

Revealed Social Preferences for Equality and Growth

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forthcoming **Journal of Income Distribution** 2008

Abstract

Using the Kuznets' inverted-U-shaped association as a structural constraint, we model the social tradeoff between changing inequality and changing income. If observed outcomes for recent decades are taken as constrained political-economic optima, this model identifies the parameters of a social welfare function. Our cross-country regression results tentatively suggest that the world is becoming an anti-egalitarian place.

JEL Codes: O10, O15, O50

Keywords: growth, inequality, social welfare

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1. Introduction

Economic growth and equality are widely held social goals and the association between the two has been much investigated. Kuznets (1955) was the pioneer in exploring this association, although he did so at a time when data were very limited. Based on some simulations and the economic history of the US, Germany, and England, he hypothesizes an inverted-U relation between development and inequality.¹

Kuznets theorizes that income is causal for inequality. Another strand of the development literature takes equality as the independent variable and the rate of change of per capita income, rather than its level, as the dependent variable. Kuznets also motivates this literature to the extent that it offers models or evidence about at least part of the inverted-U curve. Although both strands reveal a concern for policy, neither brings social choice into the formal analysis. Our approach develops a different methodology: we take both growth and equality to be endogenous, chosen to maximize social welfare subject to the constraint implied by the Kuznets curve.

In section 2 we review the Kuznets literature. We develop a social choice model in section 3; section 4 describes the data and presents the empirical findings. We close with tentative interpretations.

2. Is the Kuznets hypothesis conventional wisdom?

The inverted-U hypothesis has inspired much empirical and theoretical work. Citing both methodological and data problems Glomm's review of the literature (1997) concludes that this shape should not be elevated to the status of conventional wisdom.² At about the same time the availability of inequality data drastically improved as a result of the work of Deininger and Squire (1996), who published an extensive cross-country, cross-time panel, collecting the findings of a large number of Gini coefficient studies. After these data are merged with the Summers and Heston (1991) income data, Deininger and Squire (1998) conclude that the inverted-U shape is rejected. Barro (2000) disagrees; he finds that the

¹ He conceded that his paper was "perhaps 5 per cent empirical information and 95 per cent speculation, some of it possibly tainted with wishful thinking."

² For example, Adelman and Morris (1973), Paukert (1973), Cline (1975), Chenery and Syrquin (1975), Ahluwalia (1976), and Thorton (2001) are supportive of Kuznets. While Saith (1983), Ram (1988), Campano and Salvatore (1988), Anand and Kanbur (1993), Fields and Jacobson (1994) and Ravallion (1995) report contrary evidence. Kanbur and Squire (2000) provide an extensive review of the literature and assume a position consistent with Glomm's.

Kuznets curve “emerges as a clear empirical regularity.” Fields (2001) counters that the curve “flips” when country-specific intercept terms are included in the regression specification, while Barro’s results remain robust with respect to the addition of these fixed effects. Following Barro we specify

$$(1) \quad G_t = \alpha_0 + \alpha_1 \ln Y_t + \alpha_2 (\ln Y_t)^2,$$

where Y_t is real GDP per capita, and G_t the Gini coefficient, and $\alpha_1 > 0$ and $\alpha_2 < 0$ are expected.

Although, the literature is far from conclusive, we proceed as if the Kuznets hypothesis has long been known to be true. While the lack of consensus necessarily qualifies our specific inferences, our contribution is a methodological one: in principle social preferences can be inferred from observed outcomes when we can specify the functional form of the social welfare function and can identify the constraints impinging on each society. Our interpretation of this curve as a constraint is consistent with Kuznets’ exposition of this structural, demographic, and technological relation that is logically prior to any considerations of public policy. We suppose that each society knows that it is constrained by this curve. For the upward-sloping regions of the Kuznets curve, greater growth is associated with less equality, while in the downward-sloping regions higher growth implies more equality. Clearly, these are heroic assumptions.

