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# Auditing Income Inequality Data in Models of Capitalism, Development and Democracy

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**DEVELOPMENT AND DEMOCRACY**

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ABSTRACT

It is appropriate to take stock of extant measures of income inequality as they pertain to their utility in cross-national models of political and economic performance.  Are some measures more reliable and valid than others?  What about data coverage, conceptual mapping of similar indicators, functional form specification matters?  This paper specifies models of cross-national democratic and economic performance, with common, industry-standard variables such as economic growth and development level, globalization, political culture (colonialism, ethnicity, religion), and economic type (world-system), and insert various measures of income inequality (Hoover, Deininger and Squire, Galbraith, and UNU-WIDER).  The intent is to compare and contrast model robustness under conditions of variable country coverage, inequality definitions, and measurement strategies.  With both practical and conceptual matters in mind, the hope is to become better acquainted with the consequences of variable choice in income inequality data usage and modeling techniques.

**INTRODUCTION**

This paper is a brief discussion of how measures of income inequality affect measures of democracy, controlling for capitalism, economic development, and other factors. The literature is replete with varying income inequality measures, some based on household income, others on wages. Some utilize the Gini coefficient, while others divide the earnings population into quintiles and analyze those at the top 10%, or the top 20%. Which measures of inequality provide the most useful results to academics and policymakers?

The intent of this paper is to examine the properties and performance of four measures of income inequality in models of democratic performance: Hoover (1989), Galbraith (1993), Deininger and Squire (1996), and the UNU-WIDER World Income Inequality Database (2008). Each measure is an attempt to improve the data collection of income inequality. This analysis will discover, unsurprisingly, that each has virtues and drawbacks, but that each can be used depending on the overall purpose of the research endeavor.

Hoover (1989) was an early effort to capture in more systematic fashion the concept of income inequality, creating measures from 1973-1989. It is of the second generation of income inequality measures, the first being Paukert (1973). The second generation improved on the first by directing more attention to the quality of the measure. Hoover created an early standard, though the measure was not frequently employed. Exceptions include Burkhart (1997, 2007) and Crenshaw (1993).

Better publicized were the datasets created by Galbraith (1993) and Deininger and Squire (1996). They take the measurement in opposite directions. Unlike the Hoover

and the Deininger and Squire income-based measures, Galbraith forms his inequality measure from wage data, believing it best captures the concept of inequality. Deininger and Squire comb through extant inequality measures and create their own standard of quality. Under the auspices of the World Bank, it has become a popular measure of inequality in this literature.

A later entrant in the catalog of income inequality measures is that of the United Nations University – World Institute for Development Economics Research project, or UNU-WIDER (2008). It is an overlap of other databases, including Deininger and Squire as well as the Luxembourg Income Study and the Transmonee data from UNICEF. The UNU-WIDER dataset has gained a reputation for reliability.

Which measure is best? The answer depends on what one wishes to accomplish. The definitional question becomes important. Does one believe that household income is a sufficient measure of inequality? What is the role of consumption in the inequality measure? Or is it wages that one should focus upon for a better grasp of inequality? It is both a matter of taste and definitional belief.

The Pearson product-moment correlations demonstrate the stark contrast. They are as follows:

$r$ (Hoover, Galbraith) = .10, N = 140

$r$ (Hoover, Deininger and Squire) = .88, N = 120

$r$ (Hoover, UNU-WIDER) = .83, N = 50

$r$ (Galbraith, Deininger and Squire) = .08, N = 110

$r$ (Galbraith, UNU-WIDER) = -.01, N = 42

$r$ (Deininger and Squire, UNU-WIDER) = .85, N = 386

It is clear from the correlation analysis that the measures are measuring different aspects of inequality. It is also quite possible that the measures are not valid in comparison to one another, if validity is understood to be a measure that measures what it is supposed to measure according to definitional criteria.

