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EVIDENCE FROM LATIN AMERICA

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Is There An Openness Kuznets Curve? Evidence From Latin America

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Abstract

Numerous studies have examined the relationship between income inequality and trade openness. This paper departs from previous work by considering a possible non-linear relationship between trade openness and inequality. The evidence is consistent with the idea of a Kuznets curve: inequality increases until a critical level of openness is reached after which inequality begins to fall. The finding of a non-linear relationship between trade openness and inequality implies that governments in Latin America should introduce redistribution policies, alongside trade liberalisation measures, so as to ease the adverse effects of trade liberalisation.

1. Introduction

According to Kuznets (1955), income inequality increases until a critical income level is attained, after which inequality begins to decrease. The graphical representation of this hypothesis is an inverted U shaped (Kuznets) curve. Researchers have also examined the Kuznets hypothesis in other situations with one of the most well known being the relationship between inequality and environmental factors (such as pollution intensity). This line of research tends to generate an inverted U shaped curve, known as the environmental Kuznets curve (for example, Shafik, 1994).

A further line of inquiry has been the relationship between income inequality and trade liberalisation. In some studies greater openness is found to increase inequality (for example, Gourdon et al, 2006; Chen, 2007) while in other studies the opposite is true (for example, Reuveny and Li, 2003). In some cases, the openness variable is found to be statistically insignificant (for example, Dollar and Kray, 2002; Perry and Olarreaga, 2006). A question that naturally follows is whether the relationship between trade openness and inequality is consistent with the Kuznets curve hypothesis. One good reason for investigating the idea of an openness Kuznets curve is the implication for policy. If the available evidence points to greater openness worsening inequality, governments may well be tempted to abandon the liberalisation programme. However, if the relationship between openness and inequality is non-linear there will be gains, hence there is a case for continuing with the policy. In this situation, redistribution policies need to go hand in hand with liberalisation policies so as to ease the adverse effects.

In this paper we examine the Kuznets curve hypothesis using data for Latin America. At various times over the past two decades or so all countries in Latin America have introduced trade liberalisation policies. Chile was the first to begin the liberalisation process in the late 1970s followed by Bolivia, Mexico, Costa Rica and Venezuela in the mid 1980s

and Argentina, Brazil, Colombia and Peru in the late 1980s/early 1990s. By the end of the 1990s all countries had made progress with trade liberalisation. The fact that countries have liberalised trade at different times makes the region an especially suitable one for testing the Kuznets stages of development hypothesis. Furthermore, the fact that Latin America did not have a comparative advantage in unskilled labour at the time liberalisation policies were introduced means we ought to see inequality increase before it begins to fall. The basis for this argument is as follows.

Greater openness will reward low income groups, and so help to reduce disparities in income, where countries have a comparative advantage in unskilled labour. While it is true to say that Latin America has a large pool of unskilled labour, there is relatively more of it in other parts of the world (for example, China and India). At the time of trade liberalisation in Latin America countries like China and India were already emerging on the world trade scene, to the extent that by the 1980s and 1990s Latin America's comparative advantage had likely shifted from unskilled labour to natural resources (Wood, 1999). In this situation, an increase in openness may result in a worsening of inequality. However, once an economy has reached a certain level of openness, more (low income) people benefit via the multiplier effect, hence inequality is expected to fall. Also, given that trade liberalisation is preceded by fiscal reform, the tax revenues from firms that take advantage of liberalisation can be invested directly in employment-promoting activities or social programmes that improve education and health care. Furthermore, with trade liberalisation comes an increase in imports from countries with a comparative advantage in unskilled labour. Since the price of these goods is lower than they would be if they were produced domestically and since such goods are primarily consumed low income groups, these groups see a rise in their real income.

The rest of the paper is organised as follows. Section 2 describes the data and empirical model. The results are reported Section 3 while the final section concludes.

