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Brazil and China: Two Routes of Economic Development?

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Abstract

We look at two emerging economies, Brazil and China, and propose an evaluation of their recent development in terms of growth performance and the evolution of income inequality. Our analysis, therefore, is related to the literature on their recent vast growth and also to the much debated Kuznets curve and theory. However, we claim that neither the growth nor the Kuznets approach capture recent relevant phenomena characterizing such countries' dynamics: namely, the presence of at least two distinct growth models. Cointegration analysis and empirical evidence seem to corroborate our interpretation. They also offer some further insights. We surmise that while contributing to press for a further re-examination of convergence in the light of the issue of income distribution, such findings have interpretative relevance and policy implications for other less developed countries.

1. Introduction

After a lengthy and on the whole probably inconclusive debate, research has started to look for supplementary variables to explain the all-pervasive evidence of divergence in per capita income among developed countries as well as between them and less developed countries (LDCs) and more recently emerging economies. An extensive literature has blossomed on the causality relationship between inequality (however, measured) and economic performance, as measured by say, per capita gross domestic product (pc GDP). Recently, this debate has merged with a debate on the so-called "middle-income trap" (in particular, in relation to some of the emerging economies).

Generally in a cross-country framework, we have seen the (re-)discovery of analyses positing the existence of a functional relation between growth and inequality. It is natural to think of the time honored Kuznets curve (1955) with its associated dynamical hypothesis and prediction, a relation whose peculiarity is to describe a causal association that reverses at the (high or low) level of a country's development. In more recent years, a shared attitude has been the rejection of the very existence (or of the "end", Palma (2011)) of a K curve constructed from cross-country analysis. Hereafter, we take instead a time series approach to study the evolution of pc GDP (levels and growth rates) vs income inequality (through a Gini index) in the two economies, China and Brazil. (A companion paper by Risso et al. (2013) examines México.)

An econometric exercise shows that in both countries pc GDP and income inequality do stand in a cointegrated, long-term relationship. However, while vector

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autoregression (VAR) Granger causal relationships indicate that China's economic growth "predetermines" or "Granger-causes" income inequality (perhaps, one could say "*á la* Kuznets"), in Brazil the causal relationship seems to be reversed. Moreover, in China such a relationship is positive (such as in Risso and Sánchez Carrera (2012)) while in Brazil it is negative. Then, for each country, we construct, analyze and compare the qualitative behavior of curves in a plane with (pc GDP, Gini index) on the coordinate axes, a K-plane. Obviously, such curves are not true Kuznets curves, owing to their time series origins, though we may call them "Kuznets-like".

We suggest a re-interpretation of the experiences of the two countries, where the key notions distinguish between two growth models: a fast growth with income concentration, "investment" supported model (prevailing in China, at least until recently) and a more moderate growth with income redistribution, "consumption" supported model (of Brazil), as well as the possibility of a model switch.[1]

Section 2 briefly surveys relevant literature. Section 3 goes through the steps of an econometric exercise to discuss empirical evidence for China and Brazil focusing on the existence of stable long-run relationships between inequality and growth of the type as implied by cointegration and Granger causality. The aim of section 4 is to sketch some stylized facts of Brazil's and China's recent development in a K-plane, and to introduce the notion of growth models and model switch. Section 5 puts the two countries *vis-à-vis* with one another and summarizes our results, while section 6 outlines some conclusions.

2. The Literature: A Brief Review

In recent years, considerable efforts have been spent on understanding the differential growth experience of various countries in a hunt for the perfect policy recipe for success. Especially emerging economies, but also some LDCs, have been scrutinized with the tools of growth (rather than development) theories. One key issue that has come up is whether a growth goal is achievable through redistributing wealth or otherwise letting wealth and income concentrate. It is still subject to debate.

The dynamic process creates new resources as well as modifying their distribution. This was very clear to the theorists of economic development seeking explanations and consequences in major structural changes. Ever since Kuznets and Lewis, theoretical constructs about the effects of performance on income distribution have focused on several basic mechanisms. In a bold generalization from limited cross-country evidence, Kuznets (1955) maintained that an increase in inequality is inevitably associated with certain phases ("stages") of the development process—that is, distributional inequality would increase as the economy progresses from an agrarian to an industrial structure, only to decline later on with the transition having been accomplished and the country entered into the club of the developed ones.[2] Kuznets' theory came to be discussed within the growth literature and then within the empirics of cross-country convergence.

