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Journal of Sociology 2009 45: 5
DOI: 10.1177/1440783308099984

Trade globalization and national income inequality – are they related?

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Abstract

This article takes a comprehensive approach to examining the empirical relationship between trade globalization and national income inequality. We estimate the relationship between trade globalization on national income inequality for a wide panel of countries for the years 1975, 1985 and 1995, and the periods 1975–85 and 1985–95. We also study four subpanels of developed and developing countries and small- and large-population countries. Across a total of 210 permutations of panels, time periods, model specifications and variable operationalizations, we find that inequality is not robustly related to trade globalization, though scattered significant correlations can be detected. Excluding significant results due to one or two influential points, the number of significant correlations across all analyses is no better than chance. We conclude that the increasing levels of inequality recently experienced by the English-speaking countries are more likely caused by country-specific policies than by broad forces related to globalization.

Keywords: globalization, inequality, trade

In recent years, much attention has focused on the relationship between global trade and income inequality. The scientific evidence for the existence of such a relationship is summarized below. It has become widely recognized, however, even in the popular press, that income inequality has been rising in many developed countries in recent decades. This trend is especially evident where it began, in the major English-speaking economies of Australia, Canada, New Zealand, the United Kingdom and the United States (Atkinson, 1999). At the same time, these same countries have been at the forefront of

Journal of Sociology © 2009 The Australian Sociological Association, Volume 45(1): 5–30
DOI:10.1177/1440783308099984 www.sagepublications.com

the most recent wave of trade liberalization and the resulting globalization of trade. The temptation to draw causal inferences among those desiring to shape public policy is strong. In many parts of the public policy world it has become conventional wisdom that greater integration into the world-economy leads to downward pressure on wages and greater profits for capital. The academic literature, however, has not to date unambiguously confirmed the existence of any empirical relationship between trade and inequality, for good or ill. As a result, there is a wide discrepancy between the level of scientific knowledge on the subject and the assumptions underlying major public policy debates. At issue in this article is the simple question: is globalization, operationalized as foreign trade, related in any straightforward way to inequality, operationalized as the Gini coefficient for income?

There exist, of course, a multitude of theoretical perspectives on globalization, ranging from Ritzer's (1993) unstructured 'McDonaldization' to Robertson's (1995) semi-structured 'glocalization' to Castells' (1996) highly structured 'network society.' Such theoretical treatments of the nature of globalization are indispensable for helping organize thinking about the character of globalization, but the empirical literature on globalization and its effects has largely moved forward with little more than passing reference to these works. This is, no doubt, a failure of the empirical literature, but a failure imposed by the character of the data: nearly all cross-national empirical research on globalization focuses on foreign trade (and, occasionally, investment) as the primary indicator of globalization. This gap between theory and practice has been well-documented by Brady et al. (2007). Nonetheless, from the perspective of the empirical literature, globalization is generally simply equated with trade (Babones, 2007).

There are many competing theoretical models for the relationship between trade globalization and income inequality, and, as suggested by DiPrete (2007), a comparative and historical perspective suggests that this relationship may be more complicated than a simple unidirectional arrow of causation. Freeman and Katz (1994), in fact, identify four vectors for the recently observed increases in inequality: institutions, education, trade and technology. All four of these could be considered in light of globalization, but as a practical matter trade is the one that has come to be most closely identified with the concept. In Germany and France trade as a proportion of GDP has increased markedly since 1970, but inequality levels have remained constant or declined. In Japan, the putative coming of the current 'age of globalization' has not even led to an increase in proportional levels of foreign trade, never mind changes in inequality. Data from developing countries are also contradictory. In Mexico, foreign trade has mushroomed, while inequality has declined; in Brazil, trade has grown only slowly, while inequality has increased. In China and the post-Soviet states, on the other hand, incorporation into a globalizing world-economy has been accompanied by enormous increases in income inequality. It is difficult to detect an overall pattern in the data.

The systematically cross-national empirical literature on globalization and inequality reflects this ambiguity. Galbraith (2002: 11) goes so far as to ask explicitly 'What are the facts? Has globalization hurt or helped?' His answer is 'Oddly, researchers do not know; mostly they do not ask.' Despite the fact that foreign trade is the most commonly used indicator of globalization, its correlation with within-country inequality has rarely been the primary focus of published empirical research papers. Those studies that have investigated the effects of trade globalization on within-country income inequality in a systematic way have either done so in the course of testing other hypotheses, or studied only limited panels of countries or time periods. This leaves open the possibility that those results that have been reported on the relationship between inequality and trade are contingent on the sample of countries studied, the time period of the study, the specific operationalization of trade used in the study, or the choice of covariates included in the models. The robustness of trade globalization as a correlate of inequality changes has never been systematically tested.

In a purely cross-sectional study (using 1985 data), Chakrabarti (2000) finds that trade globalization is negatively associated with levels of income inequality in a broad panel of 73 countries. He uses an instrumental variable approach to demonstrate that the direction of causality is from trade to inequality, not the other way around. He argues that trade globalization reduces inequality levels through its tendency to promote higher levels of economic growth. Mahler (2004), however, finds no significant association between trade with less developed countries and inequality levels in 14 developed countries over the period 1980–2000. While Chakrabarti (2000) studies a wider panel of countries, the data used by Mahler (2004) are presumably much more reliable, since they are not instrumented and pertain solely to developed countries. While the results of these two studies are not technically incompatible, their lack of agreement suggests some cause for concern.

Other studies have examined the longitudinal relationship between levels of trade globalization at one point in time and changes in income inequality over subsequent years. In a wide-ranging study of the effects of globalization, Kentor (2001) finds absolutely no association between levels of trade globalization and inequality trends in a panel of 88 less developed countries. Kentor uses a straightforward longitudinal design, in which levels of trade globalization in 1980 are correlated with changes in inequality over the period 1980–97. Reuveny and Li (2003), however, find that trade globalization significantly reduces levels of inequality over time. Though their study is cross-section in design, the inclusion of time-lagged inequality among the independent variables makes it possible to reconstruct their results longitudinally. Contrary to their own theoretical model, the inequality-reducing effect of trade shows up in both developed and developing countries (they expected trade to increase inequality in developed countries).