2. Data and Empirical Model

The empirical model to be estimated is:

$$Gini_{it} = X_{it}\beta + A_i + \varepsilon_{it} \qquad (i = 1,....n; t = 1,.....T) \qquad (1)$$

where *Gini* is a measure of income inequality for country *i* at time *t*. X_{it} contains all regressors which vary across time and countries. The parameter A_i contains a constant and individual specific variables that are invariant over time (for example, location and history)[1] and ε_{it} is the classical error term. Within X_{it} we include a variable for trade openness, measured in levels and as a squared term (to capture potential non-linearity). We adopt two widely used measures of openness for which data are available and which enable us to test the non-linear hypothesis: (i) the ratio of exports plus imports (total trade) to GDP (*xmgdp*) and (ii) average tariff rate (*atr*). Though the trade ratio is an imperfect proxy for trade policy for a number of reasons[2], greater openness is reflected in a larger traded sector relative to total production. The average tariff rate is a more direct measure of a country's openness since it is a policy based variable, capturing the severity of trade restrictions in a country. This dimension is important because even though actual trade performance may be poor, incentives to foster investment and trade in poor countries (via low tariff rates) are a good proxy for trade liberalisation.[3] Using two measures of openness also serves as a robustness check for the results. The two measures of openness are plotted in Figure 1. As expected, there is an inverse relationship between the two: a reduction in the average tariff rate provides a boost to trade, hence a rise in the trade ratio.

The other variables within X_{it} are primary school gross enrolment rates (*primary*), the share of agriculture in total output (*aggdp*), the rate of inflation (*inflation*), cumulative privatisation as a percentage of GDP (*privgdp*) and corruption (*corrupt*). Education is an investment in human capital and so should contribute to a lowering of inequality. An expansion of the labour intensive agricultural sector is expected to increase employment

levels and reduce inequality. Inflation reduces the real net worth of an individual and the impact will be relatively larger on low income groups, hence inequality is expected to worsen. Privatisation is expected to worsen inequality. With privatisation comes an increasing emphasis on efficiency and profit maximisation. This is likely to result in a substitution of less skilled labour for skilled workers and in increase in prices for previously public goods. Privatisation may also result in the elimination of subsides to public services which are sometimes genuinely redistributive. Countries with more corruption (in government) are expected to see increases in inequality because policies tend to favour higher income groups. For example, in education a higher proportion of spending will go towards tertiary rather than primary education.[4,5]

The dependent variable is a standard measure of income inequality, the Gini coefficient. The data on inequality is drawn from the United Nations World Income Inequality Database (UN-WIDER, 2005).[6] We use the new quality label provided in Version 2a, which combines and improves the quality ratings in Deininger and Squire (1996) with older versions of the data. Data classified as the lowest quality is excluded. Only data which cover both the entire population and the whole area of the country is used. For each country, we form the longest possible series of observations. A summary of the years of available data for the Gini coefficient for each country is provided in Table 1. Blank cells in the table indicate that there are fewer than three observations for the decade. Not surprisingly, there are more observations for the 1990s.

Data on the trade to GDP ratio and GDP per capita is obtained from Penn World Tables, Version 6.1 (Heston, Summers, and Aten, 2002).[7] The average tariff rate is an unweighted measure, obtained from the World Bank (Data on Trade and Import Barriers).[8] Corruption data is obtained from the International Country Risk Guide (ICRG).[9] Data on education is obtained from the Global Development Network Growth Database[10] and data on

privatisation (cumulative percentage of GDP) is taken from Lora (2001), which covers the period 1985-1999. For years prior to 1985 the cumulative percentage figure is zero since the 1985 figure for all countries is zero. For the year 2000 the privatisation value was calculated from World Bank data (privatisation website).[11] All other data is obtained from the World Bank's World Development Indicators (2005). Descriptive statistics are presented in Table 2.

