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Democracy, Demography and Growth

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Abstract: While it is generally agreed that democracy is good in itself, it is not clear that it promotes other desirable outcomes such as economic growth. This note provides some evidence that democracy promotes growth indirectly by Granger causing an increase in correlates of high growth -- long life expectancy, low fertility and high government education expenditure. Since these outcomes are important in themselves, this is direct evidence that democracy Granger causes an improved physical quality of life.

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I Introduction

This paper attempts to measure the effects of democracy on indicators of the physical quality of life. This is interesting because the issue is important in itself, but also because it possible to reconcile conflicting findings on the effect of democracy on economic growth. Some authors have found a significant positive effect of democracy on growth (Kormendi and MeGuire 1985, Knack, Keefer and Olsen 1995, Scully 1988, Weede 1983). In contrast Barro finds an insignificant negative effect of democracy on Economic growth (Barro 1994) in a regression with many other explanatory variables. Barro is able to reproduce the apparent positive significant effect of democracy on growth by excluding some of the other explanatory variables from the regression. Thus, it appears that the choice of other explanatory variables determines whether democracy is partially correlated with high growth. With a parsimonious specification, the coefficient on democracy is positive and significant. The positive coefficient might be due to omitted variable bias, because the coefficient on democracy is not significant and/or not positive when other explanatory variables such as life expectancy, fertility, education and the rule of law index are included in the regression. However, there is an alternative explanation of the positive coefficient on democracy in the parsimonious specification. It is possible that democracy causes high growth indirectly by causing long life expectancy low fertility etc.

This note attempts to evaluate these two explanations of existing results by testing whether democracy Granger-causes indicators of the physical quality of life. I present regressions of e.g. log life expectancy on lagged log life expectancy the lagged democracy index and other lagged variables.

A positive effect of democracy on life expectancy could be explained in several ways. First, of course, most people would like life expectancy to be long. To the extent that democracy provides effective incentives to make governments attend to the wishes and needs of electors, it should encourage policies which promote long life expectancy. Second, as argued by Persson and

Tabellini (1994), Alesina and Rodrik (1994) and Alesina and Perotti (1993) among others, Democratic governments have an incentive to transfer wealth from the average tax-payer to the median voter. It is well known that a more equal income distribution is associated with longer life expectancy. If the egalitarian transfers are in the form of universal education or health care, a positive effect of redistribution on life expectancy is still more likely. Finally, democracy may reduce the risk of a violent change in government, since it increases the chance of a non-violent change in government.

On the other hand, democracy might shorten life expectancy for many reasons e.g. if it leads to a short term bias, interest group paralysis, increased ethnic conflict due to ethnic group based parties.

Similar arguments apply to government education expenditures and fertility reduction.

Efforts to explain the effect of democracy on life expectancy, fertility and education are hampered by the richness of the new political economy literature, which presents models which could explain any effect. Still more serious is the virtual absence of a theory of dictatorship or oligarchy. It is as easy to argue that democracy would lead to worse outcomes than would a benevolent omniscient omnipotent dictator as it is to argue that democracy would lead to better outcomes than would a malevolent omniscient omnipotent dictator.

The results suggest that democracy Granger causes long life expectancy, low fertility and high government education expenditures. In contrast, I find a statistically insignificant effect on Government consumption, primary school enrollment and secondary school enrollment. Since the apparent statistically significant effects of democracy on other variables are all associated with rapid economic growth, these results suggest that the effect of democracy on growth is underestimated when the other variables are included in the regression. Estimated long run effects of democracy on life expectancy, fertility and government education expenditures are larger than the coefficient on democracy in cross sectional regressions. These results,

therefore, tend to support the conclusion that democracy is good for growth based on regressions with parsimonious specifications.

The direct evidence on the effects of democracy, and, in particular, the evidence that democracy Granger causes long life expectancy, is arguably more important than indirect evidence that democracy causes rapid economic growth. It is often argued that Life expectancy is a better measure of the Physical quality of life than per capita GDP.

