Personality and Individual Differences 55 (2013) 391–398

Contents lists available at SciVerse ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

Openness, economic freedom and democracy moderate the relationship between national intelligence and GDP

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ARTICLE INFO

Article history:
Received 25 July 2012
Received in revised form 4 March 2013
Accepted 25 March 2013
Available online 18 April 2013

Keywords:
Economic freedom
Democracy
GDP
Intelligence
Openness

ABSTRACT

Recent studies have shown a consistent relationship between per-capita GDP and the average intelligence of the population. In the present paper we show that intelligence is indeed a powerful predictor of GDP. However, other variables significantly moderate the relationship. The rise in GDP with rising intelligence proved more pronounced in countries exhibiting high levels of openness, Freedom/Democracy, and economic freedom. These conditions appear to enable a country to translate its cognitive capital into material wealth.

1. Introduction

Although individual differences in psychological traits are large within each culture, between-country differences in the average levels of intelligence (Lynn & Vanhanen, 2012) and personality traits (McCrae & et al., 2005) can be substantial as well. Much work has been devoted to cognitive differences between countries. Lynn and Vanhanen (2002) first presented average population IQs for 81 nations measured from samples given a variety of intelligence tests. In the follow-up studies (Lynn & Vanhanen, 2006, 2012) the authors calculated IQs for 113 and finally 137 countries. They also provided estimates for additional nations. There has been much skepticism of research on national average IQ levels. Hunt and Sternberg (2006) criticized Lynn and Vanhanen's extrapolation method based on the assumption that countries that are geographically close to each other are likely to have similar average IQs. They also questioned the validity of the IQ score as an index of conceptual intelligence outside of developed industrial societies. According to the authors, culture-specific knowledge or skills may be more important to people in that culture than knowledge necessary for solving Western-developed intelligence tests.

Wicherts and colleagues (e.g. Wicherts, Dolan, Carlson, & van der Maas, 2010a; Wicherts, Dolan, & Van der Maas, 2010b) questioned the methodology used by Lynn and Vanhanen (2002, 2006). They suggested that Lynn and Vanhanen were unsystematic in their review, resulting in the underestimation of mean intelligence in sub-Saharan Africa (IQ close to 70 according to British norms). Wicherts, Dolan, Carlson, et al. (2010a) applied explicitly stated inclusion criteria including availability of test norms, standardized administration of entire IQ tests, no reported problems during testing, no measurement bias, no unhealthy or special samples (but omitting sample representativeness), and concluded that the average IQ of Africans is approximately 82 when compared to UK norms.

Despite the criticisms, both the Lynn & Vanhanen studies and subsequent work by others described many important correlates of national IQ including infant mortality, birth weight, educational level, life expectancy, religiosity, fertility, HIV prevalence, scholastic achievement, income inequality, economic growth, and homicide rates (see Lynn & Vanhanen, 2012 for a recent review). Most revealing is the relationship of national IQs with educational achievement (EA). Using high quality data from Trends in International Mathematics and Science Study (TIMSS) and Programme for International Student Assessment (PISA), Lynn and Meisenberg (2010) found a correlation of .917 between measured IQ and EA, attenuation corrected to 1.0. This shows that IQ is a valid country-level measure of the cognitive abilities required to excel in school. As a result, some critics agreed that despite some weak data points, Lynn and Vanhanen's data may be empirically useful (Hunt & Wittmann, 2008).

One of the most consistent results is the positive relationship between per-capita GDP and national intelligence (Pearson's *r* up

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http://dx.doi.org/10.1016/j.paid.2013.03.013

to .73, Lynn & Vanhanen, 2006). Evidence has been presented that aggregated national IQs strongly predict the behaviors of a country's citizens, and that this behavior, in turn, directly influences important social outcomes (Lynn & Vanhanen, 2012). However, Sternberg, Grigorenko, and Bundy (2001) emphasized that IQ could be useful only if interpreted very cautiously and in conjunction with other measures. In the present paper we show that IQ is indeed a powerful predictor of per capita GDP, but that other variables significantly moderate the relationship.