3. A political economic model: social choice between growth and inequality

The modeling of collective objectives is also controversial. We propose that social welfare is a parabolic function of economic growth and change in the Gini coefficient,

$$(2) \quad W_t = y_t + \beta y_t^2 - \lambda(G_t - G_{t-1}),$$

where $y_t = \ln Y_t - \ln Y_{t-1}$ is real economic growth per capita. We define the λ parameter as a measure of the tradeoff between the growth rate and the change in the Gini coefficient. A positive functional relation between social welfare and a measure of equality can be stipulated with any normative theory of justice.³ Accordingly, the weighting parameter λ should be positive, however if a society prefers greater inequality, then λ would be negative. Because of social costs associated with rapid economic growth, the β parameter ought to be negative. Such costs include the environmental degradation associated with rapid growth, coordination costs involving public and private investment, and the foregone consumption associated with

³ Refer for example to Rawls (1971), Fields (2001: p.165) and World Bank (2006: pp. 18-20).

high saving. We suppose that each society knows its own preferences and takes collective action accordingly. A variety of alternative functional forms are plausible.⁴ We chose equation (2) for simplicity and convenience. This could be an area for further research, and we briefly consider an alternative at the end of the next section.

This equation can be interpreted as the social welfare function in a positive political economy sense. In cases where the median voter model of democracy is accurate, then (2) is simply the utility function of the median voter. However, it may be possible for equality preferences to be over-ruled in observed policy; it may also be that voter preferences are manipulated to favor observed policy. In undemocratic societies, this function could reflect the personal ideology of the head of state, or the ruling elite. Military or political elites in non-democratic societies may care about inequality because of the associated social and political instability. Regime type may be reflected in variations in the parameters β and λ . Countries that have undertaken structural adjustment agreements with the International Monetary Fund (IMF) may find that the international financial institutions impose other priorities. The parameters of (2) may also vary for cultural reasons. Irrespective of how preferences are shaped, we view these as a form of “collective action” even if by default.

Taking the first difference of (1), it can be shown that

$$(3) \quad G_t - G_{t-1} = (\alpha_1 + 2\alpha_2 \ln Y_{t-1})y_t + \alpha_2 y_t^2.$$

We refer to this as the *tradeoff* equation because it re-specifies the Kuznets curve in the variables that appear in our hypothesized social welfare function. This equation presents the structural constraint for social choice; it enables the identification of the preference parameters β and λ . Substituting (3) into the social welfare function, taking the derivative with respect to the growth rate and solving, the optimum growth policy is

$$(4) \quad y_t^* = \frac{1 - \lambda(\alpha_1 + 2\alpha_2 \ln Y_{t-1})}{2(\lambda\alpha_2 - \beta)}.$$

Substituting back into (3), the optimum change in inequality is

⁴ Functions such as (2) have been called “abbreviated social welfare functions;” see Lambert (1993).

$$(5) \quad G_t^* - G_{t-1} = \frac{(1 - \lambda(\alpha_1 + 2\alpha_2 \ln Y_{t-1}))(\lambda\alpha_1\alpha_2 - 2\alpha_1\beta + \alpha_2 + 2\alpha_2(\lambda\alpha_2 - 2\beta)\ln Y_{t-1})}{(2(\lambda\alpha_2 - \beta))^2}.$$

Our modeling assumption that each society takes collective action to achieve this optimum combination certainly implies strong assumptions about the collective rationality of societies and governments and about the effectiveness of policy instruments.

For a society that is indifferent to equality ($\lambda=0$), the optimal combination is

$$y_t^* = -\frac{1}{2\beta}$$

$$G_t^* - G_{t-1} = \frac{(\alpha_2 - 2\alpha_1\beta - 4\alpha_2\beta \ln Y_{t-1})}{(2\beta)^2}.$$

Thus, indifference to equality does not necessarily imply the status quo, i.e. $G_t^* = G_{t-1}$. A conceptual disadvantage of our model is that it has no long-run equilibrium; in fact (3) implies that a Gini equilibrium also requires zero growth.⁵ Our model describes only the change in the social-economic equilibrium, not its level.

There are other plausible specifications of this problem, of course. One is that countries conceptualize their social welfare in terms of the level of the Gini coefficient, not its change; perhaps for convenience

$$W_t = y_t + \beta y_t^2 - \frac{1}{2}(G_t - \hat{G})^2.$$

This specification seems less plausible unless the target inequality parameter \hat{G} is allowed to differ due for reasons of culture and social history. Different cultures might more easily share opinions about identical changes in G . We can proceed nevertheless to solve this problem in the same fashion by substituting the tradeoff equation and solving the optimality condition. There are three solutions. All are complicated expressions; none are generally long-run equilibriums; only one of these is a real number for reasonable parameter values (those estimated below). We prefer our specification with its simpler, unique solution.

⁵ Equation (3) has two solutions, but the second is not economically plausible.

