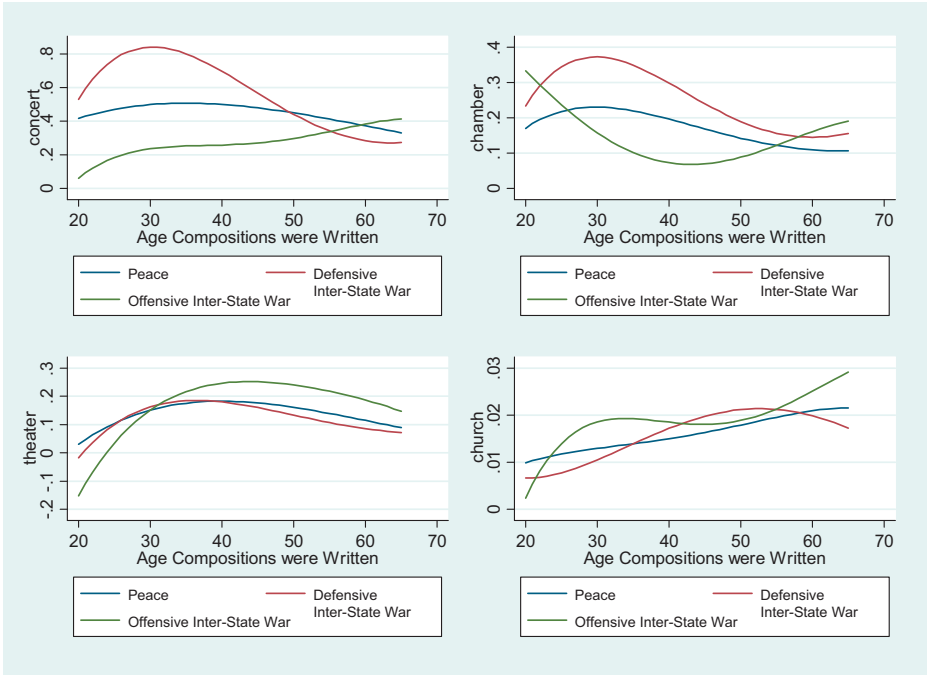
Fig. A1.2. Age-productivity profiles: By initiation and type of work.

