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Economic freedom, government policy and the trade-off between equity and economic growth *

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Abstract. This study investigates the role that economic freedom plays in economic growth and in the distribution in market income, the role of government policy in advancing economic progress and in promoting income equality, and the effect that the rate of economic progress has on the distribution of market income. Structural and reduced form models are estimated that reveal that economic freedom promotes both economic growth and equity, and that there is a positive but relatively small trade-off between growth and income inequality.

1. Introduction

The single most important political question of modem times is how to fabricate government policy so that the standard of living advances and all income classes benefit. Programs and policies that contribute to economic growth and those that redivide income separate the political parties of the right and the left. Many scholars (e.g., Tullock, 1983: 2) recognize that redistribution is the most important function of government, and that it is a major source of the growth in the size of the fiscal state (Peltzman, 1980). This role of government has been with us certainly since the second half of the nineteenth century.

To a great degree, raising living standards and "fairly" dividing the pie are mutually exclusive. Mainly, promoting economic growth means that government gets out of the way of personal decision making and the forces and consequences of free market exchange. Yet, government can contribute to economic growth. It does so by providing infrastructure, expanding educational opportunities, protecting property and contract, and providing for national defense and public health. Since these activities require resources, some size fiscal state is required and, perhaps, some intervention in market outcomes (market failures), also. These activities, up to some level, are growth-promoting. Beyond a certain size of the fiscal state, taxation, transfers, and market intervention are about redistribution. These political

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interventions have a price. As Okun (1975) pointed out long ago, transfers are made with a "leaky bucket" – a loss of national output arising from redistribution.

Several literatures are related to the study of the trade-off between the income distribution and economic growth and their link to freedom and government policy. A large literature on both the theory and the empirical evidence on the macroeconomic determinants of economic growth (including the effect of income inequality) has arisen over the last decade.[1] The early macroeconomic work was on the effect of economic transformation on income inequality in the backward countries (Adelman, 1973; Adelman and Morris, 1967; Chenery, 1974).[2] Early research that linked institutions or freedom and economic growth was by Kormendi and Meguire (1985), Scully (1988), and Grier and Tullock (1989). The topic was recently revisited by Dawson (1998). Early research on the effect of the size of the fiscal state on economic growth was by Landau (1983), Peden and Bradley (1989), and Scully (1989). The topic continues to be extensively studied. The optimal size state, in the sense of the tax rate that maximizes the growth rate is given in Barro (1990) and in Scully (1995, 1996).[3] The role of optimal policy (inflation, trade, freedom of capital markets, etc.) in increasing the rate of economic growth is discussed and its effect estimated in Kormendi and Meguire (1985) and in Scully (1997). Getting the right growth policies in place continues to be a topic of study. The effect of politics on income redistribution is discussed in Peltzman (1980) and is measured in Scully and Slottje (1989). The trade-off between income equality and economic efficiency at the macroeconomic level and its relationship to freedom (political, civil, and economic) was analyzed by Scully (1991). A positive trade-off between inequality and growth, which uses the same set of inequality measures utilized in this study, is found in Forbes (2000).

In this paper, using a set of high quality and consistent income distribution data for many advanced countries and for some newly industrializing Asian nations, the effect of economic freedom on economic growth and on income distribution, the effect of various government policies on economic growth and on income distribution, and the trade-off between equity and economic growth are examined. The analysis is conducted within a multi-equation framework, which is described in Section 2 of the paper. The data are described in Section 3 of the paper. The empirical results are discussed in Section 4. Conclusions follow.

2. Modelling the trade-off

A structural model of the trade-off between equity and economic growth contains three components. The first component is the link between the degree of economic freedom, FREE, and the set of attributes (mainly, policies that emerge in a political market) that constitute economic freedom. In what follows, endogenous variables will be in italics and exogenous or instrumental variables in normal typeface. For the instrumental variable equations, on the right hand side is listed within the parentheses all of the variables in the equation and within the squared brackets of all of the exogenous variables in the system.

Denote the vector of policy variables as X_i. Then,

$$FREE = f(X_i). \tag{1}$$

The economic growth equation is neoclassical: the growth in per capita income, g_y, is linked to the growth in per capita gross capital formation, g_k, the growth in per capita government consumption, g_g, and the degree of economic freedom present in the economy, *FREE*.

$$g_y = h(g_k, g_g, FREE)[g_k, g_g, X_i]. \tag{2}$$

The coefficient of the endogenous variable *FREE* on the rate of economic growth measures the impact of the metric (arbitrary up to a normalization) of economic freedom on the growth rate. The sign of the coefficient is expected to be positive (i.e., more economic freedom leads to a higher growth rate).[4]

Equity is measured by the Gini coefficient or by quitiles (income shares), and is designated as EQ. For reasons given below, certain dummy variables, D_i, are employed to adjust for different units (e.g., persons or households) upon which the equity measure is based. The equity equation then is

$$EQ = m(D_i, FREE, g_y)[D_i, X_i, g_k, g_g]. \tag{3}$$

The coefficient of the economic freedom measure on the Gini coefficient is expected to be negative (i.e., a higher level of economic freedom is expected to lead to a lower level of inequality).[5] The coefficient of the growth rate on the Gini is expected to be positive (i.e., higher growth is associated with greater inequality).[6]

The structural model is a multi equation model with endogenous variables on the right hand side. Absent any correlation among the residuals across the equation it is efficient to estimate the parameters of equation (1) by OLS and those of equations (2) and (3) by 2SLS (instrumental variables). However, in multi equation models it is likely that the disturbances are correlated across equations. If so, with simultaneity, 3SLS gives more efficient estimates.

