Social Psychological and Personality Science
1-10

DOI: 10.1177/1948550615608402
spps.sagepub.com

Macropsychological Factors Predict Regional Economic Resilience During a Major Economic Crisis

Martin Obschonka[1], Michael Stuetzer[2,3], David B. Audretsch[4], Peter J. Rentfrow[5], Jeff Potter[6], and Samuel D. Gosling[7,8]

Abstract

Do macropsychological factors predict "hard" economic outcomes like regional economic resilience? Prior approaches to understanding economic resilience have focused on regional economic infrastructure. In contrast, we draw on research highlighting the key role played by psychological factors in economic behaviors. Using large psychological data sets from the United States ($n = 935{,}858$) and Great Britain ($n = 417{,}217$), we characterize region-level psychological correlates of economic resilience. Specifically, we examine links between regions' levels of psychological traits and their degree of economic slowdown (indexed by changes in entrepreneurial vitality) in the wake of the Great Recession of 2008–2009. In both countries, more emotionally stable regions and regions with a more prevalent entrepreneurial personality makeup showed a significantly lower economic slowdown. This effect was robust when accounting for regional differences in economic infrastructure. Cause cannot be inferred from these correlational findings, but the results nonetheless point to macropsychological factors as potentially protective factors against macroeconomic shocks.

Keywords

macropsychology, regions, economic resilience, entrepreneurship, personality, Big Five

Psychological characteristics (e.g., personality traits and values) are distributed unevenly across geographic regions such as cities and countries (Jokela, Bleidorn, Lamb, Gosling, & Rentfrow, 2015; Rentfrow, Gosling, & Potter, 2008; Talhelm et al., 2014). However, the ''real-world'' correlates of such macropsychological factors are still largely unexplored. Recent evidence indicates that a macropsychological perspective can inform models of risk and protective factors with regard to regional health indicators (Eichstaedt et al., 2015). Here, we extend this approach to the context of regional economic resilience. We examine macropsychological correlates of regions' economic performance during a major crisis, the Great Recession of 2008–2009, which was the worst economic collapse since the Great Depression (Hausman & Johnston, 2014). Such crises pose substantial threats to the prosperity of regions by triggering a massive, instant slowdown of local economies (Krugman, 2009; Stiglitz, 2010), with long-term consequences for the economic trajectories of regions and the prosperity of the people living there (Elder, 1999). So revealing psychological protective resilience factors is an important step in establishing predictive models, which can both guide policy and inform models of the psychological mechanisms underlying economic behavior.

This study is based on two basic findings. First, the economies of some regions show considerably more resilience to economic crises than others do (Martin, 2012). Prior approaches to understanding these differences in resilience have focused on the local economic infrastructure (Gabe & Florida, 2013; Martin, 2012), but these standard macroeconomic models have struggled to account for resilience at the regional level. Second, seminal psychological research at the individual level has shown that differences in psychological

[1] Department of Psychology, Saarland University, Saarbrücken, Germany
[2] Baden Württemberg Cooperative State University, Mannheim, Germany
[3] Faculty of Economic Sciences and Media, Institute of Economics, Ilmenau University of Technology, Ilmenau, Germany
[4] Institute of Developmental Strategies, Indiana University, Bloomington, IN, USA
[5] Department of Psychology, University of Cambridge, Cambridge, United Kingdom
[6] Atof Inc., Cambridge, MA, USA
[7] Department of Psychology, University of Texas at Austin, Austin, TX, USA
[8] School of Psychological Sciences, University of Melbourne, Parkville, Victoria, Australia

Corresponding Author:
Samuel D. Gosling, Department of Psychology, University of Texas at Austin, Austin, TX 78712, USA.
Email: samg@austin.utexas.edu

features, such as emotions, traits, values, and cognitive biases, can augment purely rational models of microeconomic behavior (Tversky & Kahneman, 1974).

Thus, our logic is straightforward: Regions are made up of individuals who are the agents of economic behaviors. So regions with a high proportion of individuals disposed to engage in some behaviors (e.g., start-up a new business and remain calm under conditions of stress) are likely to perform differently from regions with different populations (McClelland, 1961; Steel, Rinne, & Fairweather, 2012), even if both kinds of regions are subject to the same macroeconomic forces and have similar economic infrastructures. Moreover, the local prevalence of personality factors shapes the region's psychological climate as a whole (Lee, Florida, & Acs, 2004; Rentfrow et al., 2008). This local climate, in turn, is likely to exert population-wide, collective motivational effects (Hofstede & McCrae, 2004). Regions as a whole will thus react to major crises in ways that may appear "irrational" in the sense that they cannot be explained by a mechanistic view that focuses solely on the region's economic infrastructure. Rather, macropsychological features are likely to play a significant role.

This macropsychological view on regional economic resilience is consistent with approaches from geographical psychology (Hofstede & McCrae, 2004; Rentfrow et al., 2008), which explain the emergence, persistence, and expression of regional cultural differences. Furthermore, recent advances in cultural, historical, and institutional economics stress the relevance of cultural and unobserved institutional factors in the study of economic outcomes (Algan & Cahuc, 2010; Beugelsdijk & Maseland, 2011; Greif, 2006; Guiso, Sapienza, & Zingales, 2006; Nunn, 2009).

We therefore examine whether macropsychological factors—in our case the personality of regions—add significant explanatory value to existing models predicting regional resilience. We use two large independent data sets to (a) examine the extent to which the findings replicate within two major economies, the United States and Great Britain (GB) and (b) compare regions at a relatively small spatial level (e.g., cities), which is the recommended strategy in comparable economic research (Lee et al., 2004). We examine 366 metropolitan statistical areas (MSAs) in the United States and 375 local authority districts (LADs) in GB.

Method

Regions

Following standard practice in regional economic research (e.g., Glaeser, 2007; Lee et al., 2004), we investigated MSAs as the fundamental spatial unit in our U.S. analysis. MSAs are defined by the U.S. Office of Management and Budget as urbanized areas with a population of 50,000 inhabitants or above. Typically, an MSA consists of a central county with a high urban population share. Additional adjacent counties are included in the MSAs if they have substantial interaction with the central county measured by commuting flows. There were 366 MSAs in the United States (excluding Puerto Rico) at the end of December 2009.

