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# HOW ARE YOU, MY DEAREST MOZART? WELL-BEING AND CREATIVITY OF THREE FAMOUS COMPOSERS BASED ON THEIR LETTERS

Karol Jan Borowiecki\*

*Abstract*—The importance of creativity is being increasingly recognized by economists; however, the possibility that emotional factors determine creative processes is largely ignored. Building on 1,400 letters written by three famous music composers, I obtain well-being indices that span their lifetimes. The validity of this methodology is shown by linking the indices with biographical information and through estimation of the determinants of well-being. I then exploit the data and provide quantitative evidence on the existence of a causal impact of negative emotions on outstanding creativity, an association hypothesized across several disciplines since the antiquity that has not yet been convincingly established.

## I. Introduction

ANECDOTAL accounts on the presence of psychological anomalies can be found in the biographies of numerous great artists, scientists, social activists, politicians, and entrepreneurs (Ludwig, 1995; Jamison, 1996). This is an astonishing disclosure, especially if one considers that these famous and extremely creative people have shaped our cultural heritage, pushed the boundaries of knowledge, contributed to the development and growth of countries, and created economic welfare. Obviously creativity—“the key ingredient for job creation, innovation and trade” (UNCTAD, 2010)—is largely the domain of extraordinary individuals or small groups. Nonetheless, within economics, the study of behavior and achievements of specific individuals is rather scarce. Only recently have some economists begun to investigate how these extraordinary individuals make their discoveries (e.g., Galenson, 2005; Galenson & Weinberg, 2001). Creativity is typically modeled as a result of rational decision making (Frey, 2000) or as a function of some objective and quantifiable factors, such as general education or experience (Bryant & Throsby, 2006). However, the possibility that emotional drivers determine creative processes is neglected and in stark contrast to the applied psychology literature that portrays the creativity of great achievers typically as a result of various psychotic anomalies (e.g., depression). In fact, the existence of a link between negative

emotions and creativity has been hypothesized and studied in a variety of forms and across several disciplines.<sup>1</sup> Despite those efforts, the association between outstanding creativity and psychopathology remains controversial, and it rather lacks convincing evidence (e.g., Waddell, 1998; Schlesinger, 2009).

This study, by disclosing the role of emotional factors in the creativity of famous achievers, introduces a new angle to the growing economic research on creativity. Furthermore, by using rigorous quantitative methods, it potentially answers a question that has fascinated many for more than two millennia and remains disputed to today.

I construct lifetime well-being indices using around 1,400 letters written by Wolfgang Amadeus Mozart, Ludwig van Beethoven, and Franz Liszt throughout their lives.<sup>2</sup> This is done with linguistic analysis software that is able to illuminate to what extent a written text uses words related to positive emotions (e.g., happiness) or negative emotions (e.g., grief). What emerges is a unique longitudinal data set for, admittedly, only three subjects, but covers the life spans and a large number of observation points. The immediate contribution of this research design is that it allows unique insights into the dynamics of a person’s emotional state throughout life.<sup>3</sup>

It is probably the first time in economics that a textual analysis has been used; this requires rigorous testing.<sup>4</sup> Useful for the testing is that we know a lot about the lives of the composers covered, and this allows linking the well-being indices qualitatively with biographical information and estimating quantitative models for the determinants of well-being. The obtained data are further tested by analyzing other dimensions and the content of written texts, such as the intensity of writing about financial concerns.

The estimated well-being models indicate that labor market outcomes (in particular artistic production or touring

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<sup>1</sup> See, for example, Kaufman and Sternberg (2007) for a review of creativity research across such fields as psychology, education, and the arts. The notion that creativity and emotional state are somehow related arguably goes back to the time of Aristotle.

<sup>2</sup> See section IIIB for a discussion of the selection.

<sup>3</sup> The fact that the analysis looks at the lives of three music giants who have left their permanent imprint on our cultural heritage makes this study perhaps particularly interesting and interdisciplinary. Numerous music historians have devoted their careers to the study of either of these composers. See, for example, Saffle (2009) for an impressive 520-page review of research and data sources concerning Franz Liszt alone.

<sup>4</sup> Text analysis methodology is relatively new, albeit increasingly used in other disciplines (e.g., psychology, linguistics). It arguably incorporates a large potential in explaining people’s behaviors: “We are in the midst of a technological revolution whereby, for the first time, researchers can link daily word use to a broad array of real-world behaviors” (Tausczik & Pennebaker, 2010, p. 24). Within economics, two years after the underlying study appeared as a working paper, Hills, Proto, and Sgroi (2015) show convincingly that textual analysis can also be applied to digitized books and used to construct country-specific subjective well-being indicators.

activity) increase positive emotions and decrease negative ones, whereas an illness strongly leads to the opposite effects. Negative emotions are also found to be sensitive to an extreme case of worsening of a composer's personal relationships, reflected by the unexpected death of a family member. To my knowledge, this is the first analysis based on well-being data for the (almost) entire life span of a person. Thus, the methodological approach constitutes a potentially useful contribution to the fast-growing field of happiness economics, where longer panel data are still rare, yet needed, in order to extend our understanding of the determinants of well-being (Dolan, Peasgood, & White, 2008). Panel data are also essential to address a number of issues related to causality, about which the current knowledge is far from satisfying.

The main contribution of this research is the exploration of a causal relationship between negative moods and creativity. Using the created index of negative emotions and instrumental variables, I study the causal impact of negative emotions on creativity, measured as the number of important, quality-adjusted compositions written by each composer in a given year. I use the incidence of the unexpected death of a composer's family member as an exogenous source of variation of his negative feelings.<sup>5</sup> The identification exploits the historical vulnerability of people to various life incidences, such as illnesses that would usually result in imminent death. The emerging findings imply that the number of works written is causally attributable to an increase in negative emotions. Disaggregating negative moods into anger, anxiety, and sadness, I further identify sadness as the main negative feeling that drives creativity. This new evidence comes close to the previously posited association between creativity and depression, a form of chronic sadness.

The paper is organized as follows. Section II provides a literature review. Section III discusses the approach undertaken to obtain the well-being data and motivates the selected sample. Section IV introduces the set of models to be estimated. Section V presents the results for the determinants of well-being and the effect of negative emotions on creativity. Finally, section VI provides concluding remarks.

## II. Literature Overview

The discipline of economics is increasingly exploring the area of creativity, which is rather new grounds and yet of enormous potential. It is perhaps not a coincidence that two substantial contributions recently appeared under the same title: "The Economics of Creativity" (Burger-Helmchen, 2013; Menger, 2014). Burger-Helmchen (2013) posits that an understanding of the economic implication of creative

individuals is not only of immense importance for the new economy but also academically relevant in related fields, such as the economics of knowledge, the economics of science, and innovation management. Burger-Helmchen further advocates more economic research on how creative people work and think and how to foster their creative productivity. Menger's (2014) focus is on creativity within the arts, where economists tend to agree that the creative process is governed by uncertainty, without which neither self-realization nor creative innovation is possible. According to Menger, artistic success depends not only on a good network, influential managers and patrons, or the talent of the artists but also on the uncertainty that affects the careers of any creative individual.