An alternative specification of equations (2) and (3) drops the endogenous variable *FREE* and incorporates the exogenous policy variables directly. In other words, this is a reduced form model. This specification is worthwhile for two reasons. First, *FREE* is an aggregated and a constructed variable. While it lends important insight into the empirical link between economic freedom and growth and inequality, as an aggregated variable, a lot is hidden. And, by proceeding to the policy instruments directly, we can assess which ones, in a statistical sense, importantly relate to economic growth and which ones relate to income inequality.

The reduced form specification is:

$$g_y = \mathrm{h}(\mathrm{g_k}, \mathrm{g_g}, \mathrm{X_j}) \text{ and} \tag{2'}$$

$$EQ = \mathrm{m}(\mathrm{D_i}, \mathrm{X_i}, g_y)[\mathrm{D_i}, \mathrm{X_i}, \mathrm{g_k}, \mathrm{g_g}, \mathrm{X_j}]. \tag{3'}$$

3. Data analysis

3.1. *Measuring equity*

A vast scholarly enterprise has arisen that is devoted to the study of income inequality. By Deininger and Squire's (1996: 571) count, some 2600 calculations of Gini coefficients have been made across countries and time, with India getting the grand prize of having done it 166 times. These Gini coefficients vary tremendously within and across countries, in part because the coverage on which they are based differ. Some studies use a national sample, others use an urban or rural sample. Some use expenditure, some use income. Some use gross income, some use income net of taxes. Some are for households, some are for individuals. And, there are other differences, as well. The problem then in making cross-country equity comparisons is in finding a set of acceptable equity measures (i.e., measures where the units of comparison are similar).

Fortunately, Deininger and Squire (1996) have assembled all of the country inequality measures and sorted them according to their quality. They grade an equity measure as acceptable, if it is based on a national sample, is expenditure or income-based, and is for individuals or households. They find that the mean difference between person-based and household-based Ginis for 67 cases is 1.69 points, and as such including both recipient units in a cross-country study will not yield a systematic bias (Deininger and Squire, 1996: 580). For income versus expenditure-based inequality measures, they

find a mean difference of 6.6 points in the Gini coefficients, for 47 observations of acceptable quality data. This difference is judged to be significant and systematic (i.e., a source of bias) (Deininger and Squire, 1996: 581). For the gross or net of taxes-based measures, they judge that the difference may be relevant for developed nations, where progressive income taxation is the fashion (Deininger and Squire, 1996: 580). In the sample of countries and time periods used in this study (86 observations, in all), 81 (5) observations are income (expenditure)-based, 79 (7) are household (person)-based, and 47 (39) are gross (net) income-based. To adjust for these differences, and to avoid any systematic bias, dummy variables are utilized. These binary variables are: INC = 1, if an income-based unit, 0 otherwise; PERS = 1, if person-based, 0 otherwise; and, GROSS = 1, if gross income-based, 0 otherwise.

Exactly what do these Gini coefficients measure? Basically, they measure the inequality in the distribution of market-based income. But, to a certain degree, though not directly measured in the income variable, the presence of the large fiscal function of the modem state has behavioral consequences in the market place. Governments intervene in all sorts of ways to alter market-based outcomes and to redistribute income. Such intervention (e.g., progressive income taxation, transfers and subsidies, minimum wage, regulation) may affect factor demand and supply, and hence the distribution of market-based income. As such, one should not conclude that the market-based income inequality measures used here are entirely free of government intervention. To what degree government intervention affects these market-based inequality measures is unknown, but one should bear in mind that there may be an unknown bias of some magnitude in these inequality measures.[7]

The sample of countries used in this study are advanced industrial countries and some of the rapidly industrializing Asian nations.[8] Because of the time period in which certain government policy variables are available (Gwartney, Lawson, and Block, 1996), the country observations, where available, are for 1975, 1980, 1985, and 1990. If an observation for that year was not available, one year prior to or one year after the desired year was used (e.g., 1974 or 1976).[9] The growth rate variables utilized here match the year of the inequality observation. The statistics on the equity measures appear in the Appendix data table. For the Gini coefficient, the mean is .35 and the range is from .23 to .58.

