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Globalization and the inequality among nations: A VAR approach

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Abstract

Granger causality and impulse-response analysis are used to show that globalization-reflected by world trade and international capital flow (measured by current-account deficits) to GDP ratios—causes an increase in the inequality of per capita GDP across nations.

Keywords: International inequality; Globalization; International trade; International capital flows; Vector autoregression

JEL classification: F02; F15; F21

1. Introduction

Two trends in the global economy–an increase in inequality among nations and a divergence in income between rich and poor nations, and globalization–have attracted widespread recent attention. For those who are concerned with the problem of the inequality among nations,[1] it

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[1] The inequality among countries, and not just the absolute performance of countries, is of interest both because well-being arguably has a relative–as well as an absolute–dimension in an increasingly interdependent world, and because the future development prospects of poor countries may depend on their position relative to that of rich countries, for instance because their ability to transfer technology may be hampered by a large gap in development levels.

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may be tempting to infer that globalization is responsible for this increase in inequality. This inference is not warranted, however, since divergent growth may be caused by factors internal to countries (due to increasing returns to scale, for instance), or because causality may run from increasing inequality to globalization (if countries which are less similar tend to interact more with each other). This note uses vector autoregressive (VAR) techniques to examine whether or not globalization, as reflected by worldwide increases in international trade and capital flows, is increasing inequality among the world's nations.

Such an examination is warranted because theoretical considerations do not provide an unambiguous answer. Much of standard economic theory (for instance, the Heckscher–Ohlin–Samuelson approach) implies that globalization reduces inequality between countries due to the mutually beneficial movements of goods, factors and knowledge. However, some recent developments in trade and growth theories and economic geography (Fujita et al., 2000), and many heterodox contributions (including dependency and structuralist work) argue that interaction between nations may lead to uneven development (Dutt, 1990). For instance, it is pointed out that increased trade between rich and poor countries can cause divergent growth by increasing (reducing) the production of goods which generate technological change due to learning by doing in rich (poor) countries (see, for instance, Young, 1991), a divergence which technology transfers may be unable to reverse. Some recent empirical analysis has attempted to address the question, but this work mostly confines attention to trade interaction and liberalization within rich countries (see Ben-David, 1993, 1996; Slaughter, 2001) or takes a broad historical perspective (O'Rourke, 2002).

2. Method

We measure inequality with the standard deviation of the logarithm of purchasing power parity-adjusted per capita GDP, a measure widely used in the literature on σ-convergence (see Sala-i-Martin, 1996). We use two widely used measures of globalization, trade as measured by the ratio of the sum of world trade to the sum of world GDP, and capital flows as measured by the ratio of the sum of the absolute values of the current account gap to the sum of world GDP (O'Rourke, 2002). We use the current account measure because, despite its incompleteness, it arguably reflects longer-term resource transfers, abstracting from short-term hot-money flows which are often seen as a problematic aspect of globalization, and is more inclusive than foreign direct investment. We exclude labor movements because they are largely an absentee in the globalization process, and technology transfers because they are difficult to measure, and because they are arguably reflected, to some extent, in trade and capital flows. The years covered are 1977 to 1998, the span of years for which data for all three series for a large number of countries is available.[2]

Our empirical analysis uses two VAR methods, Granger causality (GC) and impulse response (henceforth IR) analyses. GC tests are used to examine pair-wise causality in our three-variable VAR system. Since the GC test statistic will not follow a standard statistical distribution if any of the series in

[2] All data used in this paper are from the World Bank's *World Development Indicators* CD-ROMs for 2001 and 2002.

the VAR has a unit-root (see Toda and Phillips, 1993; Phillips, 1995), and some of our series have units roots, we use the technique developed by Toda and Yamamoto (1995) (TY) for its computational simplicity. Using TY's procedure, we define a VAR system with k lags, and estimate the VAR model with $(k+d)$ lags where d is the maximum order of integration for all the variables. We use only the first k coefficients to construct the GC test statistics. Under some regularity conditions, TY's procedure yields asymptotically Chi-squared GC tests.

Since GC tests only provide the direction of causality, we use IR analysis to determine the signs of the effects. In IR analysis we define a VAR in the levels of the variables, and give a unit shock to each of the system equations, and then we trace the responses of all the variables for the future time periods. Phillips (1998) showed that if a VAR system includes variables that are non-stationary, the IRs may converge to a random walk process in the long run. To deal with this problem, following Phillips, we use the error-correction mechanism (ECM) to estimate the VAR and IRs. To avoid the need for imposing some arbitrary ordering of the VAR system variables we use generalized impulse responses (Pesaran and Shin, 1998).