Cultural economists point to the synergies that have long existed between the arts and economics, illustrating the mutual benefit that the two disciplines offer each other (e.g., Gray, Borowiecki, & Heilbrun, 2016). Without steady economic foundations, art cannot exist, and without creativity, the economy cannot thrive. The study of these two distinct fields in partnership represents a further opportunity to be gained—namely, in the application of economic thinking to the arts. In a "work-preference" model of artists' time allocation choices, Throsby (2001) shows that the creative process can be categorized within rational decision making. Bryant and Throsby (2006) attempt to identify particular features of creativity and describe an artist's production function for creative output as a result of general education, arts training, experience, and creative talent.

The literature on the effects of mood and thought on creativity is vast, albeit outside the area of economics. As Jamison (1989) observes, in relation to artistic creativity, psychological aspects have been studied for "as long as man has observed and written about those who write, paint, sculpt or compose." Andreasen (2005) reviews research on the relationship between creativity and mental distress and concludes that mood disorders could possibly be conducive to artistic creation. Andreasen explains that in some instances, those negative emotions may provide fertile material on which the creative person could draw. Akinola and Mendes (2008) discuss how intense negative emotions can create powerful self-reflective thought and perseverance, leading to increased creativity. Furthermore, they demonstrate in a laboratory experiment that individuals exposed to a situation that causes intense negative feelings exhibit the greatest degree of creativity. Kyaga et al. (2013) draw on a large sample of 1.2 million patients from the register in Sweden and find that people in creative professions are linked to an increased risk of manic depression. Further, for a subsample of writers, an increased risk of other mental health conditions has been observed. While these results have been enthusiastically acclaimed by the media as the final proof of the existence of an association between creativity and mental anomaly, the issue of endogeneity remains open and is not even considered as a possibility by the authors.

<sup>5</sup> See Kessler (2001) for a review of the literature on how stressful life experiences worsen the well-being of a person or Monroe et al. (2001) on how severe life events increase the risk of depression. I show later that the unexpected death of a family member drives artistic productivity through emotional fluctuations, as opposed to through some other channels, for example, a change in the composer's financial situation.

Happiness economists and psychologists acknowledge the difficulty in obtaining information on how a person feels by simply asking her about her well-being. The respondent's answer might not be accurate due to her wishful thinking and various mechanisms of defense. A potentially superior way of obtaining insights into a person's anxieties and conflicts is to study the way she communicates. This psychoanalytical method is formulated by Gottschalk and Gleser (1969). Research on the use of words has especially increased recently due to the access to increasingly versatile computer programs that are able to provide various indicators on the social, personality, cognitive, and biological processes of an author of any text (Chung & Pennebaker, 2007).

It has been shown that the language people use is affected by various factors. Pennebaker and Stone (2003) build on a sample of ten famous literary artists born between 1762 and 1895 and show how language changes over the course of a person's life. They show that older people appear to disclose an increased cognitive complexity in the linguistic styles, and even if these results could be distorted by cohort effects, the role of age appears as an important factor. It is also established that significant events might affect the mood (and language use) of a person. Cohn, Mehl, and Pennebaker (2004) show how the vocabulary choices by users of an U.S. online journaling service changed due to the traumatic incident of the September 11 attacks. Immediately after the attacks, the investigated users expressed more negative emotions, were more cognitively and socially engaged, and wrote with greater psychological distance.

A study that comes close to the methodology of the underlying research is provided by Danner, Snowden, and Friesen (2001), who obtain indicators on the extent of positive emotions from autobiographies written by Catholic nuns. The authors show that positive emotional content in early-life autobiographies is related to longevity later in life. However, these findings are largely based on the assumption that the emotional well-being of a person remained stable throughout life.

According to my knowledge, this is the first economic study that exploits linguistic features of written texts. The suggested approach is used here to shed light on a person's emotional welfare, complementing the literature, which relies usually on subjective well-being indicators (e.g., Helliwell, 2003) or the occurrence of various medical conditions (e.g., Brown, 2000). One of the main research areas within happiness economics deals with the determinants of well-being. A review of this research is provided by Dolan et al. (2008) and previously by Frey and Stutzer (2002). The authors conclude that a person's well-being depends primarily on three types of determinants. First, well-being depends on labor market involvement and outcomes, in particular on income and employment status (Clark, Frijters, & Shields, 2008). Second, personal relationships, especially with family members (Martin & Westerhof, 2003), play a vital role, as does being in a stable partnership with another person

(Helliwell, 2003), independent of whether the relationship is certified by marriage or occurs as cohabitation (Brown, 2000). Third, health conditions have been shown to have an effect on subjective well-being (e.g., Shields & Price, 2005).

Next, a distinction has to be made between everyday creativity and eminent creativity, termed by Kaufman and Beghetto (2009) as the "Big-C." It is only the latter that constitutes a remarkable and lasting contribution in a domain and usually influences further developments in a field. Obviously, outstanding creative accomplishments that become history might be triggered, if at all, to a different extent by negative emotions than everyday creativity.<sup>6</sup> This paper focuses on eminent creativity.<sup>7</sup>

Psychologists have repeatedly studied distinguished creativity, the Big-C, in relation to mental abnormalities by identifying such states using information found in biographies of prominent achievers. For example, Post (1994, 1996) studies a sample of famous men in science, thought, politics, and art and finds that certain pathological personality characteristics, as well as tendencies toward depression, are linked to the creativity of those individuals. This association is especially strong in the case of poets and writers, who also come closest to the artists covered in this research. Schildkraut, Hirshfeld, and Murphy (1994), based on a small sample of mid-twentieth-century artists, argue that depression may have driven these artists to produce. Ludwig (1995) analyzes the biographies of famous people from a number of creative professions and concludes that his sample is about twice as likely to experience some mental disorder in life as noncreative individuals.<sup>8</sup>

Finally, the good data availability on music composers has previously been exploited within psychology and economics. Within psychology, for example, Simonton (1991, 1998) studies composers' career development and explores how historical reception influences the prominence of a composition now. Within economics, O'Hagan and Borowiecki (2010) and Borowiecki and O'Hagan (2012) introduce large and comprehensive data on important music composers and

<sup>6</sup>For example, Simonton (2014) suggests that mental illness is unevenly distributed across the population of creative people. He argues that typically creative individuals exhibit better mental health than do noncreative; however, among creative individuals, the most creative are more susceptible to mental illness than are the less creative. It is the creative genius that is at the risk of psychopathology.

<sup>7</sup>Readers interested in the association between happiness and everyday creativity (the little-c) are referred to, for example, Dolan and Metcalfe (2012), who show that subjective well-being correlates with innovation at the workplace but also acknowledge that causality in this relationship has yet to be established. Another study on the little-c, by Oswald, Proto, and Sgroi (2015), documents that happier people perform better at solving simple mathematical problems, which is used as a proxy for tasks associated with white-collar jobs.

<sup>8</sup>However, those studies might be biased if not all psychological states of a person were recorded in biographical sources or if the biographer had the incentive to particularly describe the dramatic moments of a person's life. Furthermore, this literature does not usually consider emotional variation over time, which means that it does not shed light on the issue of causality. Finally, only extreme emotional conditions are considered, and it is assumed that the distribution of psychological anomalies in a population remained constant over several centuries.

explore the intensity of geographic concentration and extent of migration. Borowiecki (2013b, 2015b) shows how geographic clustering and peer effects can enhance composers' creative output, while Borowiecki and Kavetsos (2015) demonstrate the cost of such peer interaction in terms of adverse health effects. The effect of war and social unrest has been analyzed in relation to conflict-induced migration of composers (Borowiecki, 2013a), geographic shifts of music clusters (Borowiecki, 2012), and creative output (Borowiecki & O'Hagan, 2013), while (Borowiecki, 2015b) discloses persistence in the demand for music and geography of composer births in Italy over a period of seven centuries.