In GB, there is no officially defined equivalent of MSAs. The closest match to the U.S. definition of MSAs are U.K. travel-to-work areas (TTWAs; Coombes & Bond, 2008). As in the United States, TTWAs are constructed using commuting flows. However, the U.K. National Statistical Office provides only a very limited set of data at the TTWA level, so we instead used LADs as the fundamental spatial unit for the analyses in GB. LADs are administrative units with a substantial degree of local government. LADs are the most fine-grained spatial unit for which entrepreneurship data are reported in GB and have been previously used in entrepreneurship studies (e.g., Mueller, van Stel, & Storey, 2008). Due to missing data for some of our independent variables, we excluded the Northern Ireland LADs and the Isle of Scilly from the sample. Additionally, we aggregated all metropolitan boroughs (also officially listed as LADs) that form the Greater London region by averaging the values of the variables across the Boroughs. With these adjustments, there were 375 LADs in GB.

Measurements

Economic resilience. We assess economic resilience by focusing on changes in the local start-up rate during the crisis. In doing so, we follow Martin and Sunley's (2015) definition of regional economic resilience as the region's "robustness that is concerned with maintaining some key functions or performances" during a crisis (p. 6), and Martin and Sunley note that this definition is similar to the way resilience is characterized in psychology, which usually defines resilience as the "capacity of individuals to maintain or quickly regain psychopathological wellbeing following personal stress, trauma or crisis of some sort" (p. 6). We focus on the region's changes in the start-up rate because entrepreneurship is widely regarded as a key performance factor of local economies (Audretsch & Fritsch, 1994). Start-up rates reflect entrepreneurial activity in a region as well as perceptions of current and future opportunities. High start-up rates reflect optimism and opportunity, and low start-up rates indicate pessimism and perceptions of diminished opportunities. Entrepreneurship is a key driver of local economies due to its crucial role in driving job and wealth creation and technological progress (Glaeser, 2007; Obschonka et al., 2015). Unlike alternative economic outcome measures such as gross domestic product (GDP), entrepreneurship strongly depends on individuals' choices involving risk and uncertainty. Today's regional development policies put a special focus on establishing and maintaining the region's competitiveness by attracting new firms and labor, so there is a strong interest among scholars and policy makers in identifying the factors protecting the region's entrepreneurial vitality during major crises. Our resilience measure (*percentage change of the regional start-up rates between 2007 and 2009*) mainly reflects opportunity-driven entrepreneurship, which is particularly relevant for job creation and economic growth.

Data on start-ups come from the Statistics of U.S. Businesses for the United States and the Inter-Departmental Register for the GB, and the detailed information on the data and the procedure to identify the start-ups are described in the "Materials and Methods" section in the Supplemental Appendix. In a nutshell, a start-up is a business not active in year $t - 1$ but active in year t, marking the birth of the new firm. The number of start-ups are divided by the number of employees (in thousands). The resulting variable—the number of start-ups per 1,000 employees—is commonly referred as start-up rate and indicates the propensity of the regional workforce to start a business (Andersson & Koster, 2011; Audretsch & Fritsch, 1994). The percentage change in the start-up rate is then used as our measure of regional resilience. Smaller values reflect a larger drop in the regional propensity of new-firm formation in the crisis. Conversely, higher values reflect a smaller drop and, thus, greater resilience.

Regional personality. To index regional psychological factors, we aggregated the personality scores of individuals residing in the different regions (Hofstede & McCrae, 2004; Rentfrow et al., 2008). We used two large personality data sets from the United States ($n = 935{,}858$) and GB ($n = 417{,}217$) that collected individual-level data on the *Big Five personality dimensions* (extraversion, conscientiousness, openness, agreeableness, and emotional stability) the predominant model of personality in contemporary psychological science (John, Naumann, & Soto, 2008). In addition to assessing the individual dimensions of the Big Five, we computed an *entrepreneurial personality profile* based on the configuration of the Big Five personality dimensions derived from previous research (Obschonka, Schmitt-Rodermund, Silbereisen, Gosling, & Potter, 2013). This profile, which is characterized by higher scores on the Big Five dimensions of extraversion, openness, conscientiousness, emotional stability, and lower scores in agreeableness, has yielded robust results in predicting both individual- and regional-level entrepreneurship outcomes (see Obschonka et al., 2013, 2015; see "Materials and Methods" in the Supplemental Appendix for a description of the psychological data sets, their regional representativeness, and the computation of the entrepreneurial Big Five profile).

Economic infrastructure. To provide a benchmark against which to evaluate the effects of these macropsychological factors, we considered four standard structural factors commonly evaluated in the literature on regional resilience (Gabe & Florida, 2013; Martin, 2012). We operationalize these factors via metrics commonly employed in the literature (see "Materials and Methods" in the Supplemental Appendix for details on their measurement).

First, scholars deem *industry composition* an important resilience factor (Brewer & Moomav, 1985; Malizia & Ke, 1993; Trendle, 2006). Specifically, industry diversity can provide greater protection from economic shocks than a specialized industry structure can because not all industries might be affected by an economic slowdown to the same extent (Martin, 2012). We measure the region's industry diversity with the inverse Hirschman–Herfindahl index based on industrial shares of employment (Beaudry & Schiffauerova, 2009).

Second, a region's endowment with *knowledge* (e.g., education, new ideas, and inventions) contributes to economic progress. The prevalence of new ideas for products and services contributes to the formation of new firms and industries, thereby making regions with large knowledge endowments relatively resistant to hardship during economic downturns. Knowledge can be embodied in people and technology. Therefore, we consider (a) human capital, which we asses via the regional share of the working-age population with a higher education (Becker, 1964), and (b) invention of tools, machines, or procedures, which we assess via patents per 1,000,000 capita (Wuchty et al., 2007).

Third, one can expect regions with more *financial capital* to have a smaller economic slowdown in terms of declining start-up rates. At first sight, the direction of this hypothesis might be surprising because the trigger of the Great Recession was an interbank credit crisis, which cumulated in the bankruptcy of Lehman Brothers in September 2008. However, founders of start-ups often have limited financial resources and need alternative means of finance, such as loans and venture capital (Black & Strahan, 2002). We assessed financial capital in terms of a region's employment share in the finance sector.

