

74674



INSTITUTE
FOR
POLICY
REFORM

Freedoms and Economic Growth

John Mc Millan[#], Gordon Rausser^{} and Stan Johnson⁺*

*[#] Staff Economist
Institute for Policy Reform*

^{} Robert Gordon Sproul Distinguished Professor
University of California, Berkeley*

*⁺ Charles F. Curtiss Professor of Economics
Iowa State University*

Draft: November, 1991

This paper investigates the empirical foundation for policy reform prescriptions suggested by the institutional approach to economic growth and development. The focus is the relationship between institutional reforms, measured by changes in a country's political rights or civil liberties, and economic growth. In addition to finding support for the idea that institutional reforms can cause increases in economic growth, four major implications emerge: (i) the economic benefits of freedom reforms are systematic and significant, (ii) economic benefits, in the form of increased growth, occur with a substantial lag after the initiation of reforms in political rights or in civil liberties, (iii) types of reforms likely to be successful differ by geographic region of the world, and (iv) civil liberties are particularly advantageous to economies in low growth years.

1. Introduction

A sure-fire recipe for accelerated and sustained national economic growth and development remains a mystery; even though donor agencies and foundations have committed hundreds of billions of dollars to technical assistance and development and growth economists have for decades researched and studied the topic (Lucas 1988). In fact, the recent evidence for the lower income economies that have benefitted from the major share of donor support is discouraging (World Bank 1991, USAID 1989). During the decade of the 1980's these lower income nations made little if any progress in improving their economic status. Moreover, there is no widely accepted empirical basis for distinguishing between those nations that did grow and develop and those that did not. Despite an abundance of anecdotal evidence and arm-chair theorizing, the policy disciplines have not solved the puzzle of sustained economic growth.

Available theories on economic growth and development has generated a number of hypotheses on potential determinants. In the contemporary literature, for example, different theories have for periods captured the imagination of the policy disciplines and the policy professionals responsible for programming development assistance. Institutions (Commons 1934), technological change (Solow 1957), human capital (Schultz 1964), infrastructure (Mellor 1976), economic policy (Balassa 1971 and Johnson 1973) and increasing external returns to knowledge (Lucas 1988) are examples. More recently, attention of the researchers studying economic growth and development has focused on institutions and contracts, returning to the themes of Commons and his contemporaries (de Soto 1989, Olson 1982, North 1990, Clague and Rausser 1991, Williamson 1991). The modern approaches have

presented a wide lens linking political freedoms, civil liberties and economic rights with results on the organization and functioning of competing interest groups and the fuller understanding of the role of incentives, contracts and incentive compatibility (Clague and Rausser 1991). The new democracy initiative of USAID and the attention given to processes of policy reform exemplify the modern institutional approach to programming for economic growth and development.

It is interesting that the renewed emphasis on institutions, in economic development and growth has captured the interest of the policy community even though there is limited empirical evidence on the soundness of its basic propositions. In part, this is due to few, if any, well articulated testable hypothesis and a lack of available data. Regardless, if new ideas on the foundations of economic growth and development are to stand the test of time, they must be subjected to a systematic and rigorous empirical evaluation. Timely empirical analysis and verification is especially important since these ideas have been embraced and are guiding the current activities of major international financial institutions and donor agencies.

The empirical results in this paper respond to the challenge of the new institutional approach to economic growth and development policy. The analysis utilizes an aggregate production specification consistent with both neoclassical and sustainable growth theories, combining a set of Freedom House indices on political freedoms and civil liberties and national aggregates measuring economic performance for 56 countries during the period 1973-1985. Exploratory work using these liberty indices along with variables describing economic performance has already been conducted (Scully 1988, Grier and Tullock 1989, Barro 1991). A distinguishing feature of the analysis presented in this paper is the

assessment of the causal relationships between political and civil freedoms and the dynamics of economic growth.

2. Institutions and Economic Growth

The modern theory for linking institutions, broadly conceived, to economic growth and development is just emerging (Buchanan 1989, North 1991, Olson 1991, Ruttan 1991, Rausser 1982, 1990). At the heart of this new theory of institutional economics is the idea that the setting in which policies are made or formulated or the "rules by which rules are made," is a critical determinant of sustained economic growth and development. This theory goes beyond the idea of rent seeking (Krueger 1974) to identify both productive and predatory roles for interest groups and government (Rausser 1982). In concept, the constitutional setting, the legal and regulatory frameworks, the authority and history of the bureaucracy (Allison 1971) and the political, civil and economic rights bestowed by this complex set of factors govern the possibilities for sustained national economic growth and development. Just how this set of what have been termed constitutional rules actually determine the process of growth and development is a matter for continued research and investigation.

Research to expand the analytical basis for applying the ideas from this new institutional approach has taken a number of directions. Game theory models have been applied to study the strategies of interest groups or agents in competing situations (Rausser and Zusman 1992). Economic functions have been dissected to understand the impacts of ownership and control on the behavior of economic agents, and the principal agent problem.

Complexities of the operations of large and multi-function economic units have been evaluated for impacts on behavior (Williamson 1985). And, the incentives in differing types of contracts and contracting arrangements have been explored (Tirole and Laffont 1990). All of these avenues of investigation point to a new conceptual framework for analysis and prescription for economic growth and development. One of the major contributions of these formulations to date has been to seriously question existing theories of economic growth and development. The more conventional theories have in large measure taken as "given" the very aspects of the national political and economic systems that are the focus of the analysis on institutional-constitutional economics (Buchanan 1989).

Formal economic growth models have been recently motivated by the search for improved explanations of sustained economic growth (Lucas 1988, Romer 1986). Traditional models of economic growth emphasizing capital accumulation predict growth until a zero growth rate steady state is reached: a prediction in contrast to the experience of sustained growth in developed economies. Rather than rely on exogenous technological change as an "explanation" of sustained growth, these more recent approaches search for specifications of technology which generate sustained nonzero equilibrium growth rates. By specifying a production technology with increasing external returns to human capital these models can describe, without the aid of external shocks, economies that with sustained economic growth. In addition to a technology of goods production, the technology of institutions can be defined to transfer wealth between sectors, and supply public goods that sustain productivity growth (Murphy, Shleifer and Vishny 1991). Change in this technology of institutions can potentially be an important explanation of an economy's growth.

In previous empirical work consistent with the modern growth theory, average rates of economic growth conditioned by production function arguments have been related to indices of political freedoms and civil liberties recorded at a particular point in time (Scully 1988, Barro 1991, Grier and Tullock 1989). These studies have produced promising results, showing an association between higher growth performance and enhanced political and civil freedoms. However, these findings are also consistent with an alternative hypothesis: that richer countries can afford more liberal political and civil rights systems. Clearly, differentiation between these two causal hypotheses has important implications for development assistance strategies. If the direction of causality is from economic growth to institutions, assistance programs which attempt to produce growth through changed policies and institutions are flawed. However, if economic growth is produced by changes in political, civil and economic institutions, addressing these fundamental features of societal organization can be successful.

Specifications that can link growth and development to the timing of the changes in political and civil freedoms can and should be estimated. Such a timing analysis can resolve the issue of causality. Perhaps more importantly, it can also provide a perspective on the likely response of a national economy to changes in political and civil freedoms. Knowledge on the form of this relationship could solidify and augment the foundations for the programming of assistance support.

3. Model Specification

The motivation for the empirical model, common to standard studies of economic growth, begins with an aggregate production function

$$Y = F(K, L, S) \quad (1)$$

relating aggregate output, Y , to the inputs of capital, K , labor, L , and shifters of the production function, S . If the production technology is homogeneous of degree zero in K and L , then an equivalent per-capita specification relates output and the capital-labor ratio

$$y = f(k, S) \quad (2)$$

where $y = Y/L$ and $k = K/L$. Total differentiation of (2) yields

$$\dot{y} = f_1 \dot{k} + f_2 \dot{S} \quad (3)$$

where f_i denotes the partial derivative of $f(\cdot)$ with respect to its i 'th argument, and a dot denotes the time derivative of a variable. Finally, multiplication of both sides of (3) by k/y yields

$$\hat{y} = f_1 \frac{K}{Y} \hat{k} + f_2 \frac{K}{Y} \hat{S} \quad (4)$$

where a hat denotes the logarithmic time derivative, or growth rate, of a variable. Equation (4) attributes growth in per-capita output to growth in inputs (weighted by the input's share in output), and to changes in the variables which shift the production function.

An empirical or statistical model corresponding to equation (4) can be specified where growth in per-capita GDP is the dependant variable and the explanatory variables have been categorized into three groups

$$Y_{it} = \sum_j \beta_j X_{jit} + \sum_j \rho_j R_{jit} + \sum_j \delta_j D_{jit} + \varepsilon_{it}$$

where the first group, X_{jit} , includes conditioning factors for level of development: the level of per capita GDP, the capital labor ratio and population growth (usual aggregate production function arguments). The second group, R_{jit} , is composed of qualitative variables defining the levels of the indices of types of freedoms. The last group, D_{jit} , are qualitative variables reflecting the duration of reforms in types of freedoms. Thus, the reduced form equation (5) links the smoothed rate of economic growth to the level of GDP and production function arguments, indicators of basic freedoms, and a set of variables designed to permit the estimation of the time path of responses to changes in basic freedoms.

4. Data

The data used in the empirical analysis are Freedom House indices of political rights and civil liberties (Gastil 1987) and the Penn World Table database on national income accounts (Heston and Summers 1988). The sample covers the period 1973, the earliest year for which Freedom House indices are available, to 1985, the last year for which economic data are available in version IV of Heston and Summers Penn World Tables. Annual national capital stocks are estimated from the Penn World Table data, using a methodology described in the appendix.

The dependant variable in equation (5) is a three year moving average (years t-1, t and t+1 in year t) of annual per capita GDP growth rates. A three year average was used, rather than annual rates, to measure basic structural changes in an economy.

The specific independent variables are grouped according to the classes defined for equation (5). The first group, economic and demographic variables include:

LGDP	The logarithm of per capita gross domestic product, parity purchasing power corrected in 1980 U.S. dollars
LDGPSQ	The square of LGDP
GROWKL	The difference in the logarithms of the capital labor ratio between the current and previous years
GROWKLSQ	The square of GROWKL
POPCHG	The difference in the logarithms of population between the current and previous years

The second group of variables measures levels of the institutional features. These Freedom House ratings are constructed by a simple averaging of ratings for different features of a nation's political rights or civil liberties (seven for political rights and thirteen for civil liberties). Each item or point in the list is given a score of 0, 1 or 2 based on a set of procedures that is standard across countries and years. These raw scores are then averaged and represented by a 7 point scale, with 1 being the most free or with the most rights and 7 being the least free or with the most restrictions on rights. For the political rights most western European democracies are 1's while nations ruled by despots that feel little constraint from public or popular tradition are 7's. Civil liberties are 1's for nations in which publication and expression are not closed, especially if the intent is to influence legitimate political processes. The scale level of 7 is for nations where there is pervasive fear, little independent expression and a police-state environment.

