The Demand for Democide: An Instrumental Variables Analysis

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The recent burgeoning literature on economic growth has resulted from the advent of better comparative international data, and with the recognition that the original growth theory explored by Solow [1956] and Kaldor [1961] held much more promise for development than economists of the 1960s and 1970s had generally believed. The "growth accounting" concept arising from the Solow model had been applied to existing data, and showed that for industrialized economies much of growth was accounted for by productivity. That productivity was measured as a residual of a regression relating the growth of output to the growth of factor inputs (we call these Solow residuals). It was understood that for an individual country this productivity would grow slowly over time as the result of technological progress and investments in human capital.

Simultaneously, the last decade has seen a rich research agenda develop in explaining differences in growth rates across countries. Knack and Keefer [1993; 1997] investigated whether a broad set of institutional factors such as democracy, respect for the rule of law, colonial status or ethnolinguistic diversity captures differences in the average size of these Solow residuals. Levine and Renelt [1992], Barro and Sala-i-Martin [1995], Mauro [1993], Sachs and Warner [1995, 1997], Clague, Keefer, Knack and Olson [1996], Hall and Jones [1998], Banaian and Luksetich [2001] and others have followed, helping to establish a rich set of international differences in institutional, demographic and geographical factors that relate to either growth rates, investment rates or Solow residuals.

This literature shows that higher savings rates are correlated with faster economic growth and development. The role of institutions largely centers on those institutions that encourage greater saving and investment. For example, a recent report from the Heritage Foundation shows that countries classified as ‘free’ tend to have higher per capita GDP than countries that are partly free or not free. Its index includes measures for regulation, property rights, wage and price controls and government intervention. The Fraser Institute scale for economic freedom looks at measures

of money and inflation, government operations, government takings of private property, and foreign trade.

Freedom and Prosperity

	GDP per capita				
Status	**>$15,000**	**$5,000-$15,000**	**$2,500-$5,000**	**$1,000-$2,500**	**<$1,000**
Free	25	32	11	6	2
Partly Free	2	9	13	17	12
Not Free	2	7	12	16	7

Sources: 2000 UNDP Human Development Report; *Freedom in the World* 2000-2001

While there has been much written about the relation between savings or investment and contract enforceability or the expropriation of wealth, less has been written about the relationship between government violations of physical rights and savings or investment. This is unfortunate because recent work by Rummel [1994, 1997] has shown that there is a strong relationship between the amount of absolute power held by a government and the number of people killed by that government. He has also provided a rich data set documenting the number of deaths by 'democide', defined as killing by government.

Scully's [1997] is an exception, in that he has tried to relate democide to economic growth rates. He shows a simple regression that a one-percent increase in real per capita GDP "buys" a 1.4-percent drop in the rate of democide. But this begs a question Scully leaves unanswered -- does democide cause lower growth, or does lower growth lead to democide? In this paper I addresses that problem, and attempts to extend the economic growth literature by showing how democracy and autocracy may connect to savings rates by their implications for human safety.

I argue that one can view democide as a 'good' for some -- usually a majority of the population, though the history of genocide includes cases of minority ethnic groups acquiring power to subjugate ethnic majorities -- that is subject to supply and demand analysis. In this paper I explore the demand equation for democide more completely, recognizing that different governmental institutions and different social structures will influence the supply as well as demand for democide.

A simple model of democide is presented in the third section of this paper. I also show there how the occurrence of democide might lead to a reduced growth rate. There is both a direct effect through the lowering of population (which, with declining marginal product should *increase* the level of per capita GDP) and an indirect effect by lowering the incentives to save and invest (*reducing* per capita GDP). Evidence is provided in the fourth section that the data that the second effect dominates. Democide reduces investment and through that GDP per person, even when correcting for simultaneity bias in the estimates (something Scully does not do). In that section I also show that a respect for property rights by the government is negatively correlated to the rate of democide in a country. It may well be that respect for private property rather than power is a method of non-violence. Before this we turn to a discussion of the evolution of democide in the 20th century.

The record of democide in the 20th century

Power kills; absolute Power kills absolutely. -- Rummel [1994, p. 1]

According to Rummel's [1994] statistics, over 170 million people were killed in the 20th century. As shown in Table 1 (reprinted from Rummel) the broad majority of these were killed by authoritarian regimes. Within that set of regimes, those following a communist philosophy (chiefly the USSR and post-1949 China, both ranking ahead of Nazi Germany) were the leading perpetrators of democide. The country that killed the highest proportion of its population was the Khmer Rouge regime in Cambodia: Democide occurred at the rate of over 8% of the population per year. As one might suspect from data organized this way, there is a correlation between the centralization of political power and the rate of democide in these countries.

