Tinpots, Totalitarians (and Democrats): An Empirical Investigation of the Effects of Economic Growth on Civil Liberties and Political Rights

by

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Abstract

Ronald Wintrobe (1990, 1998) has recently provided a theoretical foundation for estimating equations that attempt to explain the dependence of civil liberties and political rights in non-democratic regimes on the history of economic growth. This theory suggests that data from different kinds of non-democratic countries should not be pooled without allowing coefficients to vary with regime type. It also places interesting restrictions on the signs of the coefficients of economic growth in equations explaining freedom in the types of regimes Wintrobe identifies. In this paper, we employ these restrictions to test Wintrobe's theory. Some additional hypotheses about the difference between democratic and non-democratic regimes and about the role of education, not considered by Wintrobe, are also investigated.

The results indicate clearly that the relationship between the degree of freedom - as measured by the sum of the Gastil indexes of civil liberties and political rights - and economic growth varies significantly across all types of regimes. Totalitarians (that attempt to maximize power) are clearly different than tinpots (that just attempt to maintain power) in this respect, and non-democratic regimes differ from democracies. Other aspects of the theory are partially confirmed. In particular, in totalitarian regimes, positive growth reduces freedom, and negative growth increases it in some specifications. The theory predicts the opposite pattern for tinpots, and we do find that negative growth reduces freedom in tinpot regimes. However, positive growth in tinpots also appears to reduce freedom in some cases, which is not in accord with the theory.

Secondary schooling has a positive effect on freedom, as in previous empirical work, a result that is shown here to hold even when each type of regime is considered separately. But the effect of primary schooling is different**:** in tinpot and totalitarian regimes, but not in democracies, primary schooling is associated with reduced freedom, perhaps because it involves indoctrination as well as education.

1. Introduction

The effects of legal arrangements and political institutions on economic growth has been extensively explored in cross-country empirical work.[1] The effects of economic growth on civil liberties and political rights, the focus of this paper, has received less attention, with some notable exceptions including John Helliwell (1994) and Robert Barro (1996, 1997, 1999). This aspect of the empirical literature has not been grounded in a theory of the effects of growth on civil rights or political liberties, and the work essentially represents a search for interesting stylized facts.

The most robust conclusion that appears to have emerged so far is that growth has a modest positive effect on civil liberties and political rights, as measured by the Gastil indexes, after controlling for the effects of the level of education (Barro 1997, 86; Helliwell, 1994, 235).[2] Barro expresses surprise that theoretical models to explain this mechanism do not exist (p.235), while Helliwell suggests that going further would probably require making distinctions among various types of democratic and undemocratic regimes (p. 242)

Ronald Wintrobe (1990, 1998) has recently provided a theoretical foundation for estimating equations that attempt to explain civil and political rights in non-democratic regimes using the past history of economic growth. The equations used by authors such as Helliwell and Barro turn out to be generally consistent with Wintrobe's analysis, with two exceptions: first, the Wintrobe theory suggests that data from different types of non-democratic regimes should not be pooled without allowing coefficients on economic growth to vary; and second, Wintrobe's theory places interesting restrictions on the coefficients on economic growth, with the sign and relative sizes of these coefficients differing across types of non-democratic regimes. In this paper we use these restrictions to test Wintrobe's theory. Some additional hypotheses concerning the differences between democratic and non-democratic countries and the role of education not considered by Wintrobe are

also investigated.

Since Wintrobe's work is well stated in its original form, we outline the basic framework as briefly as possible in the next section, emphasizing the restrictions on coefficients in estimating equations that are suggested by the theory. These restrictions, along with a straightforward extension to deal with differences between democratic and non-democratic regimes, are summarized in a set of six propositions. In section three, we present the data and the results of our analysis concerning these propositions, including some sensitivity analysis. We also investigate differences in the role of education across regime types. A brief consideration of limitations of the analysis and some concluding remarks complete the paper.

2. The Effect of Economic Growth on Political Rights and Civil Liberties in Tinpot and Totalitarian Regimes

2.1 The classification of regime types

In Wintrobe's (1998) framework, all non-democratic regimes generate and maintain power using one or both of two basic inputs: repression *R* and loyalty *L*. Repression involves restrictions on speech, the press, and on opposition parties and groups. Loyalty is the extent of trust in the dictator or regime, and is regarded as a capital asset which may be accumulated by investment (e.g., by the distribution of rents) or used up. Loyalty is never absolute.

Non-democratic regimes are classified into four types according to the primary objective of the dictator or regime in power, and according to the levels of repression and loyalty that are used in an equilibrium. The classification is depicted in Table 1, which is an amended version of Figure 4.1 in Wintrobe (1998, 81).

[Table 1 here]

Table 1

Types of Dictatorships

Equilibrium Degree of Repression		
High	**Tyrant** (Maximizes power in absence of institutions for generation of widespread loyalty)	**Totalitarian** (Maximizes power using both repression and loyalty)
Low	**Tinpot** (Minimizes resource cost of staying in power)	**Timocrat** (Maximizes the welfare of the people)
0	Low	High

Equilibrium Degree of Loyalty

In each case, the behavior of the regime is constrained by the production function for power, and by the nature of the supply of loyalty. Both of these elements are discussed below.

'Tinpots' seek personal consumption. They therefore attempt to minimize the resource costs of maintaining power. Unnecessary expenditures on repression, or for the generation of loyalty, reduce the amount available for the dictator's personal consumption and that of his or her close associates. For later use, we call the minimum level of power required to maintain the regime π_{min}.

'Totalitarians' use both repression and loyalty to maximize power. A totalitarian regime will appropriate as much of the output of the nation as is necessary to maximize power, and will therefore purchase more of both *R* and *L* than would a tinpot.

'Tyrannies' also attempt to maximize power, but are different from totalitarians because they cannot, or do not, rely upon institutions that allow the generation of widespread loyalty. Hence, as shown in Table 1, the level of loyalty is lower in tyrannical regimes than in totalitarian ones.

'Timocracies', or benevolent despots, complete the classification scheme. A timocrat maximizes the welfare of its citizens and consequently avoids purchasing the costly inputs required to produce power. As a result, a timocracy is the most unstable of all non-democratic regimes, being at risk of overthrow by one that is prepared to repress dissent.

The empirical work in this paper is based primarily on consideration of the differences between tinpot and totalitarian regimes, since the occurrence of true tyranny and true timocracy is likely to be rare. As timocrats are always at risk of being replaced by more repressive regimes, Wintrobe suggests that they will be few in number. He does not cite any contemporary examples. Tyrannies are also likely to be few in number. This category of regime does not include Germany under Hitler, the Soviet Union under Stalin or China under Mao, since each of these cases involves

the use of mass party and other institutions to generate loyalty. Wintrobe cites Zaire under Mobutu, Chile under Pinochet, apartheid in South Africa, Haiti under the Duvaliers, and Iraq under Hussein, as contemporary examples of tyranny, and we consider the sensitivity of our results to the inclusion of these cases.

2.2 The production of power and the supply of loyalty

The effects of growth on civil liberties and political rights in tinpot and totalitarian regimes depends on the *production function for power*, and the nature of the *supply of loyalty*. We briefly outline the nature of these two central elements of the Wintrobe framework here, and then turn to the derivation of the effects of growth on the degree of repression and on its complement, the degree of freedom.

Power is generated according to the production function

$$\pi = \pi(L,R,) \qquad \textbf{(1)}$$

where $\pi_L > 0$ and $\pi_K > 0$, $\pi_{LL} < 0$ and $\pi_{KK} < 0$, and $\pi_{KL} > 0$. This production function for power is well-behaved in the sense that the marginal rate of substitution between R and L diminishes with L along any iso-power line.

The supply of loyalty L_s is governed by a function of the form

$$L_s = L(P_L, PE, R) \qquad \textbf{(2)}$$

where $L_P > 0$, $L_{PE} > 0$ and L_R may be positive or negative as discussed below. P_L is the price per unit of loyalty *supplied* to the dictator or regime, and PE is an index of economic performance such as the rate of economic growth. P_L may be thought of as the gain (i.e., the rents) that individuals expect to receive as a result of political exchange with the dictator. This differs from the price paid by the dictator, which includes the transactions costs that the regime must bear in order to create and

maintain the transfers of rents that loyal citizens expect. An increase in P_L increases the supply of loyalty. L_s also depends positively on economic performance. As *PE* increases, the value of any given political exchange with the regime may be expected to increase and, as a result, loyalty will tend to increase.

Up to modest levels of repression, an increment in *R* increases the supply of loyalty because of a 'substitution' effect: as *R* increases, the risk from disloyal activity, such as links with opposition groups, increases with the probability of detection and the size of penalties. At very high levels of *R*, however, the supply of loyalty declines (the supply curve of loyalty bends backwards) because of an 'income' effect which outweighs the substitution effect. At a sufficiently high level of *R*, the expected reduction in wealth because of the penalty associated with disloyal activity leads individuals to reduce their investments in political loyalty.