Before reporting the estimation results, we provide a visual description of the relationship between inequality and (both measures of) openness. Figure 2 shows the relationship between the Gini coefficient and the trade ratio in levels, while the relationship in changes is shown in Figure 3.[12] In Figure 2 inequality increases with the trade ratio until a critical level of the trade ratio is attained, after which inequality begins to decrease. Figure 3 provides further support for the Kuznets curve hypothesis.

Figures 4 shows the levels relationship between the Gini coefficient and the average tariff rate. Since the trade ratio and the average tariff rate are inversely related (Figure 1), the curve in Figure 4 is, as expected, U shaped. Thus, as the tariff rate increases from low levels, inequality falls before rising once a critical tariff rate is reached. The relationship between changes in the Gini coefficient and changes in the average tariff rate is shown in Figure 5. This further supports the idea of a non-linear relationship.[13]

3. Results

The empirical estimation is conducted over the period 1980-2000 for 18 Latin American countries using panel estimation methods.[14] The data is annual and the panel is unbalanced. One concern in estimating equation (1) is the possible endogeneity of the control variables. Additionally, if there is correlation between at least one explanatory variable and the error term, OLS estimates will suffer from simultaneity bias. In order to deal with both

potential problems, an instrumental variable (IV) methodology is adopted. Because of data limitations we are only able to instrument for the corruption variable.[15]

The results of estimating equation (1) are reported in Tables 3 and 4. In both tables, model (1) is estimated using pooled OLS. In model (2) fixed effects (not reported) are added. Model (3) is the same as model (2) except it deals with the endogeneity issue mentioned above. According to the Hausman test a fixed effects model is preferred to a random effects model. On the basis of the Sargan test and an F-test from the first stage regression we conclude that the instruments used (model 3) are acceptable.

The results in Table 3 provide evidence for an inverted U shaped curve between inequality and the trade ratio. As expected, the coefficient on the levels term is positive and it is negative on the squared term. The results are statistically significant in models (2) and (3). Inequality rises with openness but then falls once a critical level of the trade ratio has been reached. The fact that the relationship also holds for a sub sample of countries indicates the robustness of the results.[16] The critical level for the trade ratio is the mid to high seventies; once the trade ratio goes above this figure further increases in openness will reduce inequality, ceteris paribus.[17]

The results in Table 4 for the average tariff rate confirm the findings for the trade ratio. As expected, the coefficient on the levels term is negative and it is positive on the squared term. The results are statistically significant. Inequality falls with increases in the average tariff rate but then rises once a critical tariff level is reached. The relationship between inequality and the tariff rate also holds for a sub sample of countries.[18] The critical level for the average tariff rate is approximately 19 per cent; once the tariff rate goes above this figure inequality will rise, ceteris paribus.

The finding of a non-linear relationship between openness and inequality in both Tables 3 and 4 suggests that the results are robust to alternative measures of openness.

Regardless of which measure of trade openness we use, the results for the other variables in Tables 3 and 4 are as expected. Inequality falls with less corruption (an improvement in the corruption index), with a higher ratio of agriculture to GDP, and with higher primary school gross enrolment rates. However, inequality worsens with an increase in inflation and greater privatisation.

4. Conclusion

This paper has explored the relationship between income inequality and trade liberalisation in Latin America. The evidence is in favour of the Kuznets curve hypothesis - trade liberalisation worsens inequality until a critical level of openness is reached after which inequality begins to fall. Support for an openness Kuznets curve is consistent with Latin America not having a comparative advantage in unskilled labour so that when liberalisation is begun the benefits do not accrue to low income groups. Once trade openness reaches a critical level, inequality is reduced due to multiplier effects and lower prices of labour intensive imports. Governments should continue with liberalisation policies but, at the same time, redistribution policies should be introduced to ease the adverse effects of trade liberalisation.

Notes

[1] It is appropriate to include time (year) dummies when the number of years is small relative to the number of countries (Wooldridge, 2006). Since this is not the case in this study, time dummies are not included.