Fourth, in addition to these relatively stable structural factors, we considered a set of *fluctuating structural factors*: change in unemployment, GDP, and housing prices during the crisis (Hurst & Lusardi, 2004; Koellinger & Thurik, 2012). These factors fluctuate over the business cycle with potential effects on the region's entrepreneurial vitality during the crisis. Rising unemployment might push people into starting-up a new firm because they lack alternatives in paid employment. A dropping regional GDP should matter for entrepreneurship because it signals lower demand for products and services. Decreasing housing prices can dampen the start-up activity because houses are often used as collateral for financing the start-ups. We include the 2007–2009 percentage change in regional unemployment rates, GDP per capita in the United States (gross value added per capita in GB), and housing prices as potential predictors of the change in regional start-up rates.

Results

The data clearly reflect the substantial slowdown in economic activity during the crisis, with considerable regional variation in this slowdown. Specifically, the average start-up rate in the U.S. regions was relatively stable in the years before the Great Recession reaching a peak of 5.95 per 1,000 employees in 2007 but dropping by 30% to 4.18 in 2009. A similar picture emerged in GB, with start-up rates dropping by 17%, from 11 start-ups per 1,000 employees in 2007 to 9.11 in 2009. Figures 1A and 2A illustrate the drop in the average regional start-up rate in the United States and GB, respectively. However, these general trends masked considerable variation across regions. The change in the local start-up rate of regions

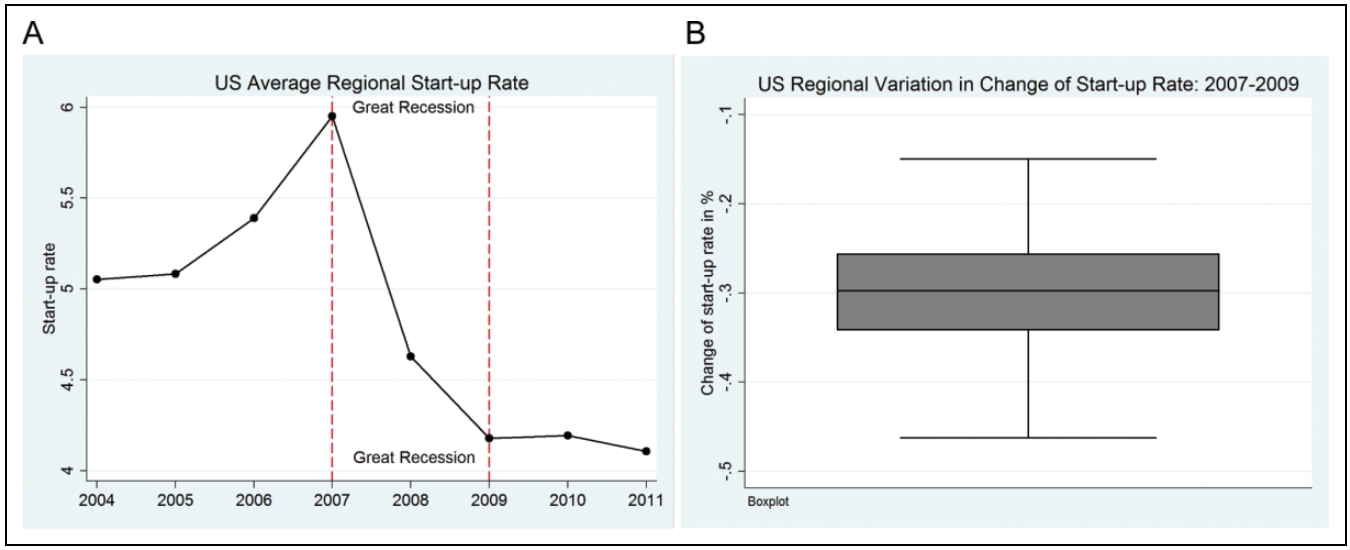

Figure 1. The regional start-up rate curve for the United States. (A) Average drop in the regional start-up rate during the Great Recession (between 2007 and 2009). (B) Regional variation in the drop in the regional start-up rate during the Great Recession (between 2007 and 2009).

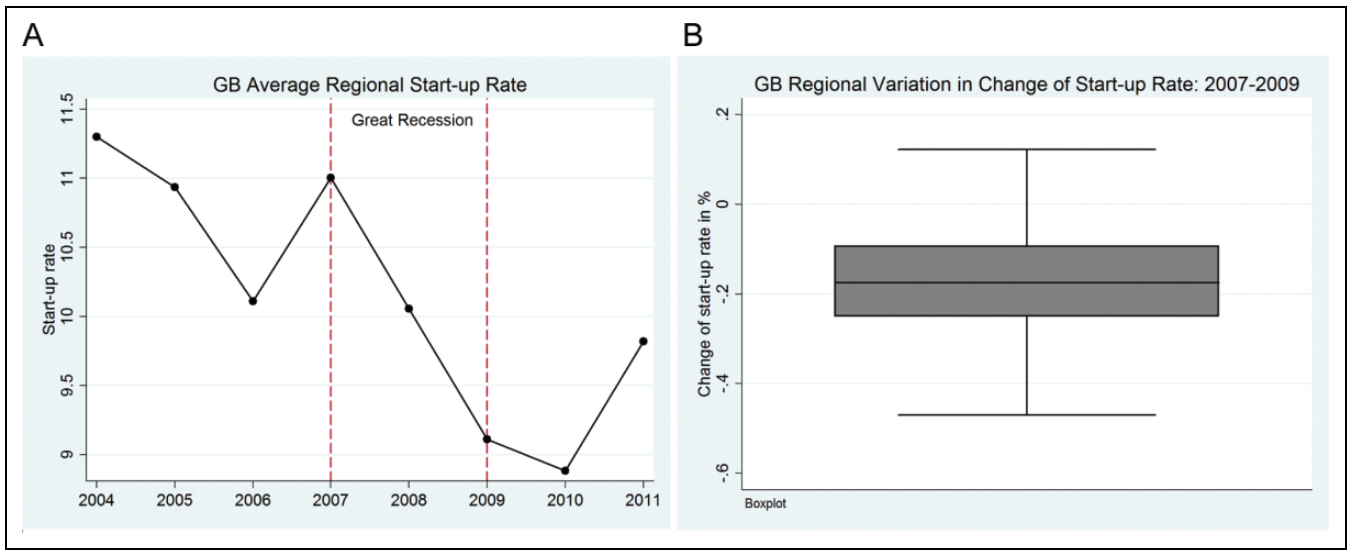

Figure 2. The regional start-up rate curve for Great Britain. (A) Average drop in the regional start-up rate during the Great Recession (between 2007 and 2009). (B) Regional variation in the drop in the regional start-up rate during the Great Recession (between 2007 and 2009).

ranged from −46% in Gulfport-Biloxi, MS, to +11% in Cape Girardeau, MO, and Jackson, IL, in the United States (SD = 7%) and from −47% in Thanet to +30% in North East Lincolnshire in GB (SD = 12%). Thus, while the vast majority of regions in both countries experienced a dramatic drop in start-up activity during the crisis, some regions showed a less severe decline or even saw a modest increase in start-up activity, indicating stronger resilience. Figures 1B and 2B show boxplots depicting the degree to which the regions varied in the wake of the crisis.