> Where the political elite can command all, where they can act arbitrarily, where they can kill as they so whim, they are most likely to commit democide. Where the elite are checked by countervailing power, where they are restrained and held to account for their actions, where they must answer to the very people they might murder, they are least likely to commit democide. [Rummel, 1997, p. 367]

In Figure 1 I have generated from Rummel's data democide rates, calculated as the midpoint

estimate of democidal deaths divided by population (at the midpoint of the democide). Rates are used to control for the fact that the two largest democides of the 20th Century – the Soviet Union and China – took place in two large countries. The numbers in parentheses represent the number of regimes that are of that type. Communist regimes are broken out separately from the remainder of totalitarian regimes. Even controlling for country size, democracies appear to generate far lower rates of government-sponsored murder than other regime types.

{Figure 1 about here.}

Rummel looks into the question of whether democide is caused by economic factors using factor analysis. He includes the wealth, national power and politics along with his measure of power. He concludes, "the fundamental relationship between Power and democide is little altered by enlarging the context of a regime's behavior to include socio-economic (which includes educational) and geographic conditions." (1997, p. 423). His analysis is flawed in an important way. Because there are so many factors possible to explain democide, Rummel uses factor analysis to analyze the correlation of a large set of factors with democide levels. This is sound insofar as it avoids much multicollinearity that would pervade the data and make ordinary least squares analysis difficult. He chooses to perform separate factor analyses on his indicators of governmental power and on socio-economic conditions. He does not allow for the correlation between these factors.

A rich economics literature has shown that concentration of power tends to be correlated with lower growth rates. Barro [1996] is typical of such studies: As political freedom is increased from the point of complete totalitarianism, economic growth increases. But at higher levels of political freedom, the effect of additional freedom is to reduce growth as differing interest groups use their access to the political process to engage in redistributive conflicts with each other. (See also Olson [1982, 1999].) The desire to redistribute is not confined to those nations with more democratic traditions, however. When redistribution by the ballot box is not available, or when

taxation has limited impact because most transactions occur outside measurable (and thus subject to confiscation) markets, resort to seizures and physical harm may well occur.

Work on the effect of assassinations on growth has been provided by several sources. Barro [1991] and Easterly and Levine [1997] find that an increase in political assassinations leads to lower GDP growth rates. In the latter paper, it is noted that the rate of political assassinations (per 1000 population per year) is about four times higher in Africa than east Asia. Interestingly from our standpoint, they find that none of that difference can be accounted for by differences in ethnic division in the two areas. Ethnic dispersion accounts for much of the difference in economic growth rates in the two areas, but the channel through which it operates is more through lower education rates and less infrastructure investment in those countries. O'Kane [1983] and Londregan and Poole [1990, 1996] also argue that coups and household income are negatively related. A problem with many of these studies, pointed out by Easterly [1997], is that the empirical estimates do not correct for all possible fixed effects. The data are often pooled cross-section time series data; such data can lead to spurious correlation between growth and political structure if those structures are also correlated with some other geographic, ethnic or social factor unaccounted in the regression.

Scully [1997] estimates a simple regression of the form $d_j = \alpha + \beta y_j$, where d is the rate of democide (as a share of the population,) and y is the level of GDP in the middle of the period when the democide occurred. This is not the pooled data that Easterly critiqued, but it is close. Scully characterizes this formulation as "crude" (p. 78) but still characterizes this as "evidence that democidal governments in higher per capita income nations exercise some self-restraint." (p. 81) To say this, however, requires either believing all countries are equally democidal or that none of the other factors that cause variations in the rates of democide would be correlated with real GDP levels.

An economic model of democide

[T]he conscription of labor must accompany the rationing of consumption. This conscription would have to be achieved either by edict or force, or (as Trotsky saw) by offering workers starvation as the alternative. -- Tom Bethell [1998, p. 146]

The model developed here assumes that there is a Leviathan government operated by a dictator. This dictator has complete control over the size of the labor force and the size of the capital stock, and has no compunctions about using democide to control their size. Leviathan extracts revenue from the population through a tax (assumed at a proportionate rate τ) on production. Output follows the usual assumptions of a neoclassical production function, i.e., to simplify the analysis, assume labor (L) and capital (K) are hired in competitive markets at fixed prices w and r.