[2] The trade ratio measure is likely to pick up the effects of technological progress, exchange rate changes, and economic cycles.

[3] This measure also has disadvantages. For example, if average tariff rates are unweighted a disproportionate weight may be given to tariffs on commodities which represent a small fraction of imports (but have a high rate). On the other hand, if the tariff rates are weighted this may give no weight to certain goods, hence they would be completely ignored. Also, the average tariff rate (whether weighted or not) makes no allowance for non-tariff barriers.

[4] The corruption variable is measured on a scale from zero (most corrupt) to six (least corrupt). A rise in the corruption index is expected, a priori, to lead to a fall in inequality (the sign on the coefficient *corrupt* is expected to be negative).

[5] In inequality studies several other explanatory variables have been used, including variables to represent financial development, land distribution, mineral resource abundance, governance and so on. We tried various combinations of these variables as well as interacting variables, but the results were not improved. One possible reason for this is that while these variables can be important in explaining differences across a diverse group of countries, they are less important in explaining inequality across more homogenous countries in the same region.

[6] www.wider.unu.edu/wiid/wwwwiid.htm

[7] http://pwt.econ.upenn.edu/php_site/pwt_index.php

[8] http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:21051044~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html

[9] The corruption index is collected and published annually by Political Risk Services (PRS). See www.prsgroup.com. This measure focuses on corruption in government; it is intended to capture the likelihood that high government officials will demand special payments and the extent to which illegal payments are expected throughout lower levels of government. The index ranges from 0-6, with higher values indicating a "better" rating (less corruption).

[10] http://www.nyu.edu/fas/institute/dri/global%20development%20network%20growth%20database.htm

[11] http://rru.worldbank.org/Privatization/Methodology.aspx

[12] The key regression results are those for a fixed effects model. If the model is well specified the sign on the coefficients from a levels regression should be the same as in a regression in first differences. For this reason, it is useful to show a plot of changes in inequality and changes in openness.

[13] Figure 5 is based on fewer observations than Figure 3 because of missing (annual) values for the average tariff rate for some countries. This means that when the data is differenced we lose even more observations.

[14] Countries in the sample: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Paraguay, Peru, El Salvador, Uruguay, and Venezuela.

[15] We instrument for corruption using democracy and ethnicity (see Gupta et al, 2002).

[16] We ran models (2) and (3) dropping each country sequentially, as well as pairs of countries, to see whether the results are being driven by a few special cases. This could happen, for example, if there are outliers or if there are many more observations for one or two countries relative to others. The results were not changed, hence we conclude that the non-linear result is general. Results are available on request from the authors.

[17] When we estimate models (2) and (3) for a sub sample of countries (as in note 16), there is a small change in the turning points. For example, when we drop the two smallest countries (Jamaica and Nicaragua) with the highest trade ratios, the turning points are 76.9 for model (2) and 75 for model (3). Full results are available on request.

[18] See note 16.