As seen by this more recent literature, the issue came to be synthetized in a single central question: is it growth that causes inequality, or else can income inequality be its engine? Thus, one has to inquire not only about the direction but also the sign of a unidirectional causality relation. In contrast to the development approach focusing on structural change, springing from the growth and convergence debate, the more recent contributions have been searching for a stable, unidirectional relation between those variables, generally through a cross-country approach similar to Kuznets's own. Opposite, often-controversial results were produced.

We pick up two strands of such growth-related literature that interest our exercise.[3] The first one posits a relation from inequality to growth, but it has two variants as to the sign. One of them has theoretical ancestors in the British classics and goes all the way down to the Keynesian theory of Kaldor–Pasinetti: an income eschewed distribution favoring profit earners enhances growth because wealthier individuals have a higher propensity to save and invest. Then, higher income concentration would lead to higher aggregate savings and thus to faster capital-accumulation-driven growth.[4]

In more recent times, this unidirectional or causal relation is retained (see, e.g. Alesina and Rodrik, 1994; Perotti, 1994, 1996; Deininger and Squire, 1998; Persson and Tabellini, 1994; Li and Zou, 1998; Forbes, 2000; Arjona et al., 2001). (Barro (2000), makes an attempt at classifying them.) However, these contributions do not share (with the classical variant), either the interpretation (other variables being brought in addition to inequality, e.g. democracy) or the expected sign: a steadily decreasing relationship from inequality to growth replacing an increasing one.[5]

The second strand of literature we will refer to, inverts the roles of the variables. In the variant that will interest us, the idea of a decreasing function is retained: higher growth may yield lower inequality. In fact, resources generated by growth need not be concentrated but can be used for redistribution, directly and/or indirectly. In dynamical terms, this analysis seems to posit the existence of a downward-sloping path (in the K-plane) over a stretch of low incomes, at least for some developing countries.[6] There, a self-feeding, virtuous mechanism would be at work: once initialized, growth feeds (positively) into income distribution and the latter further supports present and future growth through domestic market expansion, and households' long-term investment in human capital, etc., generating a path of sustained expansion. This would have been the mechanism behind the East Asian Miracle (EAM) (Stiglitz, 1996).

The nonlinearity implied by the above feedback mechanism, which does not appear in other growth interpretations, has a relation with the Kuznets hypothesis.

Thus, our discussion leads us to consider the latter's framework. As noted earlier, the general attitude now seems to be of outright rejection of the very existence of one such a curve and the implied theory. Manifold justifications for the rejection have been given. Still, references to it (and writings) periodically re-surface, showing the strong appeal of the idea.

Thus, even though we do not address the issue of the existence of a proper Kuznets curve (being constructed from single country time series, our curves are Kuznets-like), our approach and our country comparison will lead us to often refer to it as a sort of benchmark.

However, taking up the issue central to the growth-related literature, section 3 will first go through a cointegration (and causality) exercise to ascertain the existence of stable relationships between income inequality and growth, as well as their direction and sign. Results will be found that do not wholly fit into any of the growth interpretations.

3. An Econometric Exercise

The databases used hereafter, for China as well as for Brazil, over the period 1980–2009, are:

1. GDP per capita (in 2005US$ purchasing power parity (PPP)) from Penn World Tables—Table 8.1 (Feenstra et al., forthcoming).

2. Income inequality, measured by the Gini index. From the *Standardized World Income Inequality Database*, Version 4 by Frederick Solt (2009).

Although the relevant empirical literature provides insights on whether and how inequality may affect growth, it still suffers from the known limitations inherent to standard cross-country and panel regressions, because it relies on the implicit assumption of a common economic structure (Herzer and Vollmer, 2012). Nevertheless, using the same source of data for the variables, GDP per capita and Gini index, allows us to be fairly certain that data are comparable between those two countries (Ivashchenko, 2003).

Our aim is to test whether there is a long-run relationship between economic growth and income inequality using cointegration techniques, because they avoid and/or deal better with the typical problems (parameter heterogeneity, omitted variable bias and endogeneity) from which the standard cross-country approach in the econometric analysis of economic growth suffers.

As we look for results in terms of elasticity, we apply natural logarithms to the GDP per capita and Gini index series, namely ln *GDP* and ln *Gini*, respectively.

First, we establish the order of integration for both ln *GDP* and ln *Gini*, and show both series to be $I(1)$. Second, we find the optimum lag structure using Akaike Information Criteria (AIC). Third, we perform Hansen's (1992) procedure to test for the long-run relationship with endogenous structural breaks. Fourth, we conduct the Toda–Yamamoto Granger causality test, to examine whether there is a causal relationship between the two variables and its direction. Fourth, we apply the dynamic ordinary least squares (DOLS) estimation methodology, a robust single equation approach that corrects for the endogeneity of regressors by the inclusion of leads and lags of the regressors' first differences. Fifth, we verify for the stationarity of the residuals of regressions in order to make sure our estimated models do not generate a spurious regression (Choi et al., 2008).