Lynn and Vanhanen (2002) argue that relationships between variables observed among individuals, if indeed they reflect direct causality, should also be true for nations. Recent research suggests that openness to experience and IQ interact in predicting real life outcomes including academic success (Heaven & Ciarrochi, 2012). Individuals scoring high on both dimensions show the highest academic performance. By analogy, at the national level, we can therefore expect that cognitive ability will raise GDP to a greater extent in countries which are open towards novel ideas and solutions, tolerant of diverse opinions, and low in dogmatism. The latter traits are measured as high openness to experience in the five-factor model of personality (McCrae et al., 2005). In addition, recent economic analyses show that institutional factors, including democracy and economic freedom, can significantly influence a country's economic growth (Cebula & Mixon, 2012; Doucouliagos & Ulubaşoğlu, 2008; Meisenberg & Lynn, 2012). We postulated that higher levels of open-mindedness, political freedom and economic freedom will allow a nation to translate its citizens' cognitive ability into material wealth more efficiently.

2. Method

2.1. Data sources

National IQ is from Lynn and Vanhanen (2006), with the extensions and amendments reported in Lynn (2010). Missing data points were extrapolated from the school achievement data as reported in Meisenberg and Lynn (2011). For the remaining countries, IQ was estimated from the IQs of neighboring countries with similar population and economic development, as in Lynn and Vanhanen (2006).

Openness to experience is calculated from three international studies of the Five Factor Inventory (McCrae, 2002; McCrae et al., 2005; Schmitt, Allik, McCrae, & Benet-Martínez, 2007). All scores were standardized for the 23 countries having data from all three studies, followed by averaging. The highest congruence we found between two McCrae studies ($r = 0.70$; $p < 0.01$; $n = 26$). Openness from Schmitt et al. (2007) was weakly correlated with the data from McCrae (2002); $r = 0.25$; $p = 0.25$; $n = 27$ and McCrae et al. (2005); $r = 0.11$; $p = 0.62$; $n = 38$. The latter two associations are weak probably due to the differences between instruments used to measure personality traits. Schmitt et al. (2007) notice, that NEO-PI-R has been designed to measure a wider array of concepts than their Big Five Inventory (BFI). The Openness scale used by Schmitt et al. (2007) emphasizes openness toward new ideas and aesthetic experiences, while in NEO-PI-R it reflects also awareness of feelings and unconventional, non-conservative values.

GDP per capita adjusted for purchasing power was from the Penn World Tables (Heston, Summers, & Aten, 2009). The index reflects the sum value of all goods and services produced in the country valued at prices prevailing in the United States in the year noted. It is useful when comparing differences in economic output between countries because it takes into account the relative costs and the inflation rates of the countries, rather than using just exchange rates which may distort the real differences in income.

Freedom/Democracy is the average from the standardized scores of political freedom defined as the averaged scores of political rights + civil liberties from Freedom House at http://www.freedomhouse.org/research/freeworld, average 1975–2005; and democracy, defined as Vanhanen's democracy index (average 1975–2004), from the Finnish Social Science Data Archive at http://www.fsd.uta.fi/english/data/catalogue/FSD1289/. The correlation between these two measures is $r = .847$.

Economic Freedom is calculated from the unrotated first factors of maximum-likelihood factor analyses of areas 2–5 of the Fraser Institute's Economic Freedom Index, average of 1995, 2000 and 2005 (Gwartney, Hall, & Lawson, 2010), including legal system & property rights, sound money, freedom of international trade, and business regulation, but excluding area 1 (size of government), which did not correlate with the other components of the index; and domains 1, 2, and 5–8 of the Heritage Foundation Index for 1995, 2000 and 2005, including business regulation, free trade, monetary freedom, investment freedom, financial freedom and property rights, but excluding the conceptually and/or factorially different domains of corruption, "labor freedom", fiscal policy and government spending (http://www.heritage.org/research/). The variance explained by the first factor of the retained variables ranged from 55.7% (Heritage Foundation 1995) to 70.6% (Fraser Institute 2000). The correlation between these modified Fraser Institute and Heritage Foundation indices is .870.