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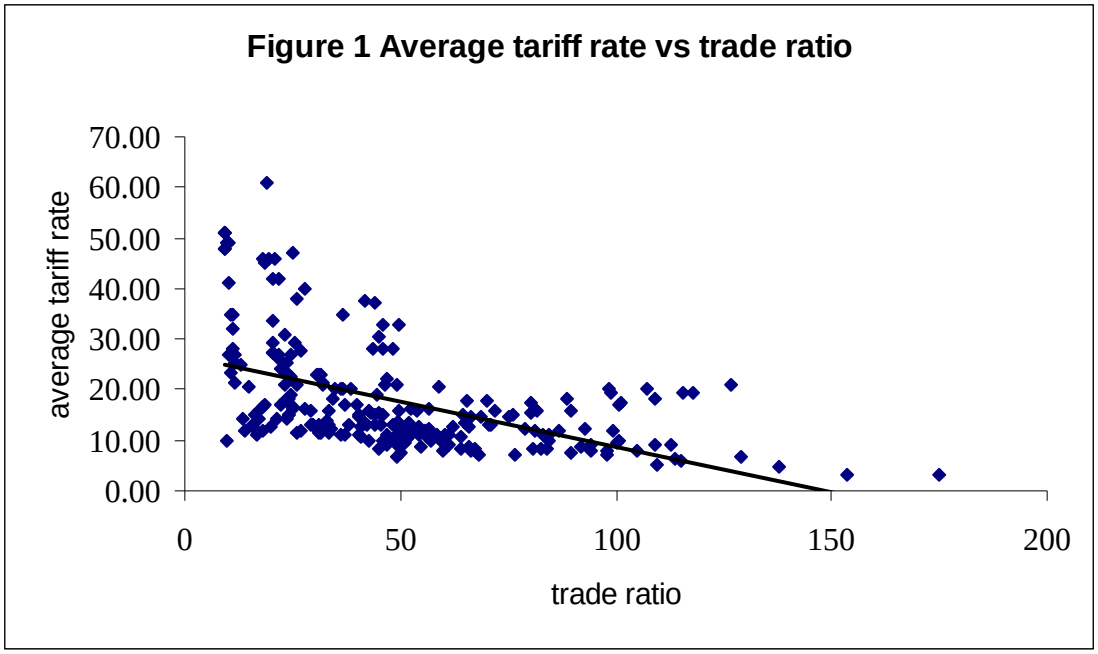


Figure 1 Average tariff rate vs trade ratio
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
average tariff rate
0
50
100
150
200
trade ratio

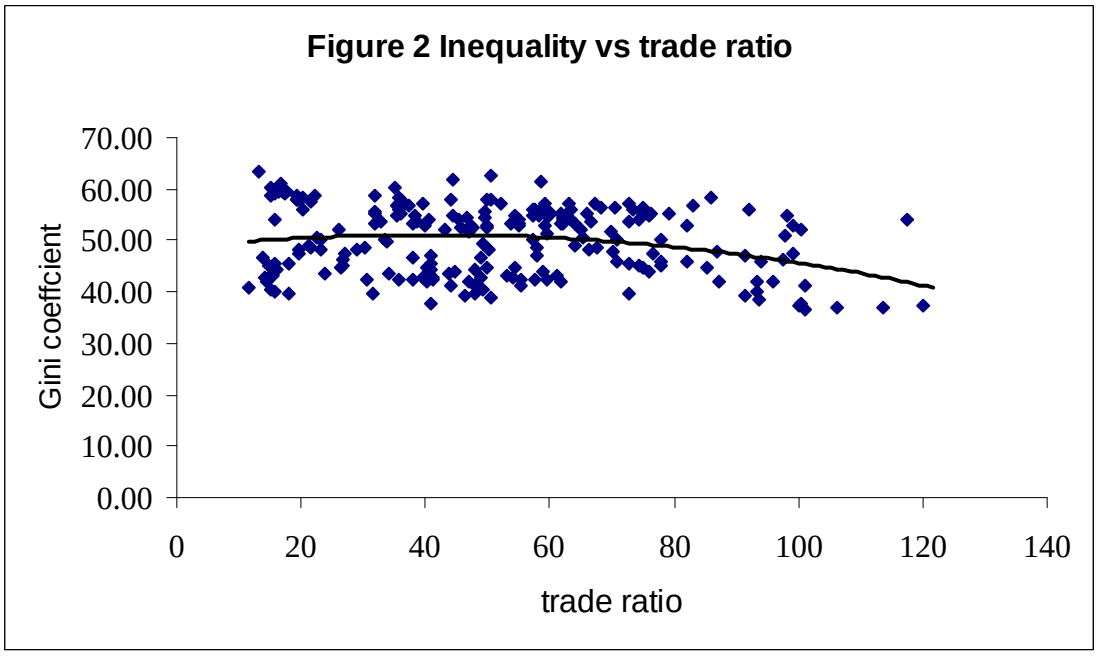


Figure 2 Inequality vs trade ratio
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Gini coeffcient
0
20
40
60
80
100
120
140
trade ratio