Unit Root Tests and Lag Length Selection

A preliminary step to investigate the link between income inequality and GDP is testing for the order of integration. The Phillips–Perron (PP) unit root tests differ from the augmented Dickey–Fuller (ADF) tests mainly in how they deal with serial correlation and heteroskedasticity in the errors. In particular, where the ADF tests use a parametric autoregression to approximate the structure of the errors in the test regression, the PP tests ignore any serial correlation in the test regression. In sum, PP tests statistics can be viewed as Dickey–Fuller statistics that have been made robust to serial correlation by using Newey–West (1987) heteroskedasticity and an autocorrelation consistent covariance matrix estimator.

Results of the PP unit root test in levels and differences of the two variables indicate that ln *GDP* and ln *Gini* are nonstationary in their respective levels (Table 1). After first differencing, however, the null hypothesis of a unit root in the PP tests is rejected for both and we can conclude that two variables are integrated of order one, $I(1)$.

Testing for Cointegration

As a third step, we test for cointegration. The Johansen methodology can estimate more than one cointegrating vector and simultaneously estimates the short-run and

Table 1. PP Unit Root Tests

	Brazil				*China*			
	ln *GDP*		ln *Gini*		ln *GDP*		ln *Gini*	
Variable (in level)	*Adj.t-stat*	*p-value*	*Adj.t-stat*	*p-value*	*Adj.t-stat*	*p-value*	*Adj.t-stat*	*p-value*
Trend and intercept	−1.65116	0.7468	−2.513603	0.3197	−1.530213	0.7953	−1.680601	0.734
Intercept	−0.822609	0.7976	−2.217562	0.2047	0.430599	0.9809	−0.745528	0.8194
None	1.613193	0.9709	−1.454428	0.1333	4.99283	1	1.247385	0.9421
Variable (first difference)	Δ ln *GDP*		Δ ln *Gini*		Δ ln *GDP*		Δ ln *Gini*	
Trend and intercept	−2.722096	0.2359	−7.666823	0.000*	−3.273441	0.091***	−2.785699	0.2136
Intercept	−2.838594	0.06***	−6.128736	0.000*	−3.301422	0.024**	−2.88077	0.060**
None	−2.94029	0.004*	−6.125438	0.000*	−1.751705	0.075***	−2.429833	0.017**

Note: Δ means first difference of the variable. Phillips–Perron test (PP): null hypothesis is unit root.
*,**,***Null hypothesis rejected at 1%, 5% and 10%, respectively.
Source: Authors' elaborations.

Table 2. Cointegration Test—Hansen Parameter Instability

Brazil				
	Stochastic	*Deterministic*	*Excluded*	
Lc statistic	*Trends* (m)	*Trends* (k)	*Trends* ($p2$)	*Prob.**
Series: ln *GDP* – ln *GINI. Null hypothesis: Series are cointegrated*				
0.09644	1	0	0	>0.2
China				
Series: ln *GDP* – ln *GINI. Null hypothesis: Series are cointegrated*				
0.02699	1	0	0	>0.2

Note: *Hansen (1992) $Lc(m2 = 1, k = 0)$ p-values, where $m2 = m - p2$ is the number of stochastic trends in the asymptotic distribution.
Source: Authors' elaborations.

long-run cointegrating relationships, offering a more intuitive interpretation since the coefficients can be naturally classified as short-run or long-run effects. However, in our bivariate model the Johansen approach is no longer required. When testing for cointegration one must bear in mind that the traditional tests (augmented Engle–Granger (AEG), Phillips–Ouliaris (PO), Johansen, etc.) are not the most adequate if breaks in the cointegration vector occurr, since they fail to reject the null hypothesis of no cointegration less often than they should, inducing a conclusion that a long-run equilibrium relationship does not exist. To overcome this difficulty, the Hansen test is performed using the Lc statistic (is a test for cointegration with the null hypothesis that the variables are cointegrated) when testing the null of cointegration against the alternative of no cointegration. However, this test detects cointegration relationships subjected to regime shifts as well as invariant cointegration vectors (Vasco et al., 2003). Since the alternative hypothesis of a random walk in the intercept is identical to no cointegration, the test Lc statistic is a test of the null of cointegration against the alternative of no cointegration.