3. Results

Using the augmented Dickey–Fuller test we find that the inequality, trade and current account balance series have unit roots in their levels only.

Our results for the modified Granger causality tests are shown in Table 1. We find that trade Granger-causes inequality and current account Granger-causes trade, both at the 95% level. The other variables do not Granger-cause each other. More specifically, the current account does not Granger-cause inequality.

Some relevant results for the IR analysis using the vector error correction (VEC) model with the correct rank of co-integration are shown in Fig. 1. The rank of the co-integration is chosen by the minimum Schwarz criteria from among a various combination of VAR lag lengths (with maximum lag order being 3) and co-integration specifications (with five different specifications based on the presence of intercept and trend in the data series and co-integrating equation). All the responses shown are cumulative, so that the effects of a *permanent* change in one variable on the others are depicted in the diagrams. We find that a shock to the current account has a slightly

Table 1
Modified Granger causality (Wald) test statistics for the VAR system

VAR specification	Order (Lag)	Does not GC		
		Inequality	Trade	Current a/c
PPP-adjusted GDP	1 (1)			
Inequality			1.7437 (0.1867)	0.1823 (0.6694)
Trade		5.6048 (0.0179)		0.0623 (0.8029)
Current a/c		0.4752 (0.4906)	13.1212 (0.0003)	

The p-values are in parenthesis. The null hypotheses in this case is: each variable in the rows "does not Granger cause" each variable in the columns (whenever appropriate). "Order (Lag)" column indicates the maximum order of integration according to TY (1995) and the lag order for the VAR.

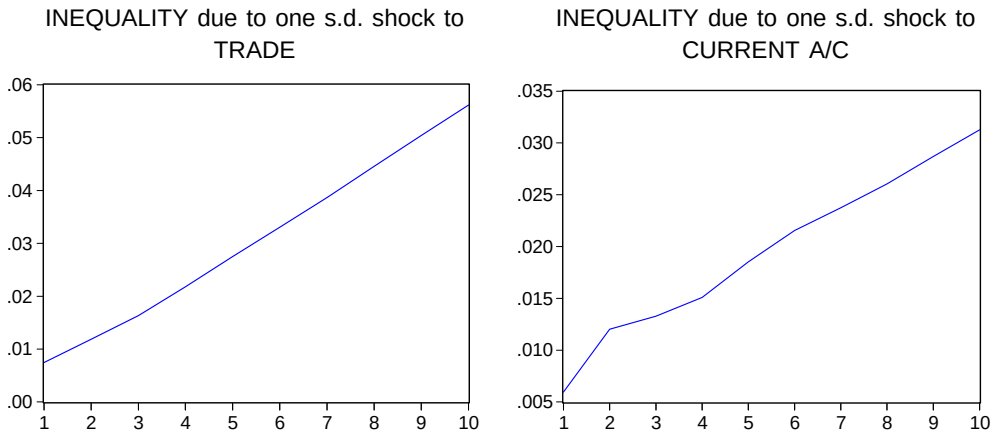

Fig. 1. Impulse response analyses using VEC model with correct rank of cointegration using PPP-adjusted value of per capita GDP for inequality measure.

positive effect on inequality, while trade increases inequality. We also find (although the figures are not shown) that a shock to trade reduces capital flows, and that a shock to capital flows reduces trade.

4. Conclusion

Our results imply that some of the major aspects globalization contribute to an increase in the inequality among nations. Trade Granger-causes, and increases, inequality. Capital flows measured by the current account deficit also increase inequality, although the Granger-causality results are not conclusive.

This conclusion goes beyond the simple association of trends in increasing globalization and inequality. We have taken into account the possibility of causality running from inequality to globalization and the possibility that increases in inequality can be caused by factors internal to the countries by distinguishing between globalization shocks (to trade and capital flows) and others which may be internal (shocks to inequality). We have also taken into account the fact that different aspects of globalization can interact.

Our analysis is subject to a number of shortcomings and caveats. In particular, we use specific measures of globalization which are highly aggregative, and an inequality measure which treats each country as one observation, rather than weighting countries by population (which some may consider a superior measure of inequality among nations) or by taking country groups (like rich and poor). Alternative measures can be used in future work to address these issues. One specific difficulty is that our measures of globalization may reflect trends within rich countries, and not actually reveal the relative benefits of globalization for poor countries. This, however, need not be a problem if we are interested in examining the implications of globalization as it is actually occurring (that is, mainly within rich countries), rather than in some idealized form.

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