On the Historical Association between National IQ and GDP per capita

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1. Introduction and summary of results

A remarkable, unquestioned assumption in ([1]–[3]) and subsequent studies measuring the association between national average Intellectual Quotients (IQ) and Gross Domestic Products (GDP) per capita is that a supposedly immutable[1] genetic[2] factor (IQ) may be correlated with a markedly fluctuant one (the wealth of nations). This short paper questions this assumption and presents the following results:

1. Using historical GDP per capita data produced by the Maddison project ([5], [6]), we find that, over history, the (Pearson product-moment) correlation coefficient (r) between average IQ and GDP per capita is highly variable and ranges from strong negative values to strong positive values. The correlation between national IQ and GDP per capita is a snapshot of the world order at some point in time, and historical data allow us to identify several other eras.

2. The reported positive correlation between national average IQ scores and GDP per capita thus only concerns "today's GDP". However, today's GDP was never difficult to explain and predict in the first place. We show that arbitrary ad-hoc scores based on a country's continental location present a more significant correlation with contemporary GDP per capita. As an economic variable, the predictive value of IQ is thus lesser than that of the common sense observation that North-America is, currently, richer than Europe which is in turn richer than Africa, etc.

3. We conclude this paper by questioning the purpose of IQ studies in Macroeconomics. If this purpose is explaining the wealth of nations then confounding variables such as literacy cannot be ignored, and the Pearson product-moment correlation cannot be considered as a sole criterion to draw causal conclusions. If, on the other hand, the purpose is predicting the wealth of nations then simply using the geographical location of countries, which is no less circular than the use of IQ due to the confounding role of literacy, would be a better predictor of GDP.

2. Related work and data sources

General knowledge regarding average national Intellectual Quotients (IQ) and their association with economic outcomes is largely based on two books by Richard Lynn and Tatu Vanhanen, "IQ and the Wealth of Nations" ([1]) and its follow-up "IQ and Global Inequality" ([2]), as well as a dataset ([3]) by the same authors. With these publications, IQ gained entry into macroeconomic research and started being considered a valid independent variable to explain and predict the Gross Domestic Product (GDP) of nations, because of the high reported correlation of .82[3]. Since then, the confounding role of literacy in the association between IQ and GDP has been thoroughly established. Indeed, Marks has shown that IQ variations across time and race are explained by literacy differences ([7]) and that literacy, not intelligence, is in fact the key predictive factor for economic development ([8]).

A recent (June 26, 2020) retraction of a publication by Clark et al. in *Psychological Science* ([9]), based on data from ([3]) notes that the above data are "plagued by lack of representativeness of the samples, questionable support for some of the measures, an excess of researcher degrees of freedom, and concern about the vulnerability of the data to bias".

In this work, we overlook these shortcomings, as well as inherent shortcomings of IQ tests as a measure of an individual's intelligence ([10]), and question the idea that a fairly static racial factor is associated with the historically variable variable that is GDP per capita.

For historical GDP per capita data, we rely on the 2020 release of the Maddison project dataset ([5]). Building up on the work of the late Angus Maddison, this collaborative research project publishes estimates of the GDP and population in the world economy between Roman times and year 2018, adjusted for territorial and political change, and expressed in 2011 US dollars. Table 1 presents a subset of the Maddison project data, presented in ([6]), and focusing on 38 nations. We have additionally included the associated national average IQ from ([2]) in the last column, and computed the corresponding coefficient of correlation (r) in the last row.

3. Historical association between GDP per capita and national IQ

Figure 1a shows the variations of the coefficient of correlation between national IQ scores and GDP per capita for the subset of 38 nations considered in **??** with the data reproduced in Table 1, while Figure 1b shows these variations for the 169 nations covered by the complete Maddison 2020 database for years 1280 to 2018. Both Figures show that the association between the two variable is largely negative before the modern era ([11]), positive association starting from 1300 and more

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[1]The Flynn effect, an intra-population effect, indiscriminately applies to all countries([4]).

[2]In the line of research of ([1]–[3]), IQ is not just intrinsic to nations but to races, as evidenced by the extrapolation of missing data on a racial basis in ([1]).

[3]We incidentally find that this correlation, when considering all countries, for the year of study of GDP in ([1]) is in fact much lower.