We obtain that the null hypothesis (of cointegration) cannot be rejected as the Lc statistic is significant at 20% (Table 2). Moreover, parameters are stable, i.e. we find no evidence of unstable relationship between the variables for either country, Brazil and China.

Testing for Causality

Cointegration, by itself, implies causality in at least one direction; however, since the variables are integrated, the application of the standard Granger causality test is invalid. In this case, Toda and Yamamoto (1995)'s alternative procedure estimates a VAR model (the equations of the VAR can also be estimated separately) with $(k + d_{\max})$ lags, where k is the standard optimal number of lags and $d_{\max}$ is the maximal order of integration that occurs in the process. Once the VAR has been estimated, we test whether the coefficients of the first k lags of the dependent variable was simultaneously null.

Table 3. Toda and Yamamoto–Granger Causality Test

Brazil			
	Chi^2	*df*	*Prob.*
Dependent variable: ln *GDP*			
ln *GINI*	32.0497	7	0.0000*
Dependent variable: ln *Gini*			
ln *GDP*	8.6951	7	0.2753
China			
Dependent variable: ln *GDP*			
ln *GINI*	2.07793	5	0.8383
Dependent variable: ln *Gini*			
ln *GDP*	10.9123	5	0.0531***

Notes: df is degree of freedom. *,**,***Rejection of the null hypothesis at 1%, 5%, and 10%, respectively.
Source: Authors' elaborations.

In our dataset, the PP test for unit root shows that both ln *GPD* and ln *Gini* are $I(1)$ for both countries, so $d_{\max} = 1$. The AIC selects 5 as optimal for the lag length of a VAR for China, while for Brazil it is 7.

Table 3 shows the results for both countries, Brazil and China, respectively.

Results show that economic growth (ln *GDP*) is causing income inequality (ln *Gini*) in China, while in Brazil income inequality (ln *Gini*) is causing economic growth (ln *GDP*), in the sense of Granger. Let us find the signs for the cause of each.

Cointegrating Equation

With cointegrated variables, standard ordinary least squares (OLS)-type procedures produce consistent estimates. Because of the unidirectionality of the effects we opt to use a dynamic ordinary least squares (DOLS) procedure (Stock and Watson, 1993), i.e. a single equation regression estimation that includes leads and lags of the differentiated independent variable so as to make its stochastic error term independent of all past observations (serial correlation) and eliminate the bias of potential endogeneity.

We therefore estimate two distinct equations:

Brazil's equation is

$$\ln GDP_t = \beta_0 + \beta_1 trend + \beta_2 trend^2 + \beta_3 \ln Gini_t + \int_{i=0}^{7} \varphi_i \Delta \ln Gini_t + \varepsilon_t$$

and China's is

$$\ln Gini_t = \beta_0 + \beta_1 \ln GDP_t + \int_{i=0}^{5} \varphi_i \Delta \ln GDP_t + \varepsilon_t.$$

Brazil's equation includes, in addition to the standard covariates, a linear and a quadratic trend, as a long-term movement of ln *GDP* detected that ln *Gini* and Δ ln *Gini*

had not been accounted for, which is moreover nonlinear, and this nonlinearity is by the quadratic term. The inclusion of a trend is a simplified way to capture the effect of an omitted variable bias, a reasonable assumption in this equation, since economic growth does not depend exclusively on variations of income inequality. Such an effect was not detected for China, and therefore a standard DOLS model was estimated.

In contrast, despite the presence of unilateral causality direction implying that the exclusion of leads in the dynamic OLS regression produces better estimators in terms of mean squared error (Hayakawa and Kurozumi, 2008), for China we included two leads to guarantee stationarity of residuals.

Table 4 shows the results of a DOLS model. Results for Brazil indicate the existence of a negative long-run relationship between ln *GDP* and its ln *Gini*. A 1% increase in Gini index would cause a 13.3% decrease in the Brazilian GDP per capita.

As already mentioned, the coefficients for the variable *trend* and $trend^2$ are, respectively, positive and negative, indicating that once the Gini index (and its differentiated lags) have been accounted for, there is still a trend for GDP. The marginal effect of the variable *trend* is indeed positive until 1997, and negative thereafter,[7] which indicates that on average, GDP grows more with time than income inequality until 1998 (included), and vice versa thereafter.

