Individualism, Human Capital Formation, and Labor Market Success

Katharina Hartinger, Sven Resnjanskij, Jens Ruhose, Simon Wiederhold[†]

December 2021

Abstract

There is an ongoing debate about the economic effects of individualism. We establish that individualism leads to better educational and labor market outcomes. Using data from the largest international adult skill assessment, we identify the effects of individualism by exploiting variation between migrants at the origin country, origin language, and person level. Migrants from more individualistic cultures have higher cognitive skills and larger skill gains over time. They also invest more in their skills over the life-cycle, as they acquire more years of schooling and are more likely to participate in adult education activities. In fact, individualism is more important in explaining adult skill formation than any other cultural trait that has been emphasized in previous literature. In the labor market, more individualistic migrants earn higher wages and are less often unemployed. We show that our results cannot be explained by selective migration or omitted origin-country variables.

JEL classification: D91; J24; I20; Z13

Keywords: cognitive skills; culture; individualism; labor market; international comparisons

[†] Hartinger: KU Eichstaett-Ingolstadt, katharina.hartinger@ku.de. Resnjanskij: ifo Institute at the University of Munich, resnjanskij@ifo.de. Ruhose: Kiel University, CESifo and IZA; ruhose@economics.uni-kiel.de. Wiederhold: KU Eichstaett-Ingolstadt, KU Research Institute BESH, ifo Institute, CESifo, and ROA; simon.wiederhold@ku.de.

We thank Stefan Bauernschuster, David Card, Alexander Danzer, Christina Felfe, David Figlio, Libertad Gonzalez, Olle Hammar, Eric A. Hanushek, Krzysztof Karbownik, Hani Mansour, Alexander Moradi, Gérard Roland, Guido Schwerdt, Jason Sockin, Romain Wacziarg, Christopher Walters, Ludger Woessmann, and numerous seminar and conference participants for helpful comments. We further thank William Thorn and, in particular, Francois Keslair from the OECD for access to and help with the international PIAAC data, as well as Anna Salomons for sharing her data on job task requirements at the two-digit ISCO level. Katharina Hartinger most gratefully acknowledges the hospitality of the Economics Department at UC Berkeley during her research stay in 2019, with a special thank you to Gérard Roland for the invitation and continued support.

"[…] *preserving our individual freedoms ultimately requires collective action.*"
President Barack Obama, Inaugural Address, January 21, 2013

"*We are fast becoming a nation of alienating individualists, unwilling to put the unifying values of patriotism ahead of our narrow self-interests.*"
John McCain, NY Times, March 26, 2008

I. Introduction

Individualism may well be the most polarizing element of our *Zeitgeist* (Dionne 2012). While individualism is a distinguishing feature of American culture—in fact, the United States is the most individualistic country in the world (Hofstede 2001; Gorodnichenko and Roland 2012)—it has also been recognized as one of the main dimensions of cultural variation across countries (Greenfield 2000; Heine 2007). Contributing to the individualism-related polarization is the lack of consensus about whether individualism is favorable for economic welfare. Individualistic culture emphasizes personal freedom and achievement, which fosters economic growth and innovation (Gorodnichenko and Roland 2011b, 2011a, 2017), but at the same time may undermine collective action. For example, recent U.S. evidence shows that more individualistic counties more strongly oppose redistribution (Bazzi, Fiszbein, and Gebresilasse 2020) and are less willing to respond to public health risks such as the COVID-19 pandemic (Bazzi, Fiszbein, and Gebresilasse 2021; Bian et al. forthcoming).[1] Given these opposing aggregate economic effects of individualism, it is a priori unclear whether individualism is actually beneficial for the *individual*. Surprisingly, there is no empirical evidence on this question. Our paper fills this gap by investigating whether and how individualism affects human capital formation and labor market success.

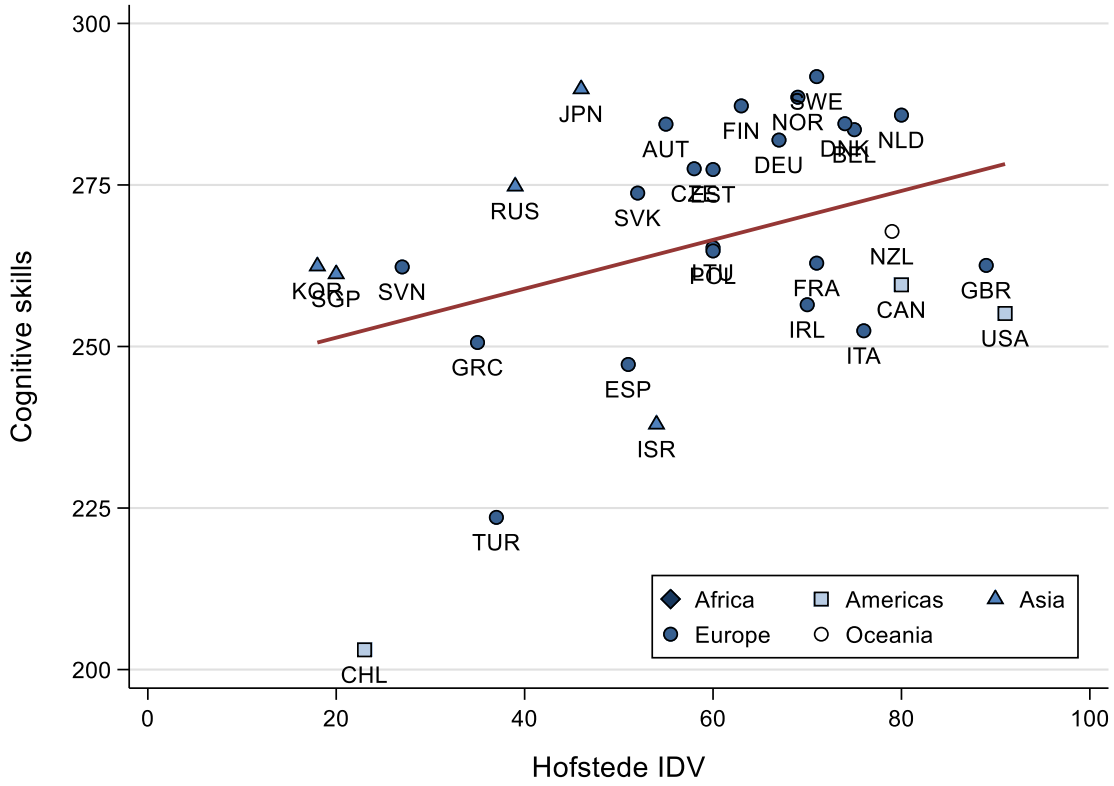
The main focus of the paper is on cognitive skills as an important measure of individual productive capacity. We use unique international survey data from the OECD "Programme for the International Assessment of Adult Competencies" (PIAAC), designed to allow for cross-country comparisons of the cognitive skills of persons aged 16 to 65 years. Cognitive skills in PIAAC, as measured by numeracy test scores, reflect the knowledge and capabilities acquired at school as well as skill developments on the labor market. Our primary measure of individualism comes from Hofstede (2001), which is mainly based on a worldwide survey of IBM employee values in the 1960s and 1970s (*Hofstede IDV*). Figure 1 gives a stylized preview of our main result. In this simple cross-country analysis, individualism and cognitive skills are clearly positively related.

However, these cross-country comparisons do not allow to disentangle the effects of individualism from those of institutional and economic factors (Alesina and Giuliano 2015).

[1] Similarly, Chen, Frey, and Presidente (2021) provide international evidence that compliance with governmental lockdown policies during the COVID-19 pandemic is considerably lower in countries with high levels of individualism.

We establish the impact of individualism on economic outcomes by comparing migrants from different cultural backgrounds within the same destination country. This so-called epidemiological approach (Fernández and Fogli 2009; Fernández 2011) relies on the idea that migrants take (some of) their original cultural toolkit with them when they migrate. This idea is formalized by Bisin and Verdier (2000, 2001), who argue that cultural values are persistent as they are passed on relatively unchanged from generation to generation within the family (see also Guiso, Sapienza, and Zingales 2006 and Tabellini 2008).[2]

Figure 1. Individualism and Cognitive Skills



Notes: The figure establishes the positive association between individualism and cognitive skills across countries. Hofstede IDV refers to Hofstede's individualism index. Average country-level PIAAC numeracy scores and country-level Hofstede IDV values are plotted in the sample of natives. The variation in individualism explains 14 percent of the international skill variation.
Data sources: PIAAC, Hofstede (2001).

Our individual-level regressions compare migrants from different cultures in the same destination country, and also account for migrant composition and geographical clustering of cultural traits. We find that individualism is strongly related to cognitive skills. In terms of magnitude, a one-standard-deviation increase in Hofstede IDV is associated with an increase in numeracy test scores of 0.29 standard deviations for first-generation migrants and 0.23 standard deviations for second-generation migrants. To put this result into

[2] An unconditional comparison of first-generation migrants from different origin countries reveals that as much as 46 percent of the international variation in cognitive skills can be explained by differences in individualism. The share of explained variance is 33 percent for second-generation migrants, who were born in the respective destination country and for whom we assign culture based on the origin language (see Figure A.1).

perspective, if an average Austrian migrant who scores slightly above the international average on the Hofstede IDV scale was as individualistic as an average U.S. American, then her test scores would increase by approximately half a standard deviation. This roughly amounts to the learning progress between lower secondary and upper secondary education in the international sample.

A series of robustness and identification checks supports a causal interpretation of our individualism estimates. Most importantly, we show that the results cannot be explained by selective migration or omitted origin-country characteristics. The results are also robust to using other measures of individualism. For example, we find similar results when we measure individualism using the Kashima and Kashima (1998) index, which is purely language-based. We also construct an individualism measure at the person level based on detailed information regarding the preferences for freedom and challenge-seeking of PIAAC respondents. In terms of identification, these alternative measures provide within-origin-country variation in individualism, which allows us to augment the epidemiological approach by controlling for confounding characteristics of migrants' birth countries.

Next, we exploit that we can observe migrants over the life-cycle to investigate the effect of individualism on the formation of human capital. We find that the skill advantage of migrants originating from countries with high individualism is only modest during adolescence. While the cognitive skills of migrants from low individualism cultures decay from labor market entry age onwards, migrants from high individualism cultures experience a rather stable skill-age profile for several years during their working life. Thus, the skill gap between migrants with high levels of individualism and those with low levels of individualism widens throughout the life-cycle. We confirm that this pattern is not just due to cohort effects using skill panel data for Germany, which show that the cognitive skills of high individualism migrants improve in relative terms over time compared to those of low individualism migrants. Consistent with the dynamics of the high-low-individualism skill gap, we observe substantially higher investments in various education activities by migrants from more individualistic cultures. More specifically, a mediation analysis (Heckman, Pinto, and Savelyev 2013; Heckman and Pinto 2015) shows that educational investments in formal and adult education can explain approximately half (45 percent) of the individualism effect on cognitive skills.

To date, among all the traits in Hofstede's model of culture, the economics literature has devoted the most attention to long-term orientation.[3] We find that individualism is more important in explaining adult skill formation than long-term orientation—and any other cultural trait that has been emphasized in the previous literature; including patience, trust, risk aversion, altruism, and reciprocity. In particular, individualism is a stronger predictor of cognitive skills than long-term orientation in 20 out of the 22 destination countries in our

[3] Long-term orientation describes the ability to defer gratification and exert self-control. Together with the related concept of patience, it has gained substantial interest in recent literature (Dohmen et al. 2010; Castillo et al. 2011; Golsteyn, Grönqvist, and Lindahl 2014; Cadena and Keys 2015; Galor and Özak 2016; Falk et al. 2018; Figlio et al. 2019; Hanushek et al. forthcoming; Sunde et al. forthcoming)

sample. The most important exception to this pattern is the United States (a highly individualistic and short-term oriented society), which exhibits by far the highest skill returns to long-term orientation worldwide, while the skill returns to individualism are close to the international average. This result is consistent with the extraordinary educational and economic performance of Asian migrants in the United States, who often come from countries that are generally characterized by low levels of individualism and high levels of long-term orientation.

We also investigate the impact of individualism on wages and employment as further measures of individual productivity. Migrants from more individualistic cultures earn higher wages and face a lower unemployment risk. These labor market effects are partly driven by occupational selection. More individualistic migrants are more likely to work in research-oriented and analytical-task-intensive occupations, which provide them with a more challenging work environment and require a higher degree of creativity and problem-solving. These results suggest that the U.S.-specific findings by Gorodnichenko and Roland (2017) on the relationship between individualism and occupational choice also hold internationally.

Our paper contributes to the understanding of how and why culture, specifically the cultural trait of individualism, matters for economic outcomes.[4] We are the first to show that individualism is an economically productive cultural trait and part of the human capital production function (Ben-Porath 1967; Cunha and Heckman 2007; Cunha, Heckman, and Schennach 2010). This adds important insights to the ongoing debate about individualism, suggesting that this trait fosters economic prosperity not only at the aggregate but also at the individual level. In fact, our results provide a micro-foundation for why more individualistic countries tend to be more innovative and prosperous (Gorodnichenko and Roland 2011b, 2011a, 2017). Moreover, our findings extend the small stream of recent literature that emphasizes the role of cross-country cultural differences in time and risk preferences (Figlio et al. 2019; Hanushek et al. forthcoming) and of differences in cultural practices, specifically matrilocality and patrilocality (Bau 2021), for educational achievement. Since individualism is formed early in life and transmitted within the family, our results help to explain why family background is—by "accident of birth" (Heckman 2008)—a powerful predictor of individual success.[5] Thus, our paper is directly related to the literature on the intergenerational persistence of education and income (Black and Devereux 2011; Jäntti and Jenkins 2013).

In addition to this core contribution, our paper makes two more general contributions to the literature on the economics of culture. First, our U.S.-specific results imply that the

[4] For general overviews of the economic effects of culture, see, for example, Guiso, Sapienza, and Zingales (2006) and Alesina and Giuliano (2015).

[5] See, for example, Behrman and Rosenzweig (2002), Sacerdote (2002), Plug (2004), Black, Devereux, and Salvanes (2005), Cunha and Heckman (2007), Cunha, Heckman, and Schennach (2010), Björklund and Jäntti (2011, 2012), and Bleakley and Ferrie (2016). Bau and Fernández (2021) provide a discussion of the family as a social institution. De Philippis and Rossi (2021) show that unobserved parental characteristics account for approximately 15 percent of the cross-country variance in PISA test scores.

country context matters for the economic effects of culture. Thus, our paper calls for caution on the generalizability of findings from studies investigating the effects of culture in only a single country. Second, by using various measures of culture that vary at different levels (country, language, person), we provide rigorous evidence on the economic effects of culture even in the absence of experimental cultural variation.

The remainder of the paper is organized as follows. Section II explains the concept of individualism and describes the main channels through which we expect individualism to influence human capital formation and labor market outcomes. Section III describes the cognitive skill and individualism data. Section IV explains our empirical strategy that relies on the opportunity to observe migrants from different cultures in the same destination country. Section V presents our main results and discusses several robustness and identification checks. Section VI provides extensions of the main empirical model that control for unobserved origin-country heterogeneity. Section VII examines cognitive skill formation over the life-cycle and identifies mechanisms through which individualism affects skill formation. Section VIII shows how individualism affects wages and other employment outcomes. Section IX concludes the paper.

II. Individualism

Individualism represents one cultural dimension in the multi-dimensional model of national culture put forth by Geert Hofstede.[6] The model has widely been used in economics to conceptualize culture (e.g., Alesina and Giuliano 2015; Figlio et al. 2019). Individualists strive to *stand out* among their peers through talent, unique characteristics, and personal achievements (Triandis 1995; Hofstede 2001; Gorodnichenko and Roland 2012). Moreover, individualists can be characterized by valuing freedom and independence (Waterman 1981), self-fulfillment (Ivtzan 2008), creativity (Goncalo and Staw 2006), personal time (Hofstede 2001), and privacy (Oyserman, Coon, and Kemmelmeier 2002).[7] Collectivists, who are positioned at the other end of the individualism-collectivism spectrum, derive a context-specific sense of self from being members of a larger entity, i.e., an in-group. In contrast to individualists, collectivists try to *fit in* and not stand out (Hofstede 2001).[8] They have a strong desire for harmony and emphasize group goals (Triandis 1995).

Part of the cultural differences in individualism are deeply anchored in the history of modern societies. For instance, Olsson and Paik (2016) trace present-day differences in

[6] See Hofstede (2001) and Hofstede and Minkov (2013). The other dimensions are power distance, uncertainty avoidance, masculinity, indulgence, and long-term orientation. Appendix B.1 provides more details on Hofstede's cultural measures.

[7] Individualism is also linked to morality in the sense that the same moral principles apply to everyone in individualist societies; that is, norms and standards are not context-dependent or limited to a specific social circle (Tabellini 2008). In contrast, collectivist societies are characterized by strong in-group norms, which allow for the powerful informal punishment of disloyal group members (Greif 1994; Hornsey et al. 2006).

[8] There is an ongoing discussion about whether collectivism and individualism are truly opposite ends of the same spectrum or rather slightly distinct concepts as argued in Kagitcibasi and Berry (1989). However, the interpretation of our results does not depend on whether "less individualistic" and "collectivistic" are exact synonyms.

individualism in the Western Hemisphere back to the Neolithic revolution more than 10,000 years ago when hunters and gatherers became farmers. A recent study by Bazzi, Fiszbein, and Gebresilasse (2020) shows that the current level of individualism in the United States—measured through the prevalence of infrequent names—is strongly linked to the experience of frontier settlement patterns. Individualism also has a personal component. Waterman (1984) describes theories on the early-life formation of individualism, which also coincides with the vertical transmission of the cultural component of individualism (Cavalli-Sforza and Feldman 1981; Bisin and Verdier 2001). According to these theories, identifying one's potential and interests during childhood and early adulthood is essential for the development of individualism as part of identity (see also Erikson 1968, Ruble et al. 2004, and Phinney and Ong 2007). While there is some variation in individualism over the life-cycle (i.e., maturation, assimilation into culturally different environments, major life events), individualism remains largely stable (Waterman 1984; see, e.g., van Dijk et al. 2020 for empirical evidence on personality traits in general).

Previous literature provides ample evidence of individualism affecting cognitive style, that is, the way people think, how they form arguments and approach problems, and which cognitive biases they are prone to (Nisbett et al. 2001; Gorodnichenko and Roland 2012). In an economic context, Cunha and Heckman (2007) and Cunha, Heckman, and Schennach (2010) formulate a skill production function, which depends on the parental environment and skill investments. Within this framework, we argue that individualism can be considered a productive trait that is family-dependent, is formed early in life, is transmitted from generation to generation, and affects the formation of skills through at least two channels (see, e.g., Figlio et al. 2019 for a similar argument using long-term orientation). First, individualistic parents invest more in the skill development of their children than collectivistic parents because they attach a higher value to the personal achievement of their offspring. Second, individualistic parents transmit and exemplify a uniqueness- and autonomy-focused mindset and analytic cognitive style to their children. Moreover, considering a skill production function with adult skill investments (see, e.g., Ben-Porath 1967), we also expect that individualists have strong incentives to invest in skills during their adult life to stand out among peers and to achieve their own goals (Triandis 1995; Oyserman, Coon, and Kemmelmeier 2002). In fact, Hofstede (2001) highlights individualism as the dimension of culture that most strongly emphasizes life-long learning. However, since individualistic cultures face coordination and collaboration problems, we may expect a negative effect on individual skill development if these problems lead to a lower provision of public goods such as public schooling and healthcare.

Previous literature has already shown that skills investment decisions are shaped not only by individualism but also by other traits and economic preferences. In particular, recent studies have documented that long-term orientation (i.e., the ability to defer gratification and exert self-control), patience, and risk-taking affect human capital investments, which

reflects the intertemporal nature of educational choices.[9] To disentangle the effect of individualism from that of other components of a person's cultural toolkit, we control for these and other important dimensions of cross-country cultural differences in the empirical analysis. Furthermore, as individualists do not distinguish between an in-group and out-group (Tabellini 2008), individualistic societies are also characterized by high levels of generalized trust (Schulz et al. 2019). However, conceptually (and, as we show below, also empirically), individualism has a distinct effect on skill formation because the willingness to stand out as well as the passion for challenge and innovation, are not characteristics of trust.

To the best of our knowledge, there are no specific theories linking individualism directly to wages and employment. From the discussion above, we may expect that a productivity-enhancing effect of individualism should also carry over to the labor market. Additionally, individualists seek challenges and personal achievement, which could motivate them to, for instance, apply for more lucrative and demanding positions or chase promotions. The innovation-focused, open mindset associated with individualism might also yield particularly high rewards on today's labor market. Individualism could thus affect labor market outcomes beyond the skill channel. However, if individualists mainly invest in non-labor market-relevant skills or pursue high-risk low-return careers for pure self-fulfillment motives (e.g., performing arts or backpacking), then higher levels of individualism will not necessarily improve labor market outcomes.

III. Data

A. International PIAAC Survey

To investigate how individualism affects human capital formation and labor market outcomes, we use data from the Programme for the International Assessment of Adult Competencies (PIAAC), which is administered by the OECD (see OECD 2013 for details). PIAAC has been designed to provide internationally comparable measures of cognitive skills for adults aged 16 to 65 years.[10] In each participating country, a representative sample of at least 5,000 adults participates in the PIAAC survey, leading to a total sample size of almost 215,000 individual-level observations. An extensive background questionnaire contains detailed information on respondents' demographic characteristics, education, and labor market outcomes.

[9] See, among others, Dohmen et al. (2010), Castillo et al. (2011), Golsteyn, Grönqvist, and Lindahl (2014), Cadena and Keys (2015), Falk et al. (2018), Figlio et al. (2019), and Hanushek et al. (forthcoming).

[10] A total of 33 countries participated in PIAAC. Data collection proceeded in two rounds. The first round, which was conducted between August 2011 and March 2012, included the following countries: Australia, Austria, Belgium (Flanders), Canada, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Japan, Korea, the Netherlands, Norway, Poland, Russia, the Slovak Republic, Spain, Sweden, the United Kingdom (England and Northern Ireland), and the United States. The second round was conducted between April 2014 and March 2015 and covered an additional nine countries: Chile, Greece, Indonesia (Jakarta only), Israel, Lithuania, New Zealand, Singapore, Slovenia, and Turkey. For expositional simplicity, we refer to 2012 (2015) as the year of PIAAC round 1 (round 2).

Cognitive Skills.—PIAAC has been designed to measure key cognitive and workplace skills needed for individuals to advance in their jobs and participate in society. Moreover, PIAAC has also been designed to facilitate international comparisons as the skill test is culturally and linguistically neutral and equivalent in difficulty across countries. It is crucial for our analysis to use assessment data rather than self-reported skills because individualism (and culture in general) likely influences the way in which people assess and report their own skills. Cognitive skill data also have a number of advantages compared to educational attainment data. For example, the quality of schooling might change over time and might vary across countries (Hanushek and Zhang 2009). Approximating an individual's stock of human capital with educational attainment is especially problematic for cross-country comparisons because such comparisons implicitly assume that the contribution of each school year to human capital accumulation is independent of the quality of the education system (Hanushek and Woessmann 2008). Moreover, attainment data reflect only a person's human capital at the end of their formal education, thus neglecting the skills that are acquired during one's working life.

PIAAC assessed cognitive skills in three domains: numeracy, literacy, and problem solving in technology-rich environments (ICT skills). Each skill domain is measured on a 500-point scale.[11] Our analysis focuses on *numeracy skills*, which capture the ability to access, use, interpret, and communicate mathematical information and ideas to engage in and manage the mathematical demands of a range of situations in adult life. Numeracy skills are arguably more comparable across countries than literacy and ICT skills and are also more strongly connected to wages and employment (Hanushek et al. 2015, 2017).[12]

Educational Outcomes.—In Section VII, we study potential mechanisms through which individualism affects cognitive skills by studying investments in formal, non-formal, and informal adult learning activities.[13] Formal adult learning is measured by *years of schooling*, which is based on the highest educational degree achieved, and a variable indicating whether the person obtained a *university degree*. Non-formal adult learning is captured by the following dummy variables: *Training on-the-job* takes a value of 1 if the person has participated in a training activity during the 12 months prior to the survey, 0 otherwise. *Any other training* takes a value of 1 if the person has participated in training other than training on-the-job (specifically, seminars or workshops, open or distance education, and private lessons) during the 12 months prior to the survey and 0 otherwise. For the most important training activity during the last twelve months, PIAAC additionally asks the respondents

[11] Throughout, we use the first plausible value of the PIAAC scores in a skill domain. The results are robust to using the other plausible values (not shown).

[12] Results for literacy and ICT skills are very similar to those for numeracy (not shown).

[13] Formal adult learning usually comprises the continuation of and re-entry into formal education, which leads to a nationally accredited certificate. Non-formal adult learning is concerned with general courses or vocational courses that take place in organized settings. Informal adult learning entails intentional, self-organized learning activities outside of a course or formal institution. (see, e.g., Rüber, Rees, and Schmidt-Hertha 2018).

whether their reason for participating in the training is to *increase knowledge and skills* in a subject that is of interest for them.[14] This question is particularly interesting for our purpose because individualists should attach a higher intrinsic value to their skill development compared to collectivists. Finally, informal adult learning activities are proxied by the frequency with which the person reported reading different outlets (newspapers, professional journals, and books). The *reading variables* takes values of 1 (never), 2 (less than once a month), 3 (less than once a week but at least once a month), 4 (at least once a week but not every day), and 5 (every day).

Wages and Employment.—PIAAC also surveys a wide range of important labor market outcomes reflecting individuals' productivity at the workplace (see Section VIII). Most importantly, we investigate the effect of individualism on *log hourly wages*.[15] We also consider employment status and occupational task content as additional labor market outcomes. We measure a person's employment status using indicator variables for being *unemployed* and being *self-employed*.[16] We proxy the occupational task content by the degree of challenge the work environment provides and by the required need for creativity and problem-solving: First, following Gorodnichenko and Roland (2017), we construct an indicator of working in a *research occupation*, which is equal to 1 if the person reports working in one of the following two-digit ISCO occupations: 21 (science and engineering professionals), 25 (information and communications technology professionals), 26 (legal, social and cultural professionals); otherwise, the variable is equal to 0 if the person reports working in any other occupation.[17] Second, we use an occupation's *abstract task intensity*, which is an average of two variables from the U.S. Dictionary of Occupational Titles (DOT), namely: "direction control and planning," which measures managerial and interactive tasks, and "GED Math," which measures mathematical and formal reasoning requirements. The task measures are mapped onto the ISCO occupational classification system (two-digit level) and then normalized to have a mean of 0 and a standard deviation of 1 across occupations (Goos, Manning, and Salomons 2014).

B. Cultural Background

For the main part of our analysis, we draw on the concept of culture formulated by Geert Hofstede (Hofstede 2001, 2013; Hofstede and Minkov 2013). Hofstede conceptualizes individualism as one of the main dimensions of culture (see Appendix B.1). Based on IBM

[14] The question was asked only if the respondent reported having taken part in training primarily due to work-related reasons. In our data, this is the case for more than two-thirds (69 percent) of the respondents who had participated in training.

[15] The PIAAC Public Use File reports gross hourly wages for Austria, Canada, Germany, Sweden, and the United States only in the form of worker's decile rank in the country-specific wage distribution. For this study, however, we gained access through the OECD to the continuous wage information in all countries. In each country, we trim the bottom and top 1 percent of the wage distribution to limit the influence of outliers.

[16] To define unemployment, PIAAC applies the definition of the International Labor Organization (ILO): An individual is considered unemployed if they (1) reported not being in gainful employment or self-employment at the time of the interview, (2) reported actively seeking work during the four weeks prior to the date of the interview, and (3) reported being available for work within the two weeks following the assessment.

[17] For this analysis, we gained access from the OECD to the two-digit ISCO-08 (International Standard Classification of Occupations) codes for all employed PIAAC respondents.

employee surveys from the 1970s as well as extensions and replications, the Hofstede cultural scores are available for approximately 100 countries and regions. Hofstede's individualism index relies on questions about the subjective importance of certain job characteristics to employees, thereby capturing workplace values such as freedom and autonomy (Hofstede 2001). In particular, individualists value having sufficient time for their personal life and challenge at work, while job security and physical conditions are only of little importance for them (Appendix B.1 provides a list of all items).

Appendix Figure A.2 shows a map of the Hofstede individualism scores (*Hofstede IDV*) for all the birth countries for which we observe individuals in PIAAC. The Hofstede IDV scores vary between 6 and 91 (originally between 0 and 100) and show substantial variation between and within continents. One standard deviation in Hofstede IDV in our sample corresponds to 21 points on the Hofstede scale, which (roughly) amounts to the difference between the U.S. (at 91 on the Hofstede scale) and Switzerland (68 on the scale) or between Germany (67 on the scale) and Morocco (46 on the scale).

In our main empirical strategy, we exploit differences in the cultural background of migrants (see Section III.B). To construct the cultural background of first-generation migrants (i.e., persons who are born in a country other than the PIAAC test country), we use the information on the country of birth reported by the PIAAC respondent to assign the country-of-origin individualism measure.[18] However, for second-generation migrants (i.e., persons who are born in the PIAAC test country, but have at least one parent who was born abroad), PIAAC does not survey the parental country of birth, thereby rendering it more difficult to identify their cultural background. To proxy the cultural background of second-generation migrants, we follow Figlio et al. (2019) in adapting an origin-language-based approach. This approach is based on the idea that people who speak the same language also share a similar culture (Galor, Özak, and Sarid 2018). We primarily use the first language that a second-generation migrant learnt at home in childhood and still understands to assign a cultural background. If this language is identical to a main language of the destination country, we turn to the second language that the migrant learnt during childhood and still understands (if applicable) or the language that is currently mostly spoken at home. We refer to this language as the *origin language* (see Appendix B.2 for details). Most languages can be matched to exactly one origin country (e.g., Tagalog – Philippines) and thus one specific Hofstede IDV score. For languages spoken in multiple countries (e.g., Spanish), we calculate a weighted average of the Hofstede IDV scores of countries in which that language is an official or regionally spoken language. Weights are the relative share of first-generation migrants in the PIAAC data who moved from each of the countries to the country where the second-generation migrant resides. These country-language-pair-specific individualism scores are then assigned to second-generation migrants.

[18] Australia, Canada, Ireland, Italy, New Zealand, Norway, Sweden, and the United States suppress information on the birth country of migrants in the PIAAC Public Use File. However, the OECD provided access to birth country information for the entire PIAAC sample, except for Australia.

However, a closer inspection of the variation of the language information reveals that two-thirds of second-generation migrants report speaking the main language of the destination country. For some migrants, the destination-country language could represent the correct cultural background (e.g., migrants from the United Kingdom in the United States). We may also expect that well-integrated migrants have fully adopted the culture (and thus language) of the destination country. Nevertheless, the cultural variation in the sample of second-generation migrants is effectively limited because we pool the cultural background for a non-negligible share of second-generation migrants. Even more problematic is that this pooling may not be exogenous to the acquisition of skills. For example, Duncan and Trejo (2007, 2011) show that U.S.-born individuals of Mexican descent stop reporting their Mexican ancestry if they are well-integrated in the labor market, which leads to downward-biased integration profiles. In our case, we may suspect that second-generation migrants who are successfully integrated into the labor market (and thus have higher cognitive skills) report the destination country language more often than less-well integrated migrants. However, dropping same-language migrants from the sample would lead to endogenous sample selection. We therefore keep all second-generation migrants and include (destination-country-specific) control variables that indicate whether the language reported by the second-generation migrant is different from the destination country's language. We are aware that this adjustment does not solve the potentially false assignment of the cultural background. We therefore rely more on the sample of first-generation migrants in the empirical analysis and provide a series of checks to address unobserved origin country heterogeneity.

Since Hofstede's IDV index is closely associated with workplace behavior and job-related values, one may wonder whether our results are specific to such a narrow, labor-market-based concept of individualism. Therefore, Appendix B.3 discusses alternative individualism measures that are not based on workplace behavior. In addition to using country-level individualism measures, we also exploit variation in individualism at the language level and person level (see Section VI). Using these additional individualism measures not only contributes to the holistic approach to individualism that we pursue, but also allows us to control more rigorously for omitted origin-country variables. We show that all concepts of individualism are highly correlated and that our results hold for all definitions of individualism.

C. Main Estimation Sample

All analyses using Hofstede IDV exclude the PIAAC countries of Australia (no migrant information) and Indonesia (only individuals from the capital city Jakarta were sampled). Moreover, the main empirical analysis requires that we have sufficient variation in the number of birth countries (for first-generation migrants) and origin languages (for second-generation migrants). Therefore, our main analytical sample of first-generation migrants is restricted to PIAAC countries with at least 100 first-generation migrants coming from at

least 10 origin countries with a valid Hofstede IDV score. This leaves us with 22 destination countries and a sample of 15,349 first-generation migrants from 68 origin countries. For second-generation migrants, we keep the sample restriction for first-generation migrants and additionally restrict the sample to PIAAC countries with at least 100 second-generation migrants and 10 origin languages that can be assigned a Hofstede IDV score. Imposing this sample restriction results in 18 destination countries with 13,372 second-generation migrants speaking 84 different languages.[19]

Appendix Table A.1 provides the summary statistics of our main variables. For analytical purposes and to be able to compare coefficients across specifications, we standardize numeracy skills and Hofstede IDV scores with a mean of 0 and a standard deviation of 1 in the full international sample that includes natives as well as first- and second-generation migrants. One standard deviation in numeracy skills amounts to 55 PIAAC points, and one standard deviation in Hofstede IDV is equal to 21 points. To avoid the dominance of countries with large PIAAC samples, destination countries are weighted equally in the summary statistics and empirical analysis (unweighted results are very similar).