Leviathan faces costs of monitoring the population (and therefore the labor force), however. As the labor force expands, there is the potential for a group to arise that threatens Leviathan's monopoly on collecting tax revenues. Ethnic strife might increase if population increases include increasing the size of an ethnic minority. In order to control a larger population, Leviathan must invest in larger armies and spy networks. I assume these costs increase at an increasing rate as population rises, and express the function as $m(L)$.

The Leviathan's maximization problem can be framed as

$$\max(\tau, K, L)\ \tau f(K,L) - rK - wL - m(L)$$

Taking derivatives with respect to all the choice variables and setting the resulting expressions equal to zero gives us this first order condition:

$$\tau f_L = w + m'(L)$$

where m' is the first derivative of the monitoring cost function and f_L is the marginal product of labor. This is simply the marginal benefit equals marginal cost condition where monitoring costs are included in the right hand side. We can see this as well graphically in figure 2:

{*Figure 2 about here.*}

The downward-sloping line shows the marginal rate of extraction for the government. Were there no monitoring costs, the optimal rate of extraction would be L'. The presence of monitoring costs reduces the level of labor hired to L* from L'. One benefit of freer government may be that economic and political freedoms reduce the desire for governments to pay monitoring costs.

Democide can be considered in this model as a means to reduce labor costs and surplus labor. It is most likely to occur when the marginal extraction rate curve shifts to the left, or when monitoring costs increase. A sharp decrease in the ability to collect taxes would be one possible cause for democide. Organski, et al. [1984] describe this as a change in "political capacity". Arbetman and Kugler [1995, p. 86] describe political capacity as "Two different but related components… (1) the ability of the government to effectively extract resources from the pool produced by society, and (2) the ability of the government to reach and mobilize its population." The ability to penetrate the population, they hypothesize, comes before the ability to extract. But what they describe as "political penetration" could be seen as well as achieving economies of scale in monitoring the population. "Political capacity does not imply legitimacy, where populations accept and support the means and goals of the elite that constitute the government. Coercive governments may be effective and so may be participatory regimes." (Ibid.) Differing regimes may find that their monitoring costs are minimized by choosing either a coercive process to produce monitoring, or by increasing participation.[1]

Growth and democide

Diversion of resources to monitoring, of course, also means fewer resources for investment in capital that creates growth. Growth theory teaches us that the amount of capital per worker

[1] This discussion, of course, treats monitoring costs as independent on the tax rate. It is quite possible that governments that tax more must also expend more on monitoring at each level of population. A more

converges to some level and then remains fixed (the steady state). Now suppose some change in monitoring costs occurs such that the governing regime is induced to commit democide. At that point there should be capital deepening -- there is more capital per worker, now that there are fewer workers. The rate of capital accumulation should slow, and savings would fall as well.

This is problematic. We would expect that as people's lives are threatened they would save less and consume more, since the future is now more uncertain. But at the same time, they could still have the same desire to save but be induced to save less because the lower rate of capital accumulation drives interest rates down. The data in Figure 3 nevertheless bear out that the rate of investment falls as democide increases. I use data from Rummel for 43 countries that committed democide between 1960 and 1989, and 54 countries that did not, and compare this to investment rates as a share of GDP over the 30-year period (from the Penn World Tables.)

{*Figure 3 about here.*}

A problem with using ordinary least squares, however, is that a few countries dominate the data on democide rates. Below is a histogram and descriptive statistics for the 66 countries in my sample (of 262 countries) that committed a democide that registered in Rummel's data. (I suppressed the 194 countries without democides, as including them alters greatly the scale of the histogram.) The data are highly skewed to the left. Most democides are of small size, and the data are still dominated by a few countries (though not the same ones now.) Moreover, there is likely censoring of the data, as we cannot really assume that countries commit zero democides, but there is probably some threshold level before a study like Rummel's measures it.

{Figure 4 about here.}

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complicated model that incorporates this possibility would not change the basic conclusions of this paper, however, and thus I omit this interesting addition to the model.

I estimate the equation relating investment to democide using a maximum likelihood procedure. I assume the errors are distributed logistically.[2] The equation estimated is

democide rate = 1.6 - 9.4*(investment share of GDP).
(2.9) (3.3)

Adjusted R^2 = .16 number of observations = 96 standard error of regression = 0.78

The t-statistics are in parentheses. The results suggest that the factors that cause investment to drop in an economy tend to be correlated with those things that cause democide to be greater. However, it should also clear that items that affect investment also affect democides. Inspection of the table in the introduction revealed that countries that are freer have higher average income levels.