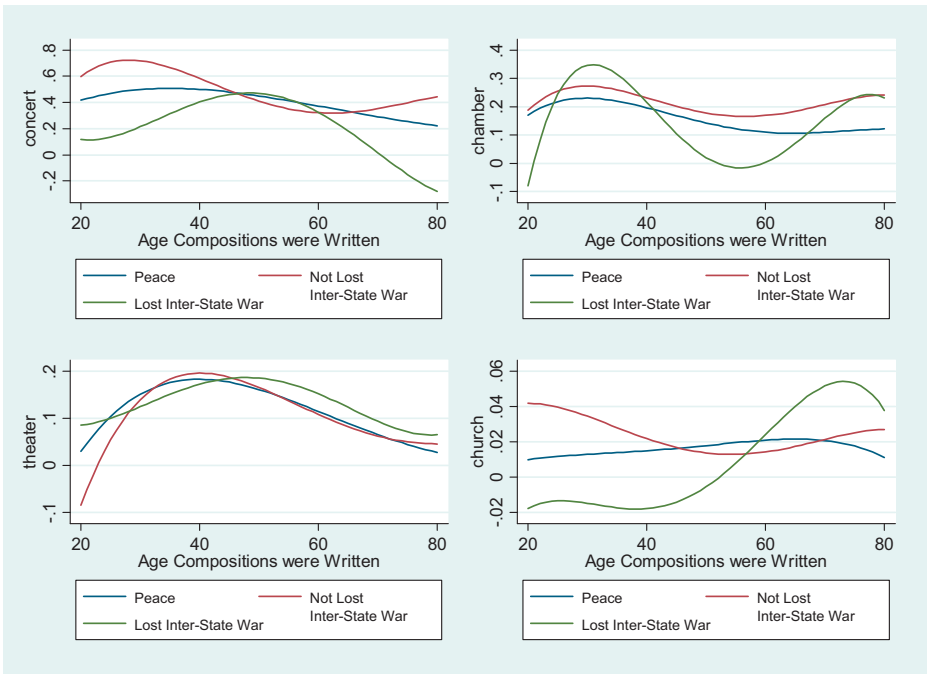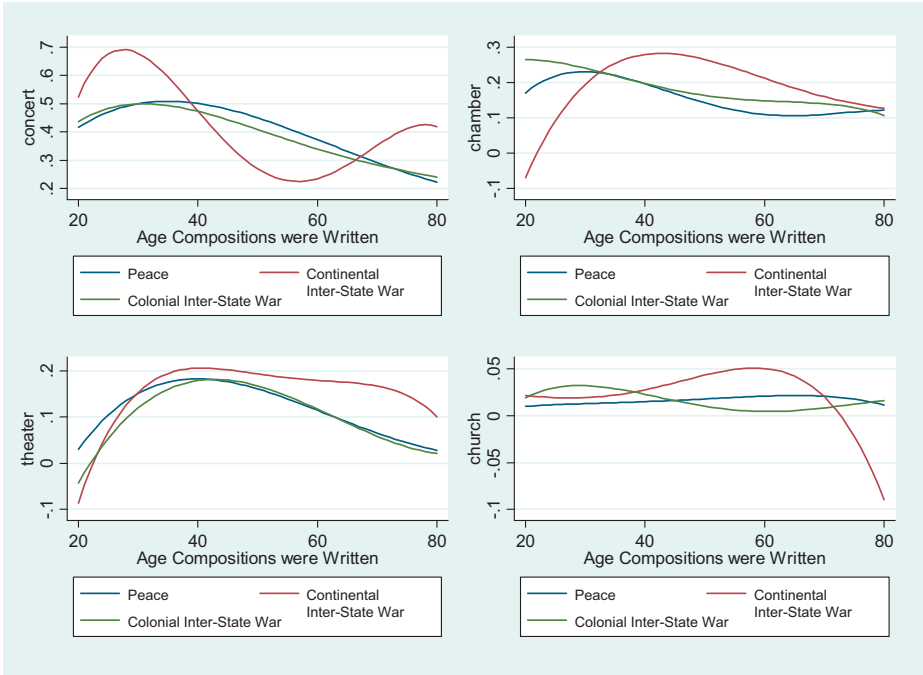**Fig. A1.3.** Age-productivity profiles: By outcome and type of work.