D. German Skill Panel Data

In further analysis reported in Section VII.A, we also use data from PIAAC-L, which is a German follow-up study of PIAAC (Zabal, Martin, and Rammstedt 2016). In this study, respondents who participated in the original German PIAAC survey (conducted in 2011/2012) were interviewed in three additional waves (2014, 2015, 2016). While the waves in 2014 and 2016 mainly elicited more detailed information from the participants, numeracy and literacy skills were re-tested in 2015. Thus, we are able to investigate whether individualism also affects skill growth over time.

Importantly, in contrast to other countries in the international PIAAC survey, Germany elicited origin-country information of respondents' parents in PIAAC-L. Thus, we assign second-generation migrants the average of the Hofstede IDV scores of parents' birth countries when information on both parents is available (98 percent of the sample), and the score of the respective country of birth of the father or mother if the information is available for only one parent.[20]

Appendix Table A.2 provides summary statistics for PIAAC-L. From the 5,145 PIAAC participants in Germany, 3,143 participants (61.1 percent) were re-tested in 2015. A total of 821 of them reported being migrants (253 first-generation migrants and 568 second-generation migrants). For comparability with the international analysis, we standardize skills and Hofstede IDV scores using the international standard deviation as the "numeraire" scale.

[19] Results are robust when not implementing these sample restrictions.

[20] Note that we do not classify those 34 respondents as second-generation migrants who report that only one parent was born abroad without providing this parent's country of birth.

IV. Empirical Strategy

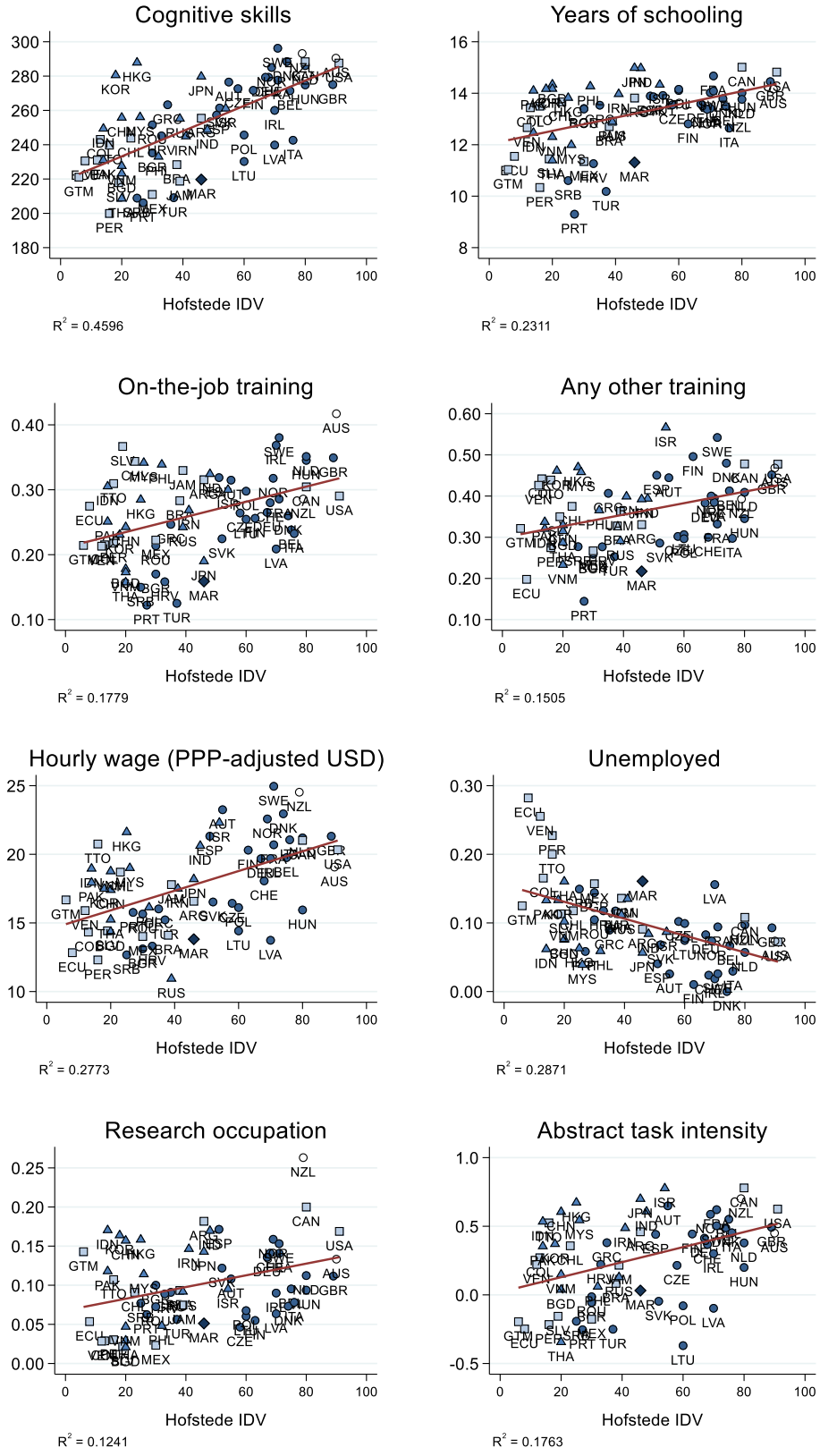
A. Endogeneity of Culture

The main empirical challenge when evaluating the economic effects of culture is to disentangle the effects of culture from those of the institutional and economic environment, as both are clearly intertwined (Alesina and Giuliano 2015; Bisin et al. 2021; Giuliano and Nunn 2021). In particular, there is evidence that individualism is linked to a country's innovative capacity and growth prospects (Gorodnichenko and Roland 2011a, 2011b, 2017). Moreover, Gorodnichenko and Roland (2021) show that more individualistic societies adopt democracy earlier than do more collectivistic societies. A cross-country comparison is further complicated by the fact that (informal) institutions and economic conditions may also vary at the regional and local levels (Obradovich et al. 2020). For example, cultural values may be confounded by shared family resources, such as access to good schools (Rouse and Barrow 2006) and being exposed to a common neighborhood or peer group (Guiso, Sapienza, and Zingales 2011).

To address the interdependence of culture and institutions, the literature frequently uses the epidemiological approach. This method relies on the comparison of outcomes of migrants from different cultural backgrounds in the same destination country, where they are exposed to the same economic and institutional environment (Fernández and Fogli 2009; Fernández 2011; Alesina and Giuliano 2015; Bisin et al. 2021). The approach assigns migrants the average cultural value of their origin country, which is based on the argument that cultural traits are persistent. Thus, migrants take their original cultural toolkit with them when they move to a different country, and the cultural traits are not drowned out by exposure to the destination country. However, direct evidence on the correlation between the cultural values of migrants and the average cultural values in the migrants' origin countries is absent from the literature because culture is typically assessed only at the country level. By virtue of our person-level individualism measure (see Section VI.B), we can compare individualism levels of natives in PIAAC countries to those of migrants originating from the same countries, and find a strong correlation (Appendix C.1 provides details).

If first-generation migrants pass on their cultural values to their offspring, we should also observe cultural differences in the second generation, even though the children were never exposed to the economic and institutional environment of their parents' birth countries. In fact, there is broad evidence in favor of the persistence of cultural traits at the societal and individual levels (Fernández and Fogli 2009; Algan and Cahuc 2010; Alesina, Giuliano, and Nunn 2011; Albanese, Blasio, and Sestito 2016; Abramitzky, Boustan, and Eriksson 2020).

Figure 2. Individualism and Economic Outcomes



Notes: The figure establishes the positive association between individualism and cognitive skills, educational outcomes, and labor market outcomes. Hofstede IDV refers to Hofstede's individualism index. Outcomes aggregated at the origin country level are plotted in the sample of first-generation migrants. To meaningfully compute country averages, we restrict the analytical sample to origin countries sending at least 30 migrants. See Figure 1 for a description of the country markers. *Data sources*: PIAAC, Hofstede (2001)

B. Estimation

Graphically, Figure 2 shows that country-of-origin individualism is strongly positively related to the cognitive skills, educational attainment, adult learning, and labor market outcomes of first-generation migrants. To more rigorously examine the relationship between individualism and economic outcomes, we estimate the following individual-level regression model:

$$NUM_{iydo} = \beta_0 + \beta_1 \overline{IDV}_o + \boldsymbol{X}'_{iydo}\boldsymbol{\gamma} + \mu_d \times \mu_y + c_o + u_{iydo}. \quad (1)$$

We regress the numeracy score of migrant i who immigrated in year y to destination country d from origin country o, NUM_{iydo}, on the average individualism score of her origin country, $\overline{IDV}_o$. Thus, relying on the stability of cultural traits, we assign migrants their country-of-origin individualism value. In addition to individual-level controls (quadratic polynomial in age and gender in our main specification), $\boldsymbol{X}_{iydo}$, we also add the full set of interactions between destination country and year-of-migration fixed effects, $\mu_d \times \mu_y$. Thus, we compare migrants with different cultural backgrounds who have moved to the same destination country in the same year, as these migrants were therefore exposed to the same educational and labor market institutions. At the same time, these fixed effects also control for destination-country-cohort-specific differences in migrant characteristics (e.g., due to country-specific immigration policies attracting certain types of migration in a given year)[21] and destination-country-specific migrant assimilation patterns. We also add continent-of-origin fixed effects, c_o, to rule out that our results reflect geographical clustering in individualism by continent.

Analogously, the epidemiological approach for second-generation migrants is implemented by estimating a version of equation (1) with individualism measured at the origin-language level and with destination country fixed effects replacing destination-country-by-year-of-migration effects.[22] Standard errors are adjusted for clustering at the origin-country level for first-generation migrants and at the origin-language level for second-generation migrants.

C. Identification

There are two well-known identification challenges in regard to the epidemiological approach. First, since migrants are not a random draw from their origin country, the selection of migrants may correlate with individualism and cognitive skills. Thus, in

[21] One example for such policies is the German "green card" initiative, which was introduced in 2000 to ease the migration of foreign experts in the field of information and communication technology (ICT) to Germany.

[22] In the model with second-generation migrants, origin continent fixed effects are defined at the origin-language level. We follow Figlio et al. (2019) in assigning the origin language to the continent on which at least 50 percent of first-generation migrants speak the language reported by second-generation migrants. In the rare case of a 50-50 tie, we use the overall number of first-generation migrants in our data from a given continent as a tiebreaker (in descending order: Europe, Asia, Africa, Americas, and Australia).

Section 0, we test for migrant selection on individualism and control for measures of migrant selection in various ways.

Second, country-of-origin individualism could be confounded by other characteristics of migrants' origin countries (e.g., GDP, educational institutions, or other cultural characteristics). That is, differences in skill levels could correlate with differences in patterns and speed of assimilation across migrants from different origin countries. Thus, Section V.C. studies the sensitivity of our results when including country-of-origin controls that, whenever possible, are specific to the year of migration. While some of these country-of-origin controls are likely endogenous to individualism, we can obtain potential bounds of the relationships between individualism and adult skills when comparing the results both including and excluding these potentially endogenous control variables. We additionally conduct an instrumental variables approach that exploits arguably exogenous variation in individualism across countries to address unobserved origin-country heterogeneity.

To address unobserved origin-country heterogeneity even more rigorously, we propose two extensions to the traditional epidemiological approach. In the first approach, we use the language-based Kashima and Kashima (1998) index of pronoun drop, which varies within origin countries and thus provides the possibility of including origin-country fixed effects (Section VI.A). In the second approach, we construct an individualism measure at the person level, thereby exploiting the fact that the PIAAC survey includes items that capture the most important elements of individualism (Section VI.B). An analysis of the economic effects of person-level cultural traits is rarely done in the literature because most datasets do not contain information on both economic outcomes and individual-level cultural traits. While the person-level individualism approach and the epidemiological approach both have their merits and demerits (see Figlio et al. 2019 for a discussion), the main advantage of measuring cultural traits at the person level is that we do not have to make assumptions about the appropriate assignment mechanism of aggregate cultural traits. Moreover, we can compare migrants who moved from the same origin country to the same destination country in the same year. We can even use within-country variation in individualism for natives.

While none of the approaches and extensions exploit truly exogenous variation in individualism, they hold different aspects of the institutional and economic environment constant. Since all approaches lead to very similar conclusions regarding the link between individualism and economic outcomes, we consider it plausible that our estimates do not simply reflect the economic and institutional environment intertwined with individualism.

Table 1. Individualism and Cognitive Skills: Hofstede IDV

	First-generation migrants				Second-generation migrants		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Hofstede IDV	0.261***	0.257***	0.264***	0.290***	0.223***	0.256***	0.228***
	(0.039)	(0.038)	(0.038)	(0.049)	(0.063)	(0.055)	(0.056)
Age		0.021***	0.021**	0.021**		0.049***	0.050***
		(0.007)	(0.009)	(0.009)		(0.009)	(0.008)
Age squared (/100)		-0.045***	-0.045***	-0.045***		-0.078***	-0.080***
		(0.008)	(0.009)	(0.009)		(0.014)	(0.014)
Female		-0.218***	-0.226***	-0.227***		-0.216***	-0.210***
		(0.025)	(0.025)	(0.025)		(0.022)	(0.021)
Fixed effects							
Destination country	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year of migration	Yes	Yes	Yes	Yes			
Destination country × year of migration			Yes	Yes			
Continental				Yes			Yes
Different language							Yes
Destination country × different language							Yes
R-squared	0.11	0.14	0.24	0.24	0.06	0.12	0.14
Observations	15,349	15,349	15,349	15,349	13,372	13,372	13,372
Origins	68	68	68	68	84	84	84

Notes: The table shows the results for numeracy test scores in the sample of first-generation migrants (Columns (1) to (4)) and second-generation migrants (Columns (5) to (7)). Observations are weighted, giving each destination country the same weight. Numeracy test scores are standardized to a mean of 0 and a standard deviation of 1 in the full international sample. Hofstede IDV refers to Hofstede's individualism index and is standardized to a mean of 0 and a standard deviation of 1 in the full international sample. *Continental fixed effects* refer to the continent of origin country for first-generation migrants and to the most plausible continent of parental origin for second-generation migrants (see Section B). *Origins* refer to origin country for first-generation migrants and origin language for second-generation migrants. Standard errors clustered at the origin-country level for first-generation migrants and at the origin-language level for second-generation migrants reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data sources: PIAAC, Hofstede (2001).

V. Individualism and Cognitive Skills

A. Main Results

Table 1 presents our results from estimating equation (1). By conditioning only on destination country and year of migration fixed effects, it can be seen that a one-standard-deviation increase in origin-country Hofstede IDV is associated with an increase in numeracy skills by 0.26 standard deviations for first-generation migrants (Column (1)). Columns (2) to (4) show that the results are robust to including sociodemographic controls, migration-year-specific destination country fixed effects, and continent-of-origin fixed effects. These results suggest that it is not a specific continent or specific migrant characteristic that drives the positive relationship between individualism and cognitive skills. The individualism estimate is also economically meaningful. For instance, Austria has a Hofstede IDV score of 55, which is somewhat above the international average (44). If an average Austrian migrant was as individualistic as an average U.S. person (individualism score: 91), then her numeracy skills would increase by half a standard deviation. To put this

into perspective, this roughly amounts to the learning progress made by school-attending PIAAC respondents between lower secondary and upper secondary education.[23] This underlines the economic significance of individualism differences even between countries that are commonly regarded as Western and developed. We can also compare two neighboring countries, namely, Japan (46) and Korea (18). While Japan might seem like a collectivistic society from a U.S. perspective, among Asian countries it is, in fact, considered individualistic (Hofstede 2001). If an average Korean migrant was as individualistic as an average Japanese migrant, then her numeracy skills would increase by more than one-third of a standard deviation.[24]

Importantly, we would expect that (part of) these skill differences of first-generation migrants are already present upon their arrival in the destination country. Figure 3 shows how the relationship between individualism and skills varies with years since immigration. We observe that first-generation migrants from high individualism cultures already have higher skills than low individualism migrants in the first years after immigration, which implies that migrants from different cultural backgrounds already arrive with different skill levels in the destination countries. While the skill gap between migrants from more and less individualistic cultures increases somewhat during the first years after arrival in the destination country, it remains fairly stable thereafter.

An important feature of our international data is that we can also study effect heterogeneity with respect to the cultural values of the destination country. One potential worry is that our effects are driven merely by highly individualistic countries, which have developed (formal or informal) institutions that appreciate skills more. Figure 4(a) shows the interaction between skill returns and level of individualism in the sample of first-generation migrants by plotting the destination-country-specific skill effect of Hofstede IDV against the destination country's Hofstede IDV score. The figure reveals no relation between the effect of individualism on skills in a destination country and that country's level of individualism. At the same time, the figure shows that the effects of individualism are partly specific to the destination country (see also Section V.D).

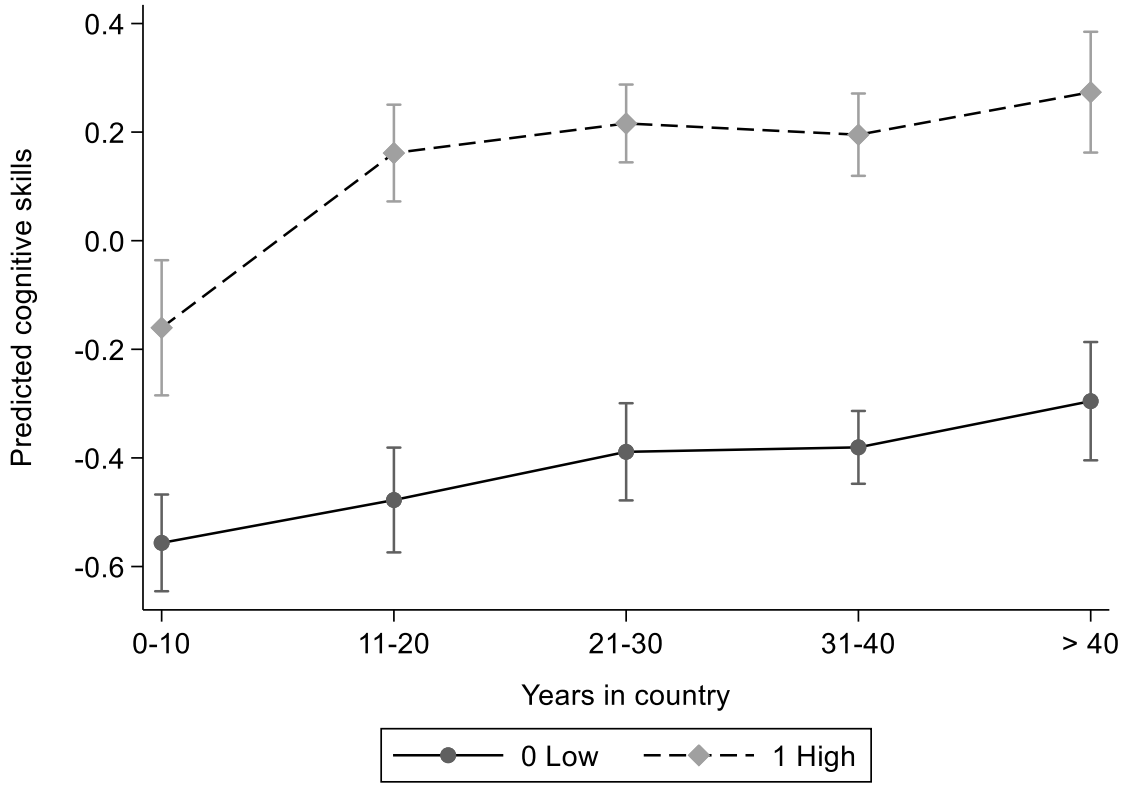
However, the skill differences of first-generation migrants presented thus far may be driven by the institutional and economic environment of their origin countries rather than by cultural background. Reassuringly, individualism estimates for second-generation migrants are also statistically significant and sizeable (Columns (5) to (7) of Table 1), which

[23] This "ISCED-level equivalent" is equal to 0.42 standard deviations. It is calculated by regressing numeracy skills of PIAAC respondents aged 16–18 years on an indicator that takes the value 1 if the respondent is currently in upper secondary education (ISCED 3A-B, C long) and 0 if the respondent is currently in lower secondary education (ISCED 2, 3C short). Regressions control for gender, age, number of books at home at age 15, indicators for first- or second-generation migrant status, and country fixed effects. The estimate provides an approximation of how much students learn on average transiting from lower secondary to upper secondary education.

[24] In Appendix Table A.3, we control for the educational background of migrants' parents and the number of books at home at age 15 as a proxy for the family's socioeconomic background. Adding these variables substantially reduces the individualism estimate, which is consistent with the idea that the family is the main locus where cultural values are formed and transmitted from one generation to the next.

suggest that the institutional and economic environment of the origin country is not a dominant confounding factor. However, these estimates are somewhat smaller than those for first-generation migrants. One potential explanation is that some cultural assimilation has taken place for the descendants of first-generation migrants (see, e.g., Duncan and Trejo 2007 and Abramitzky et al. 2020 for cultural assimilation of migrants in the United States). Furthermore, the individualism estimates of second-generation migrants may be attenuated due to measurement error that arises from constructing a language-based indicator of cultural background (due to lacking information on the parental country of birth).[25]

Figure 3. Skill-Integration Profiles for Individuals with High and Low Individualism

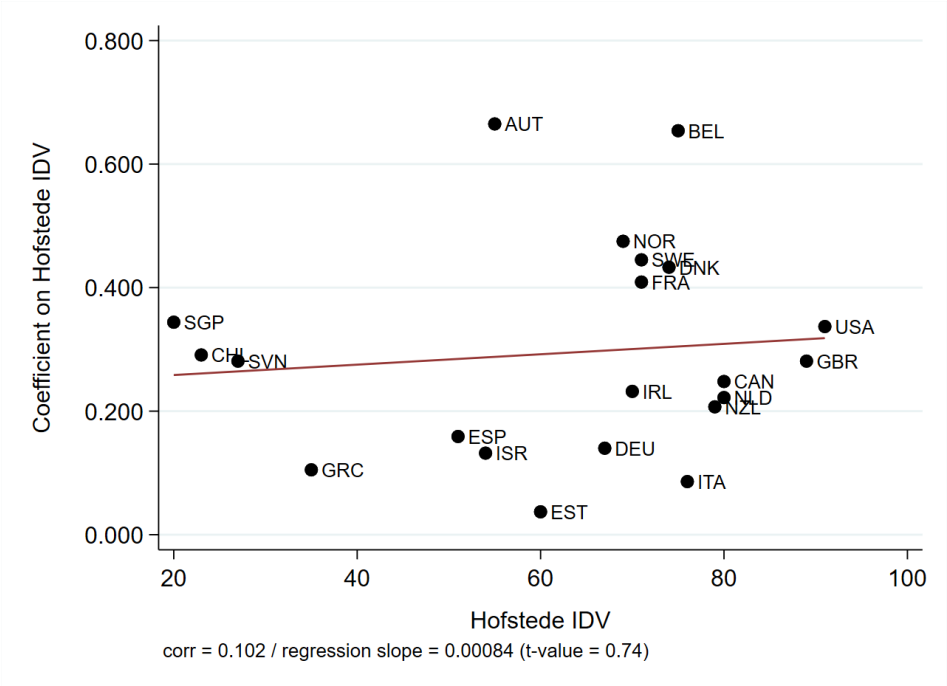


Notes: The figure shows estimated margins of high and low individualism, respectively, by the years a migrant has spent in the destination country. The sample consists of first-generation migrants aged 16 to 65 years. Marginal effects obtained from a regression of numeracy (standardized to a mean of 0 and a standard deviation of 1 in the full international sample) on a dummy for high individualism (taking a value of 1 if an origin country is above the international median in Hofstede's individualism index and 0 otherwise) interacted with an indicator of the years-since-migration group (five groups); further controls are gender, a quadratic polynomial in age, destination-country fixed effects, and origin-continent fixed effects. Error bars show standard errors clustered at the origin-country level.
Data sources: PIAAC, Hofstede (2001).

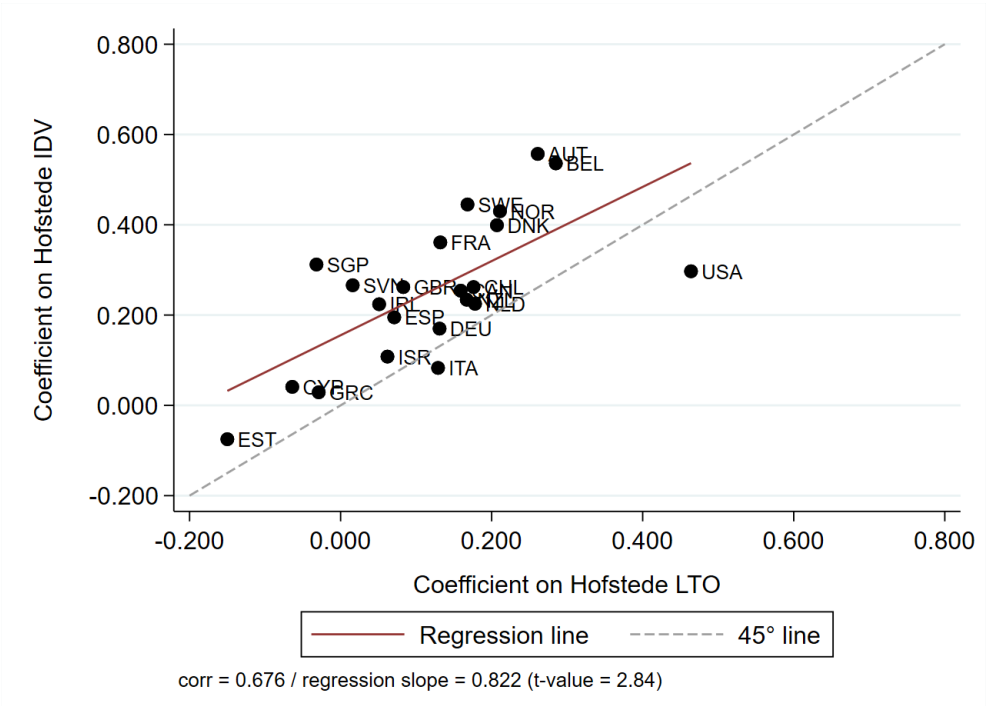
[25] In the German sample, we can compare individualism estimates when assigning the cultural background of second-generation migrants either based on the parental country of birth or based on the language spoken at home in childhood. Appendix Table A.4 presents the results. The two assignment procedures lead to rather similar individualism coefficients; in fact, the language-based individualism estimate is even somewhat larger. Thus, inferring the cultural background of second-generation migrants from the origin language does not appear to matter for the German results, but it is unclear whether this finding carries over to the other countries in the sample, especially to traditional immigration countries such as the United States and the United Kingdom.

Figure 4. Destination Country Effect Heterogeneity

(a) Destination-Specific Hofstede IDV Effect Size and Destination Country's Hofstede IDV



(b) Destination-Specific Hofstede IDV and LTO Effect Sizes



Notes: The figure shows destination country-specific effect heterogeneity using the sample of first-generation migrants. Figure 4(a) plots the destination country-specific effect of Hofstede individualism (IDV) on numeracy skills against the destination country's Hofstede IDV score. Destination country-specific effects are obtained by regressing numeracy skills on origin-country Hofstede IDV interacted with dummies for destination countries. Figure 4(b) plots the destination country-specific effect of Hofstede IDV on numeracy skills against the destination country-specific effect of Hofstede long-term orientation (LTO) on numeracy skills. Destination country-specific effects are obtained by regressing numeracy skills on origin-country Hofstede IDV and origin-country Hofstede LTO both interacted with dummies for destination countries. Due to the inclusion of Hofstede LTO in Figure 4(b), the results on Hofstede IDV between Figures a) and b) are slightly different. However, the correlation between coefficients on Hofstede IDV in both figures is equal to 0.97.
Data sources: PIAAC, Hofstede (2001).

B. Selective Migration

A main threat to identification in the epidemiological approach is that migrants are not randomly drawn from their origin-country populations. In fact, it could be that migrants are more individualistic than non-migrants, which would potentially explain our results if individualism and cognitive skills are indeed positively correlated. In contrast to previous literature, we can actually test for migrant selection on individualism using our person-level individualism measure for origin countries participating in the PIAAC survey (see Section VI.B). To do so, we compare the average level of individualism and the individualism distributions of natives and first-generation migrants originating from the same country (see Appendix Figure C.3 and Figure C.4). By pooling all PIAAC countries, we observe that the level of individualism of migrants and non-migrants is virtually identical and that the distributional differences are tiny. We also test for migrant selection by country. We do so for the 17 PIAAC countries where we can observe at least 100 first-generation migrants originating from the respective country, which is a sample size that we consider necessary to meaningfully compare individualism distributions at the country level. There is no systematic pattern of migrant selection. We find a positively selected migrant population in six countries (Finland, France, Germany, Sweden, the UK, and the US), while migrants are negatively selected on individualism in five countries (Korea, Lithuania, Poland, the Russian Federation, and Turkey). In another six countries (the Czech Republic, Greece, Ireland, Italy, the Netherlands, and the Slovak Republic), migrants are not selected on individualism. Thus, based on this analysis and given that we find positive effects of individualism on skills in *each* destination country, we conclude that migrant selection is not a first-order concern.

However, since we can directly investigate migrant selection on individualism only for countries participating in PIAAC, most of which are highly developed, it is not clear whether this pattern translates to other, less developed origin countries. Therefore, we additionally account for the potential endogeneity of migrants' location choice by controlling for skill-specific migration costs, which previous literature have highlighted as drivers of international migration decisions. These variables include geographic and linguistic distance (Mayer and Zignago 2011; Melitz and Toubal 2014; Adserà and Pytliková 2015), genetic distance (Krieger, Renner, and Ruhose 2018), and differences in returns to skills proxied by income inequality differences (Borjas 1987; Parey et al. 2017; Patt et al. 2021). The results, which are shown in Appendix Table C.1, suggest that none of these variables can explain the effect of individualism on cognitive skills.

C. Omitted Origin-Country Characteristics

As outlined above, another potential concern in the epidemiological approach is origin-country heterogeneity correlated with individualism and cognitive skills. For example, Gorodnichenko and Roland (2017) show that richer countries are more individualistic than their poorer counterparts. Thus, one worry is that migrants from more individualistic

countries are more skilled because they can spend more resources on skill acquisition. More resources may also lead to better educational systems and therefore to better educational outcomes. Gorodnichenko and Roland (2017) further show that individualism is positively correlated with innovativeness. Hence, migrants from more individualistic countries may accumulate more skills than migrants from less individualistic countries because the financial rewards for innovative activities, which are skill intense, are higher.

In Appendix C.3, we show the robustness of our results to adding various origin-country characteristics. We include GDP per capita as a measure of economic strength, average PISA math scores and IQ measures to proxy for the quality of a country's educational system, and patent applications per capita to proxy for country innovativeness. While the coefficient on individualism always remains significantly positive and sizeable, adding origin-country GDP per capita reduces the coefficient on individualism by approximately one-third compared to the main specification (see Column (4) of Table 1). However, even conditioning on all origin-country characteristics at the same time yields a highly significant and economically meaningful individualism estimate. It is important to note that origin-country characteristics are endogenous ('bad controls') because any positive skill effect of individualism may translate into higher economic development and innovativeness (as shown by Gorodnichenko and Roland 2017). Therefore, it is unsurprising and actually reassuring that controlling for potential outcomes reduces the coefficient on individualism.

Furthermore, we also address unobserved origin-country heterogeneity by means of an instrumental variable (IV) approach that exploits arguably exogenous variation in individualism across countries. While an IV approach in an international setting is a somewhat heroic task, several historical determinants of present-day individualism are known from the literature. The most prominent factors are genetic particularities (e.g., Way and Lieberman 2010) and pathogen prevalence (Fincher et al. 2008). In Appendix C.4, we discuss an empirical strategy to isolate the stable component of individualism (which is not confounded by other country-of-origin characteristics) by exploiting a genetic instrument for individualism based on a small and random polymorphism (A118G) in the μ-opioid receptor gene. The genetic trait makes social exclusion more painful for individuals, which leads to lower levels of individualism in countries with a high prevalence of A118G. This strategy follows the approach discussed in Gorodnichenko and Roland (2017) who exploit cross-country differences in the prevalence of A118G to determine the causal effect of individualism on economic growth. Using the prevalence of A118G as an instrument in our epidemiological approach, we find that the IV estimate of individualism is very close to the OLS estimate. If anything, the OLS approach seems to slightly *under*estimate the true relationship between individualism and cognitive skills.

D. Long-Term Orientation and Other Cultural Traits

Among all traits in Hofstede's model of culture, the economics literature has focused the greatest amount of attention on long-term orientation (LTO), which is associated with the

ability to defer gratification and exert self-control, as an important determinant of economic outcomes (see, e.g., Galor and Özak 2016; Figlio et al. 2019). We add to this literature by showing that long-term orientation is also an important determinant of adult skills (see Column (1) of Table 2). This result complements previous findings by Figlio et al. (2019), who document a positive effect of long-term orientation on the skill formation of children. However, by conditioning on both individualism and long-term orientation in Column (2) of Table 2, we find that the coefficient on individualism is more than twice as large as the coefficient on long-term orientation (p-value of the difference in the coefficients is 0.01).[26] Interestingly, the coefficients from the inclusion of both traits are identical to the coefficients that are obtained by including the traits separately (compare Column (1) for long-term orientation and Column (4) of Table 1 for individualism), which indicates that both measures have independent effects on skills. Including all remaining traits from the Hofstede cultural model (i.e., power distance, uncertainty avoidance, and masculinity) in Column (3) of Table 2 does not change the conclusions.