### III. Data

#### A. Emotional Content of Written Texts

Emotional content is embedded in our communication, and it is fairly established that the words individuals use, whether verbally or in written texts, are related to mental health (e.g., Pennebaker et al., 2007). In this line of research, emotional content is extracted from written texts by using the Linguistic Inquiry and Word Count (LIWC) text analysis software.<sup>9</sup> The software processes each word of a text by searching for a match with an on-purpose developed dictionary and conducts a count of words that corresponds to certain categories. In total, the dictionary includes around 4,500 words and word stems, such as *happi\**, which allows any target word that matches the first five letters (including *happiness, happier, happiest*).

The software considers a wide range of word categories tapping into psychological constructs (e.g., affect, cognition, biological processes).<sup>10</sup> Out of those, of primary interest to this research are two categories that indicate either positive or negative emotions, which are measured by means of 406 words (e.g., *love, joyful, nice*) and 499 words (e.g., *hurt, grief, nervous*), respectively. The occurrence of these words is counted and expressed as a fraction of the total word count. This means that, for example, with a rising relative occurrence of words reflecting positive emotions, one observes a higher value on the scale of positive emotions.

The internal reliability and external validity of LIWC has been demonstrated in various contexts and using different approaches (Pennebaker & Francis, 1996; Pennebaker et al., 2007). These analyses include a range of cross-checks using expert opinions and have been carried out over a range of different types of texts, including personal writings, blogs, novels, science articles, or orally communicated texts. Pennebaker et al. (2007) also show that the LIWC software performs well for historically written texts. Based on 209

novels published in English between 1700 and 2004, a match of 84% with the dictionary vocabulary is disclosed, which is indistinguishable from the mean dictionary match of 83% for all studied contemporary types of texts. Furthermore, Tausczik and Pennebaker (2010) provide an overview of 121 recently published articles that use LIWC and conclude that these empirical results demonstrate the ability of LIWC to detect meaning in a wide variety of settings, including to identify emotionality.

#### B. The Letters

This research requires a sample of creative people for whom good biographical information is available, as well as a sufficiently large selection of letters covering their lives. Therefore, the focus is on letters written by Wolfgang Amadeus Mozart, Ludwig van Beethoven, and Franz Liszt. I had several reasons for this selection. First, the available selections of letters cover the entire lives of each composer. This is not obvious, as some other available compendiums of letters written by composers (or other creative people) cover only specific periods of their lives, a dialogue with a particular peer (e.g., Hueffer, 2006), or correspondence with a selected number of music composers (e.g., Nohl & Wallace, 2009). Any of these selections might provide some insights into the writing habits in the profession but would not allow me to shed light on the lifetime well-being of a person. Second, the chosen sources include only letters, as opposed to a heterogeneous selection of writings, such as reports, testimonials, complaints, and thank you notes (e.g., David, Mendel, & Wolff, 1999). Third, the selected compendiums of letters are currently the only selections of letters written by composers that are available electronically and are provided in the Gutenberg database.<sup>11</sup> A further implicit advantage of the choice of these three composers is that their lives evolved around roughly the same time period, and there is a reasonably large overlap of the years covered. Mozart died when Beethoven was just turning 21, and Beethoven died when Liszt was 16. Finally, at the turn of the nineteenth century, the Germanic countries, particularly Austria and some parts of Germany, were globally the main centers for music. It is therefore not a coincidence that there also exists a fair overlap in the geography of the composers covered, whose longest parts of life took place in Austria and southeast Germany.

The letters of each composer have been collected, edited, and translated in all three cases from German to English by established contemporary figures. Language translation could lead to a bias if the translator's errors were systematic—for example, if for some reason positive emotions were translated in a different way from negative emotions. It is nonetheless regarded as an advantage that

<sup>9</sup>The first version of the software was introduced by Pennebaker and Francis (1996) and has been further developed since then. Here the version of 2007 is used.

<sup>10</sup>Appendix A provides an overview of other categories covered by LIWC, which include, for example, linguistic dimensions or personal concern categories. There presented is also a more detailed assessment of the reliability of the method and LIWC.

<sup>11</sup>This is connected to the fact that the works were compiled a long time ago and their copyrights have expired. Note also that using predated electronic formats ensures a high degree of accuracy in the processing of those texts.

all three composers covered wrote in the same language and that the resources used are based on direct translations into English. Furthermore, since the selection and translation occurred soon after each composer's death, the historical character of the original writings survived and has not been distorted by later trends or preferences.<sup>12</sup> I show that the letters have been selected with rather scholarly accurateness aimed at bringing to light all available writings, as opposed to a subjective selection of a sample that may perhaps be particularly attractive to readers.

Mozart's letters were curated in 1864 by Ludwig Nohl, a highly regarded writer on music of his time, and translated by Lady Wallace in 1866.<sup>13</sup> The selection arguably constitutes a "full and authentic edition of Mozart's Letters" and is aimed at providing a "faithful production of the letters, nothing being omitted" (Wallace, 1866b, preface). It is further interesting to observe that Mozart's contemporaries had already commented on the expressive nature of his writings that illuminates "the impulses of his own heart" and is a relation to others of what the composer "saw and heard, and felt and thought" (Wallace, 1866b, preface). Mozart's letters, by being "simple outpourings of his heart," are thus a mirror of his emotional side and hence "rather resemble a journal than a correspondence" (Wallace, 1866b, preface).

The translation of the letters written by Beethoven was also conducted by Lady Wallace in 1866 and was based on the compilation of Ludwig Nohl from 1865. Here, the aim is "to bring to light, at all events, the letters that could be discovered" (Wallace, 1866a, preface). Interestingly, the translator was somewhat perturbed by Beethoven's emotional fluctuation "between explosions of harshness and almost weak yieldingness, while striving to master the base thoughts"; however, none of "this less pleasing aspect of the Letters ought to be in the slightest degree softened."<sup>14</sup> This decision is important for this study, as we are left with an authentic and emotionally loaded content.

Liszt's voluminous correspondence was collected and edited by La Mara Marie Lipsius, who worked under the pen name of "La Mara" and spent 25 years editing Liszt's correspondence. The translation into English was conducted by Constance Bache in 1893. As in the case of the previous composers, the translator endeavored to "adhere as closely as possible to all the minute characteristics that add expression to Liszt's letters" (Bache, 1893, preface). It is further instructive to note that all these selections have remained influential reference works within music history, as reflected

<sup>12</sup> This is another benefit of building on these particular composers who became famous during their lifetime. Many great artists become regarded as outstanding only after death, sometimes even several decades later, and it would not be before that time that scholars begin to write about them or collect their letters.

<sup>13</sup> Nohl's contribution was already regarded as being of high value by his contemporaries and resulted in his being awarded, at the age of 34, by King Ludwig II, the title of professor of music at the University of Munich.

<sup>14</sup> The allegedly substantial variation in Beethoven's mood will later be observed in the standard deviation coefficients of his negative or positive emotions, which are found to be significantly higher ( $p$ -value < 0.01) than for the other two composers (table 2).

in the continuous citations throughout most biographies of the composers covered.

Appendix B shows two exemplary letters for each composer, together with the emerging metric of positive and negative emotions.