II Data

All data except for data on inequality were taken from "Data set for a Panel of 138 Countries," (Barro and Lee 1994a 1994b) which gives definitions and sources. Relevant sections of Barro and Lee (1994a) are included as a data appendix. Data on life expectancy at birth (Life), the fertility rate, real GDP per capita (pcGDP), average number of years of primary or secondary schooling completed by women over 25 or by men and women over 25 are available every 5 years 1960 to 1985 (pyrf and pyr). Data on Government education spending are averages over 5 year periods e.g. period 1 is 1960 to 1964 and period 2 is 1965 - 1969. Sources and definitions of the variables are provided in a data appendix.

As in Barro (1994) I use the index of political rights assembled by Raymond Gastil and associates for Freedom house as an index of democracy. In the Gastil index 1 is the highest level of political rights and 7 is the lowest. As in Barro (1994) I transform the variable so 0 is the lowest level of political rights and 1 is the highest. Excerpt from the Freedom House definition of political rights follows -- "Political rights enable people to participate freely in the political process ... In a free society this means the right of all adults to vote and compete for public office, and for elected representatives to have a decisive vote on public policies... the survey looks for a significant opposition vote ... freedom from domination by the military, foreign powers, totalitarian parties, religious hierarchies, economic oligarchies or ... Is political power

decentralized ?..." (McColm R. B. 1992). The rating is assigned by filling out a detailed checklist then subjectively adjusting some ratings. The evaluation is not conducted in the country or territory in question. The political rights index is available from 1972 on. I use average values over three periods: 72-74, 75-79 and 80-84.

III Results

There is strong evidence that a high level of the democracy index is associated with rapid growth of life expectancy, even when lagged life expectancy is included in the regression.

Cross country differences in Life expectancy are extremely persistent. Even first differences in life expectancy are persistent. When log life expectancy is plotted against log per capita GDP, the scatter is visibly concave suggesting that it becomes more difficult to increase life expectancy by a fixed proportion as life expectancy becomes high. Therefore the square of demeaned lagged log life expectancy that is $(Ln(Life_{t-5}) - avg(Ln(Life_{t-5})))^2$ is included in the regression. As expected the coefficient is negative and strongly significant. I chose to reparametrise the model so that the dependent variable is the change in log life expectancy ($dLife_t$). Changes in log life expectancy lagged by multiples of 5 years ($dLife_{t-5}$, $dLife_{t-10}$ &c) were added until the null that a further lag had no effect could not be rejected. The democracy index was lagged as well. Log Life expectancy was regressed on the democracy index averaged over six to ten years earlier or averaged one to five years earlier. If the democracy index is lagged six to ten years, there are two periods per country 1985 and 1980, while if the democracy index is lagged only one to five years the change in Log life expectancy between 1970 and 1975 can be used as well. In either case the model was estimated by seemingly unrelated regression (SUR) constraining coefficients to be the same in each period, but allowing a different constant term for each period.

In preliminary regressions with only one lagged change in log life expectancy and the democracy index lagged 6 to ten years

the coefficient on the lagged democracy index was extremely large with a t-statistic over three (results not shown). Inspection of the residual scatter revealed a highly influential data point -- Iraq in 1980. Iraq was classified by Gastil as not at all democratic (7 on the Gastil index 0 on the rescaled democracy index). The growth from 1975 to 1980 of Log life expectancy in Iraq was very low compared to that expected given other explanatory variables. This observation is to be treated with particular care since data on life expectancy for Iraq were obtained from The UN Demographic Yearbook while data for other countries were obtained from World Tables or World Bank (1991) (Barro and Lee 1994a). When an indicator variable equal to one for Iraq in 1980 and zero otherwise is included in the regression its coefficient is extremely significant with a t-statistic under -6. Therefore Iraq was excluded from all regressions which include life expectancy.

When Iraq is excluded from the regression, the coefficient on the lagged democracy index decreases but remains statistically significant with a t-statistic of 2.107. Results are reported in column one of table I. The estimated long run effect of democracy on life expectancy is large, since the ratio of the coefficient on the democracy index to the coefficient on lagged life expectancy is approximately 0.09. At the sample mean, permanently increasing the democracy index by 0.01 (1% of the way from complete dictatorship to complete democracy) would eventually cause life expectancy to increase by 0.09%. The quadratic term in lagged log life expectancy implies that the long run effect of an increase in the democracy index would be larger for countries with lower than average life expectancy and vice versa. This is an extremely large effect, similar to the coefficient of log life expectancy on the democracy index in simple univariate cross sectional regressions (0.126) and much larger than the coefficient on the democracy index in a cross sectional regression including log per capita GDP (0.028). This is in sharp contrast with the omitted variables bias explanation of the association of democracy with rapid economic growth, which asserts that there is a large cross sectional partial correlation