2.3 The effects of economic growth in tinpot and totalitarian regimes

With the above elements of Wintrobe's analysis as a background, we may now derive the effects of economic performance on the degree of repression and on its complement, the degree of freedom, in tinpot and totalitarian regimes. It is from these effects that a test of Wintrobe's analysis may be derived. For each type of regime, we first outline the argument and then summarize it with testable propositions.

Tinpots: Assume that economic growth increases in a tinpot regime, and that (2) holds so that loyalty to the regime increases to some extent. If $\pi = \pi_{min}$ before growth increases, the power of the regime will increase beyond the minimum necessary. Expenditures on repression and on the generation of loyalty may then be reduced, and the resources freed up diverted to personal consumption of members of the regime. More growth in a tinpot regime thus leads to less repression

or, equivalently, to more civil liberties and political rights.

Less growth leads a tinpot regime to increase repression in order to maintain power at the minimum level necessary for survival. However, the absolute value of the change in repression will be larger than when growth increases, for two reasons. First, an increase in repression when growth and loyalty declines is a precondition for existence of the regime. Second, since the marginal rate of substitution between *R* and *L* in the production of power is diminishing along the iso-power line $\pi = \pi_{min}$ (recall (1)), the absolute increase in *R* required to maintain power when growth declines is larger than the decrease possible when the rate of growth improves.

The preceding discussion can be summarized with the following two propositions. Here and below we refer to the degree of freedom rather than to repression, since we shall use an index of freedom based on the Gastil indexes of civil liberties and political rights as the dependent variable in the estimating equations:

> *Proposition* 1: In a tinpot regime, an increase (decrease) in economic growth leads to an increase (decrease) in the degree of freedom.
>
> *Proposition 2*: In a tinpot regime, a decrease in economic growth results in a change in the degree of freedom that is larger in absolute value than when economic growth increases.

Totalitarians: By definition, a totalitarian regime uses repression and loyalty to maximize power, subject only to the resources of the economy, which may be appropriated by the dictator as needed, and the supply of political loyalty. While a tinpot will use repression only to the point at which its power is maintained, a totalitarian regime maximizes power by employing repression up to the point at which further increases in repression lead to such large reductions in the supply of loyalty that power actually declines. Thus a totalitarian always operates on the backward bending part of the supply of loyalty curve. (If loyalty did not decline with *R*, increments in repression could be used to

generate more power; there is a financial budget restraint, but the totalitarian can appropriate resources at will, and Wintrobe regards the supply curve of loyalty as the most important constraint.)

Assume now that economic performance improves, and that the totalitarian receives some credit for this. The supply of loyalty at any level of repression then increases (recall (2)), and this leads to an increase in the power maximizing level of repression beyond which power is lost because of the adverse consequences of further repression for the supply of loyalty. It is also important to note that in contrast to the tinpot regime, no asymmetry with respect to positive and negative growth occurs. The totalitarian is not gravely threatened by negative growth, and does not confine itself to a convex iso-power line.

Stated in terms of the degree of freedom, we now have the following proposition:

Proposition 3: In a totalitarian regime, an increase (decrease) in economic growth leads to a reduction (increase) in the degree of freedom.

The combination of propositions 1,2 and 3 suggests a fourth proposition:

Proposition 4: The effects of economic growth on the degree of freedom differ significantly among tinpot and totalitarian regimes.

Democracies: A fifth proposition may be inferred by contrasting the effect of growth on civil liberties and political rights in democracies with these effects in dictatorships. Although the relationship between growth and freedom in democracies is not discussed by Wintrobe, it seems reasonable to expect the following to hold:

Proposition 5: Economic growth will not significantly affect the degree of freedom in democratic regimes.

Finally, combining the previous propositions, we have:

> *Proposition 6*: The effects of economic growth on the degree of freedom differ significantly among democratic, tinpot and totalitarian regimes.

If upheld by the evidence, propositions 4 and 6 indicate that pooling data from different regimes without allowing coefficients on growth in an equation explaining the degree of freedom to vary is not appropriate.

3. Data, Estimating Equations and Results

3.1 The classification of regimes

Following Helliwell (1994) and others, we use a simple transformation of the sum of the Gastil indexes of civil liberties (*CL*) and political rights (*PR*) to measure the degree of freedom, the complement to the degree of repression in Wintrobe's analysis. The two indexes are highly correlated and it is unlikely that we gain much from using them separately. Since the Gastil indexes range from 1 (most free) to 7 (least free), for estimation purposes we construct a normalized index, denoted *FR*, that ranges from 1, indicating the most civil and political freedom, to 0:

$$FR = \{14 - (CL + PR)\} / 12 \qquad \textbf{(3)}$$

This index is the dependent variable in the estimating equations.[3]

To test the six propositions listed above, it is necessary to classify all countries in our sample of 128 regimes (see the Appendix for a list) as being either tinpot, totalitarian or democratic. The countries listed earlier that may be ruled by tyrants are treated as exceptional cases. They are too few in number to be treated as a separate category for estimation purposes. We allow for the possible

existence of tyranny by testing the sensitivity of the analysis to the inclusion of data for these countries.

The actual classification of regimes for which a Gastil index exists is not straightforward. Wintrobe describes two methods of classifying non-democratic regimes, neither of which can be used here. One method makes use of the effect of repression on the level of loyalty. For reasons explained in the previous section, the equilibrium supply of loyalty declines with *R* in totalitarian regimes, and increases with *R* in tinpot regimes. However, we do not have an index of loyalty that can be used to operationalize this idea.

The other method of classifying regimes suggested by Wintrobe is according to the effects of growth on repression or freedom. But since tests of the propositions stated earlier are essentially tests of the sign and size of the effects of growth on the degree of freedom, this method of distinguishing regimes cannot be used either. Using the same sample, one cannot use the effects of growth on freedom to both classify regimes and to test propositions about the effects of growth on freedom.

In the absence of a better method for classifying regimes, we use the following somewhat ad-hoc but reasonable procedure, and then assess the sensitivity of results to changes in the classification scheme. (The resulting classification by country is given in the Appendix.) Using the combined value of the Gastil indexes *CL + PR* for 1988, we initially classify as most free or 'democratic' all countries with a combined index of 4 or less. (Recall that each Gastil index has a value of 1 for countries that are most free, and a value of 7 for least free countries). All countries in our sample with a combined index of 13 or 14 are initially classified as least free or 'totalitarian'. The remainder of the countries in the sample are initially classified as 'tinpots'.

The data used covers the period from 1967-1992. While the Gastil indexes exist for years after 1992, we do not extend our data set further in this respect. There have been many changes in

political systems since 1988, including those associated with the collapse of the Soviet Union. We classify countries according to their Gastil rankings in 1988, as noted above, and assume that any changes in the Gastil indexes from 1988 until 1992 are a matter of degree rather than of kind. Extending the data set beyond 1992 would stretch this last assumption too far, requiring that we explain why regimes switch between types, as from totalitarian to democratic. Such a switching model is beyond the scope of this paper (and Wintrobe does not offer one).

Nor, for a similar reason, do we reclassify individual countries before 1988 when the combined Gastil index crosses one of the boundaries between regime types specified above. When the combined Gastil index falls from, say, 6 to 4, is the country now democratic, or is it still a (somewhat less oppressive) tinpot? Changing the classification of an individual country involves just as strong an assumption as the opposite. We deal as best we can with the classification issue using sensitivity analysis concerning the dividing lines between regime types, with each boundary being applied uniformly throughout the sample.

Although the Gastil ranking does not exist prior to 1972, we increase the sample size substantially by using the 1972 Gastil indexes as representative of the average ranking over the period from 1967 to 1972, in the manner indicated below, so that existing data on economic growth for the period before 1972 may also be included in the sample.

3.1 Basic estimating equations

Two types of equations, one static and the other dynamic, are used to test the hypotheses outlined earlier. These equations are stated here in their most general form and discussed immediately below:

$$FR_t = \alpha_0 + \alpha_1\, y_t^{+} + \alpha_2\, y_t^{-} + \alpha_3 SCH_t + \alpha_4\, SCPR_t + \alpha_5 CV + \alpha_6\, D_{OECD} + \alpha_7\, D_{OIL} + \alpha_8\, D_{SUE} + \nu_1 \quad \textbf{(4)}$$

$$FR_t = \beta_0 + \beta_1\, y_t^{+} + \beta_2\, y_{t-1}^{+} + \beta_3\, y_t^{-} + \beta_4\, y_{t-1}^{-} + \beta_5 SCH_t + \beta_6\, SCPR_t + \beta_7 FR_{t-1} + \beta_8\, D_{OECD} + \beta_9\, D_{OIL} + \alpha_{10}\, D_{SUE} + \nu_2 \quad \textbf{(5)}$$

where

FR = the index of freedom defined in (3);

$\boldsymbol{y}^{+}$ = mean value of only positive growth rates during a specified time period, = 0 when growth rates during the period are all negative;

$\boldsymbol{y}^{--}$ = (absolute) mean value of only negative growth rates during a specified time period, = 0 when growth rates during the period are all positive;

SCH = secondary school enrollment as a percent of the adult population;

SCPR = primary school enrollment as a percent of the adult population;

CV = the coefficient of variation of real per capita gdp;

D_{OECD} , D_{OIL} , D_{SUE} = dummy variables indicating (= 1) respectively OECD membership, OPEC oil exporter, and country allied with the Soviet Union.

