E C O N O M I C S B U L L E T I N

Convergence in income inequality: differences between advanced and developing countries

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Abstract

It is shown that convergence in inequality has been significantly slower amongst developing countries.

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1. Introduction

Convergence in income inequality was first identified by Bénabou (1996), and has since been confirmed by Ravaillon (2001) for international data and by Panizza (2001) for U.S. states. The contribution of the present paper is to show that the convergence process differs between advanced and developing countries. To be specific, the speed of convergence is much faster in advanced countries. Since the advanced countries tend to have the most reliable data, this result suggests that convergence cannot be attributed simply to uncorrelated measurement errors in the same country at different dates.

2. Data Issues

The most popular single measure of income inequality is the Gini coefficient, which represents the entire distribution of income. The most comprehensive cross-country data on Gini coefficients of which we are aware is WIID (2000). We use version 1.0, the latest version of the database, which was last updated on 12 September 2000. This database incorporates Deininger and Squire's (1996) dataset on income inequality (the Gini coefficients of income distribution), which is another popular dataset to use. Although the country coverage in WIID is large, it is a collection of data from various data sources rather than a synthesised dataset. For some countries it provides multiple data for the same year according to several different definitions, whereas for others it includes a large number of blanks. Consequently, even for the same country in the same year, the appropriate figures to use depend on researchers' purposes and sensitivity (see Appendix 1). The WIID database differentiates "reliable" data from "less reliable" data. We always preferred "reliable" data if it was available. To maintain consistency, we also always chose data of national coverage and not data of rural or urban coverage only.

The most plentiful data on income distribution are based on gross income. Theoretically, we are probably more interested in measures based on net income (after redistribution through taxes and transfers), but these data are much less frequently collected, so for reasons of international comparability we gave priority to gross-income-based data where available. Some data are based on household expenditures. Deininger and Squire (1996) report that, for reliable data, there is no significant difference between gross- and net-income-based measures, but that expenditure-based measures yield Gini coefficients that are on average smaller by 6.6. Like Deininger and Squire (1996), we therefore added 6.6 to expenditure-based Gini coefficients. This is not entirely satisfactory, but there is no more widely accepted method of data transformation than this.[1]

Income inequality measures are not available for every year. We used the observations closest to 1965 and 1990, and most refer to a date less than two years away, although we accepted deviations of up to seven years. The samples of "reliable data only" include the data which were categorised as "reliable" in WIID (2000), and for which neither observation of income inequality was more than five years from the target date.[2] In what follows we often refer to an *income equality index*, which is obtained by subtracting the Gini coefficient (on a 100 point-scale) from 100. To calculate the annual average rate of change in the income equality index, we divided the change in the index by the number of years between the initial observation and the final observation.

[1] See Knowles (2001), which provides good discussions on data transformation.

[2] WIID (2000) follows Deininger and Squire (1996) in using three criteria for reliable data: 1) the data should be based on actual household surveys, not on estimates, 2) the data should have comprehensive coverage of all sources of income or expenditure, and 3) the data should be representative of the whole population.

Basic statistics of inequality variables are summarised in Table 1. The data show that not all countries have experienced a reduction in income inequality over the period 1965-90. Twenty-four out of 58 countries (in the reliable data) experienced a deterioration of overall income inequality, and this is not a phenomenon of a particular income group within countries. Those countries with deteriorating inequality include some of the richest countries in the world such as Australia, Austria, the United Kingdom and the United States, as well as some of the poorest countries such as China, Niger, Senegal and Tanzania.

Table 1. Data Statistics on Equality Variables

Variable	Mean	Standard dev.	Minimum	Maximum	No. of obs
Average annual change in income equality index					
Reliable data only	0.0274	0.2896	-0.6429	0.6268	58
Largest possible sample	0.0201	0.3744	-1.2652	1.3995	79
Initial level of income equality index					
Reliable data only	58.0599	11.3917	36.0000	77.7700	65
Largest possible sample	56.7190	11.7118	20.5000	77.7700	90

Note: Change variables are annual average changes over the period 1965-90. Initial levels are data circa the year 1965.

Table 2 illustrates regional differences in income inequality. It is interesting to note that only sub-Saharan Africa countries, on average, have experienced a deterioration of overall income equality in the period 1965-90. The other regions have generally improved their overall income distributions. The OECD countries are the most successful group in equalising income distribution, followed by East Asia and Latin America.[3] Interestingly, income distribution in tropical regions as a whole remained almost unchanged over the relevant period. As expected, the initial level (circa 1965) of overall income equality is the highest in the OECD countries, followed by East Asia, Latin America, and sub-Saharan Africa.