Table 1 shows the main results from ordinary least squares regressions in U.S. regions (Models 1–3) and in GB regions (Models 4–6), predicting this regional variation in resilience. As standard in regressions on change, we control for the initial level (the initial start-up rate in 2007; Barro & Sala-i-Martin, 1992). Note that including the initial start-up rate theoretically captures the effect of all determinants of the *level* of regional entrepreneurial vitality. It is already well known that both economic and psychological factors can explain variation in the level of regional start-up rates (e.g., Audretsch & Fritsch, 1994; Obschonka et al., 2013), but our econometric approach automatically accounts for these initial differences. We also include population density and historic economic hardship (measured as the mean of the unemployment rates in 1991 and 2001) as control variables. The population-density control is important because more densely populated areas, such as cities,

Table 1. Results of the Regression Analysis Predicting Economic Resilience in U.S. and GB Regions.

	DV: Economic Resilience (Percentage Change in the Local Start-Up Rate Between 2007 and 2009)											
	United States						Great Britain					
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	β (*t*)	95% CI	β (*t*)	95% CI	β (*t*)	95% CI	β (*t*)	95% CI	β (*t*)	95% CI	β (*t*)	95% CI
Control variables												
Initial-level start-up rate 2007	−0.20 (−3.16)**	[−0.33, −0.08]	−0.23 (−3.43)***	[−0.37, −0.10]	−0.23 (−3.64)***	[−0.36, −0.11]	−0.26 (−4.26)***	[−0.38, −0.14]	−0.33 (−5.14)***	[−0.46, −0.21]	−0.32 (−5.18)***	[−0.44, −0.20]
Population density	0.15 (2.68)**	[0.04, 0.26]	0.14 (2.43)*	[0.03, 0.25]	0.14 (2.61)**	[0.04, 0.25]	−0.06 (−1.00)	[−0.19, 0.06]	−0.08 (−1.25)	[−0.20, 0.05]	−0.07 (−1.18)	[−0.19, 0.05]
Historic economic hardship	−0.10 (−1.63)	[−0.22, 0.02]	−0.09 (−1.47)	[−0.21, 0.03]	−0.09 (−1.39)	[−0.21, 0.04]	0.15 (2.00)*	[0.00, 0.30]	0.15 (1.78)	[−0.02, 0.32]	0.19 (2.51)*	[0.04, 0.34]
Structural factors												
Industry composition												
Industry diversity	0.12 (1.75)	[−0.02, 0.26]	0.14 (2.03)*	[0.00, 0.28]	0.13 (1.85)	[−0.01, 0.26]	−0.12 (−2.28)*	[−0.22, −0.02]	−0.14 (−2.76)**	[−0.24, −0.04]	−0.15 (−2.94)**	[−0.25, −0.05]
Knowledge												
Human capital	0.07 (1.43)	[−0.03, 0.17]	0.07 (1.39)	[−0.03, 0.17]	0.07 (1.46)	[−0.03, 0.17]	−0.05 (−0.70)	[−0.17, 0.08]	−0.15 (−1.83)	[−0.31, 0.01]	−0.11 (−1.61)	[−0.24, 0.02]
Patents	0.09 (1.69)	[−0.01, 0.20]	0.09 (1.64)	[−0.02, 0.20]	0.09 (1.65)	[−0.02, 0.19]	−0.06 (−1.12)	[−0.16, 0.04]	−0.05 (−0.95)	[−0.15, 0.05]	−0.04 (−0.86)	[−0.15, 0.06]
Financial capital												
Financial sector	0.05 (0.76)	[−0.08, 0.18]	0.02 (0.35)	[−0.11, 0.16]	0.03 (0.44)	[−0.10, 0.16]	0.47 (6.11)***	[0.32, 0.63]	0.46 (5.43)***	[0.29, 0.63]	0.44 (5.75)***	[0.29, 0.59]
Fluctuating factors												
Unemployment rate (percentage change)	0.01 (0.14)	[−0.12, 0.13]	0.01 (0.15)	[−0.12, 0.14]	0.01 (0.17)	[−0.11, 0.14]	0.03 (0.58)	[−0.07, 0.13]	0.05 (1.02)	[−0.05, 0.15]	0.05 (1.00)	[−0.05, 0.15]
GDP per capita (United States)/ GVA per capita (Great Britain) (percentage change)	−0.03 (−0.54)	[−0.15, 0.09]	−0.03 (−0.42)	[−0.15, 0.09]	−0.03 (−0.42)	[−0.15, 0.09]	0.04 (0.84)	[−0.06, 0.14]	0.03 (0.70)	[−0.06, 0.13]	0.04 (0.77)	[−0.06, 0.13]
Housing prices (percentage change)	−0.07 (−1.14)	[−0.19, 0.05]	−0.06 (−0.90)	[−0.18, 0.07]	−0.06 (−0.94)	[−0.18, 0.06]	−0.03 (−0.62)	[−0.14, 0.07]	−0.02 (−0.44)	[−0.13, 0.08]	−0.03 (−0.60)	[−0.13, 0.07]
Macropsychological factors												
Agreeableness			−0.13 (−1.83)	[−0.28, 0.01]					−0.09 (−1.54)	[−0.20, 0.02]		
Conscientiousness			−0.03 (−0.42)	[−0.16, 0.11]					0.03 (0.37)	[−0.12, 0.17]		
Extraversion			0.10 (1.60)	[−0.02, 0.22]					0.06 (0.91)	[−0.06, 0.18]		
Openness			0.01 (0.09)	[−0.12, 0.13]					0.12 (1.83)	[−0.01, 0.25]		
Emotional stability			0.14 (2.15)*	[0.01, 0.26]					0.14 (2.13)*	[0.01, 0.28]		
Entrepreneurial personality profile					0.13 (2.45)*	[0.03, 0.24]					0.23 (3.55)***	[0.10, 0.35]
Observations	366		366		366		375		375		375	
Adjusted R^2	.0816		.0965		.0943		.133		.155		.160	
F test	4.241***		3.600***		4.454***		6.752***		5.563***		7.480***	