This paper is also a brief empirical excursion into the world of political economy, utilizing these measures of inequality as a main control variable. These models build on the work of Burkhart (2007) on exploring the utility of assessment measures of capitalism (such as those put forth by the Fraser Institute) in models of cross-national democracy. As with measures of income inequality, a major concern is that there are limitations in the amount of data available for these assessment measures. While a seemingly important theoretical variable to include, assessment measures of capitalism may well have to be excluded due to data limitations and be proxied by other variables such as wealth. The underlying purpose of this exercise is to find ways to balance the issue of country coverage in the cross-national models, without sacrificing too much in the way of failing to capture concepts such as inequality or capitalism by using proxy variables. These are important questions to consider for model specification, theoretical perspectives, and empirical procedure. Sound statistical analysis is dependent on strong theory buttressing a plausibly parsimonious, well-specified model with sufficient data to estimate it.

As just suggested, an answer to the question posed above is obvious: most any concept can be proxied. Wealth, for instance, is meant to signify a lengthy series of conditions that are largely associated with "quality of life": ownership of property, good nutrition, highly educated, resources to invest, among others. Wealth can either substitute well or poorly for quality of life, avoiding inevitable problems of collinearity

among the potential independent variables that signify quality of life. Indeed, the real question is to what degree one can proxy complex concepts such as quality of life with a single variable. In part, answering that question is an empirical exercise, one that I largely engage in throughout this essay, focusing on the concept of economic structure

**MODELS OF CONCERN**

My concern with this issue arises from two papers I have published over the past decade (Burkhart 1997, Burkhart 2007). In these papers, I have attempted to account for variation in democracy and income inequality in countries around the world using a baseline model:

(1) $Dem = a + b1\ Ineq + b2\ Econ + b3\ Econ\ x\ Semiper + b4\ Econ\ x\ Per + b5\ Eth$
$+ b6\ Prot + b7\ Brit + e$

Where Dem = democracy, Ineq = income inequality, Econ = economic development, Econ x Semiper = economic development multiplied by semiperipheral world-system position, Econ x Per = economic development multiplied by peripheral world-system position, Eth = ethnolinguistic fractionalization, Prot = percentage of population Protestant, Brit = former British colony, a = intercept, b1 – b6 = slope coefficients, e = error.

This baseline model of democracy attempts to bring several theoretical factors to the forefront. These include the effect of increased income inequality leading to a falling middle class and consequent political inequality (Aristotle 1905, Bollen and Jackman 1985), the positive effect of wealth on democracy through a rising middle class and increased power (Arat 1988, Bollen 1979, Bollen 1983, Burkhart and Lewis-Beck 1994, Gonick and Rosh 1988, Jackman 1973, Lipset 1959, Londregan and Poole 1996,

Przeworski and Limongi 1997, Przeworski et al. 2000), the negative impact of distance from the core of the global economic world-system on democracy due to the apparent concentration of economic power in countries that rely on primary products (Bollen 1983, Burkhart and Lewis-Beck 1994, Wallerstein 1974), the negative impact of an ethnically heterogeneous society on political unity leading to division and power concentration (Burkhart 1997), the positive impact of Protestantism and its encouragement of an individualistic work ethic on democratic formation (Lipset 1959, Bollen 1979), and the ameliorating effects of British colonial history on encouragement of local control and democratic development (Smith 1978, Bollen 1979, Burkhart 1997).

These variables thus have the backing of many literature sources. I should add that this model does not pretend to be exhaustive, as there are other possible independent variables: globalization effects such as composition of labor force (Rudra 2005), trade (Reuveny and Li 2003) foreign direct investment (Reuveny and Li 2003, de Soysa 2003), as well as the impact of rentier state behaviors in the petroleum export business (Ross 2001). Nor do I estimate a multiequation system to ascertain the effect of democracy on income inequality, an exercise I have performed in previous work (Burkhart 1997, Burkhart 2007).

However, I am concerned with the issue of country coverage in my research. Using the best data available, I still could only use 50 countries in the main dataset in both articles. While the countries represented in the dataset are from all world regions, some regions are less well represented. There are only three countries from Sub-Saharan Africa, for instance. There is much interesting variation thus left in the error term from countries that are not included in the analysis.