[3] "East Asia" means East Asia and South-east Asia, whilst by our definitions, Latin America includes Caribbean countries.

Table 2. Regional Differences in Income Equality

Variable	All countries	OECD	East Asia	Latin America	SS Africa	Tropics
Annual average change in income equality index	0.0153	0.0748	0.0452	0.0453	-0.1446	0.0110
Income equality index circa 1965	58.0599	64.4422	58.0333	50.3684	48.2925	50.2684

Note: Data are reliable data only. Change variables are annual average changes over the period 1965-90. Tropics are countries which score one in our variable for tropical climate (CLIMATE).

Table 3 shows that the relationship between real GDP per capita and the income equality index is positive, i.e. wealthy countries tend to be more equal in overall income distribution than poor countries. Figure 1 shows the relationship between income inequality in 1965 and 1990. The expected positive correlation is apparent, but with an appreciable dispersion, indicating that the ranking of countries has shifted quite substantially.

Table 3. Simple Correlations between Economic Development and Income Inequality

	Real GDP p.c. 1965	Real GDP p.c. 1990	Income equality index circa 1965	Income equality index circa 1990
Real GDP p.c.1965	1.000			
Real GDP p.c. 1990	0.907	1.000		
Income equality index circa 1965	0.488	0.521	1.000	
Income equality index circa 1990	0.459	0.552	0.782	1.000

Note: Data on the income equality index are the reliable data sample.

3. Results

Table 4 shows the convergence regressions for the two samples (the largest possible and reliable data only), first with common coefficients across countries and then allowing for differences between the OECD area and the rest. Regressions (1) and (2) are obtained using reliable data from 58 countries, and regressions (3) and (4) from the largest possible sample of 79 countries. As the Chow statistics at the bottom of the table show, the differences between the OECD and the rest are highly significant. In regressions (1) and (3), the coefficient of initial income inequality shows the speed of convergence, whilst the ratio of the intercept to this coefficient, multiplied by –1, gives the estimated long-run equilibrium. Thus, in regression (1) for example, the point estimate of the long-run equilibrium value of income equality (100 minus the Gini coefficient) is 62 (= 0.473/0.00764). When the coefficients are allowed to differ between OECD and other countries (regression 2), then convergence is revealed to be much faster in the OECD countries (and not significant amongst developing countries alone).

If a further 21 countries with less reliable data are added (regressions 3 and 4), the differences between the OECD and the rest remain highly significant, but convergence amongst developing countries is now statistically significant and at approximately twice the

rate estimated for the reliable data. It may be that uncorrelated measurement errors are exaggerating the apparent rate of convergence for the larger sample.

It is also the case that the estimated long-run equilibrium income distribution is more equal for OECD countries than for developing countries. Using regression (4), the point estimate for developing countries is 53 (= 0.672/0.0127), whereas that for OECD countries is 66 [= (0.672+1.542)/(0.0127+0.0208)].

4. Conclusions

The convergence of income inequality appears to be significantly faster amongst OECD countries than amongst developing countries. Using the limited sample of developing countries with reliable data, it is not clear that there is significant convergence amongst them at all, but in so far as there is, developing countries seem to be converging towards a less equal income distribution than OECD countries.

Figure 1. Income Equality of the Years 1965 and 1990 (Largest Possible Sample)