Note. We present standardized βs, *t* values, and 95% CI for the standardized βs in square brackets. The DV is the percentage change in the local start-up rate between 2007 and 2009. Higher values in this variable indicate a less severe economic slowdown regarding local start-up activities. Structural factors comprise industry diversity, human capital, patents, size of the financial sector, percentage change in unemployment rate (2007–2009), percentage change in GDP per capita (2007–2009; in United States), percentage change in GVA per capita (2007–2009; in GB), and the percentage change in housing prices (2007–2009). Psychological factors are the regional prevalence of the Big Five personality dimensions and the entrepreneurial personality profile. Control variables include initial level of the start-up rate in 2007, population density, and historic economic hardship. All variables are z-standardized. Models 1–3 report ordinary least squares regressions for the United States and Models 4–6 for Great Britain. GB = Great Britain; DV = dependent variable; GDP = gross domestic product; GVA = gross value added; CI = confidence interval.

*$p < .05$. **$p < .01$. ***$p < .001$.

might be differently affected by the economic crisis than less densely populated regions. The historic economic hardship variable accounts for the region's long-term economic development. We first tested the effect of the four standard economic structural factors. As shown in Model 1, in the United States, none of the standard economic factors predict the change in the local start-up rate. The equivalent analysis in GB reveals a different picture. Model 4 shows that, consistent with the literature, the size of the financial sector positively predicts the change in start-up rates ($\beta = .47$, $p < .001$), such that those GB regions with a greater employment share in the financial sector showed a stronger economic resilience. Industry diversity negatively predicted the change in the local start-up rates ($\beta = -.12$, $p = .023$), such that those GB regions with a more diversified industry mix were more vulnerable. All other structural factors were nonsignificant predictors in the GB analysis.

We then turned to the regional psychological factors, proceeding in two steps. First, in Models 2 and 5, we included the local prevalence of the Big Five personality dimensions as additional predictors. Emotional stability (Model 2) significantly predicted the change in the local start-up rates in both United States ($\beta = .14$, $p < .032$) and GB ($\beta = .14$, $p < .034$). That is, in both countries, regions higher in emotional stability showed stronger economic resilience. In Models 3 and 6, we substituted the entrepreneurial personality profile for the single Big Five traits. In both countries, the profile had a positive significant effect on change of regional start-up rates (United States: $\beta = .13$, $p = .015$; GB: $\beta = .23$, $p < .001$). Those U.S. and GB regions with a more prevalent entrepreneurial personality structure showed a stronger economic resilience during the crisis. Figures 3 and 4 show U.S. and GB maps, illustrating both the regional differences in economic resilience (changes in start-up rates during the crisis) and the prevalence of macropsychological resilience factors.

We also conducted a series of follow-up analyses to test the robustness of our results. First, we tackled the issue of regional representativeness of the macropsychological information. As explained in the "Materials and Methods" section of the Supplemental Appendix, the regional personality data that we used are fairly representative of the local populations with regard to ethnicity, education, and employment. However, the sample was less representative, in some cases significantly so, with regard to some age brackets and gender. Therefore, we reran our analyses but this time using macropsychological variables weighted for the regional age and gender structure (see Supplemental Appendix and Table S3 for more details). We obtained essentially the same results, that is, we continued to find a protective effect of regional emotional stability and the region's score in the entrepreneurial personality profile. In addition, these additional analysis revealed a protective effect of low agreeableness and high extraversion but only in the United States. These additional U.S. findings make sense in light of earlier studies, which have shown that low agreeableness and high extraversion relate to entrepreneurship (e.g., entrepreneurial intentions and performance) at the individual level (Zhao, Seibert, & Lumpkin, 2010). However, these findings with regard to low agreeableness and high extraversion did not replicate in GB, so we interpret them with some caution.

Second, we also combined the two samples and reran our analysis with this combined sample. Note, however, that due to different measurement approaches of many variables such as start-ups, the results of this additional analysis must be interpreted with care (see Supplemental Appendix for more details and Table S4 for a depiction of the results). We again found protective regional effects of emotional stability and the entrepreneurial personality profile, despite differences in the entrepreneurial metrics used across the two countries. In addition, the protective regional effect of low agreeableness became statistically significant.

Third, economists might argue that we somewhat deviated from the previous literature on financial economics (Haber, 2010) by using employment share in the financial sector as our proxy for the availability of financial capital. This approach was used because established measures, such as the number of banks and their assets or deposits, were not available at a fine-grained spatial level in GB. However, these measures are available for the United States, so we used these more accepted measures in a robustness check. Specifically, we used the deposits in financial institutions per capita in the United States, which is available at the county level from Federal Deposit Insurance Corporation's Summary of Deposits (Black & Strahan, 2002). Higher deposits should relate to higher availability of banks to provide loans to start-ups. The correlation between the employment share in the financial sector and the deposits per capita is $r = .43$ ($p < .001$) in the U.S. regions. We found that this alternative measure of financial capital (deposits in financial institutions) also showed an insignificant effect on local economic resilience in the United States (see Table S5 in the Supplemental Appendix), just as the employment share in the financial sector had done in our main analysis (i.e., the effect of financial sector shown in Table 1).

Discussion

The present findings deliver the first major empirical evidence for the protective effect offered by macropsychological features against an economic slowdown during a major economic crisis. The results thus suggest that the assets and liabilities of a region shaping its economic performance and prosperity are not limited to characteristics of the economic infrastructure but also include the underlying psychology of the region (Beugelsdijk & Maseland, 2011; Greif, 2006; Guiso et al., 2006; McClelland, 1961).