The time periods of all predictor variables were chosen to precede the time (2009) at which the outcome (GDP) was measured. Most of the IQ studies from which the data base of national IQ has been collated were conducted between 1970 and 2005, with corrections for the Flynn effect where indicated. Most of the scholastic assessments that were included in the data set were conducted between 1995 and 2009. The three sources from which openness was averaged are based on studies conducted mainly between 1995 and 2006. Analyses were limited to IQ, one additional variable, and this variable's interaction with IQ.

3. Results

To examine whether openness, economic freedom and democracy moderate the relationship between national intelligence and

Table 1
Regression analyses predicting 2009 GDP per capita with IQ and Openness to experience (Model 1), IQ and Freedom/Democracy (Model 2), IQ and economic freedom (Model 3), and with all analyzed variables (Model 4).

Variable	Zero-level correlation	β	t	p	Regression parameters
Model 1 (IQ and Openness to experience; N = 70 countries)					
IQ	.71	.87	9.00	.000	$R = .76$
Openness	.21	−.04	−.04	.670	$R^2 = .58$
					adjusted $R^2 = .56$
IQ × Openness		.32	3.29	.002	$F(3,66) = 30.57$, $p < .001$
Model 2 (IQ and Freedom/Democracy Index; N = 181 countries)					
IQ	.49	.38	5.14	.000	$R = .56$
F/D	.43	.14	1.71	.090	$R^2 = .31$
					adjusted $R^2 = .30$
IQ × F/D		.20	2.78	.006	$F(3,177) = 26.44$, $p < .001$
Model 3 (IQ and economic freedom; N = 161 countries)					
IQ	.48	.26	3.48	.001	$R = .60$
EF	.54	.34	4.08	.000	$R^2 = .36$
					adjusted $R^2 = .35$
IQ × F/EF		.15	2.04	.043	$F(3,157) = 29.47$, $p < .001$
Model 4 (IQ, Openness, Freedom/Democracy and economic freedom; N = 67 countries)					
IQ	.72	.28	3.31	.002	$R = 87$
Openness	.20	−.04	−0.55	.587	$R^2 = .76$
					adjusted $R^2 = .74$
F/D	.77	.32	3.09	.003	$F(4,62) = 48.71$, $p < .001$
EF	.80	.40	3.97	.000	

GDP we conducted three regression analyses. The models included IQ, a second variable that was hypothesized to moderate the IQ effect on GDP, and the interaction term (Table 1). All the predictor variables were found to be normally distributed. Skewness ranged from −0.110 (IQ) to +.692 (Freedom/Democracy), and kurtosis from −.715 (IQ) to +.919 (openness). The variables were standardized using only those cases that were included in the analysis.

The results confirmed our hypotheses. In regression models predicting GDP with IQ and one other variable, the interaction effects between the predictors proved significant (see Table 1), however the direct effects of Openness and Freedom/Democracy were not significant. The regression analyses accounted for 56% of the variance for the model with openness, 30% for Freedom/Democracy and 35% for economic freedom. Figure 1 shows graphically that the rise in GDP with rising IQ is more pronounced in countries exhibiting high levels of Openness, Freedom/Democracy, and economic freedom.

To analyze the extent to which the predictors are redundant with each other, we conducted an additional analysis with all four variables as predictors of GDP (Model 4, Table 1). National-level openness was no longer a significant predictor of GDP when economic freedom and Freedom/Democracy were included in the model. A likely reason is the conceptual and statistical relatedness of Openness with the "freedom" variables (Pearson's $r = .17$ with economic freedom and .39 with Freedom/Democracy), combined with lower data quality of Openness relative to the other predictors.

4. Discussion

The main result of this study is that the rise in GDP with rising intelligence is more pronounced in countries exhibiting high levels of openness, understood both as a personality trait and as the socioeconomic conditions. This result is consistent with previous findings indicating that GDP is predicted by intelligence (Lynn & Vanhanen, 2012), openness to experience (McCrae et al., 2005) and socioeconomic conditions (Meisenberg & Lynn, 2012), as well as with the suggestion that IQ and openness to experience may interact in predicting real life outcomes (Heaven & Ciarrochi, 2012).