The error terms v_i may be cross-sectionally heteroscedastic despite the use of variables in per capita terms to allow for differences in the size of countries, as well as time-wise autocorrelated due to the persistence of shocks. Equation (4) does not use lags, while equation (5) allows for some dynamic adjustment over time. Note that since $\boldsymbol{y}^{--}$ is the absolute value of a negative growth rate, a negative coefficient on this variable means that the index of freedom *FR* is reduced when growth is negative and declining.

In this study we employ parsimonious specifications of the estimating equations explaining the degree of freedom. The processes determining civil liberties and political rights are undoubtedly complicated, and it is likely that other factors are involved besides those discussed in the previous

section. The presence of education variables in the estimating equations follows Seymour Martin Lipset (1959) and many others since, and is a well established practice in investigations of the present kind. We use secondary school enrollment as percent of the adult population for the education variable as well as (in some specifications) primary school enrollment. (The role of education will be discussed at some length below.) Barro (1997) also includes life expectancy and urbanization variables for Asian countries, and Samantha Ravitch (2000) includes a measure of marketization. However, there is little consensus as to the specification to be employed, apart from the inclusion of a schooling variable. We follow the parsimonious approach of Helliwell (1994) here, while acknowledging the room that remains for further work on alternatives to the models we employ.

Wintrobe is not specific about how economic performance (*PE* in equation (2) above) is to be measured. In (4) and (5) we distinguish only between the effects of positive and negative rates of growth. A substantial decline in the rate of growth even when growth remains positive may also be regarded as a decline in *PE*. However, given the imprecision of the theory on this point, it seems to us that associating bad performance with negative growth, rather than with declines in positive growth rates, yields a more conservative test of the theory.

Per capita growth rates and other data are averaged over five year intervals, and in one case they are averaged over the entire sample period from 1967 to 1972. This reduces the effect of short run macroeconomic fluctuations on the relationships of interest. Since we would have few instances of negative growth rates in such 5-yearly averages if we used simple averages of both positive and negative growth rates, each average contains only either positive or negative growth rates within the period, but not both, as indicated in the definitions given above. If growth rates within a period are *all* positive, the negative growth rate variable $\boldsymbol{y}^{-}$ is assigned a value of zero (and vice-versa).

Although the Gastil data on civil liberties and political rights begin in 1972, we use the 1972 figures for *FR* as if they were averages over the 1967-1972 period, permitting one more observation for each country and thus substantially expanding the sample size. There are 128 countries in our basic sample, so with averaging and the extension of the data set back to 1967, there are 640 observations when data for all types of regimes are combined.

Means and standard deviations for the data are provided in the data Appendix, where the basic observations underlying the statistics reported are the averages over five year intervals from 1967 to 1992 (the first interval only includes 6 years). Also given, below the table, is the number of observations for y^{--} that are zero - that is, where *all* year-over-year growth rates of per capita gdp within a five year period are positive**.** It should be noted that there are a substantial number of periods for all regime types exhibiting negative as well as positive growth rates within the 5 year intervals.

Means and standard deviations clearly differ across regime types. The mean and standard deviation of positive per capita growth y^{+} both rise and then fall as *FR* declines. The mean absolute value of negative per capita growth y^{---} increases uniformly as *FR* declines, while its standard deviation, like that of y^{+}, first rises and then falls. The means of both secondary schooling (*SCH)* and primary schooling (*SCPR)* decline uniformly with *FR*.. Note the large drop in the mean of *SCH* but not in the mean of *SCPR* when moving from the 'democratic' to the 'tinpot' range of the freedom index, and that the correlation of the two schooling variables is low (- 0.098).

3.2 Estimation results: propositions 1, 3 and 5

Tables 1a through 2 present estimates of equations (4) and (5) for various samples and estimation techniques. Here we exclude primary schooling *SCPR,* the role of which will be considered later on. The results for preferred models that include all relevant dummy variables are

indicated by shaded columns.

[Tables 1a, 1b and 2 here]

Other tables, discussed below, present various tests of differences in coefficients across regime types, sensitivity analyses concerning the definition of regime type, in addition to consideration of the role of education. The discussion of results emphasizes the versions of equations (4) and (5) that include all dummy variables, and the conclusions stated in the final section of the paper are based on an assessment of these results for both static and dynamic versions of the model.

Estimation of equation (4) is presented in Table 1a. The estimation technique is generalized least squares (GLS) with a correction for cross-sectional heteroscedasticity and time-wise autocorrelation. The data consist of 5-yearly averages over the period 1967-1992. (The first period consists of 6 observations.)

Proposition 1 concerning tinpots is not confirmed by the results in Table 1a. Neither positive nor negative growth has a significant effect on freedom in tinpot regimes. Negative growth significantly reduces freedom in tinpots as in Proposition 1 only when D_{OIL} (which is itself insignificant) is omitted from the equation.

Proposition 3 concerning totalitarians is partially confirmed in Table 1a. In the preferred specification, positive growth significantly reduces freedom in totalitarian regimes as predicted. But negative growth does not have a significant effect on freedom.

Negative growth in most free or democratic countries appears to reduce freedom in Table 1a, contrary to proposition 5 which suggests that there should be no association between growth and freedom. (Growth is insignificant only in the equation that omits the OECD dummy). The results in Table 1a also indicate that more secondary schooling leads to increased levels of freedom in all types of regimes.

In Table 1b, the data for each country is averaged over the period 1967-1992 as a whole instead of over 5 year intervals. The now smaller sample size prevents the use of generalized least squares with its correction for heteroscedasticity and autocorrelation. We use maximum likelihood estimation (MLE) for all regime types, as well as two-stage least squares (2SLS) with growth treated as an endogenous variable for the larger sample of tinpots countries. In view of the small size of the sample and the absence of a correction for heteroscedasticity, the MLE estimates should probably be considered inferior to the GLS estimates in Table 1a, but we discuss them briefly nonetheless. The two-stage estimation represents a preliminary attempt to acknowledge the possibility that causality may also run from the nature of social conditions to economic growth, as has often been discussed (see, for example, Chong and Calderon 2000, and Hall and Jones 1999) . The difficult empirical issue that arises in dealing with this possibility, which we do not attempt to definitively resolve in this paper, is to find suitable instrumental variables for economic growth. We use lagged growth and lagged values of *FR* as instruments in the 2SLS estimation.

The MLE results for tinpots in column 5 of Table 1b indicate, in contrast to those in Table 1a, that tinpots are like totalitarians in the sense that positive growth reduces freedom while negative growth increases it. However, the preferred 2SLS estimation is consistent with the predicted behavior of tinpots - here negative growth reduces freedom. Clearly the combination of the choice of the manner in which the data are averaged and the estimation technique has a substantial effect on the results.

For totalitarians, the MLE results in the table for the preferred equation with all relevant dummy variables again partially confirm proposition 3: positive growth reduces freedom while negative growth does not appear to have any effect.[4]

The results for democracies in Table 1b are opposite to those in Table 1a. Here positive

growth significantly increases freedom. Thus, neither the results in Tables 1a nor those in Table 1b fully support proposition 5. Finally concerning Table 1b, it is of interest to note that the coefficient of variation of growth rates over the whole sample, denoted *CV*, consistently has a negative and significant coefficient in all types of regimes. This is the only table in which the *CV* is included.

Estimation results for the dynamic model, equation (5), are reported in Table 2. Here the results for tinpots are more strongly in accord with proposition 1 than in the previous tables. The coefficients on negative growth for tinpots are either negative and significant or insignificant, and the coefficient on y^{+}_{t-1} is positive and significant as is also suggested by proposition 1. However, the coefficient of the current value of y^{+} is negative and significant, and the combined effect of the two coefficients on positive growth rates is also negative.

For totalitarians, the result for the preferred model is fully in accord with proposition 3: positive growth reduces freedom while negative growth increases it. It is also interesting to note that membership in OPEC is associated with a lower degree of freedom in totalitarian regimes. And for the democracies, the coefficient of y^{+}_{t-1} is positive and significant.

Considering the results in Tables 1a, 1b and 2 as a whole, it appears that propositions 1 and 3 are partially supported. Coefficients on negative growth are generally negative for tinpots in the preferred specifications. However, the sum of coefficients on positive growth is not positive for tinpots in the dynamic estimating equation, as the theory requires. Proposition 3 is also partially supported, though more strongly than is proposition 1. For totalitarians, coefficients on positive growth are generally negative and significant in the preferred specifications. Negative growth has either a significantly positive effect on freedom (in the dynamic model) as predicted, or is insignificant (in the static version). Finally, proposition 5 concerning democracies is not confirmed since one of the coefficients of growth in democracies is always significant in the tables.