3.2. *Economic growth*

The Summers and Heston (1991)-World Bank data on purchasing power parity adjusted per capita GDP (in U.S. dollars) are utilized for this study. These data continue to be the conventional choice in empirical studies of economic growth. The real growth rate in per capita GDP, g_y, has a mean of .023 and

a standard deviation of .04. The growth rate in gross per capita capital formation, g_k, is obtained by multiplying per capita GDP by the gross investment share of GDP. Its mean is –.005. The growth rate in per capita government consumption, g_g, is obtained by multiplying the government consumption share of GDP times per capita GDP. Its mean is .038.

The growth model utilized here is neoclassical. As stated above, the growth rate in per capita GDP is linked to the growth rate in capital formation per head and the growth rate in government consumption per head.[10] This model differs from the endogenous growth model (Barro, 1991) and the exogenous growth model (Mankiw, Romer, and Weil, 1992) that are conventional in the growth literature. In these models, growth is linked to initial per capita GDP (among other things), which is taken as a proxy for the initial condition, on the argument that high income countries will tend to grow at a slower rate than low income countries, other things being equal. Conditional convergence to each country's steady state is a theoretical conclusion in the exogenous growth model, while persistent growth (transitional dynamics that last forever) arises theoretically in endogenous growth models. While theoretically correct in both models, inclusion of initial per capita GDP on the right hand side of the growth regression creates a very serious econometric problem. As Friedman (1992), Quah (1993), and Scully and Bass (1998) have demonstrated, such a specification suffers from the fallacy of regression toward the mean.[11] Nearly all students of economic growth continue using this misspecified model. Here, as in the past (e.g., Scully, 1988), I avoid this econometric problem by linking economic growth to the expansion of per capita resources (g_k and g_g).

Moreover, by taking this approach inevitable multicollinearity problems that emerge in the empirics of the macroeconomic determinants of economic growth are mitigated (Mankiw, 1995: 304–306) discusses this problem). Freedom measures and many macroeconomic policy variables are correlated with initial period per capita GDP. Free countries have higher GDP per capita; countries that get policies right (wrong), get most things right (wrong). This collinearity with GDP per capita weakens correlation of these macroeconomic determinants with the growth rate of real per capita GDP.

3.3. *Policy variables*

The first measure of economic freedom to appear in the literature is by Scully and Slottje (1991). Since then a great deal of effort has gone into improving the measure and calculating it for countries over time. Currently, the best measure of economic freedom and its components is by Gwartney, Lawson, and Block (1996). Its strength originates from the clear thinking by a large group of eminent economists on exactly what constitutes economic freedom

and its components. From some 17 components, several indexes of economic freedom (dependent on the method of weighting the components) were constructed by the authors. The one that I have chosen is an aggregate of the components weighted by one over the standard deviation of the component. This index, designated as FREE, has a mean of 5.6 for the sample of countries utilized in this study, with a range between 3.3 to 9.5 (a higher number on the scale 0 to 10 indicates more economic freedom).

Because of their availability for the countries in the sample, 9 components were selected as policy variables. These variables appear in the data appendix table. SOE is an index (0 is worst, 10 is best) of government-owned enterprise as a share of the output of the economy and government investment as a share of total investment. The measure probably is a crude proxy for government intervention in the market place as a whole. The mean value of SOE is 5.2, with a range from 2 to 10. TAX is an index (scaled 0 to 10) that captures the degree of takings by government, and is based on the top marginal tax rate and the threshold at which it applies. Countries with higher marginal tax rates that apply to relatively low income thresholds receive a low rating. The mean value is 2.8, with a range between 0 (worst) and 10 (best). BLACK is an index based on the difference between the official and black market exchange rate. It has a mean of 8.7 and a range of 3 to 10. Countries with freely convertible currencies have a rating of 10; countries where the black market premium is 50% or more have a rating of zero. TRADE is the actual extent of foreign trade, measured as exports plus imports divided by GDP. Its mean is .77, with a range between .15 and 4.23. TS is transfers and subsidies as a percent of GDP, which captures the redistributive fiscal state on the expenditure side. Its mean is .14; the range is between .06 and .32. INFLAT is a measure of unanticipated inflation (measured by the standard deviation of the country's CPI over 5 years). Its mean is .037 and its range is .005 to .43. MONEY is a dummy variable equal to 1, if residents are allowed to own foreign currency, and 0 otherwise. BANK is a dummy variable equal to 1, if residents may maintain foreign bank accounts, and 0 otherwise. INVEST is an index on the liberality toward foreign investment. Its mean is 5.2, with a range from 0 (most restricted) to 10 (least restricted). Countries where domestic investments by foreigners and foreign investments by citizens are unrestricted receive a rating of 10. Where government approval is required for both domestic investment by foreigners and foreign investments by citizens a zero rating is given. GCONS is government consumption as a share of GDP. Its mean is .17, and its range is from .06 to .29.