Where does the extent to which a country is capitalist fit in this discussion? As an independent variable, it has potential in accounting for variation in democracy, economic development, and income inequality. Previous studies have examined its performance in such models and found it to be statistically significant in explaining democracy (Brunk, Caldeira and Lewis-Beck 1987; Burkhart 2000) and income distribution (Burkhart 2007). Capitalism appears to be a variable that should be seriously considered for model inclusion, whether measured as government expenditure as a percentage of total economic product, or using a subjective scale as developed by an organization like Freedom House (Burkhart 2000, Freedom House 1996).

With this serious consideration come serious concerns, both in terms of theoretical overlap with measures of economic development such as GNP per capita, and data coverage. I focus on the latter in this paper. The development and democracy literature regularly employs variables with lengthy time series. GNP per capita and the POLITY democracy scale come to mind. The largest extant subjective measurement of capitalism, the Fraser Institute capitalism index (Gwartney, Lawson and Block 1996), has coverage that extends back to 1970 only. This misses a substantial time period. As well, its coverage of countries is more scattered than that of more objective political economy measures. While the benefits of a comprehensive assessment of capitalist conditions in countries has its theoretical and conceptual merits, in the end, if sufficient data is lacking for robust parameter estimation, then its statistical usefulness is questionable. This is the fundamental source of this paper's motivation. Are there enough data to warrant capitalism's inclusion in cross-national models? Are there alternative variables capable of proxying capitalism? What are the results of using such alternatives?

**DATA**

The newly constructed dataset that I employ covers 50 countries for the years 1973-1988. These countries also cover the major world regions. I use the Fraser Institute's "summary measure" of capitalism that encompasses several characteristics:

- Size of government, including expenditures, taxes, and enterprises

- Legal structures and security of property rights

- Access to sound money

- Freedom to trade internationally

- Regulation of credit, labor and business

(Fraser Institute 2006)

The democracy variable is the Freedom House measure of political rights, uncorrected, meaning that a score of 1 represents the country that is least respectful of political rights and a score of 7 represents the country that is most respectful of political rights. The economic development variable is energy consumption per capita, logged to the base 10, from Burkhart (1997). Countries that are in the semiperiphery and periphery in the world-system are coded by rules established in Burkhart and Lewis Beck (1994). British colonial status comes from the historical record. The measures of income inequality are Hoover's household inequality measure (1989, as reported in Burkhart 1997, 2007), Deininger and Squire's household inequality measure (1996, high-quality "accept" data points only), the Gini coefficient as reported by the UNU-WIDER project, and the measurement of within-country wage inequality from Galbraith's University of Texas Inequality Project, Theil's t statistic.

**ESTIMATED MODEL**

(2) Dem = a + b1 Econ + b2 Econ x Semper + b3 Econ x Per + b4 Brit

+ b5 Capital + b6 Ineq + e

Where variables are defined as in the above sections, I deviate from model (1) above in that I take just one historical measurement into account in the model, British colonial status, a consistent performer in previous models, so that the direct measure of capitalism has every opportunity to shine in these models. I provide both OLS regression results and, to account for an unbalanced pooled time-series element to the data, the xtreg procedure in Stata 10, random effects.

**MAIN RESULTS AND DISCUSSION**

[TABLE ONE ABOUT HERE]

On balance, the main variables of interest, the impact of the various measures of income and wage inequality and the Fraser Institute capitalism on democracy, do not show impressive strength. In no model does inequality achieve conventional levels of statistical significance. In models 2.1 and 2.2., the Galbraith measure of inequality approach significance at the .05 level, but in a one-tailed test which may be appropriate considering the directional aspect of inequality's influence on democracy. Since the Galbraith coefficients are negative, it suggests that as wage inequality increases, the country's democratic performance decreases, keeping in mind that the smaller the Freedom House democracy score, the more democratic the country. And the Deininger and Squire income inequality measure in model 3.2 shows promise, in the expected direction. Neither the UNU-WIDER nor the Hoover measures of income inequality come close to statistical significance.