Thus we have two conclusions. Scully finds that the rate of democide is lowered when the level rate of GDP is higher. But the rate of democide is correlated with the rate of investment, which theory teaches us must be correlated with the rate of growth. It is better to think of this problem as one of simultaneity, of a supply and demand for democide that provides input into the growth theory.

Instrumental variables estimation

Let us abandon once and for all the idea that the execution of hostages by firing squads, the slaughter of rebellious workers, and the forced starvation of the peasantry were only short-term "accidents" peculiar to a specific country or era. Our approach will encompass all geographic areas and focus on crime as a defining characteristic of the Communist system through its existence. -- Stephane Courtois [1999, p. 3]

If growth is affected by democide and more democide occurs in poorer countries, we require a more complete model than this simple equation above. In particular, we need to treat investment rates (or growth rates) and democide rates as simultaneously determined. But since the data may be censored (and democide rates not normally distributed), we should take care with the functional form of the model.

[2] The errors are assumed to have zero mean and variance equal to $\pi^2/3$. I estimated all equations using

Except for the rate of democide, which comes from Rummel [1997], the data for used comes from Easterly [1997].[3] The data set contains a broad variety of potential measures of respect for property rights by the government. One particularly useful set of measures comes from the IRIS Country Risk surveys. These data use survey results to determine the freedom one has from the risk of expropriation of one's property, freedom from the risk that the government will repudiate a contract, bureaucratic quality, a rule of law index and freedom from corruption. In this paper I have focused on the rule of law measure. It is a six-point scale, with higher ratings representing greater freedom from expropriation.[4] The survey was taken in 1990.

First, I re-estimated Scully's model using these data. Scully used the level of GDP per capita in the mid-year of the democidal period, while I use the level in 1990. I also use democide rates to correct for the dominance of China and the Soviet Union in the democide totals. My results support Scully when I use all the countries for which there are data on real GDP in 1990 and democide. When I restrict the data set to just those countries that committed democide, as Scully did, my results do not support his findings. However, the full sample results exhibit evidence of heteroskedasticity, which are not present in the smaller sample.[5]

Second, Table 3 contains simple correlation coefficients between democide rates and the variables of interest. The data confirm the expectation of a negative sign in all cases. The bureaucratic quality variable is more highly correlated with democide than the rule of law variable, but it fits less well the concept of whether property rights protect life. The model estimated below would be qualitatively the same if one included the survey results for bureaucratic quality rather than rule of law.

EViews 3.0.

[3] These data are available online. See www.worldbank.org for the Easterly data set, and www.hawaii.edu/powerkills for Rummel's democide data.

[4] The scale of all other variables in the ICRG set is 0-6 with the exception of the freedom from the risk of repudiation of contracts by the government, which is also a ten-point scale. In all cases, country behaviors that increase the security of private property rights gain higher rankings.

[5] Scully does not discuss the possibility of heteroskedasticity.

Because the data may be censored, I have constructed two different estimates of the effect of the rule of law on investment and democide. The results are in Table 4. In the first column is the ordinarily least squares estimate. Investment rates are significant and negative, while the rule of law index is of expected sign but is not significant (the p-value, or probability that the rule of law index is equal to zero, is 0.19). To correct for the simultaneity bias, I used an instrumental variables technique. The instruments used are the other two independent variables, the level of per capita GDP in 1960, the share of agricultural output in GDP, and the Political Risk Service index for government expropriation. The rule of law index is now significant at the 10% level (p-value = 0.08) while the investment rate is not (p-value = 0.17). In the last column I have used the Tobit procedure for censored data, to account for the distribution of the democide rates. These results show that the rule of law index and the number of revolutions are highly significant, while investment rates are not significant at any reasonable level.

I conclude from these results that the effect Scully found is the result of the more complex relationship between rights and democide. In particular, the results demonstrate a relationship between Leviathan's respect for private property and its respect for life itself. This is further borne out by the estimates presented in Table 5, where democide rates are regressed against the other property rights properties in the Political Risk Service survey. The Tobit results are broadly consistent with those in Table 4. In two cases – bureaucratic quality and expropriation of resources by government – greater respect for private property is statistically significantly related to lower democide rates. The corruption index is mildly significant as well. In no case is the level of investment as a share of GDP significant. While it would be desirable to ascertain which of these measures is more important – since it is highly unlikely that the institutional decisions involved in decisions of corruption, expropriate and obedience to the rule of law are independent – it would be very difficult to do so. The simple correlation coefficients between these variables are shown below the results in Table 5. These indicate that combining two or more of these

variables would most likely result in the introduction of multicollinearity in the results. It appears that these variables are roughly measuring the same type of political risk to a holder of property.