#### IV. Methodology

The main aim of the econometric estimations is to shed light on the association between negative emotions and creativity. Given the novelty of the text analysis method, the reliability of the obtained indices is first tested. For this reason, I introduce a model that sheds light on the association between various life incidences and the well-being indices. The selection of the key explanatory factors is based on a recent review of the well-being literature provided by Dolan et al. (2008), who conclude that labor market involvement and outcomes, as well as personal relationships including marital status and health, are the crucial determinants. In constructing a model of a composer's well-being, I measure (or approximate) these variables as accurately as the data availability allows. Formally, the model for the estimation is:

$$\begin{aligned} \text{Emotions} = & \alpha_0 + \alpha_1 \text{Age} + \alpha_2 \text{Labor} + \alpha_3 \text{Relationships} \\ & + \alpha_4 \text{Unexpected death of relative} \\ & + \alpha_5 \text{Health} + \alpha_6 \text{Letters} + \alpha_7 \text{Composer}_{FE} \\ & + \alpha_8 \text{Addressee}_{FE} + \epsilon, \end{aligned} \quad (1)$$

where *Emotions* measures the extent of either positive or negative emotions. The *Age* vector is a fourth-order age polynomial to allow for multiple turns of a person's well-being index. The *Labor* vector measures labor market involvement in three different ways.<sup>15</sup> First, it is measured by how many compositions were produced in the year a letter has been written. Since we are interested in correlations, the variable is identified at the year level. The productivity measure is obtained from Gilder and Port (1978), who conducted a selection of the most important works for a number of famous composers, including the three covered in this research. The fact that only important works are considered constitutes an implicit advantage, as those are the compositions that made a significant contribution to the classical music canon. Therefore, the selection is free from biases caused by pieces of no lasting value, such as the jottings of composers, trifling pieces, or unfinished work. This variable will later also serve as a measure of a composer's creativity.

Second, the model includes an indicator for whether the composer was permanently employed in a given year. Since tenured occupations were usually official posts (e.g., as court organists), this type of information has been recorded

<sup>15</sup> The proposed baseline specifications include all three measures of labor market involvement or accomplishments. One might prefer to include each of these labor variables separately, as they might be related in some way. The presented findings would nonetheless remain consistent (not reported).

in historical archives and is relatively accurate. Furthermore, tenured positions were by definition offered for at least a couple of years and should indicate some extent of occupational stability of the individual, which is potentially conducive to his well-being. These data are obtained from Grove Music Online (2013).

It is fairly out of scope to depict adequately whether and how much a composer has been performing at a given time. The numbers of performances are simply too large and too heterogeneous to be measured in a reliable way. It is nonetheless possible to introduce a further indicator of whether a composer has been touring in a given period of time. The location choices of a composer are sufficiently well recorded in order to identify the years that he spent traveling and performing across different locations. This variable might be interpreted as an approximation of the intensity of performing activity. An alternative, perhaps more conservative, interpretation of the variable is that it indicates the demand for the composer's works, as travels have usually been planned before departure and in response to received invitations.<sup>16</sup>

It would also be interesting to measure the teaching commitments of each composer. Liszt, for example, taught from his late teenage years and was still giving lessons during the last month of his life, nearly sixty years later. Walker, Eckhardt, and Mueller (2013) describe that more than 400 pupils studied with Liszt; however, they also acknowledge that the number is impossible to prove. A further difficulty lies in the definition of a pupil, as it is likely that Liszt's involvement and well-being differed depending on the number of students, the continuity of the education, and perhaps even the quality of a pupil. Unfortunately, this type of information is not available.

Next, the *Relationships* variable relates to the structure or quality of the personal relationships of a composer. For this reason, I record whether a composer was married or living in cohabitation at a given time, as registered in Grove Music Online (2013). Furthermore, since relationships with family members are arguably an important determinant of happiness, I introduce an indicator for the death of a family member, which constitutes the extreme case of worsening of a composer's family ties.<sup>17</sup>

In order to measure the physical health of a composer, a dummy variable is included measuring the years when he was suffering from health problems. While states of good health are not observable in the source dictionaries, various

illnesses and health deteriorations are, especially if they were regarded to be of significance to the composer's life and work. This variable includes, for example, the years when Beethoven was experiencing serious hearing problems. The variable thus measures the inverse of good health and is based on data from Grove Music Online (2013).

A number of additional control variables are included to ensure the reliability of the estimations. In order to deal with any possible differences in the writing frequency depending on the emotional state, I account for the number of letters written in a given year (*#Letters*). The model also includes composer fixed effects to account for any other unobserved differences across composers. Moreover, each specification includes controls for the relationship with the addressee. This set of variables mitigates the bias arising from the possibility that a person exhibits different degrees of openness depending on the nature of the relationship with the receiver. In additional robustness tests, I include a set of time controls to deal with any unobserved differences arising over time (decade fixed effects) or controls for the city where the letter was written (city fixed effects).

Assuming that the obtained indices will be proved valid and reliable and using the introduced variables of model 1, I next introduce a two-stage least-squares model that enables an analysis of the causal association between negative emotions and creativity. The focus of this specification is on negative emotions for two reasons. First, the relevant literature usually claims the existence of an association with negative rather than positive emotions. After all, the popular and controversial "mad genius" hypothesis argues that various mental anomalies, such as depression, are related to creativity, if at all. Second, the chosen research methodology enables the employment of a unique instrumental variable for negative emotions.

The employment of instrumental variables is important, as it may allow us to overcome biases that could simply result from studying the correlation between creative output and negative emotions. There are several reasons this could be so. First, certain potentially valid explanatory variables are not available, and this might lead to an omitted variable bias. One such variable could be income, which might be related to both negative emotions and output. Second, one might be concerned with reverse causality. It is possible that the completion of a composition leads to a worsening of a person's well-being, since the pleasure derived from creating something new ceases (Steiner & Schneider, 2013). Alternatively, some of the finished works may not have been understood or sufficiently appreciated by contemporaneous audiences, and hence the supply of an outstanding work might actually contribute to a worsening of the creator's mood. This is a nonnegligible scenario given the covered sample of composers, who were far more innovative in their compositions than the standards of their time. A further possibility is that the individual who was successful and became a public figure became exposed to harmful critique, which could be detrimental to his well-being.

<sup>16</sup> Note that the variable captures only voluntary migration, as none of the covered composers has been forced to migrate (e.g., due to war). Data on earnings are not consistently available. However, in two robustness estimations in appendix C, I show that the well-being indices perform in accordance with theory, using tentative indicators on the financial situation of a composer.

<sup>17</sup> This identification is similar to the "real-life happiness shocks" defined by Oswald et al. (2015) as either bereavement or illness in the family. Nonetheless, the underlying historical research setting allows us to mitigate the worry that some people were more likely to experience a bad life event. At the turn of the nineteenth century, everybody, independent of status, was prone to illness, which was often followed by imminent death.

TABLE 1.—LIST OF UNEXPECTED DEATHS OF FAMILY MEMBERS

	Date of Death	Relationship	Cause
Mozart	July 3, 1778	Mother	Illness
	August 19, 1783	Son	Infancy
	November 15, 1786	Son	Infancy
	May 28, 1787	Father	Illness
	June 29, 1788	Daughter	Infancy
	December 25, 1789	Daughter	Infancy
Beethoven	July 17, 1787	Mother	Illness
	December 18, 1793	Father	Illness/alcoholism
	November 15, 1815	Brother	Illness
Liszt	August 28, 1827	Father	Illness
	December 13, 1859	Son	Illness
	September 11, 1862	Daughter	Giving birth

Source: Grove Music Online (2013).

