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The Potential Consequences of Food Securtiy, Health Security, Income Inequality, and Eduation for the Average Level of National Intelligence

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Abstract- This paper uses cross country regression analysis to try to explain the variation in cross country cross country intelligence within the framework of an intelligence production function model. It proposes that average country intelligence is positively related to food security, healthy security, and education, but negatively related to income inequality. The empirical findings of the paper tend to provide statistical verification for each of these contentions.

Intellectual ability is critical not just for the operation of modern technologically sophisticated economy, but is also essential for rapid economic advancement through innovation, creativity, the development of new and improved products, and the introduction of new means of production. Intellectual ability, as measured by average country IQ scores, varies substantially across countries. This paper assumes that the level of intelligence is a product of a society that can be changed through appropriate changes in environmental, institutional, and cultural conditions. If this is the case, then it is a potentially highly profitable to understand the intelligence production process, to identify important variables in intelligence production function, in society. If the variables can be identified, then policy can be designed to promote favorable factors and to downplay unfavorable ones so as to enhance average societal intelligence.

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The Potential Consequences of Food Securtiy, Health Security, Income Inequality, and Eduation for the Average Level of National Intelligence

William R Dipietro

Abstract- This paper uses cross country regression analysis to try to explain the variation in cross country cross country intelligence within the framework of an intelligence production function model. It proposes that average country intelligence is positively related to food security, healthy security, and education, but negatively related to income inequality. The empirical findings of the paper tend to provide statistical verification for each of these contentions.

Intellectual ability is critical not just for the operation of modern technologically sophisticated economy, but is also essential for rapid economic advancement through innovation, creativity, the development of new and improved products, and the introduction of new means of production. Intellectual ability, as measured by average country IQ scores, varies substantially across countries. As a consequence, countries with lower average level of intelligence are at a distinct disadvantage with regard to economic growth and development relative to other countries. This paper assumes that the level of intelligence is a product of a society that can be changed through appropriate changes in environmental, institutional, and cultural conditions. If this is the case, then it is a potentially highly profitable to understand the intelligence production process, to identify important variables in intelligence production function, in society. If the variables can be identified, then policy can be designed to promote favorable factors and to downplay unfavorable ones so as to enhance average societal intelligence.

The central hypothesis of the paper is that conditions, some of which if made known could actually be subject to conscious policy control, matter, are critical, for the development of the modern intelligence of the people of a country. Four potential environmentally conditioning variables are considered and are empirically investigated for possible influence on the production of national intelligence. They are food security, health security, education, and income inequality.

The paper is divided into five sections. The first section reviews a little of the recent literature that focuses on the reasons and the consequences of the disparity in average IQ across countries. The second section provides a simple production function style model that essentially considers country intelligence as a product, implicitly implying that average country IQ depends on favorable conditions for intelligential development in a country, and on the lessening of conditions that are unfavorable for developing intelligence in a country. The third section reviews the variables that will be used in the regression analysis and identifies their sources.

The fourth section presents the results of cross country regressions on IQ within the general framework of the simple model. Finally, the fifth section rounds off the article with a few concluding remarks.

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I. Some Recent Backround Literature

Not surprisingly, quantitatively, IQ appears to matter for economic growth. Using average growth rates for the period 1965-1990 and for the period 1970-1995, Weede and Kampf's cross country regressions show that average country IQ is important for economic growth, both statistically and in terms of its overall impact, when controlling for common growth determining variables such as the level of economic development, the level of investment, literacy, freedom, and the improvement in freedom (Weede and Kampf 2002). They speculate in their conclusion that there might be a positive virtuous circle between economic growth and IQ, with higher IQ leading to greater economic growth, and greater economic growth, in turn, through improved nutrition, leading to higher average country IQ.

Meisenberg and Lynn look at the relationship between cognitive ability, as measured alternatively by IQ, school achievement, and a composite of IQ and school achievement, on a whole host of variables (Meisenberg and Lynn 2011). Their cross country regressions, which adjust for schooling and other variables, indicate that cognitive ability has a positive effect on economic growth, freedom, democracy, suicide, life expectancy, and fertility, but a negative effect on corruption, income inequality, and religiosity.

Di Pietro uses income inequality as an explanatory variable for explaining differences in cognitive abilities across countries (Di Pietro 2006). He finds a negative and significant relationship between IQ and Income inequality in his regressions.

Jamieson maintains that although favorable conditions allow a population to function more effectively and to attain a position closer to its maximum potential level of intelligence that potential intelligence itself is genetically determined and varies between groups of individuals (Jamieson 2003). He also feels that some societal organizations are more conducive to selection of greater intelligence than others, and

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believes that past natural selection has led to greater intelligence for groups that have been subject to more challenging environments. He expresses concern over the potential negative impact on future intelligence from, in his view, the current harmful artificial selection in western culture, in which the less successful members of the population have more children than the more successful.