4. Data and estimation

We estimate the Kuznets curve with 487 observations from the merged World Income Inequality Database (WIID 1.0) and Summers-Heston dataset (Penn. World Tables (PWT 6.1)).⁶ Observations and the fitted curve are shown in Figure 1. On the vertical axis are 5-year averages of the Gini coefficients; on the horizontal axis are 5-year averages of logarithm of the real GDP per capita (measured in 1996 US dollars). This data set is constructed by merging annual measurements of real gross domestic product per capita and the Gini coefficient during 1955-2000. The frequency of measurement is aggregated to 5-year intervals by averaging over observations during the previous five years, even if only one observation is available during this period. WIID includes both high and low-quality data. They define a high-quality Gini estimate as one calculated from a clearly documented nationwide incomes survey of a representative sample of the population or workers. An observation is labeled low quality if the primary source of the data is not clearly identified, or if it is based on non-representative tax records, or is limited to urban or rural residents. We selected only the high-quality observations from nationwide surveys; however, we substituted observations calculated on a survey of employees, if no household measurements are available. For the growth rate variable, we require at least two consecutive measurements of real GDP per capita during the previous five-year period.

Our Kuznets regression is

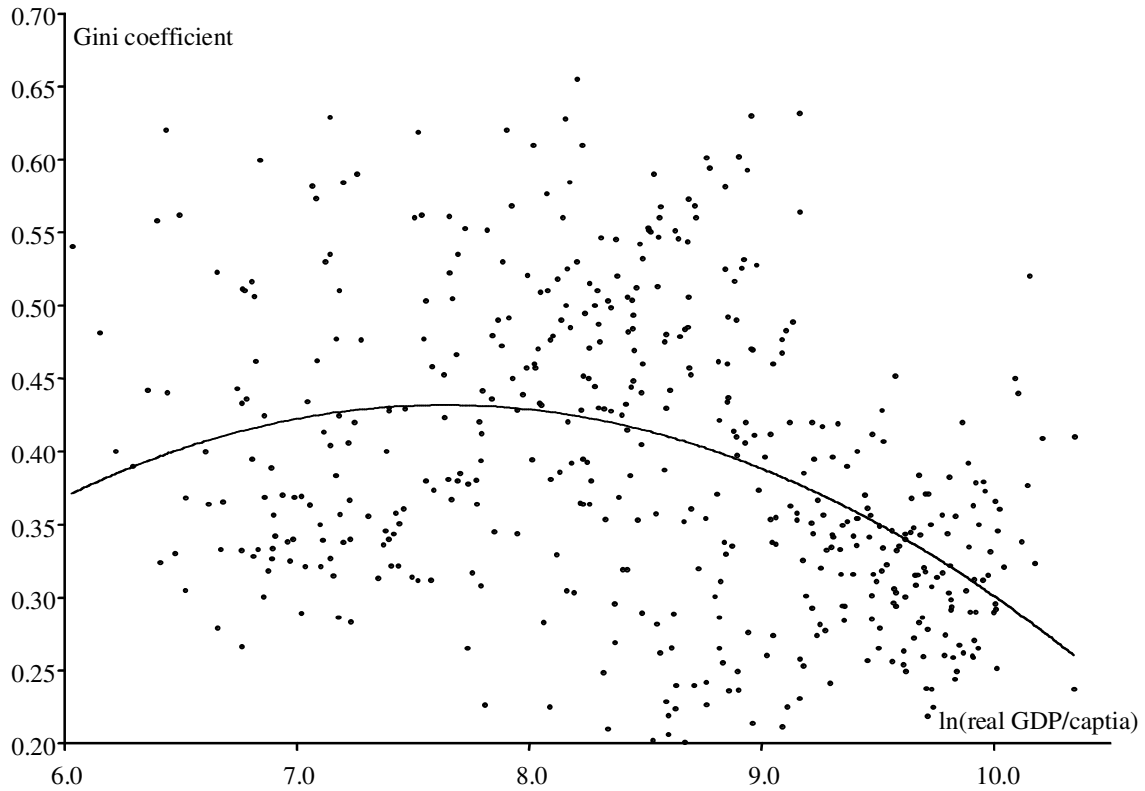
$$G_t = -0.938 + 0.358 \ln Y_t - 0.0234 (\ln Y_t)^2 \quad R^2 = 0.166$$

(-3.33) (5.26) (-5.76)

t-ratios in parentheses. Although it shows an upward-sloping region, a majority of countries are in the downward-sloping part of the curve and the fit is poor. The results shown above are consistent with Barro (2000). Contrary to Barro, we find that the inverted-U shape disappears with a fixed effect version, but contrary to Fields, it does not flip. Uncertainty about the Kuznets curve assumption qualifies the conclusions below.