I thus estimate the following pair of equations:

*Negative emotions*

$$= \beta_0 + \beta_1 \text{Unexpected death of relative} + \beta_2 \mathbf{Z} + \mu, \quad (2)$$

$$\text{Output} = \gamma_0 + \gamma_1 \text{Negative emotions} + \gamma_2 \mathbf{Z} + \nu, \quad (3)$$

where  $\mathbf{Z}$  is a vector consisting of the previously introduced control variables reflecting factors that are potentially conducive to creativity, such as age, labor market characteristics, relationship indicators, health measures, and a set of letter-related controls. In its structure and set of control variables equation (2) closely resembles equation (1) for the case of negative emotions, with the only difference that the *Output* variable is excluded. The *Output* variable approximates for creativity and measures the number of important works composed in the year a letter was written. The works covered have been identified as lasting contributions to the classical music canon by two music experts, Gilder and Port (1978). Equation (2) is the first-stage regression that makes use of the instrumental variable, *Unexpected death of relative*, measured over the year prior to the letter being written. It is required that the instrument predicts negative emotions,  $\rho(\text{Unexpected death of relative}, \text{Negative emotions})! = 0$ , but must be conditionally uncorrelated with the error term from the final equation (3),  $\rho(\text{Unexpected death of relative}, \nu) = 0$ .

It is important for the identification strategy that in the period covered, catching an illness was as good as randomly assigned and could lead to a quick death, fairly independent of the status or health endowments of a person. Mozart's mother, for example, unexpectedly succumbed to an undiagnosed illness about mid-June 1778 and, despite being treated by a doctor, died a few days later on July 3. Table 1 provides a list of relatives who died unexpectedly, along with the date and cause of death.<sup>18</sup>

In order to fulfill the exclusion restriction, the unexpected death of a family member cannot affect the composition

<sup>18</sup> These incidences are usually described by the biographer as “unexpected,” “sudden,” or “within days.”

intensity in any other way than through the impact on negative emotions. A concern might be that the death of a parent affected the composer's financial situation. The income shock could be positive due to inheritance. In the biographical entries, however, no indication of inheritance could be found. Alternatively, and possibly more likely, the shock may be negative if the household loses a family member who would otherwise contribute to the household budget. This effect is possibly the strongest for the loss of a father, usually the main breadwinner in a household. Either shock (positive or negative) would affect the financial capabilities of the composer, which is likely to be correlated with his creative output and would hence violate the exclusion restriction. Appendix D shows that the further presented results would hold if one excludes the death of a father from the analysis. Appendix D also shows that there is no statistical association between the death of any relative and the intensity with which the composer was writing about financial matters. These results strengthen the argument that the death of a relative affects emotions directly and not through any fluctuation of the composer's finances.

## V. Results

### A. Descriptive Statistics

Table 2 provides summary statistics. For each individual, the first part of the table reports background information on labor market variables, measures of social relations, indicators of periods affected by family death, and a health indicator. The latter part summarizes statistics on the letters including the measures of emotional content, the frequency of writing, and the occurrence of writing to a specific type of addressee.

Figures 1, 2, and 3 visualize time-series data reflecting positive emotions in the left panel and negative emotions in the right panel as a function of time for each of the composers. The correlation coefficient between the pooled negative and positive indices is equal to  $-0.13$  ( $p$ -value  $< 0.01$ ), implying a statistically significant negative association. Appendix E discusses the emerging indices in relation to corroborating evidence found in the biographies of the composers.

Figure 4 provides an overview of the number of letters written throughout the life of each composer. It can be seen that the intensity of writing is higher later in life; however, the composer typically began to write in his mid-teenage years. This allows the first insights into his well-being at an early stage in life. We can also observe that there exists a relatively high volatility in the writing patterns. This variation is explored in appendix F, where I determine when a composer writes more frequently. It has to be noted that in all models investigating the determinants of emotional well-being or the impact of emotions on creativity, I deal with this variation by accounting for the number of letters written in a given year.

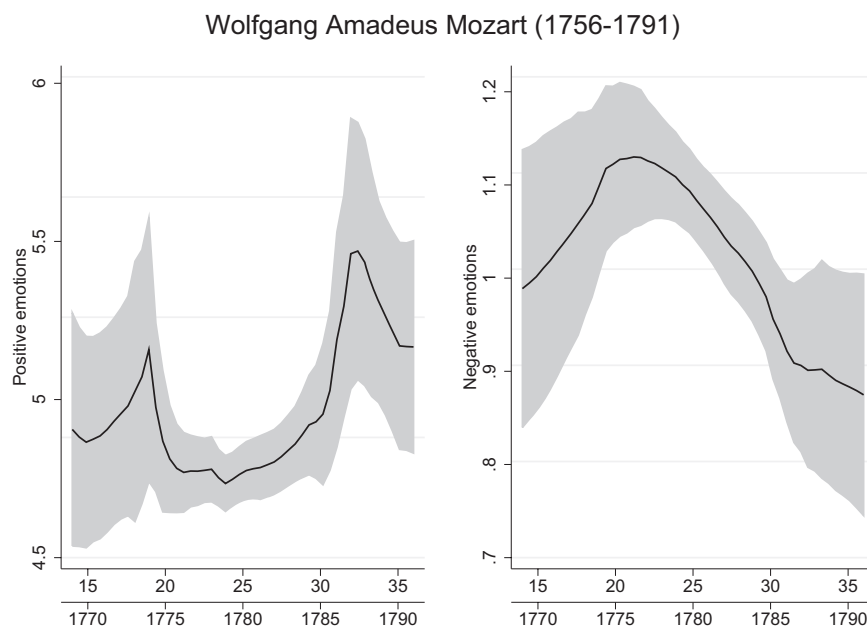


TABLE 2.—SUMMARY STATISTICS

	(1)	(2)	(3)	(4)	(5)	(6)
	Mozart, 1756–1791		Beethoven, 1770–1827		Liszt, 1811–1886	
	Mean	SD	Mean	SD	Mean	SD
<i>Background</i>						
Output (number of works p.a.)	9.529	5.027	4.976	3.231	0.658	0.971
Tenure (dummy)	0.260	0.439	0.081	0.274	0.684	0.465
Touring (dummy)	0.216	0.417	0.017	0.130	0.117	0.323
Marriage or cohabitation (dummy)	0.250	0.439	0	0	0.355	0.479
Death of relative (dummy)	0.054	0.229	0.051	0.222	0.018	0.133
Illness (dummy)	0.027	0.164	0.153	0.363	0.026	0.160
<i>Letters</i>						
Positive emotions	4.979	2.007	4.584	2.819	6.340	2.614
Negative emotions	1.067	0.714	1.273	1.283	0.932	0.797
Anxiety	0.269	0.372	0.253	0.470	0.150	0.251
Anger	0.209	0.291	0.237	0.539	0.178	0.327
Sadness	0.340	0.381	0.403	0.666	0.274	0.452
Word count per letter	557.5	454.3	198.5	189.8	339.2	257.1
Number of letters per year	13.13	14.84	14	14.88	11.26	8.043
<i>Addressee</i>						
Family	10.35	14.23	1.176	6.167	0.817	1.330
Friend	1.435	1.805	5.971	7.538	6.064	5.265
Peer	0	0	1.382	2.188	1.308	1.812
Business associate	0.783	1.506	5.412	6.021	2.644	2.670
Stranger	0.087	0.288	0	0	0.407	0.853
Unknown	0.522	1.410	0.059	0.239	0.017	0.130

The odd-numbered columns report the mean value of a variable for each composer; the even-numbered columns report the standard deviation. The background variables refer to whole life. The letters and addressee variables are expressed per year, refer to periods in which letters are recorded, and are based on 299 letters written by Mozart, 473 by Beethoven, and 660 by Liszt. The death of a relative variable is recorded over a twelve-month period after the death occurred.