Figure 4(b) shows that the average effect of long-term orientation across all countries conceals important destination-specific effect heterogeneity. First, the heterogeneity of the skill effect of long-term orientation is strongly correlated ($r = 0.68$) with the heterogeneity of the individualism effect discussed above. For most countries, the individualism estimate is larger than the estimate for long-term orientation. However, an important exception is the United States, which shows by far the highest estimate for long-term orientation among all countries (while the individualism estimate is close to the international average). With an Hofstede LTO score of 26, the United States is in the lowest tercile of the international LTO distribution, in the neighborhood of countries such as Uruguay and Algeria. Arguably, the large effect of long-term orientation may explain why Asian-Americans are so successful in the United States; according to statistics provided by the Pew Research Center referring to 2015 (Budiman and Ruiz 2019), Asian-Americans have a median household income equal to $73,060, which is substantially larger than the average income of $53,600 among all U.S. households. The same data also show that Asian migrants have the highest share of university graduates among all ethnicities. However, Asians usually have a low individualism background (with an average Hofstede IDV score of 28.5 compared to the international average of 44),[27] while at the same time, they score relatively high on long-term orientation (with an average Hofstede LTO value of 53, compared to the international average of 45). Thus, judging the importance of cultural traits may be misleading if they are studied in isolation.

[26] All cultural traits in Table 2 are standardized to a mean of 0 and a standard deviation of 1 in the full international sample.

[27] Asian countries (including Pacific islands) in our sample include Bangladesh (Hofstede IDV score of 20), China (20), Hong Kong (25), Indonesia (14), India (48), Iran (41), Israel (54), Japan (46), Korea (18), Malaysia (26), Pakistan (14), Philippines (32), Russian Federation (39), Singapore (20), Thailand (20), and Vietnam (20). The average for Asia reported in the text is an unweighted average of the Hofstede IDV scores of all Asian sample countries.

In fact, the U.S.-specific estimates illustrate that the effect of culture can work through different cultural traits at the same time. Therefore, it is important to examine the robustness of the individualism effect in a model that includes other cultural traits that are conceptually related to each other. We perform this analysis in Columns (4) to (9) of Table 2. We start with trust in Column (4), which is measured as averaged generalized trust taken from the World Values Survey (WVS, Inglehart et al. 2014). Trust is positively related to skills. This is not surprising given that trust is highly predictive of various economic outcomes (Guiso, Sapienza, and Zingales 2006; Dohmen et al. 2012). However, the coefficient on individualism is reduced only slightly and remains larger than the coefficient on trust. As discussed in Section II, human capital theory highlights the importance of the two economic preferences, namely, patience and risk-taking for educational decisions. Therefore, Columns (5) and (6) examine how the importance of individualism for skills changes when we condition on cross-country cultural differences in patience and risk-taking. The data come from the Global Preference Survey (GPS). In line with the literature, we find that patience is highly positively associated with skills, while risk-taking is (weakly) negatively associated with skills. While adding patience somewhat reduces the individualism coefficient, it remains large and highly significant. Together with the analysis on long-term orientation, which also captures time preferences, these findings extend the previous evidence found regarding the role of time preferences for the educational achievement of children in skill formation in adulthood. In Columns (7) to (9), we check whether the relationship between individualism and skills is affected by altruism, positive reciprocity, and negative reciprocity, respectively. None of these traits have a substantial impact on the individualism coefficient. Finally, by including all cultural traits simultaneously in Columns (10) and (11), we find that the skill effect of individualism cannot be explained by other cultural traits. In fact, individualism is by far the strongest predictor of adult skills.

Table 2. Individualism and Cognitive Skills: Hofstede IDV, Hofstede LTO, and Other Country-of-Origin Cultural Traits

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Hofstede IDV		0.290***	0.249***	0.230***	0.190***	0.291***	0.278***	0.298***	0.293***	0.203***	0.246***
		(0.044)	(0.049)	(0.045)	(0.048)	(0.052)	(0.047)	(0.048)	(0.048)	(0.056)	(0.057)
Hofstede LTO	0.159***	0.158***	0.150***								0.091*
	(0.058)	(0.038)	(0.037)								(0.048)
Hofstede Power Distance			-0.073								-0.033
			(0.058)								(0.057)
Hofstede Uncertainty Avoidance			-0.016								0.069
			(0.040)								(0.060)
Hofstede Masculinity			-0.034								-0.030
			(0.054)								(0.052)
Trust (WVS)				0.133***						0.069	0.056
				(0.044)						(0.055)	(0.077)
Patience (GPS)					0.176***					0.129**	0.083
					(0.041)					(0.052)	(0.057)
Risk (GPS)						-0.004				-0.029	0.021
						(0.043)				(0.037)	(0.037)
Altruism (GPS)							0.089**			-0.026	-0.028
							(0.043)			(0.099)	(0.095)
Positive Reciprocity (GPS)								0.080**		0.055	0.059
								(0.035)		(0.077)	(0.074)
Negative Reciprocity (GPS)									-0.077	-0.060	-0.076
									(0.063)	(0.052)	(0.046)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.21	0.25	0.25	0.25	0.25	0.24	0.24	0.24	0.24	0.26	0.26
Observations	15,349	15,349	15,349	15,349	15,349	15,349	15,349	15,349	15,349	15,349	15,349
Origin countries	68	68	68	68	68	68	68	68	68	68	68

Notes: The table shows the results for numeracy test scores adding other country-of-origin cultural traits in the sample of first-generation migrants. Observations are weighted, giving each destination country the same weight. Numeracy test scores are standardized to a mean of 0 and a standard deviation of 1 in the full international sample. All cultural measures are standardized to a mean of 0 and a standard deviation of 1 in the full international sample. See text for the definition of further variables. Missing observations in the cultural variables are imputed by the international mean (at the country level). *Covariates:* age, age squared, and gender. *Fixed effects:* destination country, year of migration, destination country × year of migration, and continent of origin country. Standard errors clustered at the origin-country level reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data sources: PIAAC, Hofstede (2001), World Values Survey (WVS, Inglehart et al. 2014), Global Preference Survey (GPS, Falk et al. 2018).

VI. Individualism and Cognitive Skills: Methodological Extensions

A. Language-Level Measure of Individualism

While Hofstede's (and most other) individualism measures vary at the country level, the index by Kashima and Kashima (1998) (*Kashima IDV*) is language-based and thus has within-country variation if multiple languages are spoken in an origin country.[28] This index is based on the idea that language and culture are closely related and that pronoun drop rules have developed from a specific culture. If a language permits pronoun drop, such as Italian or Spanish, this indicates collectivistic culture because the emphasis is on the action rather than the actor. If pronoun drops are not permitted, such as in English or German, this indicates individualistic culture because the focus is on the actor. We assign first-generation migrants the Kashima IDV score based on their origin language.[29] In our sample, 34 percent of the migrants speak a language in which pronoun drops are not allowed, which shows that the relevant variation comes from a sizeable part of the sample. Overall, 56 percent of the origin countries in our sample show variation in the Kashima measure among their first-generation emigrants.

Columns (1) to (4) of Table 3 show the results from estimating the standard epidemiological approach outlined in equation (1) with the Kashima IDV index. Standard errors are clustered at the origin-language level. We find a strong and significant positive relationship between Kashima IDV and skills; migrants who speak a language that reflects an individualistic cultural background have approximately 0.7 standard deviations higher cognitive skills compared to migrants who speak a language indicative of collectivist culture (Column 4). Thus, our results are not specific to measuring individualism based on the Hofstede scale.[30]

In Column (5) of Table 3, we add origin-country fixed effects to exploit within-origin-country between-language variation in culture. While it is not surprising that the coefficient on Kashima IDV decreases when thoroughly controlling for origin country characteristics, we still find a significant and sizeable effect of individualism on cognitive skills. In Column (6), we even control for destination-specific origin country fixed effects to allow for heterogeneity in the origin country by destination country. Here, we compare migrants from the same origin country who move to the same destination country but speak different languages; illustrative examples are Swiss migrants who move to France speaking French or German (no pronoun drop allowed) versus Italian (pronoun drop allowed) or Tunisian migrants who move to Israel speaking Arabic (pronoun drop allowed) versus French (no pronoun drop allowed). Thus, this

[28] An additional source of within-country variation comes from migrants who speak a language different from the origin-country's main language.

[29] Our language-based cultural assignment of the Kashima IDV index follows the same procedure we apply when assigning Hofstede IDV to second-generation migrants (see Section III.B). That is, we use information on the language first learned at home during childhood (and still understood). If this language information is not available (or identical to the official language of the destination country), then we use any other language learned at home during childhood (and still understood) or the language currently spoken at home. Note that we cannot perform the Kashima IDV analysis with origin-country fixed effects for second-generation migrants because we do not observe parental country of birth in PIAAC.

[30] In Appendix B.3, we show results for other individualism measures, thereby providing further evidence for the robustness of our results to the measurement of individualism.

specification accounts for cross-country heterogeneity at the level of the destination country, the origin country, and the destination-origin-country pair. It also accounts for time-invariant migration costs (such as geographic distance, cultural distance, and migration policies). Even in this very demanding specification, we find a significant and economically meaningful individualism effect on cognitive skills. Therefore, we conclude that our results are not driven by omitted origin-country variables.

Table 3. Individualism and Cognitive Skills: Kashima IDV

	Between origin countries				Within origin countries	
	(1)	(2)	(3)	(4)	(5)	(6)
Kashima IDV	0.663***	0.664***	0.655***	0.654***	0.345***	0.215***
	(0.094)	(0.098)	(0.094)	(0.082)	(0.042)	(0.064)
Age		0.028***	0.026***	0.026***	0.026***	0.022***
		(0.006)	(0.008)	(0.008)	(0.008)	(0.008)
Age squared (/100)		-0.053***	-0.050***	-0.051***	-0.052***	-0.049***
		(0.006)	(0.008)	(0.008)	(0.006)	(0.007)
Female		-0.223***	-0.217***	-0.220***	-0.231***	-0.229***
		(0.033)	(0.033)	(0.032)	(0.028)	(0.029)
Fixed effects						
Destination country	Yes	Yes	Yes	Yes	Yes	Yes
Year of migration	Yes	Yes	Yes	Yes	Yes	Yes
Destination country × year of migration			Yes	Yes	Yes	Yes
Continental				Yes		
Origin country					Yes	Yes
Destination country × origin country						Yes
R-squared	0.13	0.16	0.25	0.26	0.32	0.41
Observations	16,020	16,020	16,020	16,020	16,020	16,020
Origin languages	39	39	39	39	39	39

Notes: The table shows the results for numeracy test scores in the sample of first-generation migrants. Observations are weighted, giving each destination country the same weight. Numeracy test scores are standardized to a mean of 0 and a standard deviation of 1 in the full international sample. Kashima IDV refers to the individualism index by Kashima and Kashima (1998); the index is a binary variable, taking the value of 1 if the origin language does not allow a pronoun drop (indicating an individualist country) and of 0 if a pronoun drop is permitted (indicating a collectivistic country). *Continental fixed effects* refer to the continent of the origin country. Standard errors clustered at the origin-language level reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data sources: PIAAC, Kashima and Kashima (1998).

B. Person-Level Measure of Individualism

Country-level and language-level individualism measures reflect the average level of individualism of a society. A unique feature of PIAAC is that it also allows us to construct an individualism index that varies at the person level. The approach enables the comparison of outcomes of migrants from the *same* origin country and language. That is, we exploit differences in individualism that occur between migrants (or migrant families) with the same broad cultural background. Using person-level variation in individualism within countries, we can also more credibly examine the role of individualism in human capital formation for natives. If it is true that cultural traits are formed within the family and are fairly stable across

generations, then we would expect to find a similarly strong influence of individualism across samples of natives and migrants.

PIAAC includes items that capture the most important elements of individualism emphasized in previous literature, namely, freedom and challenge-seeking—two fundamental parts of Hofstede's individualism index—and broad-mindedness and cognitive style—which are emphasized in other individualism measures. More specifically, we use the following PIAAC items to construct person-level individualism index (*person-level IDV*): *i) planning one's own activities at work, ii) using one's own approach to the job, iii) managing one's own time at work, iv) solving complex problems at work, v) enjoying learning new things, vi) getting to the bottom of difficult things, and vii) seeing if different ideas fit together.*[31]

The first three items measure different behaviors that express freedom and autonomy at the workplace, i.e., behaviors that are strongly valued by individualists and frequently used to measure individualism (Hofstede 2001; Oyserman, Coon, and Kemmelmeier 2002; Gorodnichenko and Roland 2012). Items iv) to vi) capture a desire for intellectual challenge and growth—both at the workplace and in the private domain—that is also strongly linked to individualism (Hofstede 2001, Gorodnichenko and Roland 2012).[32] Item vii) reflects both openness-related and cognition-related aspects of individualism. Individualism is associated with an analytical rather than holistic cognitive style (Choi and Nisbett 1998; Nisbett et al. 2001), which favors the investigation and resolution of potential contradictions as captured by item vii). To construct our measure of person-level IDV, we follow Kling, Liebman, and Katz (2007) and first standardize each item by subtracting the mean and dividing by the standard deviation. We then compute the mean across all standardized items and standardize again.[33] The spatial pattern is very similar to that of Hofstede IDV depicted in Appendix Figure A.2; the correlation between (aggregated) person-level IDV and Hofstede IDV is 0.52.

In this analysis, we use all migrants with origin-country and origin-language information for first- and second-generation migrants, respectively (necessary for clustering standard errors).[34] Moreover, we can also extend the analysis to natives. In the person-level IDV estimations, we have observations for 159,068 natives (from 31 origin countries), 21,451 first-generation migrants (from 212 origin countries), and 17,869 second-generation migrants (speaking 123 origin languages).

[31] Appendix B.4 describes in detail on which survey items person-level IDV is based and provides both an assessment of the internal reliability and a cross-validation using existing country-level individualism measures.

[32] The desire for intellectual challenge as measured by items iv) to vi) is considered particularly important in the context of innovation (Gorodnichenko and Roland 2017).

[33] Using latent factors extracted from factor analysis results in a person-level IDV measure that is very highly correlated with the averaged measure ($r > 0.9$).

[34] To account for the fact that some PIAAC countries have only very few migrants, we restrict the sample of first-generation (second-generation) migrants to PIAAC countries with at least 100 first-generation (second-generation) migrants. The results are robust to estimating effects of person-level IDV in the more restricted main analytical sample. The results are also similar when we use an extended sample that includes first-generation (second-generation) migrants without origin-country (origin-language) information.

Table 4. Individualism and Cognitive Skills: Person-Level IDV

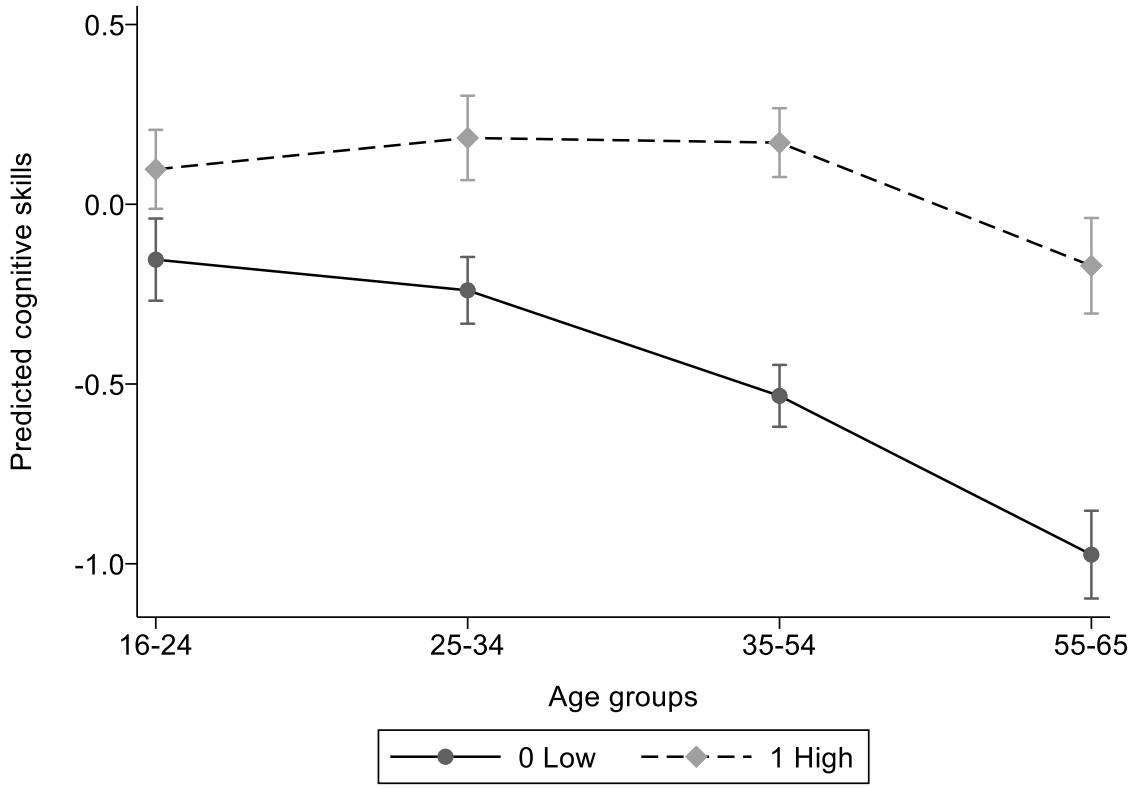
	First-generation migrants		Second-generation migrants		Natives
	(1)	(2)	(3)	(4)	(5)
Person-level IDV	0.353***	0.289***	0.301***	0.290***	0.258***
	(0.021)	(0.021)	(0.029)	(0.030)	(0.013)
Age	0.004	0.007	0.025***	0.024***	0.025***
	(0.006)	(0.006)	(0.006)	(0.005)	(0.004)
Age squared (/100)	-0.022***	-0.029***	-0.042***	-0.042***	-0.044***
	(0.007)	(0.007)	(0.009)	(0.009)	(0.005)
Female	-0.172***	-0.196***	-0.152***	-0.152***	-0.160***
	(0.019)	(0.018)	(0.022)	(0.023)	(0.017)
Fixed effects					
Destination country	Yes	Yes	Yes	Yes	Yes
Year of migration	Yes	Yes			
Destination country × year of migration	Yes	Yes			
Continental	Yes		Yes		
Origin country		Yes			
Destination country × origin country		Yes			
Origin language				Yes	
Destination country × origin language				Yes	
R-squared	0.29	0.44	0.19	0.24	0.26
Observations	21,451	21,451	17,869	17,869	159,068
Origins	212	212	123	123	31

Notes: The table shows the results for numeracy test scores in the sample of first-generation migrants (Columns (1) and (2)), second-generation migrants (Columns (3) and (4)), and natives (Column (5)). Observations are weighted, giving each destination country the same weight. Numeracy test scores are standardized to have a mean of 0 and a standard deviation of 1 in the full international sample. Person-level IDV refers to our newly constructed individualism index that varies at the person level; the index is standardized to a mean of 0 and a standard deviation of 1 in the full international sample. *Continental fixed effects* refer to the continent of origin country for first-generation migrants and to the most plausible continent of parental origin for second-generation migrants (see Section IV.B). *Origins* refer to origin countries for first-generation migrants, origin languages for second-generation migrants, and destination countries for natives. Standard errors clustered at the origin-country level for first-generation migrants, at the origin-language level for second-generation migrants, and at the destination-country level for natives, reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data source: PIAAC.

The relationship between skills and individualism measured by person-level IDV is shown in Table 4. When deriving inference, we allow for correlations in the error term at the origin-country and origin-language levels for first- and second-generation migrants, respectively. Clustering at this level allows for an arbitrary correlation of skills among migrants from the same origin country or language in the various destinations. The empirical analysis starts again with a replication of the epidemiological approach, thereby replacing Hofstede IDV with person-level IDV (see Columns (1) and (3) for first- and second-generation migrants, respectively). The person-level IDV measure enables us to very rigorously control for origin-country or origin-language confounds. To do so, Columns (2) and (4) add fixed effects for the destination-specific origin country (for first-generation migrants) and for the destination-specific origin-language (for second-generation migrants), respectively, which allows the investigation of individual-level variation in individualism among migrants from the *same* origin in the same destination. For comparison, Column (5) exploits within-country variation

in individualism and skills in the sample of natives. Overall, the results indicate a strong and significant positive association between individualism and cognitive skills, which is strikingly similar across samples of natives and migrants.[35] Thus, the results are consistent with the view that cultural traits are primarily transmitted within the family.

Figure 5. Skill-Age Profiles for Individuals with High and Low Individualism



Notes: The figure shows estimated margins of high and low individualism by age group. The sample includes first-generation migrants aged 16 to 65 years. Marginal effects obtained from a regression of numeracy (standardized to a mean of 0 and a standard deviation of 1 in the full international sample) on a dummy for high individualism (taking a value of 1 if an origin country is above the international median in Hofstede's individualism index and 0 otherwise) interacted with an indicator for the age group (four groups); further controls are gender, migration-year-specific destination-country fixed effects, and origin-continent fixed effects. Error bars show standard errors clustered at the origin-country level.
Data sources: PIAAC, Hofstede (2001).

VII. Individualism and Skill Dynamics over the Life-Cycle

After having provided extensive evidence to support the idea that individualism affects the *level* of cognitive skills in adulthood, we now shed light on skill accumulation and investment patterns over the life-cycle. We will also provide insights into the mechanisms through which the effect of individualism on skills materializes.

[35] Our person-level IDV index includes various items directly connected to the labor market, to capture Hofstede's concept of individualism. However, one may be worried that our person-level IDV measure overly emphasizes labor market aspects. Therefore, we additionally construct indices that rely only on Items i) to iv) to construct a work-related index and on Items v) to vii) to construct a non-work-related index (see Appendix B.4 for details). Appendix Table B.5 shows that the results are very similar for the different person-level IDV measures across samples of natives and migrants. These results provide further evidence that our conclusions do not depend on a specific definition of individualism.

A. Skill Formation over the Life-Cycle

Figure 5 illustrates that individualism not only affects the level of skills at a given point in time but also influences skill accumulation over the life-cycle. Specifically, the figure shows the linear prediction of the skill-age profile for first-generation migrants from countries with above ("high") and below ("low") median Hofstede IDV scores. We observe a skill advantage of migrants from more individualistic cultures over those from less individualistic cultures over the entire life cycle. While the skill gap tends to widen after labor-market-entry age, the differences found before the age of 25 are relatively modest and not statistically significant. This finding is in line with the result in Figlio et al. (2019), who show that individualism does not significantly affect the test scores of high-school-attending migrant children in Florida. However, after labor market entry, migrants from less individualistic cultures face a steady decline in skills over their lifetime. The skills of migrants from more individualistic cultures, on the other hand, are rather stable until the beginning of labor market prime age and, afterward, deteriorate more slowly than those of migrants from less individualistic cultures. The increasing skills advantage of more vs. less individualistic migrants over the life-cycle is also consistent with the idea of dynamic skill complementarities (e.g., Cunha and Heckman 2007, Cunha, Heckman, and Schennach 2010, Aizer and Cunha 2012). This literature posits that the return to skills investments is higher for those with a higher initial level of skills ("skills beget skills").

The cross-sectional nature of the PIAAC data does not allow us to distinguish between age and cohort effects. To provide more compelling evidence that individualism affects skill accumulation over time, we use longitudinal German PIAAC-L data (see Section III.D). In value-added models, we explain skill growth over a period of three years. More specifically, we continue to pursue an epidemiological approach by examining how the change in migrants' skills between 2012 and 2015 is affected by origin-country individualism. Estimations condition on the skill level in 2012, which addresses time-invariant unobserved individual heterogeneity. We implement this value-added approach by regressing the numeracy skills of individual i in 2015 on her cultural background, as measured by origin-country Hofstede IDV, numeracy skills in 2012, and individual-level controls (quadratic polynomial in age and gender):

$$NUM_{i,2015} = \beta_0 + \beta_1 \overline{IDV}_o + \beta_2 NUM_{i,2012} + \boldsymbol{X}'_{i,2012}\boldsymbol{\gamma} + \mu_y + c_o + u_i. \quad (2)$$

To maximize the sample size, we run our analysis on the joint sample of first- and second-generation migrants, always controlling for migrant type. Following our epidemiological approach, we also add year-of-migration fixed effects (for first-generation migrants), μ_y, and continent-of-origin fixed effects, c_o, which are based on all possible combinations of the respondent's, the father's, and the mother's country of birth. Since the value-added specification aims at identifying the effect of individualism on skill growth, we may worry that the results are affected by different skill formation patterns over the life-cycle. Thus, controlling for lagged skills in a simple linear fashion might not be flexible enough to capture the full effect of lagged skills on the current skill level. We therefore also provide results in which we interact

age and age squared with lagged skills, which controls more flexibly for age-specific skill dynamics.

Consistently across specifications, Table 5 shows that coming from a more individualistic culture not only affects the level of skills but is also associated with skill growth over time. In the full-control specification, a one-standard-deviation increase in Hofstede IDV corresponds to a 0.09 standard deviation increase in numeracy skills between 2012 and 2015 (Column (4)).[36] The magnitude of this effect is only slightly below the male-female gap in numeracy skills, which amounts to 0.11 standard deviations in the main specification.

Table 5. Individualism and Cognitive Skills: Value-Added Approach

	(1)	(2)	(3)	(4)
Hofstede IDV	0.059**	0.059**	0.085***	0.085**
	(0.027)	(0.022)	(0.028)	(0.033)
Numeracy in 2012	0.751***	0.750***	0.749***	0.675***
	(0.014)	(0.016)	(0.017)	(0.079)
Age	-0.010	-0.007	-0.012	-0.010
	(0.010)	(0.015)	(0.017)	(0.016)
Age squared (/100)	0.003	0.005	0.008	0.005
	(0.013)	(0.019)	(0.021)	(0.020)
Female	-0.127***	-0.125***	-0.111***	-0.111**
	(0.018)	(0.030)	(0.038)	(0.042)
Second-generation migrant	-0.052	0.026	-0.001	-0.003
	(0.033)	(0.057)	(0.054)	(0.054)
Fixed effects				
Year of migration		Yes	Yes	Yes
Continental			Yes	Yes
Age-specific numeracy in 2012				Yes
Age-squared-specific numeracy in 2012				Yes
R-squared	0.66	0.69	0.69	0.69
Observations	821	821	821	821

Notes: The table shows the value-added results for numeracy test scores measured in 2015 in the joint sample of first- and second-generation migrants in Germany. Numeracy test scores are standardized using the standard deviation of the full international sample as "numeraire." Hofstede IDV refers to Hofstede's individualism index and is standardized using the standard deviation of the full international sample as "numeraire." *Continental fixed effects* are included for each combination of the respondent's, the father's, and the mother's country of birth. Year of migration is set equal to year of birth for second-generation migrants. Standard errors two-way clustered at the level of the origin country of the respondent and the level of the interaction of father's and mother's country of birth in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data sources: German PIAAC-L, Hofstede (2001).

[36] Appendix D shows that the results from the value-added model are remarkably similar when we add a large number of controls that were elicited in PIAAC-L (but not in PIAAC). These include personality traits (i.e., the Big-Five, grit, internal and external locus of control, risk preferences, and trust), family background (i.e., occupation of respondent's mother and father, number of siblings, and number of years spent with both (biological) parents), and the educational history (i.e., final high-school grades in mathematics and German). The individualism estimates change only very little when including these controls, which suggests that the initial skill level does indeed capture relevant differences across individuals.

Table 6. Individualism and Skill Investments over the Life-Cycle

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Formal education		Non-formal adult education			Informal adult education		
	Years of education	University degree	Training on-the-job	Any other training	Training to increase knowledge	Read newspaper	Read professional journals	Read books
Hofstede IDV	0.616***	0.069***	0.034***	0.045***	0.028***	0.147***	0.141***	0.173***
	(0.143)	(0.013)	(0.008)	(0.007)	(0.010)	(0.030)	(0.043)	(0.035)
Age	0.329***	0.049***	0.019***	0.017***	-0.002	0.035***	-0.003	-0.017**
	(0.022)	(0.004)	(0.003)	(0.003)	(0.005)	(0.006)	(0.009)	(0.009)
Age squared (/100)	-0.366***	-0.052***	-0.027***	-0.024***	0.003	-0.036***	-0.002	0.030***
	(0.028)	(0.005)	(0.003)	(0.003)	(0.006)	(0.007)	(0.012)	(0.010)
Female	-0.054	0.015	-0.046***	-0.012	0.016	-0.004	-0.229***	0.516***
	(0.109)	(0.015)	(0.012)	(0.015)	(0.016)	(0.027)	(0.038)	(0.044)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.36	0.27	0.14	0.16	0.24	0.20	0.16	0.19
Observations	15,150	15,312	14,909	14,909	5,426	15,346	15,337	15,343
Origin country	68	68	68	68	68	68	68	68

Notes: The table shows the results for the outcome indicated in the column header in the sample of first-generation migrants. Observations are weighted, giving each destination country the same weight. *Years of schooling:* years of schooling to obtain the highest educational degree. *University degree:* a dummy variable equal to 1 if the respondent has a university degree and 0 otherwise. *Training on-the-job:* dummy variable equal to 1 if respondent has participated in training on-the-job during the 12 months prior to the survey, 0 otherwise. *Any other training:* dummy variable equal to 1 if respondent has participated in any training other than training on-the-job during the 12 months prior to the survey and 0 otherwise. *Training to increase knowledge:* dummy variable equal to 1 if respondent has participated in training to increase knowledge and skills, 0 otherwise (question only asked if respondent participated in training due to work-related reasons). *Reading:* indicates the frequency with which respondent reads outlets indicated in the column header in private life; variables take values of 1 (never), 2 (less than once a month), 3 (less than once a week but at least once a month), 4 (at least once a week but not every day), and 5 (every day). Hofstede IDV refers to Hofstede's individualism index and is standardized to a mean of 0 and a standard deviation of 1 in the full international sample. *Fixed effects:* destination country, year of migration, destination country × year of migration, and continent of origin country. Standard errors clustered at the origin-country level reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data sources: PIAAC, Hofstede (2001).

B. Skill Investments over the Life-Cycle

Next, we make use of PIAAC's rich background questionnaire to explain the influence of individualism on skill accumulation over the life-cycle by investments in skill-increasing activities. Specifically, PIAAC elicits information on respondents' academic achievement early in life and on their skill-investment activities later in life (both work-related and non-work-related), all of which may affect skill accumulation. The following parsimonious skill production function illustrates how we think of individualism affecting cognitive skills:

$$skills = f(formal\ schooling(IDV), adult\ education(IDV), IDV) \tag{3}$$

Equation (3) illustrates that one factor through which individualism affects skills is formal schooling, which is measured by the number of years an individual has spent in formal education. Although university education also enters the years-of-schooling measure, we also separately examine whether individualism is associated with the likelihood of receiving a university degree, respectively. Columns (1) and (2) of Table 6 show that Hofstede IDV is strongly positively associated with years of education and the probability of receiving a

university degree. To explain skill formation after labor market entry, the remaining columns of Table 6 examine investments in non-formal (i.e., on-the-job training and any other training) and informal (e.g., frequency of reading newspapers and other outlets) adult learning activities. The results shown in Table 6 highlight that migrants from more individualistic cultures invest more in skill-enhancing activities after labor market entry than do those from less individualistic cultures. This skill investment behavior lines up well with the divergent skill-age pattern illustrated in Figure 5.

C. Mediation Analysis

In this section, we perform a mediation analysis to investigate to what extent skill differences between migrants from more versus less individualistic cultures can be explained by the differences in skill investment behavior.[37]

Following Heckman, Pinto, and Savelyev (2013) and Heckman and Pinto (2015), we introduce additional assumptions to test how the effect of individualism on skills is transmitted through j mediators ($M^j, j \in \mathcal{J}$), where $\mathcal{J}$ describes the set of all potential mediators. In summary, these assumptions require that we are able to identify (i) the causal effect of individualism on skills, (ii) the causal effect of the mediators on skills, and (iii) the causal effect of individualism on the mediators.[38] Under these assumptions, the mediation analysis aims to decompose the positive effect of individualism on skills—as estimated in equation (1)—into indirect effects operating through changes in observed mediators ($M^j: j \in \mathcal{J}_P,\ \mathcal{J}_P \subseteq \mathcal{J}$) and a direct effect that is not driven by any mechanisms or is mediated by unobserved mediators ($M^j: j \in \mathcal{J} \setminus \mathcal{J}_P$).[39] Assuming a linear skill production function, we can measure the importance of different mechanisms by using OLS to estimate the parameters of equations (4) and (5):

$$M^j_{iydo} = \beta^j_0 + \beta^j_1 \overline{IDV}_o + \boldsymbol{X}'_{iydo}\boldsymbol{\gamma}^j + \mu^j_d \times \mu^j_y + c^j_o + \varepsilon^j_{iydo},\ \ \forall\, j \in \mathcal{J}_P, \tag{4}$$

$$NUM_{iydo} = \beta_0 + \beta^M_1 \overline{IDV}_o + \boldsymbol{X}'_{iydo}\boldsymbol{\gamma} + \boldsymbol{M}'_{\boldsymbol{iydo}}\boldsymbol{\beta_2} + \mu_d \times \mu_y + c_o + u_{iydo}. \tag{5}$$

Equation (4) presents the relationship between individualism and each mediator, where β^j_1 is the effect of individualism on mediator M_j. Equation (5) estimates the direct effect of individualism and the effect of all mediators on cognitive skills; β^M_1 denotes the direct effect of individualism on skills that is not operating through the mediators $\boldsymbol{M} = \left(M^j: j \in \mathcal{J}_P\right)$. The

[37] The hypothesis that individualistic traits (i.e., the desire to stand out and to achieve own goals in life) provide additional non-monetary incentives for skill investments and life-long learning, which then results in higher skills as first stated in the social psychology literature (Triandis 1995; Hofstede 2001; Oyserman, Coon, and Kemmelmeier 2002). With our mediation analysis, we provide the first empirical test of this hypothesis.