Closer examination does not elucidate the reasons Kentor (2001) and Reuveny and Li (2003) reach conflicting results. There are some differences between the studies: Kentor (2001) models changes in inequality levels, for the period 1980–90, while Reuveny and Li (2003) model inequality by decade, controlling for inequality in the previous decade. Still, these two approaches should give similar results. There is no reason to think that underlying inequality dynamics in the 1980s (studied by Kentor) were substantially different from inequality dynamics in the 1960s, 1970s, 1980s and 1990s (studied by Reuveny and Li). More likely the differences between the studies result from a lack of robustness in their data and models more generally. We should note that while we have been able to confirm Kentor's results with our own data, we have not been able to confirm Reuveny and Li's.

Lending some support to the thesis that trade globalization is associated with reduced income inequality is a study by Meyer (2003), which suggests that trade globalization reduces sex segregation and gender inequality. Gender inequality is a major component of total inequality among individuals in a society. Reducing the relevance of Meyer's results for the wider literature, however, is the fact that most cross-national studies of income inequality take the household as the statistical reference unit, rather than the individual.

Other studies have adopted a case study approach to analysing the relationship between globalization and inequality. Cormier and Targ (2001) study the effects of NAFTA on workers in the US, Canada and Mexico, concluding that increased trade has harmed workers in all three countries. Fluckiger et al. (2002) use a time series approach to come to similar conclusions for Switzerland, finding that increasing levels of trade globalization have been accompanied by increases in inequality. Zhang and Zhang (2003) find that trade globalization has increased inequality in China, mainly through its promotion of broad regional differences in incomes across the country. Anner (2001) traces the path from foreign capital penetration to income inequality in Mexico, Hungary and El Salvador through the intermediating influence of union power. While the case study literature seems to support a link between globalization and inequality, there could be a publication bias in operation: a case study showing no relationship between trade and inequality would be unlikely to be contemplated, completed or published.

The high level of public, academic and policy interest in how globalization affects income inequality within countries, measured against the inconsistency of empirical results to date, calls for a comprehensive examination of the empirical relationship between inequality and trade. In what follows, we test the robustness of the relationship between trade globalization and national income inequality using a variety of trade indicators and model configurations. In each of our analyses, we test the impact of trade globalization after controlling for a base set of variables that are commonly found in the literature on inequality: national income, national income per capita, schooling and fertility. We also report the unadjusted correlations of trade

with inequality. Our goal is to present a systematic empirical review that can form the basis for further exploration of the relationship (if any) between trade globalization and national income inequality.

Models, data sources and variable operationalization

In order to test the robustness of trade globalization as a correlate of inequality, we begin by analysing the correlational structure of the globalization–inequality relationship. We then proceed to more sophisticated statistical models. In these, we first construct a base model for income inequality, drawing on predictors of inequality commonly found in the literature. The rationales underpinning the inclusion of each of the variables in the base model and their operationalizations are described later in this section. The general form of the base model is shown as Equation 1.

(1) INEQUALITY = f (National income, National income per capita, Schooling, Fertility)

After estimating the base model for each of our model configurations (described below, p. 00), we test the robustness of trade globalization as a correlate of income inequality by adding trade globalization to the base model and testing the significance of the resulting coefficient for trade globalization. The general form of these models is shown as Equation 2.

(2) INEQUALITY = f (National income, National income per capita, Schooling, Fertility, Trade globalization)

Three different measures of trade globalization are tested in each model configuration – imports only, exports only and total trade (imports plus exports), each divided by gross domestic product (GDP). The strength of each trade variable is tested individually in a series of three separate models for each model configuration and time period.

We estimate the base model and all three trade variable models in a series of three distinct model configurations: cross-sectional, longitudinal and full-difference. The cross-sectional configuration explores the relationship between income inequality and trade globalization at a specific point in time. Using only one point in time it maximizes the numbers of cases available for analysis, but provides evidence only for a correlation between trade and inequality, not a causal link between them. This is especially true in light of the potential endogeneity of trade globalization, which may be influenced either by income inequality itself or (more plausibly) by omitted variables that also influence income inequality. While the presence in the model of national income, per capita income, schooling and fertility provides some control for possible omitted variable biases, it is reasonable to hypothesize that income inequality and trade globalization share other common causes that are not included in our models.

One way to address the possibility of endogeneity is to study inequality change, rather than inequality itself. This is, explicitly, the approach of Kentor (2001) and, implicitly, of Reuveny and Li (2003), whose use of a lagged dependent variable design effectively simulates a longitudinal model. Accordingly, we study inequality change in a set of longitudinal models in which inequality change over a period of time t0–t1 is regressed on the point values of the independent variables at time t0. Differencing the dependent variable eliminates biases caused by time-invariant omitted variables, but at the cost of introducing a model mis-specification: an effect of trade on inequality does not necessarily imply an effect of trade on inequality change. Also, differencing only the dependent variables does not eliminate the effects of common-cause omitted variables that may be correlated with both the dependent and the independent variables.

Firebaugh and Beck (1994), who label this type of model a 'semi-difference' model, point out these deficiencies and advocate instead the use of 'full-difference' models. In the full-difference design, both the dependent variable and all independent variables are operationalized as change scores over the period t0–t1. The full-difference configuration controls perfectly for both time-invariant and dynamic omitted variables, so long as the effects of the omitted variables on the measured variables are stable over time (Firebaugh and Beck, 1994: 638). The downside of the full-difference configuration is low power: if the dependent variable changes only slowly over time, its variability over the study period may be quite limited, making it difficult to detect (potentially real) causal effects. As a result, the full-difference configuration is the most conservative (though best-specified) of the three configurations.