Conclusions

"One cannot bite the hand that funds." --David Landes [1999, p. 34]

It requires governmental power, of course, to expropriate, to repudiate, and to extract bribes. A finding that governments with power can commit murder against their own people and a finding that governments with power can weaken or abrogate property rights could occur simultaneously without their being any necessary relationship between the presence of respected private property and a respect for the lives of citizens. One can go too far with the point of this paper. It remains an open question whether a democracy with little respect for private property can commit democide, in part because there are few cases of democracies that do not respect property. Weart [1997] argues that there is no case where two established democracies have ever been at war with each other; he does not investigate whether the failure for democracy to be established has to do with property. There are more cases of autocracies with significant amounts of economic freedom, such as some countries in East Asia. Pol Pot and the military leaders of Myanmar have had democide and insecure property rights, but Indonesia's checkered history with ethnic Chinese and East Timor stand with a government that has had greater respect for private property. It is worth noting, however, that Indonesia in 1996 had a political risk rating below that of Haiti.

Biting the hand that funds is easier to do when that hand is less productive. As a final point I have taken data on aggregate labor productivity (Solow residuals) from a human capital-augmented Cobb-Douglas production function. (See Hall and Jones [1998].) Plotting this data against democide rates for the subset of countries that committed democide yields Figure 5. The slope of the line is negative and significant at the 10% level of significance. More productive workers are worth more alive. But again, we do not know whether those countries with high

productivity are so because of democracy, sanctity of private property, sanctity of contract or something else.

{*Figure 5 about here.*}

One should thus take a cautious approach to the ideas expressed in this paper. I argue that relationships between democide and power, and between democide and growth, have ignored a potentially vital third factor that moves all three: private property rights. Scully's results appear to scratch the surface of that relationship. Using a simple marginal cost-marginal benefit analysis, we can see that outbreaks of democide occur when either monitoring of the public is costlier, or the benefits of keeping a labor force in productive employment falls. The results of a reduced-form model that incorporates the simultaneity of investment, growth and democide shows that respect for private property leads both to less democide and greater investment (and hence greater growth.) The results appear robust to the specification of how property rights are defined. Thus I leave an open question: Is the greatest instrument of non-violence democracy or property rights?

Tables

Table 1. Democide and Power

Reprinted from Rummel [1994]

TABLE 4
Democide and Power

SOURCE/REGIME	REGIME POWER	KILLED (000) [2] TOTAL	DOMESTIC	FOREIGN	RATE % [3] OVERALL	ANNUAL	
DEMOCIDE							
Democratic	LEAST	2,016	158	1,858	0.04	0.01	
Authoritarian	MID	28,691	25,730	2,961	1.06	0.21	
Totalitarian	HIGH	137,977	103,194	34,783	4.15	0.40	
Communist	HIGHEST	110,281	101,923	8,357	5.35	0.52	
Others [4]		518	465	53			
WORLD		169,202	129,547	39,655	7.28 [5]	0.083	[5]
WAR		**TOTAL**	**DOMESTIC**	**INTER'L**	**PER WAR [6]**	**% POP. [7]**	
Democratic	LEAST	4,370	5	4,365	62	0.24	
Authoritarian	MID	15,298	4,774	10,523	86	0.33	
Totalitarian	HIGH	14,354	68	14,286	399	0.64	
Communist	HIGHEST	9,784	68	9,715	326	0.53	
WORLD		34,021	4,848	29,174	120	1.46	[8]
WORLD TOTAL		203,224	134,395	68,829		8.74	[9]

1. These are regimes in states, quasi-states, and non-state groups. Classification of regimes based on Small and Singer (1976) and Ted Robert Gurr's Polity I and II data.
2. Figures for democide are the sum of most probable mid-values in a low-high range 1900-87. Figures for war are a regime's battle-dead over 1,000 for 1900-80, based on Small and Singer (1982), modified by additional data. Figures may not add up due to round off.
3. "Overall" is the average percent of mid-period regime's populatin killed in democide. "Annual" is this average for the percent of the population killed per year.
4. These are groups for which a regime could not be specified, such as international terrorists and domestic guerrillas.
5. The world rate is calculated for the 1944 global population.
6. Average regime's battle-dead per foreign war in thousands.
7. Average percent of a regime's population killed in international wars.
8. Percent of world's 1944 population killed in all wars 1900-1980. The annual percentage is .018.
9. Percent of the world's 1944 population killed in democide 1900-1987 and wars 1900-1980.