between democracy and life expectancy due to unobserved country characteristics. This argument would imply that the apparent long run effect of democracy on life expectancy would be much reduced when lagged log life expectancy is included in the regression. The result that the estimate of the effect of democracy actually becomes larger when lagged log life expectancy is included in the regression suggests that the effect of democracy on per capita GDP growth is more accurately estimated by excluding log life expectancy from the regression than by including life expectancy.

Column two of table I shows that the coefficient on the democracy index is very slightly increased when current and five year lagged log per capita GDP and a further lagged growth rate of life expectancy are added to the regression. This is very striking since per capita GDP is such an important determinant of life expectancy in cross sectional regressions of log life expectancy on unlagged variables which do not include lagged log life expectancy. Given the very small effect of including a very important explanatory variable such as current log per capita GDP on the coefficient on the lagged democracy index, it is difficult to argue that this coefficient is the result of omitted variable bias.

Column three of table I shows that extremely similar results are obtained when the basic specification is estimated with the democracy index lagged one to five years instead of six to ten. Since the democracy index changes rather slowly, the main effect of the change in lags is the addition of one more data point per country.

Column four includes the square of the democracy index lagged one to five years. There is no evidence that the relationship is concave. In fact, the point estimate of the coefficient on the quadratic term is positive. This is in striking contrast to the non-linear relationship between democracy and growth found in Barro (1994). When the democracy index is replaced by indicator variables for democracy index < 0.33 and for $0.33 \leq$ than democracy index < 0.67, the coefficient on democracy index < 0.33 (-0.00224) is almost exactly twice the

coefficient on 0.33 ≤ democracy index < 0.67 (-0.00095). Again there is no evidence that the relationship between the democracy index and the change in log life expectancy is concave.

There is similarly little evidence that the relationship between democracy and life expectancy is different for countries at different stages of development. When the product of the democracy index and real per capita GDP is included in the regression its t-statistic is 0.533. When the product of log per capita GDP and the democracy index is included its t-statistic is -0.02. There is essentially no evidence that democracy has better effects in rich countries than in poor countries or vice versa.

As with the democracy index lagged six to ten years, the inclusion of current and lagged per capita GDP has almost no effect on the coefficient on the democracy index, as shown in column five of table I. Finally column six shows the small effect of adding the average number of years of primary schooling completed by women 25 years old and older lagged for five and for ten years as explanatory variables. Again given the small effect of inclusion of powerful explanatory variables, it is hard to believe that the positive coefficient on the lagged democracy index could be due to omitted variable bias.

One way in which democracy could lengthen life expectancy is by providing a non-violent means to resolve political conflict and achieve transitions in government. Furthermore the Freedom House index of political liberties automatically assigns high scores (low values of the rescaled democracy index) to countries where there is a violent struggle for power. I would be unsurprising if a violent struggle for power were associated with slow growth of life expectancy. Weak evidence against this interpretation of the results in table I is provided in column four of table I which shows no evidence that the relationship between democracy and a rapid increase in life expectancy is concave.

More direct evidence is provided in table II which reports regressions which include direct measurements of violent political struggle. Column two of table II shows that the

coefficient on the lagged democracy index actually increases when lagged data on revolutions per year and coups per year are included in the regression. The regression reported in column three of table II also includes current and lagged logged per capita GDP. The coefficient on the lagged democracy index remains significant and, again, is larger than the coefficient in the regression without data on revolutions and coups (column five of table I). These results are evidence against the claim that democracy is associated with rapid improvement in life expectancy since it is negatively associated with violent political struggle.

There are many differences between countries which are not directly measured in international data sets. Among the consequences are significant coefficients on continent indicator variables. Columns one and four of table II show the effects of adding indicator variables for East Asia, Latin America, Southern Africa and the OECD (all as defined in Barro and Lee 1984a southern Asia is the excluded group). Column one shows the small effect of adding these variables on the coefficient on the lagged democracy index. Since continent indicators pick up a large variety of unobserved country characteristics, this is evidence against the hypothesis that the coefficient on the lagged democracy index is caused by omitted variables bias.