Openness to experience, Freedom/Democracy and economic freedom have much in common. As Zeidner and Matthews (2000) noticed, openness to experience has a "liberal" aspect manifesting in willingness to question social, political and religious values, which in turn can lead to rejection of traditional conservative beliefs. Low openness and low intelligence both correlate with authoritarianism – a value system that includes political conservatism, antidemocratic sentiments, and ethnic prejudice (Altemeyer, 1996; Trapnell, 1994). McCourt, Bouchard, Lykken, Tellegen, and Keyes (1999) suggest that "Intelligence drives attitude formation. That is, when considering social, moral, and political situations, those with greater cognitive skill are able to form more individualistic and open-minded (i.e., antiauthoritarian) attitudes than those of lesser cognitive ability" (p. 987). Therefore, we believe that the results obtained in the present study concerning GDP, IQ and the

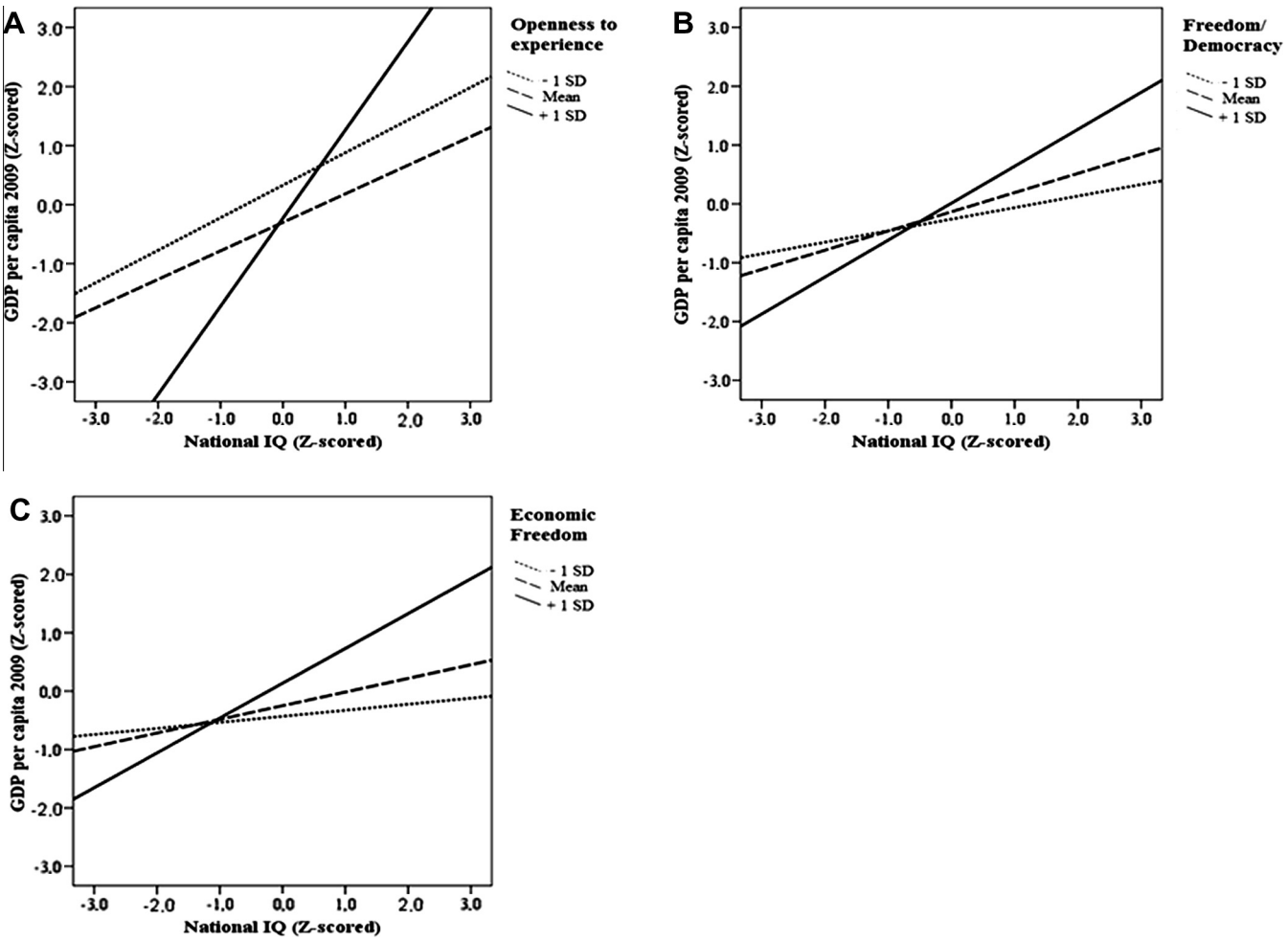

Fig. 1. Interaction effects of national IQ and (A) Openness to experience, (B) Freedom/Democracy, and (C) economic freedom predicting 2009 per capita GDP.