Summary data for the Freedom House variables are supplied in Table 1. The first two columns of Table 1 measure the number of times, between 1973 and 1985, that a nation initiated a decrease in its rating in political rights or in civil liberties from its historically

highest value. The next three columns display the maximum, minimum and average rating a country received in political rights, while the last three columns display the maximum, minimum and average rating a country received in civil liberties. A striking feature in Table 1 is the within-country variability in these ratings: 32 of the 56 countries initiated a reform in political rights and 34 of the 56 countries initiated a reform in civil liberties, several countries initiating reforms more than once in the twelve year period the data covers (see Table 7 for sensitivity of these reform results to alternative measures of reform). This variability suggests that previous analyses which have used these institutional measures of a country for a particular point in time have missed much of the dynamic variations that potentially might explain economic growth.

The qualitative variables measuring institutional features are:

P1OR2	Takes the value 1, if the political rights have a scale value of 1 or 2, 0 otherwise
P3T05	Takes the value 1, if the political rights have a scale value of 3 to 5, 0 otherwise
C1OR2	Takes the value 1, if the civil liberties have a scale value of 1 or 2, 0 otherwise
C3T05	Takes a value of 1, if the civil liberties have a scale value of 3 to 5, 0 otherwise

Note that the Freedom House indices were compressed into three instead of seven scale values. Also, to avoid singularity by construction, the qualitative variables representing with the scaled values of 6 and 7 were omitted.

The last group of variables are again qualitative and are designed to permit impact estimation of the timing and magnitude of the institutional changes for each of the countries (D_{jt}).

RPD1	Takes the value 1 if the nation has had a political right scale value less than
------	---

- the historically highest for one year, 0 otherwise
- RPD2-RPD5** Similarly defined with the number of years with a scale value less than the historically highest indicated by the numbers 2 through 5. Reforms which continue beyond 5 years continue to register 1 for RPD5.
- RCD1-RCD5** Defined using the same procedures as for political rights, but for civil liberties.

With the model specified to include these three categories of variables the empirical results will have an interpretive value that can in the simplest possible fashion address the issue of causality of political rights and civil liberties in the process of economic growth.

5. Estimation

In regressions which combine cross-sectional and time-series data, the set of right hand side variables need not explain all of the systematic variation in the left-hand side variable. A more general expression of the error term in equation (5) is

$$\varepsilon_{it} = m_i + s_t + \mu_{it} \quad (6)$$

where m_i is the systematic component associated with the i 'th geographic unit, s_t is the systematic component associated with the t 'th time period, and μ_{it} is a random error. Two strategies have been proposed to exploit this additional source of systematic variation: a "fixed effects" estimator which involves a dummy variable transformation of m_i and s_t and a "random effects" estimator which involves the estimation of (5) through the application of GLS. As Mundlak (1978) has shown, a decision between the fixed effect approach and the random effect approach is unnecessary, since the effects are in fact random and the fixed effect estimator can result in inferences conditional on the sample used in the estimation. Of course for this interpretation of the fixed effects estimator, the applicability of parameter

estimates to populations outside the sample depends on whether the sample used in estimation is random and representative.

Table 2 shows averages for economic variables for the sample used in estimation (56 country sample) and the entire sample of countries available in the Penn World Table database (112 countries). While the unweighted averages are different between the two samples, when weighted by population, the averages from the two samples are very similar. The 56 country sample population weighted growth rate of .0187 is close to the overall population weighted growth rate of .0164. The growth rate in the capital-labor ratio is .0488 in the 56 country sample, .0434 in the overall sample. The 56 country sample includes larger countries, 44 million people on average, compared with the overall sample where the average country size is 24 million people. The 56 country has a population weighted GDP of 3960 which compares closely with the overall sample population weighted average of 3826. The population weighted capital-labor ratio of the 56 country average is 8877 while the sample population weighted capital-labor ratio is 8781. Shares of GDP for consumption, investment, and government also are similar for the 56 country sample and the overall population. Thus, population-weighted least squares is justified as a method of estimation for capturing the unconditional parameters through the application of a "fixed effects" estimation model.

Qualitative variable construction can transform the m_i and s_i into observed elements whose effects may be directly estimated. The estimated version of equation (5), after

substituting the fixed effect transformation of equation (6) into equation (5) is:

$$Y_{it} = \sum_j \beta_j X_{j\mu} + \sum_j \rho_j R_{j\mu} + \sum_j \delta_j D_{j\mu} + \sum_j \gamma_j Z_{j\mu} + \mu_{it}$$

where $Z_{j\mu}$ are regional and time qualitative variables. Regional variables are defined with the European countries omitted to prevent singularity. The country groups for the geographic effect (with numbers of countries in parenthesis) are:

AMERICA	North and South American continent countries plus Israel (12)
ASIA	Asian countries (12)
AFRICA	African (18)
OPEC	Middle Eastern Oil Exporting countries (3)

There were 11 European countries in the sample. The sample provides a rough parity between the geographic from the regions. The annual quantitative variables account for experiences of economic growth common to all nations, due for example, to common world economic conditions. Clearly, the economic growth of a nation is affected by the growth of other nations through trade and financial linkages that likely go beyond regional factors. Quantitative time variables, were constructed, omitting 1973 to ensure nonsingularity by construction.

6. Results

Tables 3 through 5 report estimation results for each of the three blocks of conditioning variables appearing in equation (7). Table 3 presents the effects of economic and demographic variables and the summary statistics. Table 4 does the same for regional and time qualitative variables while Table 5 focuses on institutional effects and reform timing qualitative variables. Each of the three tables reports results first for the pooled regression,

and then regressions by geographic region and time period. It is important to remember that while the results are presented in three tables, the three blocks were estimated as part of the same regression analysis.

In Table 3 a number of the standard results of economic growth models are reproduced. Convergence of growth rates is supported in the overall sample, by the negative sign of the estimated coefficient of the log of per capita GDP. However, the estimated convergence is slow. The difference in convergence of growth rates between high growth and low growth years is especially noteworthy. High growth years exhibit convergence while the low growth years do not, implying that convergence is a feature of economic expansion, and is not obtained in years of slow world economic growth. Growth in the capital labor ratio has a positive effect on growth in per capita GDP. From equation (4), this coefficient measures the marginal productivity of investment, multiplied by the capital-output ratio.

There appear to be decreasing returns to investment in American countries, and increasing returns in the pooled sample. Population change is interpreted as a quasi-human capital variable, since faster growing populations are younger, on average, and thus losing the human capital associated with age or experience. It is expected that this coefficient will be negatively associated with per capita GDP growth; in the pooled sample, it has a large, negative effect. The effect of population growth on per capita GDP growth differs by region: in the Americas and Europe population has little effect, in Asia it has a small negative effect, and in Africa it has a large negative effect on economic growth.

Table 4 summarizes the results for regional and temporal qualitative variables.

Regionally, OPEC and ASIA had the highest growth rates, while Africa had the lowest. The effect of low growth years is large and negative for Africa, while the high growth years were comparatively good for the Americas and for Asia. This may reflect the raw materials export base of many of the African nations and their lack of diversity compared to Asian and American nations.

Results for institutional level and institutional reform variables are presented in Table 5. In the pooled sample, levels of both liberal political rights and free civil liberties are associated with higher economic growth: coefficients for P1OR2, P3TO5, C1OR2 and C3TO5 are positive and statistically significant. The relationship is not monotone for political rights: the coefficient for P3TO5 is larger than the coefficient for P1OR2, but it is monotone for civil liberties: the coefficient for C1OR2 is larger than the coefficient for C3TO5. The coefficients for the variables reflecting the duration of reforms suggest that the realization of these benefits occurs with a delay. For example, the estimated coefficient for RPD2 is negative, indicating a decrease in growth in the second year following a reform in political rights, while the coefficient for RPD5 is positive, indicating an increase in growth in the fifth and subsequent years following a reform in political rights. For civil liberties, RCD3 and RCD4 are negative, indicating decreases in growth in the third and fourth years following a reform, while RCD5 is positive, indicating an increase in the fifth and subsequent years of a sustained reform in civil liberties.

The estimated effects institutional levels differ by geographic region. In Asia, political freedoms are important for economic growth, civil freedoms are not (P1OR2 is positive, C1OR2 is negative). In Africa, the converse is suggested: civil liberties have a

positive effect on growth while political rights have a negative effect (P1OR2 is negative while C1OR2 is positive).

The estimated effects institutional levels also differ between high growth and low growth years. In high growth years, political freedoms are an important determinant of economic growth, while civil liberties have no estimated effect. In low growth years, economies with more political freedoms have higher growth rates, but the largest estimated effect on economic growth is in economies with a civil liberties rating of one or two: economies with this rating had annual growth rates .071 percent larger than economies rated six or seven, and .058 percent larger than economies with civil liberties rated three to five.

7. Interpretations and Implications of Results

These empirical results have four broad implications for policy reform and economic growth:

- The economic benefits of a reform in freedoms are systematic and significant
- Economic benefits, in the form of increased growth, occur with a lag after the initiation of reforms in political rights or in civil liberties
- Types of reforms likely to be successful differ by geographic region of the world
- Free civil liberties are particularly advantageous to economies in low growth years.

Table 6 illustrates calculations of changes in a nation's capital/labor ratio necessary to have the same effect on growth as a reform in civil liberties or in political rights. To calculate the change in the capital-labor ratio with an equivalent effect on growth to a change in institutions, totally differentiate equation (5) setting to zero differentials of variables not of interest. Equation (8) may be solved for the

$$d\hat{y} = (2\beta_1 \hat{k} + \beta_2) d\hat{k} + \rho_1 d\hat{R} \quad (8)$$

change in the capital-labor ratio which produces the same effect on growth as a change in institutions by setting $dy = 0$ and solving for dk in terms of dR

$$d\hat{k} = \frac{\rho_1}{(2\beta_1 \hat{k} + \beta_2)} d\hat{R} \quad (9)$$

As an example of calculating the benefits from a reform in civil liberties from a rating of 6 to a rating of 3 in the pooled regression (a change from civil liberties in Rwanda to civil liberties in Botswana), the coefficient of RCD5 is added to C3TO5, yielding a long-term benefit of 2.6 percent higher annual per-capita GDP growth. Using the mean K/L growth rate of .044, and coefficients estimated in the pooled sample, this calculation states that the civil liberties reform is equivalent to an additional increase of the capital/labor ratio of 16.9% (.026/(2*3.70-.17)). For the average sized countries taken from Table 1, this is equivalent to a \$66.3 billion dollar increase in the capital stock.

Table 6 presents capital/labor ratio change equivalences of four types of reforms for different geographic regions, and economic conditions. The first column of Table 6 calculates capital-labor ratio growth rate equivalences for reforms which change a country's civil liberties rating from 6 to 3 (eg. from Rwanda into Botswana). The second column of Table 6 shows equivalences for reforms which represent a change in the country's political rights rating from 6 to 3 (eg. from Cameroon into Mexico): the third column calculates equivalences for reforms which change a country's civil liberties rating from 4 to 2 (eg. from Egypt into France) and the fourth column calculates equivalences for reforms which change a country's political rights rating from 4 to 2 (eg. from Morocco into Spain).