4. Empirical results

Of the three dependent variables in the structural model, two are bounded in the unit interval (FREE is easily rescaled as FREE/10), and as such the regression cannot have normally distributed residuals.[12] A solution is to convert such variables to a log-odds transformation (i.e., $\ln(y/(1-y))$).[13] A disadvantage of such a transformation is that it makes difficult discussion and interpretation of the regression coefficients of interest. This can be remedied by converting back to an arithmetical value calculated at the mean. Since $\ln(y/(1-y)) = a + bx + \epsilon, y = 1/(1+e^{-(a+bx+\epsilon)})$. Then, $dy/dx = be^{-(a+bx)}/[1+e^{-(a+bx)}]^2 = \hat{b}\overline{y}(1-\overline{y})$, where $\hat{b}$ is the estimated regression coefficient and $\overline{y}$ is the mean value of y.

The model was first examined for any non-normality in the disturbances. Standard tests for heteroskedasticity were performed. Based on the χ^2 values, equations (1) and (2) were found to have normal errors. Equation (3) has heteroskedastic residuals. The appropriate correction is White's (1980) heteroskedastic-consistent covariance matrix estimation, which yields the corrected asymptotic standard errors. This correction is made for all of the 2SLS estimates of the equity regressions and for the 3SLS system estimation for all of the regressions.

As the literature review above indicates, there are many competing theories that seek to explain economic growth, and income inequality, as well. The explanatory variables in these different models often contain non-overlapping variables. Hence, an issue about a structural model is whether the instrumental variable equations are overidentified. A test for overidentifying restrictions is the J-test (Davidson and MacKinnon, 1981). This test was performed on the instrumental variable equations and the probability value obtained. For Equation (2) the p-value is .63 and for Equation (3) it is .69. Since none of these p-values indicate statistical significance, the result indicates that the structural model has no overidentifying restrictions and is not misspecified.

Table 1 presents the results for the first model, which was discussed previously. To conserve space and because the regression of log-odds FREE on the 9 policy components is not central to the study, the regression result is not presented. However, it is worth noting that all of the regressors are significant and of the right sign, and that most of the variation (R^2 adj. = .92) in the economic freedom index is associated with these policy variables.

As can be judged by the high R^2 in Table 1, a large portion of the variation in economic growth across the sample of countries is associated with the specified regressors. The per capita economic growth rate is determined in a statistically significant manner by the growth rate in gross capital formation per head, the growth rate in government consumption per head, both of which

Table 1. 2SLS and 3SLS estimates of structural model (N = 86)

Variable	g_y	log-odds GINI	g_y	log-odds Gini
	2SLS	2SLS	3SLS	3SLS
Constant	.18E-02	–.69	–.11E-03	–.70
	(.87)	(.14)	(9.5)	(.14)
g_k	.26		.26	
	(.016)		(.019)	
g_g	.21		.22	
	(.036)		(.040)	
FREE	.25E-02	–.53E-01	.28E-02	–.53E-01
	(.14)	(.19)	(.15)	(.18)
g_y		2.73		2.79
		(.66)		(.63)
INC		.084		.09
		(.12)		(.12)
PERS		.14		.15
		(.10)		(.10)
GROSS		.40		.40
		(.05)		(.05)
R^2	.81	.50	.81	.50

Note. Asymptotic standard errors, corrected for heteroskedasticity, in parentheses.

are exogenous variables, and by FREE, which is an endogenous variable. The coefficients of g_k and g_g on g_y are statistically significant well above the 99% level. The coefficient of economic freedom on the growth rate is significant in a two-tail test at the 92% level, but in a one-tail test, which is appropriate since the sign is known a priori, it is significant at the 96% level. The value of the coefficient is .0025. The mean growth rate is .023 and the mean value of FREE is 5.6. The range in the value of the FREE index is 3.3 to 9.5, a difference of 6.2. This difference multiplied by the coefficient yields a predicted spread in the per capita growth rates of about 1.5 percentage points, a tidy growth rate differential. And, it is to be remembered that we have no Zambias or other freedom-suppressing regimes in this sample of countries. These are the advanced countries and some newly, industrializing, Asian states.

The income inequality regression, which has the log-odds of the Gini coefficient as the dependent variable, performs well statistically. The coefficient of FREE on the Gini coefficient is negative and statistically significant. This means that nations that have more economic freedom have a more equal

income distribution. The value of the coefficient is –.053. Converting the coefficient (–.053* .35* (1–.35)) to an arithmetic unit at the mean yields –0.13. Given the difference in the range of economic freedom (6.2), the predicted spread in the Gini coefficients is .075, which is not terribly large, since the Gini coefficients in the sample range from .23 to .58. a difference of .35.