Finally column four of table II shows the extremely small effect on the coefficient on the lagged democracy index when current and lagged log real per capital GDP and female years of primary schooling are included in the regression.

Tables I and II report considerable evidence of a beneficial effect of democracy on health measured by life expectancy. The estimated long run effect of a permanent increase in democracy is large -- even larger than the apparent effect in cross sectional regressions. This makes it difficult to argue that the apparent effect is due to the omission of stable unobserved country characteristics which are correlated both with democracy and with life expectancy. The lagged life expectancy term should pick up such characteristics and drive the apparent effect of democracy on life expectancy towards zero. The very small

effects on the democracy coefficient of the addition of per capita income and education, which are highly correlated with both democracy and long life expectancy, is further striking evidence that the relationship is structural.

There is also some evidence that democracy Granger causes lower fertility. Differences across countries in fertility are highly persistent. Table III reports models estimated by SUR with the dependent variable log fertility in 1980 and 1985 or in 1975 1980 and 1985. Both the coefficients of the log of the fertility rate on five and on ten year lagged log fertility are very strongly significant in all specifications. The democracy index lagged one to five years has a negative and significant coefficient of -0.047 with a t-statistic of -2.799 as is shown in column one of table III. As with life expectancy, the coefficient is virtually unchanged when explanatory variables are added to the regression. All regressions reported in table III also include the five and ten year lagged log of per capita GDP. The coefficient on the democracy index is virtually unaffected by the addition of five year lagged and ten year lagged average years of primary and of secondary school completed by men or women over the age of 25. There is similarly little effect when lagged schooling of women is included. Fifteen year lagged log fertility has an insignificant coefficient and, again, virtually no effect on the democracy coefficient.

When the democracy index lagged six to ten years is used instead of the democracy index lagged one to five years the coefficient falls by half and becomes statistically insignificant. This is largely due to the fact that only two observations per country can be used, and the fact that fewer countries are dropped due to missing values. This is shown by re-estimating the original specification with the reduced sample. Results are shown for comparison in columns three and four of table III.

Since estimates of the effect of democracy on fertility are strongly significant when the largest available sample is used and since the coefficient is little affected by additional explanatory variables, there is evidence that democracy Granger

causes lower fertility. Again this would be an indirect path from democracy to rapid per capita GDP growth.

If democracy causes long life expectancy and low fertility one would expect that it does so via government policy, not because of the act of voting itself. Unfortunately, the Barro and Lee (1994a,1994b) data set contains relatively little information on government policy, principally on components of government spending. I consider the ratio of nominal total government education expenditures to nominal GDP (GEETOT), the ratio of nominal recurrent government education expenditures to nominal GDP (GEEREC), the ratio of real government consumption expenditures to real GDP (GOVSH5), Government consumption net of defence and education (GVXDXE), and the ratio of Nominal government consumption to nominal GDP (GOVWB). All these data are averages over five year periods. Also considered were primary and secondary school enrollment rates which reflect both government and private choices. All of these data were taken from Barro and Lee (1994a) as were the notes on definitions and sources which are presented in the data appendix.

There is considerable evidence that democracy affects government education expenditures and in particular recurrent government education expenditures. The evidence that democracy Granger causes a high ratio of total government education expenditure (GEETOT) to GDP is borderline statistically significant as is shown in table IV. As always lagged GEETOT is included in the regression. Since all government spending variables are averages over five year periods, the democracy index is lagged one five year period as are the lagged spending variables. Other explanatory variables are measured five years before the beginning of the period. Column two of table IV shows a borderline significant coefficient of 0.006 with a t statistic of 1.99 when only lagged GEETOT lagged log fertility and the lagged democracy index are included in the regression. Columns one and three show the small effect of including lagged log(pcGDP) and of adding GEETOT lagged two periods.

Similar regressions were estimated with primary and with secondary school enrollment rates. The lagged democracy index

has an insignificant positive coefficient in the primary school enrollment rate regression and an insignificant negative coefficient in the secondary school enrollment rate regression (results not shown).