[38] We provide a formal discussion of the additional assumptions using the potential outcomes framework in Appendix E.1. An advantage of our identification strategy introduced in Section IV is that we can use the full set of fixed effects introduced in equation (1) to estimate all three causal estimands of the mediation model; for instance, we estimate the effect of the mediators on skills among migrants that arrived from the same continent in the same year in the same destination country.

[39] While this approach also depends on the conditional independence assumption with respect to unobservables, it relaxes the assumption of conditional independence of omitted, but observable mediators. Thus, in contrast to the approach of Baron and Kenny (1986), in which only a single mediator is considered, it allows the identification of indirect effects of *several* observed and potentially correlated mediators.

vector $\boldsymbol{\beta_2}$ comprises the effects of the mediators on skills. The coefficients β_1^j, β_1^M, and those included in vector $\boldsymbol{\beta_2}$ are sufficient to identify the contribution of each mediator in the mediation model. Appendix E.1 provides the details of the estimation procedure.

Our set of measured mediators includes all inputs of the skill production function presented in equation (3) and Table 6, except for having obtained a university degree and the indicator of whether the main reason for training participation was to increase skills and knowledge. The former is already captured by the years-of-schooling variable; the latter is available only for a subset of respondents (i.e., those who participated in training for work-related reasons). The estimates of β_1^j in equation (4), as reported in Table 6, provide strong evidence for a statistically and economically significant positive association between individualism and the mediators included in the mediation model. However, a necessary condition for the existence of mediation channels is that individualism not only affects mediators but also that these mediators themselves cause changes in skills. Therefore, Appendix Table E.2 reports the estimates of $\boldsymbol{\beta_2}$ in equation (5). In fact, all the mediator variables have a precisely estimated positive impact on skills.

Figure 6 summarizes the results of the mediation analysis based on the sample of first-generation migrants. Panel (a) decomposes the effect of individualism into a direct effect and several indirect effects that measure the relative contribution of each mediator. We observe that individualistic behavior both before and after the completion of formal education is relevant for the skill effect of individualism to materialize. Overall, we can explain approximately half (45 percent) of the increase in skills with the measured mediators. While the largest indirect effect of individualism on skills operates through higher formal education (32 percent), skill investments in adulthood still explain 13 percent of the total effect of individualism on skills. The direct effect indicates that 55 percent of the individualism effect on skills is driven by other factors linked to unobservable inputs of the skill production function, for instance, learning-by-doing and worker peer effects. In summary, the mediation results suggest that part of the reason why migrants from more individualistic cultures have higher cognitive skills is because they advance further in the formal education system and because they are more likely to participate in adult learning activities (controlling for the fact that more educated people are more likely to participate in adult learning).

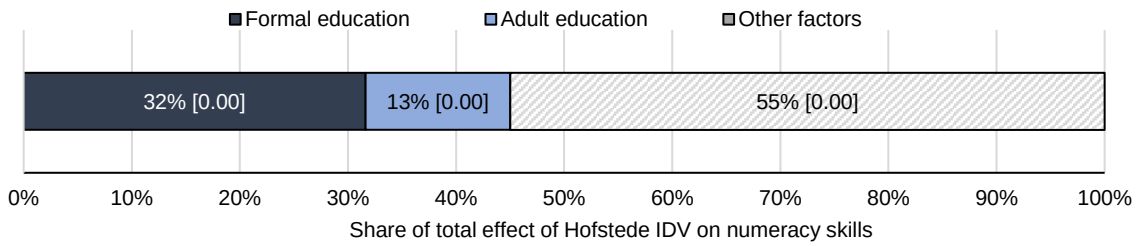
Among the mediators capturing adult skill investment, participation in non-job-related types of training is more important in explaining the individualism effect on skills than participation in on-the-job training (21 vs. 10 percent in Figure 6(b)).[40] This finding is in line with the idea that individualists strive to increase their skills independent of the training offers made by the employer. Interestingly, individualism-driven informal adult learning activities, which is proxied by the frequency of reading newspapers, books, and professional journals at home,

[40] The training measures and the other mediators are positively correlated, which our mediation framework is correcting for. When considering only one mediator at a time (ignoring the effect of other correlated mediators in the analysis), we would substantially overestimate the importance of each single mediator.

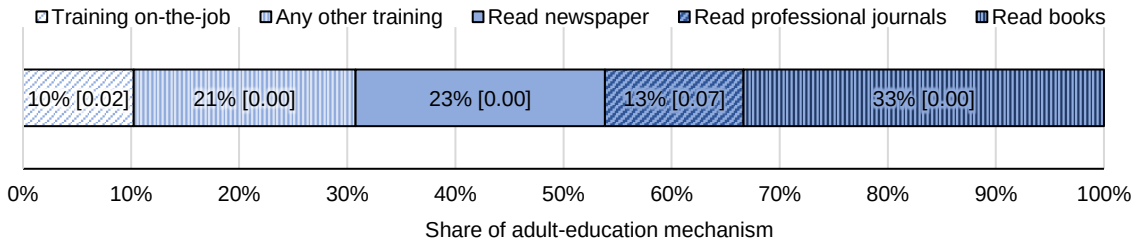
jointly explain more than two-thirds (69 percent) of the contribution of adult skill investments to the overall individualism effect on skills.

Figure 6. Decomposition of the Individualism Effect on Cognitive Skills – Relative Contributions

(a) Relative Importance of Different Mechanisms



(b) Relative Importance of Different Skill Investments in Adult Education



Notes: Figure 6(a) depicts the relative contributions of the individualism-induced changes in academic achievement and in adult education to the positive effect of individualism (measured by Hofstede IDV) on cognitive skills. Figure 6(b) depicts the relative contributions of different skill investments in adult education to the overall adult education mechanism. *p*-values derived from a bootstrap of the mediation coefficients with 999 replications are reported in brackets. Detailed results are presented in Appendix Table E.3.
Data sources: PIAAC, Hofstede (2001).

VIII. Individualism in the Labor Market

Previous analyses have provided extensive evidence to support the idea that individualism affects the formation of cognitive skills. However, if individualists invest in their skills for reasons that are unrelated to economic incentives (e.g., pure self-fulfillment), these skill effects would not translate into a labor market advantage. Table 7 provides evidence that individualism has a positive impact on wages and employment outcomes. Most importantly, Column (1) shows that individualism is strongly related to hourly wages. If individualism increases by one standard deviation, then hourly wages increase by 8.4 percent. This is approximately half of the average wage return resulting from a one-standard-deviation increase in numeracy skills among prime-age workers (Hanushek et al. 2015). On the extensive margin, we find that migrants from more individualistic cultures are less likely to suffer from unemployment. In Column (2), a one-standard-deviation increase in individualism is associated with a decrease in the probability of being unemployed of 1.9 percentage points—this amounts to a 20 percent decrease relative to the baseline unemployment rate of 9.5 percent.

Table 7. Individualism, Wages, and Employment

	(1)	(2)	(3)	(4)	(5)
	Log hourly wage	Unemployed	Self-employed	Research occupation	Abstract task intensity
Hofstede IDV	0.084***	-0.019***	0.000	0.022***	0.154***
	(0.012)	(0.004)	(0.006)	(0.006)	(0.028)
Age	0.066***	-0.014***	0.005*	0.011***	0.067***
	(0.006)	(0.003)	(0.003)	(0.002)	(0.007)
Age squared (/100)	-0.075***	0.015***	-0.001	-0.012***	-0.075***
	(0.008)	(0.004)	(0.003)	(0.003)	(0.008)
Female	-0.174***	0.014	-0.030***	-0.051***	-0.089*
	(0.024)	(0.008)	(0.006)	(0.013)	(0.048)
Fixed effects	Yes	Yes	Yes	Yes	Yes
R-squared	0.89	0.16	0.20	0.15	0.24
Observations	8,532	11,818	10,471	10,496	10,472
Origin countries	67	68	68	68	68

Notes: The table shows the results for the outcome indicated in the column header in the sample of first-generation migrants. Observations are weighted, giving each destination country the same weight. *Log hourly wage:* excluding bonuses for wage and salary workers (not self-employed). *Unemployed:* dummy variable equal to 1 if respondent is unemployed and 0 if respondent is employed. *Self-employed:* a dummy variable equal to 1 if the person is self-employed and 0 if person is employed. *Research occupation:* a dummy variable equal to 1 if the respondent works in one of the following two-digit ISCO occupations: 21 (science and engineering professionals), 25 (information and communications technology professionals), 26 (legal, social and cultural professionals), and equal to 0 if the respondent works in any other occupation (Gorodnichenko and Roland 2017). *Abstract task:* average of two variables from the U.S. Dictionary of Occupational Titles (DOT): "direction control and planning," measuring managerial and interactive tasks, and "GED Math," measuring mathematical and formal reasoning requirements. Task measures are mapped onto the ISCO occupational classification system (two-digit level) and are normalized to have a mean of 0 and a standard deviation of 1 across occupations (Goos, Manning, and Salomons 2014). Hofstede IDV refers to Hofstede's individualism index and is standardized to a mean of 0 and a standard deviation of 1 in the full international sample. *Fixed effects:* destination country, year of migration, destination country × year of migration, and continent of origin country. Standard errors clustered at the origin-country level reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data sources: PIAAC, Hofstede (2001), Goos, Manning, and Salomons (2014).

However, why do more individualistic migrants have this labor market advantage? First, we consider self-employment, which seems to align well with the idea of individualists seeking freedom and self-fulfillment. However, there is no apparent relationship between individualism and self-employment (Column (3) of Table 7) visible in our data. In a similar vein, it seems plausible that migrants with more individualistic backgrounds choose different types of occupations than their less individualistic counterparts. The results in Columns (4) and (5) of Table 7 support this idea. First, Gorodnichenko and Roland (2017) argue that research-oriented occupations provide a particularly challenging work environment, require independent thought, and allow us to deviate from traditional ways of doing things. They show a positive relationship between individualism and the probability of working in a research-oriented occupation for the United States. In Column (4), we find that their U.S.-specific results also hold in our international analysis. The magnitude of the effect is substantial; a one-standard-deviation increase in individualism increases the likelihood of working in a research-oriented occupation by 2.2 percentage points, which is an increase of 21 percent relative to the baseline share of migrants working in research-oriented occupations (10.5 percent). In line with the previous result, Column (5) shows that migrants from more individualistic cultures are more likely to work in jobs that are pervasive at abstract tasks, such as problem solving, adaptability, and

creativity (as opposed to occupations dominated by manual or routine tasks) (Autor, Levy, and Murnane 2003). A one-standard-deviation increase in individualism is associated with an increase of 0.15 standard deviations in the abstract intensity of a job (e.g., from a health professional to an information and communications technology professional or from an electrical trades worker to a personal care worker). These results for occupational selection also provide a micro-foundation for why more individualistic countries tend to be more innovative (Gorodnichenko and Roland 2017).[41]

IX. Conclusion

"No man is an island", said John Donne, a British poet. While his sentiment is indisputably right, we may acknowledge that some of us are more like islands—peninsulas maybe—than others who seek a landlocked position in this world. Such attitudes and human characteristics shape the societies we live in. Societies differ in many dimensions. One of them describes how loose—or island-esque—the ties between their members are, namely, individualism.

In this paper, we have established a strong positive relationship between individualism and human capital formation in adults. This is in line with the notion of individualists continuously seeking challenges, self-development, and self-fulfillment. Our analysis relies on international skill assessment data, which not only allow the use of thoroughly measured, internationally comparable post-school skill scores but also provide the opportunity to investigate a wide range of relevant mechanisms and labor market outcomes. Our findings are robust across complementary identification strategies that leverage within-country variation in individualism and skills across different specifications and populations. We also employ several robustness and identification checks, which show that the relationship is not driven by confounding factors. Importantly, when comparing the effect of individualism to the effect of other cultural traits, we observe that individualism is more important in explaining skill formation of adults than any other cultural trait emphasized in previous literature.

With this paper, we contribute to economic research that has already demonstrated the power of culture as a factor that influences decision-making in many different dimensions. However, economically relevant aspects of culture and their multifaceted economic implications are far from being systematically explored. The link we establish between individualism and both human capital formation and labor market success is another step toward a thorough economic understanding of culture.

However, the results of this study warrant a careful interpretation; we investigate the effect of individualism on economic outcomes at the *individual* level. While other research has shown that more individualistic countries grow faster and are more prosperous, it is important to acknowledge that individualism can also have negative effects such as reduced social cohesion and cooperation at the societal level. Thus, by no means does our research suggest that there are "better" or "worse" cultures. Instead, we use cultural differences as a vehicle to gain insights

[41] These labor market effects of individualism are also robust when exploiting variation at the language or person level (see Section VI.).

into the formation of human capital and the determinants of individual labor market success. Future research must examine the effects of individualism on other important life outcomes to draw a more complete picture of the role of individualism in economics.

References

Abramitzky, Ran, Leah P. Boustan, and Katherine Eriksson. 2020. "Do Immigrants Assimilate More Slowly Today Than in the Past?" *American Economic Review: Insights*, 2(1): 125–41.

Abramitzky, Ran, Leah P. Boustan, Katherine Eriksson, and Stephanie Hao. 2020. "Discrimination and the Returns to Cultural Assimilation in the Age of Mass Migration." *AEA Papers and Proceedings*, 110: 340–46.

Adserà, Alícia and Mariola Pytliková. 2015. "The Role of Language in Shaping International Migration." *Economic Journal*, 125(586): F49-F81.

Aizer, Anna and Flavio Cunha. 2012. "The Production of Human Capital: Endowments, Investments and Fertility." NBER Working Paper 18429.

Albanese, Giuseppe, Guido de **Blasio, and Paolo Sestito.** 2016. "My Parents Taught Me. Evidence on the Family Transmission of Values." *Journal of Population Economics*, 29(2): 571–92.

Alesina, Alberto and Paola Giuliano. 2015. "Culture and Institutions." *Journal of Economic Literature*, 53(4): 898–944.

Alesina, Alberto, Paola Giuliano, and Nathan Nunn. 2011. "Fertility and the Plough." *American Economic Review*, 101(3): 499–503.

Algan, Yann and Pierre Cahuc. 2010. "Inherited Trust and Growth." *American Economic Review*, 100(5): 2060–92.

Autor, David H., Frank Levy, and Richard J. Murnane. 2003. "The Skill Content of Recent Technological Change: An Empirical Exploration." *Quarterly Journal of Economics*, 118(4): 1279–333.

Baron, Reuben M. and David A. Kenny. 1986. "The Moderator–Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations." *Journal of Personality and Social Psychology*, 51(6): 1173–82.

Bau, Natalie. 2021. "Can Policy Change Culture? Government Pension Plans and Traditional Kinship Practices." *American Economic Review*, 111(6): 1880–917.

Bau, Natalie and Raquel Fernández. 2021. "The Family as a Social Institution." NBER Working Paper 28918.

Bazzi, Samuel, Martin Fiszbein, and Mesay Gebresilasse. 2020. "Frontier Culture: The Roots and Persistence of "Rugged Individualism" in the United States." *Econometrica*, 88(6): 2329–68.

Bazzi, Samuel, Martin Fiszbein, and Mesay Gebresilasse. 2021. ""Rugged Individualism" and Collective (In)Action during the COVID-19 Pandemic." *Journal of Public Economics*, 195.

Behrman, Jere R. and Mark R. Rosenzweig. 2002. "Does Increasing Women's Schooling Raise the Schooling of the Next Generation?" *American Economic Review*, 92(1): 323–34.

Ben-Porath, Yossef. 1967. "The Production of Human Capital and the Life Cycle of Earnings." *Journal of Political Economy*, 75(4): 352–65.

Bian, Bo, Jingjing Li, Ting Xu, and Natasha Z. Foutz. forthcoming. "Individualism during Crises." *Review of Economics and Statistics*.

Bisin, Alberto, Jared Rubin, Avner Seror, and Thierry Verdier. 2021. "Culture, Institutions & the Long Divergence." CESifo Working Paper 8900.

Bisin, Alberto and Thierry Verdier. 2000. ""Beyond the Melting Pot": Cultural Transmission, Marriage, and the Evolution of Ethnic and Religious Traits." *Quarterly Journal of Economics*, 115(3): 955–88.

Bisin, Alberto and Thierry Verdier. 2001. "The Economics of Cultural Transmission and the Dynamics of Preferences." *Journal of Economic Theory*, 97(2): 298–319.

Björklund, Anders and Marks Jäntti. 2011. "Intergenerational Income Mobility and the Role of Family Background." In *The Oxford Handbook of Economic Inequality*, ed. Brian Nolan, Wiemer Salverda, and Timothy M. Smeeding, 522–48. Oxford: Oxford University Press.

Björklund, Anders and Marks Jäntti. 2012. "How Important Is Family Background for Labor-Economic Outcomes?" *Labour Economics*, 19(4).

Black, Sandra E. and Paul J. Devereux. 2011. "Recent Developments in Intergenerational Mobility." In *Handbook of Labor Economics*, ed. David Card and Orley C. Ashenfelter, 1487–541. Amsterdam, New York: Elsevier.

Black, Sandra E., Paul J. Devereux, and Kjell G. Salvanes. 2005. "Why the Apple Doesn't Fall Far: Understanding Intergenerational Transmission of Human Capital." *American Economic Review*, 95(1): 437–49.

Bleakley, Hoyt and Joseph Ferrie. 2016. "Shocking Behavior: Random Wealth in Antebellum Georgia and Human Capital Across Generations." *Quarterly Journal of Economics*, 131(3): 1455–95.

Borjas, George J. 1987. "Self-Selection and the Earnings of Immigrants." *American Economic Review*, 77(4): 531–53.

Budiman, Abby and Neil G. Ruiz. 2019. Key Facts about Asian Origin Groups in the U.S. Online: https://www.pewresearch.org/fact-tank/2019/05/22/key-facts-about-asian-origin-groups-in-the-u-s/ (accessed September 1, 2021).

Cadena, Brian C. and Benjamin J. Keys. 2015. "Human Capital and the Lifetime Costs of Impatience." *American Economic Journal: Economic Policy*, 7(3): 126–53.

Castillo, Marco, Paul Ferraro, Jeffrey Jordan, and Ragan Petrie. 2011. "The Today and Tomorrow of Kids: Time Preferences and Educational Outcomes of Children." *Journal of Public Economics*, 95(11-12): 1377–85.

Cavalli-Sforza, Luigi L. and Marcus W. Feldman. 1981. *Cultural Transmission and Evolution. A Quantitative Approach*. Princeton: Princeton Univ. Press.

Chen, Chinchih, Carl B. Frey, and Giorgio Presidente. 2021. "Culture and Contagion: Individualism and Compliance with COVID-19 Policy." *Journal of Economic Behavior & Organization*, 190: 191–200.

Choi, Incheol and Richard E. Nisbett. 1998. "Situational Salience and Cultural Differences in the Correspondence Bias and Actor-Observer Bias." *Personality and Social Psychology Bulletin*, 24(9): 949–60.

Cunha, Flavio and James J. Heckman. 2007. "The Technology of Skill Formation." *American Economic Review*, 97(2): 31–47.

Cunha, Flavio, James J. Heckman, and Susanne M. Schennach. 2010. "Estimating the Technology of Cognitive and Noncognitive Skill Formation." *Econometrica*, 78(3): 883–931.

De Philippis, Marta and Federico Rossi. 2021. "Parents, Schools and Human Capital Differences Across Countries." *Journal of the European Economic Association*, 19(2): 1364–406.

Dionne, E. J. 2012. *Our divided political heart. The battle for the American idea in an age of discontent*. New York, Berlin: Bloomsbury.

Dohmen, Thomas, Armin Falk, David Huffman, and Uwe Sunde. 2010. "Are Risk Aversion and Impatience Related to Cognitive Ability?" *American Economic Review*, 100(3): 1238–60.

Dohmen, Thomas, Armin Falk, David Huffman, and Uwe Sunde. 2012. "The Intergenerational Transmission of Risk and Trust Attitudes." *Review of Economic Studies*, 79(2): 645–77.

Duncan, Brian and Stephen J. Trejo. 2007. "Ethnic Identification, Intermarriage, and Unmeasured Progress by Mexican Americans." In *Mexican Immigration to the United States*, ed. George J. Borjas, 229–68. Chicago: University of Chicago Press.

Duncan, Brian and Stephen J. Trejo. 2011. "Intermarriage and the Intergenerational Transmission of Ethnic Identity and Human Capital for Mexican Americans." *Journal of Labor Economics*, 29(2): 195–227.

Erikson, Erik H. 1968. *Identity: Youth and crisis*. New York: Norton.

Falk, Armin, Anke Becker, Thomas Dohmen, Benjamin Enke, David Huffman, and Uwe Sunde. 2018. "Global Evidence on Economic Preferences." *Quarterly Journal of Economics*, 133(4): 1645–92.

Fernández, Raquel. 2011. "Does Culture Matter?" In *Handbook of Social Economics*. 1st ed., ed. Jess Benhabib, Alberto Bisin, and Matthew O. Jackson, 481–510. San Diego, Amsterdam: Elsevier/North Holland.

Fernández, Raquel and Alessandra Fogli. 2009. "Culture: An Empirical Investigation of Beliefs, Work, and Fertility." *American Economic Journal: Macroeconomics*, 1(1): 146–77.

Figlio, David, Paola Giuliano, Umut Özek, and Paola Sapienza. 2019. "Long-Term Orientation and Educational Performance." *American Economic Journal: Economic Policy*, 11(4): 272–309.

Fincher, Corey L., Randy Thornhill, Damian R. Murray, and Mark Schaller. 2008. "Pathogen Prevalence Predicts Human Cross-Cultural Variability in Individualism/Collectivism." *Proceedings of the Royal Society of London, Series B: Biological Sciences*, 275: 1279–85.

Galor, Oded and Ömer Özak. 2016. "The Agricultural Origins of Time Preference." *American Economic Review*, 106(10): 3064–103.

Galor, Oded, Ömer Özak, and Assaf Sarid. 2018. "Geographical Roots of the Coevolution of Cultural and Linguistic Traits." NBER Working Paper 25289.

Giuliano, Paola and Nathan Nunn. 2021. "Understanding Cultural Persistence and Change." *Review of Economic Studies*, 88(4): 1541–81.

Golsteyn, Bart, Hans Grönqvist, and Lena Lindahl. 2014. "Adolescent Time Preferences Predict Lifetime Outcomes." *Economic Journal*, 124(580): F739-F761.

Goncalo, Jack A. and Barry M. Staw. 2006. "Individualism–Collectivism and Group Creativity." *Organizational Behavior and Human Decision Processes*, 100(1): 96–109.

Goos, Maarten, Alan Manning, and Anna Salomons. 2014. "Explaining Job Polarization: Routine-Biased Technological Change and Offshoring." *American Economic Review*, 104(8): 2509–26.

Gorodnichenko, Yuriy and Gerard Roland. 2011a. "Individualism, Innovation, and Long-Run Growth." *Proceedings of the National Academy of Sciences of the United States of America*, 108(Supplement 4): 21316–19.

Gorodnichenko, Yuriy and Gerard Roland. 2011b. "Which Dimensions of Culture Matter for Long-Run Growth?" *American Economic Review*, 101(3): 492–98.

Gorodnichenko, Yuriy and Gerard Roland. 2012. "Understanding the Individualism-Collectivism Cleavage and Its Effects: Lessons from Cultural Psychology." In *Institutions and Comparative Economic Development*, ed. Masahiko Aoki, Timur Kuran, and Gerard Roland, 213–36. London: Palgrave Macmillan.

Gorodnichenko, Yuriy and Gerard Roland. 2017. "Culture, Institutions, and the Wealth of Nations." *The Review of Economics and Statistics*, 99(3): 402–16.

Gorodnichenko, Yuriy and Gerard Roland. 2021. "Culture, Institutions and Democratization." *Public Choice*, 187: 165–95.

Greenfield, Patricia M. 2000. "Three Approaches to the Psychology of Culture: Where Do They Come From? Where Can They Go?" *Asian Journal of Social Psychology*, 3(3): 223–40.

Greif, Avner. 1994. "Cultural Beliefs and the Organization of Society: A Historical and Theoretical Reflection on Collectivist and Individualist Societies." *Journal of Political Economy*, 102(5): 912–50.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales. 2006. "Does Culture Affect Economic Outcomes?" *Journal of Economic Perspectives*, 20(2): 23–48.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales. 2011. "Civic Capital as the Missing Link." In *Handbook of Social Economics*. 1st ed., ed. Jess Benhabib, Alberto Bisin, and Matthew O. Jackson, 417–80. San Diego, Amsterdam: Elsevier/North Holland.

Hanushek, Eric A., Lavinia Kinne, Philipp Lergetporer, and Ludger Woessmann. forthcoming. "Culture and Student Achievement: The Intertwined Roles of Patience and Risk-Taking." *Economic Journal*.

Hanushek, Eric A., Guido Schwerdt, Simon Wiederhold, and Ludger Woessmann. 2015. "Returns to Skills around the World: Evidence from PIAAC." *European Economic Review*, 73: 103–30.

Hanushek, Eric A., Guido Schwerdt, Simon Wiederhold, and Ludger Woessmann. 2017. "Coping with Change: International Differences in the Returns to Skills." *Economics Letters*, 153: 15–19.

Hanushek, Eric A. and Ludger Woessmann. 2008. "The Role of Cognitive Skills in Economic Development." *Journal of Economic Literature*, 46(3): 607–68.

Hanushek, Eric A. and Lei Zhang. 2009. "Quality-Consistent Estimates of International Schooling and Skill Gradients." *Journal of Human Capital*, 3(2): 107–43.

Heckman, James J. 2008. "Schools, Skills, and Synapses." *Economic Inquiry*, 46(3): 289–324.

Heckman, James J. and Rodrigo Pinto. 2015. "Causal Analysis After Haavelmo." *Econometric theory*, 31(1): 115–51.

Heckman, James J., Rodrigo Pinto, and Peter Savelyev. 2013. "Understanding the Mechanisms Through Which an Influential Early Childhood Program Boosted Adult Outcomes." *American Economic Review*, 103(6): 2052–86.

Heine, Steven. 2007. *Cultural Psychology*. New York: Norton.

Hofstede, Geert. 2001. *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations*. Thousand Oaks: SAGE Publications.

Hofstede, Geert. 2013. "Values Survey Module 2013. Questionnaire - English Language Version (Release: May 2013)."

Hofstede, Geert and Michael Minkov. 2013. "Values Survey Module 2013 Manual."

Hornsey, Matthew J., Jolanda Jetten, Brendan McAuliffe, and Michael A. Hogg. 2006. "The Impact of Individualist and Collectivist Group Norms on Evaluations of Dissenting Group Members." *Journal of Experimental Social Psychology*, 42(1): 57–68.

Inglehart, Ronald, C. Haerpfer, A. Moreno, C. Welzel, K. Kizilova, J. Diez-Medrano, M. Lagos, P. Norris, E. Ponarin, B. Puranen, and et al. (eds.), ed. 2014. *World Values Survey: All Rounds – Country-Pooled Datafile*. Madrid, Vienna: JD Systems Institute; WVSA Secretariat.

Ivtzan, Itai. 2008. "Self Actualisation: For Individualistic Cultures Only." *International Journal on Humanistic Ideology*, 1(2): 111–38.

Jäntti, Marks and Stephen P. Jenkins. 2013. "Income Mobility." In *Handbook of Income Distribution*, ed. Anthony B. Atkinson and François Bourguignon, 807–935. Amsterdam, New York: Elsevier/North Holland.

Kagitcibasi, Cigdem and John W. Berry. 1989. "Cross-Cultural Psychology: Current Research and Trends." *Annual review of psychology*, 40(1): 493–531.

Kashima, Emiko S. and Yoshihisa Kashima. 1998. "Culture and Language." *Journal of Cross-Cultural Psychology*, 29(3): 461–86.

Kling, Jeffrey R., Jeffrey B. Liebman, and Lawrence F. Katz. 2007. "Experimental Analysis of Neighborhood Effects." *Econometrica*, 75(1): 83–119.

Krieger, Tim, Laura Renner, and Jens Ruhose. 2018. "Long-Term Relatedness between Countries and International Migrant Selection." *Journal of International Economics*, 113: 35–54.

Mayer, Thierry and Soledad Zignago. 2011. "Notes on CEPII's Distances Measures: The GeoDist Database." Centre d'Études Prospectives et d'Information Internationales Working Paper 2011-25.

Melitz, Jacques and Farid Toubal. 2014. "Native Language, Spoken Language, Translation and Trade." *Journal of International Economics*, 93(2): 351–63.

Nisbett, Richard E., Kaiping Peng, Incheol Choi, and Ara Norenzayan. 2001. "Culture and Systems of Thought: Holistic versus Analytic Cognition." *Psychological Review*, 108(2): 291.

Obradovich, Nick, et al. 2020. "Expanding the Measurement of Culture with a Sample of Two Billion Humans." NBER Working Paper 27827.

OECD. 2013. "OECD Skills Outlook 2013: First Results from the Survey of Adult Skills." Organisation for Economic Cooperation and Development.

Olsson, Ola and Christopher Paik. 2016. "Long-Run Cultural Divergence: Evidence from the Neolithic Revolution." *Journal of Development Economics*, 122: 197–213.

Oyserman, Daphna, Heather M. Coon, and Markus Kemmelmeier. 2002. "Rethinking Individualism and Collectivism: Evaluation of Theoretical Assumptions and Meta-Analyses." *Psychological Bulletin*, 128(1): 3–72.

Parey, Matthias, Jens Ruhose, Fabian Waldinger, and Nicolai Netz. 2017. "The Selection of High-Skilled Emigrants." *Review of Economics and Statistics*, 99(5): 776–92.

Patt, Alexander, Jens Ruhose, Simon Wiederhold, and Miguel Flores. 2021. "International Emigrant Selection on Occupational Skills." *Journal of the European Economic Association*, 19(2): 1249–98.

Phinney, Jean S. and Anthony D. Ong. 2007. "Conceptualization and Measurement of Ethnic Identity: Current Status and Future Directions." *Journal of Counseling Psychology*, 54(3): 271–81.

Plug, Erik. 2004. "Estimating the Effect of Mother's Schooling on Children's Schooling Using a Sample of Adoptees." *American Economic Review*, 94(1): 358–68.

Rouse, Cecilia E. and Lisa Barrow. 2006. "U.S. Elementary and Secondary Schools: Equalizing Opportunity or Replicating the Status Quo?" *The Future of children*, 16(2): 99–123.

Rüber, Ina E., Sai-Lila Rees, and Bernhard Schmidt-Hertha. 2018. "Lifelong Learning – Lifelong Returns? A New Theoretical Framework for the Analysis of Civic Returns on Adult Learning." *International Review of Education*, 64(5): 637–56.

Ruble, Diane N., et al. 2004. "The Development of a Sense of "We": The Emergence and Implications of Children's Collective Identity." In *The Development of the Social Self*, ed. Mark Bennett and Fabio Sani, 22–76. New York: Psychology Press.

Sacerdote, Bruce. 2002. "The Nature and Nurture of Economic Outcomes." *American Economic Review*, 92(2): 344–48.

Schulz, Jonathan F., Duman Bahrami-Rad, Jonathan P. Beauchamp, and Joseph Henrich. 2019. "The Church, Intensive Kinship, and Global Psychological Variation." *Science*, 366(6466).

Sunde, Uwe, Thomas Dohmen, Benjamin Enke, Armin Falk, David Huffman, and Gerrit Meyerheim. forthcoming. "Patience and Comparative Development." *Review of Economic Studies*.

Tabellini, Guido. 2008. "Institutions and Culture." *Journal of the European Economic Association*, 6(2-3): 255–94.

Triandis, Harry C. 1995. *New Directions in Social Psychology*, *Individualism and Collectivism*. Boulder: Routledge.

van Dijk, Marloes P., William W. Hale, Skyler T. Hawk, Wim Meeus, and Susan Branje. 2020. "Personality Development from Age 12 to 25 and its Links with Life Transitions." *European Journal of Personality*, 34(3): 322–44.

Waterman, Alan S. 1981. "Individualism and Interdependence." *American Psychologist*, 36(7): 762–73.

Waterman, Alan S. 1984. *The Psychology of Individualism*. New York: Praeger.