Nations	1	730	1000	1150	1280	1300	1348	1400	1500	1600	1661	1700	1766	1850	1870	1913	1929	1937	1960	1973	1995	2016	IQ
Netherlands	600	-	-	-	-	-	-	2151	2617	4791	3560	3789	4891	4266	4992	7285	10237	9776	14911	23539	33649	45600	102
Belgium	1050	-	-	-	-	-	-	2407	2607	-	2255	-	-	3029	4415	6922	8291	8138	11404	19964	30020	38766	100
France	1050	-	-	1364	1469	1906	1853	1748	1661	1731	1748	1766	-	2627	3086	5733	7748	7381	12170	21097	30135	37124	98
Germany							2315	1631	-	1897	-			2884	3715	7369	8184	9464	15565	24173	34579	44689	100
Austria														2861	3229	6009	6413	5471	11302	19479	31582	41445	100
Finland								1209	-	1352	-			1543	1845	3417	4398	5571	10087	17946	26069	37239	101
Russia																			8972	16939	12369	23635	96
Ukraine																				11123	6552	9214	95
USSR																3040	2979	4634	8481	13026	8651	18635	95
Yugoslavia															1066	1880	2427	2265	4580	8759	7278	15416	93
Czechoslovakia														2023	2182	3929	5704	5403	9578	13202	14916	27738	99
Hungary															2656	5105	6024	6188	8879	13615	13989	23279	98
Poland								1050	1036	1266	1113	1202	1189	1202	1921	3383	4119	3726	6253	10386	10950	24838	97
Italy	1546	-	-		3302	3089	3568	3125	2778	-	3009	-	-	3018	3143	4698	5663	5651	10922	19632	32061	33419	97
Spain	1050	-	-	1585	1430	1477	1558	-	1422	-				2017	2140	3629	4938	3139	5960	13770	24465	30110	97
Portugal	1050	-	-							1615	1855	1554	1938	1597	1687	2164	2786	3041	5115	12222	20507	25346	95
Greece	1400	-	844	816	-									1940	2339	2264	4505	5327	6052	14727	19790	22574	92
Turkey	984	-												1114	1449	1831	1931	2566	3765	6275	11756	17906	89
Egypt	1225	1278	1050	1155	1173	1068			1190					1999	2799	-	-		2643	3450	7399	11351	83
Iraq	1225	1610	1435	1190										4197	5596				19133	26256	6161	13898	86
Jordan	1225													1440	2058				4794	4915	8211	11529	84
Iran	1225													1670	2227				6003	15205	10849	16783	84
Indonesia														797	892	1498	1875	1867	1776	2616	5914	10911	87
India									1055			970			710	895	969	900	1002	1135	2053	6125	82
China											1083		791	684	754	786	800	825	843	1207	3367	12569	105
South Korea															465	669	861	1202	1691	3895	17095	36103	106
Japan	633	-	818	829			527		903			990		1072	1160	2182	3188	3643	6273	17993	31577	37465	105
United States														2825	3736	8101	10543	10450	18058	26603	39391	53015	98
Canada														2249	2866	7521	8568	7566	14804	23405	32961	43745	99
Mexico									950	1407	1758	1672		1255	1246	2385	2886	2955	5624	9046	11360	16133	88
Haiti																			2512	2330	1769	1728	67
Cuba														1294	-	3088	3653	2975	4360	5076	3810	7889	85
Brazil														1123	1405	1354	1899	2086	4404	7885	10905	13873	87
Venezuela														2126	1996	1974	3319	4382	5913	17529	15837	15219	84
Chile														1178	1629	4217	4953	4433	5913	6899	12357	21696	90
Argentina												4041	3299	2198	2578	6670	7671	7246	9765	13986	14091	18875	93
South Africa														1552	1916	-	3553	4836	5913	9906	8674	12139	77
Australia														3589	5947	9369	9562	10439	15972	23398	33908	48845	100
r	-0.424	-0.893	-0.343	-0.722	-0.462	0.591	-0.314	-0.440	0.538	0.347	0.237	-0.179	-0.182	0.370	0.284	0.380	0.373	0.3414	0.378	0.457	0.636	0.750	

Table 1. GDP per capita (in 2011 $) over history, for the subset of nations considered in (6)

clearly after year 1500. The modern era itself can be broken down into several cycles of stability in the value of the positive correlation (ranging from 0 to periods of stability around .5). The beginning of new cycles can be linked to important historical changes (industrial revolution, postmodernism starting after the second World War, decolonization).
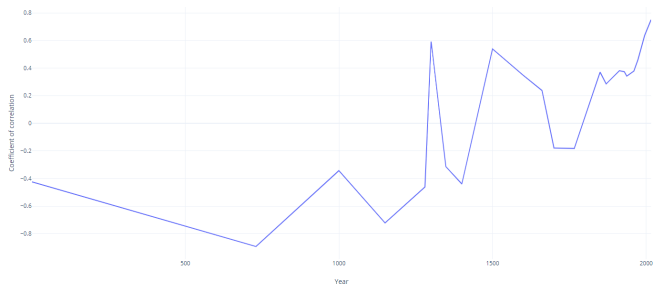
(a) Pearson Product-moment coefficient of correlation (r) between GDP per capita and national IQ for the subset of nations considered in (6)
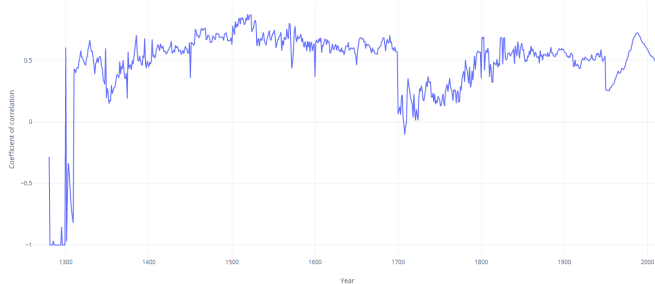
(b) Pearson Product-moment coefficient of correlation (r) between GDP per capita and national IQ for the complete Maddison 2020 database (5) of 169 nations