Meisenberg notes that IQ is highly correlated with race, latitude (higher latitudes being associated with higher intelligence) and GDP per capita (Meisenberg 2003). He proposes that the Flynn effect, the large increase in intelligence over the last century in many countries, can be attributed to the positive feedback interaction between IQ and the standard of living, with higher IQ leading to an increase in the standard of living and a rise in the standard of living causing an increase in IQ.

Eppig, Fincher and Thornhill put forth a parasite stress hypothesis (Eppig, Fincher and Thornhill 2010). It essentially states that the need to fight off infectious diseases is detrimental to development of cognitive ability because the need to fight off infection from parasitic diseases uses body energy and resources that could otherwise be used for brain development. To test their theory, they look at the impact of the intensity of infectious diseases on cognitive ability across countries around the world and between countries within six major regions of the world, when controlling, in their regressions, for GDP per capita, education, temperature, and distance from Africa. They find evidence that infectious diseases have a negative effect on IQ for the world as a whole and for five of the six regions they consider, and that the intensity of infectious diseases is a strong predictor of intelligence thereby giving support to the parasitic stress hypothesis. In another more recent study, looking across U.S. States instead of across countries, they obtain similar results for the importance of parasitic infectious diseases on intelligence, and for the validity of the parasite stress hypothesis (Eppig, Fincher and Thornhill 2011).

Weiss theorizes that progress is not linear, but cyclical, and that both progress and the form of government depend critically on population characteristics such as population density and population quality (Weiss 2007). He believes that, whereas before we were in the ascendant phase of the cycle in which higher income people, people with greater intellectual ability, have a greater number of children than lower income people, thereby leading to increased average intelligence and a consequent positive feedback effect on economic growth, that, just when humans are overcrowding the planet and human civilization is in the greatest need for cognitive capacity, we are now in a dysgenic downward phase in which higher income people have few children, while lower income groups have many children with a resultant decrease in average intelligence. He can see no political solution to this human population quality problem but foresees the eventual collapse of human civilization into chaos. In his view, greater population density leads to more democratic and equalitarian values that prevent any policies, or even the consideration of policies, that are designed to change the distribution of births in a direction favorable for intelligence.

Barber focuses on the environmental variable education as a determinant of differences in IQ scores between countries (Barber 2005). In his regressions, he uses birth weight, illiteracy, infant mortality, geographic location, and GNP as control variables. The regressions show that IQ is positively related to education, but negatively related to illiteracy and the proportion of workers in agriculture.

II. The Production Function Style Model

The model between the average level of intelligence of society and key experiential variables in the intelligence production function consists of single equation with associated partial derivatives. The model's equation is as follows.

$$I = f(F, H, E, Q) \quad \delta I/\delta F > 0, \delta I/\delta H > 0, \delta I/\delta E > 0, \delta I/\delta Q < 0$$

In the model equation, I stands for the country's average level of intelligence, F for food security, H for health security, E for the average amount of education, and Q for the degree of income inequality.

A country's average intelligence is expected to be positively related to food security, health security, and the average amount of education, and negatively related to income inequality.

Without proper nutrition for children, and children are likely to be the first to suffer in the absence of food security, proper child brain development runs a high risk of being impaired or retarded. In addition, the brains of adults lacking food do not function to capacity, even if their brains are fully developed and lacking any ill consequences from childhood.

For similar reasons, it is anticipated that average intelligence will be positively related to health security. Just like the absence of food security, bad health retards child mental development, and, just like the lack of food security, poor health dampens adult physical and mental performance and effectiveness.

The third variable, income inequality, is expected to have a negative effect on national intelligence. Over and above its potential negative effects on the first two variables, food security and health security, greater income inequality reduces

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national intelligence for other reasons. Child mental development depends on parents providing a rich intellectual environment for their children, and on parents devoting large amounts of time and resources to child development. With greater inequality in society, fewer and fewer parents are in a position to be able to do this. Greater inequality also diminishes opportunity for those who are not at pinnacle of society. In the face of reduced opportunity, those at the lower end of the income distribution do not try to develop socially useful IQ intelligence which provides little or no future, but rather street smarts that are favorable for survival.

Finally, education is viewed as major institutional means to develop intelligence. Just being able to read, mere literacy, opens up worlds and gives potential access to a wide variety of new perspectives. If nothing else, formal education at least provides a block of time specifically devoted to mental development.