FIGURE 1.—POSITIVE AND NEGATIVE EMOTIONS OF WOLFGANG AMADEUS MOZART

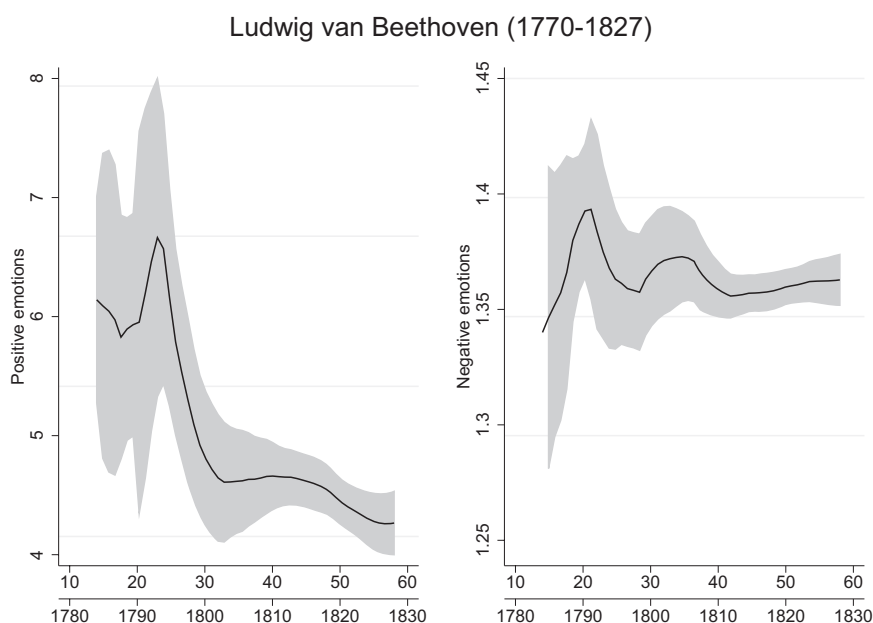


The depicted prediction is based on a local polynomial regression method with an Epanechnikov kernel, and it is presented along with a 95% confidence interval.

Figure 5 shows to whom the letters are addressed and how this frequency changes throughout the composer's life. During youth, most letters are written to family members, who constitute the composer's network since birth. The share of family members among the addressees decreases during midlife before somewhat bouncing off again later in life. Friends become an increasingly important share of

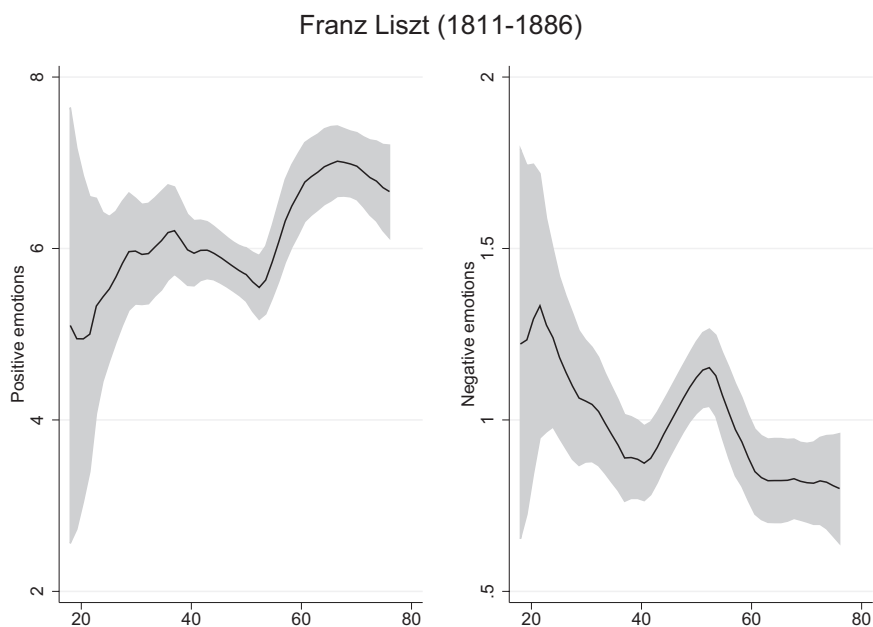
addressees over the course of life. These two groups of receivers are most common and account for almost two-thirds of all letters. Professional correspondence over the course of life follows the shape of an inverted-U and, interestingly, comes close to the typical pattern of many labor market variables, such as income or working time. A somewhat similar shape is disclosed by letters written

FIGURE 2.—POSITIVE AND NEGATIVE EMOTIONS OF LUDWIG VAN BEETHOVEN



See the figure 1 note.

FIGURE 3.—POSITIVE AND NEGATIVE EMOTIONS OF FRANZ LISZT



See the figure 1 note.

to strangers—a category that includes potential professional associates or public figures. Correspondence with peers is rather scarce and declines slowly throughout life.

*B. The Determinants of Well-Being*

The regression results from estimating model 1 are presented in table 3 for negative emotions (columns 1 to 3) and positive emotion (columns 4 and 5). Column 2 gathers both negative and positive emotion indicators into one model in

order to illuminate the association between them. All results are reported with composer fixed effects and addressee fixed effects and then extended further by including decade fixed effects and city fixed effects (columns 3 and 5).

Age is found to be significantly related to positive emotions, but only in the baseline model with composer fixed effects and addressee fixed effects (column 4). Output exhibits a positive correlation only with positive emotions in both specifications. For negative emotions, the only significant measure of labor market involvement is the touring

FIGURE 4.—NUMBER OF LETTERS BY AGE

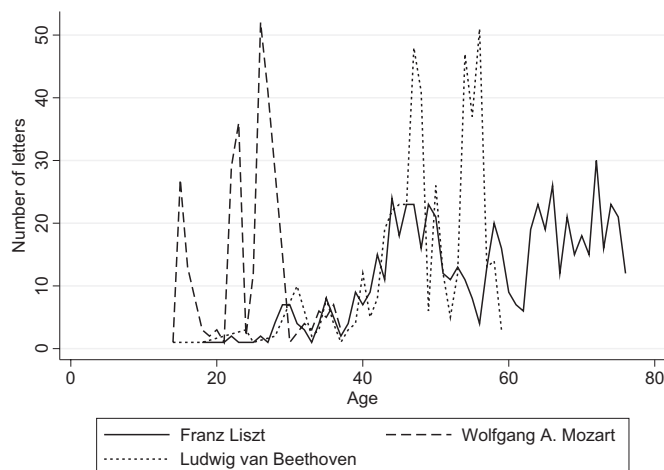
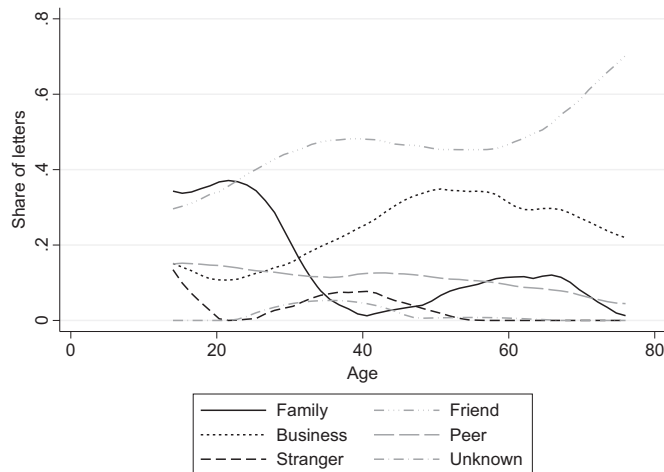


FIGURE 5.—SHARE OF LETTERS BY TYPE OF ADDRESSEE AND AGE



indicator. The coefficient remains consistent in size and significance across all three specifications. The negative sign implies that composers involved in intense work-related traveling exhibit a lower degree of negative emotions. The coefficient is positive, albeit statistically insignificant, for positive emotions.