⁶ The WIID database is an update and extension of the Deininger and Squire data.

Figure 1. The Kuznets regression: 1955-2000



Taking this estimated Kuznets curve as known and *a priori*, and granting our assumptions about social welfare and about collective behavior, the observed optimum growth and inequality should be chosen according to equations (4) and (5). We estimate a two-equation, nonlinear, ordinary least squares regression model with two parameters (β and λ) and one exogenous variable ($\ln(Y_{t-1})$) written according to these equations; see Table 1, model (a). This model is restricted in the sense that the linear and quadratic Kuznets parameters are taken to be those estimated above, $\alpha_1=0.358$ and $\alpha_2=-0.023$. Our data set is the 302 available observations during the period 1960-2000 on real GDP per capita lagged five years $\ln(Y_{t-1})$, its average growth rate y_t , and the change in the Gini coefficient G_t-G_{t-1} . Our results indicate negative estimates of both the quadratic growth parameter β and the Gini-weight parameter λ . The fit of this model is poor in terms of R^2 statistics and the estimate of λ is statistically insignificant at the 5% level. Although this makes inference uncertain, nevertheless, this result is remarkable because it implies that social welfare increases with greater, rather than less, inequality.

Table 1. Estimation results
(*t*-ratios in parentheses)

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
β : growth curvature	-3.84 (-11.90)	-3.84 (-12.30)	-3.83 (-11.76)	-3.62 (-13.13)	-3.72 (-12.27)	-3.06 (-14.02)	-2.93 (-14.44)	-3.45 (-10.44)	-3.20 (-11.12)
λ_0 : constant	-1.32 (-1.15)	5.31 (2.08)	1.45 (0.12)	-4.47 (-0.82)	0.77 (0.63)	14.83 (3.56)	8.89 (0.72)	197.60 (2.89)	17.64 (0.24)
λ_1 : time		-2.53 (-3.03)					-1.20 (-1.88)		-1.63 (-1.86)
λ_2 : income			-0.30 (-0.24)				0.71 (0.57)		-0.17 (-0.11)
λ_3 : Hindu				19.47 (1.99)			11.94 (1.43)		22.26 (2.24)
λ_4 : Eastern				15.31 (2.36)			10.82 (2.15)		15.02 (2.41)
λ_5 : Jewish				12.54 (1.24)			11.75 (1.66)		13.69 (1.58)
λ_6 : Muslim				4.43 (0.61)			-4.15 (-0.63)		9.14 (1.20)
λ_7 : Christian				0.83 (0.13)			2.04 (0.42)		4.98 (0.85)
λ_8 : exchange rate					-15.83 (-4.65)		-10.93 (-4.28)		-13.81 (-4.23)
λ_9 : educ. sex ratio						-20.36 (-4.37)	-19.29 (-3.14)		
λ_{10} : pop. sex ratio								-210.15 (-2.94)	-19.47 (-0.27)
R ² (real growth) ⁷	0.0031	0.0204	0.0024	0.1087	0.1013	0.0641	0.2922	0.0525	0.2484
R ² (Gini change)	0.0042	0.0001	0.0039	0.0045	0.0007	0.0000	0.0006	0.0079	0.0002
observations	302	302	302	302	281	270	259	244	231