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The capitalism variable is fully significant in the Deininger and Squire model (3.2), and is positive, meaning that more capitalism leads to less democracy. But capitalism is not significant at conventional levels in any of the other models. Instead, perhaps we should consider the constancy in both the OLS and the xtreg estimates of the statistically significant logged gross national product per capita variable. The coefficients are in the expected direction, positively affecting democratic performance regardless of the inequality measure presented. This leaves one with the impression that there is less value added from the inclusion of income inequality and capitalism in these models to our knowledge about the variation of democracy.

## CONCLUSION

Should inequality and capitalism be left out of models explaining variation in cross-national democracy? For a definitive answer, this very short exercise needs empirical expansion. Country coverage needs expansion. Additionally, other functional forms of capitalism, such as the second-order polynomial and logarithmic, remain untried in these models. Lagging democracy by one year may also make the model be more robust. Clearly, more fine-tuning needs to take place.

For now, if one is willing to believe that inequality is a rather static phenomenon (Firebaugh 2000), that the four measures of income and wage inequality considered in this paper represent well the variety of extant measures, and that capitalism is adequately captured by gross domestic product per capita, then there appears to be little urgency in adding income inequality and direct, assessment-based measures of capitalism as main explanatory variables in cross-national democracy models, other than as reasonable control variables. Their explanatory power falls short of ideal, but this story is not over.

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**TABLE ONE: CAPITALISM, DEMOCRACY AND INEQUALITY**
Dependent Variable = Democracy (Freedom House "political rights" scale, scored 1=most respecting of
political rights to 7=least respecting of political rights). Estimated with Stata 10, OLS and xtreg.

| IVs⇓ | Model 1.1 OLS, Hoover | Model 1.2 Random-Effects GLS, Hoover | Model 2.1 OLS, Galbraith | Model 2.2 Random Effects GLS, Galbraith | Model 3.1 OLS, Deininger and Squire | Model 3.2 Random Effects GLS, Deininger and Squire | Model 4.1 OLS, UNU-WIDER | Model 4.2 Random Effects GLS, UNU-WIDER |
|---|---|---|---|---|---|---|---|---|
| Econ | -1.85 (3.97) | -1.96 (3.63) | -2.51 (5.16) | -1.97 (2.72) | -2.14 (1.6) | -.31 (.45) | -1.33 (.77) | -2.81 (1.87) |
| Econ x Semi | .001 (.01) | .03 (.16) | .09 (.73) | .11 (.51) | -.35 (1.09) | -.10 (.34) | .45 (1.27) | .25 (.60) |
| Econ x Per | .05 (.35) | .05 (.26) | .19 (1.16) | .06 (.22) | .15 (.33) | .70 (2.33) | .24 (.47) | .03 (.01) |
| Brit | -.56 (1.58) | -.27 (.38) | -.88 (2.38) | .25 (.23) | -.66 (.81) | 1.75 (1.50) | -1.70 (1.86) | -2.88 (1.08) |
| Ineq | .01 (.27) | .02 (.77) | -.05 (1.56) | -13.23 (1.69) | -.02 (.42) | -.06 (1.64) | -.03 (.94) | -.01 (.27) |
| Capital | .01 (.04) | .08 (.63) | -.06 (.42) | .16 (.91) | .38 (1.21) | .48 (2.17) | .73 (1.72) | ..37 (1.00) |
| Intercept | 9.95 (4.74) | 9.37 (3.82) | 14.72 (5.78) | 10.07 (3.91) | 10.06 (1.85) | 3.05 (1.02) | 5.82 (.92) | 12.49 (2.38) |
| R-square | .18 | .19 | .29 | .13 | .17 | .26 | .10 | .14 |
| Number of cases | 176 | 176 | 144 | 126 | 36 | 36 | 46 | 46 |

Figures in parentheses are either absolute t-ratios (OLS estimations).