Fig. A1.4. Age-productivity profiles: By geographic extent and type of work.
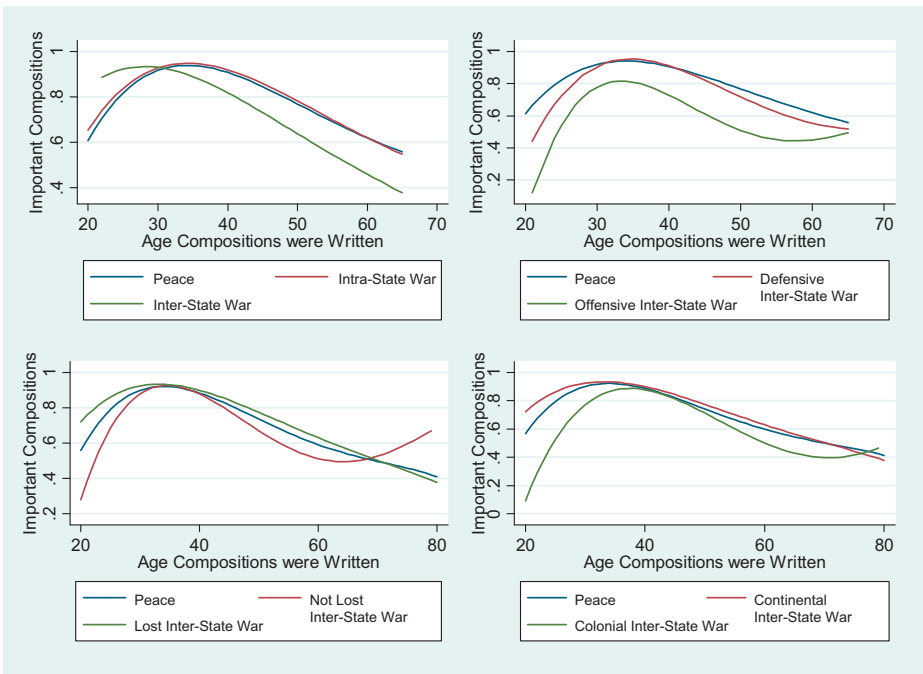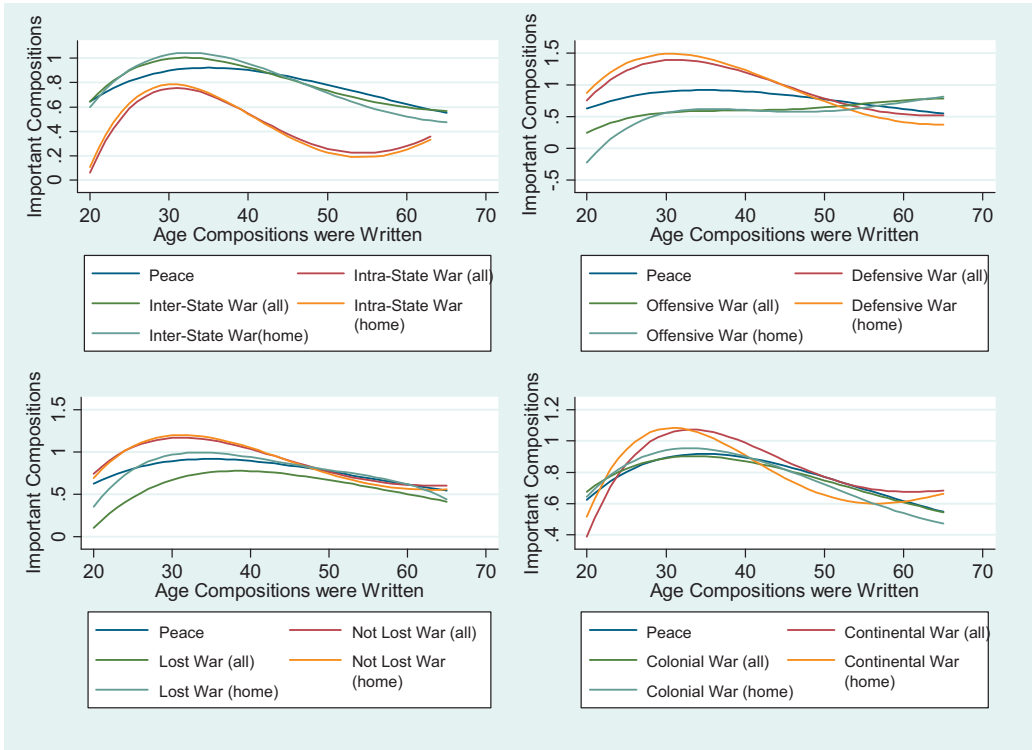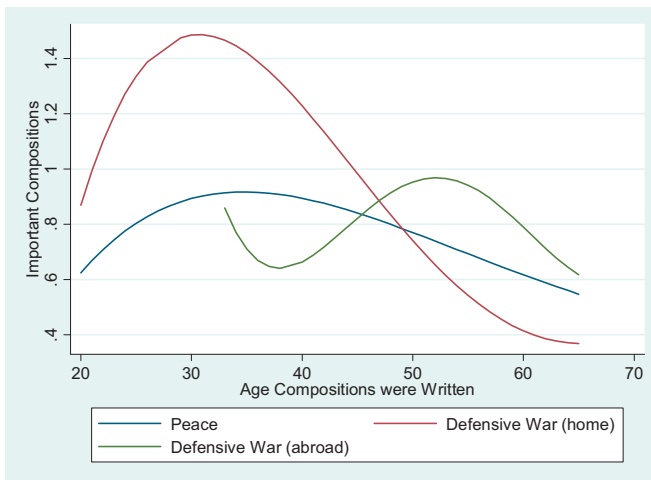

Fig. A2.1. Age-productivity profiles 2 years after war.

Fig. A3.1. Composers' productivity in home country and abroad.