Fig. 1. Historical association between GDP per capita and national IQ

A. The case of Romania, Thailand, Botswana, and Togo. Let us consider four comparable middle-income economies, Romania (IQ=94), Thailand (IQ=91), Botswana (IQ=72), and Togo (IQ=66), covering a range of 3.31 standard deviations of

national IQ. Figure 2 presents the historical GDP per capita, for years 1960 (independence of Togo) to 2018. The correlation of IQ with 2018 GDP for these four countries is .51, and comparable to the global correlation. The economies of Botswana and Thailand have been growing steadily at a rather stable rate, whereas changes in the growth rate of GDP per capita of Gabon can be linked to the discovery of important offshore fossil fuel reserves, and the effect of the 2007 enlargement of the European Union can be similarly seen in the growth of Romania's GDP. This example illustrates the fluctuating nature of both GDP per capita as well as its growth rate. Any treatment other than as a time-series is bound to be inadequate.
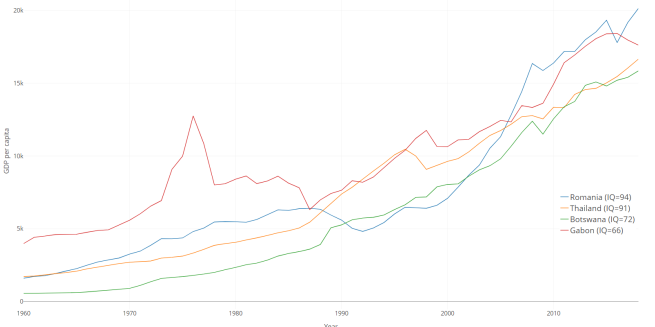

Fig. 2. GDP per capita of four middle-income economies over time

4. Modern GDP per capita was never difficult to predict

We divide the world in 13 regions and assign an ad-hoc integer score from 1 to 10 reflecting the wealth of the region (1 for Subsaharan Africa, 10 for North America), according to table 2. Each country is assigned the score of the region it belongs to. Figure 3 compares the coefficient of correlation of this lazy ad-hoc score with that of national IQ.

Continent	Score
North America	10
Western Europe	9
Oceania	8
East Asia	7
West Asia	7
Eastern Europe	5
South-East Asia	4
South America	3
North Africa	2
Central Asia	2
Caribbean	2
South Asia	1
Subsaharan Africa	1

Table 2. Ad-hoc score assigned to each of 13 geographical regions of the world

Fig. 3. A lazy geographical score with nine possible values shows a better correlation with modern GDP per capita than national IQ for the complete Maddison 2020 database (5) of 169 nations

5. Conclusion

The purpose of IQ research in Macroeconomics is unclear. If it is an attempt at explaining the wealth of nations, e.g. to predict the value of investment in increasing intelligence, then this type of analysis cannot avoid controlling for literacy rates and other confounding variables (nourishment, health, etc.). If on the other hand, it is an attempt at predicting the wealth of nations based on an independent variable (notwithstanding the poor test-retest correlation of IQ test), e.g. to inform immigration policies, with correlation as the only criterion, then assigning lazy 1 to 10 scores to different continents based on their current wealth would be a better model than national IQ. The wealth of nations (and of anyone for that matter) is best studied as a time-series. Any association with a static variable is bound to be uninformative.

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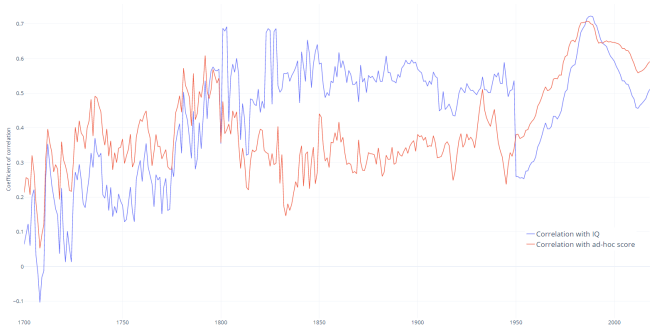11. Giddens, A. (1990). The Consequences of Modernity. Stanford: Stanford University Press. ISBN 0-8047-1762-1