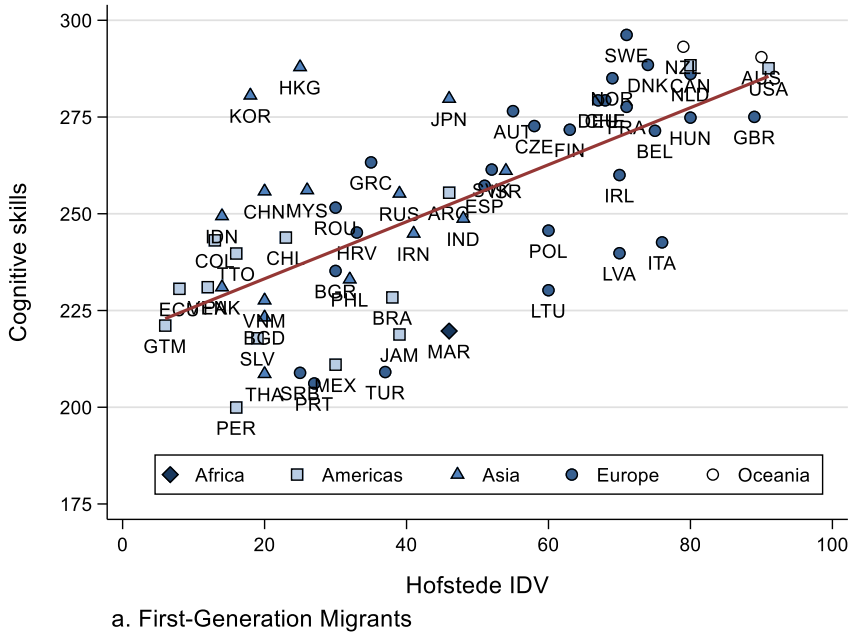
Way, Baldwin M. and Matthew D. Lieberman. 2010. "Is There a Genetic Contribution to Cultural Differences? Collectivism, Individualism and Genetic Markers of Social Sensitivity." *Social cognitive and affective neuroscience*, 5(2-3): 203–11.

Zabal, Anouk, Silke Martin, and Beatrice Rammstedt. 2016. "PIAAC-L Data Collection 2014: Technical Report; Follow-up to PIAAC Germany 2012." GESIS Papers 2016/17.

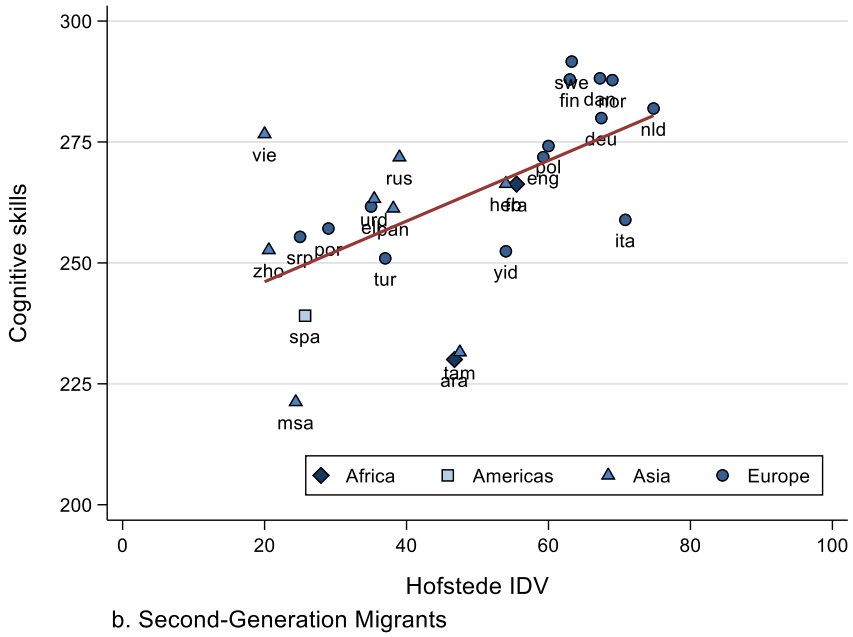
Online Appendix (NOT FOR PUBLICATION)

A. Further Tables and Figures

Figure A.1. Individualism and Cognitive Skills: First- and Second-Generation Migrants



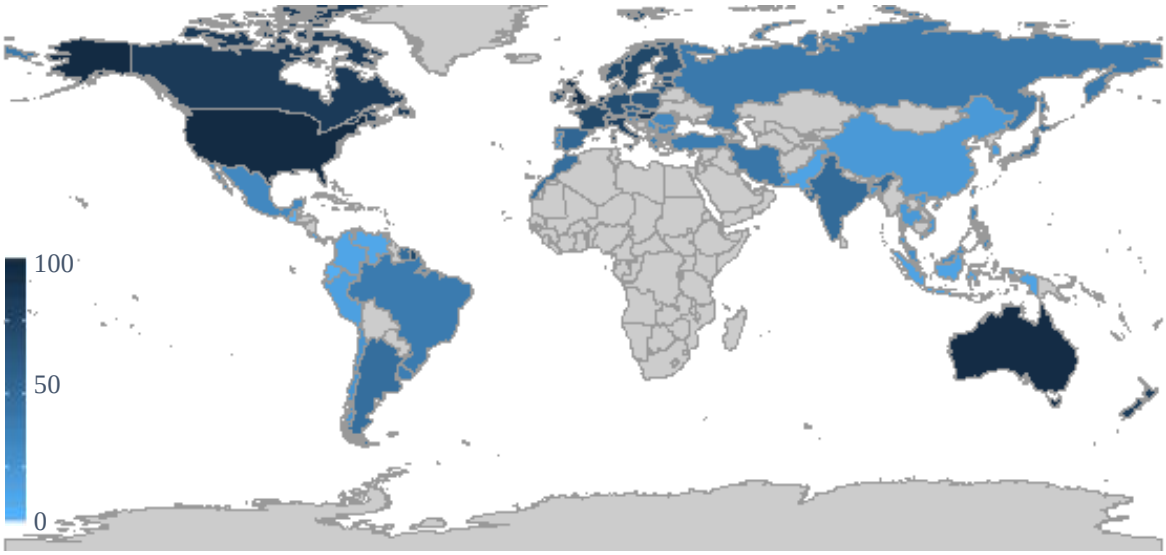
a. First-Generation Migrants



b. Second-Generation Migrants

Notes: The figure establishes the positive association between individualism and numeracy skills in a country. Hofstede IDV refers to Hofstede's individualism index. PIAAC numeracy scores and Hofstede IDV are aggregated at the origin-country level for first-generation migrants (top panel) and origin-language level for second-generation migrants (bottom panel). To meaningfully compute country averages, we restrict the analytical sample to origin countries/languages with at least 30 migrants.
Data source: PIAAC, Hofstede (2001).

Figure A.2. Individualism Around the World



Notes: The figure shows Hofstede IDV scores for all origin countries of first-generation migrants observed in PIAAC. Hofstede IDV refers to Hofstede's individualism index. Gray color indicates missing values (either because nobody originates from these countries in PIAAC or because no Hofstede IDV score is available for these countries).
Data source: Hofstede (2001).

Table A.1. Summary Statistics

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Epidemiological approach						
	First-generation migrants			Second-generation migrants		
	Mean	SD	N	Mean	SD	N
Culture						
Hofstede IDV	48.5	24.2	15,349	61.4	21.4	13,372
Hofstede LTO	51.6	21.8	15,349	52.9	18.6	13,372
Skills and education						
Numeracy	251.9	63.6	15,349	266.1	56.5	13,372
Years of schooling	13.2	3.4	15,150	12.6	3.0	13,177
University degree	0.447	0.497	15,312	0.340	0.474	13,366
Training on-the-job	0.267	0.442	14.909	0.313	0.464	12,509
Any other training	0.354	0.478	14,909	0.385	0.487	12,511
Training to increase knowledge	0.231	0.421	5,426	0.247	0.432	5,152
Read newspaper	4.012	1.299	15,346	4.096	1.245	13,372
Read professional journals	2.409	1.418	15,337	2.378	1.363	13,366
Read books	3.023	1.512	15,343	3.009	1.501	13,371
Labor market outcomes						
Hourly wage (PPP USD)	17.2	10.8	8,532	17.7	11.5	7.386
Unemployed	0.099	0.299	11,818	0.086	0.280	10,225
Self-employed	0.128	0.335	10,471	0.140	0.347	9,156
Research occupation	0.104	0.305	10,496	0.088	0.283	9,175
Abstract task intensity	0.266	0.989	10,472	0.357	0.953	9,110
Demographics						
Age	40.6	12.7	15,349	39.4	14.9	13,372
Female	0.558	0.497	15,349	0.512	0.500	13,372
Year of migration	1993	14.9	15,349	–	–	–

Table continued on next page.

Table A.1 continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel B: Person-Level approach									
	First-generation migrants			Second-generation migrants			Natives		
	Mean	SD	N	Mean	SD	N	Mean	SD	N
Culture									
Person-level IDV	-0.006	1.01	21,451	0.021	1.000	17,869	-0.037	1.009	159,068
Skills and education									
Numeracy	247.0	63.2	21,451	266.4	54.3	17,869	265.6	53.5	159,068
Years of schooling	12.9	3.4	21,175	12.5	3.0	17,670	12.4	3.2	157,166
University degree	0.415	0.493	21,390	0.337	0.473	17,861	0.315	0.465	159,025
Training on-the-job	0.258	0.438	20,781	0.299	0.458	16,752	0.275	0.447	150,724
Any other training	0.336	0.472	20,780	0.359	0.480	16,756	0.317	0.465	150,724
Training to increase knowledge	0.228	0.419	7,343	0.248	0.432	6,571	0.244	0.429	54,991
Read newspaper	3.937	1.335	21,445	4.061	1.252	17,868	3.945	1.316	159,047
Read professional journals	2.363	1.421	21,434	2.387	1.359	17,860	2.314	1.331	159,021
Read books	2.986	1.515	21,446	2.981	1.488	17,867	2.770	1.471	159,035
Labor market outcomes									
Hourly wage (PPP USD)	16.2	10.3	11,645	15.7	11.1	9,471	15.6	10.1	82,649
Unemployed	0.110	0.312	16,273	0.094	0.292	13,421	0.082	0.274	115,503
Self-employed	0.123	0.328	14,261	0.135	0.342	11,904	0.146	0.353	103,360
Research occupation	0.095	0.293	14,296	0.085	0.278	11,954	0.073	0.261	103,961
Abstract task intensity	0.200	0.977	14,266	0.315	0.961	11,877	0.193	0.941	103,335
Demographics									
Age	40.5	12.9	21,451	39.5	14.8	17,869	40.0	14.4	159,068
Female	0.550	0.497	21,451	0.524	0.499	17,869	0.530	0.499	159,068
Year of migration	1992	14.7	21,451	–	–	–	–	–	–

Notes: The table shows summary statistics for our main estimation samples in the epidemiological approach with Hofstede individualism (IDV) (Panel A) and in the extension based on person-level IDV (Panel B). Observations are weighted, giving each destination country the same weight.
Data sources: PIAAC, Hofstede (2001).

Table A.2. Summary Statistics (PIAAC-L)

	(1)	(2)	(3)
	Mean	SD	N
Hofstede IDV	54.4	13.5	821
Numeracy in 2015	273.4	51.3	821
Numeracy in 2012	272.7	50.3	821
Age	43.5	13.1	821
Female	0.518	–	821
Year of migration	1990	12.5	250
Second-generation migrant	0.692	–	821

Notes: Table shows summary statistics for the German PIAAC-L sample (joint sample of first- and second-generation migrants).
Data sources: PIAAC-L, Hofstede (2001).

Table A.3. Individualism and Cognitive Skills: Hofstede IDV with Conditioning on Family Background

	(1)	(1)	(2)	(3)
Hofstede IDV	0.290***	0.219***	0.215***	0.192***
	(0.049)	(0.038)	(0.033)	(0.030)
Age	0.021**	0.032***	0.017*	0.025***
	(0.009)	(0.008)	(0.008)	(0.008)
Age squared (/100)	-0.045***	-0.049***	-0.038***	-0.043***
	(0.009)	(0.008)	(0.008)	(0.008)
Female	-0.227***	-0.236***	-0.254***	-0.249***
	(0.025)	(0.024)	(0.022)	(0.023)
Fixed effects	Yes	Yes	Yes	Yes
Parental background				
Education father		Yes		Yes
Education mother		Yes		Yes
Books at home at age 15			Yes	Yes
R-squared	0.24	0.31	0.32	0.35
Observations	15,349	14,490	14,490	14,490
Origin countries	68	68	68	68

Notes: The table shows the results for numeracy test scores in the sample of first-generation migrants. Observations are weighted, giving each destination country the same weight. The numeracy test scores are demeaned and are standardized using the standard deviation of the full international sample as "numeraire." Hofstede IDV refers to Hofstede's individualism index and is standardized using the standard deviation of the full international sample as "numeraire.". *Fixed effects:* destination country, year of migration, destination country × year of migration, and continent of origin country. *Education* is assessed in three categories for the father and the mother: less than upper secondary (ISCED 1, 2, and 3C short), upper secondary (ISCED 3 (excluding 3C short) and 4), and tertiary (ISCED 5 and 6). *Books at home at age 15* is assessed in six categories: 10 books or less, 11 to 25 books, 26 to 100 books, 101 to 200 books, 201 to 500 books, and More than 500 books. Standard errors clustered at the origin-country level reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data sources: PIAAC, Hofstede (2001).

Table A.4. Individualism and Cognitive Skills: Different Definitions of Hofstede IDV in the German PIAAC Sample

	(1)	(2)
Hofstede IDV based on parental country of birth	0.198**	
	(0.092)	
Hofstede IDV based on language learnt in childhood		0.244***
		(0.077)
Age	0.091***	0.087***
	(0.009)	(0.004)
Age squared (/100)	-0.118***	-0.116***
	(0.012)	(0.006)
Female	-0.317***	-0.327***
	(0.046)	(0.027)
Continental fixed effects	Yes	Yes
R-squared	0.12	0.13
Observations	898	898

Notes: The table shows the results for numeracy test scores in the German sample of second-generation migrants (2012 PIAAC wave). Numeracy test scores are demeaned and are standardized using the standard deviation of the full international sample as "numeraire." Hofstede IDV refers to Hofstede's individualism index and is standardized using the standard deviation of the full international sample as "numeraire." In Column (1), Hofstede IDV is assigned to migrants based on parental country of birth. We use the average of the Hofstede IDV scores of the birth countries of mother and father; in the few cases (2 percent) in which the respondent reports the birth country of only one parent, we use the Hofstede IDV score of the respective country. In Column (2), Hofstede IDV is assigned to migrants based on the language learnt in childhood. *Continental fixed effects* are included for each combination of the respondent's, the father's, and the mother's country of birth. Standard errors clustered at the all combinations of father's and mother's country of birth in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data sources: PIAAC Germany, Hofstede (2001).

B. Measuring Individualism

B.1 Hofstede Individualism (IDV)

Individualism is one of six cultural dimensions developed by Geert Hofstede. Thus, we obtain the individualism scores directly from the Hofstede database—together with the scores for the other Hofstede dimensions.[1] The Hofstede database is an established data source in economics (see, e.g., Gorodnichenko and Roland 2017). In our analysis, we use those culture scores that refer to specific *countries* rather than broad geographical *regions* of the world, leaving us with 69 Hofstede IDV country scores.

Of these 69 Hofstede IDV scores, the vast majority (50) stem from two waves of workplace surveys that Hofstede conducted among IBM employees in the respective countries in the late 1960s and early 1970s. The remaining scores (19) are based on extensions and replications of the original IBM survey (see, for instance, Nasierowski and Mikula 1998 for Poland, Huettinger 2008 for Latvia and Lithuania as well as Hofstede 2001 for an overview of all countries and surveys in the database).

The original Hofstede IDV scores were derived through factor analysis based on 14 work goal items from the IBM survey (see Appendix 1A in Hofstede 2001 for a complete list of these items). However, Hofstede (2001) describes six main items as the core of his individualism index:

In choosing an ideal job, how important would it be to you to ...

(IBM-A5) ... have challenging work to do—work from which you can get a personal sense of accomplishment

(IBM-A9) ... have training opportunities (to improve your skills and to learn new skills)

(IBM-A12) ... have good physical working conditions (good ventilation and lighting, adequate work space, etc.)

(IBM-A13) ... have considerable freedom to adapt your own approach to the job

(IBM-A17) ... fully use your skills and abilities on the job

(IBM-A18) ... have a job, which leaves you sufficient time for your personal or family life.

These items are often referred to as the original Hofstede IDV items, even though the original index is based on 14 items. The index loads positively on items IBM-A5 (loading: 0.46), IBM-A13 (0.49), and IBM-A18 (0.86), and negatively on IBM-A9 (-0.82), IBM-A12 (-0.69), and IBM-A17 (-0.63) (Hofstede 2001). Notably, aspects associated with the *person / individual* carry a positive loading, while items referring to *conditions* at the workplace load negatively. At first glance, it may be surprising to see a negative factor loading on the items related to training and use of skills given that we find positive effects of individualism on training and skills. However, Hofstede (2001) considers the training item as part of the

[1] See https://geerthofstede.com/research-and-vsm/dimension-data-matrix/; we use the most current version (version 2015 12 08). The other Hofstede dimensions are long-term orientation, power distance, masculinity, uncertainty avoidance, and indulgence.

workplace conditions that individualists care traditionally less about than the type of work (challenging, flexible) they perform. Individualists strive to increase their skills independent of the offers made by the employer. If training offers are, for instance, unsatisfactory, individualists will resort to other strategies, such as learning-by-doing, private-life learning behavior, or informal/nonformal training (as also becomes evident in the mediation analysis in Section VII.C). Furthermore, individualists are not looking for jobs that fit their skill profiles perfectly (to avoid shame and embarrassment, which is very important in collectivist societies) but rather for jobs that provide challenges and room to grow. The subtleties in the meaning behind the items thus explain the negative loadings of training and skill use in the Hofstede IDV index.

Due to their intricacies, neither the training nor the skill use items enter our person-level IDV measure (see Appendix B.4 for a detailed description). Instead, we use items IBM-A5 and IBM-A13 from the original IBM survey, which capture the type of work that is performed. Additionally, we use two items from Hofstede's Values Survey Module (*VSM*; Hofstede 2013; Hofstede and Minkov 2013). The VSM questionnaire was created (and adapted over the years) to facilitate further research and replication outside of the specific IBM environment (Hofstede 2001). Usually, four items measure Hofstede IDV in the VSM. Two of the VSM questionnaire items designed to capture individualism are particularly useful as an additional theoretical foundation of our person-level IDV index items. They highlight particular nuances of the original "challenging work" item that can be more readily captured by private-life questions (as in our index): VSM 1994 item 08 measures to which extent a person values "an element of *variety and adventure* in the job". The VSM 2013 version of the same item (item 06 in VSM 2013) captures the desire for doing "work that is *interesting*". Thus, we make use of both Hofstede's original IBM survey as well as the VSM to capture the essence of Hofstede IDV in our person-level IDV measure.

B.2 Assignment of Cultural Background to Second-Generation Migrants

For second-generation migrants, we construct aggregate measures of cultural background at the language level, following Figlio et al. (2019). Wherever possible, we use the first language a second-generation migrant learnt at home in childhood and still understands. If this language is identical to a main language of the destination country, we turn to the second language the migrant learnt during childhood and still understands (if applicable) or the language currently mostly spoken at home. We call this language the *origin language*.

For most languages, there is a one-to-one association between language and origin country (e.g., Tagalog – Philippines). For languages spoken in multiple countries, we assign the migrant an individualism score that is a weighted average of the individualism scores of countries in which that language is an official or regionally spoken language (see below for the construction of weights). The language-country connections are based on data from the 17th version of the Ethnologue (Figlio et al. 2019). We extend these data by using

information from the CIA Factbook and Encyclopaedia Britannica on the incidence of official and regional languages. Using these data, we match each country for which a Hofstede IDV index is available to the languages spoken by the native population in this country. We focus on those languages that are either official, region-specific official or otherwise recognized as a native language of the country. This means that we also consider such languages that do not fit the official criterion but are (quasi) uniquely assignable to a specific country (e.g., some indigenous languages, such as Mapuche in Argentina (non-official) and Chile (region-specific official)). For languages that show up in at least one Hofstede country but whose main source country is not in the Hofstede dataset, we assign all Hofstede countries that share a border with the missing main source country, relying on the idea that countries which are geographically close to each other are also culturally close.[2]

We weight the country-level Hofstede IDV scores by the relative share of first-generation migrants in the PIAAC data who moved from each of the countries to the country where the second-generation migrant resides. Thus, for each PIAAC country, we compute the share of first-generation migrants by country of origin. This relative share of first-generation migrants from a country is then used as a weight for the respective Hofstede IDV score. Consider "Portuguese in France" as an illustrative example: 96 percent of Portuguese-reporting first-generation migrants in France are from Portugal, 4 percent are from Brazil. Thus, if a second-generation migrant in France reports Portuguese as the first language learnt at home in childhood, we assign 96 percent of the weight to Portugal and 4 percent to Brazil when calculating the language-based Hofstede IDV score. If for any language there are no matching first-generation migrants in our data set, each country-level Hofstede IDV score receives the same weight. These country-language-pair-specific Hofstede IDV scores are then assigned to each second-generation migrant.

B.3 Alternative Measures of Individualism

In addition to Hofstede's IDV index, we also use further measures of individualism (and the associated concept of collectivism) to show that our results do not only hold for one specific concept of individualism.

GLOBE Measure.—The first alternative to Hofstede IDV is the measure of collectivism taken from the GLOBE survey. The 2004 GLOBE data (House 2004) are based on a survey of 17,000 mid-level managers (banking, telecommunications, and food processing) from 62 countries. Among other Hofstede-related concepts like power distance, the study measures collectivism. Collectivism describes societies in which ties between individuals are strong and collective success leads to feelings of pride. Generally, our favored collectivism measure is practical in-group collectivism, as it is based on actual behavior rather than normative values and on actual life-choices rather than the design of institutions. The

[2] We omit "Romani" because it is a non-territorial language.

following items (each measured on a seven-point Likert scale) are used to determine the practical in-group collectivism score (Gelfand et al. 2004):

"In this society, children take pride in the individual accomplishments of their parents."

"In this society, parents take pride in the individual accomplishments of their children."

"In this society, aging parents generally live at home with their children."

"In this society, children generally live at home with their parents until they get married."

A stronger agreement to these questions indicates a higher degree of collectivism (and, vice versa, a lower degree of individualism). Content-wise, this collectivism measure differs substantially from Hofstede IDV as it focuses on private-life decisions instead of workplace behavior.

Suh Measure.—Another alternative individualism measure comes from Suh et al. (1998). This index needs to be used with caution though, as it is simply a mixture of the Hofstede index and the country categorization of individualism by Harry Triandis. Data for the Suh individualism measure stem from Fincher et al. (2008).

Schwartz Measure.—Lastly, we also measure individualism using the Schwartz scale for intellectual and affective autonomy, referring to autonomy of thinking and enjoying life, respectively. Intellectual autonomy values the pursuit of own ideas, creativity, and curiosity. Affective autonomy deals with affectively positive experiences like living an exciting life (Schwartz 2008). As the broad description of these concepts already suggests, they are not directly related to workplace behavior. The Schwartz (1992, 1994) survey was first administered to teachers and university students in 1988 and has since been continuously extended, so that 73 country scores for autonomy are available. The study asks respondents about the subjective importance of around 50 values as *guiding principles* in their life, nine of which are used to calculate the affective and intellectual autonomy scores *("freedom (freedom of action and thought)"* and *"a varied life (filled with challenge, novelty and change)"* are examples for values corresponding to intellectual and affective autonomy, respectively). For a complete list of items used to derive the autonomy measures, see Schwartz (2009).

Robustness Results Using Alternative Measures of Individualism.—In Table B.1, we apply the epidemiological approach using the country-level individualism measures discussed above. Reassuringly, the individualism coefficients are very similar to the coefficient based on Hofstede IDV. The GLOBE measure depicts collectivism rather than individualism, which explains its negative association with skills. Thus, our results are highly robust to different measures of individualism at the country level.

Table B.1. Individualism and Cognitive Skills: Alternative Measures of Individualism

	(1)	(2)	(3)	(4)	(5)
Hofstede IDV	0.290***				
	(0.049)				
GLOBE in-group collectivism		-0.430***			
		(0.052)			
Suh individualism			0.321***		
			(0.059)		
Schwartz affective autonomy				0.322***	
				(0.042)	
Schwartz intellectual autonomy					0.240***
					(0.057)
Covariates	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes
R-squared	0.24	0.27	0.26	0.24	0.21
Observations	15,349	13,735	12,805	16,135	16,135
Origin countries	68	57	56	72	72

Notes: The table shows the results for numeracy test scores in the sample of first-generation migrants. Observations are weighted such that each destination country receives a weight of one. Numeracy test scores are standardized to a mean of 0 and a standard deviation of 1 in the full international sample. Hofstede individualism (IDV) and the other individualism/collectivism measures are standardized to a mean of 0 and a standard deviation of 1 in the full international sample. See text for the definition of further variables. *Covariates:* age, age squared, and gender. *Fixed effects:* destination country, year of migration, destination country × year of migration, and continent of origin country. Standard errors clustered at the origin-country level reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data Sources: PIAAC, Hofstede (2001), Schwartz (1994), House (2004), Suh et al. (1998).

B.4 Person-Level IDV

Here, we describe how we construct our person-level individualism measure, *person-level IDV*, and cross-validate the measure using well-established society-level individualism indices. In general, there is considerable research on the measurement of individualism at the person level. Oyserman, Coon, and Kemmelmeier (2002) provide a review of the literature, showing that the exact wording and the items used differ substantially across studies. However, the authors identify common themes such as freedom and focus on own goals. Importantly, person-level measures (and aggregate measures alike) should not and cannot capture *all* aspects of individualism and usually focus on some traits that are particularly important for individual decision-making and are suitable for a survey-based measurement. Specifically, not all macro-level connotations of individualism, such as weaker family ties, market focus, high status awarded to innovators, and independence, among others, are captured by these measures.

There are two main differences between our person-level individualism measure and Hofstede IDV. First, our measure has variation at the individual level, while Hofstede's measure varies only at the country level. Second, our measure is more encompassing, as it is based on questions dealing with work-related and private-life attitudes and behaviors.

Item Selection in PIAAC.—Guided by existing country-level individualism measures (see Appendix B.1 and B.3), we identified seven items in the PIAAC questionnaire (each

measured on a five-point Likert scale) that are sufficiently similar to questions used in the construction of other individualism scales. Individualism is characterized by a desire for freedom, independence, and intellectual challenge (Triandis 1995, Hofstede 2001, Gorodnichenko and Roland 2012) as well as by openness (Greif 1994) and analytic thinking (Choi and Nisbett 1998; Nisbett et al. 2001).

The first set of PIAAC items used to construct our person-level IDV index depicts behavior at the workplace and relates strongly to the Hofstede index. Hofstede's (2001) IBM questionnaire asks how important it is to respondents "to have considerable freedom to adapt [their] own approach to the job", which we mirror using three PIAAC questions: Respondents self-assessed (a) how often they plan their own activities at work, (b) to which extent they can choose or change how they do their work, and (c) to which extent they can choose or change their working hours. All these aspects are very close to the respective Hofstede item and other individualism scales as reviewed in Oyserman, Coon, and Kemmelmeier (2002); all of which list freedom as one of the main factors used in the measurement of individualism. Freedom as depicted by these items is strongly valued by individualists from a theoretical perspective (Waterman 1981, Gorodnichenko and Roland 2012), as they fundamentally perceive themselves as independent and unique (Markus and Kitayama 1991).

The next Hofstede IDV item we want to capture with our person-level measure is the importance of having "challenging work to do; work from which [one] get[s] a personal sense of accomplishment", which describes the notion of the individualist's wish for intellectual development. This is also reflected in the Hofstede items on "interesting" work and "variety and adventure in the job". Three PIAAC items cover this aspect of individualism. First, in a workplace-related question, respondents state how often they are confronted with more complex problems in their job, which directly reflects individualism-related problem-solving and challenge-seeking behavior at work. We expect people from individualistic backgrounds to seek such job characteristics either via job selection or by (re-)shaping their own position in a company. Two additional PIAAC items elicit general attitudes toward learning in the respondent's private life: Respondents indicate to which extent they enjoy learning new things in general and whether they enjoy getting to the bottom of difficult things. Clearly linked to the spirit of intellectual challenge, adventure, and life-long learning dominant in individualistic cultures (Hofstede 2001), these PIAAC items capture challenge- and variety-seeking in private and professional life alike. Thus, our challenge-related items capture a wide range of learning, achievement-seeking, and self-fulfillment attitudes that are commonly attributed to individualists (Oyserman, Coon, and Kemmelmeier 2002, Ivtzan 2008, Gorodnichenko and Roland 2012).

In terms of cognition, we further include a PIAAC item that depicts whether a person enjoys figuring out how *different* ideas fit *together*. Research in psychology suggests that individualism affects cognitive style substantially (Nisbett et al. 2001; Oyserman, Coon, and Kemmelmeier 2002; Oyserman and Lee 2008). Nisbett et al. (2001) coin the term

"analytic thinking" in reference to individualism: Individualists do not tolerate contradictions (which are accepted in the holistic cognitive style attributed to collectivists) and, thus, are more likely to use logic to analyze the connection between different ideas (which could be complements or contradictions). The PIAAC item captures this particular use of logic in the evaluation and the preference for analytically resolving contradictions rather than accepting them as given. A further connotation of this item is that of openness towards new and diverse ideas and concepts as another facet of individualism. Together with the other private-life items, it is also related to Schwartz' (1999) intellectual autonomy dimension. The three private-life items capturing challenge-seeking, and analytic cognitive style/openness are in line with recent theoretical and empirical work on the role of individualism in innovation and—as a consequence—economic development (Gorodnichenko and Roland 2017).

Overall, our person-level IDV index balances items on job-related and private-life behavior and depicts the major and economically relevant aspects of individualism suggested by individualism theory and widely used in previous measurement of this cultural dimension. Table B.2 summarizes the items used to construct three variants of the person-level measure. The first four items describe workplace attitudes, which enter the "work-related" measure. The last three items are more general and refer to the private domain, entering the "non-work-related" index. In our preferred measure, all items are combined to our person-level IDV index.

To construct the person-level IDV index (and the two sub-indices), we follow Kling, Liebman, and Katz (2007) and first calculate the *z*-score for each of the PIAAC items individually, aggregate the *z*-scores, and normalize by the standard deviation of the aggregate.[3] Table B.3 presents the bivariate correlations between the person-level index and the individual items.[4] All correlations have the expected positive sign, are quantitatively meaningful, and precisely estimated.

We further assess the internal reliability of our person-level individualism measures by computing the Cronbach's Alpha (α). For our person-level IDV index, we obtain $\alpha = 0.75$. For the work-related and the non-work-related sub-indices, we estimate $\alpha = 0.71$ and $\alpha = 0.81$, respectively. The high values for Cronbach's Alpha suggest a high reliability of our constructed person-level measures and provide additional confidence that a simple average of all items produces a reasonable estimate for the latent individualism measure.[5]

[3] In case of missing values for single items, we average over the non-missing items.

[4] Alternatively, we applied factor analysis to derive the person-level IDV index. This approach is more flexible than simply averaging the PIAAC items, because it does not constrain them to have equal weight in the final index. Reassuringly, the individualism measures derived from averaging and from factor analysis are very highly correlated—with pairwise correlations exceeding 0.9. Thus, in the spirit of Occam's razor and following previous work by Kling, Liebman, and Katz (2007) and Deming (2017), we report the results for the averaged person-level IDV index.

[5] A small Cronbach's Alpha could either suggest that the items do not share a common latent component, or that assigning equal weights to all items (after standardizing them) is inappropriate.

Table B.2. PIAAC Items Used in the Person-Level Measure of Individualism

PIAAC survey item	Person-level IDV			Theoretical justification
	Full	Work-related	Non-work-related	
Planning own activities at work	x	x		Hofstede IBM
Choice of approach	x	x		Hofstede IBM
Organizing own time	x	x		Hofstede IBM
Solving complex problems	x	x		Hofstede IBM, VSM 2013
Learning new things	x		x	Hofstede VSM 94, VSM 2013
Get to bottom of difficult things	x		x	Hofstede VSM 94, VSM 2013
Different ideas fit together	x		x	Nisbett et al. (2001)

Notes: The table shows the items used to construct the person-level IDV index from the PIAAC data. "IBM" refers to the key questions contributing to the individualism index derived from the IBM surveys (Hofstede 2001); "VSM" refers to the respective version of Hofstede's questionnaire for replication and extension (Hofstede 2013; Hofstede and Minkov 2013). See Appendix B.1 for details.

Table B.3. Index-Items Correlations

Individualism item	Person-level IDV		
PIAAC survey item	Full	Work-related	Non-work-related
Planning own activities at work	0.648***	0.808***	
Choice of approach	0.553***	0.663***	
Organizing own time	0.644***	0.803***	
Solving complex problems	0.561***	0.631***	
Learning new things	0.686***		0.810***
Get to bottom of difficult things	0.721***		0.860***
Different ideas fit together	0.732***		0.866***

Notes: The correlations are based in the full international sample, including natives, first-generation migrants, and second-generation migrants. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data source: PIAAC.