Fig. A3.2. Composers' productivity during defensive wars (home country and abroad).
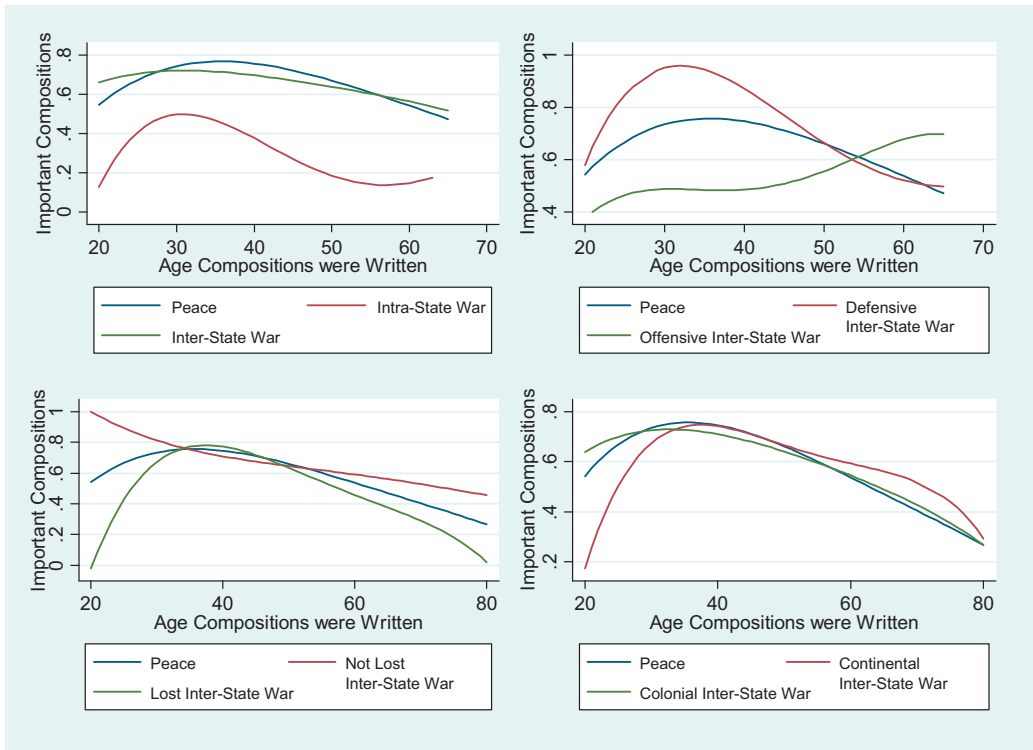
Fig. A4. Dropping extreme decile.

Table A1
Composers included in this study.

Name	Year of birth	Year of death	Country of birth	Primary work destination	Total works during lifetime	Intra-state wars (in years)	Inter-state wars (in years)
Adam, Adolphe	1803	1856	France	Paris	8	3	4
Albeniz, Isaac	1860	1909	Spain	Barcelona	6	1	1
Arensky, Anton Stepanovich	1861	1906	Russia	Moscow	3	0	1
Balakirev, Mily Alekseyevich	1836	1910	Russia	St Petersburg	14	4	7
Barber, Samuel	1910	1981	USA	New York	25	0	18
Bartok, Bela	1881	1945	Hungary	Budapest	42	2	6
Bax, Sir Arnold	1883	1953	England	London	86	0	16
Bellini, Vincenzo	1801	1835	Italy	Milan	9	0	0
Berg, Alban	1885	1935	Austria	Vienna	14	1	2
Berlioz, Hector	1803	1869	France	Paris	26	3	11
Bizet, Georges	1838	1875	France	Paris	20	1	12
Bliss, Sir Arthur	1891	1975	England	London	65	0	10
Bloch, Ernest	1880	1959	Switzerland	San Francisco	46	0	10
Borodin, Aleksandr	1833	1887	Russia	St Petersburg	10	2	2
Brahms, Johannes	1833	1897	Germany	Vienna	99	0	2
Bruch, Max	1838	1920	Germany	Berlin	17	0	10
Bruckner, Anton	1824	1896	Austria	Vienna	24	0	4
Busoni, Ferruccio	1866	1924	Italy	Berlin	25	0	1
Casella, Alfredo	1883	1947	Italy	Rome	43	0	13
Chabrier, Emmanuel	1841	1894	France	Paris	10	1	12
Charpentier, Gustave	1860	1956	France	Paris	7	0	19