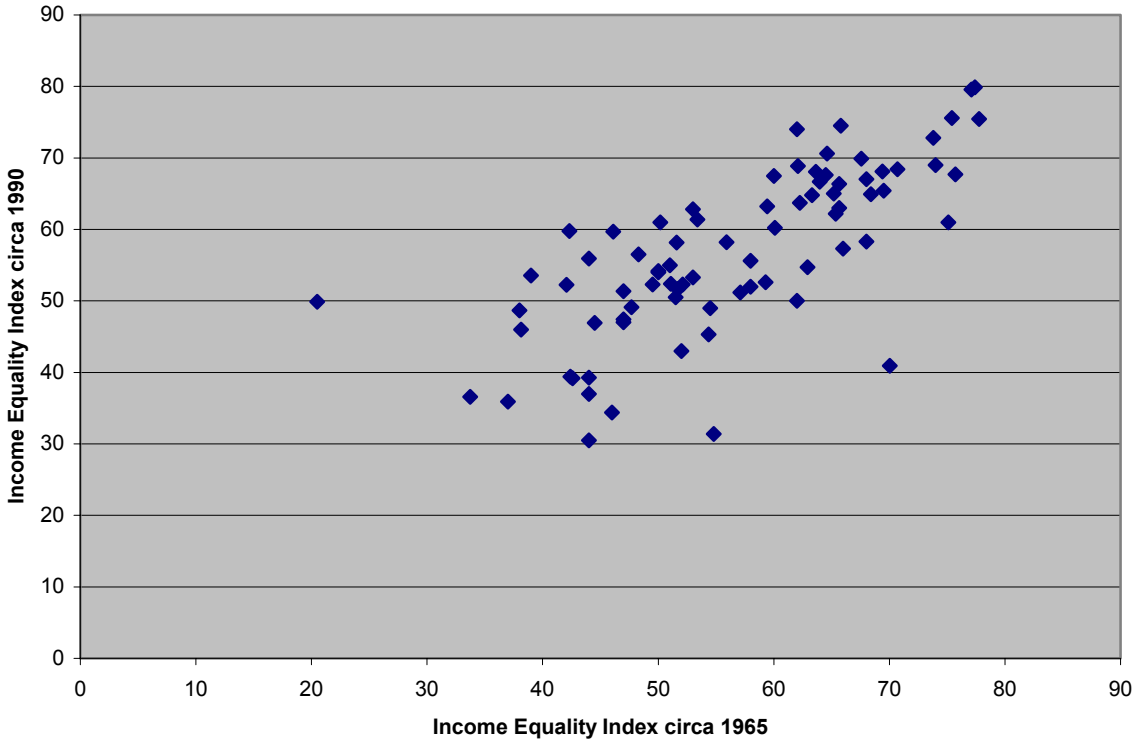

Table 4. Convergence in Income Equality

(Dependent variable: Annual average change in the income equality index for 1965-90)

	(1)	(2)	(3)	(4)
Type of income equality data:	**<Reliable data sample>**	**<Reliable data sample>**	**<Largest possible sample>**	**<Largest possible sample>**
Variable		[Chow test for OECD]		[Chow test for OECD]
Constant	0.473**	0.296	0.727***	0.672***
	(2.43)	(1.56)	(3.82)	(3.48)
Initial income equality	-0.00764**	-0.00520	-0.0125***	-0.0127***
	(-2.33)	(-1.56)	(-3.80)	(-3.64)
OECD dummy		2.244***		1.542***
		(3.99)		(2.71)
OECD dummy times initial income equality		-0.0330***		-0.0208**
		(-3.74)		(-2.27)
Adjusted R-squared	0.072	0.282	0.147	0.267
Standard error	0.279	0.245	0.346	0.320
No. of observations	58	58	79	79
Residuals sum of square	4.3591	3.2522	9.2082	7.7007
Chow test for OECD		F(2, 54) =9.190***		F(2, 75) =7.341***

Note: Figures in brackets are *t*-statistics. Figures in square brackets are *p*-values. Three asterisks *** denote significance at the 1% level. Two asterisks ** denote significance at the 5% level. One asterisk * denotes significance at the 10% level. The 1% critical value of F(2, 60) is 4.98.