In contrast to the fairly weak evidence that democracy is associated with high total government education expenditure and mixed very weak evidence of effects on enrollment, there is quite strong evidence that democracy is associated with high recurrent government expenditure. Columns four through six of table IV report large and strongly statistically significant positive coefficients on the lagged democracy index. A comparison of the columns shows the very small effects of additional explanatory variables. It is possible that the evidence that democracy Granger causes high recurrent government education expenditure is stronger because data are available for more countries. It is also possible that the evidence is stronger because recurrent expenditures are more predictable and less influenced by population growth. Overall the evidence that democracy Granger causes high government education expenditures is quite strong.

A positive effect of democracy on government education expenditure could help to explain the positive coefficient on the democracy index in parsimonious growth regressions (Kormendi and MeGuire 1985, Knack, Keefer and Olsen 1995, Scully 1988, Weede 1983). Such an effect could also help to explain the apparent positive effect on life expectancy and the apparent negative effect on fertility reported in tables I, II and III.

There is almost no evidence that democracy is associated with high government consumption in general. Table V reports three regressions of government consumption on log(pcGDP), the unlagged democracy index and (as always) a period specific constant. Two of three coefficients on the democracy index are negative and one -- with GOVSH5 as the dependent variable -- is statistically significant with a t-statistic of -2.265. When lagged government consumption is included in the regressions none of the coefficients on the democracy index are statistically significant and one is negative. There is essentially no evidence in the Barro and Lee (1994a,1994b) data set that

democracy is associated with high government consumption in general.

IV Conclusions

There is fairly strong evidence that democracy Granger causes long life expectancy, low fertility and High government education expenditures. High levels of political rights (democracy) as measured by Gastil and followers are associated with long life expectancy, low fertility and high government education expenditures. These partial correlations are not eliminated when lagged dependent variables and other lagged data are included along with the lagged democracy index.

This evidence suggests that democracy causes increased physical quality of life. It also suggests that democracy has an indirect positive effect on economic growth. The apparent the long run effect of democracy on these other variables is generally larger than the coefficient on democracy in cross sectional regressions. This suggests that parsimonious regressions excluding life expectancy, fertility and government education expenditures give a more accurate estimate of the effect of democracy on economic growth than do regressions which include these variables. Thus these results suggest that democracy has a positive effect on economic growth.

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Kormendi R. C. and P. G. Meguire (1985) "Macroeconomic Determinants of Economic Growth," Journal of Monetary Economics vol. 16 pp.141-163.

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Data Appendix

All data and quotes from Barro and Lee 1984a. All data via Barro and Lee 1984a.

The data set contains variables for the panel estimation. Data are presented either quinquennially for the years 1960-1985, i.e., 1960, 1965, 1970, 1975, 1980, and 1985, or for averages of five years' sub-periods over 1960-1985. The term XX behind a variable denotes a specific year (for example, P60 is the primary school enrollment ratio in 1960), while the term X denotes average of a sub-period among the five year sub-periods: 1960-64, 1965-69, 1970-74, 1975-79, and 1980-84 for the averaged variables (e.g. INV3 denotes average investment rate during 1970-74).

For the data sources, references are abbreviated as follows:

BANKS : Banks, A.S., "Cross-National Time Series Data Archive", Center for Social Analysis, State University of New York at Binghampton, September 1979, updated.

BARRO and LEE : Barro R. and J. Lee, "International Comparisons of Educational Attainment," NBER Working Paper, 1993.

GASTIL : Freedom in the World, various years

GFS : IMF, Government Financial Statistics, various issues

IFS : IMF, International Financial Statistics, various issues

SH v.5.5 : Summers.R and A. Heston, "The Penn World Table (Mark 5.5)" (Dataset on Floppies)

SIPRI : SIPRI Yearbooks, various issues.

UN : United Nations, Global Estimates and Projections of Population by Sex and Age, the 1990 Assessment, 1991. (Dataset on Floppies)

UNESCO : UNESCO, Statistical Yearbooks , various issues.

WB : World Bank, World Tables, various editions.

WDR : World Bank, World Development Report Data Set, 1991.