The variable measuring the effect of marriage (or cohabitation) turns out to be insignificant. Perhaps it is not a surprise that this social relationships proxy does not have a clear impact on the well-being of the composers covered, since their relationships were not always happy.<sup>19</sup> For example, Liszt's relationship with Princess Carolyne von Sayn-Wittgenstein constituted a bitter thirteen-year fight to secure her annulment from a previous unhappy marriage (Walker et al., 2013). The other variable measuring social relationships, the death of a family member, turns out to be a

<sup>19</sup>The insignificant association is robust to alternative ways of measuring the relationships—for example, as the number of years spent in a relationship or as the incidence of getting married (or entering into cohabitation).

highly significant driver of negative emotions. The disclosed coefficient comes close to 1, implying an almost doubling of negative emotions in the case of the death of a family member. Negative emotions also increase strongly due to poor health. A large effect of illness is found also for positive emotions, implying that poor health is associated with a marked decrease in positive affect. It is also interesting to observe the significant negative coefficient on the number of letters written in a year. This suggests that composers wrote less when their positive emotions were high. A more detailed analysis of the determinants of writing patterns and of the probability of writing to a specific type of addressee is presented in appendix F. Finally, the correlation between negative and positive emotions is negative and highly significant (column 2). This implies that the two types of emotions are to some degree opposite each other. Here it can be also seen that the results described are not influenced by the inclusion of this additional variable into the negative emotions regression.

While some variables turn out to be insignificant, those estimated with sufficient statistical precision appear with the expected sign. As such, despite the obvious measurement difficulties, these results support the validity of the calculated well-being indices. The reported correlation between output and emotion is not claimed to be causal here because of the suspicion that output is itself determined by emotion—and that is what I show in the next section.

In appendix C several additional tests are conducted. First, I explore the role of earnings using a measure of the intensity with which a composer was writing in his letters about money-related concerns. Second, I use income information for eleven years of Mozart's life, as provided by Baumol and Baumol (1994). Both measures indicate that fewer money-related concerns or higher income of Mozart correspond to greater positive emotions, which is in accordance with theory. I also estimate the correlates of the financial concerns variable using the available background information for each composer and show that the variable decreases if the composer has tenured employment. The validity of the LIWC variable is further documented using indicators on the intensity of writing about death-related concerns or social relationships.

### C. Creativity and Negative Emotions

With increased confidence in the obtained well-being indices, I study next the existence of a causal link between negative emotions and creativity and begin by estimating OLS coefficients between the two variables of interest. In columns 1 and 2 of table 4, the estimated coefficients on negative emotions come with the plus sign, but are statistically significant in the specification with age fixed effects only. In analogy with the previous estimations, the baseline specification is extended by the inclusion of decade and addressee fixed effects. An interesting side result is that obtaining a permanent position (tenure) exhibits a strong negative correlation with the productivity measure. This is

TABLE 3.—THE DETERMINANTS OF WELL-BEING

	(1) Negative Emotions OLS	(2) Negative Emotions OLS	(3) Negative Emotions OLS	(4) Positive Emotions OLS	(5) Positive Emotions OLS
Age	0.122 (0.131)	0.141 (0.130)	0.227 (0.261)	0.598* (0.343)	0.245 (0.675)
Age <sup>2</sup> /100	-0.569 (0.512)	-0.648 (0.511)	-0.918 (0.984)	-2.448* (1.343)	-1.587 (2.548)
Age <sup>3</sup> /10,000	1.010 (0.821)	1.140 (0.819)	1.533 (1.526)	3.983* (2.153)	3.480 (3.951)
Age <sup>4</sup> /1,000,000	-0.614 (0.460)	-0.685 (0.459)	-0.889 (0.829)	-2.192* (1.206)	-2.204 (2.147)
Output	0.00486 (0.00958)	0.00670 (0.00957)	0.00366 (0.0110)	0.0566** (0.0251)	0.0585** (0.0284)
Tenure	0.0128 (0.0707)	0.0169 (0.0704)	0.0576 (0.0961)	0.125 (0.185)	0.180 (0.249)
Touring	-0.303** (0.119)	-0.288** (0.119)	-0.333** (0.153)	0.480 (0.311)	0.208 (0.397)
Marriage (or cohabitation)	-0.0214 (0.0993)	-0.0231 (0.0990)	-0.0239 (0.129)	-0.0528 (0.260)	-0.118 (0.334)
Death of relative	0.854*** (0.236)	0.870*** (0.236)	0.879*** (0.249)	0.481 (0.620)	0.306 (0.644)
Illness	0.601*** (0.221)	0.550** (0.221)	0.618** (0.244)	-1.569*** (0.580)	-1.276** (0.632)
Number of letters	0.00189 (0.00241)	0.00134 (0.00241)	0.00212 (0.00272)	-0.0169*** (0.00632)	-0.0175** (0.00703)
Positive emotions		-0.0326*** (0.0101)			
Observations	1,432	1,432	1,432	1,432	1,432
R <sup>2</sup>	0.032	0.039	0.043	0.052	0.086
Composer FE	✓	✓	✓	✓	✓
Addressee FE	✓	✓	✓	✓	✓
Decade FE			✓		✓
City FE			✓		✓

Standard errors in parentheses: \*\*\**p* < 0.01, \*\**p* < 0.05, \**p* < 0.1.

TABLE 4.—CREATIVITY AND NEGATIVE EMOTIONS

	(1) Output OLS	(2)	(3) Negative Emotions First Stage	(4)	(5) Output IV	(6)
Negative emotions	0.254*** (0.0943)	0.0611 (0.0737)			2.189** (1.113)	2.537** (1.016)
Tenure		-0.542*** (0.196)		0.0103 (0.0705)		-0.543** (0.263)
Touring		0.282 (0.332)		-0.302** (0.119)		1.045* (0.543)
Marriage (or cohabitation)		-1.093*** (0.275)		-0.0264 (0.0988)		-0.979*** (0.371)
Illness		0.193 (0.615)		0.611*** (0.220)		0.480 (1.016)
Number of letters		0.0519*** (0.00656)		0.00214 (0.00236)		0.0473*** (0.00899)
Death of relative			0.867*** (0.237)	0.865*** (0.235)		
Observations	1,432	1,432	1,432	1,432	1,432	1,432
R <sup>2</sup>	0.065	0.187	0.012	0.032		
Age FE	✓	✓	✓	✓	✓	✓
Composer FE		✓		✓		✓
Addressee FE		✓		✓		✓

Standard errors in parentheses: \*\*\**p* < 0.01, \*\**p* < 0.05, \**p* < 0.1.