These calculations illustrate the dramatic effects reforms have in terms of the equivalent increases in a country's capital/labor ratio necessary to produce the same increases in per capita GDP. Reforming civil liberties from a rating of six to three has the largest effect on per capita GDP growth in Asian countries, and in low-growth years. Reforming political rights from a rating of six to three has the largest effect on per capita GDP growth in African countries and in high-growth years. Reforms which change a nation's civil liberties from four to two have the largest effect on growth in African countries and in low-growth years, while reforms which change a nation's political rights rating from four to two have the largest effect in Asian and African countries as well as high-growth years. Reforms showing reverse implications are changes in civil liberties from four to two or changes in political rights from six to three in Asian countries, any change in civil liberties in European countries, or a change in political rights from four to two in low-growth years.

The lagged effects on growth can be seen from the plot of the estimated "timing variables" coefficients in Figures 1 through 3. Figure 1 presents plots of the coefficients indicating the timing of economic growth benefits, estimated from the pooled sample, following a reform in political rights or in civil liberties. Figure 2 provides plots of these coefficients for each of the geographic regions as well as for high growth and low growth years. Figure 3 presents plots of these coefficients for a reform in civil liberties. For each figure, coefficients not significant at the 10% level have been set to zero.

The coefficients in Figure 1 show that economic growth will, on average, decline in each of the first two years following a reform in political rights, and in the third and fourth years following a reform in civil liberties. In each case, however, economic growth

increases in the fifth and subsequent years following a reform.

Geographic differences in responses to political rights reform are revealed by Figure 2. In European countries, there is no lag in realizing benefits: the response is positive and immediate. In African countries, there is a decline in the first two years following a reform, followed by increases in growth in the fourth and subsequent years following a reform. Effects of reforms in civil liberties also differ geographically in the timing of responses, as seen in Figure 3. Countries in North or South America experience no returns to reforms in civil liberties until five years following the reform. Both Asian and African countries have declines in growth in the first two years following a reform, and all countries have a decline in growth in the third year following a reform.

Regions of the world also differ in the levels of their responses to reforms in freedoms. These differences are shown by the top block of coefficients in Table 3, and these coefficients are plotted in Figure 4 (with statistically insignificant coefficients set to zero). Freedoms in political rights have a large positive effect on growth in Asian countries, while these freedoms have a negative effect on growth in African countries. Conversely, freedoms in civil liberties have a negative effect on growth in Asian countries compared to the positive effect on growth these freedoms have in African countries.

Differences in political, social and economic cultures in these regions may explain these different relationships between freedoms and economic growth. Asian countries are typically characterized by homogeneous groups sharing a common religion and ethnic background, while African countries are composed of tribes with a more diverse tradition of religions and ethnicities. Because of a shared belief, political debate and discourse may not

be comparatively important in Asian countries: in fact, the expression of views not accepted by the majority of citizens could explain the negative effect of civil liberties in these countries on economic growth. However, an open political system is necessary to insure individuals are adequately represented. In African countries, protection of minority opinions becomes more important, since there is significant dissent from majority views. Civil liberties which protect minority opinions thus have a positive effect on economic growth. However, an open political system may result in conflicts and chaos that in turn leads to lower economic growth.

Since we have employed an arbitrary measurement of reforms in institutions, it would be useful to know whether the results are sensitive to changes in this measurement. In addition to defining reforms as decreases of size at least one from historically highest observed values, reforms could alternatively be defined as decreases of size two, and as decreases of size at least three. The effect of these definitions on reform duration dummy variables are reported in Table 7. While defining reforms as decreases of size one identifies 39 reforms in political rights and 45 reforms in civil liberties, defining reforms of size two identifies 22 reforms in political rights and 17 in civil liberties, and the most restrictive definition, defining reforms as declines of at least three, identifies 14 reforms in political rights and 11 in civil liberties. Regression analyses using these alternatively defined reform duration dummy variables do not measurably differ from results reported here.

8. Conclusion

The analysis of the cross-country and inter-temporal data linking political freedom and civil liberties has produced results that support the broad scale policy interventions often

advocated for improving economic growth in developing nations. The model, though largely descriptive, parallels standard aggregate production specifications in neo-classical growth theory. Institutional variables for political freedom and civil liberties are introduced to obtain estimates of the effects of both level and changes in institutions. The latter effect provides the principal basis for the conclusion that the institutional, constitutional, and policy changes leading to improved political freedoms and civil liberties contribute systematically to higher and sustained economic growth.

The data for the 56 countries included in the sample were partitioned by region of the world and high and low economic growth years. The results of partitioning of the data by region of the world: America, Africa, Asia, and Europe, suggested that the effects of changes in constitutions, institutions, and policies leading to improved political freedoms and civil liberties had different impacts. Our speculation is that these differential impacts are related to the culture, trading relationships, human and physical capital, and perhaps other factors that might emerge from a more detailed analysis. However, despite these differential effects, a general basis for institutional reform as a stimulant to economic growth is supported.

The differential impacts of political freedoms and economic liberties in high and low growth years is interesting. Our preliminary conjecture is that societies with greater political freedoms and civil institutions are more adaptive to adverse external conditions. That is, these economies by virtue of the broad participation in political and economic decisions can be more adaptive in periods of stress.

Finally, preliminary calculations were made to illustrate the value of changing

institutions that affect political freedoms and economic liberties relative to achieving similar levels of economic growth by augmentation of the capital stock. These preliminary results support startling conclusions. Specifically, they show a great value for strategies for development assistance that concentrate on the leverage that is available in policy and institutional change. The remaining puzzle, aside from refinements in the estimates related to improved structure and data, is how to make and sustain the institutional, constitutional, and policy changes that result in improved political freedoms and civil liberties.

Table 1
Summary of Freedom House Ratings
For 56 Countries

	Reform	Reform	Max	Min.	Avg.	Max	Min.	Avg
	Pol	Civil	Pol.	Pol.	Pol.	Civil	Civil	Civil
Country	Rights	Lib	Rights	Rights	Rights	Lib	Lib	Lib
ARGENTINA	2	2	6	2	4.2	6	2	3.9
AUSTRALIA	0	0	1	1	1.0	1	1	1.0
AUSTRIA	0	0	1	1	1.0	1	1	1.0
BANGLADESH	1	1	7	2	4.6	5	3	4.2
BELGIUM	0	0	1	1	1.0	1	1	1.0
BOTSWANA	1	1	3	2	2.1	4	3	3.1
BRAZIL	1	2	5	3	3.9	5	2	3.8
CAMEROON	1	0	7	6	6.1	7	4	5.3
CANADA	0	0	1	1	1.0	1	1	1.0
COLOMBIA	0	0	2	2	2.0	3	2	2.8
COSTA RICA	0	0	1	1	1.0	1	1	1.0
DOMINICAN REP.	1	2	4	1	2.5	3	2	2.5
EGYPT	1	2	6	4	5.2	6	4	4.8
ETHIOPIA	0	1	7	5	6.6	7	5	6.5
FRANCE	0	1	1	1	1.0	2	1	1.8
INDIA	0	0	5	5	5.0	6	5	5.2
INDONESIA	1	1	6	5	5.8	6	5	5.2
IRAN	2	2	6	5	5.5	6	5	5.8
IRAQ	1	1	7	6	6.8	7	6	6.9
ISRAEL	0	1	2	2	2.0	3	2	2.5
IVORY COAST	1	1	3	1	1.8	5	1	2.6
JAPAN	1	0	2	1	1.6	1	1	1.0
KENYA	0	1	6	5	5.2	5	4	4.5
KOREA	3	3	6	4	4.8	6	5	5.5
MADAGASCAR	2	0	6	5	5.3	6	3	5.2
MALAWI	1	0	7	6	6.5	7	6	6.5
MALAYSIA	0	0	7	7	7.0	6	6	6.0
MALI	0	1	3	2	2.8	5	3	3.8
MEXICO	1	1	5	3	3.7	4	3	3.6
MOROCCO	1	1	5	3	4.2	5	3	4.5
NEW ZEALAND	0	0	1	1	1.0	1	1	1.0
NIGERIA	1	1	7	2	4.8	5	3	3.8

- 22 -

NORWAY	0	0	1	1	1.0	1	1	1.0
PAKISTAN	2	2	7	3	5.2	6	4	5.0
PERU	1	1	7	2	4.5	6	3	3.9
PHILIPPINES	1	1	5	4	4.8	6	3	4.8
PORTUGAL	1	1	5	1	2.7	6	2	2.8
RWANDA	1	1	7	6	6.5	6	5	5.6
SAUDI ARABIA	0	0	6	6	6.0	7	6	6.2
SENEGAL	1	1	6	3	4.6	6	3	4.2
SPAIN	1	1	5	1	2.9	6	2	3.4
SRI LANKA	0	1	3	2	2.2	4	2	3.2
SWEEDEN	0	1	1	1	1.0	2	1	1.1
SWITZERLAND	0	0	1	1	1.0	1	1	1.0
TAIWAN	1	2	6	5	5.3	6	4	4.9
TANZANIA	0	0	6	6	6.0	6	6	6.0
THAILAND	1	2	7	2	4.4	6	3	4.0
TUNISIA	1	0	6	5	5.7	5	5	5.0
TURKEY	2	1	5	2	2.8	5	3	3.9
UNITED KINGDOM	0	0	1	1	1.0	1	1	1.0
UNITED STATES	0	0	1	1	1.0	1	1	1.0
URUGUAY	1	1	6	2	4.9	6	2	4.8
VENEZUELA	1	0	2	1	1.3	2	2	2.0
WEST GERMANY	0	0	1	1	1.0	2	1	1.5
ZAMBIA	0	2	5	5	5.0	6	4	5.2
ZIMBABWE	1	1	6	3	4.8	6	4	5.0

Table 2				
Comparison of Economic Features of				
Sampled and of All Countries				
	'73-'85 56 Countries	'61-'85 56 Countries	'73-'85 All Countries	'61-'85 All Countries
Average Per Capita GDP Growth Rate	.014640	.018080	.009857	.015654
Population Weighted Per Capita GDP Growth Rate	.018721	.018998	.016485	.017067
Average K/L Growth Rate	.048820	.024825	.045974	.029226
Population Weighted K/L Growth Rate	.044482	.030326	.043405	.029117
Average Population (thousands)	44063	39042	23960	21203
Average Per Capita GDP (1980 U.S. dollars)	4273	3638	3894	2053
Pop. Weighted Per Capita GDP	3960	3598	3826	3478
Average K/L (1980 U.S. dollars)	9528	7751	8876	7027
Population Weighted K/L	8877	7631	8781	7454
Average Consumption Share (%)	63.58	64.90	63.47	69.55
Average Investment Share	18.80	18.50	18.81	14.75
Average Government Share	18.72	17.40	19.61	15.70
Pop. Weighted Cons. Share	64.16	65.25	64.08	69.68
Pop. Weighted Inv. Share	18.77	18.76	18.68	15.39
Pop. Weighted Gov. Share	17.66	16.73	17.98	15.24
Number of countries	56	56	121	121
Number of years	13	25	13	25
Number of observations	728	1400	1573	3025

Notes:

Computed from data in Penn World Tables IV (Summers and Heston 1988). 56 Country sample is the sample used in the estimation of the effects of institutions and reforms on economic growth. All countries sample uses all market economies reported in the Summers and Heston database. Capital stocks are computed as described in appendix.