3.3 Propositions 2, 4 and 6

While propositions 1 and 3 are partially supported in the manner discussed above, propositions 4 and 6 concerning differences across regime types are both strongly supported by the evidence. As indicated by the F tests in Table 3a, constant terms, coefficients of positive growth and of negative growth are clearly different across all three regime types considered together at the 1% level of significance. The coefficients also differ when each possible pair of regimes is considered. Narrowing or broadening the definition of regimes types (to the extent permitted by sample sizes), in the manner indicated in the tables, does not alter these conclusions.

[Tables 3a and 3b here]

In Table 3b, tests of the null hypothesis that coefficients on positive and negative growth in tinpot regimes are equal are presented. Proposition 2 requires that these coefficients differ. However, such differences do not appear to be generally present in the estimation results. Only for the dynamic model is there some support for differences across coefficients of positive and negative growth in tinpot regimes.

3.4 Sensitivity analysis - the effect of regime classification, and the role of tyrants

Tables 4a, 4b and 5, corresponding to Tables 1a, 1b and 2 respectively, present results for key coefficients in equations (4) and (5) when the definition of regime type is both narrowed and broadened. Note that we do not consider narrowing the definition of a totalitarian due a degrees of freedom problem. In each case, only the preferred equations from Tables 1a and 2 are re-estimated.

[Tables 4a, 4b and 5 here]

Of particular interest in these tables is the result when the definition of a tinpot is narrowed to (6 - 12) from (5 - 12). Countries such as India, Botswana and Columbia for the whole period, and Brazil, Peru and the Philippines at least after the mid 1980's, may be reasonably considered by some observers to be more or less democratic, yet they are classified as tinpots in the previous tables along with more repressive regimes. In 1988, all of these countries have a combined Gastil index of 5 and so are just over the dividing line between democrats and tinpots.

In Tables 4a and 5, it can be seen that a narrowing of the definition of a tinpot to (6 – 12), so that these countries are excluded, brings the results more closely into accord with the Wintrobe theory. In Table 4a, negative growth then has a significantly negative effect on *FR* for tinpots (instead of being insignificant in Table 1a), while the results for tinpots in Table 5 remain consistent with those in Table 2.

These tables also show that when the definition of a totalitarian is broadened to (12 - 14) from (13 - 14), the results are worse from the point of view of the theory. In Tables 4a and 4b, growth now has no effect on freedom (in Table 1b, positive growth reduced freedom), while in Table 5, negative growth now reduces freedom (in Table 2, negative growth increased freedom).

Thus the results of the sensitivity analysis concerning the classification of regimes adds support to the theory: a tighter definition of a tinpot improves the results from the perspective of the theory, while a weaker definition of totalitarian regimes worsens them.

Finally, Table 6 presents results when countries identified by Wintrobe as 'tyrants' are removed from the samples of tinpots and totalitarians. A comparison of Table 6 and Table 1a indicates that the significance of coefficients, but not the general pattern of signs, is somewhat sensitive to the presence in the sample of countries suspected of being tyrannical. The only substantial difference is for democracies. Removing Argentina and Uruguay, which had repressive

regimes earlier in the sample period, from the democratic group eliminates the significant coefficient on negative growth found in Table 1a so that now, proposition 5 is confirmed: in Table 6, there is no relationship between freedom and growth in democracies.

[Table 6 here]

3.5 The role of education

To complete the statistical analysis, we consider the role of education at greater length. The role of education is of heightened interest when viewed in the context of the extensive body of research on the relationship of education to freedom by Lipset (1959), Barro (1999), John Lott (1999) and many others.

Tables 7a (corresponding to Table 1a) and 7b (corresponding to Table2) present estimates of our preferred static and dynamic equations when both secondary (*SCH)* and primary (*SCPR*) schooling are included in the regressions. As can be seen in these tables, and like the relationship between growth and freedom, that of education and freedom also appears to differ significantly with regime type. While secondary schooling continues to have a positive effect on growth in all regime types, as in previous tables, primary schooling reduces growth in both tinpot and totalitarian regimes and is insignificant in democracies.

[Tables 7a and 7b here]

One possible explanation for this interesting result is suggested by Lott (1999).[5] Totalitarians may use education as a form of indoctrination, in manner not possible in free societies. If this allows the saving of resources required to produce a given amount of loyalty, such resources can be used to increase repression, or at least to offset any general tendency for education to lead to improvements in legal and political rights. Indoctrination may also reduce the input of resources required to produce

a given amount of repression.

4. Limitations of the Analysis, and Conclusions

Before summarizing our conclusions, some limitations of the analysis that point the way towards further research are worth noting. First, it is likely that other factors are involved in the processes determining the nature of civil liberties and political rights besides the variables in the models estimated here. We use education, the coefficient of variation of growth, selected dummy variables and, in one model, the lagged value of the normalized freedom index, as controlling variables, in addition to current and lagged values of positive and negative growth rates. It is not clear what other variables should be included in the equations, and further work should explore the robustness of the conclusions reached here to alternative specifications, provided that a clear justification can be given for the model employed. [6]

Second, the classification of regimes using the combined Gastil index is based on an informed guess rather than a precise set of criteria. While sensitivity analysis has been used to deal with this characteristic of the assembled data, further research may uncover a more precise method of distinguishing between types of regimes using indexes of loyalty.

Third, there is the possibility of simultaneity - legal and political rights may create conditions that are conducive to economic growth. The two-stage estimation we have conducted that formally allows for simultaneity is preliminary. The difficulty here lies in the absence of good instrumental variables in the present context. The issue of simultaneity remains on the research agenda.

With these limitations and the results of the sensitivity analysis in mind, we may summarize our conclusions as follows: The results indicate clearly that the relationship between the Gastil indexes of civil and political freedoms and economic growth varies significantly across all regime

types. Tinpots are clearly different than totalitarians, and non-democratic regimes differ from democracies. It is evidently dangerous to pool countries like Somalia, Sweden, Pakistan and Germany in the same sample without taking differences across types of regimes explicitly into account. Moreover, allowing constant terms in estimating equations to vary is not by itself sufficient to capture all important differences in the nature of political regimes.

Other aspects of the theory are partially confirmed. The results for totalitarians are most clearly consistent with Wintrobe's framework. Positive growth leads to a reduction in the degree of freedom in totalitarian regimes, while negative growth has either a positive impact or no effect on freedom, depending on the estimating equation employed. Moreover, broadening the definition of a totalitarian worsens the results from the perspective of the theory

For tinpot regimes, there is good evidence that negative growth reduces freedom, as Wintrobe predicts. A narrower definition of 'tinpot' also appears to improve the consistency of our results with Wintrobe's framework to some extent. However, positive growth in tinpots has a negative effect on freedom in one of the two main estimating equations, while the theory indicates that positive growth should increase freedom, and we cannot find clear evidence that the coefficient on negative growth is larger in absolute value than that on positive growth.

Finally, in view of the work of Lipset (1959) and others since concerning the role of education, it is interesting to note that the often uncovered positive effect of education (that is, of secondary schooling) on freedom is shown here to carry over to each type of regime separately. In addition, our results indicate that primary schooling is associated with *reduced* freedom in tinpot and totalitarian regimes, and has no significant relationship with the index of civil liberties and political rights in democracies. A possible explanation for these results may be that primary schooling in non-democratic countries involves indoctrination as well as education. Whatever the explanation, such

results indicate that researchers investigating the relationship between education and the nature of civil society must also take care to control for the type of regime from which their data comes.

In general, we may say that the relationship between civil liberties and political rights, economic growth and education is complicated substantially by the existence of different types of political regimes, and that much work remains to be done to come to grips with the consequences of this situation for our understanding of democracy, freedom and growth. Wintrobe' s work is likely to be of help in guiding this research.

References

Barro, Robert (1996). "Democracy and Economic Growth." *Journal of Economic Growth* 1(1), March, 1-28.

Barro, Robert (1997). *Determinants of Economic Growth: A Cross-Country Empirical Study* Cambridge MA: Harvard University Press.

Barro, Robert (1999). " Determinants of Democracy". *Journal of Political Economy* 107 (6,part 2), S158-S183.

Brunetti, Aymo (1998). "Political Volatility and Economic Growth: A Comparative, Empirical Analysis". *European Journal of Political Economy* 14(1), 35-51.

Chong, Alberto and Cesar Calderon (2000). "Causality and Feedback Between Institutional Measures and Economic Growth". *Economics and Politics* 12 (1), 69-81

Clague, Christopher, S.Gleason and Stephen Knack (2001). "Determinants of Lasting Democracy in Poor Countries: Culture, Development and Institutions". *Annals of the American Academy of Political and Social Science*, no. 573, January, 16-41.