Variables

pcGDPxx is Real GDP per capita (1985 international prices) from SH v.5.5. (xx = 65, 70, 75, 80, 85)

Years of Primaryxx is the average years of primary schooling in the total population over age 25. The source is BARRO and LEE

Female Years of Primaryxx is Average years of primary schooling in female population over age 25. The source is BARRO and LEE

Years of secondaryxx is the average years of secondary schooling in the total population over age 25. Source : BARRO and LEE

Female Years of Secondaryxx is the average years of secondary schooling in the female population over age 25. The source is BARRO and LEE

Fertilityxx is the total fertility rate (children per woman). The source is WB.

LIFExx is the life expectancy at age 0. The sources are WDR, WB except For the following countries, LIFExx came from
Iran : UN Demographic Yearbook for 1960,65. World Tables.
Iraq : UN Demographic Yearbook.
Taiwan : Taiwan Statistical Yearbook. Average of male and female life expectancy.

GOVSH5x is the Ratio of real government "consumption" expenditure to real GDP. (Period average) from SH v.5.5.
(x = 3, 4 and 5)

GOVWBx is the ratio of nominal government "consumption" expenditure to nominal GDP (using current local currency). The source is WB .

GDEx is the ratio of nominal government expenditure on defense to nominal GDP. The source is GFS, SIPRI see notes in Barro and Lee 1984a.

GEERECx is the ratio of recurring nominal government expenditure on education to nominal GDP. The source is UNESCO.

GEETOTx is the ratio of total nominal government expenditure on education to nominal GDP. The source is UNESCO.

Data on Taiwan's education expenditure come from Taiwan Statistical Yearbook.

GVXDXE5x Ratio of real government "consumption" expenditure net of spending on defense and on education to real GDP, sourced from SH v.5.5. (GVXDXE=GOVSH5-GDE-GEEREC) see notes in Barro and Lee 1984a. Since total government consumption and defence/education expenditures are differently measured, net government consumption ratios are negative for some countries. For these cases, Barro and Lee assumed 0.01.

COUPx is the number of coups per year. The source is BANKS.

REVOLx is the number of revolutions per year. The source is BANKS.

POLRIGHTx is the index of political rights (from 1 to 7; 1=most freedom). The source is GASTIL (x = 3, 4, 5, 6, 3=1972-74)

DEMOCRACYx is (7-polrightx)/6

Table I Political Rights and Life Expectancy

Dependent variable

Change in Log Life Expectancy 1985 - 1980 & 1980 - 1975 & 1975-1970

no.	113	109	113	113	108	88
R^2 1985	0.79	0.80	0.73	0.73	0.72	0.76
R^2 1980	0.70	0.69	0.70	0.70	0.69	0.77
R^2 1975			0.73	0.73	0.72	0.73
Democracy $Index_{6-10}$	0.0040 (2.107)	0.0041 (1.969)				
Democracy $Index_{1\_5}$			0.0035 (2.124)	0.0002 (0.041)	0.0032 (1.841)	0.0042 (2.086)
$(Democracy\ Index_{t-1\_5})^2$				0.0031 (0.651)		
$Log(Life_{t-5})$	-0.044 (-12.951)	-0.055 (-8.925)	-0.031 (-11.086)	-0.032 (-11.020)	-0.040 (-8.383)	-0.035 (-7.775)
$(Log(Life_{t-5})-Mean_{t-5})^2$	-0.065 (-4.703)	-0.074 (-4.890)	-0.035 (-3.194)	-0.037 (3.200)	-0.041 (-3.549)	-0.039 (-2.404)
Change in $Log(Life_{t-5})$	0.669 (14.539)	0.646 (13.048)	0.679 (19.925)	0.681 (19.869)	0.649 (18.421)	0.711 (14.415)
Change in $Log(Life_{t-10})$	-0.187 (-4.550)	-0.226 (-4.023)	-0.065 (-2.509)	-0.067 (-2.570)	-0.049 (-1.873)	-0.121 (-2.343)
Change in $Log(Life_{t-15})$		0.042 (1.477)				
$Log(GDP_t)$		0.006 (1.999)			0.007 (2.566)	
$Log(GDP_{t-5})$		-0.005 (-1.480)			-0.006 (-2.060)	
Female Years of $Primary_{t-5}$						0.003 (1.887)
Female Years of $Primary_{t-10}$						-0.003 (-1.832)

t-statistics in parentheses. The regressions also contain a period specific constant term which is not reported. Source "A data set for a panel of 138 countries" by Robert Barro and Jong Wha Lee 1994. Iraq is excluded as an outlier