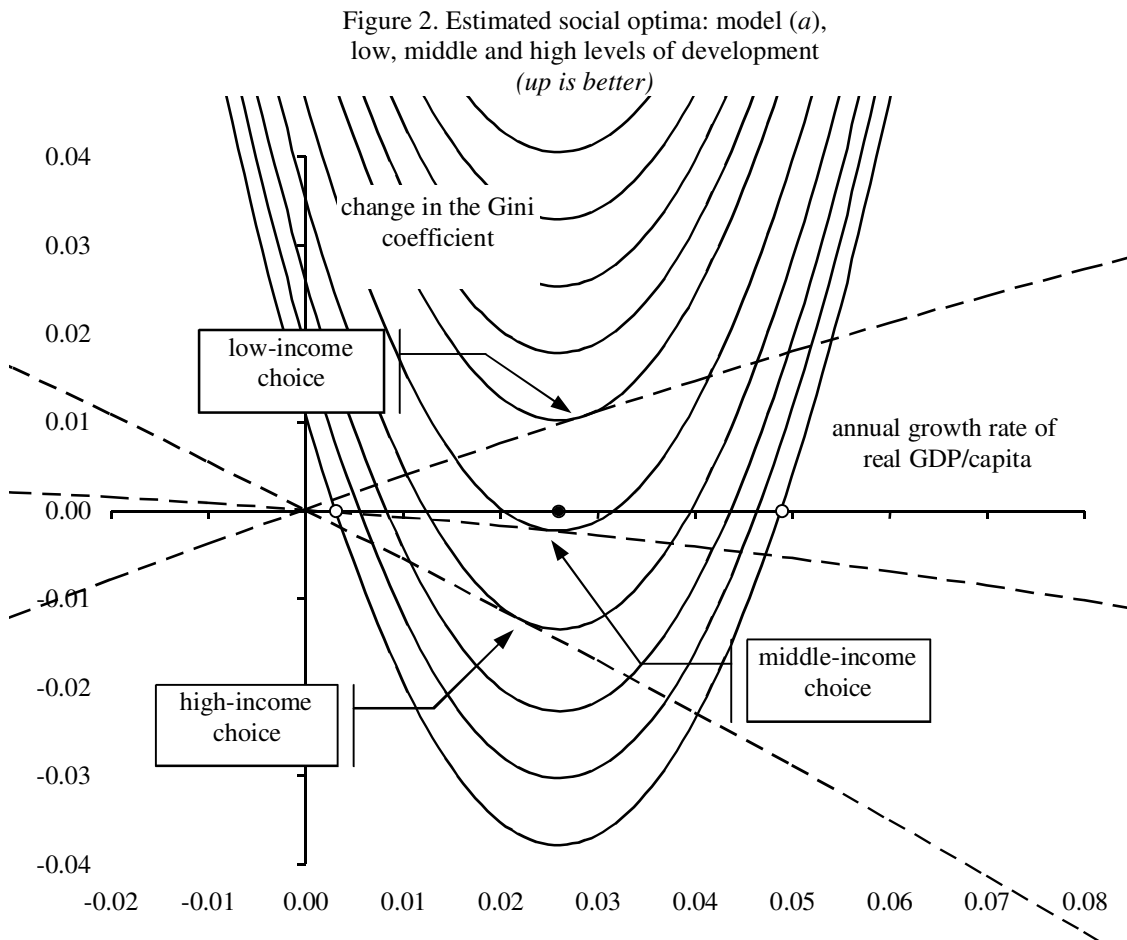
Estimated indifference curves are plotted in Figure 2. These imply that countries that maintain the status quo, in the sense that they prefer growth of 2.6%, are illustrated as a solid dot.⁸ They are also worse off with, but indifferent to, growth rates of either 0.3% or 4.9%, illustrated as open dots.⁹ Also shown are implied tradeoff equations (3) as dashed lines for three levels of development: low is $\ln Y = 6$ (GDP per capita=\$403), middle is $\ln Y = 8$ (GDP per capita=\$2981), and high is $\ln Y = 10$ (GDP per

⁷ This statistic is computed by the conventional formula using the observed and model-predicted values of the dependent variable.

⁸ This point is calculated by substituting $G_t - G_{t-1} = 0$ into (2) and maximizing, which gives a 5-year growth rate of $y_t = -\frac{1}{2\hat{\beta}} = -\frac{1}{2(-3.84)} = 0.130$, or annual growth rate of 0.026.

⁹ These points are calculated by substituting $G_t - G_{t-1} = 0$ and $W = 0.015$ (the level of the lowest indifference curve in Figure 2) into (2), which gives $0.015 = y_t - 3.84y_t^2$, and solving for y_t .

capita=\$22,026). The horizontal axis is real growth (as an annualized rate) and the vertical the change in the Gini coefficient over a 5-year period. Due to its upward-sloping tradeoff curve, a low-income country chooses higher growth and increasing inequality. A high-income country chooses slower growth and decreasing inequality because of its downward sloping tradeoff. The middle-income country's choice implies the status quo approximately. This result implies quite a different interpretation of the much-discussed phenomenon of convergence that asserts that the poorer countries are catching up with richer ones. It implies that convergence is an outcome of the social preference for decreasing equality and the varying slope of the Kuznets curve.