We use observations from three time points (1975, 1985, 1995) to construct the data for all three model configurations. Our analyses end in 1995 because data for our dependent variable, national income inequality, have unfortunately not been systematically collected for a sufficiently large number of countries for the period since 1995. The dependent variables in all of the models we estimate are derived from estimated Gini coefficients taken from the Standardized Income Distribution Database, Version 3 (Babones, 2008), which in turn utilizes raw data from the World Income Inequality Database (UNU-WIDER, 2000). There has since been some scattered accumulation of new national income inequality estimates, but no more inclusive dataset that incorporates national inequality estimates for large numbers of developing countries. Details of our operationalizations of income inequality and the independent and control variables used in this study are given below.

Dependent variable: income inequality

Many indices have been developed to measure income inequality within countries, but in general comparative data for large numbers of countries are only available for one such index, the Gini (1921) coefficient. The Gini coefficient ranges from 0 (perfect equality – all members of society have the same

income) to 1 (perfect inequality – one member of society has all of the society's income). Although other measures – such as the Theil (1967) index – possess superior technical qualities, the Gini coefficient has become the de facto standard by which national income inequality is measured (Babones and Turner, 2003). In many historical cases, the raw data underlying the computation of the reported inequality measure are inaccessible or lost, and only the Gini coefficent is known. Unfortunately, income inequality data are not reported in clean annual time series in the same way as most other basic economic data. Instead, researchers and policymakers must rely on income survey data that are more or less complete depending on the country. Making matters worse, such income inequality survey data are generally not methodologically comparable across countries, or in many cases even across years within countries.

This study takes advantage of a new source of internationally and intertemporally consistent inequality data, the Standardized Income Distribution Database (SIDD) Version 3 (Babones, 2008). The SIDD3 includes methodologically standardized Gini coefficients for up to 141 countries for the period 1960–99. An earlier version of this database is documented in greater detail in Babones and Alvarez-Rivadulla (2007). The SIDD is based on data from the World Income Inequality Database (WIID), produced by the United Nations University – World Institute for Development Economics Research (UNU-WIDER, 2000). The WIID in turn incorporates inequality data from the Deininger and Squire (1996) dataset, the Luxembourg Income Study (LIS) dataset and UNESCO datasets, among others.

The SIDD takes the raw reported WIID Gini data, cleans it and adjusts cases for differences in methodology (scope of coverage, income definition and reference unit). In the SIDD3, these adjustments are done separately for developed and developing countries. The resulting Gini coefficients are broadly comparable both across countries and across observations for the same country. A polynomial smoothing curve is then fitted to the adjusted data for every country. Points along the polynomial fit line for each country are used to interpolate estimated Gini coefficients for missing years. Babones and Alvarez-Rivadulla (2005) demonstrate the reliability and criterion validity of this technique. The Gini coefficients reported in the SIDD3 are similar in magnitude to the raw WIID data, but incorporate much lower levels of annual volatility.

Independent variable: trade globalization

Trade as a proportion of GDP is by far the most commonly used measure of economic globalization in the empirical literature (Babones, 2007). For example, in their benchmark study tracing the trajectory of world trade over the past two centuries, Chase-Dunn et al. (2000) identify two peaks in the globalization of the world-economy (1880s, 1920s) that predate the current upsurge in world trade. The authors simply equate higher levels of

foreign trade with globalization. Kim and Shin (2002) focus on the most recent wave of globalization, defining globalization in terms of increasing numbers of partners in foreign trade. Kaplinsky (2001), in a wide review of the costs and benefits of globalization, defines globalization exclusively in terms of the ratio of foreign trade to GDP.

All trade globalization series used in this article are based on imports and exports as proportions of GDP as reported in the World Bank's (2004) World Development Indicators. Foreign trade expressed as a proportion of GDP, however, presents some odd, if often ignored, qualities. Though the net trade balance (exports minus imports) is properly speaking a component of GDP, gross foreign trade is not. It is entirely possible for imports plus exports to total more than a country's total GDP; this is in fact the case for more than 50 countries today. One way to deal with this problem is to consider what is meant by trade globalization. If globalization is theorized as the degree to which jobs in a county are exposed to the vagaries of supply and demand on world markets, then exports as a proportion of GDP might be a more appropriate operationalization of the concept than total trade. On the other hand, if globalization is the degree to which consumers are exposed to products from throughout the world, imports might be more appropriate. Imports and exports as proportions of GDP are highly correlated ($r \approx 0.78$ between countries, 2000), but it is not clear that they are always manifestations of the same latent concept. In some cases they probably are: if globalization is the degree to which members of a population have contact with the world outside their country, then total trade (imports plus exports) as a proportion of GDP is probably an appropriate operationalization. To cover all of these globalization concepts, all three measures of trade – imports, exports and total – are used here.

All three trade operationalizations exhibit moderate positive skew, as infinitely positive outliers are theoretically possible (trans-shipment ports such as Hong Kong and Malta score particularly high) but negative outliers are bounded by zero (trade is always positive). The skew in all three trade variables expressed as a proportion of GDP can easily be handled by logging the data. For example, using 2000 as a reference year, trade as a proportion of GDP has a positive skew of 1.5. The logged series shows a negative skew of less than 0.1. Few researchers bother to log trade data, but both the empirical and the methodological cases for logging are straightforward. Methodologically, the fact that trade figures are theoretically bounded on the left but unbounded on the right suggests a log transformation. Empirically, logging effectively normalizes the data.

Control variables

All regression models reported below contain controls for national income, national income per capita, schooling and fertility. National income is operationalized using the World Bank's 'Atlas' series of gross national income.

National income per capita is simply this figure divided by population. Both of these variables are logged for normalization. In addition, a quadratic term is included for national income per capita in order to allow for potential convexity in its relationship with income inequality, as predicted by the Kuznets (1955) conjecture (see Moran, 2005, for a review). Though the inclusion of the ratio variable national income per capita in models alongside one of its components (national income) can lead to problems of interpretation of the resulting coefficients (Firebaugh and Beck, 1994), these variables are not of interest to the present study. They are used here only as statistical controls.