Appendix 1. Gini coefficients

Country Name	*Gini circa 1965*	*Data description Gini circa 1965*	*Gini circa 1990*	*Data description Gini circa 1990*
Argentina	42 (1961)	G, P, ?, AP	48 (1989)	G, P, M, AP
Australia	32 (1967)*	G, P, AA, AP	41.72 (1990)*	G, H, AA, AP
Austria	29.3 (1970)*	G, P, AA, IR	31.6 (1987) *	SPDS
Bahamas	48.41 (1970)*	G, H, AA, AP	41.83 (1991)*	G, H, AA, AP
Bangladesh	34.34 (1966)*	G, H, AA, AP	37 (1986)*	G, H, AA, AP
Barbados	36.2 (1962)	I, P, AA, T	NA	
Belgium	36.37 (1969)*	G, H, AA, T	31.9455 (1992)*	G, H, AA, AP
Bolivia	53 (1968)*	G, P, AA, AP	42.04 (1990)*	E, P, AA, AP
Botswana	57.4 (1971)	I, P, AA, EA	54.21 (1986)*	E, H, AA, AP
Brazil	57.61 (1970)*	G, H, AA, AP	60.6 (1990)*	G, HC, AA, AP
Bulgaria	22.23 (1965)*	G, P, AA, AP	24.53 (1990)*	SPDS
Canada	31.61 (1965)*	G, H, AA, AP	35.0807 (1991)*	G, H, AA, AP
Chad	35 (1958)	G, P, AA, AP	NA	
Chile	45.64 (1968)*	G, H, AA, AP	54.7 (1990)*	G, H, AA, AP
China	30.5 (1964)*	G, H, AA, AP	34.6 (1990)*	G, P, AA, AP
Colombia	62 (1964)*	G, P, AA, AP	51.32 (1991)*	G, P, AA, AP
Costa Rica	50 (1969)*	G, P, AA, AP	46 (1989)*	G, P, AA, AP
Côte d'Ivoire	51.7 (1970)	I, P, AA, EA	36.9 (1988)*	E, HC, AA, AP
Cuba	28.114 (1962)	G, P, AA, IR	NA	
Czechoslovakia	22.6 (1965)*	N, HC, AA, AP	20.1 (1988)*	SPDS
Dahomey (Benin)	42 (1959)	G, P, AA, AP	NA	
Denmark	24.908 (1966)*	G, H, AA, AP	39 (1990)*	G, H, AA, AP
Dominican Republic	45.5 (1969)	G, P, AA, AP	51 (1989)*	G, P, AA, AP
Ecuador	38 (1968)*	G, P, AA, AP	50 (1993)*	G, P, AA, AP
Egypt	40 (1965)*	E, H, AA, AP	32 (1991)*	E, HC, AA, AP
El Salvador	53 (1965)*	G, P, AA, AP	53 (1994)*	G, P, AA, AP
Fiji	46 (1968)*	G, P, AA, AP	NA	
Finland	34.2 (1966)*	G, H, AA, AP	25.5 (1990)*	G, H, AA, AP
France	47 (1965)*	G, H, AA, AP	37.2 (1984)*	G, HC, AA, AP
Gabon	64 (1960)*	G, P, AA, AP	NA	
Germany, West	38 (1964)*	N, H, AA, AP	26 (1990)*	N, H, AA, AP
Greece	44.1 (1965)	I, P, AA, T	35.16 (1988)*	E, H, AA, AP
Guatemala	29.96 (1966)	I, H, R, IR	59.06 (1989)*	G, P, AA, AP
Honduras	61.88 (1968)*	G, H, AA, AP	54 (1990)*	G, P, AA, AP
Hong Kong	49 (1966)*	G, H, AA, AP	45 (1991)*	G, H, AA, AP
Hungary	22.91 (1967)*	N, P, AA, AP	20.42 (1991)*	N, HC, AA, AP
India	31.14 (1965)*	E, P, AA, AP	29.69 (1990)*	SPDS
Indonesia	33.3 (1964)*	E, P, AA, AP	33.18 (1990)*	E, P, AA, AP
Iran	41.88 (1969)*	E, P, AA, AP	42.9 (1984)	E, P, AA, AP
Ireland	36.7 (1973)	N, H, AA, AP	35.2 (1987)*	SPDS
Israel	37.08 (1961)*	I, P, AA, T	45.3 (1992)*	I, P, AA, AP
Italy	40 (1967)*	N, H, AA, AP	32.5 (1991)*	SPDS
Jamaica	41.272 (1971)	E, H, AA, AP	41.1 (1991)*	E, HC, AA, AP
Japan	34.8 (1965)*	G, H, AA, AP	35 (1990)*	G, H, AA, AP
Kenya	63 (1964)	I, P, AA, T	57.5 (1992)*	E, HC, AA, AP
Korea, Republic of	34.34 (1965)*	G, H, AA, AP	33.64 (1988)*	G, H, AA, AP
Lebanon	55 (1960)*	G, P, AA, AP	NA	
Madagascar	53 (1960)*	G, P, AA, AP	46 (1993)*	E, HC, AA, AP
Malawi	45.2 (1969)	I, P, AA, IR	62 (1993)*	E, P, AA, AP
Malaysia	48.3 (1967)*	G, H, AA, AP	48.35 (1989)*	G, P, AA, AP
Mexico	55.5 (1963)*	G, H, AA, AP	53.09 (1989)*	G, P, AA, AP
Morocco	50 (1965)	G, P, AA, AP	39.2 (1991)*	E, HC, AA, AP