We generalized this model to investigate societal determinants of the equality preference by respecifying the weighting parameter as

$$(6) \quad \lambda_t = \lambda_0 + \sum \lambda_i x_{it},$$

where the x 's are possible exogenous influences on social choice. Our first extension adds an interaction term with the number of decades since 1960 to investigate whether there has been a long-term trend in the preference for equality. The result reported as model (b) suggests a worldwide trend toward a preference for greater inequality. This regression implies a preference for greater equality in 1960 and for greater inequality in 2000 (both statistically significant); we estimate the indifference date as 1981.

In order to understand the determinants of this trend we add a series of possible exogenous indicators, one by one. Model (c) adds an interaction with the logarithm of real GDP per capita; the results suggest that the preference for inequality is unrelated to the level of development. Model (d) adds the fractions of the population claiming various religions: Hindu, Eastern, Jewish, Christian and Muslim.¹⁰ This model is motivated by pan theological teachings on charity. Since the base case is the percent of the population not ascribing to any of these religions (implicit in λ_0), we expect these parameters to be positive; indeed all are positive.¹¹

Model (e) adds the maximum annual rate of change of the exchange rate over the preceding 5-year period.¹² The idea here is that countries experiencing currency crises are further limited in their choice between growth and equality. In recent decades, many of these countries have had structural adjustment packages imposed by the IMF in exchange for bailout loans. Even when countries with unstable currencies do not accept such deals, their choices could be influenced by the threat of future structural adjustment. Our results suggest that a preference for inequality may not have been a matter of indigenous choice. It may be

¹⁰ Eastern is the sum of the Buddhist, Confucian, Taoism and Shinto fractions; likewise, Christian is the sum of Catholic, Protestant and Orthodox fractions. These variables derive from the *World Factbook 2003*. We assume that these religion fractions have been fixed throughout our sample period. This assumption is reasonable in light of the slow evolution of religious strength. Nevertheless, constancy of these variables implies that they may be associated with nonreligious effects in particular countries; for example, it is hard distinguish between the % Jewish variable and a dummy variable for Israel.

¹¹ Our estimate of λ for a 100% Buddhist, Confucian or Taoist country is 10.8, and for a 100% Christian country it is -3.6 ; both are statistically significant. All other religions are indistinguishably different from equality indifference.

¹² This variable derives from the PWT 6.1. There has been considerable currency instability in these countries. The sample mean is about 0.26 with a standard deviation of 0.49.

that the international financial institutions have imposed their own preferences on countries experiencing currency crises; see Stiglitz (2000).¹³

Model (f) adds the female-to-male ratio of the years of education among the population older than 25.¹⁴ Our result suggests that a preference for increased income inequality is associated with decreased gender inequality.¹⁵ We expected the opposite, and speculate that our result reflects some other phenomenon, as yet unidentified. To test this omitted variable explanation, model (g) includes all effects: time, income level, religion, currency crisis, and gender gap. The results suggest that the influences identified in (d), (e) and (f) cannot be explained as a correlation to some other factor.

Perhaps gender equality and income equality are on separate ideological paths: in high-income countries the momentum for gender equality is well established while the post-Berlin-Wall social philosophy concerning equality has become more conservative. In low-income countries where such a momentum is less evident, public policy may be more influenced by the social unrest inequality generates.¹⁶ This explanation is inconsistent with our model (g) finding that the social preference for inequality is not significantly associated with income level, nor does the inclusion of income as determinant reduce the size of this surprising gender effect.

Perhaps our interpretation of the education sex ratio is spurious; perhaps there are more appropriate measures of gender inequity than unequal schooling. To investigate this possibility, model (h) replaces the schooling sex ratio by the population sex ratio, the ratio of girls to boys under 14 years.¹⁷ This

¹³ Of course, other indicators besides devaluation may also measure the effect of foreign trade crises on inequality preference. Our exchange rate finding suggests that trade deficits may also be correlated with this phenomenon. In an unreported regression we replaced the change in the exchange rate with net exports as a percentage of GDP. The results are consistent with our finding above, but statistically insignificant. And, in yet another unreported regression we include both the change in the exchange rate and net exports; the results indicate that the change in the exchange rate is the statistically the strongest correlate with the revealed preference for inequality, and that the net exports percent is still insignificant.

¹⁴ This variable derives from an update of the Barro-Lee dataset.

¹⁵ For a country with perfect gender equity, our estimate of the inequality parameter λ is -5.5 ; while it is 4.7 for a country in which women complete only one half as many years of schooling as men. Both estimates are statistically significant.