Schooling is operationalized as the gross secondary school enrolment ratio (the ratio of the total number students enrolled in secondary school – irrespective of age – to the total number of children of secondary school age). We selected this operationalization of schooling from among the many educational variables available from international databases because figures for gross secondary school enrolment are relatively complete and, in any case, very highly correlated with figures for other educational variables. Schooling has consistently been found to be significantly inversely correlated with income inequality and income inequality change (Alderson and Nielsen, 1999; Beer and Boswell, 2002; Kentor, 2001). Gross secondary enrolment ratios are taken from the World Bank's (2004) World Development Indicators.

Fertility is operationalized as the total expected number of births per woman over her lifetime. Fertility (or closely related measures like youth population or population growth) has consistently been found to be significantly positively correlated with income inequality and income inequality change (Alderson and Nielsen, 1999; Crenshaw, 1992; Kentor, 2001). Though they represent distinct concepts, fertility, youth population and population growth are in practice empirically indistinguishable. The choice of fertility from among these three is arbitrary. Fertility rates are taken from the World Bank's (2004) World Development Indicators. They are logged for normalization.

Statistical results

In this section we report the results of our statistical models of the relationship between trade globalization and income inequality. We estimate three sets of cross-sectional models (1975, 1985, 1995), two sets of longitudinal models (1975–85, 1985–95), and two sets of full-difference models (1975–85, 1985–95). The selection of years and periods was made to maximize the availability of income inequality data. We decided to compare trends over two 10-year periods rather than a single 20-year period in order to shed some light on the robustness of model coefficients with respect to period. The countries included in each of the models/periods are given in Table 1.

Correlations between income inequality and trade globalization for all model configurations, time periods and trade operationalizations are reported in Table 2. To ensure comparability of results, the figures reported

Table 1: Countries used in statistical analyses

Country (A–K)	*Cross-Sectional 1975*	*Cross-Sectional 1985*	*Cross-Sectional 1995*	*Longitudinal 1975–85*	*Longitudinal 1985–95*	*Difference 1975–85*	*Difference 1985–95*
Algeria			X				
Argentina	X	X		X		X	
Armenia			X				
Australia	X	X	X	X	X	X	X
Austria	X	X		X		X	
Azerbaijan			X				
Bahamas, The		X					
Bangladesh	X	X	X	X	X	X	X
Belarus			X				
Belgium	X	X		X		X	
Bolivia	X	X		X		X	
Brazil	X	X	X	X	X	X	X
Bulgaria		X	X		X		X
Burkina Faso			X				
Canada	X	X		X		X	
Chile	X	X	X	X	X	X	X
China	X	X	X	X	X	X	X
Colombia	X	X		X		X	
Costa Rica	X	X	X	X	X	X	X
Cote d'Ivoire		X	X		X		X
Czech Republic			X				
Denmark	X	X	X	X	X	X	X
Dominican Republic		X					
Ecuador	X	X	X	X	X	X	X
Egypt, Arab Rep.	X	X	X	X	X	X	X
El Salvador	X		X	X			
Estonia			X				
Ethiopia		X	X		X		X
Fiji	X						
Finland	X	X	X	X	X	X	X
France	X	X		X		X	
Georgia			X				
Ghana			X				
Greece	X	X		X		X	
Guatemala		X					
Guinea			X				
Honduras	X	X	X	X	X	X	X
Hong Kong, China	X	X	X	X	X	X	X
Hungary	X	X	X	X	X	X	X
India	X	X	X	X	X	X	X
Indonesia	X	X	X	X	X	X	X
Ireland	X	X		X		X	
Israel		X					
Italy	X	X	X	X	X	X	X
Jamaica	X	X	X	X	X	X	X
Japan	X	X		X		X	
Jordan		X	X		X		X
Kazakhstan			X				
Kenya		X					
Korea, Rep.	X	X		X		X	
Kyrgyz Republic			X				

Table 1: *(Continued)*

Country (L–Z)	*Cross-Sectional 1975*	*Cross-Sectional 1985*	*Cross-Sectional 1995*	*Longitudinal 1975–85*	*Longitudinal 1985–95*	*Difference 1975–85*	*Difference 1985–95*
Latvia			X				
Lithuania			X				
Luxembourg		X					
Madagascar	X			X			
Malaysia	X	X		X		X	
Mauritania		X					
Mauritius			X				
Mexico	X	X	X	X	X	X	X
Moldova			X				
Mongolia			X				
Nepal		X	X		X		X
Netherlands	X	X	X	X	X	X	X
NewZealand	X	X	X	X	X	X	X
Niger	X	X	X	X	X	X	X
Nigeria	X	X	X	X	X	X	X
Norway	X	X	X	X	X	X	X
Pakistan	X	X	X	X	X	X	X
Panama		X	X		X		X
Paraguay			X				
Peru	X	X	X	X	X	X	X
Philippines	X	X	X	X	X	X	X
Poland			X				
Portugal	X	X		X		X	
Puerto Rico	X			X			
Romania			X				
Russian Federation			X				
Senegal	X	X	X	X	X	X	X
Sierra Leone	X	X		X		X	
Slovak Republic			X				
Slovenia			X				
South Africa			X				
Spain	X	X	X	X	X	X	X
Sri Lanka	X	X	X	X	X	X	X
Swaziland	X	X		X		X	
Sweden	X	X	X	X	X	X	X
Switzerland		X					
Thailand	X	X	X	X	X	X	X
Trinidad and Tobago	X						
Tunisia	X	X		X		X	
Turkey	X	X		X		X	
Turkmenistan			X				
Ukraine			X				
United Kingdom	X	X	X	X	X	X	X
United States	X	X	X	X	X	X	X
Uruguay		X	X		X		X
Venezuela, RB	X	X	X	X	X	X	X
Vietnam			X				
Zambia		X	X		X		X

in Table 2 are based on only those countries that have complete data on all variables used in estimating the cross-sectional, longitudinal and full-difference models presented further below. As reported in Table 2, trade globalization is marginally significantly correlated with inequality in several of the cross-sectional panels. The longitudinal correlations, relating trade globalization indicators in the base year to change in income inequality over the ensuing 10 years, tell a mirror image of the same story: a non-significant negative correlation for 1975–85 and no correlation whatsoever for 1985–95. The full-difference models correlating trade globalization change 1975–85 with inequality change 1975–85 similarly show no significant correlations. Breaking this pattern, however, the full-difference models for 1985–95 show significantly positive correlations between trade globalization change and inequality change. This strong result is seemingly at odds with the indicative results from the cross-sectional correlations: if trade globalization is negatively correlated with income inequality (even weakly), it would be surprising to find that change in globalization is positively correlated with change in inequality, since over the long run this would lead to a situation in which globalization was positively correlated with inequality in cross-section.