Table II Political Rights and Life Expectancy II
Dependent var:. change in Log Life Expectancy 1985 -1980 &1980 -1975 &1975-1970

no.	108	108	103	86
R^2 1985	0.75	0.74	0.74	0.79
R^2 1980	0.70	0.69	0.68	0.77
R^2 1975	0.75	0.74	0.72	0.74
Democracy Index$_{t-1_5}$	0.0041 (2.114)	0.0048 (2.747)	0.0043 (2.356)	0.0042 (1.788)
Log(Life$_{t-5}$)	-0.042 (-10.186)	-0.033 (-10.882)	-0.042 (-8.759)	-0.049 (-6.940)
(Log(Life$_{t-5}$)-Mean$_{t-5}$)^2	-0.049 (-3.900)	-0.039 (-3.262)	-0.043 -3.495)	0.055 (-3.048)
Change in Log(Life$_{t-5}$)	0.646 (18.820)	0.669 (19.408)	0.638 (17.908)	0.675 (13.337)
Change in Log(Life$_{t-10}$)	-0.052 (-2.082)	-0.055 (-2.134)	-0.038 (-1.465)	-0.107 (-1.974)
Revolutions per year$_{t-1_5}$	0.0022 (1.323)	0.0024 (1.432)	0.0029 (1.633)	0.0041 (1.902)
Coups per year$_{t-1_5}$	-0.105 (-2.340)	-0.0086 (-1.919)	-0.0082 (-1.805)	-0.011 (-2.070)
East Asia	-0.0020 (-1.395)			-0.0028 (-1.572)
Latin America	-0.0029 (-2.607)			-0.0027 (-1.886)
OECD	0.0008 (0.515)			0.0001 (0.006)
Southern Africa	-0.0046 (-3.786)			-0.0049 (-3.043)
Female Years of Primary$_t$				0.0017 (0.967)
Female Years of Primary$_{t-5}$				-0.0015 (-0.871)
Log(GDP$_t$)			0.0079 (2.632)	0.0037 1.003)
Log(GDP$_{t-5}$)			-0.0062 (-2.077)	-0.0029 (-0.794)

See notes to table I

Table III Political Rights and Fertility

Dependent variable: Log Fertility rate 1985, 1980 and 1975

no.	93	83	107	107	103	83
R^2 1985	0.99	0.99	0.99	0.99	0.99	0.99
R^2 1980	0.98	0.98	0.98	0.98	0.98	0.98
R^2 1975	0.98	0.98			0.98	0.98
see 1985	0.06	0.06	0.06	0.06	0.06	0.06
see 1980	0.07	0.08	0.07	0.07	0.07	0.07
see 1975	0.07	0.08			0.07	0.07
Corr 85-80	0.15	0.20	0.32	0.31	0.08	0.18
Corr 80-75	-0.42	-0.40			-0.43	-0.38
Corr 85-75	0.08	0.03			0.16	0.05
Log(Fertility $Rate_{t-5}$)	1.453 (33.610)	1.402 (28.030)	1.245 (24.641)	1.246 (24.727)	1.485 (32.350)	1.397 (28.164)
Log(Fertility $Rate_{t-10}$)	-0.502 (-11.599)	-0.442 (-8.842)	-0.262 (-5.106)	-0.266 (-5.199)	-0.593 (-7.986)	-0.435 (-8.713)
Log(Fertility $Rate_{t-15}$)					0.062 (1.286)	
Democracy $Index_{t-1\_5}$	-0.047 (-2.799)	-0.048 (-2.281)		-0.036 (-1.558)	-0.048 (-2.854)	- 0.051 (-2.411)
Democracy $Index_{t-6\_10}$			-0.022 (-1.004)			
Log(GDP_{t-5})	-0.065 (-2.901)	-0.076 (-2.731)	-0.068 (-2.605)	-0.065 (-2.485)	-0.066 (2.965)	-0.076 (-2.759)
Log(GDP_{t-10})	0.042 (1.851)	0.053 (1.898)	0.053 (1.962)	0.052 (1.947)	0.044 (1.921)	0.051 (1.834)
Years of $Primary_{t-5}$		-0.036 (-2.070)				-0.038* (-2.407)
Years of $Primary_{t-10}$		0.039 (2.144)				0.041* (2.493)
Years of $Secondary_{t-5}$		0.009 (1.179)				0.015* (1.851)
Years of $Secondary_{t-10}$		-0.008 (-1.124)				-0.009* (-1.372)