The coefficient of the growth rate on the log-odds of the Gini is 2.73 and is statistically significant. Hence, the result indicates a trade-off between income inequality and economic growth. Transforming the coefficient to its arithmetical value at the mean yields .62.Therefore, a one percentage point increase (i.e., .01) in the rate of economic growth is predicted to yield a .0062 increase in the Gini coefficient. For this sample of countries and time periods, at least, we can conclude that a rather small increase in income inequality is associated with economic growth. While the effect of growth on income inequality is rather small here, it is even smaller in a recent study by Forbes (2000: 878). She finds that a ten point increase in the Gini yields a 1.3% increase in growth. Compared with the result here, 0.62^{-1} gives the trade-off of the growth rate with respect to the Gini coefficient. A one point increase in the Gini yields a 1.6% per annum increase in per capita economic growth.[14] At one standard deviation of the growth rate, the interval in growth rates is –.018 to .063. At .05, the predicted difference in the Gini is rather small for this large spread in the growth rates.

The results of the 3SLS system estimation of the structural model also appear in the table. While there are differences in the coefficients and in the asymptotic standard errors, the differences are rather small. If anything, system estimation strengthens the statistical findings on the coefficient of FREE on the growth rate, on the coefficient of FREE on the GINI, and on the coefficient of the growth rate on the Gini coefficient.

The estimates of the coefficients of the reduced form model appear in Table 2. In the model, FREE is dropped as a variable, and the policy variables are directly introduced into the analysis. The growth equation has two policy or state variables that are statistically significant – TRADE and GCONS. At one standard deviation, the range in trade as a share of GDP is 1.32. Multiplied by the coefficient, the predicted spread in the growth rate is .01. Thus, ceteris paribus, openness to international trade is of some importance in raising the standard of living. The size of government, measured by government consumption as a share of GDP, lowers economic growth, and the order of magnitude is roughly the same as the trade share.[15] At one standard deviation, the spread in GCONS is .10. Multiplied by the coefficient, the predicted spread in economic growth is .0084 percentage points.

Increases in the size of the government consumption share lower income inequality, an expected result. But, its effect is small. The coefficient of the

Table 2. Parameter estimates of reduced form model

Variable	log-odds			
	g_y	GINI	g_y	GINI
	OLS	2SLS	3SLS	3SLS
Constant	.25E-01	–.44	.25E-01	–.45
	(.081)	(.13)	(.085)	(.13)
g_k	.25		.25	
	(.016)		(.019)	
g_g	.19		.18	
	(.035)		(.052)	
TRADE	.74E-02		.77E-02	
	(.30)		(.37)	
GCONS	–.84E-01	–1.28	–.84E-01	–1.24
	(.41)	(.59)	(.40)	(.59)
TAX		.14E-01		.14E-01
		(.10)		(.10)
TS		–.78		–.81
		(.33)		(.33)
INFLAT		1.18		1.20
		(.41)		(.41)
SOE		–.75E-01		–.76E-01
		(.11)		(.11)
INC		.28		.29
		(.074)		(.075)
PERS		–.22		–.21
		(.12)		(.12)
GROSS		.33		.33
		(.055)		(.055)
g_y		1.33		1.35
		(.61)		(.62)
R^2	.83	.71	.83	.71

Note. Asymptotic standard errors, corrected for heteroskedasticity, in parentheses.

log-odds of the Gini on GCONS is –1.28 (transformed back to its arithmetical value, it is –.29). The difference in the GCONS at one standard deviation (range) is .10 (.23). Multiplied by the coefficient, the predicted spread in the GINI is .029 (.067).

Four other policy variables are found to be related to the income distribution. The tax variable coefficient is .014, but the coefficient is statistically marginal. The effect on the log-odds of the Gini of transfers and subsidies as a share of GDP (TS) is negative and statistically significant. The effect of the regulatory side of government, at least as measured by government-owned enterprise as a share of the economy (SOE), is rather large and is statistically significant. The coefficient is –.075 (converted back to its arithmetical value it is –.017). At one standard deviation (range) in the SOE rating, the predicted effect on the GINI is .07 (.14). State intervention in the economy, at least as measured by this variable, has a big effect on income distribution.

Inflation, as measured by the standard deviation in the CPI, has a statistically significant positive effect on income inequality. Conventional wisdom holds that unanticipated inflation redistributes income from the rich (predominantly, bondholders) to the non-rich. Hence, ceteris paribus, unanticipated inflation ought to lower the GINI. There is such evidence of the direction of this effect of inflation on income inequality for the United States (Blinder and Esaki, 1978; Scully and Slottje, 1989). Yet, the empirical evidence, here, is just the opposite. At one standard deviation of INFLAT, the predicted effect on the GINI is .03.

The coefficient of the endogenous economic growth variable on the log-odds of the GINI, while remaining statistically significant, in the reduced form model is about one half of its value in the structural model (1.33 versus 2.73). Thus, taking government policy into account, as measured by the various policy measures specified in the model, the predicted effect on the GINI of a one standard deviation in the growth rate (.081 points) is .025.

The system estimation by 3SLS yields only modest differences is the parameters and asymptotic standard errors.