Specifically, the results in the two countries examined here suggest that a strong local "entrepreneurial culture" (indicated by a higher regional prevalence in the entrepreneurial personality profile; Hofstede & McCrae, 2004; Rentfrow et al., 2008) can serve as a protective factor that maintains the region's entrepreneurial vitality during critical times. In those regions that do not enjoy a robust entrepreneurial culture, entrepreneurial vitality is more vulnerable to severe external conditions such as global recessions. In addition, the region's

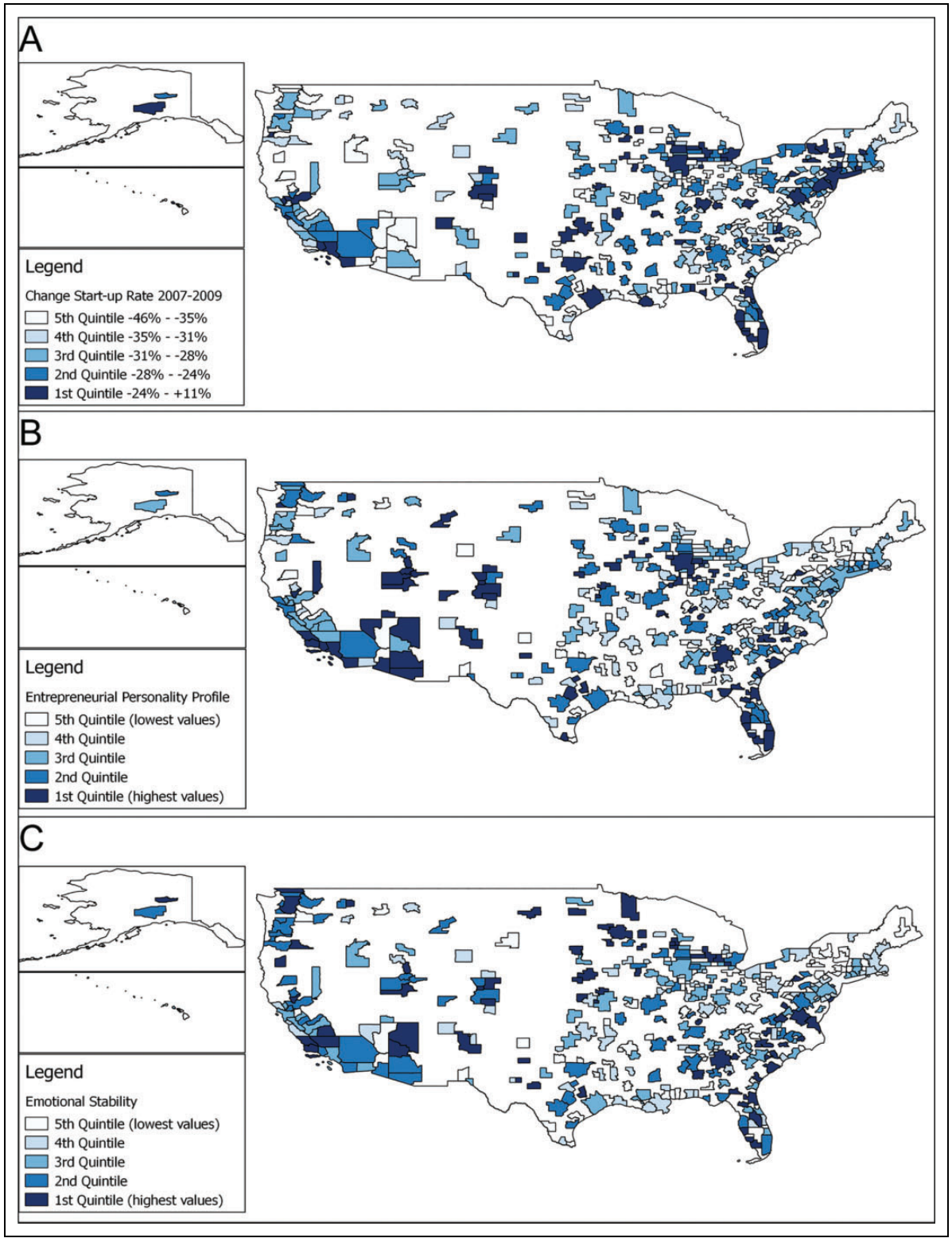

Figure 3. Drop in start-up in U.S. regions between 2007 and 2009 (A), regional distribution of the entrepreneurial personality profile (B), and regional distribution of emotional stability (C).

emotional stability proved to be another protective factor in these two countries. Emotional stability is a personality trait reflecting the degree of coping with and resistance to threats and severe conditions (John et al., 2008). So it stands to reason that such an indicator of psychological resilience could translate into economic resilience at the regional level, and regions with a stronger collective emotional stability may be more successful in maintaining the vitality, risk taking, optimism, and