Myanmar	35 (1958)	G, P, AA, AP	NA	
Netherlands, The	35.4 (1967)*	N, H, AA, T	29.3846 (1991)*	N, HC, AA, AP
New Zealand	57.7 (1965)	I, P, AA, T	40.21 (1990)*	G, H, AA, AP
Niger	34 (1960)*	G, P, AA, AP	36.1 (1992)*	E, HC, AA, AP
Nigeria	57.94 (1970)*	N, P, AA, T	41.15 (1992)*	E, P, AA, AP
Norway	36.04 (1967)*	N, H, AA, AP	33.31 (1991)*	SPDS
Pakistan	35.51 (1966)*	G, H, AA, AP	32.38 (1988)*	G, H, AA, AP
Panama	48 (1969)*	G, P, AA, AP	57 (1989)*	G, P, AA, AP
Peru	61 (1961)*	G, H, AA, AP	46.43 (1991)*	G, H, AA, AP
Philippines	50.5 (1965)*	G, H, AA, AP	47.7 (1991)*	SPDS
Poland	26 (1965)	I, P, AA, AP	31 (1990)*	G, H, AA, AP
Portugal	40.58 (1973)	N, H, AA, AP	36.76 (1990)*	N, H, AA, AP
Puerto Rico	52.32 (1969)*	G, H, AA, AP	50.86 (1989)*	SPDS
Senegal	56 (1960)*	G, P, AA, AP	54.12 (1991)*	E, P, AA, AP
Sierra Leone	56 (1968)*	G, P, AA, AP	62.9 (1989)*	E, HC, AA, AP
Singapore	49.83 (1966)*	G, P, AA, EP	39 (1989)*	G, H, AA, AP
South Africa	56 (1965)	I, P, AA, AP	63 (1990)*	G, HC, AA, AP
Spain	31.99 (1965)*	G, H, AA, AP	32.99 (1991)*	G, H, AA, AP
Sri Lanka	47 (1963)*	G, H, AA, AP	46.7 (1987)*	SPDS
Sudan	38.72 (1968)*	G, H, AA, AP	NA	
Surinam	30 (1962)*	G, P, AA, AP	NA	
Sweden	37.9242 (1967)*	G, H, AA, AP	31.112 (1992)*	SPDS
Taiwan	32.43 (1966)*	N, P, AA, AP	30.11 (1990)*	SPDS
Tanzania	54 (1964)*	G, P, AA, AP	59.01 (1991)*	E, P, AA, AP
Thailand	42.9 (1968)*	G, H, AA, AP	48.8 (1990)*	G, H, AA, AP
Trinidad and Tobago	53.9 (1971)	G, H, AA, AP	40.3 (1992)	I, HC, AA, AP
Tunisia	42.3 (1965)*	E, P, AA, AP	41 (1990)*	E, P, AA, AP
Turkey	56 (1968)*	G, H, AA, AP	44.09 (1987)*	G, H, AA, AP
Uganda	40.7 (1970)	I, P, AA, AP	40.78 (1992)*	E, P, AA, AP
Ukraine	24.6 (1968)*	I, P, AA, EP	24.4 (1989)*	I, P, AA, EP
United Kingdom	24.3 (1965)*	N, H, AA, AP	32.3 (1990)*	SPDS
United States	34.64 (1965)*	G, H, AA, AP	37.8 (1990)*	SPDS
Uruguay	44.9 (1967)	I, H, AA, AP	NA	
USSR	26.2 (1968)*	I, P, AA, EP	27.2 (1989)*	I, P, AA, EP
Venezuela	42 (1962)	G, P, AA, AP	44.4 (1990)*	G, P, AA, AP
Yugoslavia	30.6 (1965)*	G, P, AA, IR	31.88 (1990)*	SPDS
Zambia	79.5 (1970)	I, P, AA, IR	43.51 (1991)*	E, P, AA, AP
Zimbabwe	66.27 (1968)	I, P, AA, IR	56.83 (1990)*	E, P, AA, AP

Notes: Figures in brackets are the years of observations. In the second and the fourth columns, an asterisk "*" indicates that the data are categorised as reliable data in our dataset. Data were categorised as reliable in our dataset if they satisfied both of the two criteria: 1) data are categorised as "reliable data" in the WIID; 2) A gap between the year of observation and the year of concern (1965 or 1990) is no more than 5 years. In columns of data description, income definition, reference unit, area coverage and population coverage are shown in order. 1) Income definition: G= Gross income; N= Net income; I= other income, or no information on the type of income is available; E: Expenditure. 2) Reference unit: H= Household; P= Person; HC=Household per capita. 3) Area coverage: AA=All area; M= Metro Area; R= Rural area; ?= no information given. 4) Population coverage: AP=All population; IR=Income recipients; T=Tax payers; EA=Economically active population; EP=Employed population. In the fifth column, SPDS means that the data around 1990 are from the Same Primary Data Source of the data around 1965 and also the data share the identical data definition with the data employed for 1965. When data circa 1990 is available and data circa 1965 is not available, such country samples were not included in our dataset for the nature of our analysis. The figures shown are pre-adjustment values. For our analysis, +6.6 was added to the figures shown, if income definition is expenditure. Our income equality indices were constructed by [100 – Gini coefficient]. As for the change variables, which we created for the dependent variables, only if all the data used in the calculation are reliable data, the created figures were categorised as reliable data; otherwise, the created figures were included only in the largest possible sample.

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