In short, the correlational results are provocative, but generally weak and certainly inconsistent. This suggests either the need for additional controls to remove the effects of factors other than globalization that may be affecting the inequality series, or a lack of robustness in the models estimated. We examine the globalization–inequality relationship from a regression standpoint in the remainder of this section; in the next section, we analyse the robustness of the results reported here.

Cross-sectional models

Cross-sectional models of the relationship between income inequality and trade globalization at three points in time (1975, 1985 and 1995) are reported in Table 3. The 1975 base cross-sectional model fits the dependent variable reasonably well, accounting for over half the variance in income inequality across the 56 countries for which data are available; the 1985 and 1995 models fit expanded samples somewhat less well. Inequality seems to be slightly lower in larger economies, but the effect is only marginally significant and disappears in the 1985 and 1995 base models. The Kuznets effect is clearly demonstrated in the significantly negative coefficient in the quadratic term for GNP per capita. As expected, schooling has a strong negative relationship with inequality, while fertility has a strong positive effect. There is some suggestion that over time schooling becomes more important and the Kuznets mechanism less so, but this may also be due to the expansion of the panel over time to include more lower-income countries. Overall, the results from the three base models (1975, 1985 and 1995) conform to expectations arising from the broader literature on income inequality. This is reassuring, not just for the validity of the cross-sectional models reported here, but for

Table 2: Correlations between trade variables and inequality variables

	Cross-sectional approach			*Longitudinal approach*		*Full-difference approach*	
	1975	*1985*	*1995*	*1975–85*	*1985–95*	*1975–85*	*1985–95*
Imports (log)	0.230(+)	0.026	–0.078	–0.181	0.072	–0.162	0.522(*)
Exports (log)	0.223(+)	–0.049	–0.138	–0.186	0.058	–0.118	0.450(*)
Trade (log)	0.229(+)	–0.011	–0.109	–0.176	0.068	–0.167	0.500(*)
(*N*)	56	67	70	54	42	51	42

(+) $p < .10$.
(*) $p < .05$.

the validity of the longitudinal and full-difference models reported below as well, which are based on manipulations of the same underlying data.

In contrast to the correlational results reported above, after controlling for the base model variables there is no significant cross-sectional relationship between any of the measures of trade globalization and income inequality in any of the years 1975, 1985 or 1995. Though non-significant, the negative correlations reported here for 1985 are consistent with the findings of Chakrabarti (2000) summarized above. The results reported in Table 3, however, suggest that had Chakrabarti used 1975 or 1995 as his benchmark year in place of 1985, he likely would have found no relationship at all between globalization and inequality.

Longitudinal models

Longitudinal models of the relationship between income inequality and trade globalization over the two periods 1975–85 and 1985–95 are reported in Table 4. Not surprisingly, given the underlying mis-specification of the longitudinal models discussed above, the base model variables account for very little of the variance of inequality change over time. None of the base model variables are significantly associated with inequality change except national income, and then only for the later period. Neither of the base models, and indeed none of the longitudinal models, account for more than 20 percent of the variance in inequality change over either time period under study. Inequality change simply does not seem to be related to any variables representing the state of a country at a prior cross-section in time, globalization included.

These negative results are more or less consistent with the conflicting results reported by Reuveny and Li (2003) and Kentor (2001). Kentor studied a

Table 3: Cross-sectional regression models for inequality

	Base	*Model 1*	*Model 2*	*Model 3*
1975				
GNP (log)	–0.226(+)	–0.107	–0.135	–0.117
GNP per capita (log)	4.257(*)	4.136(*)	4.198(*)	4.166(*)
(log GNPpc) squared	–3.358(*)	–3.245	–3.323(*)	–3.285(*)
Schooling (secondary)	–0.284	–0.303	–0.282	–0.289
Fertility rate (log)	0.815(*)	0.880(*)	0.866(*)	0.876(*)
Imports		0.129		
Exports			0.107	
Trade				0.121
N	56	56	56	56
R-squared	0.528	0.535	0.534	0.535
1985				
GNP (log)	–0.202	–.0363(*)	–0.352(*)	–0.368(*)
GNP per capita (log)	3.185(*)	3.331(*)	3.392(*)	3.373(*)
(log GNPpc) squared	–2.609(*)	–2.663(*)	–2.715(*)	–2.693(*)
Schooling (secondary)	–0.412(+)	–0.378(+)	–0.405(+)	–0.390(+)
Fertility rate (log)	0.475(*)	0.468(*)	0.420(+)	0.442(+)
Imports		–0.200		
Exports			–0.198	
Trade				–0.208
N	67	67	67	67
R-squared	0.412	0.432	0.430	0.433
1995				
GNP (log)	–0.008	0.147	0.032	0.088
GNP per capita (log)	0.908	0.978	0.911	0.935
(log GNPpc) squared	–0.366	–0.476	–0.387	–0.427
Schooling (secondary)	–0.436(*)	–0.409(*)	–0.429(*)	–0.419(*)
Fertility rate (log)	0.384(*)	0.504(*)	0.417(*)	0.461(*)
Imports		0.193		
Exports			0.056	
Trade				0.126
N	70	70	70	70
R-squared	0.286	0.305	0.288	0.295

(+) $p < .10$.
(*) $p < .05$.

period (1980–97) that corresponds most closely to our second period, but which includes a portion of our earlier period. We found negative but non-significant coefficients in the first period and positive but non-significant coefficients in the second period; that these would average out to the near-zero result reported by Kentor seems reasonable. Reuveny and Li, on the other hand, studied a broader collection of time periods that began in 1960, and thus might have been closer in overall composition to our 1975–85 period results. They found a negative and marginally significant (significant