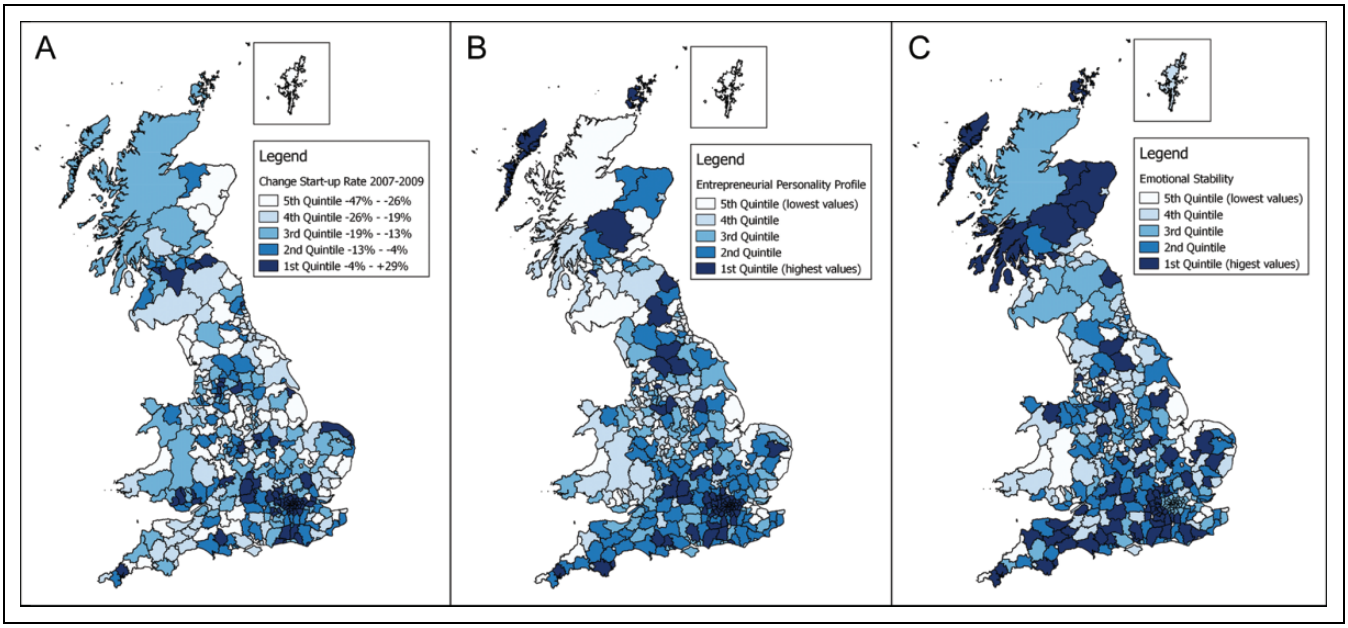

Figure 4. Drop in start-up in U.S. regions between 2007 and 2009 (A), regional distribution of the entrepreneurial personality profile (B), and regional distribution of emotional stability (C).

creativity needed for strong economic activity in the face of severe macroeconomic conditions.

It should be noted that we cannot tell whether the effects of the entrepreneurial profile are carried largely or even wholly by the emotional stability component of the profile, and there are reasons to think that the two effects are linked (e.g., the strong correlations [.61 and .77 for the United States and GB, respectively] between the profile-based scores and the mean emotional stability scores). There are also reasons to think the two effects (profile scores and emotional stability scores) are separable. In particular, previous research has suggested that the entrepreneurial personality profile, but not emotional stability, is a robust predictor of regional entrepreneurship (see Tables 1 and A8 in Obschonka et al., 2015). Future research should investigate the degree to which the effects of the profile are carried by the emotional stability component. Moreover, it must also be noted that cause cannot be inferred from these correlational findings. Nonetheless, these results point to a new set of macropsychological factors that could be treated as potentially protective factors against financial shocks.

Finally, we should be careful not to fall foul of the ecological fallacy (Robinson, 1950), which would be to assume that our region-level effects play out at the individual level. Aggregate-level effects may or may not be found at the individual level. So further research is needed to shed light on the psychological predictors of economic resilience at the individual level.

To conclude, future research should continue to examine the role of macropsychological features in the formation of regional economic resilience. Our results indicate that such features may help explain the mechanism by which some regions continue to prosper in the face of economic shocks. If so, models of regional economic resilience will be improved by integrating macropsychological factors such as regional personality features. This interpretation also implies that, in order to promote regional economic resilience and thus the well-being of regions, the local "mentality" should be taken into account. However, regional macropsychological factors might be deeply rooted in regions, resulting in considerable persistence over time (Plaut, Markus, Treadway, & Fu, 2012; Rentfrow et al., 2008). Indeed, several studies have traced some of the origins of such regional macropsychological differences back to the economic history of regions and their populations (Cohen, Nisbett, Bowdle, & Schwarz, 1996; Nunn, 2009; Talhelm et al., 2014). Thus, the resilient macropsychological makeup of a region could serve both as an engine of the region's positive economic trajectory in critical times, and as a mirror, reflecting in its culture the region's economic history.

Acknowledgments

The authors are grateful to Valeriya Mikhaylova and Patrick Schratz for their research assistance.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Financial support by the Fritz-Thyssen-Stiftung (Az. 20.14.0.051) is gratefully acknowledged.

Supplemental Material

The online supplemental appendix is available at http://spps.sagepub.com/supplemental.

References

Algan, Y., & Cahuc, P. (2010). Inherited trust and growth. *The American Economic Review*, *100*, 2060–2092.

Andersson, M., & Koster, S. (2011). Sources of persistence in regional start-up rates—Evidence from Sweden. *Journal of Economic Geography*, *11*, 179–201.

Audretsch, D. B., & Fritsch, M. (1994). The geography of firm births in Germany. *Regional Studies*, *28*, 359–365.

Barro, R. J., & Sala-i-Martin, X. (1992). Convergence. *Journal of Political Economy*, *100*, 223–251.

Beaudry, C., & Schiffauerova, A. (2009). Who's right, Marshall or Jacobs? The localization versus urbanization debate. *Research Policy*, *38*, 318–337.

Becker, G. S. (1964). *Human capital*. Cambridge, MA: MIT Press.

Beugelsdijk, S., & Maseland, R. (2011). *Culture in economics: History, methodological reflections and contemporary applications*. Cambridge, England: Cambridge University Press.

Black, S. E., & Strahan, P. E. (2002). Entrepreneurship and bank credit availability. *Journal of Finance*, *57*, 2807–2833.

Brewer, H. L., & Moomaw, R. L. (1985). A note on population size, industrial diversification, and regional economic instability. *Urban Studies*, *22*, 349–354.

Cohen, D., Nisbett, R. E., Bowdle, B. F., & Schwarz, N. (1996). Insult, aggression, and the southern culture of honor: An "experimental ethnography." *Journal of Personality and Social Psychology*, *70*, 945–960.

Coombes, M., & Bond, S. (2008). *Travel-to-Work areas: The 2007 review*. London, England: Office for National Statistics.

Eichstaedt, J. C., Schwartz, H. A., Kern, M. L., Park, G., Labarthe, D. R., Merchant, R. M., . . . Seligman, M. E. (2015). Psychological language on Twitter predicts county-level heart disease mortality. *Psychological Science*, *26*, 159–169. doi:10.1177/0956797614557867

Elder, G. H., Jr. (1999). *Children of the great depression: Social change in life experience*. Boulder, CO: Westview Press.

Gabe, T. M., & Florida, R. (2013). Effects of the housing boom and bust on U.S. metro employment. *Growth and Change*, *44*, 391–414.

Glaeser, E. L. (2007). *Entrepreneurship and the city* (NBER Working Papers 13551). Cambridge, MA: National Bureau of Economic Research.

Greif, A. (2006). *Institutions and the path to the modern economy: Lessons from medieval trade*. Cambridge, England: Cambridge University Press.

Guiso, L., Sapienza, P., & Zingales, L. (2006). Does culture affect economic outcomes? *Journal Economic Perspectives*, *20*, 23–48.