4.1. *Income quintiles*

A disadvantage of the Gini measure (this is true for other aggregate measures of income inequality, as well) is that there is no unique mapping between changes in the measure and the underlying income distribution. That is, redistribution from the top to the middle or the middle to the bottom may yield the same value of the Gini coefficient. Partly for this reason, but because there is more information in the quintiles, as well, we return to the structural model, with quintile income shares as the dependent variable.

Table 3. 3SLS system estimation of quintile income shares (N = 80)

Variable	q_1	q_2	q_3	q_4	q_5
Constant	.68E-01	.12	.18	.24	.39
	(.072)	(.008)	(.009)	(.005)	(.03)
FREE	.27E-02	.26F-02	.11E-02	–.53E-03	–.59E-02
	(.10)	(12)	(14)	(1.0)	(37)
g_y	–.90E-01	–.16	–.23	–.16	.64
	(.30)	(.038)	(.057)	(.045)	(14)
INC	–.56E-02	–.32E-02	.11E-03	.67E-02	.20E-02
	(.64)	(.68)	(7.4)	(.33)	(.021)
PERS	–.94E-03	–.95E-02	–.15E-01	–.15E-01	.41E-01
	(4.7)	(.74)	(.073)	(.05)	(.23)
GROSS	–.23E-01	–.22E-01	–.19E-01	–.12E-01	.77E-01
	(.028)	(.036)	(.044)	(.036)	(12)
R^2	.50	.42	.34	.28	.47

Note. Asymptotic standard errors, corrected for heteroskedasticity, in parentheses.

The quintiles, of course, sum to unity. Hence, it is natural to model them jointly as a system of share equations, with an arbitrary quintile dropped from the model to obtain a nonsingular system. Since $\sum \mathbf{b}_i = 0, i = 1, 5$ quintiles, the vector of the coefficients of the dropped quintile is easily obtained. With simultaneity and to account for any contemporaneous correlation in the disturbances across equations, system estimation is by 3SLS. The results appear in Table 3.

The pattern of the signs of the coefficients across the quintiles tells an interesting story, and one that is consistent with the findings on the effect of economic freedom and economic growth on the Gini coefficient. The effect of an increase in economic freedom is to raise the income shares of the two lowest quintiles (the coefficients are statistically significant). Changes in FREE have no apparent effect on the income shares of the third and fourth quintiles. However, increased economic freedom lowers the share of the highest income quintile (the coefficient is statistically significant at the 89.2% level in a two-tail test and at the 94.6% level in a one-tail test). A similar finding of the effect of economic liberty on the share of income of the highest income quintile for 70 nations is found in Scully (1991). The effect of economic growth on income shares is statistically significant across all income quintiles. But, the lowest income quintiles experience a negative effect from economic growth, while the highest income quintile experiences a positive effect.

The results of the analysis of the effect of economic growth on income shares are consistent with the finding of its effect on the Gini coefficient. It was found (3SLS estimate of the coefficient in Table 2) that a one percentage point change in the growth rate was associated with a .64 point change in the Gini coefficient. In the quintile share equations, a one point increase in the growth rate raises the share of income going to the highest income quintile by .64 percentage points and, of course, lowers the share of income share going to the other income quintiles by an equivalent amount.

5. Conclusions

In this study, it is found that the amount of economic freedom across nations has the attribute of increasing the rate of economic progress and improving the distribution of market income. That economic freedom is a positive and significant macroeconomic determinant of economic growth is not a controversial finding. The empirical evidence here indicates that economic freedom reduces income inequality (i.e., lowers the Gini). Estimation of the structural model applied to the quintile income shares indicates that it does this by increasing the share of market income going to the two lowest income quintiles and lowering the share going to the highest income quintile. This finding is not without controversy. Berggren (1998) has concluded the opposite. But, the failure to adjust for differences in the unit or basis of the sample upon which the inequality measure is constructed, raises doubt about his finding.

Economic growth raises income inequality. From the results of the parameter estimates of the structural model of the system of income quintile share equations, it does so by shifting the share of market income to the highest quintile, at the expense of the other income quintiles. Judged by the size of the coefficient of economic growth on the Gini, the amount of increased income inequality is rather small for substantial differences in growth rates across the sample of countries utilized in this study. Again, this finding of a positive trade-off between economic growth and income inequality is not without controversy. A number of earlier findings are of a negative correlation between income inequality and economic growth. But, these studies have used Gini coefficients calculated from diverse and non-comparable samples. Forbes (2000), using the same set of quality controlled income inequality measures employed here, finds a positive and statistically significant trade-off between growth and inequality, as well.

The reduced form model examined the effect of various policy measures on economic growth and on income inequality. Holding the growth rates of per capita gross investment and per capita government consumption constant, more openness of international trade is associated with more growth; a larger

fiscal state is associated with lower growth. A larger set of policy variables affected the distribution of market income. The statistically significant policy variables that reduce income inequality are the size of the fiscal state, as measured by government consumption as a share of GDP, transfers and subsidies as a share of GDP, and the index of state owned enterprise. Unanticipated inflation appears to increase income inequality.