Table A1 (*Continued*)

Name	Year of birth	Year of death	Country of birth	Primary work destination	Total works during lifetime	Intra-state wars (in years)	Inter-state wars (in years)
Chausson, Ernest	1855	1899	France	Paris	17	0	3
Chavez, Carlos	1899	1978	Mexico	Mexico City	41	4	2
Chopin, Fryderyk Franciszek	1810	1849	Poland	Paris	48	0	0
Copland, Aaron	1900	1990	USA	New York	39	0	16
Cui, Cesar	1835	1918	Russia	St Petersburg	18	7	10
Dallapiccola, Luigi	1904	1975	Croatia	Florence	26	0	7
Dargomizhsky, Aleksandr Sergeyevich	1813	1869	Russia	St Petersburg	4	9	4
Debussy, Claude	1862	1918	France	Paris	80	0	6
Delibes, Leo	1836	1891	France	Paris	5	1	14
Delius, Frederick	1862	1934	England	Paris	29	0	9
Dohnanyi, Ernst von	1877	1960	Hungary	Budapest	22	0	12
Dukas, Paul	1865	1935	France	Paris	17	0	10
Dvorak, Antonin	1841	1904	Czech	Prague	88	0	0
Elgar, Edward	1857	1934	England	London	48	0	6
Enesco, Georges	1881	1955	Romania	Paris	16	0	12
Falla, Manuel de	1876	1946	Spain	Grenada	14	5	1
Faure, Gabriel	1845	1924	France	Paris	56	1	16
Flotow, Friedrich Freiherr von	1812	1883	Germany	Paris	1	1	4
Franck, Cesar	1822	1890	France	Paris	29	3	15
Gade, Niels Wilhelm	1817	1890	Denmark	Copenhagen	27	0	2
Gerhard, Roberto	1896	1970	Spain	Cambridge	27	4	11
Gershwin, George	1898	1937	USA	New York	7	0	2
Glazunov, Aleksandr Konstantinovich	1865	1936	Russia	St Petersburg	41	8	9
Glier, Reingol'd Moritsevich	1875	1956	Russia	Moscow	20	12	19
Glinka, Mikhail Ivanovich	1804	1857	Russia	St Petersburg	12	11	5
Gounod, Charles-Francois	1818	1893	France	Paris	21	2	12
Grieg, Edvard Hagerup	1843	1907	Norway	Bergen	21	0	0
Harris, Roy	1898	1979	USA	Stockton	56	0	18
Hindemith, Paul	1895	1963	Germany	Blonay	60	0	12
Holst, Gustav	1874	1934	England	London	69	0	6
Honegger, Arthur	1892	1955	France	Paris	41	0	14
Humperdinck, Engelbert	1854	1921	Germany	Berlin	9	0	5
Ibert, Jacques	1890	1962	France	Paris	21	0	12
Indy, Vincent d'	1851	1931	France	Paris	41	0	12
Ives, Charles Edward	1874	1954	USA	New York	29	0	12
Janacek, Leos	1854	1928	Czech	Brno	21	0	1
Kabalevsky, Dmitry Borosovich	1904	1987	Russia	Moscow	42	4	9
Kodaly, Zoltan	1882	1967	Hungary	Budapest	28	2	7
Lalo, Edouard	1823	1892	France	Paris	13	3	15
Leoncavallo, Ruggero	1857	1919	Italy	Milan	4	0	8
Liszt, Franz	1811	1886	Hungary	Weimar	25	0	6
Macdowell, Edward	1860	1908	USA	New York	26	0	1
Mahler, Gustav	1860	1911	Austria	Vienna	18	0	0
Malipiero, Gian Francesco	1882	1973	Italy	Venice	60	0	14
Martin, Frank	1890	1974	Switzerland	Amsterdam	50	0	0
Martinu, Bohuslav	1890	1959	Czech	Paris	50	0	9
Mascagni, Pietro	1863	1945	Italy	Rome	19	0	14
Massenet, Jules Emile Frederic	1842	1912	France	Paris	29	1	8
Mendelssohn, Felix	1809	1847	Germany	Berlin	65	0	0
Messiaen, Olivier	1908	1992	France	Paris	28	0	8
Milhaud, Darius	1892	1974	France	Paris	73	0	13
Musorgsky, Modeste Petrovich	1839	1881	Russia	St Petersburg	18	0	2
Nicolai, Otto	1810	1849	Germany	Vienna	7	0	2
Nielsen, Carl	1865	1931	Denmark	Copenhagen	29	0	0
Offenbach, Jacques	1819	1880	Germany	Paris	8	4	13
Orff, Carl	1895	1982	Germany	Munich	21	0	10
Piston, Walter	1894	1976	USA	Boston	60	0	18
Pizzetti, Ildebrando	1880	1968	Italy	Rome	23	0	14