Haber, S. (2010). Politics, banking, and economic development: Evidence from new world economies. In J. Diamond & J. A. Robinson (Eds.), *Natural experiments of history* (pp. 88–119). Cambridge, MA: Harvard University Press.

Hausman, A., & Johnston, W. J. (2014). Timeline of a financial crisis: Introduction to the special issue. *Journal Business Research*, *67*, 2667–2670.

Hofstede, G., & McCrae, R. R. (2004). Personality and culture revisited: Linking traits and dimensions of culture. *Cross-Cultural Research*, *38*, 52–88.

Hurst, E., & Lusardi, A. (2004), Liquidity constraints, household wealth, and entrepreneurship. *Journal of Political Economy*, *112*, 319–347.

John, O. P., Naumann, L. P., & Soto, C. J. (2008). Paradigm shift to the integrative Big Five taxonomy: History, measurement and conceptual issues. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (pp. 114–158). New York, NY: Guilford Press.

Jokela, M., Bleidorn, W., Lamb, M. E., Gosling, S. D., & Rentfrow, P. J. (2015). Geographically varying associations between personality and life satisfaction in the London metropolitan area. *Proceedings of the National Academy of Sciences*. doi:10.1073/pnas.1415800112

Koellinger, P. D., & Thurik, A. R. (2012). Entrepreneurship and the business cycle. *Rev Economic Statistics*, *94*, 1143–1156.

Krugman, P. (2009). *How did economists get it so wrong?* Retrieved from http://www.nytimes.com/2009/09/06/magazine/06Economic-t.html

Lee, S. Y., Florida, R., & Acs, Z. (2004). Creativity and entrepreneurship: A regional analysis of new firm formation. *Regional Studies*, *38*, 879–891.

Malizia, E., & Ke, S. (1993). The influence of economic diversity on unemployment and stability. *Journal of Regional Science*, *33*, 221–235.

Martin, R. (2012). Regional economic resilience, hysteresis and recessionary shocks. *Journal of Economic Geography*, *12*, 1–32.

Martin, R., & Sunley, P. (2015). On the notion of regional economic resilience: Conceptualisation and explanation. *Journal of Economic Geography*, *15*, 1–42.

McClelland, D. (1961). *The achieving society*. Princeton, NJ: Van Nostrand.

Mueller, P., van Stel, A., & Storey, D. (2008). The effect of new firm formation on regional development over time: The case of Great Britain. *Small Business Economics*, *30*, 59–71.

Nunn, N. (2009). The importance of history for economic development. *Annual Review of Economics*, *1*, 65–92.

Obschonka, M., Schmitt-Rodermund, E., Silbereisen, R. K., Gosling, S. D., & Potter, J. (2013). The regional distribution and correlates of an entrepreneurship-prone personality profile in the United States, Germany, and the United Kingdom: A socioecological perspective. *Journal of Personality and Social Psychology*, *105*, 104–122.

Obschonka, M., Stuetzer, M., Gosling, S. D., Rentfrow, P. J., Lamb, M. E., Potter, J., & Audretsch, D. B. (2015). Entrepreneurial regions: Do macro-psychological cultural characteristics of regions help solving the "knowledge paradox" of economics? *PLoS ONE*, *10*, e0129332. doi:10.1371/journal.pone.0129332.

Plaut, V. C., Markus, H. R., Treadway, J. R., & Fu, A. S. (2012). The cultural construction of self and well-being: A tale of two cities. *Personality and Social Psychology Bulletin*, *38*, 1644–1658.

Rentfrow, P. J., Gosling, S. D., & Potter, J. (2008). A theory of the emergence, persistence, and expression of geographic variation in psychological characteristics. *Perspectives on Psychological Science*, *3*, 339–369.

Robinson, W. (1950). Ecological correlations and the behavior of individuals. *American Sociological Review*, *15*, 351–357.

Steel, G. D., Rinne, T., & Fairweather, J. (2012). Personality, nations, and innovations: Relationships between the Big Five personality traits and national innovation scores. *Cross-Cultural Research*, *46*, 3–30.

Stiglitz, J. (2010). *Freefall: America, free markets, and the sinking of the world economy*. New York, NY: WW Norton.

Talhelm, T., Zhang, X., Oishi, S., Shimin, C., Duan, D., Lan, X., & Kitayama, S. (2014). Large-scale psychological differences within China explained by rice versus wheat agriculture. *Science*, *344*, 603–608.

Trendle, B. (2006). Regional economic instability: The role of industrial diversification and spatial spillovers. *Annals of Regional Science*, *40*, 767–778.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, *185*, 1124–1130.

Wuchty, S., Jones, B. F., & Uzzi, B. (2007). The increasing dominance of teams in production of knowledge. *Science*, *316*, 1036–1039.

Zhao, H., Seibert, S. E., & Lumpkin, G. T. (2010). The relationship of personality to entrepreneurial intentions and performance: A meta-analytic review. *Journal of Management*, *36*, 381–404.

Author Biographies

Martin Obschonka is Assistant Professor of Entrepreneurship and Innovation Psychology at Saarland University, Germany. His main fields of research concern the overlap between psychology, economics, and management.

Michael Stuetzer is Professor (Full) of Economics and Quantitative Methods at the DHBW Mannheim, Germany. His main fields of research are regional economics and entrepreneurship.

David B. Audretsch is a Distinguished Professor and Ameritech Chair of Economic Development at Indiana University, where he is also serves as Director of the Institute for Development Strategies. He also is an Honorary Professor of Industrial Economics and Entrepreneurship at the WHU-Otto Beisheim School of Management in Germany and a Research Fellow of the Centre for Economic Policy Research in London.

Peter J. Rentfrow received his PhD in social-personality psychology from the University of Texas at Austin. He is currently a Senior Lecturer in the Psychology Department at Cambridge University. His research interests lie in person-environment interactions.

Jeff Potter studied computer science and visual art at Brown University. He is head of The Big Five Project (Atof Inc.).

Samuel D. Gosling is Professor of Psychology at the University of Texas at Austin and Professional Fellow at the Melbourne School of Psychological Sciences, University of Melbourne. He is a personality/social psychologist with three main areas of interest: connections between people and the physical spaces in which they live, personality in nonhuman animals, and new methods for obtaining data useful for research in the social sciences.