TABLE 5.—CREATIVITY GAINS BY TYPE OF NEGATIVE EMOTION

	(1) Anxiety First Stage	(2) Output IV	(3) Anger First Stage	(4) Output IV	(5) Sadness First Stage	(6) Output IV
Death of relative	0.155* (0.0887)		0.180* (0.0989)		0.299** (0.127)	
Tenure	-0.000470 (0.0265)	-0.510 (0.421)	0.0130 (0.0296)	-0.676 (0.422)	0.0234 (0.0379)	-0.688** (0.346)
Touring	-0.0674 (0.0447)	1.235 (0.943)	-0.0526 (0.0499)	0.921 (0.811)	-0.0729 (0.0638)	0.813 (0.636)
Marriage (or cohabitation)	0.0131 (0.0372)	-1.233** (0.596)	0.0148 (0.0415)	-1.227** (0.585)	-0.0169 (0.0531)	-0.922* (0.482)
Illness	0.00800 (0.0830)	1.917 (1.315)	0.101 (0.0926)	0.796 (1.488)	-0.120 (0.118)	2.911** (1.162)
Number of letters	0.000147 (0.000887)	0.0507*** (0.0141)	0.00252** (0.000990)	0.0220 (0.0234)	-0.00255** (0.00127)	0.0715*** (0.0151)
Anxiety		14.18 (9.081)				
Anger				12.22 (7.691)		
Sadness						7.329* (3.770)
Observations	1,432	1,432	1,432	1,432	1,432	1,432
R <sup>2</sup>	0.012		0.015		0.016	
Composer FE	✓	✓		✓		✓
Age FE	✓	✓	✓	✓	✓	✓
Addressee FE	✓	✓	✓	✓	✓	✓

Standard errors in parentheses: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

consistent with what one might expect and also in line with previous research.<sup>20</sup> Obtaining job security or, alternatively, becoming involved in new duties not directly related to composing results in a lower creative output for a composer. Being married or living in cohabitation is also negatively related with compositions written. Finally, the number of works composed is positively related with letter writing frequency, which possibly indicates the periods when a composer was professionally more active or perhaps wrote more letters in order to promote a new piece.<sup>21</sup>

The first-stage results are presented in columns 3 and 4 of table 4.<sup>22</sup> Consistent with previous specifications explaining negative emotions, the variable measuring the unexpected death of a family member is found to be a significant determinant. It can be further observed that the coefficient for the unexpected death variable does not change when other variables are included; this supports the argument that death occurred randomly. The second-stage results are presented in columns 5 and 6. The IV estimates are positive, large, and statistically significant, implying a causal impact of negative emotions on the number of compositions written. The coefficient in the preferred specification (column 6) indicates that a 0.1 point rise (approximately 9.3% increase) in negative emotions leads to the creation of additional 0.25 works in the

following year (approximately 6.3% increase). Considering the average value of the negative emotions index (table 2), an increase in negative emotions by about 36.7% inspires one additional important composition the following year.<sup>23</sup>

There can be several reasons why the OLS coefficients are downward biased. First, it is possible that output may have a decreasing role on negative emotions. A successful, well-received composition may be the reason negative emotions decrease. Alternatively, the effect may also work through positive emotions, which, as we have observed, are negatively correlated with negative emotions (e.g., column 2, table 3). Furthermore, it could be the case that the composer burns down his negative affect in the creative process. He draws on negative emotions, but once this “fertile material” (Andreasen, 2005) expires, the creative process ends.

An arising question deals with the precise type of emotion that raises creativity. A way to address this issue is to use a disaggregated measure of negative emotions, which is provided by the LIWC software for anxiety, anger, and sadness. In analogy with the previous approach, I instrument for each of these three types of negative emotions with the incidence of death of a family member in order to find the causal impact on productivity and present the results in table 5. The first-stage coefficients indicate that the instrumental variable exhibits a positive and significant association with each type of negative mood, even if it somewhat decreases in size and precision for anxiety and anger. Interestingly, the IV parameters imply that a significant causal effect on creativity can

<sup>20</sup> See, for example, Holley (1977), who finds a negative impact of tenure decisions on the research productivity of academics.

<sup>21</sup> The OLS, as well as the first-stage and IV results, are robust to the inclusion of decade fixed effects and city fixed effects, with the only exception that the significant association for the married (or living in cohabitation) variable disappears.

<sup>22</sup> The estimation in column 4 is very similar to the model estimating negative emotions in column 1 of table 3, with the only difference that the output variable is not included in the first stage.

<sup>23</sup> For further discussion of the timing issue, see appendix G. The IV coefficients on negative emotions remain very stable in size and significance if one also includes the positive emotions variable as an additional control (not reported).

be detected only for the case of sadness ( $p$ -value = 0.052), whereas the effects of anxiety and anger are estimated to be just outside the usual confidence intervals ( $p$ -value < 0.12). Since depression is strongly related with sadness (Monroe et al., 2001) and is sometimes even defined as a state of chronic sadness, this result comes very close to the previous claims of psychologists that depression leads to increased creativity (e.g., Andreasen, 2005).

It is interesting to note the coefficients on the intensity of letter writing in the first-stage regressions. Composers were writing more letters when they were angry, perhaps in an attempt to release their anger. However, the association with sadness is negative, which is consistent with the notion that isolation and solitude are the most common coping mechanism for sadness (Goleman, 1996).

## VI. Conclusion

Psychology research has increasingly relied on the analysis of word use in order to shed light on the emotional well-being. Building on the association between a person's emotional state and language use, I apply this methodology in an economic analysis and use innovative computer software in order to calculate the extent of positive and negative emotions expressed in a large number of letters written by three famous composers. This allows me to create unique well-being indices that reflect emotional fluctuations of three famous artists throughout their lifetime. I show that the shape and patterns of the emerging well-being indices find corroborating support in the biographies of the composers covered.

In further support of the validity of the methodology, I quantitatively investigate the determinants of well-being. The results indicate that the artists covered reacted emotionally to various life incidences in a similar fashion to people in general. Labor market achievements, measured as the composition of an important piece and touring activity, increase positive or decrease negative emotions, while the illness or death of a family member raises negative emotions. It may almost come as a surprise that the three music geniuses who have shaped the classical music canon like probably nobody else in history are only human after all and are affected by life events in a similar way as anybody else.

I then use the data to explore how negative emotions are associated with outstanding creative achievements. By utilizing instrumental variables and exploiting the temporal dimension of the data, I show that creativity, measured by the number of important compositions, is causally attributable to negative moods, in particular to sadness. This constitutes important insights on an issue that has fascinated many since antiquity.

This study contributes to the new and fast-growing literature within economics on the creative processes of successful people. The insights come in partial response to a recent claim by Galenson (2010) that "economists' failure to study [creative] individuals has prevented them from

understanding the sources of the contributions of the most productive people in our society" (Galenson, 2010). Despite the small sample and the risk of some degree of measurement imprecision, the disclosed results appear to be consistent across different specifications and throughout several robustness tests. While further research on the potential of generalization of this study is required, the presented research design and findings contribute to the methodology and knowledge within several areas in economics: innovation, happiness, labor, and health economics, but also to psychology and music history. Furthermore, the text analysis method, which some psychologists see as "revolutionary," may possibly become a useful tool also in economics and help us better understand people's behaviors and their decision-making processes.

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