Table 2. Democide and Real GDP -- "Replicating" Scully

	Coefficient on real GDP 1990	R^2
Full sample (n = 116)	-0.701868	0.054642
	(0.253811)	
Democide > 0 only	-0.325902	<.0001
(n = 46)	(0.395329)	

Note: Standard errors in parentheses. I added the value .001 to the democide variable in these regressions to allow me to use the double-logarithmic formulation for the full sample. It was retained in the restricted sample for sake of comparison.

Table 3. Correlations with Democide

Variable	**Number**	**Mean**	**Correlation with Democide**
Democide (in millions)	*263**	*0.496875*	---
Investment growth, 1960-89	97	0.206637	-0.377317
Real GDP, 1990 at PPP rates	116	4904.250	-0.172515
Capital per worker, 1980	63	25.70794	-0.152027
Gini coeff. of income inequality	68	38.41009	-0.123515
Bureaucratic quality	128	3.226562	-0.212271
Corruption	128	3.332031	-0.023013
Expropriation	128	6.640625	-0.126027
Repudiation of contracts	128	5.894531	-0.110373
Respect for rule of law	128	3.035156	-0.109928

- 198 values at zero, 65 non-zero

Table 4. Democide, investment and the rule of law

Dependent variable is democide rate.

	OLS	Instrumental Variables	Tobit (with IV)
Investment rate	-3.64069 (2.60)**	-3.5735 (1.38)	-1.9650 (0.42)
Rule of law index	-0.08574 (1.33)	-0.08884 (1.74)*	-0.43506 (3.13)**
Number of revolutions per year	0.35157 (2.83)***	0.25652 (1.60)	0.51684 (2.47)**
Constant	1.1218 (3.40)***	1.1506 (1.82)*	0.89023 (0.94)
Adjusted R^2	0.22	0.21	0.07
Number of observations	82	71	96
Standard error	0.729	0.658	0.805
Standard deviation of democide rates	0.828	0.740	0.836

NOTES: Instrumental variables were used identically in the censored (Tobit) and uncensored estimates: rule of law; the number of revolutions per year; the level of per capita GDP in 1960; the share of agricultural output in GDP; and the IRIS Political Risk Service index for government expropriation of resources. Instrumental variables estimation includes the use of White's heteroskedastic covariance matrix for the error terms. Tobit errors are assumed to be logistically distributed, while the instrumental variable and OLS errors are normally distributed. Tobit estimates with normally distributed errors give similar results but slightly worse overall fit.

Table 5. Censored (Tobit) estimates of democide and political risk

	Coefficient on investment	Coefficient on political risk	Coefficient on revolutions	R^2
Bureaucratic quality	-3.93013 (0.83)	-0.26328 (2.10)**	0.45213 (2.13)**	0.07
Corruption	-6.59666 (1.46)	-0.17999 (1.65)*	0.54488 (2.58)***	0.04
Expropriation	-0.85483 (0.15)	-0.21239 (2.06)**	0.44191 (2.15)**	0.07
Government repudiation	-4.20648 (0.78)	-0.13375 (1.45)	0.48907 (2.28)**	0.07

All estimates are maximum likelihood of a censored model, with the assumption that errors are distributed logistically. Constants were included, omitted here for sake of brevity. The inclusion of more than one of these variables in a single equation is problematic, due to the possibility of multicollinearity as seen below.

Correlation of political risk measures

	Bureaucratic quality	Corruption	Expropriation	Government repudiation	Rule of law
Bureaucratic quality	1.000000				
Corruption	0.586165	1.000000			
Expropriation	0.562530	0.400329	1.000000		
Government repudiation	0.516877	0.292222	0.746542	1.000000	
Rule of law	0.390729	0.533449	0.716376	0.461055	1.000000