Notes

1. Modern growth theory is reviewed in Mankiw (1995). The endogenous growth model is developed in Barro (1991) and extensively analyzed theoretically and empirically in Barro and Sali-i-Martin (1995). The modem neoclassical or exogenous growth model is developed and tested in Mankiw, Romer, and Weil (1992). For a critical review of the empirical study of the macroeconomic determinants of growth see Levine and Renault (1992). Levine and Renault use extreme bounds analysis to demonstrate that most of the macroeconomic determinants of growth are not robust. Extreme bounds analysis is an excessively strict criterion to be of much use. Surveys of theoretical and empirical aspects of income inequality and growth are contained in Benabou (1996) and Perotti (1996).
2. The earliest discussion on the implication for inequality of exogenous economic growth is Kuznets (1955).
3. Colin Clark (1945) conjectured that a tax share of 25% of national output was about the maximum rate before the rate of economic progress suffered.
4. The reasons are well known in the literature. In a free economy there are no long-term economic rents to be had; the larger the share of government in the economy, the more resources are withdrawn from productive activity, at their opportunity cost, and wasted in the political market in rent-seeking activity. Value-added in the government sector is widely held to be lower than in the private sector. Regulatory activity sets prices in a political market, not at a level that maximizes income. Incentive and distortionary effects arise when governments intervene in the market allocation of resources. A fuller discussion of these issues is contained in Scully (1992).
5. Partly, the reason is given in the previous note. Free societies actively encourage equal opportunity for all. Less free societies tend to allocate favor, resources, licenses, and so on to those groups that support the political regime. Further discussion and evidence of the link between freedom and equity is contained in Scully (1991).

   Recently, Berggren (1999) found that the level of economic freedom in 1985 is positively correlated with the Gini coefficient, but that the interperiod change in freedom is negatively correlated. It is impossible to know exactly what is his sample of countries, but he appears to have 66 observations of Gini coefficients and the economic freedom index for 1975 and 1985. There is no control for the sample base in his study, and the summary measure of economic freedom is based on weights conjectured by participants at various Economic Freedom Conferences. Berggren's failure to adjust for the type of income on which the inequality measure is based throws into doubt his empirical finding that the level of economic freedom is associated with more inequality. While the three aggregate economic freedom indexes constructed by Gwartney, Lawson. and Block (1996) are intercorrelated, the match is by no means perfect. The authors point to serious flaws concerning the aggregate economic freedom index that Berggren chose as the measure for his study.

6. Previous studies (Alesina and Perotti, 1994; Alesina and Rodrik, 1994; Person and Tabelli, 1994; Birdsall, Ross and Sabot, 1995; and Clarke, 1995) mainly find a negative relationship between inequality and economic growth. However, these studies are plagued by the use of inequality measures across countries that have come from vastly different and essentially non-comparable samples. As such, serious measurement error in inequality and omitted-variable bias are econometric problems that undermine these studies. For a discussion of these problems see Forbes (2000). As mentioned already, Forbes finds a positive relationship between inequality and growth.
7. It is a source of amazement that after a century of growth in taxation and transfers, little is known as to the effectiveness of the fiscal state in redistributing income. To know how effective that intervention is in redistributing income, an inequality measure based on income net of taxes and inclusive of government expenditures is required. Such a measure then could be compared to the market-based inequality measure to determine the efficacy of government intervention in redistributing income. In such an inequality measure, all taxes need to be subtracted from income, and, then, all specific goods and services provided by government expenditures, including the imputed value of public goods (first calculated by Aaron and McGuire, 1970), added to market-based income (see Scully and Stroombergen, 2000, for the application of this methodology to New Zealand). But, of course, because of the conceptual and empirical difficulties, this type of computation is seldom made.

   To the extent that political regimes in advanced countries are by and for the middle class, income redistribution is a zero sum game (negative sum, if there is efficiency loss and transaction cost in the redistribution game) of taxing and then transferring back income to the middle class. If so, the post-fiscal distribution of income may not differ much from the pure market distribution of income. This view is consistent with Director's Law (Stigler, 1970): the capture of the state's coercive power by voters to redistribute income toward the middle class majority in representative democracies.
8. The countries in the sample are Australia, Belgium, Canada, Denmark, Finland, France, West Germany, Greece, Hong Kong, Ireland, Italy, Japan, S. Korea, Malaysia, Mexico, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Taiwan, Thailand, United Kingdom, and the United States.

   Excluded from the sample of countries are the less developed nations. In part, this exclusion is justified on the basis that such countries are only partially monetized. It would seem unreasonable to use Gini coefficients which are based on money income or expenditure for countries where a good deal of economic exchange is by barter and where own-household production and consumption is high relative to market production and consumption. A more general reason for excluding the LDCs is the problem of parameter heterogeneity. It is likely that in cross-section growth and equity regressions the parameters will vary across developed and undeveloped nations, which will render conventional estimates inconsistent.
9. I violated my self-imposed rule twice. The latest observations for Belgium and Denmark are for 1992.
10. The model to be estimated is linear throughout. Therefore, the growth model is linear in form. Since all of the countries are highly developed or rapidly industrializing, linearity in the relationship is a serviceable approximation. Nevertheless, a logarithmic specification (with g transformed to $1 + g$ for all of the variables) was tested against the linear specification. Statistically, there were no meaningful differences in the coefficients or standard errors.