Table 3

Regression Results of Annual Smoothed Growth Rates on Institutional and Economic Variables

Economic and Demographic Variables and Regression Summary Statistics

	All Countries		American Countries		Asian Countries		African Countries		European Countries		High Growth Years		Low Growth Years	
	Coeff.	P Value	Coeff.	P Value	Coeff.	P Value	Coeff.	P Value	Coeff.	P Value	Coeff.	P Value	Coeff.	P Value
Intercept	0.13726	0.000	2.10538	0.017	0.04054	0.483	0.73849	0.069	-2.98202	0.000	-0.56103	0.002	0.39746	0.040
Log of Per Capita GDP	-0.01651	0.000	-0.50300	0.015	0.00007	0.994	-0.21802	0.067	0.67381	0.000	0.17397	0.000	-0.07035	0.163
Square of Log of Per Capita GDP			0.02902	0.015			0.01795	0.037	-0.03781	0.000	-0.01228	0.000	0.00201	0.536
Growth Rate of Capital/Labor Ratio	-0.17654	0.017	1.71071	0.000	0.43658	0.000	0.22085	0.000	0.48136	0.000	-0.36180	0.012	-0.08036	0.146
Square of Growth Rate of Capital/Labor Ratio	3.70626	0.000	-4.58017	0.019							4.12229	0.000	4.37208	0.000
Growth Rate of Population	-0.93618	0.008	0.23169	0.616	-1.38685	0.030	-2.61802	0.000	-0.04348	0.897	-1.64926	0.000	-0.97443	0.068
# Obs	728		156		156		234		143		392		336	
Countries	56		12		12		18		11		56		56	
Years	13		13		13		13		13		7		6	
Weighted r^2	.673		.932		.831		.971		.874		.680		.777	
Unweighted r^2	-.004		.483		.169		.083		.324		-.116		-.259	

Table 4
 Regression Results of Annual Smoothed Growth Rates on Institutional and Economic Variables
 Regional and Time Dummy Variables

	All Countries		American Countries		Asian Countries		African Countries		European Countries		High Growth Years		Low Growth Years	
	Coeff.	P Value	Coeff.	P Value	Coeff.	P Value	Coeff.	P Value	Coeff.	P Value	Coeff.	P Value	Coeff.	P Value
America	0.00487	0.396									0.02072	0.009	0.01265	0.145
Asia	0.01966	0.001									0.03426	0.000	0.00629	0.455
Africa	-0.02964	0.001									-0.01088	0.311	-0.05490	0.000
OPEC	0.06717	0.000									-0.00078	0.967	0.15007	0.000
1974	-0.01283	0.001	-0.01936	0.000	-0.01204	0.254	-0.01023	0.000	-0.02274	0.000				
1975	0.00412	0.269	-0.00889	0.050	-0.02645	0.013	0.01421	0.000	-0.02719	0.000				
1976	-0.00899	0.015	-0.01685	0.000	-0.05148	0.000	0.00053	0.789	-0.03224	0.000				
1977	-0.00855	0.081	-0.01298	0.002	-0.03696	0.001	-0.01079	0.074	-0.02133	0.000				
1978	0.00125	0.822	0.00906	0.045	-0.02699	0.017	-0.01204	0.320	-0.00408	0.432				
1979	0.00658	0.244	0.00256	0.577	-0.01853	0.098	-0.01213	0.324	-0.00860	0.070				
1980	0.00648	0.259	0.00653	0.202	-0.00302	0.794	-0.01737	0.138	-0.00985	0.048				
1981	0.00293	0.612	-0.00452	0.346	-0.00137	0.912	-0.02728	0.014	-0.02596	0.000				
1982	0.00454	0.359	0.00403	0.468	-0.01141	0.361	-0.01452	0.052	-0.02833	0.000				
1983	-0.01608	0.002	0.00652	0.252	-0.04112	0.002	-0.06257	0.000	-0.03265	0.000				
1984	-0.02353	0.000	0.00308	0.574	-0.02532	0.078	-0.05713	0.000	-0.02110	0.000				
1985	-0.01283	0.022	0.02275	0.000	-0.00925	0.522	-0.04616	0.000	-0.01736	0.004				

of

Table 5

Regression Results of Annual Smoothed Growth Rates on Institutional and Economic Variables

Institutional Level and Reform Variables

	All Countries		American Countries		Asian Countries		African Countries		European Countries		High Growth Years		Low Growth Years	
	Coeff.	P Value	Coeff.	P Value	Coeff.	P Value	Coeff.	P Value	Coeff.	P Value	Coeff.	P Value	Coeff.	P Value
P1OR2	0.01108	0.092	0.01243	0.293	0.05332	0.010	-0.02916	0.000	0.00337	0.562	0.01586	0.098	0.02140	0.004
P3TO5	0.02079	0.000	0.01098	0.358	0.00342	0.675	-0.00038	0.952			0.02611	0.001	0.02812	0.000
C1OR2	0.02969	0.000	0.00491	0.843	-0.05489	0.036	0.04387	0.000	0.00278	0.782	0.01595	0.228	0.07133	0.000
C3TO5	0.01444	0.020	0.02577	0.279	0.06961	0.000	-0.00672	0.443	0.00664	0.487	0.00353	0.729	0.01391	0.062
RPD1	-0.01947	0.002	-0.02754	0.002	-0.01444	0.094	-0.01202	0.371	0.02679	0.000	-0.02327	0.062	0.01125	0.287
RPD2	-0.02085	0.002	-0.01201	0.097	-0.03018	0.007	-0.01535	0.317	0.03554	0.000	-0.01665	0.025	0.01375	0.276
RPD3	-0.00324	0.637	-0.00614	0.413	-0.01156	0.355	-0.00169	0.911	0.04925	0.000	0.00897	0.369	0.01437	0.122
RPD4	0.01087	0.113	-0.02610	0.002	-0.01338	0.251	0.04208	0.003	0.05682	0.000	0.02197	0.005	0.00977	0.421
RPD5	0.01065	0.026	-0.02120	0.010	-0.02397	0.004	0.04448	0.000	0.04203	0.000	0.01542	0.027	-0.00105	0.871
RCD1	-0.00510	0.422	0.00592	0.357	-0.02918	0.012	-0.01832	0.017	-0.00397	0.495	-0.00313	0.590	0.01434	0.218
RCD2	-0.00948	0.159	0.00555	0.492	-0.04064	0.001	-0.02143	0.011	-0.00069	0.904	-0.01108	0.152	0.04986	0.007
RCD3	-0.02032	0.003	0.00811	0.285	-0.03956	0.001	-0.02646	0.006	-0.02285	0.010	-0.03397	0.000	0.01917	0.140
RCD4	-0.01436	0.032	-0.00272	0.717	-0.04295	0.001	-0.00912	0.399	-0.04443	0.000	-0.03123	0.000	0.03134	0.071
RCD5	0.01239	0.022	0.01455	0.024	-0.04935	0.000	0.01258	0.129	-0.05983	0.000	0.00209	0.769	-0.00508	0.542

Notes to Tables 3 through 6:

Dependant variable in each regression is a three year smoothed annual growth rate of per-capita real GDP

LGDP and LGDPSQ are the log and square of the log of real, per-capita GDP

GROWKL and GROWKLSQ are the annual growth rate, and its square, of real the real capital stock per person

POPCHG is the percentage change in population

AMERICA, ASIA, AFRICA and OPEC are regional dummy variables (the excluded region is Europe)

T74 - T85 are annual dummy variables (the excluded year is 1973)

PIOR2 and P3TO5 are dummy variables describing a country's rating in political rights (the excluded group is P6TO7)

C1OR2 and C3TO5 are dummy variables describing a country's rating in civil liberties (the excluded group is C6TO7)

RPDi, $i=1-5$ are dummy variables indicating a decrease in political rights rating lasting for i years

RCDj, $j=1-5$ are dummy variables indicating a decrease in civil liberties rating lasting for j years

Each regression is estimated by Least Squares, weighted by population

American countries are: Argentina, Brazil, Canada, Colombia, Costa Rica, Dominican Republic, Israel, Mexico, Peru, United States, Uruguay, and Venezuela

Asian countries are: Australia, Bangladesh, India, Indonesia, Japan, Korea, Malaysia, New Zealand, Pakistan, Philippines, Taiwan and Thailand

African countries are: Botswana, Cameroon, Egypt, Ethiopia, Ivory Coast, Kenya, Madagascar, Malawi, Mali, Morocco, Nigeria, Rwanda, Senegal, Sri Lanka, Tanzania, Tunisia, Zambia and Zimbabwe

European countries are: Austria, Belgium, France, Norway, Portugal, Spain, Sweeden, Switzerland, Turkey, United Kingdom and West Germany

OPEC countries are: Iran, Iraq and Saudi Arabia

High Growth years are years with non-negative estimated coefficients in the pooled regression:

1973, 1975, 1978, 1979, 1980, 1981, and 1982

Low Growth years are years with negative estimated coefficients in the pooled regression:

1974, 1976, 1977, 1983, 1984 and 1985

No variables are significant in regressions for the OPEC countries

There are no European countries with political rights ratings or 6 or 7, so the excluded group in this regression is P3TO5

LGDPSQ was not significant in the Asian regression, and GROWKLSQ was not significant in the Asian, African and European regressions

Table 6

Growth Rate in Capital/Labor Ratio With Equivalent
Effect on Percapita GDP Growth for Selected Reforms