Figure 1. Democide rates by type of government

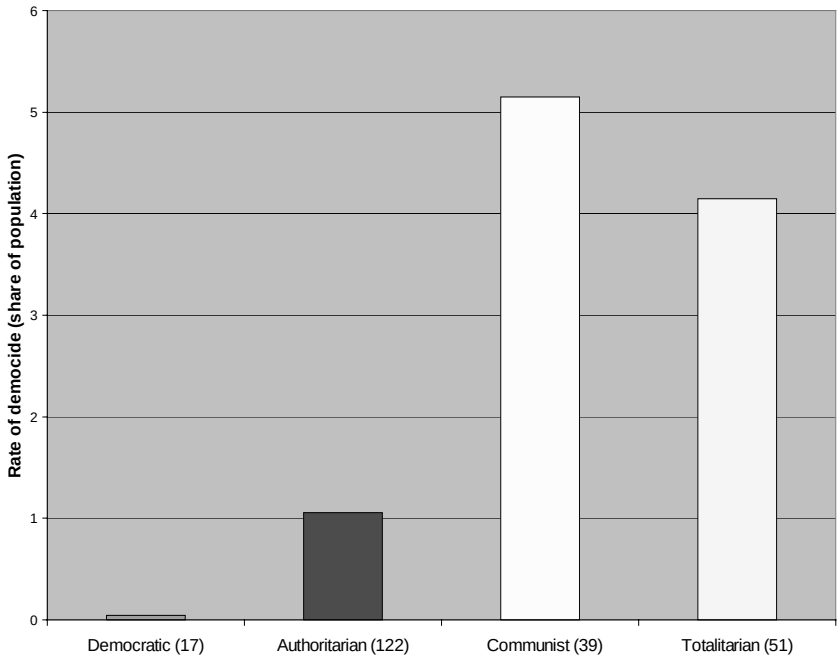


FIGURE 2.

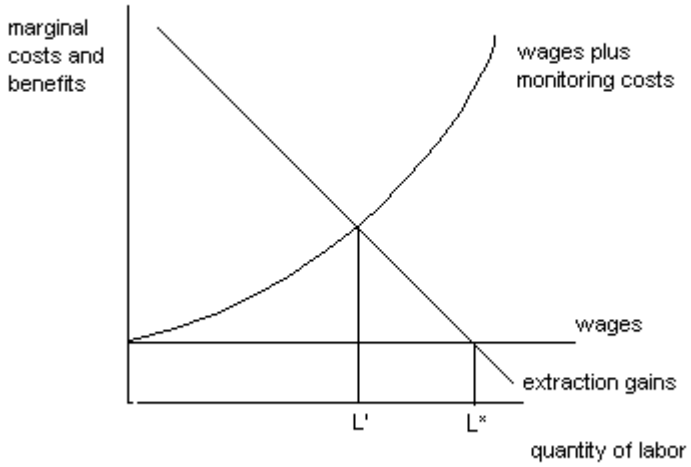

marginal
costs and
benefits
wages plus
monitoring costs
wages
extraction gains
L'
L*
quantity of labor