Cross-Validation of Person-Level IDV.—Using the PIAAC data to construct a person-level IDV measure raises concern that the PIAAC items—although being reasonably close to questions in individualism surveys—were not constructed to capture individualism. Thus, we validate our newly constructed individualism measure by comparing it to well-established country-level measures. To do so, we aggregate the person-level measure at the country level in the spirit of Schwartz (1992). We perform the validation exercise for first-generation migrants, so person-level IDV (and the sub-indices) are aggregated at the level of migrants' country of origin (average sample size of 259 observations per origin country).[6]

Figure B.1 shows that our person-level IDV measure, as well as the sub-indices, are strongly positively correlated to Hofstede IDV. When restricting the sample to origin countries sending at least 30 migrants in PIAAC to meaningfully compute country averages, the correlations with Hofstede IDV are 0.52 (full index), 0.64 (work-related index), and 0.34 (non-work-related index). The weaker correlation with Hofstede IDV of the non-work-

[6] Using the samples of second-generation migrants and natives yields qualitatively similar results.

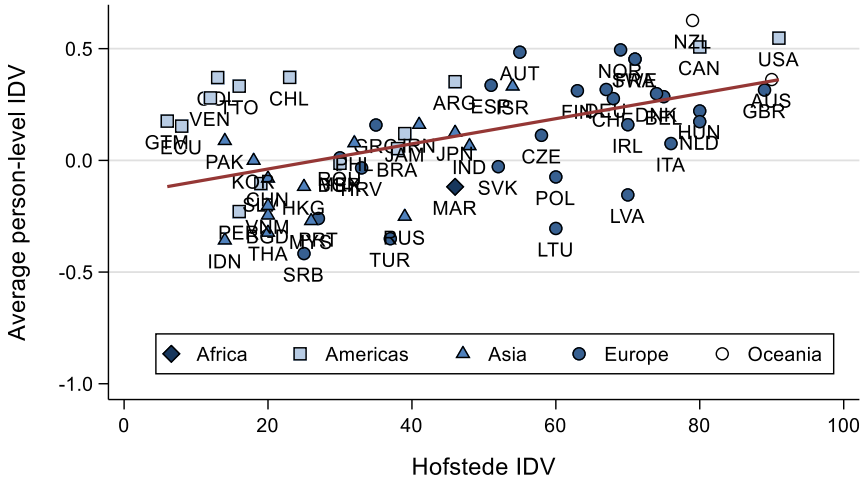
related index compared to the work-related index is not surprising, given that the Hofstede measure is based on workplace attitudes and behavior.

Next, we investigate the correlation of person-level IDV with other country-level individualism indices; that is, the GLOBE collectivism measure, Kashima individualism, the Suh measure, and the Schwartz measures of affective autonomy and intellectual autonomy. In contrast to Hofstede IDV, these alternative measures are less or not at all based on workplace-related questions (see Appendix B.3): For instance, the GLOBE measure is based on value questions like whether ageing parents usually live with their children and the Kashima index depicts linguistic characteristics – both are arguably unrelated to job characteristics. If person-level IDV is also correlated with these alternative individualism measures, it is plausible that our measure reflects both work-related and private-life aspects of individualism and does not simply pick up particular workplace characteristics such as flexibility or autonomy at work. Table B.4 shows the results. All cross-country correlations are strong and point in the correct direction; that is, person-level IDV is positively correlated with country indices of individualism (Hofstede, Kashima,[7] Suh, Schwartz) and is negatively correlated with country indices of collectivism (GLOBE). The correlation is weakest for the Schwartz measures, which is not surprising given that they are purely value-based while our individualism measure focuses on actual individual behavior and is therefore more similar in nature to the GLOBE and Hofstede indices. Additionally, the Schwartz autonomy measures capture only a relatively narrow scope of individualism—they are called *autonomy* and not *individualism* measures for a reason—while our person-level IDV measure is based on a holistic concept of individualism, capturing freedom, challenge, culture of learning, and openness.

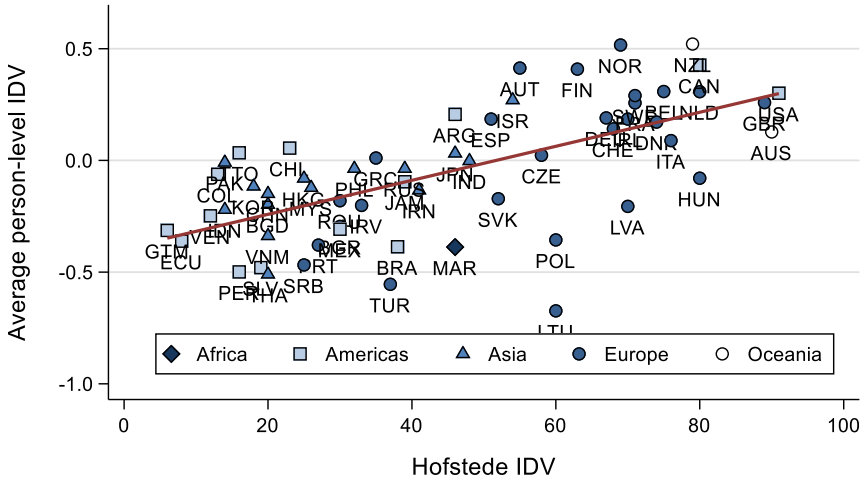
Robustness of Main Results to Using Sub-Indices.—Table B.5 provides evidence that the strong association between person-level IDV and cognitive skills shown in Table 4 is robust to using the work-related and non-work-related sub-indices of person-level individualism. Thus, our results are unlikely to be driven by specific items included in the person-level IDV measure.

[7] Note that the Kashima measure is originally a collectivism measure, which we recoded to indicate the degree of individualism for expositional reasons.

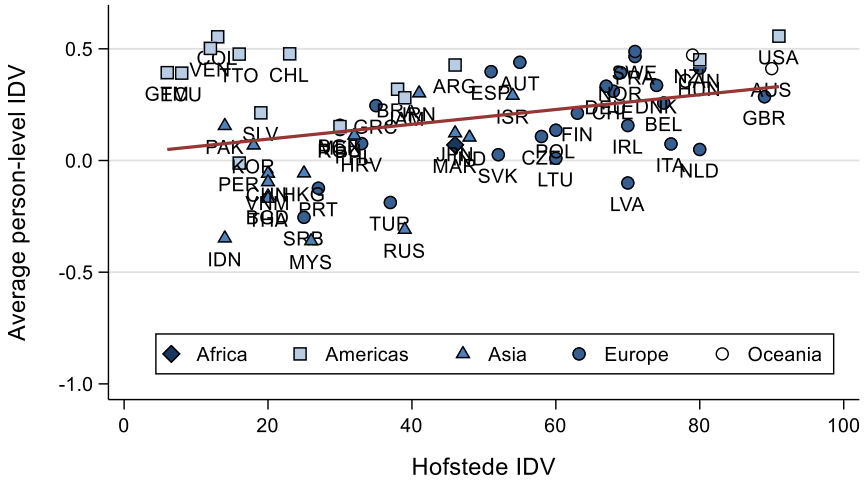
Figure B.1. Cross-Country Correlations between (Aggregated) Person-Level IDV and Hofstede IDV



a. Person-level IDV and Hofstede IDV



b. Person-level IDV (work-related index) and Hofstede IDV



c. Person-level IDV (non-work-related index) and Hofstede IDV

Notes: The figure is based on the sample of first-generation migrants aggregated at the origin-country level (59 country-level observations). To meaningfully compute country averages, we restrict the analytical sample to origin countries sending at least 30 migrants. Hofstede IDV refers to Hofstede's individualism index; person-level IDV refers to our newly constructed individualism index that varies at the person level.
Data sources: PIAAC, Hofstede (2001).

Table B.4. Cross-Country Correlations between (Aggregated) Person-Level IDV and Country-Level Individualism Measures

	Person-level IDV	Hofstede IDV	GLOBE in-group collectivism	Kashima indiv.	Suh	Schwartz affective autonomy	Schwartz intellectual autonomy
Person-level IDV	1.000 [75]						
Hofstede IDV	0.523*** [59]	1.000 [59]					
GLOBE in-group coll.	-0.573*** [51]	-0.736*** [43]	1.000 [51]				
Kashima individualism	0.640*** [60]	0.826*** [50]	-0.801*** [45]	1.000 [60]			
Suh	0.581*** [50]	0.889*** [42]	-0.822*** [36]	0.709*** [44]	1.000 [50]		
Schwartz affective autonomy	0.390*** [63]	0.634*** [48]	-0.685*** [41]	0.513*** [50]	0.673*** [46]	1.000 [63]	
Schwartz intellect. autonomy	0.301** [63]	0.531*** [48]	-0.676*** [41]	0.386*** [50]	0.627*** [46]	0.733*** [63]	1.000 [63]

Notes: The analysis is based on the sample of first-generation migrants; it is conducted at the origin-country level using only origin countries with at least 30 observations to meaningfully compute country averages. The number of country observations is reported in brackets. Hofstede IDV refers to Hofstede's individualism index; person-level IDV refers to our newly constructed individualism index that varies at the person level. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Data sources: PIAAC, Hofstede (2001), Schwartz (1994), House (2004), Suh et al. (1998), Fincher et al. (2008).

Table B.5. Individualism and Cognitive Skills: Using Alternative Definitions of Person-Level IDV

	Natives			First-generation migrants			Second-generation migrants		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Person-level IDV	0.258*** (0.013)			0.289*** (0.021)			0.290*** (0.030)		
Person-level IDV, work-related		0.215*** (0.011)			0.245*** (0.021)			0.254*** (0.028)	
Person-level IDV, non-work-related			0.216*** (0.013)			0.248*** (0.019)			0.243*** (0.027)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects									
Destination country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year of migration				Yes	Yes	Yes			
Destination country × year of migration				Yes	Yes	Yes			
Origin country				Yes	Yes	Yes			
Destination country × origin country				Yes	Yes	Yes			
Origin language							Yes	Yes	Yes
Destination country × origin language							Yes	Yes	Yes
R-squared	0.26	0.23	0.24	0.44	0.44	0.43	0.24	0.22	0.22
Observations	159,068	118,015	159,046	21,451	16,260	21,429	17,869	13,622	17,867
Origins	31	31	31	212	207	212	123	113	123

Notes: The table shows the results for numeracy test scores for alternative definitions of person-level individualism in the samples of natives (Columns (1) to (3)), first-generation migrants (Column (4) to (6)), and second-generation migrants (Columns (7) to (9)). Observations are weighted, giving each destination country the same weight. Specifications with the work-related individualism measure (Columns (2), (5), and (8)) include only the employed because persons currently not working did not receive questions on their work environment. The numeracy test scores are standardized to have a mean of 0 and a standard deviation of 1 in the full international sample. Person-level IDV refers to our newly constructed individualism index that varies at the person level; the index is standardized to a mean of 0 and a standard deviation of 1 in the full international sample. *Covariates:* age, age squared, and gender. *Origins* refer to destination countries for natives, origin countries for first-generation migrants and origin-country languages for second-generation migrants. Standard errors clustered at the destination country for natives, at the origin-country level for first-generation migrants, and at the origin-language level for second-generation migrants reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data source: PIAAC.

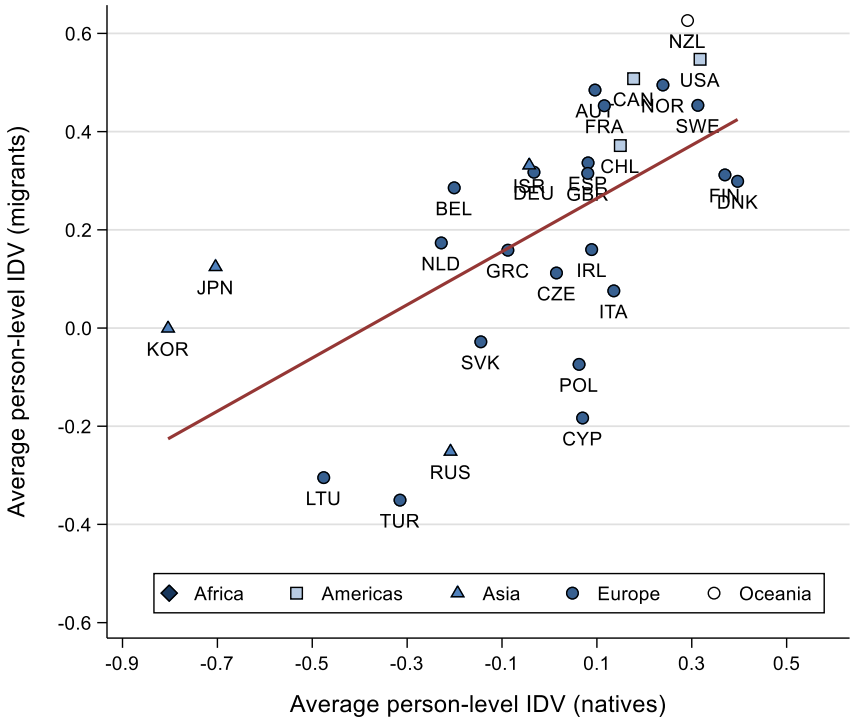
C. Epidemiological Approach: Identification and Robustness

C.1 Persistence of Individualism

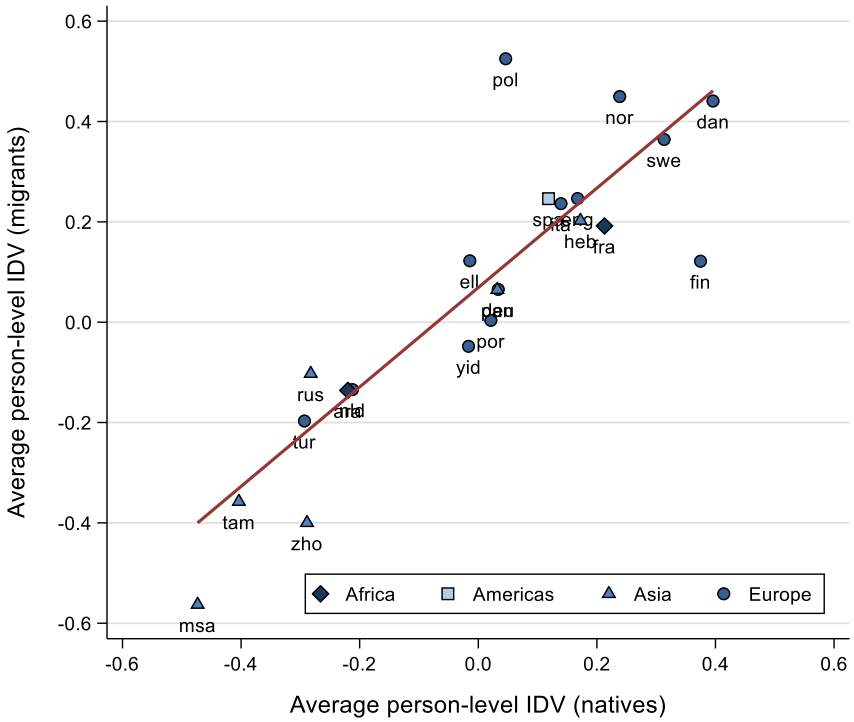
The epidemiological approach relies on the idea that culture is persistent and that migrants take their original cultural toolkit with them when they migrate, assigning them the origin-country cultural traits. However, because migration is not a random event, the question arises to what extent the country-of-origin individualism score is a reasonable proxy for the actual cultural background of migrants. In this appendix, we provide evidence that assigning migrants the average cultural values of their origin countries is an adequate depiction of their actual cultural background. Figure C.1 plots the country-level averages of our person-level IDV measure for natives and migrants originating from the same countries. Restricting the sample to the 22 PIAAC countries that send at least 30 first-generation migrants, the correlation of both individualism measures is strongly positive (ρ = 0.68). For second-generation migrants, we can perform a similar exercise at the origin-language level. Considering only languages with at least 30 observations (26 languages), we find a substantial positive correlation between the average individualism levels of natives and second-generation migrants speaking the respective language of ρ=0.94.

In Figure C.2, we replace the average person-level IDV of natives by the origin country's level of Hofstede IDV to test the stability of individualism. Since the construction of the person-level measure and Hofstede's measure differ, we cannot expect a one-to-one correlation (also see Appendix B.4). As a benchmark, we therefore also provide the correlation between person-level IDV and Hofstede IDV for natives, which is equal to $\rho = 0.57$ (Figure a). In comparison, for origin countries sending more than 30 first-generation migrants in the PIAAC data (46 origin countries), the correlation between person-level IDV and Hofstede IDV is $\rho = 0.53$. For second-generation migrants, we observe a somewhat smaller correlation of $\rho = 0.43$ for origin languages spoken by more than 30 second-generation migrants (25 origin-country languages). The lower association between origin country culture and person-level culture for second-generation migrants is expected since they have never been affected by the institutional and economic environment of the origin country. Nevertheless, the high correlations imply that a substantial portion of the origin-country culture is still present in first- and second-generation migrants.

Figure C.1. Persistence of Individualism –
Comparing Person-Level IDV of Natives and Migrants from the Same Countries



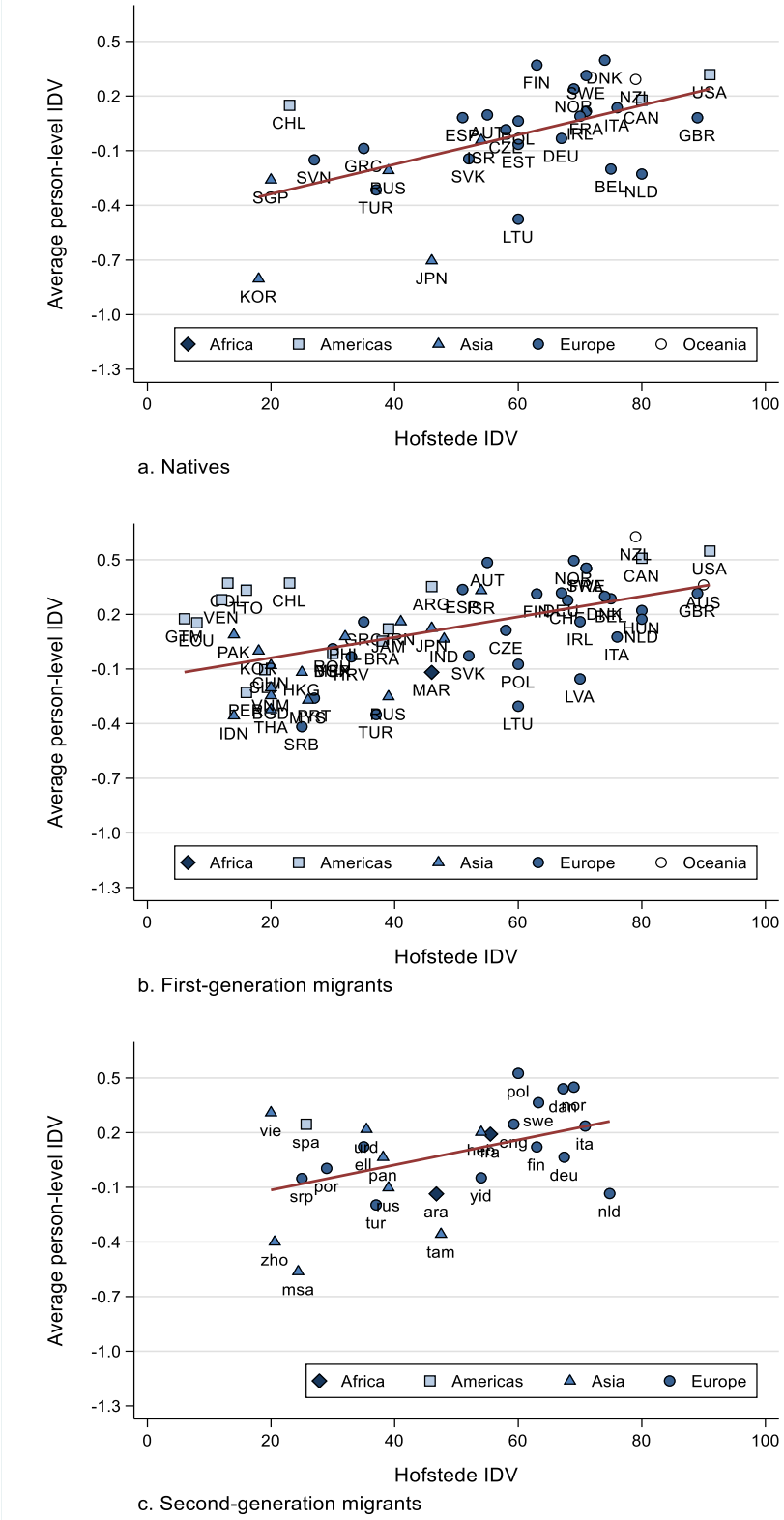
a. First-generation migrants



b. Second-generation migrants

Notes: The figure compares country averages of person-level IDV of natives and migrants originating from the same countries. To meaningfully compute country averages, main analytical sample is restricted to PIAAC countries sending at least 30 first-generation migrants (upper panel) and to PIAAC countries with origin languages with at least 30 observations (lower panel), respectively. Person-level IDV refers to our newly constructed individualism index that varies at the person level.
Data source: PIAAC.

Figure C.2. Persistence of Individualism – Person-Level IDV vs. Origin-Level Hofstede IDV



Notes: The figure shows the positive correlation between Hofstede IDV in the origin country and average person-level IDV of natives (Panel a), first-generation migrants originating from the respective country (Panel b) and second-generation migrants (Panel c). To meaningfully compute country averages, main analytical sample is restricted to origins with at least 30 observations. Hofstede IDV refers to Hofstede's individualism index; person-level IDV refers to our newly constructed individualism index that varies at the person level.
Data sources: PIAAC, Hofstede (2001).

C.2 Selective Migration

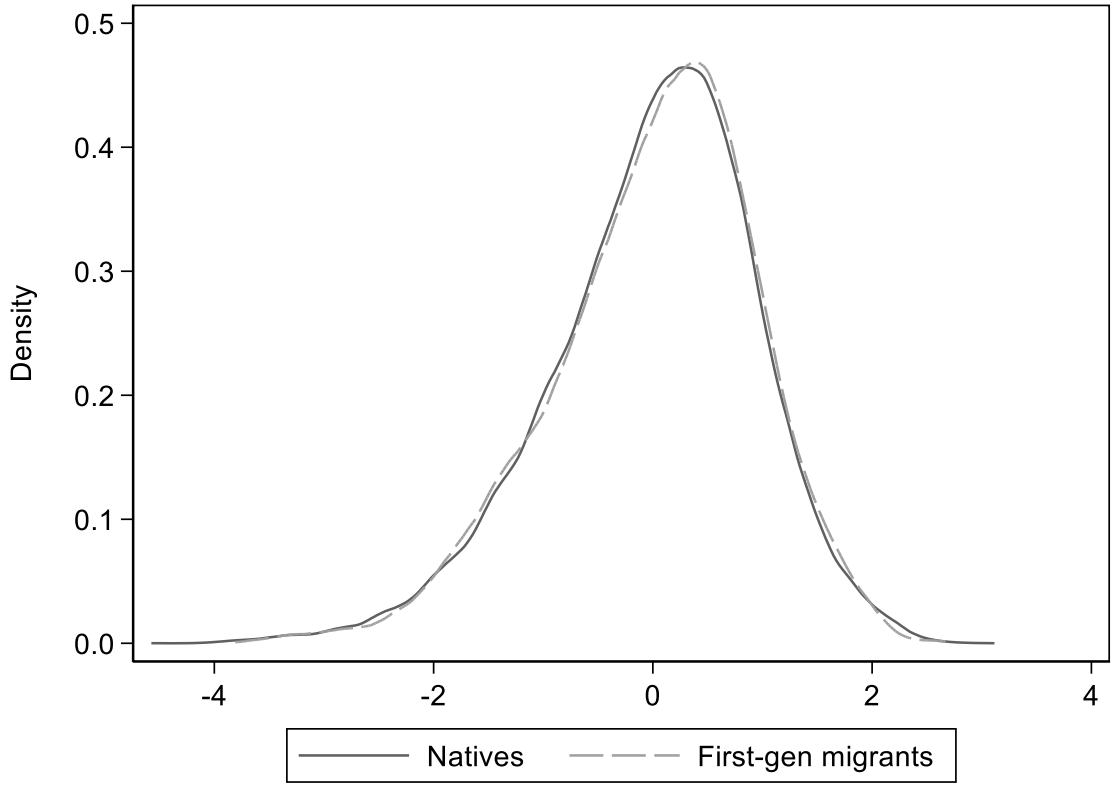
An abundant literature shows that migrants differ from a randomly chosen person in their origin country. It could be that the selection of migrants correlates with individualism and skills. Relying on our newly constructed person-level measure of individualism, this appendix shows how we test for selection on individualism. To do so, we compare the levels and distributions of individualism of migrants and natives in the PIAAC countries. Moreover, we control for important determinants of migrant selection.

Comparison of Individualism between Migrants and Non-Migrants.—The persistence of (average) individualism (see Appendix C.1) does not necessarily imply that migrants are not selected from the top or bottom of the individualism distribution of their respective origin country. In fact, there are good reason to believe that migrants are more individualistic compared to non-migrants because more individualistic people might suffer less from leaving existing social networks behind (Kitayama et al. 2006). However, direct empirical evidence on migrant selection on individualism is scarce (see, e.g, Knudsen 2019 for some historical evidence). By virtue of our person-level IDV measure, we can compare the level and distribution of individualism between natives and migrants originating from the same country in PIAAC.

Figure C.3 shows a density plot of the distribution of individualism of natives and first-generation migrants from the same origin country (e.g., U.S. natives vs. U.S. migrants elsewhere in the world), pooling all PIAAC countries. Individualism is conditional on a quadratic polynomial in age, gender, and destination country fixed effects, as these are the basic control variables that we use in the empirical analysis. The distributions are almost entirely overlapping, and average individualism of migrants and non-migrants is virtually identical. In fact, when regressing individualism on a migrant indicator in the pooled sample, the p-value of the estimated coefficient is close to 1 (0.953).

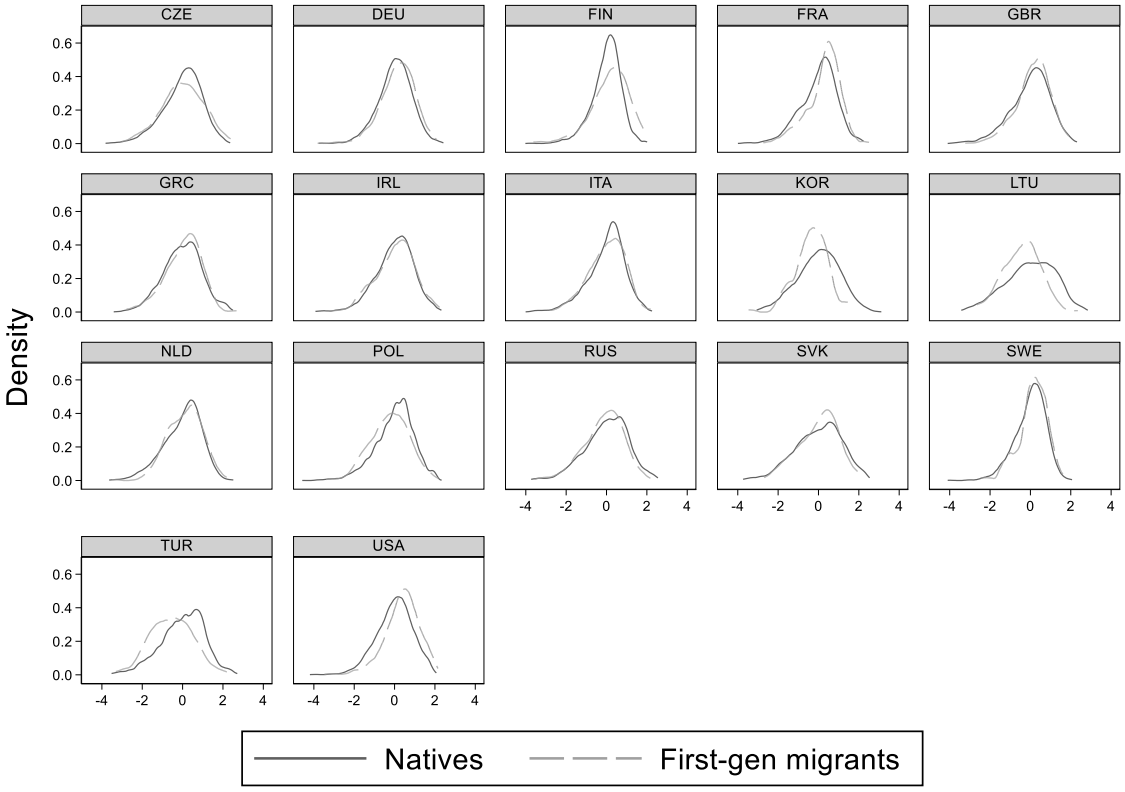
Figure C.4 shows analogously constructed density plots for each of the 17 PIAAC countries sending at least 100 migrants (which we deem necessary to make distributional comparisons). Mirroring the pooled results, there is no systematic pattern of migrant selection. Two-sided t-tests on the average difference in individualism between migrants and non-migrants show that migrants are positively selected with respect to individualism in six countries (Finland, France, Germany, Sweden, the United Kingdom, and the United States), negatively selected in five countries (Korea, Lithuania, Poland, Russian Federation, and Turkey), and not selected in six countries (Czech Republic, Greece, Ireland, Italy, Netherlands, and the Slovak Republic). Moreover, the pattern of selection does not correlate with the association between individualism and cognitive skills, as we find positive skill returns to individualism in *all* destination countries (see Figure 4). Overall, the results strongly suggest that selection on individualism is no first-order concern, which lends more credibility to the epidemiological approach.

Figure C.3 Distribution of Individualism for First-Generation Migrants and Natives from the Same Origin Country



Notes: The figure shows a density plot of the distribution of person-level IDV for natives and first-generation migrants from the same PIAAC origin countries. Person-level IDV refers to our newly constructed individualism index that varies at the person level; values shown are conditional on age, age squared, gender, and destination country fixed effects.
Data source: PIAAC.

Figure C.4 Distribution of Individualism for First-Generation Migrants and Natives from the Same Origin Country



Notes: The figure shows density plots of the distribution of person-level IDV for natives and first-generation migrants from the same PIAAC origin country. Only countries sending at least 100 migrants are shown. Person-level IDV refers to our newly constructed individualism index that varies at the person level; values shown are conditional on age, age squared, gender, and destination country fixed effects.
Data source: PIAAC.

Controlling for Migrant Selection and Migration Costs.—Even though the above analysis implies that migrant selection is no serious issue for our analysis, our results could still be driven by a correlation between origin-country individualism and migrant selection. For example, since we observe only emigrants from countries that have participated in PIAAC (i.e., developed countries), one may wonder whether the selection of migrants is different for emigrants from developing countries. In Table C.1, we directly control for origin-country educational selection. We further add measures of migration costs that are potentially associated with skill-biased migrant selection. In this analysis, we focus on first-generation migrants because we are most concerned that they are affected by the institutional and economic environment in the origin country. Moreover, the assignment of country-level controls is associated with less measurement error in the sample of first-

generation migrants than in the sample of second-generation migrants, which relies on the main language learnt in childhood to identify the migrant's origin.[8]

Column (1) of Table C.1 shows that the results are not affected by conditioning on average origin-country educational selection. Data come from Brücker, Capuano, and Marfouk (2013) and measure selection by dividing the emigration share of high-skilled migrants by the share of low-skilled migrants from a given origin country toward the main OECD immigration countries over time.[9] The emigration share from origin country i for educational level e at time t is defined as $m_{it} = M^{i}_{OECD,e,t}/(R^{i}_{e,t} + M^{i}_{OECD,e,t})$. $R^{i}_{e,t}$ is the number of residents and $M^{i}_{OECD,e,t}$ is the total number of emigrants residing in OECD countries. The data are available in five-year intervals for the years 1980 to 2010. We assign this variable to the closest immigration year; for instance, immigrants in the years 1990 to 1994 receive the educational selection control from the year 1990. Immigrants who entered the destination country before 1980 receive the value from 1980 (i.e., the earliest available year).

The remaining columns of Table C.1 control for migration costs that may lead to selection on education or skills. Columns (2) and (3) account for geographical aspects of the migration decision. More specifically, we control for geographical distance between the country of origin and the destination country and whether the two countries share a common border. Data comes from the CEPII trade database (Mayer and Zignago 2011).[10] Geographic distance is measured by the distance between the two countries' largest cities (in 1000 km). Geographic distance does not affect the individualism-skills relationship, and is itself not related to skills. While contiguity does have a positive association with migrant skills (possibly due to a different selection of migrants resulting from lower migration costs or a better knowledge of the returns to migration), the individualism coefficient remains unaffected. Thus, although geographic proximity likely influences the migration decision, it does not matter for the relationship between individualism and skills.

In Column (4) of Table C.1, we control for the linguistic proximity between two countries. It is well known that language differences are crucial to explain economic exchange (such as migration and trade) between two countries (Melitz and Toubal 2014; Adserà and Pytliková 2015; Ginsburgh and Weber 2020). Cultural differences often manifest as linguistic differences because culture and language are intertwined. For example, Chen (2013) argues that the level of long-term orientation in a society is directly related to the way the corresponding language expresses future actions (see Galor, Özak, and Sarid 2020). Controlling for linguistic proximity captures a variety of other cultural aspects that we want to disentangle from individualism. We use the ASJP (Automated

[8] In Table C.1, missing country values of selection controls are imputed by the international average to avoid issues of sample selectivity. The results are robust in the sample of non-imputed observations (not shown).

[9] The dataset contains information for 20 OECD destination countries: Australia, Austria, Canada, Chile, Denmark, Finland, France, Germany, Greece, Ireland, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States.

[10] Source: http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp.