Figure 3 Change in inequality vs change in trade ratio

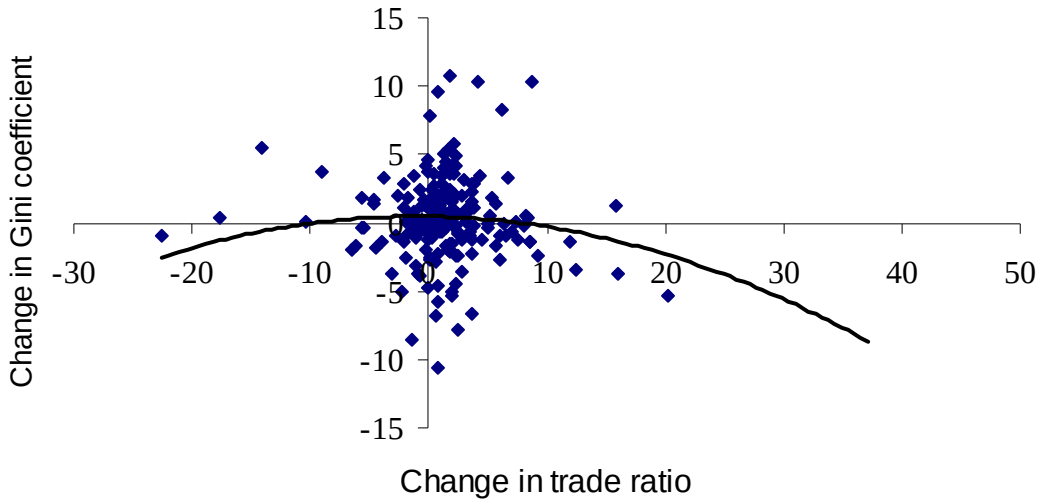
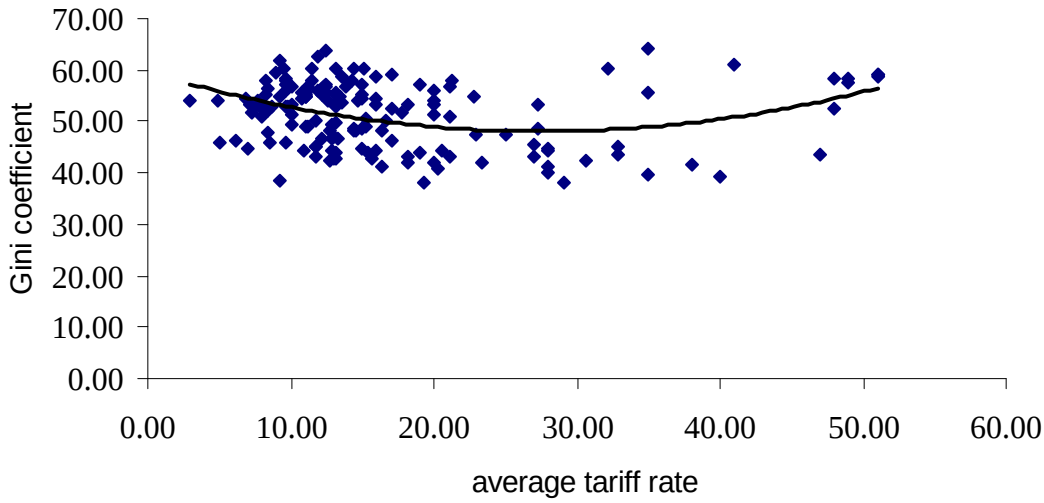