Figure 3. Investment rates and democide

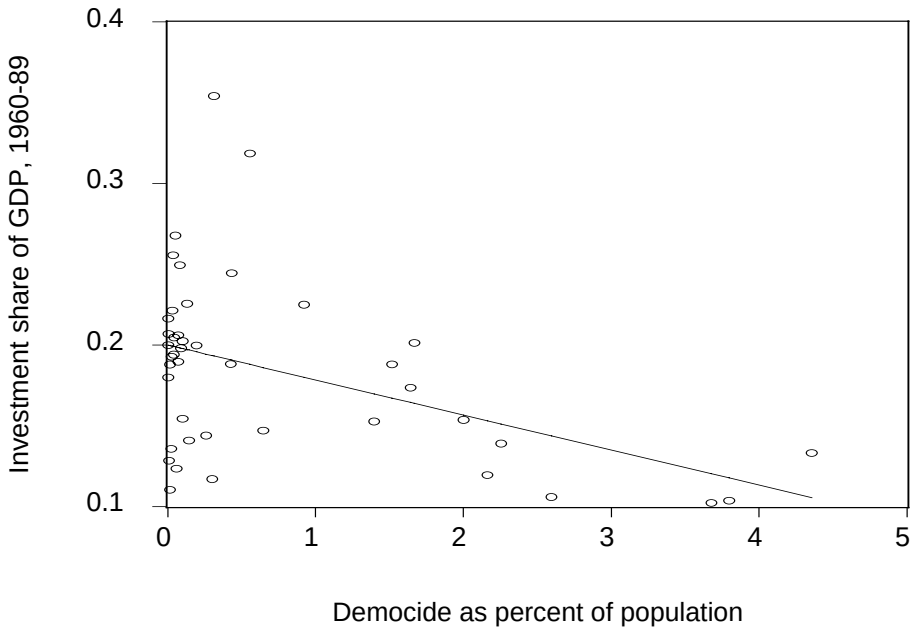
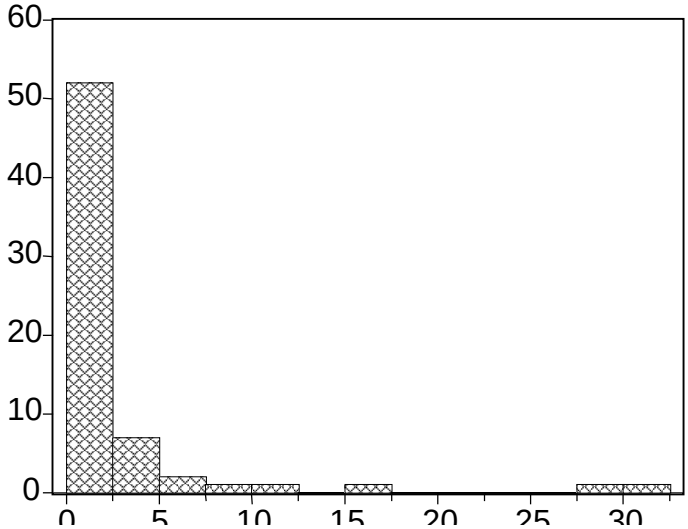
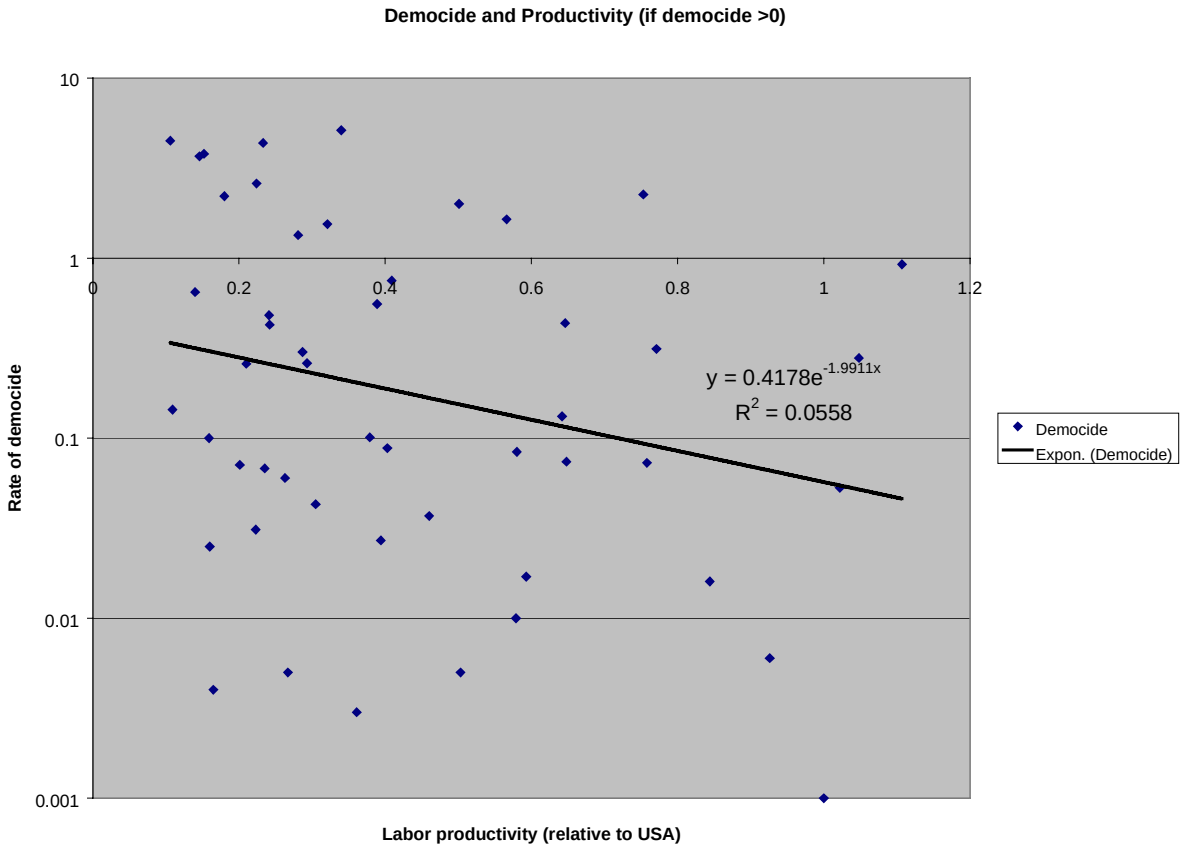


Figure 4. Democide rates (if greater than zero)



Series: DEMORATE	
Sample 1 262	
Observations 66	
Mean	2.449636
Median	0.431000
Maximum	31.25500
Minimum	0.003000
Std. Dev.	5.748520
Skewness	3.883203
Kurtosis	18.40714
Jarque-Bera	818.6669
Probability	0.000000

Figure 5. Democide and Productivity



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