Clague, Christopher, Philip Keefer, Stephen Knack and Mancur Olson (1996). "Property and Contract Rights in Autocracies and Democracies" *Journal of Economic Growth*. 1, 243-276.

Dawson, John W. (1998). "Institutions in Investment and Growth: New Cross Country and Panel Evidence", *Economic Inquiry* 36, 603-619.

De Haan, Jacob and C.L.J. Siermann (1995). "New Evidence on the Relationship Between Democracy and Growth." *Public Choice* 86, 175-198.

De Haan, Jacob and C.L.J. Siermann (1998). "Further Evidence on the Relationship Between Economic Freedom and Economic Growth". *Public Choice* 95(3-4), 363-380.

De Haan, Jacob and Jan-Egbert Sturm (2000). " On the Relationship Between Economic Freedom and Economic Growth". *European Journal of Political Economy* 16, 215-241.

Gastil, Raymond D., and subsequent editors, *(1986,1989* and various other years). *Freedom in the World: Political Rights and Civil Liberties*. Freedom House, Westport CT: Greenwood Press.

Hadenius, Axel (1992). *Democracy and Development*. Cambridge University Press.

Hall, Robert E. and Charles I. Jones (1999). "Why Do Some Countries Produce So Much More Output Per Worker Than Others". *Quarterly Journal of Economics*, February, 83-116.

Helliwell, John (1994). "Empirical Linkages Between Democracy and Economic Growth". *British*

Journal of Political Science 24, 225-248.

Lipset, Seymour Martin (1959). "Some Social Requisites of Democracy": Economic Development and Political Legitimacy." *American Political Science Review* 53, 69-105.

Lott, John (1999). “Public Schooling, Indoctrination and Totalitarianism”. *Journal of Political Economy* 107 (6,part 2), S127-S157.

Ravitch, Samantha F. (2000). *Marketization and Democracy: East Asian Experiences. New York:* Cambridge University Press.

Summers, Robert and Allan Heston (1991). "The Penn World Table (Mark 5): An Expanded Set of International Comparisons, 1950-1988." *Quarterly Journal of Economics*, May, 327-368.

Wagner, Alexander (1999). "Economic Growth, Democracy and Political Stability", Paper presented at the Public Choice Society, New Orleans, March 1999.

Wintrobe, Ronald (1998). *The Political Economy of Dictatorship*. New York: Cambridge University Press.

Wintrobe, Ronald (1990). "The Tinpot and the Totalitarian: An Economic Theory of Dictatorship". *American Political Science Review* 84 (1990), 849-872.

Wolfson, Murray, Zagros Madjd-Sadjadi and Patrick James (2001). "Classifying National Types in Terms of Conflict, Economic and Political Factors". Unpublished paper prepared for the International Studies Association meeting, Chicago, February 2001.

Appendix: Definition of Variables, Data Sources, List of Countries in the Sample, and Basic Sample Statistics

1. Variables and Sources

CL = Gastil index of civil liberty. (*Freedom in the World*, various issues)

PR = Gastil index of political rights. (*Freedom in the World*, various issues)

FR = [14 – (CL + PR)] / 12. The degree of freedom.

y^+ = mean value of only positive growth rates during a specified time period, = 0 when growth rates during the period are all negative (RGDPCH from PWT 5.6; see Summers and Heston, 1991).

y^{--} = (absolute) mean value of only negative growth rates during a specified time period, = 0 when growth rates during the period are all positive.

SCH = average secondary school enrollment as percentage of adult population (*World Bank Information Retrieval System*).

SCPR = average primary school enrollment as percentage of adult population (William Easterly and Hairing Yu, World Bank**,** *Global Development Network Growth Database*).

CV = coefficient of variation of real GDP per capita.

D_{OECD} = dummy variable = 1 when a country is a member of the OECD, = 0 otherwise.

D_{OIL} = dummy variable = 1 when a country is a member of the OPEC, = 0 otherwise.

D_{SUE} = dummy variable =1 indicating Soviet Union and East European countries, = 0 otherwise.

2. Listing of Countries with Classification by Regime Type

Panel A: 'Democracies' : CL + PR = (2-4) in 1988

	Countries	*CL+PR*	D_{OECD}	D_{OIL}		Countries	*CL+PR*	D_{OECD}	D_{OIL}
1	Argentina	3	0	0	25	Netherlands	2	1	0
2	Australia	2	1	0	26	New Zealand	2	1	0
3	Austria	2	1	0	27	Norway	2	1	0
4	Barbados	2	0	0	28	Portugal	3	1	0
5	Belgium	2	1	0	29	Spain	3	1	0
6	Canada	2	1	0	30	Switzerland	2	1	0
7	Costa Rica	2	0	0	31	Sweden	2	1	0
8	Cyprus (G)	3	0	0	32	Trinidad and Tobago	2	0	0
9	Denmark	2	1	0	33	U.K.	2	1	0
10	Dominican Republic	4	0	0	34	United States	2	1	0
11	Ecuador	4	0	0	35	Uruguay	4	0	0
12	Finland	3	1	0	36	Venezuela	3	0	1
13	France	3	1	0					
14	Germany	3	1	0					
15	Greece	4	1	0					
16	Iceland	2	1	0					
17	Ireland	2	1	0					
18	Israel	4	0	0					
19	Italy	2	1	0					
20	Jamaica	4	0	0					
21	Japan	2	1	0					
22	Luxembourg	2	1	0					
23	Malta	3	0	0					
24	Mauritius	4	0	0					

D_{SUE}= 0, all countries in Panel A.

Panel B: 'Tinpots' : CL +PR = (5-12) in 1988

	Countries	$CL+PR$	D_{OIL}	D_{SUE}		Countries	$CL+PR$	D_{OIL}	D_{SUE}
1	Algeria	11	1	0	25	Hungary	9	0	0
2	Bahrain	10	1	0	26	India	5	0	0
3	Bangladesh	9	0	0	27	Indonesia	10	1	0
4	Bhutan	10	0	0	28	Iran	11	1	0
5	Bolivia	5	0	0	29	Jordan	11	0	0
6	Botswana	5	0	0	30	Kenya	12	0	0
7	Brazil	5	0	0	31	Korean Republic	5	0	0
8	Cameroon	12	0	0	32	Kuwait	11	1	0
9	China (M)	12	0	0	33	Laos	12	0	0
10	Cape Verde Island	11	0	0	34	Lesotho	12	0	0
11	Central African Republic	12	0	0	35	Liberia	10	0	0
12	Chili	9	0	0	36	Madagascar	10	0	0
13	Columbia	5	0	0	37	Malaysia	9	0	0
14	Comoros	12	0	0	38	Mali	12	0	0
15	Djibouti	12	0	0	39	Mauritania	12	0	0
16	Egypt	9	0	0	40	Mexico	7	0	0
17	El Salvador	6	0	0	41	Morocco	9	0	0
18	Fiji	9	0	0	42	Nepal	7	0	0
19	Gabon	12	0	0	43	Nicaragua	9	0	0
20	Gambia	6	0	0	44	Niger	10	0	0
21	Ghana	12	0	0	45	Nigeria	12	1	0
22	Guatemala	6	0	0	46	Oman	12	0	0
23	Haiti	12	0	0	47	Pakistan	6	0	0
24	Honduras	5	0	0	48	Panama	11	0	0

Panel B Continued

	Countries	*CL+PR*	D_{OIL}	D_{SUE}
49	Paraguay	12	0	0
50	Peru	5	0	0
51	Philippines	5	0	0
52	Poland	10	0	1
53	Qatar	10	1	0
54	Rwanda	12	0	0
55	Senegal	7	0	0
56	Singapore	9	0	0
57	Srilanka	7	0	0
58	Suriname	5	0	0
59	Sierra Leone	10	0	0
60	South Africa	11	0	0
61	Soviet Union	11	0	1
62	Sudan	9	0	0
63	Swaziland	11	0	0
64	Tanzania	12	0	0
65	Thailand	6	0	0
66	Togo	12	0	0
67	Tunisia	10	0	0
68	Uganda	10	0	0
69	United Arab Emirates	10	1	0
70	Yemen (N)	10	0	0
71	Yugoslavia	10	0	1
72	Zambia	11	0	0
73	Zimbabwe	11	0	0

Panel C: 'Totalitarians' : CL + PR = (13-14) in 1988

	Countries	*CL+PR* (1988)	D_{OIL}	D_{SUE}
1	Angola	14	0	0
2	Benin	14	0	0
3	Bulgaria	14	0	1
4	Burkina Faso	13	0	0
5	Burundi	13	0	0
6	Chad	13	0	0
7	Ethiopia	13	0	0
8	Guinea	13	0	0
9	Guinea-Bissau	13	0	0
10	Iraq	14	1	0
11	Malawi	13	0	0
12	Mongolia	14	0	1
13	Mozambique	13	0	0
14	Myanmar	13	0	0
15	Romania	14	0	1
16	Saudi Arabia	13	1	0
17	Somalia	14	0	0
18	Syria	13	0	0
19	Zaire	13	0	0

$D_{OECD} = 0$, all countries in Panel C.