three non-cognitive predictors reinforce each other because Freedom/Democracy and economic freedom both can be interpreted as institutional expressions of an open mind.

Openness and intelligence are correlated at the individual level (Zeidner & Matthews, 2000), and according to some authors they both characterize intellectual activity (DeYoung, 2011). Thus, looking into the nature of these dimensions, we may say that both objective (IQ) and self-reported (openness) intellectual characteristics play a significant role in country economic functioning. This statement is in line with predictions made by McCrae (1996), who emphasized the profound influence of openness to experience on societies' functioning. In addition to achieving high income, which is related to intelligence (Murray, 1998), some individuals have to invest some significant fraction of their income into entrepreneurial activities. The latter requires not only future orientation, which again is related positively to intelligence (Shamosh & Gray, 2008), but also openness-related traits (McCrae, 1996) such as creativity and novelty seeking. Therefore only a combination of intelligence and openness is expected to lead to optimal economic outcomes.

The important question concerns the mechanism of the openness, intelligence and GDP relationships. Ziegler, Danay, Heene, Asendorpf, and Buhner (2012) tested the hypothesis that openness leads to more exploration of the environment and social interactions, and thus to the experience of an enriched, stimulating, varied, and challenging environment that favors the development of higher intelligence. The same authors also propose that high intelligence favors the development of openness because the experience of comprehending and mastering new information and new situations is likely to reinforce an open mind set (Ziegler et al., 2012). Entrepreneurial interests and skills are among those traits that are reinforced by the experience of successful understanding and application.

Although both intelligence (Flynn, 1987) and personality traits (Smits, Dolan, Vorst, Wicherts, & Timmerman, 2011) can change over time, for both traits changes on a time scale of 2–3 decades are relatively small compared to the magnitude of differences between countries. Therefore some researchers assume high stability of national traits (Lynn & Vanhanen, 2006; McCrae, 2004). The same is true for macro-social traits including GDP, democracy, and economic freedom. For example, although we predicted GDP in 2009, results were virtually the same in analyses for GDP measured in other years between 2000 and 2009 (Stolarski, Zajenkowski, & Meisenberg, 2013), but not for measures of economic growth. The results presented here are nevertheless an interesting starting point for further investigations of this socially relevant issue.

Although country-level IQs are quite robust, as shown by the high correlations between IQ and school achievement measured in international studies such as TIMSS and PISA (Lynn & Vanhanen, 2012; Meisenberg & Lynn, 2011), the openness scores are less well validated. This is shown by the low correlations between scores obtained in different studies (see e.g. Pace & Brannick, 2010). One likely reason is that college samples were used in most studies, although community-based samples were used in some (McCrae, 2002; McCrae et al., 2005; Schmitt et al., 2007). Another threat to the validity of country-level personality is the reference group effect, meaning that respondents judge their own and others' personality not by absolute standards, but based on a comparison with typical levels of the trait in the population (Credé, Bashshur, & Niehorster, 2010).

Wicherts, Dolan, Carlson et al. (2010a) note that reliability and validity are necessary but not sufficient for group comparison of test scores. Measurement invariance should be analyzed in addition, to establish whether the test measures the same latent attributes in different populations. Few attempts were made to examine the measurement invariance with modern psychometric methods. For instance, in the area of personality, Church et al. (2011) used multi group confirmatory factor analysis to detect differential item functioning (DIF) in factor loadings and intercepts for the NEO-PI-R in comparisons of college students in the United States, Philippines, and Mexico. These authors concluded that considerable caution is warranted in cross-cultural comparisons of personality profiles. As regards cognitive ability, Wicherts et al. (2010b, 2010c) reviewed the literature on Raven's test performance in Africa. They stated that although some studies support measurement invariance of the Raven's test (mainly among student samples), generally there is little empirical support for its measurement invariance between African and western samples. Therefore, our results should be interpreted cautiously and further studies are necessary to fully understand the cross-cultural differences of psychological and political dimensions.