Similarity Judgment Program) measure, which calculates linguistic proximity between the country of origin and the destination country based on pronunciation similarities and differences in a predetermined set of words in different languages. Data are also taken from the CEPII trade database. The positive and highly significant coefficient on linguistic proximity suggests that coming from a linguistically similar country—a country whose language likely seems more familiar and manageable to a migrant—helps migrants flourish in their destination country. While this is an interesting finding in itself, the individualism effect on skills is hardly affected by including linguistic proximity.

Krieger, Renner, and Ruhose (2018) highlight the role of genetic distance between two countries, as a measure of long-term relatedness, for migrant selection. Genetic similarities are correlated with cultural similarities but can also represent other important aspects like common ancestors. Previous research has shown that genetic distance is correlated with differences in economic development and the speed of diffusion of innovation (Spolaore and Wacziarg 2009, 2012, 2018). Adding genetic distance in Column (5) of Table C.1 leaves the individualism coefficient largely unaffected. The genetic distance coefficient itself is insignificant, indicating that migrants arriving from genetically similar countries do not differ in their skills from their counterparts from genetically distant countries.

In a seminal paper, Borjas (1987) argues that (non-)migration is an income-maximizing choice, as individuals allocate their skills to the country where these skills are valued the most. One implication of the model is that migrants who move from a country with high returns to skills to a destination with low returns to skills should have lower skills than individuals remaining in their home country (i.e., migrants are negatively selected on skills from the sending country's population). Likewise, one should observe positive migrant selection on skills if returns to skills in the migrants' origin country are lower than the returns in the destination country. Column (6) of Table C.1 controls for economically motivated migration decisions by including the difference in income inequality (as a proxy for returns to skills) between origin and destination country (Borjas 1987; Grogger and Hanson 2011; Parey et al. 2017; Patt et al. 2021). We measure income inequality by the Gini coefficient. Since we need information on the Gini coefficient for a large number of countries and years, we compiled the data set ourselves combining different sources. Our main source (especially for the early years) is the World Bank Catalogue[11], while we rely on the OECD IDD database[12] and the World Bank's World Development Indicators[13] as well as Eurostat[14] for the more recent years. Adding the origin-destination-country difference in Gini coefficients from the decade of migration hardly changes the individualism coefficient.

Finally, in Column (7) of Table C.1, we simultaneously include all variables related to migrant selection, which barely changes the coefficient on individualism. Taken together,

[11] Source: https://datacatalog.worldbank.org/
[12] Source: https://stats.oecd.org/Index.aspx?DataSetCode=IDD
[13] Source: https://databank.worldbank.org/reports.aspx?source=2&series=SI.POV.GINI
[14] Source: https://ec.europa.eu/eurostat/web/products-datasets/-/tessi190

this evidence suggests that accounting for migration costs or benefits—while potentially affecting the pattern of migrant selection—does not alter the relationship between individualism and skills. We conclude that migrants' non-random choice of destination country and, relatedly, migrant selection is no major concern for our analysis (see also Figlio et al. (2019) for a similar finding for long-term orientation).

Table C.1. Individualism and Cognitive Skills: Results from the Epidemiological Approach Controlling for Migrant Selection

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Hofstede IDV	0.282***	0.290***	0.283***	0.286***	0.269***	0.261***	0.229***
	(0.052)	(0.050)	(0.047)	(0.043)	(0.044)	(0.039)	(0.038)
Educational selection	-0.003						-0.003
	(0.004)						(0.003)
Geographic distance		0.002					0.015**
		(0.008)					(0.006)
Contiguity			0.093				0.156*
			(0.099)				(0.094)
Linguistic proximity				1.131***			1.043***
				(0.201)			(0.183)
Genetic distance					-0.133		-0.040
					(0.087)		(0.079)
Inequality distance						0.016**	0.016***
						(0.006)	(0.005)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects							
Migration-year-specific destination country	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Continental	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.24	0.24	0.24	0.25	0.24	0.25	0.26
Observations	15,349	15,349	15,349	15,349	15,349	15,349	15,349
Origin Countries	68	68	68	68	68	68	68

Notes: The table shows the results for numeracy test scores in the sample of first-generation migrants. Observations are weighted, giving each destination country the same weight. Numeracy test scores are standardized to a mean of 0 and a standard deviation of 1 in the full international sample. Hofstede IDV refers to Hofstede's individualism index and is standardized to a mean of 0 and a standard deviation of 1 in the full international sample. See text for the definition of further variables. Missing observations in the selection variables are imputed by the international mean (at the country level). *Continental fixed effects* refer to continent of origin country. *Covariates:* age, age squared, and gender. *Origins* refer to origin country. Standard errors clustered at the origin-country level reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data sources: PIAAC, Hofstede (2001), CEPII, Krieger, Renner, and Ruhose (2018), Brücker, Capuano, and Marfouk (2013).

C.3 Origin-Country Characteristics

In this appendix, we show to what extent other origin-country characteristics can explain the association between individualism and cognitive skills. In the epidemiological approach, this is a major concern because the omission of origin-country characteristics correlated with (origin-country) individualism and skill formation of migrants may lead to biased estimates. In the following, we discuss how the baseline results change when we add several variables reflecting the origin country's economic strength, quality of education system, and innovative capacity. Specifically, we control for GDP per capita, PISA math score, IQ, and the patent applications per capita.[15] We perform the analysis for first-generation migrants, for whom we are most worried that individualism is confounded with other characteristics of migrants' origin countries.

GDP per capita is obtained from the Penn World Table (version 9.0), available for 182 countries since 1950 in yearly intervals (Feenstra, Inklaar, and Timmer 2015). We assign migrants the GDP per capita of the migration year (GDP data are available for all migration years). This assignment procedure is supposed to capture the economic conditions at the time of migration (i.e., around the time when the migrant has decided to leave the country). Adding GDP per capita in Column (1) of Table C.2, we find that the coefficient on individualism decreases to 0.212 (from the baseline of 0.294 in Column (4) of Table 1. Thus, a better performance of migrants from wealthier countries partly reflects differences in income. However, the coefficient on individualism remains highly significant and sizeable conditional on GDP. Moreover, the significantly positive coefficient on GDP per capita indicates that migrants coming from wealthier countries perform better than those from poorer countries.

To control for differences between origin countries in educational performance, we use data from the PISA student achievement test and IQ data. PISA math scores are obtained from the OECD. PISA data are available since 2000; until 2018, a total of seven waves have been conducted. We use the average PISA math scores between 2000 and 2018, capturing the more contemporaneous performance of the education system. Nation-level IQ data come from Lynn and Meisenberg (2010); the values are not year-specific. Interestingly, adding the PISA score in Column (2) of Table C.2 reduces the coefficient on individualism only slightly. As expected, the PISA score of the origin country is positively related to migrants' cognitive skills. Moreover, while we observe that migrants originating from high-IQ countries have higher cognitive skills than those from low-IQ countries, adding IQ has only little impact on the individualism coefficient (Column (3)).

Finally, we include patent applications (of origin-country residents) per 10,000 inhabitants. The measure refers to patent applications, which are filed worldwide through the Patent Cooperation Treaty procedure or with a national patent office for exclusive rights for an invention (generally for 20 years). Patent and population data come from the World Bank and are available since 1980 on an annual basis. We apply the same assignment

[15] Throughout this analysis, we impute missing origin-country controls with the international mean.

procedure for patent applications per capita as for GDP, that is, migrants are assigned the value of the migration year.[16] This assignment procedure should again capture the origin-country's innovativeness around the time of migration. Adding patent applications in Column (4) of Table C.2, we observe only a slight decrease in the individualism coefficient, while patent applications are positively related to skills.

When we jointly include all origin-country controls in Column (5) of Table C.2, the individualism estimate remains highly significant and economically meaningful.[17] Moreover, we discuss in the main text that origin-country characteristics might themselves be the outcomes of individualist behavior, making them bad controls when estimating the overall effect of individualism on skill formation. However, adding origin-country characteristics to the model provides some insight regarding their importance as channels through which the skill effect of individualism materializes and also shows the robustness of the estimated relationship between individualism and skills.

Table C.2. Individualism and Cognitive Skills: Adding Other Country-of-Origin Characteristics

	(1)	(2)	(3)	(4)	(5)
Hofstede IDV	0.192***	0.248***	0.251***	0.249***	0.182***
	(0.047)	(0.046)	(0.048)	(0.046)	(0.051)
Log real GDP per capita	0.264***				0.163***
	(0.046)				(0.059)
PISA math score /100		0.273***			0.135
		(0.092)			(0.081)
IQ			0.027***		0.007
			(0.007)		(0.008)
Patent applications				0.045***	0.018
				(0.015)	(0.012)
Covariates	Yes	Yes	Yes	Yes	Yes
Fixed effects					
Migration-year-specific destination country	Yes	Yes	Yes	Yes	Yes
Continental	Yes	Yes	Yes	Yes	Yes
R-squared	0.25	0.25	0.25	0.25	0.26
Observations	15,349	15,349	15,349	15,349	15,349
Origin countries	68	68	68	68	68

Notes: The table shows the results for numeracy test scores in the sample of first-generation migrants. Observations are weighted, giving each destination country the same weight. Numeracy test scores are standardized to a mean of 0 and a standard deviation of 1 in the full international sample. Hofstede IDV refers to Hofstede's individualism index and is standardized to a mean of 0 and a standard deviation of 1 in the full international sample. See text for the definition of further variables. Missing observations in the country-of-origin variables are imputed by the international mean (at the country level). *Continental fixed effects* refer to the continent of the origin country. *Covariates:* age, age squared, and gender. Standard errors clustered at the origin-country level reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Data sources: PIAAC, Hofstede (2001), PISA, Penn World Table 9.0, Feenstra, Inklaar, and Timmer (2015), and Lynn and Meisenberg (2010).

[16] Migrants who moved to the destination country before 1980 are assigned the patent-per-capita value of 1980.

[17] Besides individualism, GDP per capita is the only origin-country variable that is consistently related to skills.

C.4 Instrumental Variable Approach

In this section, we exploit quasi-experimental variation in individualism to complement the results from the epidemiological approach. To control for unobservable factors affecting skills and individualism, we use international variation in Hofstede IDV caused by their genetic heritage in an instrumental variable (IV) approach. Using gene-based variation in individualism allows us to disentangle the effect of Hofstede IDV from other cultural dimensions or country characteristics.[18]

In particular, we follow Gorodnichenko and Roland (2017) in exploiting cross-country variation in the frequency of the polymorphism A118G in the μ-opioid receptor gene as an instrument for Hofstede IDV. A118G represents a single-nucleotide polymorphism (SNP) characterized by the smallest possible variation in the genetic code—a single letter modification in the DNA sequence replacing the letter A with the letter G.[19] Individuals carrying the A118G polymorphism are more sensitive to social exclusion. When socially excluded, they report higher stress levels in surveys and have stronger neural activity in brain areas related to the processing and evaluation of social pain (Eisenberger, Lieberman, and Williams 2003; Way, Taylor, and Eisenberger 2009). If this genetic coin flip occurs frequently in a population, a collectivistic society—insuring against exclusion—is more likely to form (Way and Lieberman 2010). In terms of instrument validity, A118G is a small anomaly, and there is no prior research suggesting a link to fitness, intelligence, or other economic capabilities. Next, we elaborate further on the social-exclusion mechanism responsible for the link between A118G and individualism.

A118G and the Evolution of Individualism.—This paragraph describes how a small variation in the genetic code, the polymorphism A118G located in the OPMR1 (μ-opioid receptor) gene, affected the development of individualistic values in different countries.

The mechanisms through which the OPMR1 genes affect human behavior are well established. The OPMR1 gene is known to be involved in the opioid system responsible for physical (Kieffer and Gavériaux-Ruff 2002) and social pain regulation (Zubieta et al. 2003). Studies on the effect of opioids like morphine (that act on the OPMR1 gene (Pert and Snyder 1973)) find that morphine regulates the perception of physical pain as well as social pain caused by social separation (Way, Taylor, and Eisenberger 2009). Through its effect on social pain, the OPMR1 gene is linked to social behavior.

Relying on the "CyberBall" paradigm (Williams, Cheung, and Choi 2000), Way, Taylor, and Eisenberger (2009) investigate the effect of the polymorphism A118G on social pain as

[18] The fact that cultural dimensions (i) are relatively stable over time, (ii) are largely transmitted vertically from generation to generation, and (iii) are typically observed at the country level inherently limits the set of potential instruments that can be used to predict the level of individualism embedded in a country's set of cultural values.

[19] In contrast to a genetic *mutation* that occurs very rarely in a population, the term *polymorphism* describes a genetic variation that occurs at least in one percent of the population. The prevalence of the A118G variation in a country population varies between 10 and 50 percent in our sample (see Figure C.5).

a result of separation or social rejection.[20] The authors invited human subjects containing both A and G allele carriers into a research lab to participate in a computer-based online game with other participants. After being suddenly excluded from the game, G allele carriers reported a stronger sensitivity to rejection. The results were complemented by an fMRI study that identified the neural mechanisms driving the results.[21]

Frequency of A118G as a Predictor for Individualistic Culture.—Regarding the mechanism that links the polymorphism A118G to individualism, Way and Lieberman (2010) hypothesize that culture may have evolved as a response to the genetic disposition of a society for its social sensitivity. A collectivistic culture may then evolve as an insurance mechanism to reduce the risk of social exclusion and mitigate the more pronounced negative effect of social distress in societies with high social sensitivity. In line with this hypothesis, Yamaguchi, Kuhlman, and Sugimori (1995) find a positive correlation of collectivism and the sensitivity to social rejection at the individual level. In contrast, in an individualistic society, personal autonomy may dominate the needs of the group, loosening the ties within social networks and increasing the risk of social rejection—with more severe consequences for individuals with a pronounced social sensitivity due to their genetic disposition.

To test the hypothesis that the share of individuals in a population carrying the A118G polymorphism is linked to the collectivism-individualism nexus of countries, Way and Lieberman (2010) collect international data on gene studies and estimate the relative prevalence of the polymorphism. Their empirical estimates provide support for a negative effect of the prevalence of the A118G polymorphism on a country's level of individualism. Figure C.5 confirms their results in our sample, showing a strong negative bivariate association between the prevalence of A118G and Hofstede IDV at the country level ($b = -1.86$, p-value = < 0.01).[22] The variation in A118G explains about 54 percent of the cross-country variation in Hofstede IDV in a simple bivariate regression.

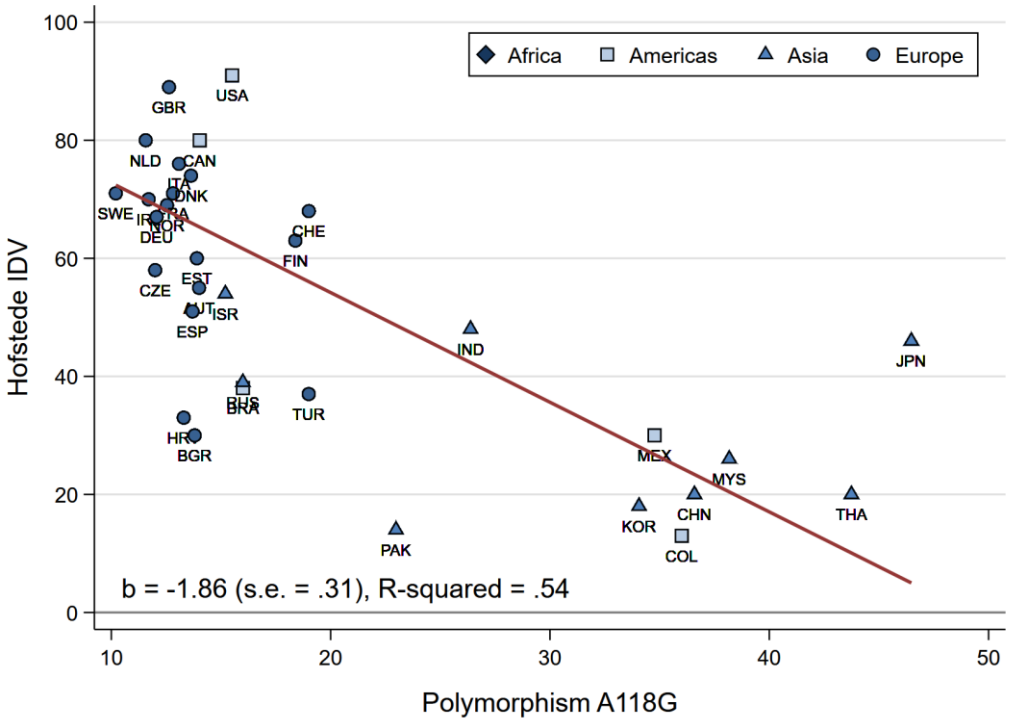
The more detailed individual-level analysis presented in Table C.3 supports the bivariate results. In the sample of first-generation migrants, a one-percentage-point increase in the share of A118G carriers in the origin country's population is associated with 0.10 standard deviations lower level of Hofstede IDV (Column (1)). A strong association between the prevalence of A118G and Hofstede IDV remains when adding further controls (including continental fixed effects in Column (4)).

[20] The "CyberBall" paradigm has been used to study social distress in many different settings including large-scale surveys (Williams, Cheung, and Choi 2000) as well as fMRI studies (Eisenberger, Lieberman, and Williams 2003). A detailed description of the CyberBall game is available in the supplementary information to Eisenberger, Lieberman, and Williams (2003).

[21] A subset of the participants played the game in an fMRI scanner while the neural activity in different brain areas was recorded. When excluded from the game, G allele carriers showed a stronger neural response in the dorsal part of the anterior cingulate cortex (dACC) and the anterior insula. Previous work has related both brain areas to the processing and evaluation of physical and social pain (Eisenberger, Lieberman, and Williams 2003; Dedovic et al. 2016). Using the data from the fMRI sample, Way, Taylor, and Eisenberger (2009) conducted a mediation analysis showing that the effect of the A118G polymorphism on self-reported social distress is significantly mediated by the neural activity on the dACC region of the brain.

[22] Our sample is restricted to the 33 origin countries of first-generation migrants in PIAAC for which data on Hofstede IDV and on the prevalence of the A118G polymorphism are both available.

Figure C.5. Frequency of A118G Polymorphism and Individualism by Country



Notes: The figure establishes the negative bivariate association between the frequency of the occurrence of the A118G polymorphism in a country's population and the country's level of Hofstede individualism (IDV). The figure includes all origin countries in the IV estimation sample.
Data source: Hofstede (2001), Way and Lieberman (2010), Gorodnichenko and Roland (2017).

Table C.3. Genetic Variation and Individualism (First Stage)

	(1)	(2)	(3)	(4)
A118G	-0.100***	-0.100***	-0.099***	-0.079***
	(0.011)	(0.011)	(0.012)	(0.016)
Age		-0.003	-0.007	-0.005
		(0.006)	(0.006)	(0.005)
Age squared (/100)		0.001	0.008	0.007
		(0.007)	(0.007)	(0.007)
Female		-0.005	-0.011	-0.015
		(0.030)	(0.028)	(0.027)
Fixed effects				
Destination country	Yes	Yes	Yes	Yes
Year of migration	Yes	Yes	Yes	Yes
Destination country × year of migration			Yes	Yes
Continental				Yes
Observations	10,359	10,359	10,359	10,359
Origin countries	33	33	33	33

Notes: The table shows the relationship between Hofstede IDV (dependent variable) and the frequency of the A118G polymorphism in the migrants' origin country in the sample of first-generation migrants. Observations are weighted, giving each destination country the same weight. Hofstede IDV refers to Hofstede's individualism index and is standardized to a mean of 0 and a standard deviation of 1 in the full international sample. *Continental fixed effects* refer to continent of origin. Standard errors clustered at the origin-country level. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data sources: PIAAC, Hofstede (2001), Way and Lieberman (2010), Gorodnichenko and Roland (2017).

Exclusion Restriction.—The identifying assumption when using A118G as an instrument to estimate the causal effect of Hofstede IDV on cognitive skills is that A118G affects cognitive skills only through Hofstede IDV. The social-exclusion mechanism through which the prevalence of A118G is linked to individualism is well understood (see discussion above), which limits the set of potential channels besides individualism through which A118G may affect skill accumulation. Furthermore, exploratory genome wide association studies (GWAS) on the predictive power of genetic differences for educational attainment show no direct association between A118G and education, which further limits concerns about alternative channels (Okbay et al. 2016; Lee et al. 2018).[23]

Column (1) of Table C.4 replicates the results for the epidemiological approach (see Column (4) of Table 1) for the IV sample of first-generation migrants from 33 (instead of 68) origin countries. The results are qualitatively and quantitatively similar to our baseline results. Column (2) reports the results from the reduced form regression of cognitive skills on the frequency of the A118G polymorphism in an origin country. Column (3) presents a suggestive test (see, e.g., Ashraf and Galor (2013)) on the validity of the exclusion restriction by conducting a horse race between A118G and Hofstede IDV in predicting cognitive skills. If the A118G polymorphism affects cognitive skills only through its effect on Hofstede IDV, it should lose its explanatory power if we also include Hofstede IDV in the regression. While we find a precisely estimated negative coefficient on the A118G polymorphism in the reduced-form regression in Column (2), the coefficient drops by more than 80 percent and becomes statistically indistinguishable from zero after we control for Hofstede IDV in Column (3).

Instrumental Variable Results.—Columns (4) to (7) of Table C.4 present the 2SLS estimates for the effect of Hofstede IDV on cognitive skills and shows that the IV results are not sensitive to a specific set of control variables. The set-up of the table follows our baseline epidemiological approach in Columns (1) to (4) of Table 1. Thus, we start by controlling for destination country and year-of-migration fixed effects in Column (4) and sequentially add sociodemographic controls (Column (5)), migration year times destination country fixed effects (Column (6)), and origin-continent fixed effects (Column (7)).

Across specifications, the instrument is strong and the 2SLS estimate on Hofstede IDV is very close to the corresponding baseline estimate from the epidemiological approach, that is, comparing the OLS estimate in Column (1) of Table C.4 ($\beta_1^{OLS} = 0.307$) and the corresponding 2SLS in Column (7) of Table C.4 ($\beta_1^{2SLS} = 0.349$). Due to the similarity of the OLS and 2SLS estimates, a Durbin-Wu-Hausman test cannot reject the exogeneity of Hofstede IDV in each of the reported IV models (e.g., in Column (7): $p = 0.53$). Thus, we

[23] The exclusion restriction would still hold if individualistic culture acted as mediator for the effect of genetic differences on other contemporary outcomes. Way and Lieberman (2010) find some evidence that the prevalence of A118G is linked through collectivism to prevalence of depression. In previous medical studies, A118G was linked to the sensitivity to alcohol. Recent evidence from GWAS and a systematic meta-study conducted by Sloan et al. (2018) find no systematic correlation to alcohol sensitivity.

interpret our IV results as additional evidence supporting the internal validity of the results obtained from the epidemiological approach.

Alternative Instruments.—Gorodnichenko and Roland (2017) provide evidence on other potential instruments for individualism. Two of these alternative instruments are another genetic polymorphism (HTTLPR) that is linked to a higher risk of depression when confronted with stress, and the distance in terms of the prevalence of blood types compared to the United Kingdom (a highly individualistic country) (*distM_UK*). Our results are robust to using these alternative instruments for individualism (see Table C.5). However, the link of these alternative instruments to individualism are less well understood than is the case for A118G. Moreover, it is less clear for these other instruments that the exclusion restriction holds. Finally, while the results are comparable, the other instruments are not as predictive of Hofstede IDV as A118G is, possibly due to the more limited data availability.

Table C.4. Instrumental Variable Approach: Reduced Form, Exogeneity of A118G, and 2SLS Estimates

	OLS			2SLS			
	Baseline	Reduced form	Horse race	IV	IV	IV	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Hofstede IDV	0.307***		0.287***	0.275***	0.276***	0.275***	0.349***
	(0.082)		(0.085)	(0.076)	(0.074)	(0.074)	(0.116)
A118G		-0.028**	-0.005				
		(0.010)	(0.008)				
First stage (dependent variable: Hofstede IDV)							
A118G	—	—	—	-0.100***	-0.100***	-0.099***	-0.079***
				(0.011)	(0.011)	(0.012)	(0.016)
First stage F-statistic	—	—	—	77.4	77.9	72.5	24.2
Endog. Test: H_0: exog. IDV (p-value)	—	—	—	0.82	0.76	0.76	0.53
Fixed effects							
Covariates	Yes	Yes	Yes		Yes	Yes	Yes
Destination country	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year of migration	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination country × year of migration	Yes	Yes	Yes			Yes	Yes
Continental	Yes	Yes	Yes				Yes
R-squared	0.25	0.23	0.25	0.06	0.09	0.08	0.07
Observations	10,359	10,359	10,359	10,359	10,359	10,359	10,359
Origin countries	33	33	33	33	33	33	33

Notes: The table shows the IV results for numeracy test scores in the sample of first-generation migrants, which is restricted to origin countries for which data on the frequency of the genetic variation (A118G) is available. Observations are weighted, giving each destination country the same weight. Numeracy test scores are standardized to mean 0 and standard deviation 1 in the full international sample. Hofstede IDV refers to Hofstede's individualism index and is standardized to a mean of 0 and a standard deviation of 1 in the full international sample. *Covariates:* age, age squared, and gender. *Continental fixed effects* refer to the continent of the origin country. Standard errors clustered at the origin-country level reported in parentheses. Standard errors clustered at the origin-country level reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data sources: PIAAC, Hofstede (2001), Way and Lieberman (2010), Gorodnichenko and Roland (2017).

Table C.5. Results of Instrumental Variable Approach with Alternative Instruments

	(1)	(2)	(3)	(4)
Second stage (dependent variable: cognitive skills)				
Hofstede IDV	0.391***	0.344**	0.515**	0.429***
	(0.115)	(0.161)	(0.199)	(0.108)
First stage (dependent variable: Hofstede IDV)				
Instrument(s)	A118G	HTTLPR	distM_UK	A118G HTTLPR distM_UK
First stage F-statistic	22.8	19.5	5.40	8.50
Covariates	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes
Observations	9,232	9,232	9,232	9,232
Origin countries	29	29	29	29

Notes: The table shows the IV results for numeracy test scores in the sample of first-generation migrants, which is restricted to origin countries for which data on the instruments is available. Observations are weighted, giving each destination country the same weight. Numeracy test scores are standardized to a mean of 0 and a standard deviation of 1 in the full international sample. Hofstede IDV refers to Hofstede's individualism index and is standardized to a mean of 0 and a standard deviation of 1 in the full international sample. *Covariates:* age, age squared, and gender. *Fixed effects:* destination country, year of migration, destination country × year of migration, and continent of origin country. Standard errors clustered at the origin-country level reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data sources: PIAAC, Hofstede (2001), Gorodnichenko and Roland (2017).

D. Value-Added Approach: Robustness

Table D.1. Individualism and Cognitive Skills: Value-Added Epidemiological Approach Conditioning on Personality Traits

	(1)	(2)	(3)	(4)	(5)	(6)
Hofstede IDV	0.077**	0.087**	0.087***	0.086**	0.081**	0.078**
	(0.034)	(0.035)	(0.031)	(0.036)	(0.035)	(0.031)
Numeracy in 2012	0.636***	0.686***	0.646***	0.677***	0.685***	0.602***
	(0.134)	(0.087)	(0.094)	(0.082)	(0.078)	(0.130)
Big-5 Openness to experience	-0.016					-0.014
	(0.016)					(0.015)
Big-5 Conscientiousness	-0.028					-0.045
	(0.028)					(0.036)
Big-5 Extraversion	-0.029**					-0.028**
	(0.011)					(0.011)
Big-5 Agreeableness	-0.012					-0.020
	(0.017)					(0.015)
Big-5 Neuroticism	-0.038*					-0.025
	(0.021)					(0.026)
Grit		0.024				0.049
		(0.040)				(0.045)
Internal locus of control			0.022			0.027
			(0.044)			(0.044)
External locus of control			0.029			0.025
			(0.022)			(0.020)
Willingness to take risks				-0.006		-0.010
				(0.009)		(0.009)
Trust					0.080**	0.070**
					(0.030)	(0.033)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects						
Year of migration	Yes	Yes	Yes	Yes	Yes	Yes
Continental	Yes	Yes	Yes	Yes	Yes	Yes
Age-specific numeracy in 2012	Yes	Yes	Yes	Yes	Yes	Yes
Age-squared-specific numeracy in 2012	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.70	0.69	0.69	0.69	0.69	0.70
Observations	814	814	814	814	814	814

Notes: The table shows the value-added results for numeracy test scores measured in 2015 on the joint sample of first- and second-generation migrants. Numeracy skills are demeaned and are standardized using the standard deviation of the full international sample as "numeraire." Hofstede IDV refers to Hofstede's individualism index and is standardized using the standard deviation of the full international sample as "numeraire." The *Big-5* are measured by the extent to which the following statements apply to the respondents (personality inventory according to Gerlitz and Schupp 2005, Lang et al. 2011): *Openness:* I am someone who is inventive, full of ideas; I am someone who values artistic, aesthetic experiences; I am someone who has a vivid imagination/fantasy; I am someone who is eager for knowledge. *Conscientiousness:* I am someone who does a thorough job; I am someone who tends to be lazy; I am someone who does things effectively and efficiently. *Extraversion:* I am someone who is communicative, talkative; I am someone who is outgoing, sociable; I am someone who is reserved. *Agreeableness:* I am someone who is sometimes rough to others; I am someone who has a forgiving nature; I am someone who is considerate and kind to others. *Neuroticism:* I am someone who worries a lot. I am someone who gets nervous easily; I am someone who is relaxed, handles stress well. *Grit* is measured by the extent the respondents agree with the following statements (grit scale by Duckworth et al. 2007 and Duckworth and Quinn 2009): I am a hard worker; I am self-disciplined; I can cope with setbacks; I finish whatever I begin; I have difficulty maintaining focus on projects or tasks that take more than a few months to complete. *Internal locus of control* is measured by the extent of agreement with the following three statements: How my life goes depends on me; Success takes hard work; Inborn abilities are more important than any efforts one can make. *External locus of control* is measured by the extent of agreement with the following five statements: what a person achieves in life is above all a question of fate or luck; I frequently have the experience that other people have a controlling influence over my life; If I run up against difficulties in life, I often doubt my own abilities; the opportunities that I have in life are determined by the social conditions; I have little control over the things that happen in my life. *Risk attitude* is based on the following question: How do you see yourself: Are you generally a person who is fully prepared to take risks or do you try to avoid risks? *Trust* is measured by the extent respondents agree with the following statements: In general, you can trust other people; Nowadays one can't rely on anyone; If one is dealing with strangers, it is better to be careful not to trust them. The Big-5 measures as well as internal and external locus of control range from 1(=lowest value) to 7(=highest value); grit ranges from 1(=lowest grid) to 5(=highest grid); risk attitude ranges from 0(=completely unwilling to take risk) to 10(=completely willing to take risk); trust ranges from 1(=lowest trust) to 4(=highest trust). *Covariates:* age, age squared, gender, and second-generation migrant. *Continental fixed effects* are included for each combination of the respondent's, the father's, and the mother's country of birth. Year of migration is set equal to year of birth for second-generation migrants. Standard errors two-way clustered at the level of the origin country of the respondent and the level of the interaction of father's and mother's country of birth in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Data sources: German PIAAC-L, Hofstede (2001).

Table D.2. Individualism and Cognitive Skills: Value-Added Epidemiological Approach Conditioning on Family Background

	(1)	(2)	(3)	(4)
Hofstede IDV	0.108**	0.081**	0.080***	0.107**
	(0.039)	(0.031)	(0.029)	(0.039)
Numeracy in 2012	0.557**	0.634***	0.683***	0.512*
	(0.239)	(0.092)	(0.095)	(0.281)
Age	-0.001	-0.007	-0.011	0.007
	(0.020)	(0.015)	(0.016)	(0.017)
Age squared (/100)	-0.007	0.002	0.006	-0.016
	(0.027)	(0.019)	(0.020)	(0.023)
Female	-0.123**	-0.113**	-0.097**	-0.106*
	(0.052)	(0.044)	(0.041)	(0.056)
Second-generation migrant	-0.082	-0.008	-0.018	-0.119
	(0.092)	(0.055)	(0.055)	(0.104)
Fixed effects				
Occupation father	Yes			Yes
Occupation mother	Yes			Yes
Number of siblings		Yes		Yes
Years spent with both parents (at age 15)			Yes	Yes
Year of migration	Yes	Yes	Yes	Yes
Continental	Yes	Yes	Yes	Yes
Age-specific numeracy in 2012	Yes	Yes	Yes	Yes
Age-squared-specific numeracy in 2012	Yes	Yes	Yes	Yes
R-squared	0.81	0.70	0.70	0.82
Observations	821	821	821	821

Notes: The able shows the value-added results for numeracy test scores measured in 2015 on the joint sample of first- and second-generation migrants. Numeracy test scores are demeaned and are standardized using the standard deviation of the full international sample as "numeraire." Hofstede IDV refers to Hofstede's individualism index and is standardized using the standard deviation of the full international sample as "numeraire." *Occupation* is assessed at the four-digit occupational level. *Years spent with both parents (at age 15):* years the respondent has lived together with both (biological) parents until age 15. *Continental fixed effects* are included for each combination of the respondent's, the father's, and the mother's country of birth. Year of migration is set equal to year of birth for second-generation migrants. Standard errors two-way clustered at the level of the origin country of the respondent and the level of the interaction of father's and mother's country of birth in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data sources: German PIAAC-L, Hofstede (2001).