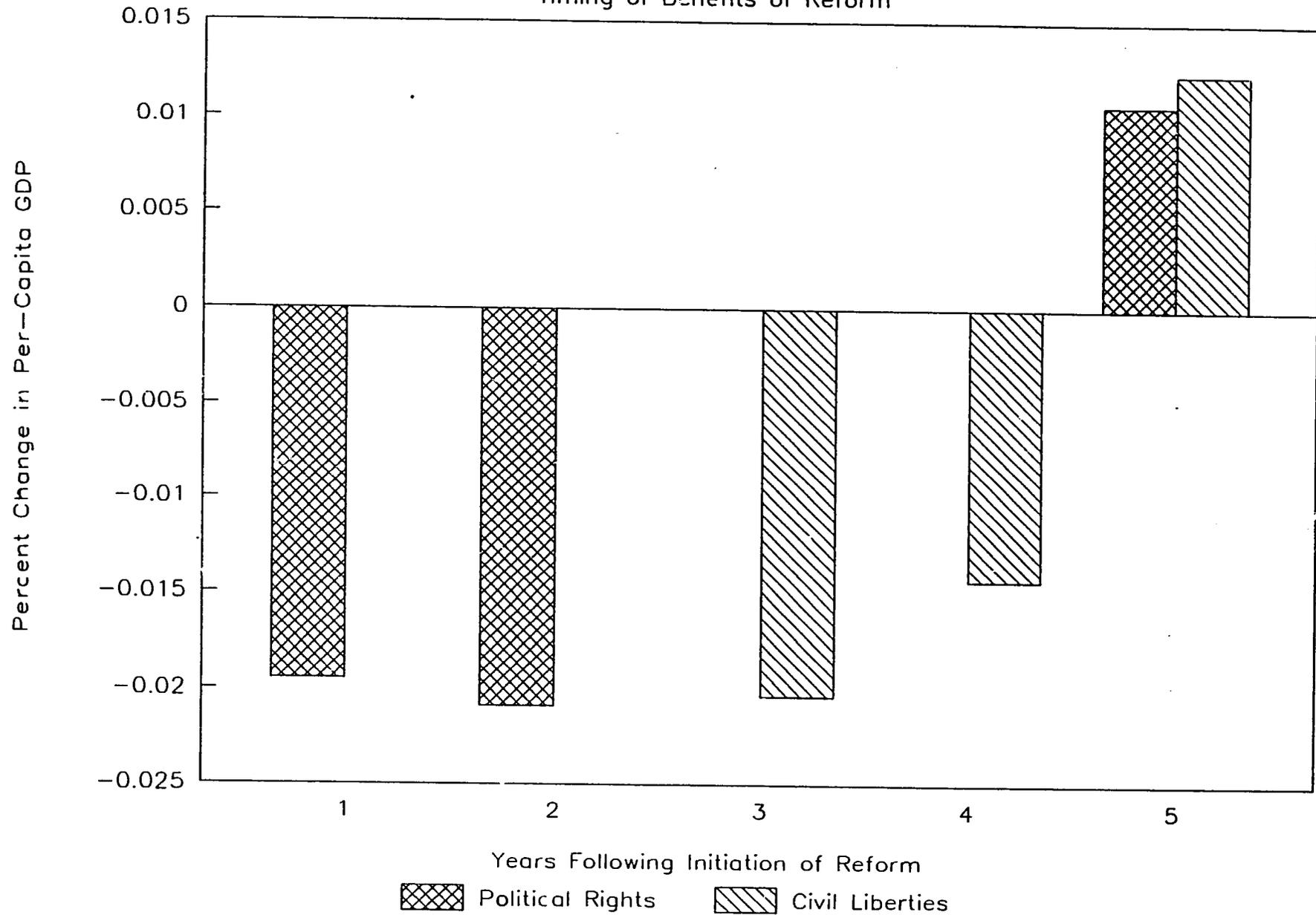
Group	Reform			
	Civil Liberties Six - Three	Political Rights Six - Three	Civil Liberties Four - Two	Political Rights Four - Two
All Countries	.169	.205	.173	.006
Americas	.011	-.016	.011	-.016
Asia	.046	-.055	-.398	.067
Africa	.000	.201	.199	.069
Europe	-.124	.087	-.124	.087
High Growth Years	.000	.735	.000	.091
Low Growth Years	.053	.106	.221	-.026

Table 7
Sensitivity of Reform Measures
To Different Criteria of Reform

Reform Type, Criteria	Year following initiation of Reform				
	1	2	3	4	5+
Political Rights ≥ 1	39	34	29	24	101
Civil Liberties ≥ 1	45	33	27	23	89
Political Rights ≥ 2	22	18	14	10	23
Civil Liberties ≥ 2	17	15	12	9	34
Political Rights ≥ 3	14	11	10	6	12
Civil Liberties ≥ 3	11	7	7	3	13

Figure 1

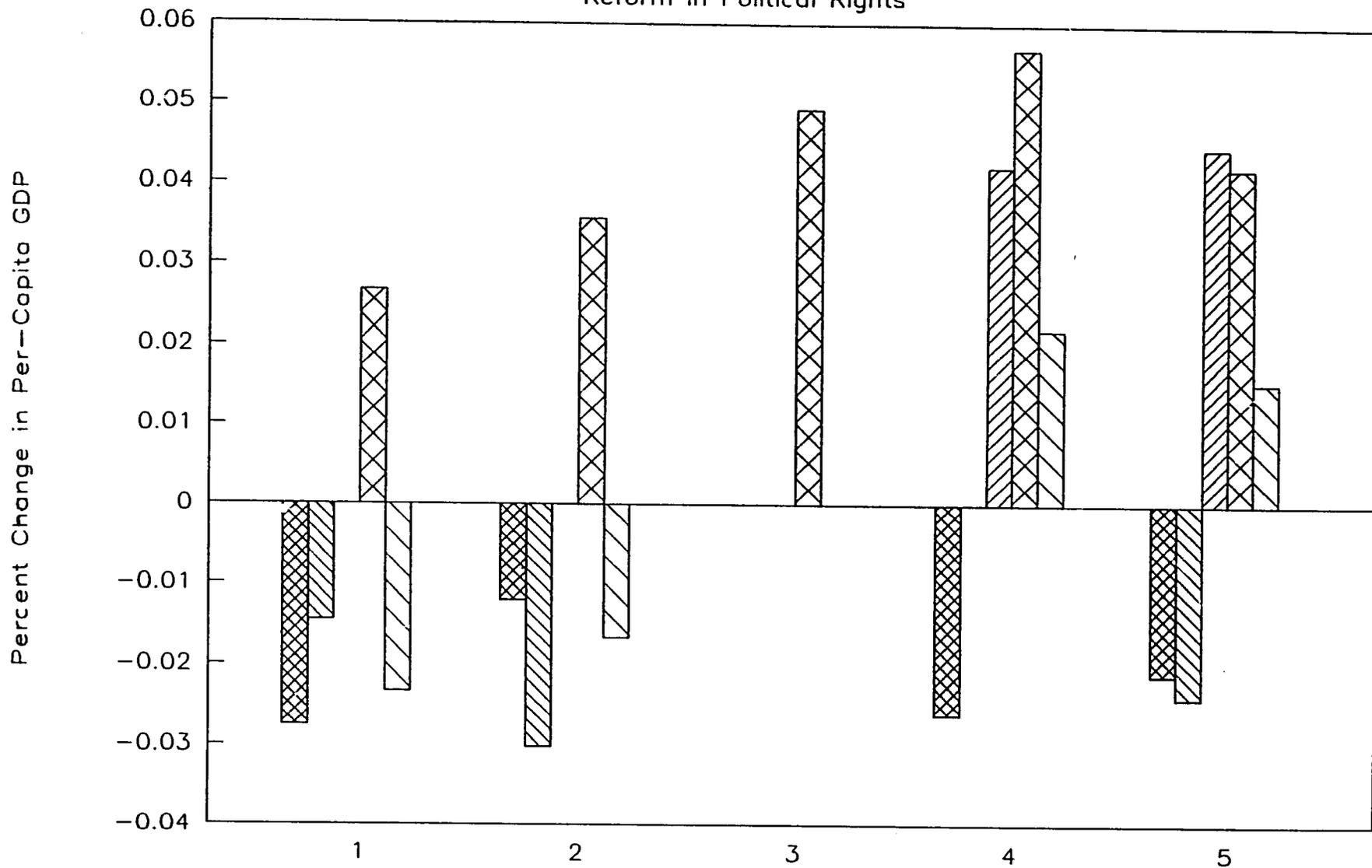
Timing of Benefits of Reform



31

Figure 2

Reform in Political Rights



Years Following Initiation of Reform

Americas Asia Africa Europe High-Growth Low-Growth

166

Figure 3

Civil Liberties Reform

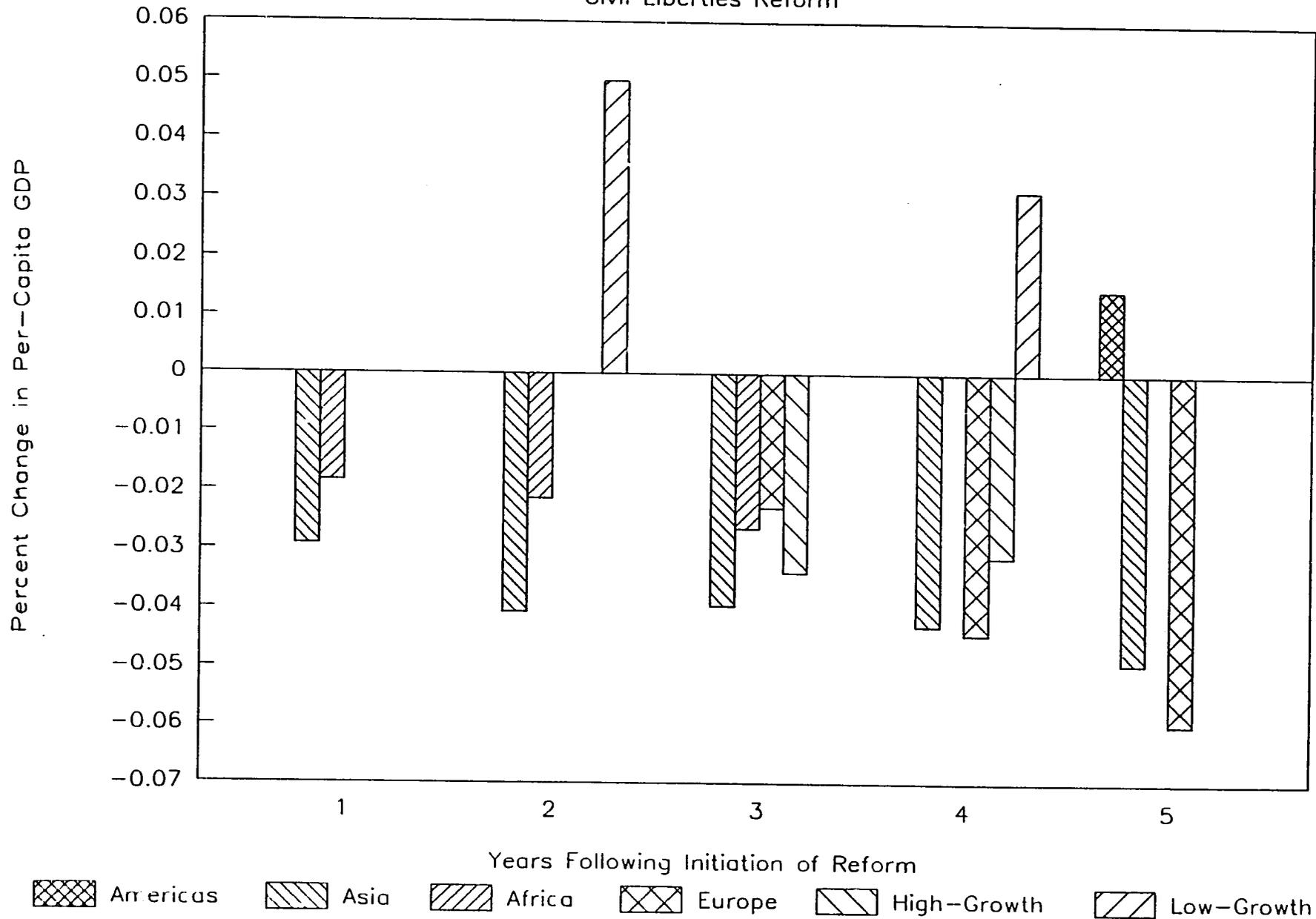
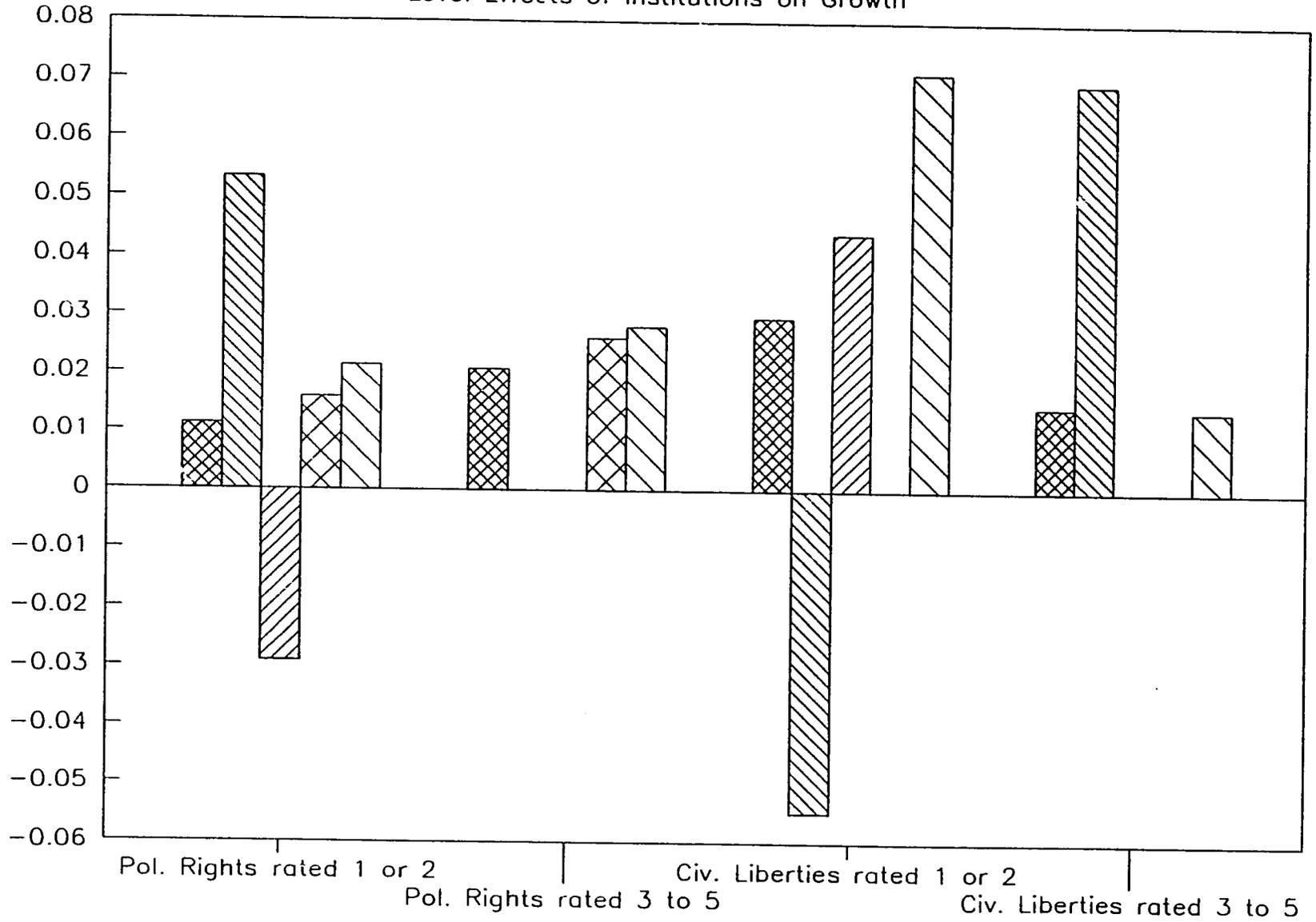