Acknowledgements

Marcin Zajenkowski and Maciej Stolarski were supported by a Grant No. NN106 039938 of Polish Ministry of Science and Higher Education.

Appendix Dataset. used in the analyses

Country	IQ	O1	O2	O3	EF	F/D	GDP
Afghanistan	(75.0)					−1.295	1157
Albania	82.9*				−0.437	−0.572	6702
Algeria	82.8*				−0.749	−0.743	6095
Angola	(69.8)				−1.849	−1.232	4580
Argentina	96.0	46.1	50.8		0.303	0.861	11983
Armenia	92.0				0.262	−0.475	5338
Australia	98.0	50.7	50.1		1.714	1.904	41239
Austria	99.5	50.5	49.3	59.1	1.505	1.943	37452
Azerbaijan	84.8*				−0.650	−0.881	8908
Bahamas	(84.0)				0.871	0.908	28327
Bahrain	81.0				0.896	−0.929	22775
Bangladesh	81.0		53.4		−1.098	−0.179	1396
Barbados	80.0				0.550	1.293	22826
Belarus	(95.1)				−0.869	−0.820	13179
Belgium	99.0	50.4	54.6	51.8	1.444	2.262	34631

(*continued*)

Country	IQ	O1	O2	O3	EF	F/D	GDP
Belize	76.7*				0.429	0.887	8382
Benin	67.7*				−0.509	−0.461	1114
Bhutan	(84.2)					−0.993	4576
Bolivia	87.0		50.7		0.015	0.423	3815
Bosnia	94.0				−0.975	−0.561	7122
Botswana	72.2	47.7	48.2		0.869	0.335	8740
Brazil	87.0	49	49.2		−0.293	0.435	9336
Brunei	(88.9)					−1.040	46021
Bulgaria	92.5				−0.254	0.063	10912
Burkina Faso	71.0*	49.3			−0.509	−0.722	902
Burundi	75.1*				−1.110	−1.172	370
Cambodia	(92.0)				−0.407	−1.116	1766
Cameroon	64.0				−0.686	−0.950	1831
Canada	100.0	48.4	48.8	51.6	1.699	1.564	36341
Cape Verde	(74.0)				0.142	−0.149	3586
Centr. Afr. R.	64.0				−0.995	−0.763	649
Chad	67.1*				−0.938	−0.971	1230
Chile	91.0	51.8	54.7		1.302	0.208	12093
China	105.5	50.1		48.3	−0.488	−1.253	7212
Colombia	83.5				−0.059	0.273	7504
Comoros	70.6*					−0.559	896
Congo (B.)	73.0				−1.106	−0.848	2240
Congo (K.)	68.0		46.2		−1.802	−1.215	231
Costa Rica	86.0				0.604	1.260	11244
Cote d'Ivoire	71.0				−0.576	−0.811	1326
Croatia	99.0	49.1	48.0	49.0	−0.236	−0.109	15098
Cuba	85.0				−1.780	−1.288	11680
Cyprus	91.5*		49.4		0.692	1.503	19086
Czech Rep.	98.0	50.4	50.6	52.3	1.073	0.432	22968
Denmark	98.0	55.2		46.5	1.945	2.287	34150
Djibouti	(74.8)				−0.423	−0.811	2041
Dominica	73.0					1.240	6617
Dominican R.	82.0				−0.448	0.624	9948
East Timor	(85.4)					−0.183	1097
Ecuador	88.0				−0.521	0.358	6179
Egypt	81.0				−0.299	−0.756	4965
El Salvador	78.9*				0.685	0.157	6321
Equ. Guinea	(72.4)				−1.087	−1.262	22127
Eritrea	75.5					−1.050	591
Estonia	99.0	46.8	53.2	52.6	1.207	−0.028	16079
Ethiopia	68.5	48.5	47.2		−0.983	−1.008	684
Fiji	85.0		47.2		−0.065	0.320	4298
Finland	97.0		50.3		1.690	1.733	32380
France	98.0	51.4	48.1	54.1	1.019	1.767	30859
Gabon	76.6*				−0.294	−0.646	10227
Gambia	62.0				−0.509	−0.223	1453
Georgia	86.4*				−0.407	−0.576	4669
Germany	99.0	54.9	47.8	56.7	1.472	1.811	32535
Ghana	70.0				−0.236	−0.370	1235
Greece	92.0		51.5		0.383	1.669	27442
Guatemala	79.0				−0.149	−0.286	6192
Guinea	66.5				−0.291	−0.975	816
Guinea-Bissao	(68.5)				−1.398	−0.672	801
Guyana	(86.1)				0.053	0.301	3420
Haiti	(71.0)				−1.133	−1.055	1404
Honduras	81.0				−0.173	0.272	3564
Hong Kong	108.0	47.3	41.6	49.2	2.272	0.296	36288
Hungary	96.5			53.7	0.906	0.540	16433
Iceland	101.0	51.2			1.531	2.054	38751
India	82.0	48.8	48.5	47.7	−0.389	0.685	3232
Indonesia	87.0	48.9	48.0	49.9	−0.463	−0.395	4052