Table 4: Longitudinal regression models for inequality

	Base	*Model 1*	*Model 2*	*Model 3*
1975–85				
GNP (log)	–0.011	–0.324	–0.226	–0.282
GNP per capita (log)	–1.906	–1.556	–1.773	–1.670
(log GNPpc) squared	1.624	1.297	1.549	1.433
Schooling (secondary)	–0.124	–0.076	–0.124	–0.103
Fertility rate (log)	–0.408	–0.592	–0.534	–0.567
Imports (log)		–0.338		
Exports (log)			–0.254	
Trade (log)				–0.301
N	54	54	54	54
R-squared	0.051	0.100	0.086	0.094
1985–95				
GNP (log)	0.407(*)	0.465(+)	0.573(*)	0.524(*)
GNP per capita (log)	1.749	1.633	1.169	1.434
(log GNPpc) squared	–1.755	–1.670	–1.285	–1.509
Schooling (secondary)	–0.366	–0.373	–0.332	–0.363
Fertility rate (log)	–0.195	–0.186	–0.077	–0.147
Imports (log)		0.080		
Exports (log)			0.247	
Trade (log)				0.162
N	42	42	42	42
R-squared	0.156	0.159	0.187	0.170

(+) $p < .10$.
(*) $p < .05$.

only when they used a 1-tailed test) relationship between globalization and inequality. This is consistent with our findings for 1975–85, which are non-significant using a 2-tailed test.

Full-difference models

Full-difference models of the relationship between income inequality and trade globalization over the two periods 1975–85 and 1985–95 are reported in Table 5. The 1975–85 models conform to the expectations of low power: not a single variable of any kind in any model is statistically significant, and the proportion of variance in inequality change explained by the models never rises above 10 percent. The Kuznets effect seems to operate, though weakly and non-significantly, and though the sign for the schooling coefficient is in the expected direction, the sign for the fertility coefficient is not. It appears that whatever variability in inequality that remains after differencing 1975–85 is simply not related to any of the expected causes of inequality, including trade globalization.

This picture changes somewhat for the later period, 1985–95. The quadratic Kuznets term becomes positive and highly significant, indicating

a reversal of the expected pattern. The interpretation of the meaning (if any) of this term, however, is quite difficult (it represents a difference of a quadratic term), and in any case not germane to the current study. More relevant is the significance of the coefficients for imports ($p < .05$) and trade ($p < .10$). Countries that experienced rising trade globalization over the period 1985–95 generally experienced rising inequality over the same period. This confirms the unadjusted correlational results reported in Table 2 above. But if rising globalization is associated with rising inequality (full-difference model), why is point globalization not associated with point inequality (cross-sectional models)? It is difficult to reconcile the 1985–95 full-difference results with either the 1975–85 full-difference results or the 1985 or 1995 cross-sectional results.

Robustness to outliers and subpanels

To further test the consistency of the relationship between trade globalization and income inequality we re-ran all of the analyses reported above for four overlapping subpanels:

(1) Countries with populations under 10 million
(2) Countries with populations over 10 million
(3) Developing countries as categorized by the World Bank
(4) Developed countries as categorized by the World Bank

Categories (1) and (2) are mutually exclusive, as are categories (3) and (4). Results of these subpanel analyses are reported in appendix tables A1–A6. Tables A1–A3 report the correlational results for the subpanels, while Tables A4–A6 report the regression results. For the regression results, we report only the coefficients for the three trade globalization variables. Coefficients for the control variables are not of central interest here, but are available on request from the authors.

Results for all subpanels, as well as the main panel, are summarized in Table 6. Each entry in Table 6 represents a result that is significant at the $p < .05$ level. For each model configuration three operationalizations of trade globalization are tested against income inequality; thus, up to three entries are possible in each cell. Each entry of 'N' represents a significant negative correlation, while each entry of 'P' represents a significant positive correlation. A glance at Table 6 shows how sparse and inconsistent are the significant empirical relationships between trade globalization and income inequality. In fact, out of 210 total relationships tested, only 27 – just under 13 percent – were significant at the $p < .05$ level. Since $p < .05$ significant relationships would be expected 5 percent of the time simply by chance, this is not a strong indication of the existence of an underlying relationship between the variables. Moreover, what significant correlations there are split 1/3 negative and 2/3 positive. This further calls into question the relationship between globalization and inequality.

Table 5: Full difference regression models for inequality

	Base	*Model 1*	*Model 2*	*Model 3*
1975–85				
GNP (log)	0.001	0.053	–0.131	–0.080
GNP per capita (log)	0.216	0.116	0.216	0.152
(log GNPpc) squared	–0.272	–0.247	–0.165	–0.163
Schooling (secondary)	–0.116	–0.099	–0.091	–0.083
Fertility rate (log)	–0.148	–0.176	–0.192	–0.204
Imports (log)		–0.176		
Exports (log)			–0.164	
Trade (log)				–0.209
N	51	51	51	51
R-squared	0.035	0.064	0.056	0.720
1985–95				
GNP (log)	–0.237	–0.199	–0.375	–0.313
GNP per capita (log)	–0.371	–0.273	–0.117	–0.155
(log GNPpc) squared	0.651(*)	0.399(+)	0.466(*)	0.411(+)
Schooling (secondary)	–0.009	0.004	–0.004	0.000
Fertility rate (log)	–0.033	0.053	0.005	0.032
Imports (log)		0.363(*)		
Exports (log)			0.237	
Trade (log)				0.318(+)
N	42	42	42	42
R-squared	0.307	0.391	0.340	0.368

(+) $p < .10$.
(*) $p < .05$.