3. Basic Sample Statistics*

	All countries (n = 640; 5 time periods x 128 countries)		'Democracies' *FR* = (2 - 4) in 1988 (n_1 = 5 x 36 = 180)		'Tinpots' *FR* = (5 - 12) in 1988 (n_2 = 5 x 73 = 365)		'Totalitarians' *FR* = (13 - 14) in 1988 (n_3 = 5 x 19 = 95	
Variable	Mean	Std	Mean	Std	Mean	Std	Mean	Std
FR	0.4729	0.3298	0.8749	0.1787	0.3716	0.2146	0.1021	0.1110
y^+	0.4445	0.0378	0.0340	0.0270	0.0489	0.0415	0.0474	0.0367
y^-	0.0562	0.0861	0.0510	0.0706	0.0554	0.0924	0.0689	0.0876
SCH	42.50	30.02	73.62	20.72	32.49	22.78	22.01	25.11
SCPR	88.29	48.52	106.48	75.58	84.07	27.56	70.03	33.82

Number of observations with $y^- = 0$ indicating *only* positive growth rates during a given time period:

All countries = 246/640
Democracies CL + PR = (2-4) = 71/180
Tinpots CL + PR = (5-12) = 150/365
Totalitarians CL + PR = (13-14) = 25/95.

Selected correlations in entire sample: FR and SCH = 0.638. FR and SCPR = 0.009. SCH and SCPR = - 0.098

* The basic data summarized here are averages for each country over the 5 intervals 1967-72, 73-77, 78-82, 83-87 and 88-92.

Table 1a

Static Model
Dependent variable is FR. Data consist of 5-yearly averages pooled over the period 1967-1992.
(Generalized Least Squares Estimation)

Variables	36 'Democracies' CL + PR = (2-4)				73 'Tinpots' CL + PR = (5-12)		19 'Totalitarians' CL + PR = (13-14)			
Constant	0.7127* (28.140)	0.7283* (34.020)	0.7259* (28.670)	0.6415* (24.650)	0.2967* (22.390)	0.3003* (23.460)	0.0968* (9.861)	0.0974* (9.442)	0.0942* (9.143)	0.1158* (5.818)
y^{+}	0.1124 (1.040)	-0.0344 -(0.471)	0.0965 (0.924)	-0.1727 (-1.378)	-0.0297 (-0.446)	-0.0309 (-0.597)	-0.2044** (-1.664)	-0.2100** (-1.661)	-0.1756** (-1.418)	-0.3610* (-2.116)
y^{--}	-0.0506 (-1.548)	-0.0322 (-1.503)	-0.0429 (-1.311)	-0.1326* (-3.107)	-0.0458** (-1.436)	-0.0279 (-0.931)	-0.1097* (-2.035)	-0.1096* (-2.023)	-0.1129* (-2.078)	-0.0429 (-0.694)
SCH	0.0023* (7.783)	0.0008* (3.246)	0.0021* (7.110)	0.0032* (10.35)	0.0019* (5.367)	0.0018* (5.291)	0.00002 (0.119)	0.00001 (0.057)	0.0003 (0.720)	0.0021* (2.444)
D_{OECD}	---	0.1516* (7.951)	---	-0.0631* (-4.012)	---	---	---	---	---	---
D_{OIL}	---	---	0.0966* (8.190)	-0.4545* (-11.630)	---	0.0022 (0.120)	---	0.0049 (0.174)	---	0.0337 (0.962)
D_{SUE}	---	---	---	---	---	---	---	---	-0.0235 (-0.760)	-0.1625* (-2.550)
$\bar{R}^2$	0.2613	0.3713	0.4528	0.7553	0.0791	0.0773	0.0624	0.0639	0.0686	0.1241
(n)	(180)	(180)	(180)	(180)	(365)	(365)	(95)	(95)	(95)	(95)

Notes: t statistics in brackets. R^2 is adjusted. n = number of countries times number of time periods.
(*) and (**) indicate statistical significance at 5% and 10% levels, respectively.

Table 1b

Static Model
Dependent variable is FR. Data consist of average for each country over the period 1967-1992.
Maximum Likelihood (MLE) and Two-Stage Least-Squares (2 SLS) Estimation

Variables	36 'Democracies' CL + PR = (2-4)		73 'Tinpots' CL + PR = (5-12)				23 'Totalitarians' CL + PR = (13-14)				
	MLE	MLE	MLE	MLE	2SLS	2SLS	MLE	MLE	MLE	MLE	MLE
Constant	0.1891* (3.007)	0.5664* (3.650)	11.3700* (9.205)	10.3675* (8.431)	0.2096* (3.977)	0.1995* (2.873)	0.2281* (6.155)	0.2372* (6.791)	0.1821* (2.915)	0.2550* (3.951)	0.1989* (2.891)
y^+	0.5471 (1.217)	-2.9266* (-1.982)	-38.8070* (-8.678)	-24.9813* (-6.215)	0.0194 (0.092)	0.2135 (0.103)	-0.8160* (-2.195)	-0.9963* (-2.679)	-4.6806* (-5.141)	-4.4004* (-5.025)	-3.8935* (-4.821)
y^-	0.5133 (0.578)	-0.0194 (-0.525)	0.0016* (4.731)	0.0015* (3.891)	-0.0206** (-1.818)	-0.0351** (-1.821)	0.5801* (5.761)	0.6124* (6.398)	-2.2298* (-3.908)	-0.4833 (-1.580)	-0.5310 (-0.983)
SCH	0.0019** (1.534)	0.0052* (3.547)	-0.1172** (-8.583)	-0.1003* (-5.683)	0.0051* (5.622)	0.0049* (6.891)	0.0013* (2.517)	0.0019* (3.407)	0.0022* (3.185)	0.0052* (4.872)	0.0058* (2.975)
CV	0.000001 (0.107)	0.000001 (0.115)	-0.0098* (-8.434)	-0.0063* (-5.872)	---	-0.0078* (-4.321)	---	-0.00001* (-2.922)	---	---	-.00001** (-1.73)
D_{OECD}	---	-0.0189 (-0.270)	---	---	---	---	---	---	---	---	---
D_{OIL}	---	---	---	0.0034 (0.005)	-0.0104 (-0.214)	-0.0132 (-0.182)	---	---	-0.068** (-1.639)	---	-.0539** (-1.681)
D_{SUE}	---	---	---	---	---	---	---	---	---	-0.3291* (-4.829)	-0.2918* (-3.683)
$\bar{R}^2$	0.0955	0.4361	0.011	0.012	0.3497	0.3510	0.3807	0.4999	0.2059	0.2865	0.2895
(n)	(36)	(36)	(73)	(73)	(73)	(73)	(23)	(23)	(23)	(23)	(23)

Notes: See Table 1a. There are 23 totalitarian countries in the sample, while only 19 in Table 1a. The reason is that 5-yearly averages in Table 1a can be computed only for 19 countries, while data exist for some years (at least) for 23 countries. Additional totalitarians included here are: Congo, North Korea, Yemen (S) and Czechoslovakia. Instruments for 2SLS are lagged growth and lagged FR.

Table 2

Dynamic Model
Dependent variable is FR. Data consist of 5-yearly averages over the period 1972-1992.
(Generalized Least Squares Estimation)

Variables	36 'Democracies' CL + PR = (2-4)		73 'Tinpots' CL + PR = (5-12)		23 'Totalitarians' CL + PR = (13-14)			
Constant	0.3668* (8.091)	0.3797* (8.374)	0.2037* (11.950)	0.0318* (4.128)	0.0929* (9.065)	0.0647* (4.784)	0.0751* (5.916)	0.0661* (5.589)
$\mathbf{y}^{+}$	-0.0794 (-0.575)	0.0256 (0.188)	-0.2341** (-1.837)	-0.4219* (-4.993)	-0.3926* (-2.760)	0.0519 (0.346)	-0.0168 (-0.113)	0.0714 (0.471)
$\mathbf{y}^{+}_{-1}$	0.2720** (1.689)	0.3016* (1.973)	0.1913** (1.491)	0.3190* (3.792)	-0.0982 (-0.670)	-0.3530* (-2.739)	-0.3448* (-2.722)	-0.2872* (-2.433)
$\mathbf{y}^{--}$	-0.0364 (-0.840)	-0.0398 (-1.011)	-0.1007* (-2.309)	-0.1040** (-1.707)	-0.1619* (-2.729)	0.0029 (0.053)	-0.0350 (-0.703)	-0.0145 (-0.294)
$\mathbf{y}^{--}_{-1}$	0.0541 (1.113)	0.0561 (1.252)	-0.0941* (-2.131)	0.0019 (0.032)	-0.1184* (-2.145)	0.3068* (5.490)	0.3347* (5.896)	0.3082* (5.653)
SCH	0.0035* (12.150)	0.0038* (12.730)	0.0026* (8.392)	0.0019* (10.220)	0.0002 (1.043)	0.0006* (2.548)	0.0008* (3.648)	0.0010* (4.649)
FR_{-1}	0.2750* (7.871)	0.2682* (7.916)	0.0878* (5.290)	0.7474* (30.42)	0.0134 (0.921)	0.8175* (27.74)	0.7948* (29.29)	0.7855* (28.01)
D_{OECD}	---	-0.0656* (-5.206)	---	---	---	---	---	---
D_{OIL}	---	---	---	0.0107 (0.755)	---	-0.0778* (-4.366)	---	-0.0350* (-2.720)
D_{SUE}	---	---	---	---	---	---	-0.0790* (-5.643)	-0.0612* (-4.050)
$\bar{R}^2$	0.5456	0.6040	0.2231	0.8701	0.1408	0.9604	0.9771	0.9711
(n)	(144)	(144)	(292)	(292)	(76)	(76)	(76)	(76)

Notes: see Table 1a.