Figure 4

Level Effects of Institutions on Growth



Legend: All Countries (cross-hatch), Asia (diagonal lines), Africa (diagonal lines), High-Growth Years (cross-hatch), Low-Growth Years (diagonal lines)

54

Appendix

Calculation of Economic Variables used in regression analyses

Variables in [] refer to variable names in the PWT IV data set constructed by Summers and Heston (1988)

GDP figures used are Summers and Heston Real Per-Capita GDP current prices [X9], converted to 1980 U.S. dollars by dividing by the U.S. GDP deflator, as reported in the Economic Report of the President.

The growth rate in per-capita GDP is the log difference between per-capita GDP in adjacent years.

Investment is calculated as Summers and Heston's current prices investment share [X11] multiplied by 1980 current prices per-capita GDP [X9] multiplied by population [X1].

An initial capital stock (1960) is estimated as one over the assumed depreciation rate (5%) times investment in 1960. Subsequent capital stocks are calculated as lagged capital stocks multiplied by one minus the depreciation rate, plus current year investment.

Since data used in the regression analysis covers the period 1973 - 1985, capital stocks in this period are somewhat insensitive to the manner in which beginning capital stocks are approximated.

The capital/labor ratio is the calculated capital stock divided by population [X1]. The growth rate in the capital/labor ratio is the log difference in adjacent years.

Bibliography

- Allison, Graham. 1971. *Essence of Decision: Explaining the Cuban Missile Crisis*. Boston: Little, Brown.
- Balassa, Bela. 1971. *The Structure of Protection in Developing Countries*. Baltimore: Johns Hopkins Press.
- Barro, Robert. 1991. Economic Growth in a Cross Section of Countries. *Quarterly Journal of Economics*. CVI. p. 407 - 448.
- Buchanan, James. 1989. *Explorations into Constitutional Economics*. College Station. Texam A&M Press.
- Clague, Christopher and Gordon Rausser, eds. 1991. *The Emergence of Market Economies in Eastern Europe*. Cambridge, MA: Blackwell Publishers.
- Commons, John. 1934. *Institutional Economics; Its Place in Political Economy*. New York, New York. The Macmillan Company.
- deSoto, Hernando. 1989. *The Other Path*. New York: Harper and Row.
- Gastil, Raymond. 1987. *Freedom in the World*. Westport, Conn.: Greenwood.
- Grier, Kevin and Gordon Tullock. 1989. An Empirical Analysis of Cross-National Economic Growth, 1951-80. *Journal of Monetary Economics*. vol. 24. p. 259 - 276.
- Johnson, D. Gale. 1973. *World Agriculture in Disarray*. London, Fontana, Collins, in association with the Trade Policy Research Center.
- Krueger, Anne. 1974. The Political Economy of the Rent-Seeking Society. *American Economic Review*. vol. 64. p. 291-303.
- Lucas, Robert E. Jr.. 1988. On the Mechanics of Economic Development. *Journal of Monetary Economics*. XXII. p. 3-42.
- Mellor, John. 1976. *The New Economics of Growth: A Strategy For India and the Developing World*. Ithaca, New York. Cornell University Press
- Mundlak, Yair. 1978. On the Pooling of Time Series and Cross Section Data. *Econometrica*. vol. 46. p. 69 - 85.
- Murphy, Kevin, Andrei Shleifer and Robert Vishny. 1991. The Allocation of Talent: Implications for Growth. *Quarterly Journal of Economics*. CVI. p. 503-530.
- North, Douglas. 1990. *Institutions, Institutional Change and Economic Performance*. Cambridge; New York: Cambridge University Press.

- Olson, Mancur. 1982. *The Rise and Decline of Nations: Economic Growth, Stagflation, and Social Rigidities*. New Haven: Yale University Press.
- Rausser, Gordon C.. 1982. Political Economic Markets: PESTs and PERTs in Food and Agriculture. *American Journal of Agricultural Economics*. vol. 64. p. 821-33.
- Rausser, Gordon C.. 1990. A New Paradigm for Policy Reform and Economic Development. *American Journal of Agricultural Economics*. vol 72, no. 3. p. 821-26.
- Rausser, Gordon C. and Pinhas Zusman. 1992. *Political-Economic Analysis: Explanation and Prescription*. University of Cambridge press, in progress.
- Romer, Paul. 1986. Increasing Returns and Long Run Growth. *Journal of Political Economy*. XCIV. p. 1002-37.
- Schultz, T.W.. 1964. *Transforming Traditional Agriculture*. New Haven. Yale University Press.
- Scully, Gerald. 1988. The Institutional Framework and Economic Development. *Journal of Political Economy*. vol. 96. p. 652 - 662.
- Solow, Robert. 1957. Technical Change and the Aggregate Production Function. *Review of Economics and Statistics*. XXXIX. p. 312-20.
- Summers, Robert and Heston, Alan. 1988. A New Set of International Comparisons of Real Product and Price Levels: Estimates for 130 Countries, 1950-1985. *Review of Income and Wealth*. Series 34, no. 1. p. 1 - 25.
- Tirole, Jean and Laffont, J.J.. 1990. The Politics of Government Decision Making: Regulatory Institutions. *Journal of Law, Economics and Organization*. vol. 6. p. 1-32.
- United States Agency for International Development. 1989. *Development and the National Interest: U.S. Economic Assistance into the 21'st Century*. Washington, DC: Government Printing Office.
- Williamson, Oliver. 1985. *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*. New York: Free Press; London: Collier Macmillan.
- Williamson, Oliver. 1991. *Comparative Economic Organization: The Analysis of Discrete Structural Alternatives*. Institute For Policy Reform Working Paper.
- World Bank. 1991. *World Development Report: The Challenge of Development*. New York: Oxford University Press.

Table 1. Output, Labor Productivity, and Employment in East Germany, 1986-90

Period	Industrial output (1989 = 100)	Labor productivity (September 1989 = 100)	Employment ^a (in thousands)			
			Industry	Construction	Transportation and communications	Trade
1986	92.1	...	3,224	475	608	784
1987	94.8	...	3,212	470	613	786
1988	97.7	...	3,214	467	617	788
1989	100.0	...	3,193	460	619	784
1989						
Fourth quarter	...	...	3,153	454	615	783
October	100.6	101.2	...	...	...	...
November	98.6	100.2	...	...	...	...
December	97.6	99.7	...	...	...	...
1990						
First quarter	...	...	3,086	439	613	760
January	94.4	98.1	...	...	...	...
February	96.6	100.3	...	...	...	...
March	97.8	101.7	...	...	...	...
Second quarter	...	...	2,961	371	580	722
April	97.0	101.6	...	...	...	...
May	92.1	97.1	...	...	...	...
June	86.0	93.5	...	...	...	...
Third quarter	...	...	2,690	339	554	654
July	56.0	64.9	2,777	361	553	671
August	47.9	56.8	2,710	367	558	661
September	48.9	...	2,584	350	552	634
Fourth quarter	...	...	...	...	...	...
October	49.5	...	2,452	343	525	582
November	50.9	...	2,388	337	512	554
December	45.5	...	...	...	...	...

Sources: *Monatszahlen*, November 1990, pp. 16-18, and December 1990, 3. Folge, pp. 9-11 and 18.
a. The employment figures show the number of wage and salary workers.