Figure 4 Inequality vs average tariff rate



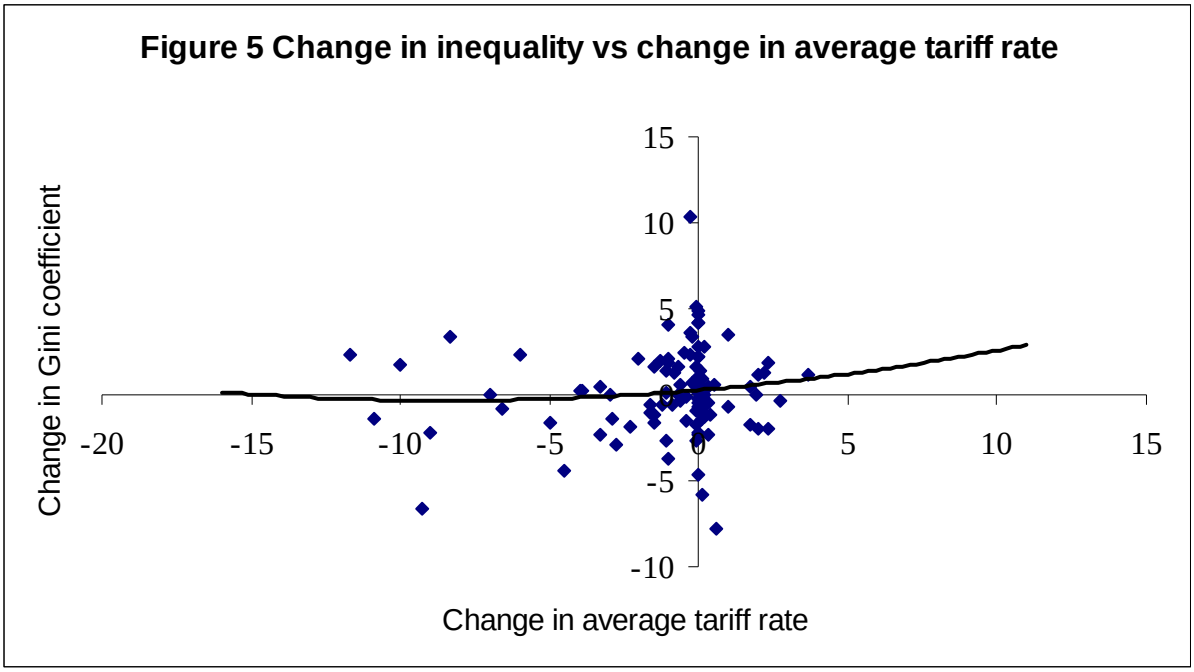


Figure 5 Change in inequality vs change in average tariff rate
Change in Gini coefficient
15
10
5
0
-5
-10
-20
-15
-10
-5
0
5
10
15
Change in average tariff rate

Table 1 Data availability for the Gini coefficient

Country	Years of available data	Movement in Inequality	
		1980s	1990s
Argentina	All except 1984	↑	↑
Bolivia	1984, 1989-90, 1992-93, 1995-97, 1999, 2000		↓↑
Brazil	1980-90, 1992-93, 1995-99	↑	↓
Chile	All except 1997	↑	stable
Columbia	1980, 1982-83, 1985, 1988-89, 1991-2000	↓	↑
Costa Rica	1981-83, 1986, 1989-98, 2000	stable	stable
Dominican Republic	1984,1986, 1989, 1992, 1995-98, 2000	↑	↑
Ecuador	1987-88, 1994-95, 1998-2000	↑	↑
Guatemala	1987-88, 1997, 1998, 2000		stable
Honduras	1986, 1989-99	↑	stable
Jamaica	1988-93, 1995-2000	↑	stable
Mexico	1984, 1989, 1992, 1994, 1998, 2000		↓
Nicaragua	1993, 1998, 2000		↓
Peru	1981, 1991, 1994, 1997-2000		stable
Paraguay	1983, 1990, 1994-95, 1997, 1999		↑
El Salvador	1990-91, 1994-2000		stable
Uruguay	1980-87, 1989, 1992, 1995-98, 2000	↑	stable
Venezuela	All	↑	stable