11. Evans and Karras (1993: 150) argue that the usual specification for testing for convergence can yield severely biased estimates. If the coefficient of initial per capita income (consumption) is negative and *all* factors (**x** variables) that cause permanent variation in steady states have been specified and if the regression coefficients of *all* of the **x** variables are zero (non zero) then *absolute* (*conditional*) convergence is implied. But, the assumption that **x** has been exhaustively specified in previous studies has not been met, and the OLS estimate of the convergence parameter cannot have been consistent.
12. Additionally, FREE is an ordinal variable. While most research that uses this measure (and, other freedom measures, as well) employs them in their ordinal form, one might wish to model FREE as a categorical variable within the framework of a polychotomous choice problem. However, this is left to future work on the topic.
13. An alternative is to assume a gamma-distributed error term and use MLE.
14. Forbes (2000) uses a sample of 45 countries for up to six time periods (5 year averages over the period 1966–95) and a fixed effects and a generalized method of moments model in first differences of the variables. Since fixed effects models remove inter-country effects, the coefficient reflects short to medium term effects of income inequality on growth. The coefficient naturally is smaller than in my model, since my model captures effects across my sample of countries. Coefficient estimates in the GMM model are even smaller, since first differences of the variables are used.
15. That the size of government lowers economic growth has been found before. But, others have found a positive or no association between the variables. Nijkamp and Poot (2000) review 41 published studies on the topic and conclude that the effect of the size of government on economic growth is an open question. They also conclude that a number of other macroeconomic determinants of economic growth also are of ambiguous sign. The problem with their egalitarian research methodology is that it reduces all intellectual inquiry, no matter how well or how badly conceived and measured, into a simple counting of signs of the relevant coefficient. Subjecting this count to a 95% probability confidence interval to determine whether the null hypothesis of an inverse relationship between size of government and economic growth is accepted trivializes the scholarship undertaken on this topic.

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Appendix data table 1.

Measure	Description (source)	Mean (σ)
Equity		
Gini	Gini coefficient (DS)	.35 (.07)
q_1	First Quintile (DS)	.064 (.017)
q_2	Second Quintile (DS)	.12 (.020)
q_3	Third Quintile (DS)	.17 (.023)
q_4	Fourth Quintile (DS)	.23 (.018)
q_5	Fifth Quintile (DS)	.42 (.066)
INC	Dummy = 1, if income-based unit	.94 (.24)
PERS	Dummy = 1, if person-based unit	.08 (.28)
GROSS	Dummy = 1, if gross income-based unit	.55 (.50)
Growth		
g_y	Real growth rate of per capita GDP (SH)	.023 (.040)
g_k	Real growth rate of per capita investment (SH)	–.05 (1.24)
g_g	Real growth rate of per capita government consumption (SH)	.038 (.054)
Policy		
FREE	Index of Economic Freedom (GLB)	5.6 (1.4)
SOE	Index of Government Enterprise (GLB)	5.2 (2.1)
TAX	Index of Government Taxation (GLB)	2.8 (2.6)
BLACK	Index of Black Market Exchange Premium (GLB)	8.7 (1.9)
TRADE	Exports plus Imports/GDP (GLB)	.77 (.66)
TS	Transfers and Subsidies/GDP (GLB)	.14 (.092)
INFLAT	Inflation Variability (last 5 years) (GLB)	.036 (.051)
MONEY	Dummy if Ownership of Foreign Currency (GLB)	.65 (.48)
BANK	Dummy if Ownership of Foreign Bank Account (GLB)	.54 (.50)
INVEST	Index of Capital Transactions with Foreigners (GLB)	5.2 (3.0)
GCONS	Government Consumption/GDP (GLB)	.16 (.05)

Except for the statistics on quintile share (N = 80), the sample size is 86.

DS = Deininger and Squire (1996). Data on the Gini coefficient and the income quintiles and explanations concerning the data-base file are available on the web site www.worldbank.org.

SH = Summers and Heston (1991). Data are from the diskette for Penn World Table (Mark 5.6). g_y is calculated from the data as $(RGDP_t - RGDP_{t-1})/RGDP_{t-1}$. For g_k and g_g the variables were constructed as follows. Gross investment (government consumption) as a share of GDP was multiplied by RGDP to obtain per capita real gross investment (government consumption). The growth rate in each variable was obtained in the usual manner.

GLB = Gwartney, Lawson, and Block (1996). All of the data used here for the above variables are contained in their Appendix II – The Underlying Data and Country Ratings for Each of the 17 Components in the Index, pp. 244–308.