(*continued on next page*)

(*continued*)

Country	IQ	O1	O2	O3	EF	F/D	GDP
Iran	83.5	50.1			−1.083	−0.962	10707
Iraq	87.0				−1.986	−1.346	4721
Ireland	92.5				1.870	1.660	33184
Israel	95.0		51.0		0.878	1.602	25607
Italy	97.0	52.3	50.0	52.6	0.859	2.152	27851
Jamaica	71.0				0.527	0.490	8760
Japan	105.0	51.2	41.5	51.7	1.190	1.483	32182
Jordan	84.0		47.1		0.771	−0.759	4789
Kazakhstan	84.7*				−0.518	−0.858	11851
Kenya	74.0				−0.054	−0.702	1215
Kuwait	86.5	47.6			0.536	−0.745	48422
Kyrgyztan	85.0				−0.491	−0.707	2303
Laos	89.0				−1.852	−1.297	2536
Latvia	96.0*		49.9		0.474	0.024	12,503
Lebanon	82.0	48.1	49.4		−0.108	0.023	12,014
Lesotho	68.7*				−0.213	−0.538	1376
Liberia	(66.4)					−0.865	378
Libya	84.6				−1.898	−1.283	19,269
Lithuania	92.0		49.0		0.394	0.019	13,858
Luxembourg	95.3*				1.801	1.784	85,316
Macedonia	90.4*				−0.255	−0.274	7664
Madagascar	82.0				−0.581	−0.194	768
Malawi	60.0				−0.527	−0.494	655
Malaysia	88.5	47.5	47.6	46.6	0.677	−0.060	11,476
Maldives	(80.8)					−0.810	4345
Mali	69.5				−0.381	−0.654	1003
Malta	97.0	48.5	50.7		0.759	1.636	21,789
Marshall Isl.	84.0					−0.218	7091
Mauritania	(74.1)				−0.484	−1.029	1615
Mauritius	89.0				0.810	1.054	9489
Mexico	88.0	50.2	52.3		0.126	0.213	11,624
Moldova	92.5*				−0.317	−0.506	2458
Mongolia	100.0				0.158	−0.229	3134
Montenegro	85.8*				−0.123	−0.583	7260
Morocco	81.9	48.5	49.1		0.020	−0.597	3219
Mozambique	64.0				−0.722	−0.687	759
Namibia	72.0				0.580	−0.120	4753
Nepal	78.0				−0.562	−0.280	1202
Netherlands	100.0		49.9	55.7	1.827	2.191	40,597
New Zealand	99.0	50.1	49.5		2.160	1.846	27,790
Nicaragua	78.8*				−0.247	−0.003	2201
Niger	61.0*				−0.825	−0.790	535
Nigeria	71.0	49.1			−0.762	−0.529	2014
Norway	100.0			51.5	1.386	2.071	50,214
Oman	84.5				0.796	−1.084	20,229
Pakistan	84.0				−0.421	−0.478	2344
Panama	80.5*				0.692	0.345	10,215
Papua NG	82.5				−0.204	1.144	2948
Paraguay	84.0				−0.126	−0.214	3742
Peru	85.0	48.9	51.3	50.0	0.209	0.137	7228
Philippines	90.0	50.8	49.3	51.8	0.042	0.239	2846
Poland	95.0	48.6	49.1		0.305	0.234	16,401
Portugal	94.5	51.3	50.3	49.2	0.900	1.322	20,065
Puerto Rico	83.5	49.7				1.745	23,748
Qatar	83.0				−0.254	−1.010	15,9810
Romania	91.0		53.1		−0.614	−0.143	9745
Russia	96.5	49.7		49.1	−0.615	−0.342	14,462
Rwanda	76.0				−1.211	−1.084	1047
S. Africa	72.0		49.0	48.4	0.553	−0.130	7584
S. Korea	106.0	50.9	44.3	51.4	0.692	0.594	25,462
Sao Tome & P.	(72.9)					−0.353	1734