t-statistics in parentheses. The regressions also contain a period specific constant term which is not reported. Source "A data set for a panel of 138 countries" by Robert Barro and Jong Wha Lee 1994.
* These coefficients on years of female scholing.

Table IV Political Rights and Government Education Expenditure

Dependent variable: Government Education Expenditures 5 & 4

	Total	Total	Total	Recurrent	Recurrent	Recurrent
no.	91	95	87	101	105	98
R^2 5	0.69	0.69	0.77	0.65	0.66	0.70
R^2 4	0.77	0.76	0.76	0.77	0.78	0.80
see 5	0.01	0.01	0.01	0.01	0.01	0.01
see 4	0.01	0.01	0.01	0.01	0.01	0.01
Corr 5-4	-0.12	-0.17	-0.08	-0.10	-0.10	-0.10
Education Expend lag	0.899 (19.389)	0.920 (21.573)	0.830 (10.167)	0.898 (20.504)	0.898 (21.627)	0.955 (11.296)
Education Expend 2 lag			0.091 (0.989)			0.049 (0.492)
Log(Fertility Rate) lag	0.005 (2.007)	0.003 (1.674)	0.004 (1.615)	0.003 (1.133)	0.003 (1.907)	0.003 (1.167)
Democracy Index lag	0.006 (1.861)	0.006 (1.991)	0.005 (1.447)	0.010 (3.427)	0.009 (3.565)	0.009 (3.372)
Log(GDP) lag	0.002 (1.280)			-0.0003 (-0.222)		

t-statistics in parentheses. The regressions also contain a period specific constant term which is not reported. Source "A data set for a panel of 138 countries" by Robert Barro and Jong Wha Lee 1994. Period 4 is 1975-80 period 5 is 1980-85. Lag is one period or 5 years before the begining of the period.

Table V Political Rights and Government Consumption Expenditure

Dependent variable:Government Consumption Ratio 5, 4 and 3

	Real - Defence and Educ[1]		Real[2]		Nominal[3]	
no.	95	104	121	121	106	108
R^2 5	0.81	0.37	0.77	0.26	0.75	0.01
R^2 4	0.87	0.33	0.79	0.21	0.76	0.02
R^2 3	0.87	0.30	0.87	0.17	0.77	0.03
see 5	0.03	0.06	0.04	0.06	0.03	0.06
see 4	0.03	0.06	0.04	0.07	0.03	0.05
see 3	0.03	0.06	0.03	0.07	0.03	0.05
Corr 5-4	-0.08	0.82	-0.08	0.85	-0.01	0.86
Corr 4-3	0.12	0.90	0.23	0.86	0.17	0.87
Corr 5-3	-0.14	0.72	-0.16	0.72	-0.10	0.74
Government consum. lag	0.861 (31.820)		0.877 (34.788)		0.915 (30.506)	
Democracy Index	0.007 (0.891)	0.019 (1.263)	-0.010 (-1.293)	-0.035 (-2.265)	0.001 (0.164)	-0.007 (-0.503)
Log(GDP)	-0.009 (-3.504)	-0.043 (-7.382)	-0.006 (-2.266)	-0.025 (-4.319)	0.002 (0.777)	0.007 (1.268)

t-statistics in parentheses. The regressions also contain a period specific constant term which is not reported. Source "A data set for a panel of 138 countries" by Robert Barro and Jong Wha Lee 1994. Government consumption net of education and defence. Democracy index unlagged. GDP at end of period.
1. gvxdxe -- real government consumption to real GDP (Penn W.T. mark 5.5) - ratio of nominal defence and education spending to nominal GDP.
2. Real Government consumption to real GDP (Penn W.T. mark 5.5)
3. Nominal Government consumption to nominal GDP (World Bank)

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