The results for the four subpanels are generally in alignment with the results from the full panel. In cross-sectional models, where a significant relationship is observed between trade globalization and income inequality it is invariably negative: more globalization is associated with less inequality. On the other hand, where a significant relationship is observed between change in globalization and change in inequality, it is invariably positive: increasing globalization implies increasing inequality. This pattern of results is profoundly inconsistent. The fact that positive relationships between globalization change and inequality change appear only in the 1985–95 models, however, leaves open the possibility that an historical negative correlation between globalization and inequality is in the process of being reversed. While this possibility is consistent with the data, it is by no means confirmed or even strongly suggested by the data.

Nearly all of the significant results summarized in Table 6 should be treated with caution for three reasons. First, they are susceptible to Type I error (due to the large number of models run). Second, they do not represent independent trials: the three trade globalization measures are all highly correlated with each other, and both trade and inequality are highly autocorrelated within countries

Table 6: Summary of results and influential points

Developed	*Full panel*	*Population < 10 million*	*Population > 10 million*	*Developing countries*	*countries*
Correlational analyses					
Model configuration					
Cross-Sectional 1975	- - -	- - -	- - -	- - -	- - -
Cross-Sectional 1985	- - -	- - -	- - -	- - -	- - -
Cross-Sectional 1995 (a)	- - -	- - -	**N N N**	**- N -**	- - -
Longitudinal 1975–1985	- - -	- - -	- - -	- - -	- - -
Longitudinal 1985–1995 (b)	- - -	- - -	**N- -**	**N- -**	- - -
Full-difference 1975–1985	- - -	- - -	- - -	- - -	- - -
Full-difference 1985–1995 (c)	**P P P**	**P - P**	**P P P**	**P P P**	**P P P**
Regression analyses					
Model configuration					
Cross-Sectional 1975	- - -	- - -	- - -	- - -	- - -
Cross-Sectional 1985	- - -	- - -	- - -	- - -	- - -
Cross-Sectional 1995	- - -	- - -	- - -	- - -	- - -
Longitudinal 1975–1985	- - -	- - -	**N N N**	- - -	- - -
Longitudinal 1985–1995(d)	- - -	- - -	- - -	- - -	**P P P**
Full-difference 1975–1985	- - -	- - -	- - -	- - -	- - -
Full-difference 1985–1995	**P - -**	- - -	- - -	- - -	- - -

Summarizing results from the statistical tables, each N or P represents one Negative or Positive result (out of three possible) that is significant at the $p < .05$ level for the impact of a given trade globalization measure (imports, exports, trade) on inequality. Each '-' represents a non-significant result.

(a) Dropping Brazil reduces these results to non-significance.
(b) Dropping Belgium reduces these results to non-significance.
(c) Dropping Nigeria and Honk Kong reduces all of these results to non-significance.
(d) Dropping Hong Kong reduces these results to non-significance.

over time. Third, and potentially most important, most of the results summarized in Table 6 are not robust with respect to deletion of outliers. Of the 27 significant correlations reported in the table, all but four recede to insignificance with the deletion of one or two influential cases. Moreover, many of the same countries show up repeatedly as influential points, Hong Kong in particular. In fact, the simple removal of Hong Kong – which has never been a sovereign nation, though it is a standard statistical case in international comparisons – from all analyses would reduce the number of significant relationships from 27 to 19, and the removal of Hong Kong and Nigeria (an outlying case of dubious data integrity) would leave only 10 significant relationships (less than chance). In other words, all deviation from chance in the relationship between trade globalization and income inequality can be traced to a few influential cases.

Conclusions

The analyses presented above seem to indicate that trade globalization is not robustly related to income inequality across multiple variable operationalizations, model specifications, panels and time periods. The inconsistency of results across time periods is particularly troublesome: few studies in the empirical literature explicitly cover multiple time periods and break out their results by time period. Results may thus be interpreted as causal when they are, in fact, panel-specific or period-specific. Single-period studies may report significant results for one point in time, ignoring the possibility that the relationships established may represent no more than historical contingencies. On the other hand, grouped designs covering multiple time periods may report results as being generally applicable when, in fact, all of the power behind their statistical significance is drawn from just one decade's experience. Even more troubling, not a single study reviewed in the literature makes any mention of exploring the robustness of its results with respect to outliers. The comprehensive approach taken here suggests that most if not all reported findings of a significant relationship between trade globalization and income inequality may be traceable to outliers or pure chance.

This should not be taken to imply that problems of income inequality are not generated or exacerbated through processes related to globalization. The overall level of engagement of a country's economy with the larger global economy seems not to be related to income inequality. But it is at least provocative that nearly all of the developed countries that have experienced rising income inequality in recent years have been English-speaking (Australia, Canada, New Zealand, the United States, the United Kingdom), while nearly all developing countries operating under International Monetary Fund structural adjustment programs in the 1980s experienced rising income inequality as well. Rather than spreading internationally through foreign trade, income inequality seems more likely to be spreading

internationally through the diffusion of neoliberal government economic policies, as argued for the Australian case in particular by Conley (2006). This process is perhaps illustrated most clearly by the historical trajectory of the third group of countries to experience rising income inequality: the post-communist states. Whatever the merits of neoliberalism vis-a-vis communism, the free market certainly brings with it much higher levels of inequality.

It is entirely possible that today's neoliberal global economic orthodoxy may be promoting trade globalization with one hand while at the same time promoting policies that increase income inequality with the other, despite the lack of any observed empirical relationship between trade globalization and income inequality. For example, if the neoliberal program of promoting increased trade is successful everywhere, while the neoliberal program of policies that promote increased income inequality is not, no relationship between trade globalization and income inequality would result. Prima facie evidence suggests that this is the case. For example, the membership of the World Trade Organization now comprises nearly every country in the world outside major oil exporters, ensuring the continuing expansion of global trade. Many countries, however, have experienced a strong domestic backlash against the implementation of neoliberal economic policies. This trend is most clearly apparent in Latin America and continental Europe, two areas that have seen little or no increase in income inequality. It may be that populations in many countries are successfully resisting policies that promote increased inequality, even while allowing (or at least not successfully blocking) policies that promote increased trade.