(*continued*)

Country	IQ	O1	O2	O3	EF	F/D	GDP
Saudi Arabia	79.0				−0.003	−1.288	19,815
Senegal	70.5				−0.484	−0.244	1492
Serbia	88.5	51.6	52.4	56.0	−0.727	−0.363	8535
Seychelles	82.2*					−0.257	24,922
Sierra Leone	64.0				−1.024	−0.767	851
Singapore	108.5				2.137	−0.260	46,182
Slovakia	98.0	48.2	52.5		0.594	0.302	19,718
Slovenia	96.0	48.8	50.5		0.436	0.235	25,122
Solomon Isl.	(84.9)					0.788	1995
Somalia	(71.8)				−2.174	−1.370	461
Spain	97.0	48.8	49.6	48.0	1.074	1.449	27,625
Sri Lanka	79.0				−0.009	0.452	4036
St. Lucia	62.0					0.936	12,719
St. Vincent	71.0					0.943	7431
Sudan	77.5				−1.119	−1.143	2194
Suriname	89.0				−0.548	0.233	10,721
Swaziland	80.5*				0.391	−0.940	3410
Sweden	99.0			46.0	1.409	2.033	35,276
Switzerland	101.0	56.1	52.6	58.9	1.708	2.270	39,765
Syria	80.5				−1.183	−1.250	3964
Taiwan	105.0		45.7	50.2	1.090	0.076	28,878
Tajikistan	(79.6)				−1.011	−0.916	1881
Tanzania	72.5		48.2		−0.446	−0.768	1190
Thailand	88.0	48.5			0.530	−0.001	7793
Togo	(69.1)				−0.986	−0.893	736
Tonga	86.0					−0.423	7761
Trinidad & T.	86.7*				0.844	0.876	31,850
Tunisia	84.0				0.179	−0.844	6259
Turkey	88.5	48.2	52.7	50.8	0.132	0.345	9950
Turkmenistan	(79.6)				−1.365	−1.229	6956
Uganda	72.0	49.5			−0.097	−0.693	1171
Ukraine	95.0		42.1		−0.846	−0.121	6205
Un. Arab Emir.	83.0				0.799	−0.921	52,072
United K.	100.0	53.5	46.0		2.059	1.753	33430
Uruguay	96.0				0.451	1.066	11,038
USA	98.0	50.4	50.0	50.0	1.862	1.747	41,595
Uzbekistan	(79.6)				−1.421	−1.157	2377
Vanuatu	(84.6)					0.814	6517
Venezuela	84.0				−0.678	0.782	9100
Vietnam	94.0			44.0	−1.329	−1.306	2869
W. Samoa	88.0				0.114	0.381	6572
Yemen	83.0				−0.759	−0.933	2506
Zambia	75.0				−0.025	−0.523	1761
Zimbabwe	71.5		48.5	47.0	−1.233	−0.547	137

Note: IQ, national IQ; *, IQ calculated from scholastic achievement, estimated IQs in parentheses; O1, openness scores from McCrae et al. (2005); O2, openness scores from Schmitt et al. (2007); O3, openness scores from McCrae (2002); EF, Economic Freedom; F/D, Freedom/Democracy; GDP, Gross domestic product per capita in $US, corrected for purchasing power.

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