Table A1 (*Continued*)

Name	Year of birth	Year of death	Country of birth	Primary work destination	Total works during lifetime	Intra-state wars (in years)	Inter-state wars (in years)
Poulenc, Francis	1899	1963	France	Paris	97	0	14
Prokofiev, Sergey	1891	1953	Russia	St Petersburg	75	3	16
Puccini, Giacomo	1858	1924	Italy	Torre de Lago	10	0	6
Rachmaninoff, Serge	1873	1943	Russia	Moscow	36	1	5
Ravel, Maurice	1875	1937	France	Paris	35	0	9
Reger, Max	1873	1916	Germany	Leipzig	48	1	3
Respighi, Ottorino	1879	1936	Italy	Rome	46	0	8
Rimsky-Korsakov, Nikolay Andreyevich	1844	1908	Russia	St Petersburg	35	3	5
Roussel, Albert	1869	1937	France	Varengeville	23	0	4
Saint-Saens, Camille	1835	1920	France	Paris	40	1	20
Satie, Erik	1866	1925	France	Paris	46	0	10
Schoenberg, Arnold	1874	1951	Austria-Hungary	Vienna	29	0	12
Schuman, William	1910	1992	USA	Leipzig	41	0	19
Schumann, Robert	1810	1856	Germany	Leipzig	45	0	2
Sessions, Roger	1896	1985	USA	Princeton	29	0	20
Shostakovich, Dmitry	1906	1975	Russia	St Petersburg	131	7	13
Sibelius, Jean	1865	1957	Finland	Helsinki	44	1	6
Smetana, Bedrich	1824	1884	Czech	Prague	21	0	0
Stanford, Sir Charles Villiers	1852	1924	Britain	London	28	0	7
Strauss, Johann (Jr.)	1825	1899	Austria	Vienna	8	2	4
Strauss, Richard	1864	1949	Germany	Vienna	38	1	8
Stravinsky, Igor	1882	1971	Russia	Los Angeles	66	2	20
Sullivan, Sir Arthur	1842	1900	England	London	35	0	3
Szymanowski, Karol	1882	1937	Poland	Warsaw	13	2	3
Tchaikovsky, Pyotr Il'yich	1840	1893	Russia	Moscow	21	0	0
Thomas, Ambroise	1811	1896	France	Paris	26	3	16
Thomson, Virgil	1896	1989	USA	New York	41	0	19
Tippett, Sir Michael	1905	1988	England	London	39	0	14
Vaughan Williams, Ralph	1872	1958	England	London	82	0	14
Verdi, Giuseppe	1813	1901	Italy	Milan	28	2	9
Villa-Lobos, Heitor	1887	1959	Brazil	Rio de Janeiro	80	1	6
Wagner, Richard	1813	1883	Germany	Zurich	13	0	5
Walton, Sir William	1902	1983	England	Ischia	24	0	0
Webern, Anton	1883	1945	Austria	Vienna	28	0	11
Wolf, Hugo	1860	1903	Austria	Vienna	11	0	0
Wolf-Ferrari, Ermanno	1876	1948	Italy	Venice	13	0	7

Source: Data on composers are obtained from Grove Music Online (2009). Number of important compositions is taken from Gilder and Port (1978). War data is employed from the Correlates of War data set (Sarkees, 2000).

Table A2
Categories of classical works.

Category	Types of classical works	Observations
Concert	Symphony, overture, march, or other concert form	2208
Chamber	Sonata, quartet, art song, or other chamber form	885
Theatre	Ballet, opera, or other theatre form	664
Church	Mass, church cantata, or other religious form	84

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