Table D.3. Individualism and Cognitive Skills: Value-Added Epidemiological Approach Conditioning on School Grades

	(1)	(2)	(3)
Hofstede IDV	0.109***	0.092**	0.109***
	(0.034)	(0.034)	(0.035)
Numeracy in 2012	0.702***	0.675***	0.703***
	(0.084)	(0.071)	(0.082)
Age	-0.009	-0.007	-0.009
	(0.019)	(0.020)	(0.019)
Age squared (/100)	0.004	0.002	0.004
	(0.021)	(0.022)	(0.020)
Female	-0.108**	-0.121***	-0.109**
	(0.043)	(0.042)	(0.044)
Second-generation migrant	0.007	0.011	0.007
	(0.058)	(0.061)	(0.059)
Grade mathematics	-0.091***		-0.090***
	(0.016)		(0.017)
Grade German		-0.027	-0.004
		(0.016)	(0.014)
Fixed effects			
Year of migration	Yes	Yes	Yes
Continental	Yes	Yes	Yes
Age-specific numeracy in 2012	Yes	Yes	Yes
Age-squared-specific numeracy in 2012	Yes	Yes	Yes
R-squared	0.71	0.70	0.71
Observations	821	821	821

Notes: The table shows the value-added results for numeracy test scores measured in 2015 on the joint sample of first- and second-generation migrants. Numeracy test scores are demeaned and are standardized using the standard deviation of the full international sample as "numeraire." Hofstede IDV refers to Hofstede's individualism index and is standardized using the standard deviation of the full international sample as "numeraire." All regressions contain fix effects for the state of secondary schooling. Missing school grades are imputed and dummy variables included indicating missing school grades. *Continental fixed effects* are included for each combination of the respondent's, the father's, and the mother's country of birth. Year of migration is set equal to year of birth for second-generation migrants. Standard errors two-way clustered at the level of the origin country of the respondent and the level of the interaction of father's and mother's country of birth in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Data sources: German PIAAC-L, Hofstede (2001).

E. Mediation Analysis

E.1 Econometric Framework of the Mediation Analysis

This appendix describes the assumptions of the mediation analysis to decompose the effect of the treatment on the outcome of interest into its mechanisms, discusses the limitations of the predominant approach in investigating mechanisms in the economic literature, defines the variables of interest in a potential outcome framework, and describes the mediation approach we use in the paper. We use the potential outcome framework (Rubin 1974) to define direct and indirect effects (mechanisms) and to describe the conditional independence assumptions underlying the mediation framework.

Definition of Estimands of Interests.—To define the average total effect of an increase in individualism from level a' to a, let $NUM_i(a)$ represent the potential cognitive skills for individual i with individualism level a. For each individual either $NUM_i(a)$ or $NUM_i(a')$ is observed. The total effect of the change in individualism is equal to the difference in potential outcomes $\tau(a, a') = NUM_i(a) - NUM_i(a')$. We can define the average total effect (ATE) as:

$$\text{ATE}(a, a') = \mathbb{E}[NUM_i(IDV = a) - NUM_i(IDV = a')].$$

In our setting the average total effect equals the average treatment effect of individualism. Let us further define $NUM_i(a, m^j)$ as the outcome for individual i if we fix the level of individualism at $IDV_i = a$ and the mediating variable at $M^j = m^j$.[24] We are now able to define another interpretable estimand of the mediation model—the average controlled direct effect (ACDE) —as follows:

$$\text{ACDE}(a, a', m^j) = \mathbb{E}[NUM_i(a, m^j) - NUM_i(a', m^j)].$$

The ACDE describes the effect of individualism on cognitive skills that is not driven by changes in mediator M^j.

The final estimand of interest—the indirect effect of individualism on cognitive skills through M^j—is identified by the difference between the $\text{ATE}(a, a')$ and $\text{ACDE}(a, a', m^j)$. It quantifies the part of the total effect of individualism on skills that is mediated through the respective mechanism (e.g., inputs in the production function).

Identifying Assumptions.—To interpret the estimand $\text{ATE}(a, a')$ as a causal average treatment effect, the usual conditional independence assumption (CIA-1) is necessary:

(CIA-1) $$NUM_i(a), NUM_i(a') \perp\!\!\!\perp IDV_i | \ \boldsymbol{X_i} = \boldsymbol{x}, \quad \forall\, a, a', x.$$

To simplify the notation in this appendix, we let vector $\boldsymbol{X}$ represent all relevant control variables, including any fixed effects, and omit most indices used to denote the level of variation.

[24] The terms fixing and controlling, although related, are conceptionally different (Haavelmo 1943). Fixing the level of a mediator refers to an exogenous manipulation of the mediator.

The identification of the ACDE requires an additional conditional independence assumption (CIA-2) that is linked to the relationship between the outcome and mediators. Let vector $\boldsymbol{M} = \left(M^j : j \in \mathcal{J}_P\right)$ represent all observed mediators, whereas vector $\boldsymbol{M}^{\neg k}$ represent all observed mediators in $\boldsymbol{M}$ other than the mediator of interest M^k that are not conditionally independent of M^k. Furthermore, let vector $\boldsymbol{Z}$ denote variables correlated with skills and the mediators of interest M^k. Then the $\text{ACDE}(a, a', m^k)$ is identified under the following CIA:

(CIA-2) $NUM_i(a, m^k) \perp\!\!\!\perp M_i^k | IDV_i = a,\ \boldsymbol{X_i} = \boldsymbol{x},\ \boldsymbol{M_i^{\neg k}} = \boldsymbol{m}^{\neg k},\ \boldsymbol{Z_i} = \boldsymbol{z},\ \forall\, a, k, \boldsymbol{x}, \boldsymbol{z}.$

The presence of unmeasured inputs that are not statistically independent of the measured inputs would violate CIA-2 and, therefore, confound the estimated relationship between individualism and the mediators, as well as the relationship between mediators and cognitive skills.[25] Hence, to consistently estimate the ACDE for mediator M^k without violating assumption CIA-2, we have to control for any other mediator $\boldsymbol{M_i^{\neg k}}$ that is not conditionally independent of M^k, as well as for any confounder Z that is correlated with the outcome and the mediator.

In the most common approach to estimate the effect of mechanisms in the applied economics literature (as proposed in Baron and Kenny (1986)) a single mediator M^j is included in the outcome equation (1) and the regression model shown in equation (5) is used to estimate β_1^M. Here, the difference $\Delta_M \equiv \beta_1 - \beta_1^M$ is attributed to the mechanism measured by the mediator M^j. Because the indirect effects of the individual mediators are not identified if more than one mediator is included in the Baron-Kenny-model, a separate version of equation (5) is estimated for each mediator that represents a proposed mechanism.

While considering only a single mediator in the Baron-Kenny model (Baron and Kenny (1986)) and interpreting β_1^M as an estimate for the ACDE is very popular, it requires a stronger version of CIA-2:

(CIA-2´) $NUM_i(a, m^k) \perp\!\!\!\perp M_i^k | IDV_i = a,\ \boldsymbol{X_i} = \boldsymbol{x}, \boldsymbol{Z_i} = \boldsymbol{z},\ \forall\, a, k, \boldsymbol{x}, \boldsymbol{z},$

where the conditioning on other mechanisms ($\boldsymbol{M_i^{\neg k}}$) is absent. Assumption CIA-2´ is stronger than CIA-2 and requires conditional independence with respect to not just the unmeasured but also the *measured* mediators. As in most other applications, this assumption is unlikely to hold in our setting because our set of measured mediators includes proxies for various skill investments, which are likely to be correlated.

[25] The bias that arises from including mediators in the outcome equation without imposing additional independence assumptions is similar to the bias that arises from including any other post-treatment variable or endogenous control (Rosenbaum 1984). The imprecise discussion of the necessary identifying assumptions underlying mediation analyses has led some researches to the conclusion that mediation analysis is more elusive than useful (Rubin 2004). However, we think that recent applications of the mediation analysis as in Heckman, Pinto, and Savelyev (2013) that carefully state the assumptions underlying the analysis and choose an estimation strategy that avoids unnecessary assumptions have provided a valuable contribution to the understanding of underlying mechanisms of treatment effects.

Assumption CIA-2´ is more restrictive than necessary. In contrast to the plug-in approach proposed in Baron and Kenny (1986), our estimation strategy is flexible enough to account for all observable confounding mediators and identifies the individual effects of all observable mediators under assumption CIA-1 and CIA-2.

Estimation of the Mediation Model.—Under assumptions CIA-1 and CIA-2, we estimate the ACDE with a linear mediation model (implicitly assuming no interactions between mediators and individualism) following the sequential g-estimation approach introduced in the mediation literature by Joffe and Greene (2009) and Vansteelandt (2009).[26] The ATE is the OLS estimate of β_1 in equation (1):

(g.1) $$NUM_{iydo} = \beta_0 + \beta_1 \overline{IDV}_o + \boldsymbol{X}'_{iydo}\boldsymbol{\gamma} + \mu_d \times \mu_y + c_o + u_{iydo}.$$

We then use OLS to estimate a model with all observed mediators (see also equation (5)):

(g.2) $$NUM_{iydo} = \beta_0 + \beta_1^M \overline{IDV}_o + \boldsymbol{X}'_{iydo}\boldsymbol{\gamma} + \boldsymbol{M}'_{\boldsymbol{iydo}}\boldsymbol{\beta_2} + \mu_d \times \mu_y + c_o + u_{iydo}.$$

In an intermediate step, we use the individual estimates in $\widehat{\boldsymbol{\beta}}_{\boldsymbol{2}} = \left(\hat{\beta}_2^j : j \in \mathcal{J}_P\right)$ from equation (g.2) and derive new skill measures ($\widehat{NUM}_{iydo}^{-M^j}$) that only contain variation not explained by changes in mediator M^j by computing:

(g.3) $$\widehat{NUM}_{iydo}^{-M^j} = NUM_{iydo} - \hat{\beta}_2^j M_{iydo}^j, \;\; \forall\, j \in \mathcal{J}_P.$$

The ACDE for each mediator M^j in $\boldsymbol{M}$ is estimated with the following regression:

(g.4) $$\widehat{NUM}_{iydo}^{-M^j} = \beta_0 + \beta_1^{M^j} \overline{IDV}_o + \boldsymbol{X}'_{iydo}\boldsymbol{\gamma} + \mu_d \times \mu_y + c_o + u_{iydo}, \;\; \forall\, j \in \mathcal{J}_P,$$

where the ACDE for mediator M^j is the OLS estimate of $\beta_1^{M^j}$. Finally, the indirect effect of individualism on cognitive skills that is mediated by each mediator M^j (IDE^{M^j}) is computed as follows:

(g.5) $$IDE^{M^j} = \beta_1 - \beta_1^{M^j}, \;\; \forall\, j \in \mathcal{J}_P.$$

The share of the individualism effect that cannot be attributed to changes in mediators (i.e., the direct effect of individualism) is given by β_1^M as estimated in equation (g.2) or by subtracting all indirect effects from the ATE:

$$\text{Direct effect of IDV} = \beta_1^M = \beta_1 - \sum_j IDE_{M^j}.$$

[26] In comparison to alternative estimators for mediation effects, the sequential g-estimator is robust to certain types of misspecification (Goetgeluk, Vansteelandt, and Goetghebeur 2008) and has superior finite-sample properties (Huber, Lechner, and Mellace 2016). A related approach, introduced by Pearl (2001) and made popular in political science by Imai et al. (2011), identifies the average natural direct effect (ANDE). ANDE estimation is based on stronger assumptions than those required for the estimation of the average controlled direct effect (ACDE) identified by our estimation strategy.

To compute standard errors, we include all estimation steps (g.1 – g.5) in a pairs bootstrap that accounts for both the sequential estimation procedure and the clustering at the origin-country level.

E.2 Results of the Mediation Analysis

For selecting inputs of the skill production function that potentially mediate the effect of individualism on cognitive skills, we focus on measures in the PIAAC data that can plausibly be linked to individualism and are relevant for skill accumulation over the life cycle. The sign and size of the effect of mediating inputs depend on the relation between individualism and the inputs in the skill production function, and on the direct effect of these inputs on cognitive skills.

Specifically, we use the following variables as mediators:

- Formal education: number of years of schooling to obtain the highest educational degree.
- Non-formal adult education:
  - On-the-job training (OJT): dummy variable equal to 1 if person has participated in training on-the-job in the 12 months prior to the survey, 0 otherwise
  - Any other training: dummy variable equal to 1 if person has participated in any training other than training on-the-job in the 12 months prior to the survey, 0 otherwise.
- Informal adult education: Three reading variables indicating the frequency with which person reads newspapers, professional journals, and books in private life: variables take values of 1 (never), 2 (less than once a month), 3 (less than once a week but at least once a moth), 4 (at least once a week but not every day), and 5 (every day).

Effect of Individualism on Inputs of the Skill Production Function (Mediators).—Table E.1 provides empirical evidence for the positive effect of Hofstede IDV on the proposed mediators in the sample of first-generation migrants. For all considered mediators, we find a precisely estimated and quantitatively meaningful positive association with Hofstede IDV. Note that the results differ slightly from those reported in Table 6 because we restrict the estimation sample in the mediation analysis to the sample in which all mediators are non-missing.

Effect of Mediators on Skill Accumulation.—As expected, all mediators are significantly positively related to cognitive skills conditional on Hofstede IDV (see Table E.2). Notably, comparing Columns (1) to (6) with the joint model in Column (7) shows that the effect of each mediator is substantially overestimated when not controlling for the other mediators.

E.3 Detailed Results of the Mediation Analysis

When decomposing the total individualism effect into direct and indirect effects, we include the same control variables as in our baseline estimation in Column (4) of Table 1. Table E.3 reports the decomposition results based on the mediation framework as described

above. The upper part of the table reports the average total effect (ATE) of Hofstede IDV on cognitive skills. The middle and bottom parts of the table contain the decomposition of the ATE into the mechanisms represented by the estimates on the mediators.

Column (1) of Table E.3 indicates that a one-standard-deviation increase in Hofstede IDV is associated with an increase in numeracy skills by 0.291 standard deviations (ATE). The individualism-induced increase in formal education accounts for 31.6 percent of the total effect (Column 4). Individualism-induced changes in skill-relevant adult education, that is, participation in training and reading habits, jointly account for 13.4 percent of the total effect. The remaining 55 percent of the ATE are the unexplained share of the individualism effect attributed to either unobserved factors or measurement error in the observed mediators (ACDE).

Table E.1. Individualism and Inputs in the Skill Production Function (Mediators)

	Formal education	Non-formal adult education		Informal adult education		
	(1)	(2)	(3)	(4)	(5)	(6)
	Years of education	Training on-the-job	Any other training	Read newspaper	Read professional journals	Read books
Hofstede IDV	0.638***	0.034***	0.044***	0.146***	0.141***	0.174***
	(0.144)	(0.008)	(0.006)	(0.031)	(0.046)	(0.036)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.35	0.15	0.16	0.21	0.16	0.20
Observations	14,696	14,696	14,696	14,696	14,696	14,696

Notes: The table shows the results for mediators specified in the column header in the sample of first-generation migrants, which is restricted to observations with non-missing information for all mediators. The estimation follows equation (4). Observations are weighted, giving each destination country the same weight. Hofstede IDV refers to Hofstede's individualism index and is standardized to a mean of 0 and a standard deviation of 1 in the full international sample. *Covariates:* age, age squared, and gender. *Fixed effects:* destination country, year of migration, destination country × year of migration, and continent of origin country. Standard errors clustered at the origin-country level reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data sources: PIAAC, Hofstede (2001).

Table E.2. Mediators and Cognitive Skills

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Hofstede IDV	0.180***	0.278***	0.269***	0.263***	0.266***	0.260***	0.160***
	(0.034)	(0.048)	(0.047)	(0.045)	(0.044)	(0.045)	(0.032)
Years of education	0.175***						0.144***
	(0.010)						(0.010)
Training on-the-job		0.371***					0.122***
		(0.031)					(0.023)
Any other training			0.499***				0.186***
			(0.047)				(0.030)
Read newspaper				0.192***			0.063***
				(0.012)			(0.009)
Read professional journals					0.181***		0.033***
					(0.014)		(0.010)
Read books						0.176***	0.074***
						(0.012)	(0.008)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.41	0.26	0.28	0.28	0.29	0.29	0.44
Observations	14,696	14,696	14,696	14,696	14,696	14,696	14,696

Notes: The table shows the results for numeracy test scores in the sample of first-generation migrants, which is restricted to observations with non-missing information for all mediators. The estimation follows equation (5). Observations are weighted, giving each destination country the same weight. Numeracy test scores are standardized to a mean of 0 and a standard deviation of 1 in the full international sample. Hofstede IDV refers to Hofstede's individualism index and is standardized to mean 0 and standard deviation 1 in the full international sample. *Covariates:* age, age squared, and gender. *Fixed effects:* destination country, year of migration, destination country × year of migration, and continent of origin country. Standard errors clustered at the origin-country level reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Data sources: PIAAC, Hofstede (2001).

Table E.3. Decomposition of the Effect of Individualism on Cognitive Skills

	Estimated mediator coefficients			Relative importance of mediators	
	(1)	(2)	(3)	(4)	(5)
	Coefficient	Standard error	*p*-value	Coefficient/ ATE	Coefficient/ ∑(Later educ.)
Total effect					
ATE	0.291	(0.066)***	[0.00]	100%	—
Indirect effects					
Formal education					
Years of education	0.092	(0.028)***	[0.00]	31.6%	—
Adult education					
Training on-the-job	0.004	(0.002)**	[0.02]	1.4%	10.3%
Any other training	0.008	(0.002)***	[0.00]	2.7%	20.5%
Read newspaper	0.009	(0.003)***	[0.00]	3.1%	23.1%
Read professional journals	0.005	(0.002)*	[0.07]	1.7%	12.8%
Read books	0.013	(0.004)***	[0.00]	4.5%	33.3%
∑(Adult education)	0.039	(0.009)***	[0.00]	13.4%	100%
Other factors					
Unexplained/Direct effect	0.16	(0.042)***	[0.00]	55.0%	—

Notes: The decomposition analysis includes the same controls and fixed effects as their outcome equation counterparts (see equations (4) and (5) and text for details). *p*-values are based on a pairs bootstrap of the entire multi-stage estimation procedure with 999 replications. Standard errors are clustered at the same level as in the respective outcome specification. *Data sources:* PIAAC, Hofstede (2001).

Appendix References

Adserà, Alícia and Mariola Pytliková. 2015. "The Role of Language in Shaping International Migration." *Economic Journal*, 125(586): F49-F81.

Ashraf, Quamrul and Oded Galor. 2013. "The 'Out of Africa' Hypothesis, Human Genetic Diversity, and Comparative Economic Development." *American Economic Review*, 103(1): 1–46.

Baron, Reuben M. and David A. Kenny. 1986. "The Moderator–Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations." *Journal of Personality and Social Psychology*, 51(6): 1173–82.

Borjas, George J. 1987. "Self-Selection and the Earnings of Immigrants." *American Economic Review*, 77(4): 531–53.

Brücker, Herbert, Stella Capuano, and Abdeslam Marfouk. 2013. "Education, Gender and International Migration: Insights from a Panel-Dataset 1980-2010." Unpublished paper.

Chen, M. Keith. 2013. "The Effect of Language on Economic Behavior: Evidence from Savings Rates, Health Behaviors, and Retirement Assets." *American Economic Review*, 103(2): 690–731.

Choi, Incheol and Richard E. Nisbett. 1998. "Situational Salience and Cultural Differences in the Correspondence Bias and Actor-Observer Bias." *Personality and Social Psychology Bulletin*, 24(9): 949–60.

Dedovic, Katarina, George M. Slavich, Keely A. Muscatell, Michael R. Irwin, and Naomi I. Eisenberger. 2016. "Dorsal Anterior Cingulate Cortex Responses to Repeated Social Evaluative Feedback in Young Women with and without a History of Depression." *Frontiers in Behavioral Neuroscience*, 10(64).

Deming, David J. 2017. "The Growing Importance of Social Skills in the Labor Market." *Quarterly Journal of Economics*, 132(4): 1593–640.

Duckworth, Angela L., Christopher Peterson, Michael D. Matthews, and Dennis R. Kelly. 2007. "Grit: Perseverance and Passion for Long-Term Goals." *Journal of Personality and Social Psychology*, 92(6): 1087.

Duckworth, Angela L. and Patrick D. Quinn. 2009. "Development and Validation of the Short Grit Scale (GRIT–S)." *Journal of personality assessment*, 91(2): 166–74.

Eisenberger, Naomi I., Matthew D. Lieberman, and Kipling D. Williams. 2003. "Does Rejection Hurt? An FMRI Study of Social Exclusion." *Science*, 302(5643): 290–92.

Feenstra, Robert C., Robert Inklaar, and Marcel P. Timmer. 2015. "The Next Generation of the Penn World Table." *American Economic Review*, 105(10): 3150–82.

Figlio, David, Paola Giuliano, Umut Özek, and Paola Sapienza. 2019. "Long-Term Orientation and Educational Performance." *American Economic Journal: Economic Policy*, 11(4): 272–309.

Fincher, Corey L., Randy Thornhill, Damian R. Murray, and Mark Schaller. 2008. "Pathogen Prevalence Predicts Human Cross-Cultural Variability in Individualism/Collectivism." *Proceedings of the Royal Society of London, Series B: Biological Sciences*, 275: 1279–85.

Galor, Oded, Ömer Özak, and Assaf Sarid. 2020. "Linguistic Traits and Human Capital Formation." *AEA Papers and Proceedings*, 110: 309–13.

Gelfand, Michele J., Dharm P. S. Bhawuk, Lisa H. Nishi, and David J. Bechthold. 2004. "Individualism and Collectivism." In *Culture, Leadership, and Organizations. The GLOBE study of 62 societies*, ed. Robert J. House, 437–512. Thousand Oaks: SAGE Publications.

Gerlitz, Jean-Yves and Jürgen Schupp. 2005. "Zur Erhebung der Big-Five-basierten Persoenlichkeitsmerkmale im SOEP. Dokumentation der Instrumententwicklung BFI-S auf Basis des SOEP-Pretests 2005." DIW Research Notes 4.

Ginsburgh, Victor and Shlomo Weber. 2020. "The Economics of Language." *Journal of Economic Literature*, 58(2): 348–404.

Goetgeluk, Sylvie, Stijn Vansteelandt, and Els Goetghebeur. 2008. "Estimation of Controlled Direct Effects." *Journal of the Royal Statistical Society: Series B (Statistical Methodology)*, 70(5): 1049–66.

Gorodnichenko, Yuriy and Gerard Roland. 2012. "Understanding the Individualism-Collectivism Cleavage and Its Effects: Lessons from Cultural Psychology." In *Institutions and Comparative Economic Development*, ed. Masahiko Aoki, Timur Kuran, and Gerard Roland, 213–36. London: Palgrave Macmillan.

Gorodnichenko, Yuriy and Gerard Roland. 2017. "Culture, Institutions, and the Wealth of Nations." *The Review of Economics and Statistics*, 99(3): 402–16.

Greif, Avner. 1994. "Cultural Beliefs and the Organization of Society: A Historical and Theoretical Reflection on Collectivist and Individualist Societies." *Journal of Political Economy*, 102(5): 912–50.

Grogger, Jeffrey and Gordon H. Hanson. 2011. "Income Maximization and the Selection and Sorting of International Migrants." *Journal of Development Economics*, 95(1): 42–57.

Haavelmo, Trygve. 1943. "The Statistical Implications of a System of Simultaneous Equations." *Econometrica*, 11(1): 1.

Heckman, James J., Rodrigo Pinto, and Peter Savelyev. 2013. "Understanding the Mechanisms Through Which an Influential Early Childhood Program Boosted Adult Outcomes." *American Economic Review*, 103(6): 2052–86.

Hofstede, Geert. 2001. *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations*. Thousand Oaks: SAGE Publications.

Hofstede, Geert. 2013. "Values Survey Module 2013. Questionnaire - English Language Version (Release: May 2013)."

Hofstede, Geert and Michael Minkov. 2013. "Values Survey Module 2013 Manual."

House, Robert J., ed. 2004. *Culture, Leadership, and Organizations. The GLOBE study of 62 societies*. Thousand Oaks: SAGE Publications.

Huber, Martin, Michael Lechner, and Giovanni Mellace. 2016. "The Finite Sample Performance of Estimators for Mediation Analysis Under Sequential Conditional Independence." *Journal of Business & Economic Statistics*, 34(1): 139–60.

Huettinger, Maik. 2008. "Cultural Dimensions in Business Life: Hofstede's Indices for Latvia and Lithuania." *Baltic Journal of Management*, 3(3): 359–76.

Imai, Kosuke, Luke Keele, Dustin Tingley, and Teppei Yamamoto. 2011. "Unpacking the Black Box of Causality: Learning about Causal Mechanisms from Experimental and Observational Studies." *American Political Science Review*, 105(04): 765–89.

Ivtzan, Itai. 2008. "Self Actualisation: For Individualistic Cultures Only." *International Journal on Humanistic Ideology*, 1(2): 111–38.

Joffe, Marshall M. and Tom Greene. 2009. "Related Causal Frameworks for Surrogate Outcomes." *Biometrics*, 65(2): 530–38.

Kieffer, Brigitte L. and Claire Gavériaux-Ruff. 2002. "Exploring the Opioid System by Gene Knockout." *Progress in Neurobiology*, 66(5): 285–306.

Kitayama, Shinobu, Keiko Ishii, Toshie Imada, Kosuke Takemura, and Jenny Ramaswamy. 2006. "Voluntary Settlement and the Spirit of Independence: Evidence from Japan's "Northern Frontier"" *Journal of Personality and Social Psychology*, 91(3): 369–84.

Kling, Jeffrey R., Jeffrey B. Liebman, and Lawrence F. Katz. 2007. "Experimental Analysis of Neighborhood Effects." *Econometrica*, 75(1): 83–119.

Knudsen, Anne S. B. 2019. "Those Who Stayed: Individualism, Self-Selection and Cultural Change During the Age of Mass Migration." University of Copenhagen Department of Economics Discussion Paper 19-01.

Krieger, Tim, Laura Renner, and Jens Ruhose. 2018. "Long-Term Relatedness between Countries and International Migrant Selection." *Journal of International Economics*, 113: 35–54.

Lang, Frieder R., Dennis John, Oliver Lüdtke, Jürgen Schupp, and Gert G. Wagner. 2011. "Short Assessment of the Big Five: Robust across Survey Methods except Telephone Interviewing." *Behavior research methods*, 43(2): 548–67.

Lee, James J., et al. 2018. "Gene Discovery and Polygenic Prediction from a Genome-Wide Association Study of Educational Attainment in 1.1 Million Individuals." *Nature Genetics*, 50: 1112–21.

Lynn, Richard and Gerhard Meisenberg. 2010. "National IQs Calculated and Validated for 108 Nations." *Intelligence*, 38(4): 353–60.

Markus, Hazel R. and Shinobu Kitayama. 1991. "Culture and the Self: Implications for Cognition, Emotion, and Motivation." *Psychological Review*, 98(2): 224–53.

Mayer, Thierry and Soledad Zignago. 2011. "Notes on CEPII's Distances Measures: The GeoDist Database." Centre d'Études Prospectives et d'Information Internationales Working Paper 2011-25.

Melitz, Jacques and Farid Toubal. 2014. "Native Language, Spoken Language, Translation and Trade." *Journal of International Economics*, 93(2): 351–63.

Nasierowski, Wojciech and Bogusz Mikula. 1998. “Culture Dimensions of Polish Managers: Hofstede's Indices.” *Organization Studies*, 19(3): 495–509.

Nisbett, Richard E., Kaiping Peng, Incheol Choi, and Ara Norenzayan. 2001. “Culture and Systems of Thought: Holistic versus Analytic Cognition.” *Psychological Review*, 108(2): 291.

Okbay, Aysu, et al. 2016. “Genome-Wide Association Study Identifies 74 Loci Associated with Educational Attainment.” *Nature*, 533(7604): 539–42.

Oyserman, Daphna, Heather M. Coon, and Markus Kemmelmeier. 2002. “Rethinking Individualism and Collectivism: Evaluation of Theoretical Assumptions and Meta-Analyses.” *Psychological Bulletin*, 128(1): 3–72.

Oyserman, Daphna and Spike W. S. Lee. 2008. “Does Culture Influence What and How We Think? Effects of Priming Individualism and Collectivism.” *Psychological Bulletin*, 134(2): 311–42.

Parey, Matthias, Jens Ruhose, Fabian Waldinger, and Nicolai Netz. 2017. “The Selection of High-Skilled Emigrants.” *Review of Economics and Statistics*, 99(5): 776–92.

Patt, Alexander, Jens Ruhose, Simon Wiederhold, and Miguel Flores. 2021. “International Emigrant Selection on Occupational Skills.” *Journal of the European Economic Association*, 19(2): 1249–98.

Pearl, Judea. 2001. “Direct and Indirect Effects.” In *UAI’01, Proceedings of the Seventeenth Conference on Uncertainty in Artificial Intelligence*, ed. John Breese and Daphne Koller, 411–20. San Francisco: Morgan Kaufmann Publishers Inc.

Pert, C. B. and S. H. Snyder. 1973. “Opiate Receptor: Demonstration in Nervous Tissue.” *Science*, 179(4077): 1011–14.

Rosenbaum, Paul R. 1984. “The Consequences of Adjustment for a Concomitant Variable That Has Been Affected by the Treatment.” *Journal of the Royal Statistical Society. Series A (General)*, 147(5): 656–66.

Rubin, Donald B. 1974. “Estimating Causal Effects of Treatments in Randomized and Nonrandomized Studies.” *Journal of Educational Psychology*, 66(5): 688–701.

Rubin, Donald B. 2004. “Direct and Indirect Causal Effects via Potential Outcomes.” *Scandinavian Journal of Statistics*, 31(2): 161–70.

Schwartz, Shalom H. 1992. “Universals in the Content and Structure of Values: Theoretical Advances and Empirical Tests in 20 Countries.” In *Advances in experimental social psychology*, ed. Mark P. Zanna, 1–65. San Diego, London: Academic Press.

Schwartz, Shalom H. 1994. “Are There Universal Aspects in the Structure and Contents of Human Values?” *Journal of Social Issues*, 50(4): 19–45.

Schwartz, Shalom H. 1999. “A Theory of Cultural Values and Some Implications for Work.” *Applied Psychology*, 48(1): 23–47.

Schwartz, Shalom H. 2008. “The 7 Schwartz Cultural Value Orientation Scores for 80 Countries.”

Schwartz, Shalom H. 2009. “Draft Users Manual: Proper Use of the Schwarz Value Survey.” Centre for Cross Cultural Comparisons.

Sloan, Matthew E., et al. 2018. “The OPRM1 A118G Polymorphism: Converging Evidence against Associations with Alcohol Sensitivity and Consumption.” *Neuropsychopharmacology*, 43(7): 1530–38.

Spolaore, Enrico and Romain Wacziarg. 2009. “The Diffusion of Development.” *Quarterly Journal of Economics*, 124(2): 469–529.

Spolaore, Enrico and Romain Wacziarg. 2012. “Long-Term Barriers to the International Diffusion of Innovations.” In *NBER International Seminar on Macroeconomics*, ed. Jeffrey Frankel and Christopher Pissarides, 11–46. Chicago: University of Chicago Press.

Spolaore, Enrico and Romain Wacziarg. 2018. “Ancestry and Development: New Evidence.” *Journal of Applied Econometrics*, 33(5): 748–62.

Suh, Eunkook, Ed Diener, Shigehiro Oishi, and Harry C. Triandis. 1998. “The Shifting Basis of Life Satisfaction Judgments across Cultures: Emotions versus Norms.” *Journal of Personality and Social Psychology*, 74(2): 482–93.

Triandis, Harry C. 1995. *New Directions in Social Psychology*, *Individualism and Collectivism*. Boulder: Routledge.

Vansteelandt, Stijn. 2009. “Estimating Direct Effects in Cohort and Case–Control Studies.” *Epidemiology*, 20(6): 851–60.

Waterman, Alan S. 1981. “Individualism and Interdependence.” *American Psychologist*, 36(7): 762–73.

Way, Baldwin M. and Matthew D. Lieberman. 2010. "Is There a Genetic Contribution to Cultural Differences? Collectivism, Individualism and Genetic Markers of Social Sensitivity." *Social cognitive and affective neuroscience*, 5(2-3): 203–11.

Way, Baldwin M., Shelley E. Taylor, and Naomi I. Eisenberger. 2009. "Variation in the Mu-Opioid Receptor Gene (OPRM1) Is Associated with Dispositional and Neural Sensitivity to Social Rejection." *Proceedings of the National Academy of Sciences of the United States of America*, 106(35): 15079–84.

Williams, Kipling D., Christopher K. T. Cheung, and Wilma Choi. 2000. "Cyberostracism: Effects of Being Ignored over the Internet." *Journal of Personality and Social Psychology*, 79(5): 748–62.

Yamaguchi, Susumu, David M. Kuhlman, and Shinkichi Sugimori. 1995. "Personality Correlates of Allocentric Tendencies in Individualist and Collectivist Cultures." *Journal of Cross-Cultural Psychology*, 26(6): 658–72.

Zubieta, Jon-Kar, et al. 2003. "Regulation of Human Affective Responses by Anterior Cingulate and Limbic Mu-Opioid Neurotransmission." *Archives of General Psychiatry*, 60(11): 1145–53.