Table 3a

F-tests Across All Regime Types Taken Together*

Definition of Regime Types **All regimes types considered**	Constant terms do not vary across regime types	Constant terms and coefficients of y^{+} do not vary across regime types	Constant terms and coefficients of y^{--} do not vary across regime types	Constant terms and coefficients of y^{+} and of y^{--} do not vary across regime types
Democracies CL+PR= (2-4) Tinpots CL+PR= (5-12) Totalitarians CL+PR= (13-14)	112.53 df: 1,625	37.00 df: 3,626	38.70 df: 3,626	55.23 df: 2,635
Democracies CL+PR= (2-4) Tinpots CL+PR= (5-11) Totalitarians CL+PR= (12-14)	3146.51	1042.28	1056.3	1588.5
Democracies CL+PR= (2-3) Tinpots CL+PR= (4-11) Totalitarians CL+PR= (12-14)	385.86	126.62	130.38	193.36
Democracies CL+PR= (2-3) Tinpots CL+PR= (4-13) Totalitarians CL+PR= (12-14)	385.12	126.37	130.13	192.98
Democracies CL+PR= (2-3) Tinpots CL+PR= (4-13) Totalitarians CL+PR= (14)	991.05	327.35	333.36	499.2

*df = degrees of freedom, numerator first. df are identical for all entries in a column. The F tests are based in the usual manner on unrestricted and restricted equations of the type noted at the top of each column of resulting F statistics: F = {[R - (R1 + R2 + R3] / d1} / {R1 + R2 + R3} / d2, where: R is the residual sum of squares from a restricted regression embodying one of the hypotheses indicated in the table; Ri is the residual sum of squares from a regression (of the type described below) using data for each separate regime type (1=democracies or most free, 2=tinpots, 3=totalitarians or least free); d1 is the number of coefficients including constant in an unrestricted regression minus the number of coefficients excluded from restriction, and d2 is the number of observations less the total number of coefficients being estimated. All unrestricted equations used contain a constant term, *y+*, *y-*, and *SCH*. Unrestricted equations for democracies (most free) also include the D_{OECD} dummy. Unrestricted equations for tinpots also include the D_{OIL} dummy. Unrestricted equations for totalitarians (least free) also include the Soviet and East European dummy D_{SUE}. The restricted equations also include the relevant dummies (listed above), and dummies for regime types and their interaction with the variable(s) included in the restriction.

Table 3a continued **

Only tinpot and totalitarian categories considered	Constant terms do not vary across regime types	Constant terms and coefficients of y^{+} do not vary across regime types	Constant terms and coefficients of y^{--} do not vary across regime types	Constant terms and coefficients of y^{+} and of y^{--} do not vary across regime types
Tinpots CL+PR= (5-12) Totalitarians CL+PR= (13-14)	319.14 df:1,455	104.69 df: 3,455	1076.83 df: 3,455	1577:38 df:2,455
Tinpots CL+PR= (5-11) Totalitarians CL+PR= (12-14)	3420.29	1134.96	1150.74	1706.96
Tinpots CL+PR= (4-11) Totalitarians CL+PR= (12-14)	519.77	171.13	1749.4	2576.42
Tinpots CL+PR= (4-13) Totalitarians CL+PR= (12-14)	518.82	170.82	1746.22	2571.7
Tinpots CL+PR= (4-13) Totalitarians CL+PR= (14)	1479.19	488.84	4965.69	7353.92
Only democratic and tinpot categories considered				
Democracies CL+PR= (2-4) Tinpots CL+PR= (5-12)	430.62 df: 1,535	141.44 df: 3,535	145.02 df: 3,535	212.81 df: 2,535
Democracies CL+PR= (2-4) Tinpots CL+PR= (5-11)	4408.29	1458.65	1477	2191.34
Democracies CL+PR= (2-3) Tinpots CL+PR= (4-11)	851.06	280.66	285.81	421.94
Democracies CL+PR= (2-3) Tinpots CL+PR= (4-13)	849.43	280.12	285.26	421.13

**** F tests for democratic and totalitarian categories are not shown. All F tests in these cases lead to rejection of all hypotheses of equality of coefficients at the 1% level.**

Table 3b

Test of Equality of the Coefficients of y^{+} and y^{--} in Tinpot Regressions

Type of data	Equation	Test statistic (Degrees of freedom)			Significance/Insignificance
		T	**F**	**Wald-χ^2**	
5-yearly Averages (Static Model in Table 1a, all dummies included)	CL + PR = (5 –12)	-0.2325 (360)	0.0540 (1,360)	0.0540 (1)	Insignificant
	CL + PR = (5 – 12) (Excluding Tyrants)	-0.0063 (345)	0.0040 (1,345)	0.0040 (1)	Insignificant
	CL + PR = (4 – 13)	-1.3299** (445)	1.7685 (1,445)	1.7685 (1)	Significant at 10% level
	CL + PR = (5 –11)	-0.9308 (265)	0.8665 (1,265)	0.8665 (1)	Insignificant
	CL + PR = (6 – 12)	-0.3705 (310)	0.1373 (1,310)	0.1373 (1)	Insignificant
5-yearly Averages (Dynamic Model in Table 2, all dummies included)	CL + PR = (5 –12)	-3.2091* (285)	10.2980* (1,285)	10.2980 (1)	Significant at 1% level
	CL + PR = (5 –11)	-0.5139 (209)	0.2642 (1,209)	0.2642 (1)	Insignificant
	CL + PR = (6 – 12)	-3.9885* (197)	15.9082 (1,197)	15.9082 (1)	Significant at 1% level
Annual Averages	CL + PR = (5 –12)	0.6109 (72)	1.4488 (1,72)	1.4488 (1)	Insignificant
	CL + PR = (4 – 13)	0.5909 (89)	1.1430 (1,89)	1.1430 (1)	Insignificant
	CL + PR = (6 – 12)	0.8926 (62)	1.0411 (1,62)	1.0411 (1)	Insignificant

Table 4a

Sensitivity to Definition of Type of Country: Static Model of Table 1a
Dependent variable is FR. Data consist of 5-yearly averages pooled over the period 1967-1992.
(Generalized Least Squares Estimation)

Equation	Constant	y^{+}	y^{--}	SCH	$\bar{R}^2$ (n)
CL + PR = (2-3) 29'Democracies'	0.6827* (18.49)	0.3127** (1.738)	-0.1169** (-1.936)	0.0026* (7.038)	0.3348 (145)
CL + PR = (2-5) 46'Democracies'	0.4028* (11.70)	-0.0243 (-0.141)	-0.0741 (-1.335)	0.0053* (13.82)	0.5547 (230)
CL + PR = (4-13) 92 'Tinpots'	0.2575* (18.990)	-0.0491 (-0.797)	-0.0497** (-1.633)	0.0033* (8.955)	0.1554 (460)
CL + PR = (5-11) 54 'Tinpots'	0.2874* (18.100)	-0.1555 (-1.060)	-0.0188 (-0.440)	0.0021* (4.890)	0.1051 (270)
CL + PR = (6-12) 63 'Tinpots'	0.2908* (21.150)	-0.0936 (-0.720)	-0.0557** (-1.570)	0.0020* (5.500)	0.1076 (315)
CL + PR = (12-14) 38 'Totalitarians'	0.1483* (8.393)	-0.1109 (-1.015)	-0.0508 (-1.309)	0.0012* (1.934)	0.0360 (190)

Note: This table is to be compared with Table 1a with all relevant dummy variables included.

Table 4b

Sensitivity Analysis: Static Model of Table 1b
Dependent variable is FR. Data consist of average for each country over the period 1967-1992.