¹⁶ We thank a referee for pointing to this duality.

¹⁷ This variable derives from the UN Demographic Yearbook. The quality of these data is variable, combining full censuses, samples and estimates. To reduce the influence of migration, or wars, or conditions that affect the life chances of adults, researchers often focus on the sex ratio among children. The presumption is that boys and girls are equally likely to accompany the migrating adult, or to stay with

alternative indicator is widely used in cross-country studies. It reflects discrimination against women that takes such extreme forms as the selective abortion, infanticide or fatally inadequate health care. Of course, sexual discrimination has other dimensions beyond these two rather crude ratios. Model (*h*) supports the unexpected gender equity inference, but the model (*i*) shows that this conclusion is not robust to the inclusion of other factors. It implies that there may be no gender effect after accounting for religion, income, currency crises and a time trend. The statistically significant time trend coefficient in model (*i*) suggests that another explanation of the increasing preference for income inequality has yet to be identified.

The overall statistical fit is still poor especially for the inequality change equation. Adding these eleven variables as determinants of the inequality parameter does not noticeably improve the fit of the inequality regression, although the growth equation fits markedly better.¹⁸ No doubt the Gini data includes considerable measurement error.

5. Conclusion

We develop a public choice model in which governments, being aware of limitations implied by the Kuznets curve, choose optimally the policies that determine changes in income and inequality. Our method could be extended to consider other indicators, and other constraints. For example, social choice may be generalized to include environmental protection in the social welfare function, or a technical tradeoff between output and environmental quality could be formalized as an additional constraint. Perhaps environmental constraints are implicit in the problem we examine here; they may be included in the β parameter that we interpret as a reflection of social costs of rapid growth.

Although the statistical evidence is weak, the revealed preference is anti-egalitarian. Some of the unexplained variance can be explained by introducing various indicators. Our results are consistent with the imposition of a preference for greater inequality through the structural adjustment programs of the

the parent left behind. Children are too young to die in wars or civil violence. They are also too young to die from alcohol abuse. So, when researchers find a shortfall of girls compared to the numbers expected for a given age group, they see this as indirect evidence of discriminatory practices against girls; see Sen (1990). In the few cases we use under 19 or under 10 data, where the under 14 category is unavailable.

¹⁸ In unreported models we added the average years of schooling; also derived from the updated Barro-Lee dataset. It suggests that the preference for inequality is not linked to the level of education. Another model tried Gastil's index of political rights (from the Freedom House dataset, 1=full rights, 7=no rights). The insignificant interaction coefficient implies that a preference for inequality is not necessarily linked to democracy.

international financial institutions (IMF and World Bank). A seeming inexplicable finding is the statistical association between decreases in gender inequality and a preference for increased income inequality, but this result is tentative and not robust. Our regressions suggest that the preference for inequality has been increasing worldwide, even after accounting for other factors. Notwithstanding the questionable nature of our modeling assumptions and the uncertainty of our empirical inferences, our social choice framework provides an alternative understanding of the association of growth and inequality.

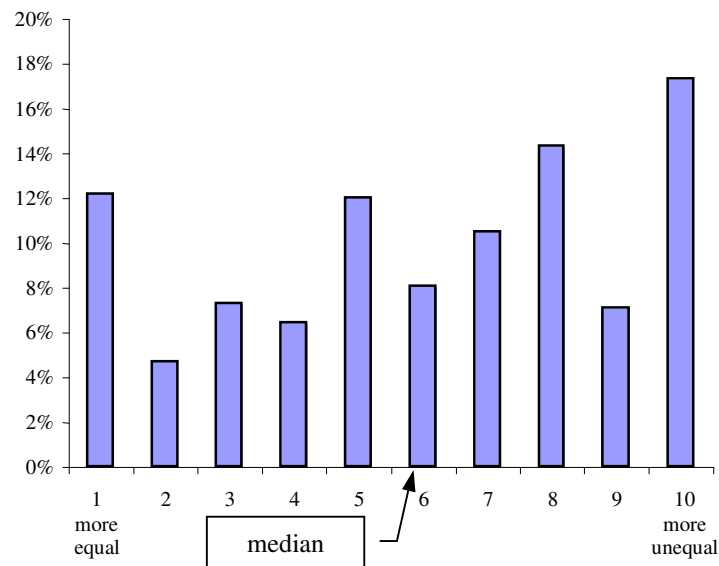
Appendix

Our estimate of social preferences for equality could be a reflection of individual values. The World Values Survey measures individual preferences. An international network of social scientists has been conducting this survey of social and political opinion since 1980. After 1990 it has included a question that mirrors our interpretation of the λ

How would you place your views on this scale? 1 means you agree completely with the statement “incomes should be made more equal;” 10 means you agree completely with the statement “we need larger income differences as incentives for individual effort;” and if your views fall somewhere in between, you can choose any number in between.