If this perspective is correct, future research on globalization and inequality, or on the impact of globalization more broadly, should focus on modelling the global diffusion of institutions – or even, as suggested by Atkinson (1999), of societal norms – across cultural, political, and economic networks. Dobbin et al. (2007) propose a comprehensive framework for testing the predictions of four different forms of diffusion processes: constructive, coercive, competitive and learning-based. These might be taken as a starting point for analysing the diffusion of policies that foster inequality, or even of inequality itself, across national boundaries. Constructive diffusion might operate through the actions of academics and think tanks; coercive diffusion through the actions of intergovernmental organizations like the IMF, World Bank and WTO; competitive diffusion through global commodity chain sourcing; and learning-based diffusion through local elites adopting stances pioneered in the leading advanced economies. Any or all of these mechanisms could provide a link between globalization, more subtly operationalized, and income inequality. Whatever specific mechanisms are at work, neoliberal policy responses to globalization and income inequality certainly have diffused widely over the past 30 years for reasons that are poorly understood. The (largely) negative regression results reported in this article, counterpoised to the self-evident

impact of globalization experienced by populations around the world, clearly suggests the need for a new approach to the study of globalization.

Appendix

Table A1: Correlations between trade variables and inequality variables for subpanels – cross-sectional models

Standardized coefficient for ...	*Population < 10 million*	*Population > 10 million*	*Developing countries*	*Developed countries*
1975				
Imports (log)	0.294	–0.209	0.271	0.397(+)
Exports (log)	0.254	–0.157	0.320(+)	0.225
Trade (log)	0.278	–0.185	0.302(+)	0.315
N	26	30	34	22
1985				
Imports (log)	–0.011	–0.150	0.126	0.079
Exports (log)	–0.156	–0.116	0.106	0.037
Trade (log)	–0.084	–0.136	0.121	0.058
N	34	33	42	25
1995				
Imports (log)	0.015	–0.404(*)	–0.199	0.365
Exports (log)	–0.126	–0.330(*)	–0.305(*)	0.352
Trade (log)	–0.055	–0.372(*)	–0.253(+)	0.359
N	33	37	57	13

(+) $p < .10$
(*) $p < .05$

Table A2: Correlations between trade variables and inequality variables for subpanels – longitudinal models

Standardized coefficient for ...	*Population < 10 million*	*Population > 10 million*	*Developing countries*	*Developed countries*
1975–85				
Imports (log)	–0.184	–0.141	–0.166	–0.187
Exports (log)	–0.137	–0.172	–0.149	–0.178
Trade (log)	–0.162	–0.159	–0.159	–0.184
N	24	30	32	22
1985–95				
Imports (log)	0.191	–0.467(*)	–0.364(*)	0.452
Exports (log)	0.351	–0.233	–0.222	0.391
Trade (log)	0.280	–0.362(+)	–0.318(+)	0.421
N	18	24	30	12

(+) $p < .10$
(*) $p < .05$

Table A3: Correlations between trade variables and inequality variables for subpanels – full difference models

Standardized coefficient for ...	*Population < 10 million*	*Population > 10 million*	*Developing countries*	*Developed countries*
1975–85				
Imports (log)	–0.240	–0.068	–0.197	–0.113
Exports (log)	–0.150	–0.083	–0.099	–0.195
Trade (log)	–0.231	–0.082	–0.175	–0.164
N	21	30	30	21
1985–95				
Imports (log)	0.550(*)	0.551(*)	0.502(*)	0.711(*)
Exports (log)	0.433(+)	0.526(*)	0.391(*)	0.703(*)
Trade (log)	0.502(*)	0.559(*)	0.471(*)	0.709(*)
N	18	24	30	12

(+) $p < .10$
(*) $p < .05$

Table A4: Cross-sectional regression models for inequality – standardized regression coefficients for trade variables in subpanel models

Standardized coefficient for ...	*Population < 10 million*	*Population > 10 million*	*Developing countries*	*Developed countries*
1975				
Imports (log)	0.347	–0.110	–0.183	0.377
Exports (log)	0.274	–0.054	0.071	0.114
Trade (log)	0.321	–0.082	–0.015	0.240
N	26	30	34	22
1985				
Imports (log)	–0.130	–0.307	–0.303	–0.055
Exports (log)	–0.125	–0.332	–0.377(+)	0.047
Trade (log)	–0.134	–0.320	–0.340(+)	–0.002
N	34	33	42	25
1995				
Imports (log)	0.227	–0.043	0.047	0.414
Exports (log)	0.083	–0.034	–0.181	0.416
Trade (log)	0.159	–0.039	–0.072	0.415
N	33	37	57	13

(+) $p < .10$
(*) $p < .05$

Table A5: Longitudinal regression models for inequality – standardized regression coefficients for trade variables in subpanel models

Standardized coefficient for ...	*Population < 10 million*	*Population > 10 million*	*Developing countries*	*Developed countries*
1975–85				
Imports (log)	–0.271	–0.684(*)	–0.517	–0.330
Exports (log)	–0.198	–0.573(*)	–0.203	–0.271
Trade (log)	–0.240	–0.649(*)	–0.331	–0.303
N	24	30	32	22
1985–95				
Imports (log)	0.178	–0.208	–0.317	0.776(*)
Exports (log)	0.187	0.109	–0.117	0.747(*)
Trade (log)	0.184	–0.057	–0.291	0.762(*)
N	18	24	30	12

(+) $p < .10$
(*) $p < .05$

Table A6: Full difference regression models for inequality – standardized regression coefficients for trade variables in subpanel models

Standardized coefficient for ...	*Population < 10 million*	*Population > 10 million*	*Developing countries*	*Developed countries*
1975–85				
Imports (log)	–0.259	–0.015	–0.172	–0.344
Exports (log)	0.033	–0.083	–0.206	–0.245
Trade (log)	–0.131	–0.044	–0.243	–0.319
N	21	30	30	21
1985–95				
Imports (log)	0.264	0.376	0.294	0.706
Exports (log)	–0.149	0.376	0.041	0.962
Trade (log)	0.062	0.412	0.198	0.884
N	18	24	30	12

(+) $p < .10$
(*) $p < .05$

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