Key: ↑ increase in Gini coefficient; ↓ decrease in Gini coefficient; stable = no change in Gini coefficient

Table 2 Summary statistics

Variable	Mean	Standard deviation	Minimum	Maximum	Observations
Logarithm of GDP per capita (PPP adjusted)	8.68	0.40	7.69	9.38	398
Ratio of agriculture to GDP	14.11	7.57	4.10	37.96	387
Gini coefficient	49.97	6.55	36.69	63.28	219
Privatisation (cumulative % of GDP)	2.31	3.86	0	21.8	210
Primary (gross enrolment rates)	105.36	9.47	79.1	165.96	214
Corruption	3.08	0.87	1.00	5.00	219
Inflation (GDP deflator, annual)	202.24	1102.43	-31.52	13611.63	398
Exports + imports/GDP	51.16	30.02	9.12	138.01	398
Average tariff rate (unweighted)	17.80	3	10.06	61	222

Table 3 Income inequality and openness (trade ratio measure)

Independent variables	**Pooled OLS (1)**	**Panel OLS (2)^**	**Panel TSLS (3)^**
lgdp	-11.216	125.978	217.008
	(0.759)	(0.054)	(0.005)
$lgdp^2$	0.322	-6.965	-12.048
	(0.879)	(0.0583)	(0.005)
primary	0.116	-0.034	-0.059
	(0.013)	(0.336)	(0.101)
corrupt	0.719	-0.573	-2.236
	(0.187)	(0.194)	(0.023)
xmgdp	0.039	0.259	0.231
	(0.478)	(0.001)	(0.005)
$xmgdp^2$	-0.001	-0.002	-0.002
	(0.028)	(0.001)	(0.003)
priv	0.221	0.260	0.324
	(0.075)	(0.004)	(0.001)
aggdp	0.108	-0.140	-0.208
	(0.241)	(0.216)	(0.077)
inflation	0.002	0.001	0.001
	(0.194)	(0.195)	(0.066)
constant	107.443	-518.939	-915.558
	(0.500)	(0.073)	(0.007)
R-squared	0.26	0.84	0.84
Turning point for trade ratio*	20.99	78.24	76.79
Observations	204	204	204
Hausman		18.910	
		(0.020)	
Sargan			0.579
F-1^{st}			10.737

robust p values are in parentheses
^ fixed effects are not reported
* calculated using pre-rounded coefficient values

Table 4 Income inequality and openness (average tariff rate)

Independent variables	**Pooled OLS (1)**	**Panel OLS (2)^**	**Panel TSLS (3)^**
lgdp	84.3291	77.2411	129.459
	(0.136)	(0.016)	(0.027)
$lgdp^2$	-4.916	-4.0675	-6.941
	(0.096)	(0.128)	(0.095)
primary	0.1272	-0.0445	-0.0533
	(0.086)	(0.167)	(0.101)
corrupt	-1.2461	-1.2431	-2.713
	(0.074)	(0.009)	(0.004)
priv	0.1513	0.3115	0.345
	(0.293)	(.000)	(0.000)
atr	-0.8251	-0.1710	-0.2010
	(0.000)	(0.106)	(0.092)
atr^2	0.0157	0.0044	0.0053
	(0.000)	(0.095)	(0.055)
aggdp	0.3279	0.3056	-0.3068
	(0.008)	(0.060)	(0.076)
inflation	0.0034	0.0013	0.0019
	(0.074)	(0.195)	(0.008)
constant	-312.05	-300.05	-529.775
	(0.163)	(0.370)	(0.160)
R-squared	0.33	0.86	0.88
Turning point for tariff rate*	27.17	19.43	18.96
Observations	144	144	156
Hausman		38.06	
		(0.000)	
Sargan			1.648
$F\text{-}1^{st}$			12.456

robust p values are in parentheses
^ fixed effects are not reported
* calculated using pre-rounded coefficient values

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