This question has been posed to about 135,000 people drawn from representative samples in 62 countries. The distribution of responses in Figure 3 is roughly uniform, frequently with complete agreement or disagreement.

Figure 3. Worldwide opinion on the income distribution

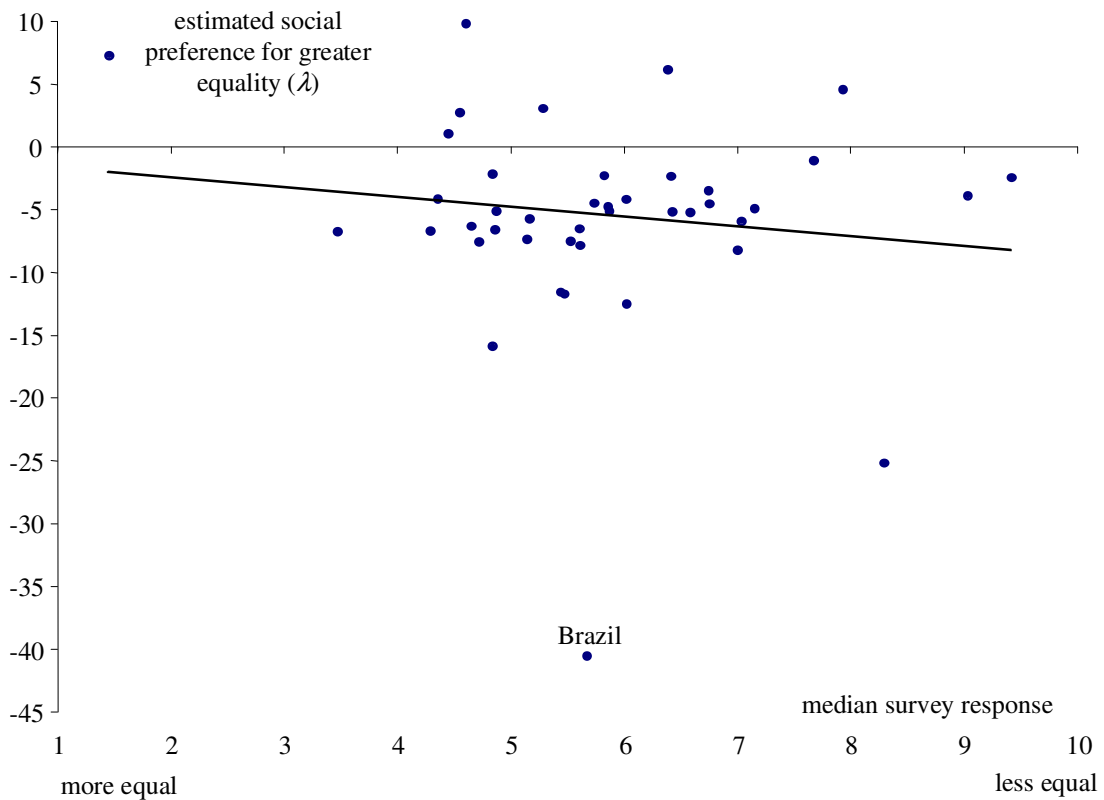


The median is 5.9 and the mean is 6.0, close to indifference.

Figure 4 plots the median individual preference from the World Value Survey against our estimate of the λ from model (g); there is overlap between the two data sets for only 42 cases (30 countries). Is our model truly measuring social preferences? Although the relation is not obvious, the expected inverse

relation may be seen. It would be stronger if a few notable outliers were dropped, especially the case of Brazil in 1990. In an unreported estimate we added this survey response to our extended model (g) from Table 1 as a hypothetical determinant of social preference. The estimated λ -parameter is negative, as expected, but statistically insignificant ($t = -0.65$). The weakness of the relation might be explained by the difference between survey opinions and public policy, or the difference between individual and social preferences, or perhaps the small sample size.

Figure 4. Individual preferences are related to social ones, $r = 0.14$.



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