Table 2. Indexes of Output and Producer Prices by Industrial Sector, 1990
Index, 1989 = 100

Industrial sector	Index of industrial output				Index of producer prices ^a		
	May	July	October	December	May	July	August
Total industry	92.1	56.0	49.5	45.5	98.4	51.7	48.8
Energy ^b	85.9	52.9	58.9	71.8	105.1	97.6	98.1
Water supply ^b	101.0	93.2	91.1	96.4	122.2	122.8	126.2
Chemicals	85.5	61.8	47.3	46.3	99.0	31.3	31.9
Metallurgy	91.9	39.8	30.1	23.7	99.9	44.1	41.2
Building materials	102.8	61.8	33.9	22.6	100.6	80.1	78.5
Machinery and transportation equipment	101.3	70.7	61.8	60.0	103.5	66.1	61.8
Electronics	100.5	68.6	56.0	41.3	71.7	40.6	43.3
Light industry (excluding textiles)	88.4	48.9	47.7	39.4	102.9	51.2	52.0
Textiles	81.8	47.8	44.2	29.1	100.7	31.7	31.1
Food	90.0	40.8	45.1	43.4	91.4	60.4	53.9

Sources: Industrial output: *Monatszahlen*, December 1990, 3. Folge, p. 22. Producer prices: Statistisches Amt der DDR, "Indizes der Erzeugerpreise gewerblicher industrieller Produkte," Heft 6, July 1990, and Heft 8, August 1990.
a. Prices before July 1, 1990, are *Industrieabgabepreise* in mark of the GDR. These prices include product-specific taxes and subsidies levied at the producer level. Prices after July 1, 1990, are in deutsche mark.
b. Prices in these sectors continued to be set officially even after currency union.

Table 3. The Employment Situation in East Germany, 1990-91
Thousands of workers, except where noted

Month	Unemployment		Short time		Vacancies
	Number	Rate ^a	Number	Rate ^a	
1990					
January	7.4	...	...	...	158.6
February	11.0	...	...	...	141.4
March	38.3	...	...	...	105.9
April	64.8	...	...	...	73.6
May	94.8	...	...	...	54.3
June	142.1	1.6	...	...	41.4
July	272.0	3.1	656.3	7.4	27.7
August	361.3	4.1	1,499.9	16.9	20.4
September	444.9	5.0	1,728.7	19.3	24.3
October	536.8	6.1	1,703.8	19.1	24.7
November	589.2	6.7	1,709.9	20.1	23.8
December	642.2	7.3	1,795.4	20.5	22.6
1991					
January	757.2	8.6	1,856.0	21.1	23.0
February	787.0	8.9	1,900.0	21.5	...

Source: *Monatszahlen*, December 1990, 3. Folge, p. 12; Bundesanstalt für Arbeit, *Arbeitsmarkt in Zahlen*: Aktuelle Eckdaten für das Beitrittsgebiet, January 1991, Nürnberg, p. 2; *Konjunktur Aktuell*, January 1991, Anhang II, p. 72.
a. The rates shown are the number of unemployed or short-time workers as a percent of the civilian work force.

22

Table 4. The Cost of Living for Private Households in East Germany, 1990-91
Index, 1989 = 100

Month	All items	Food, drink, and tobacco	Clothing and shoes	Rent and energy	Furniture and household goods	Health care products	Transportation and communications	Education and recreation	Other goods
1990									
May	98.3	100.9	89.0	100.0	96.0	92.3	100.2	106.4	90.5
June	87.9	97.4	51.7	100.0	84.8	88.5	93.4	88.3	92.6
July	94.5	115.4	57.5	100.0	74.5	119.4	85.2	88.5	99.0
August	94.9	111.9	59.9	100.0	74.9	121.4	89.2	96.9	102.0
September	96.6	111.4	64.4	100.0	76.3	122.6	89.8	95.2	105.1
October	98.2	112.2	66.9	100.0	76.6	123.4	92.5	99.6	105.3
November	98.1	112.4	68.1	100.0	76.6	123.7	90.3	99.2	104.6
December	99.1	113.8	69.5	100.0	77.5	126.6	89.1	100.2	105.3
1991									
January	106.4	114.9	69.3	157.8	78.8	127.5	96.2	102.6	154.9

Sources: *Monatszahlen*, December 1990, pp. 52-53, and January 1990, pp. 24-25; Statistisches Bundesamt, Mitteilung für die Presse, February 26, 1991.

Table 5. Monthly Wages by Industrial Sector, 1988-90*
Mark before July 1990, deutsche mark thereafter

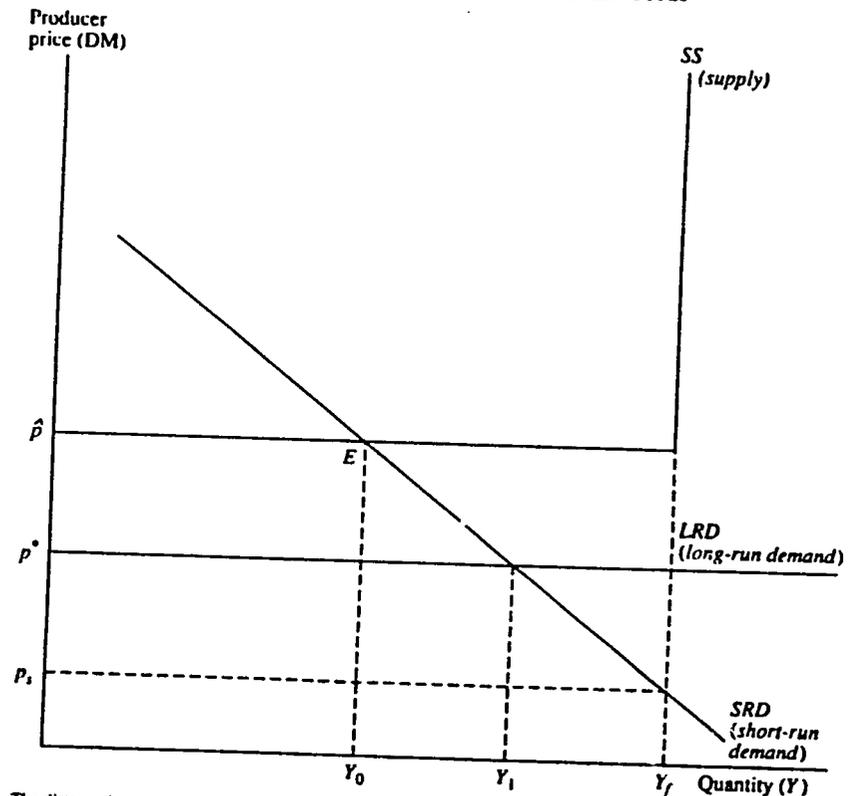
Industrial sector	1988	1989	1990			
			First quarter	Second quarter	July ^b	October ^b
Total industry	1,041	1,072	1,089	1,205	1,335	1,545
Energy	1,202	1,229	1,228	1,385	1,454	1,798
Water supply	985	1,020	1,051	1,228	1,238	1,579
Chemicals	1,075	1,112	1,115	1,283	1,494	1,582
Metallurgy	1,116	1,140	1,132	1,335	1,352	1,547
Building materials	1,012	1,045	1,081	1,230	1,307	1,593
Machinery and transportation equipment	1,073	1,101	1,124	1,229	1,410	1,574
Electronics	1,045	1,069	1,091	1,195	1,367	1,502
Light industry (excluding textiles)	946	978	994	1,062	1,117	1,415
Textiles	943	978	994	1,048	1,069	1,401
Food	965	1,003	1,032	1,142	1,187	1,482

Source: 1988 and 1989: Statistisches Amt der DDR, *Jahrbuch, Arbeitskräfte und Löhne*, 1989, pp. 74-78; first and second quarter 1990: Statistisches Amt der DDR, "Arbeiter und Angestellte und deren Bruttolöhne nach Wirtschaftsbereichen und Sektoren im 1. Halbjahr 1990," Berlin, August 24, 1990, p. 6; July 1990 and October 1990: Gemeinsames Statistisches Amt, unpublished data.

a. The average gross monthly wage per full-time employee is shown.

b. Data for July and October 1990 are reported according to the sectoral classification used in the former GDR. Data for these same months reported according to the West German sectoral classifications are available in *Konjunktur Aktuell*, January 1991, Anhang II, p. 69.

Figure 1. The Decline in Output of East German Tradable Goods



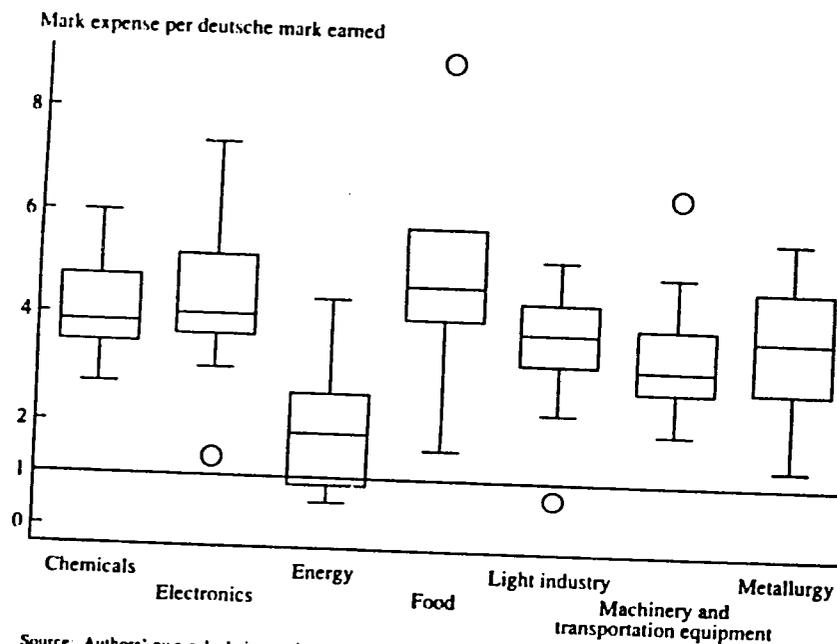
The distance between Y_1 and Y_0 is the change in quantity due to the price-cost squeeze. The distance between Y_f and Y_1 is the change in quantity due to the demand shift.

Table 6. The Domestic Resource Cost of Earning Foreign Exchange in East Germany, by Sector, 1989 and 1990

Industrial sector	Share of employment	Domestic resource cost of earning one:			
		Deutsche mark		Transfer ruble	
		Unadjusted ^a	Adjusted ^a	Unadjusted ^a	Adjusted ^a
Total industry	1.00	3.73	1.84	4.65	2.30
Energy	0.11	2.08	0.85	3.16	1.29
Chemicals	0.12	4.11	1.50	5.93	2.16
Metallurgy	0.07	3.22	1.35	7.43	3.11
Machinery and transportation equipment	0.26	3.54	1.83	3.51	1.81
Machinery	0.15	3.59	1.85	3.62	1.87
Transportation equipment	0.10	3.46	1.79	3.35	1.73
Electronics	0.18	4.82	2.42	3.44	1.73
Light industry	0.24	3.74	1.72	5.69	2.62
Textiles	0.14	3.70	1.71	6.45	2.97
Furniture, toys, and other	0.05	4.22	1.95	4.55	2.10
Glass, ceramics, and paper	0.05	3.33	1.54	4.65	2.14
Food, drinks, and tobacco	0.02	4.09	2.93	8.00	5.73

Sources: Authors' own calculations using unpublished data from the government of the former GDR.
^a The unadjusted cost in each sector is the average expense in mark of earning a deutsche mark in trade with non-CMEA countries and a transfer ruble in CMEA trade in 1989. The numbers are the averages of *Kombinat*-level data by sector, weighted by each *Kombinat*'s share of sectoral employment.
^b The adjusted cost is an estimate of the short-run average variable cost in deutsche mark of earning one deutsche mark in trade with non-CMEA countries and a transfer ruble in CMEA trade in October 1990. The adjusted expense is estimated by multiplying the unadjusted expense by one minus the adjustment factors in the sixth column of table 7. These factors approximate the percentage difference between domestic resource cost in 1989 and short-run average variable cost in 1990.