III. The Variables that are used in the Regression Analysis, Description, and Sources

The gauge of average national modern intelligence is the estimated national 2006 average IQ index score from Richard Lynn and Tatu Vanhanen's book entitled IQ and Global Inequality (Lynn and Vanhanen 2006).Their IQ index is standardized by setting the U.K. equal to a hundred, is available for one hundred and ninety countries, and varies from a low value of 59 to a high value of 108.

The measure of food security and the measure of health security are, respectively, the food security index and the health security index from the 2010 Human Security Index data set (Human Security Index 2010). For the available countries, the food security index ranges from zero to .960 and the health security index from .157 to .905.

Income inequality is the average Gini coefficient for the years 1990 through 2007. The average is calculated from the annual Gini coefficient numbers of the World Bank (World Bank 2011). In some cases the country average may be based on one or two years because of missing data. The potential range of the average Gini coefficient is between zero and a hundred with higher values indicating greater income inequality.

The amount of education is captured by using the average number of years of education received by people aging twenty-five years and older for the year 2010. The education data is taken from the United Nations (United Nations 2013).

IV. The Cross Country iq Regressions

Table I shows the cross country regressions of IQ on the four explanatory variables.

Table 1 : Cross Country Regressions Of Average Country Iq Scores On Food Security, Health Security, Income Inequaltiy, And Average Years Of Eduation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CONSTANT	67.912 (48.52) *	48.184 (20.41) *	112.876 (29.21) *	65.289 (39.32) *	51.542 (20.15) *	60.386 (15.35) *	61.314 (16.00) *
FOODSECURITY	34.439 (12.82) *				11.892 (3.06) *	11.011 (2.72) *	10.752 (2.71) *
HEALTHSECURTIY		52.474 (15.61) *			39.417 (7.31) *	42.006 (8.32) *	35.155 (5.71) *
AVGGINI			-.6905 (-7.59) *			-.2254 (-3.44) *	-.2197 (-3.50) *
AVGSCHOOLING				2.830 (12.75) *			.5744 (2.08) **
RSQ	.469	.567	.288	.515	.588	.756	.795
N	188	188	144	155	188	144	129

The table is set up with the first column listing the explanatory variables. The second through the eighth columns show the results of a separate regression runs with the regressions numbered in the first row. If a variable enters an equation, then the top value corresponding to the row of the variable and the column of the equation that it enters is the estimated coefficient for that variable. Underneath its estimated coefficient is its individual t-statistic. A variable significant at the one percent level of significance or better in an equation is marked by a single asterisk under its individual t-statistic, while those that are significant at the five percent level of significance or better are labeled with two asterisks. Finally, the second

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to last row shows the R squared values, the last row reports the number of countries entering an equation.

The table consists of seven equations. The first four equations are the regressions of average country IQ separately on each one of the four different explanatory variables. The remaining equations show the results when the explanatory variables are used together in assorted combinations. The fifth regression equation employs food security and health security as the two independent variables. The sixth equation adds income inequality, and the seventh equation uses all four explanatory variables.

The results lend strong support for the notion that national intelligence is a produced phenomenon, and that differences in average intelligence between nations can be ascribed to dissimilarity in intellectual developmental conditions between nations. In every one of the seven equations in the table, the estimated coefficients on the variables have their theoretically expected signs, positive signs for food security, health security, and the average amount of education, and a negative sign for income inequality.

Looking at the individual t-statistics for the variables reveals that all the variables are consistently highly statistically significant. Except for average schooling in equation seven (in which it is significant at the five percent level or significance or better), each and every one of the variables is significant at the one percent level of significance or better in every equation in which they appear.

The r-squared values, especially for a cross section, are quite good. On its own health security accounts for over fifty six percent of the total variation in average IQ scores across nations, and, when used in combination with food security, the two variables together account for over fifty eight percent of the variation. Looking at equation seven shows that the four variables as a group account for almost eighty percent of the variation in IQ scores across countries.

V. Conclusion

Given intelligence is so important for economic progress and is becoming even more essential with the passage of time, countries need to focus on the ingredients in the making of national intelligence so as to be able to conduct informed, intelligent, and effective policy to upgrade national intelligence. The empirical results suggest that if a country wants to produce a high level of average intelligence in its population, with all its consequent positive effects on economic growth and development, then it must be sure to design, implement, and maintain policies that assure food and health security for its population, that provide decent education for all, and that keeps income inequality within bounds.

Food and health security are critical for the optimal intellectual development of youth and for effective functioning and performance of adults. Education provides the space and the time for children to expand their minds and to improve their mental abilities. On the other hand, extremely high levels of inequality is likely to reduce the actual opportunities and the perceived chances of advancement for all but the elite, thereby dampening incentives and motivation for the general population, leading to reduced investment in human capital in themselves and in their children.

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