Equation	Constant	y^{+}	y^{--}	SCH	$\bar{R}^2$ (n)
CL + PR = (2-3) 29'Democracies'	0.6788* (5.420)	0.8761 (0.622)	0.1940 (0.297)	0.0028** (1.749)	0.2435 (29)
CL + PR = (2-5) 46'Democracies'	0.6452* (7.536)	1.0769 (1.068)	0.1772 (0.572)	0.0034* (3.250)	0.3072 (46)
CL + PR = (4-13) 92 'Tinpots'	0.5504* (8.994)	0.4133 (0.726)	-0.1777 (-0.862)	0.0038* (4.127)	0.2982 (93)
CL + PR = (5-11) 54 'Tinpots'	0.6919* (5.692)	0.6301 (0.755)	-0.2625 (-0.951)	0.0025* (2.032)	0.1578 (54)
CL + PR = (6-12) 63 'Tinpots'	0.5925 (9.878)	0.4163 (0.735)	-0.1333 (-0.637)	0.0035* (3.866)	0.2886 (63)
CL + PR = (12-14) 38 'Totalitarians'	0.6852* (5.728)	0.6114 (0.726)	-0.2283 (-0.832)	0.0021** (1.710)	0.1304 (38)

Note: This table is to be compared with Table 1b with all relevant dummy variables included.

Table 5

Sensitivity Analysis: Dynamic Model of Table 2
Dependent variable is FR. Data consist of 5-yearly averages pooled over the period 1972-1992.
(Generalized Least Squares Estimation)

Equation	Constant	y^{+}	y^{+}_{t-1}	y^{--}	y^{--}_{t-1}	SCH	FR_{-1}	$\bar{R}^2$ (n)
CL + PR = (2 – 3) 29 'Democracies'	0.1264** (1.269)	-0.2220** (-1.751)	0.2910** (1.754)	-0.1371* (-3.292)	-0.0167 (-0.361)	0.0025* (8.547)	0.5668* (6.761)	0.4596 (116)
CL + PR = (4 – 13) 92 'Tinpots'	0.1270* (8.524)	-0.3240* (-2.368)	0.2051** (1.425)	-0.0975* (-2.036)	-0.0761** (-1.608)	0.0046* (18.040)	0.1113* (6.994)	0.4823 (368)
CL + PR = (5 – 11) 54 'Tinpots'	0.2331* (9.923)	-0.3210** (-1.767)	-0.0078 (-0.039)	-0.0862 (-1.230)	-0.1029** (-1.530)	0.0026* (6.461)	0.0819* (3.438)	0.1747 (216)
CL + PR = (6 – 12) 63 'Tinpots'	0.0728* (4.366)	-0.7637* (-5.280)	0.6781* (3.979)	-0.1324** (-1.692)	0.0980 (1.313)	0.0020* (7.344)	0.6364* (17.490)	0.7444 (204)
CL + PR = (12 – 14) 38 'Totalitarians'	0.1007* (6.335)	-0.3123* (-2.170)	0.0725 (0.504)	-0.0915** (-1.742)	-0.1024* (-2.129)	0.0024* (4.988)	0.0378* (2.641)	0.1755 (152)

Note: This table is to be compared with Table 2 with all relevant dummy variables included.

Table 6

Sensitivity Analysis: Exclusion of Tyrants in Static Model of Table 1a
Dependent variable is FR. Data consist of 5-yearly averages pooled over the period 1967-1992.
(Generalized Least Squares Estimation)

Variables	'Totalitarians' CL + PR = (13 – 14) (Excluding Zaire)				'Tinpots' CL + PR = (5 – 12) (Excluding Chile, Haiti and South Africa)		'Democracies' CL + PR = (2-4) (Excluding Argentina and Uruguay)
Constant	0.0974* (7.912)	0.1135* (5.762)	0.0953* (7.665)	0.1186* (5.064)	0.2958* (22.08)	0.2427* (17.96)	0.6222* (18.02)
y^+	-0.2013 (-1.417)	-0.3150** (-1.891)	-0.1712 (-1.213)	-0.3094** (-1.646)	-0.0284 (-0.437)	-0.0223 (-0.219)	0.0452 (0.248)
y^{--}	-0.1185* (-2.056)	-0.0569 (-0.982)	-0.1221* (-2.127)	-0.0205 (-0.322)	-0.0364 (-1.146)	-0.0160 (-0.527)	-0.0676 (-0.887)
SCH	0.000005 (0.026)	0.0008 (1.159)	0.0003 (0.635)	0.0033* (3.412)	0.0020* (5.332)	0.0030* (9.093)	0.0033* (9.040)
D_{OECD}	---	---	---	---	---	---	-0.0344 (-1.421)
D_{OIL}	---	-0.0047 (-0.146)	---	0.0299 (0.779)	---	0.0049 (0.369)	---
D_{SUE}	---	---	-0.0227 (-0.719)	-0.2476* (-3.347)	---	---	---
$\bar{R}^2$	0.1966	0.0726	0.0706	0.1681	0.0796	0.2300	0.3586
(n)	(90)	(90)	(90)	(90)	(350)	(350)	(170)

Note: This table is to be compared to Table 1a.

Table 7a

Static Model in Table 1a Extended to Include Primary Schooling
Dependent variable is FR. Data consist of 5-yearly averages pooled over the period 1967-1992.
(Generalized Least Squares Estimation).

Variables	36 'Democracies' CL + PR = (2 – 4)	73 'Tinpots' CL + PR = (5 –12)	19 'Totalitarians' CL + PR = (13 – 14)
Constant	0.6388* (23.65)	0.3236* (15.20)	0.2250* (6.789)
$\mathbf{y}^{+}$	-0.1815 (-1.437)	-0.0806 (-0.764)	-0.3275* (-1.957)
$\mathbf{y}^{--}$	-0.1358* (-3.171)	-0.0297 (-0.935)	0.0046 (0.076)
SCH	0.0032* (10.30)	0.0026* (7.588)	0.0030* (3.465)
SCPR	0.00003 (0.422)	-0.0007* (-3.133)	-0.0016* (-4.527)
D_{OECD}	-0.0631* (-4.001)	---	---
D_{OIL}	-0.4600* (-11.68)	0.0082 (0.594)	0.0040 (1.282)
D_{SUE}	---	---	-0.1822* (-2.756)
$\bar{R}^2$	0.7777	0.1788	0.3313
(n)	(180)	(365)	(95)

Notes: see Table 1a.

Table 7b

Dynamic Model in Table 2 Extended to Include Primary Schooling
Dependent variable is FR. Data consist of 5-yearly averages pooled over the period 1967-1992.
(Generalized Least Squares Estimation).

Variables	36 'Democracies' CL + PR = (2-4)	73 'Tinpots' CL + PR = (5-12)	23 'Totalitarians' CL + PR = (13-14)
Constant	0.0955* (3.032)	0.0509* (4.183)	0.0922* (3.404)
y^+	0.1954** (1.782)	-0.4069* (-4.547)	0.1136 (0.760)
y_{-1}^+	-0.2339* (-1.985)	0.3440* (3.786)	-0.3330* (-2.865)
y^-	-0.459 (-1.259)	-0.1365* (-2.405)	-0.0085 (-0.176)
$\bar{y}_{-1}$	0.0007 (0.019)	0.0420 (0.747)	0.2935* (5.297)
SCH	0.0010* (3.375)	0.0020* (9.831)	0.0011* (4.081)
SCPR	0.00001 (0.313)	-0.0002* (-2.040)	-0.0006* (-2.319)
FR_{-1}	0.8175* (24.720)	0.7417* (29.320)	0.8098* (25.320)
D_{OECD}	0.0105 (1.435)	-	-
D_{OIL}	-	0.0111 (0.785)	-0.0448* (-2.633)
D_{SUE}	-	-	-0.0403 (-2.123)
$\bar{R}^2$	0.8802	0.8590	0.9513
(n)	(144)	(292)	(76)

Notes: see Table 2.

Endnotes

1. Much of the literature on the effects of freedoms on growth has been reviewed by de Haan and Siermann (1995) and Wagner (1999). See also de Hann and Sturm (2000).

2. It may be of interest to note that De Haan and Siermann (1995) and Wagner (1999) conclude that the effect of civil liberties and political rights on growth is not clearly established by existing empirical work, and Helliwell (1994, 242) concludes that the link is probably insignificant. Barro (1997, 61) also expresses doubt that more or less democracy is a critical determinate of growth, and Barro (1999) emphasizes the positive role of education in determining the degree of legal and political rights.

3. For a comparison of different measures of political freedom. see Hadenius (1992, Appendix A). We are aware of Wagner's (1999) argument that the Gastil indexes do not provide a cardinal measure.

4. In the less complete models, the coefficient on negative growth in totalitarian regimes takes on varying signs, depending on the specification.

5. Lott (1999) finds that totalitarian governments tend to spend more on information production and control. A similar explanation for the sign of the coefficient of primary schooling was suggested by Roger Congleton (personal communication).

6. On this point, see for example, Clague, Gleason and Knack (2001).