Figure 2. The Domestic Resource Cost of Earning Foreign Exchange in Selected East German Industries, 1989^a



Source: Authors' own calculations using unpublished data from the government of the former GDR.
^a The figure uses a box-and-whiskers diagram to display the univariate distributions of the unadjusted data. The box represents the interquartile range—that is, the box encompasses the middle 50 percent of the data. The line across the middle of the box denotes the median. The whiskers extend to 150 percent of the interquartile range rolled back to the first available data point. Observations that lie beyond the whiskers are considered outliers and are individually marked by bubbles.

Table 7. A Decomposition of the Factors Contributing to the Difference between Domestic Resource Costs before Currency Union and Short-Run Variable Costs after Currency Union
 Percent, except for elasticities

Sector	Adjustment in domestic resource cost by factor					
	Reduction in profits, interest, and taxes	50 percent reduction in depreciation	Reduction in costs of imported inputs	10 percent wage increase ^a	Additional 32 percent wage increase	Total adjustment
Total industry	-36.1	-4.8	-19.7	2.4	7.6	-50.6
Energy	-47.3	-10.0	-9.4	1.8	5.8	-59.1
Chemicals	-41.1	-4.3	-23.2	1.2	3.9	-63.5
Metallurgy	-30.9	-4.4	-29.6	1.6	5.2	-58.1
Building materials	-40.9	-5.1	-16.2	2.4	7.8	-52.0
Machinery and transportation equipment	-36.0	-4.2	-19.3	2.6	8.5	-48.4
Electronics	-39.8	-4.1	-17.2	2.7	8.6	-49.8
Light industry	-43.0	-3.8	-17.0	2.4	7.6	-53.9
Food	-18.4	-5.7	-20.3	3.8	12.3	-28.4
Agriculture and forestry	-31.6	-5.1	-11.6	4.0	12.8	-31.6
Transportation and communications	-29.3	-8.2	-12.2	3.5	11.4	-34.7
Construction	-36.6	-4.4	-12.6	3.5	11.4	-38.6

Source: Authors' own calculations using input-output analysis. See the text for a more detailed description of the cost changes brought about by currency union.
^a We estimate that because of increased payroll deductions after currency union, a 10 percent wage increase would have kept net wages constant.

Table 8. The Viability of East German *Kombinate* under Benchmark and Alternative Assumptions

Adjusted expenses per deutsche mark earned	Benchmark case ^a		Viable employment with across-the-board changes (percent)			
	Number of <i>Kombinate</i> ^b	Viable employment (percent) ^c	10 percent wage increase	10 percent productivity increase	50 percent labor cost subsidy	75 percent labor cost subsidy
< 0.25	2	0.4	0.4	0.4	1.9	2.5
< 0.5	7	2.5	2.5	2.5	4.9	10.6
< 0.75	10	4.9	4.9	5.2	14.5	36.6
< 1.0	14	8.2	7.5	12.3	36.6	77.2
< 1.25	27	19.9	17.5	26.8	69.3	89.7
< 1.5	46	37.5	33.3	46.7	82.7	96.2
< 1.75	66	55.2	49.9	63.4	90.7	99.5
< 2.0	86	73.9	64.1	78.1	96.1	99.8
< 2.25	96	81.8	77.1	86.7	98.5	99.8
< 2.5	105	87.2	83.9	89.8	99.4	99.8
< 2.75	107	90.8	89.8	91.2	99.8	99.8
< 3.0	108	91.2	90.9	96.3	99.8	100.0
< 3.25	111	96.3	91.3	96.3	99.8	100.0
< 3.5	111	96.3	96.4	99.6	99.8	100.0
< 3.75	114	99.6	96.4	99.6	99.8	100.0
< 4.0	114	99.6	99.6	99.8	99.8	100.0
< ∞	116	100.0	100.0	100.0	100.0	100.0

Source: Authors' own calculations as described in the text.
^a The benchmark case (as in the sixth column of table 7) assumes elimination of taxes, profits, interest, and subsidies to the firm; an increase in employer and employee contributions to social insurance to the West German level of 18.25 percent each; a 50 percent reduction in depreciation expense; savings on imported inputs as described in the text; and a 42 percent increase in gross wages.
^b The cumulative number of *Kombinate* with adjusted domestic resource cost ratios below the level indicated in column one is shown.
^c The percent of wage and salary workers in *Kombinate* with adjusted domestic resource cost ratios below the level indicated in the first column, as a fraction of the total number of wage and salaried workers in all *Kombinate* in the sample, is shown in the third through seventh columns.

Table 10. Survey Answers Concerning Migration and Employment Conditions in East and West Germany for Various Subgroups of the East German Population

Responses of those answering question, in percent

Survey item	Nonstudents						Students
	All	Employed	Unem- ployed	Short- time	Female	Under 31	
Number of respondents	556	460	96	99	211	144	107
Migration scale ^a							
0	22	21	29	16	32	13	3
1-2	16	16	15	21	16	9	3
3-4	19	20	13	19	17	21	25
5	29	30	24	25	24	32	48
6-7	7	7	7	11	4	14	13
8-10	8	7	12	8	7	10	9
Willing to wait for Eastern job paying current wages ^b	85	86	85	91	88	80	75
Median wait time (months) ^c	6	6	6	6	6	6	6
Would then try to work in West ^d	11	11	15	13	7	14	28
Expected percent change in wages if work in West ^e	154	145	199	143	154	151	118
Hard to find a job in the West ^f	Yes	65	66	61	69	73	...
	No	35	34	39	31	27	45
Expect to lose my Eastern job ^g	Agree	28	28	...	65	28	38
	Disagree	39	39	...	9	37	37
Hard to find a new job in the East ^h	Agree	73	73	78	86	73	64
	Disagree	15	14	22	4	13	22

(Continued)

Table 11. Survey Responses Concerning the Reasons for Eastern Wage Increases

Percent

Survey statement	Agree ^a	Disagree ^a
"My wages rose to compensate for the removal of subsidies (for example, on food) and higher social insurance contributions."	52	33
"My wages rose because it would have been unfair for them to remain so far below the West German level."	31	57
"It is fair for West German firms that set up enterprises in East Germany to pay lower wages as long as the unemployment rate in East Germany remains high."	14	76
"My wages rose because productivity increased."	12	80
"My wages rose because unions fought hard for wage increases."	64	22
"My employer and/or my union was concerned that my benefits not be too low in case of short-time or unemployment."	28	56
"Unions were restrained in bargaining because they feared that more firms would go out of business."	29	51
"My current wage would be much lower now if wage contracts had been converted at the rate of two mark to one deutsche mark (instead of one to one)."	69	25

Source: Authors' own surveys of 556 nonstudents in East Germany in February 1991. The table shows the responses of employed individuals whose wages had increased since currency union. See text for further information.

^a In personal interviews, individuals could agree, partly agree-partly disagree, or disagree. In the mail questionnaire, individuals could also agree or disagree strongly. Agree refers to all those who agree or agree strongly. Disagree refers to those who disagree or disagree strongly.

Table 10 (continued)

Survey item	Nonstudents						Students
	All	Employed	Unem- ployed	Short- time	Female	Under 31	
Expect wages in the East to rise quickly ^a	Agree	46	52	19	37	47	35
	Disagree	31	26	59	29	29	42
Willing to accept up to a 20 percent wage cut ^b	Agree	28	32	25	13	30	17
	Disagree	59	48	70	75	57	78
Wouldn't be welcome in the West ^c	Agree	44	45	40	42	48	35
	Disagree	27	26	32	25	22	33

Sources: Authors' own surveys of 556 nonstudents and 107 students in East Germany in February 1991. The results for students, which are reported in the last column, were gathered from comparable questions in the special student survey with appropriate changes in wording as described in the text. For several questions the respondents were asked to agree, partly agree-partly disagree, or disagree with a given statement. In the mail sample, they could also agree strongly and disagree strongly. The percentages who agree or disagree in the table include those who agree strongly or disagree strongly, respectively.

a. The migration scale refers to a scale from 0 to 10, where 0 means "I am not going to work in West Germany under any condition", and 10 means "I am definitely going to work in West Germany."

b. "Imagine the following situation: (If employed: You are unemployed and) you learn that new, secure jobs will be created in East Germany which pay wages comparable to your old (current) job. If you can be reasonably certain that you will be offered a job, would you be prepared to wait for this job?"

c. "How many months would you wait?"

d. "What would you do next?"

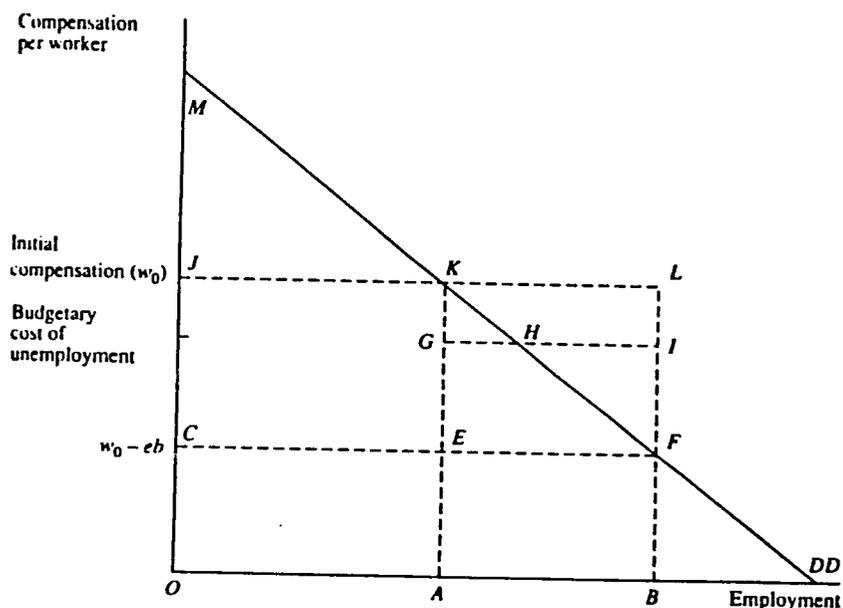
e. "By what percent would your wages change if you worked in West Germany?"

f. "Do you think it would be difficult or easy to find a job in West Germany?"

g. "If I stay in East Germany I will probably lose my job."

h. (If employed: If I lose my current job) "it will be difficult to find a (new) job in East Germany."

Figure 3. The Effects of Employment Bonuses with Fixed Eastern Wages



Direct budgetary cost of the subsidies
 - budgetary savings from lower unemployment
 - additional Treuhand revenues from selling firms

$CFLJ$
 $- ABIG$
 $- CFKJ$

= Net budgetary cost of the EB program.

= $KHLI - ABFHG$.