Table 4. Dynamic Least Squares (DOLS)

Brazil

Dependent variable: ln *GDP*
Cointegrating equation deterministics: *Intercept, TREND, TREND*^{2}
Fixed leads and lags specification (*lead* = 0, *lag* = 7)

Variable	*Coefficient*	*Std. error*	*t-statistic*	*Prob.*
ln *Gini*	–13.34172	1.41728	–9.41	0.000
Intercept	59.00851	5.450209	10.83	0.000
TREND	0.2863449	0.0207356	13.81	0.000
TREND^2	–0.0076621	0.0006278	–12.20	0.000
R^2-adjusted	0.9883			

China

Dependent variable: ln *Gini*
Cointegrating equation deterministics: *Intercept*
Fixed leads and lags specification (*lead* = 2, *lag* = 5)

Variable	*Coefficient*	*Std. error*	*t-statistic*	*Prob.*
ln *GDP*	0.5426794	0.2363498	2.3	0.039
Intercept	–0.5325115	1.675147	–0.32	0.756
R^2-adjusted	0.8130			

Source: Authors' elaborations.

Table 5. ADF Test for Residuals

H_0: *series are integrated*			
Brazil		*China*	
Z-stat	*Prob.*	*Z-stat*	*Prob.*
–1.994	0.0514	–1.396	0.0964

Source: Authors' elaborations.

Estimation results for China indicate fairly clearly that there is a positive long-run relationship between GDP per capita and the Gini index. A 1% increase in GDP per capita causes a 0.54% increase in the Gini index of income inequality.

Testing for stationarity of the residuals In order to assess a valid inference and not spurious regressions, stationarity of residuals from the DOLS cointegrating regression is checked for both countries. The null hypothesis is that residuals are integrated, so a *Z*-statistic with a *p*-value smaller than 0.10 implies a rejection (at 10%) of the null of nonstationary.

Table 5 shows that residuals from the cointegrating regressions of both Brazil and China are found to be stationary, thus the cointegrating regressions are not spurious.

4. Brazil and China: Two Different (Models/Strategies for) Economic Growth?

While, to our knowledge, most of the existing empirical literature on the income inequality/growth relationship uses (after Kuznets) a cross-country or a panel approach, the analysis of individual case studies and their comparison may also throw some new light on the implications for economic development. Cointegration analysis performed separately for Brazil and China—countries that rose from low to middle income over the same time period—allows us now to examine their performance comparatively. Moreover, we could, in particular, address the question of whether the functional relationship between the variables be qualitatively the same. It is not, as we have already found, but why?

Redistribution policies undertaken along the development process may help to mitigate its adverse distributional shortcomings, and even speed it up, as in the EAM countries. In our two economies, the policies were implemented at different points of time and their impact was different. Economic expansion, though with different degrees of success, has also made it possible to reduce the numbers of those living in extreme poverty both in Brazil and in China.

The following sections will sketch out only some of the relevant facts.

China

At least until around 2004, China's success in poverty reduction had not been accompanied by a reduction in household income inequality, which had been on a steady increase, likely as a consequence of the reforms undertaken between 1978 and the early 1980s to boost economic growth.[8] This confirms how the two goals, poverty reduction and equity, are unrelated.

First, a land reform took place with the allocation of plots to farmers with the possibility of keeping any production in excess of the government quota for personal use or for selling. It is this reform and its associated policies that are thought to have had the greatest impact on poverty reduction (Ravallion and Chen, 2007). Apparently, these initial reforms, while igniting growth and giving stronger incentives to farmers, led to increased inter-farmer inequality (Chaudhuri and Ravallion, 2006) and ignited the late 1980s inflation, the first such episode since the new regime had taken over.[9]

In contrast, the increase in household income inequality can be mostly attributed to industrial policies, which led to resource concentration through measures favoring large (private as well as state-owned) firms. In brief, such policies introduced subsidies on the prices for key inputs (energy, utility and land), weak (or weakly enforced) regulation, especially as far as environmental impacts are concerned, favorable treatment in accessing finance, especially for large enterprises, and finally restrictions on labor movement (Ravallion, 2009).[10]

Figure 1 plots China's time series for pc GDP in PPP (constant 2005 USD), and Gini measure of income inequality in the K-plane, showing also a quadratic fit. It shows that the relationship between economic growth and inequality increases at least until around 2004–2005, but it reverses thereafter.

Such a pattern is somewhat reminiscent of Kuznets's prediction and related structural dynamics.

Accordingly, in a Kuznets-like story, China initiated its plan in the late 1970s and thereafter boldly proceeded by means of economic reforms and the interplay between government and market forces, going through major structural changes, generating export-led fast growth that relied on large labor shifts from low-productivity agriculture to higher-productivity industry.

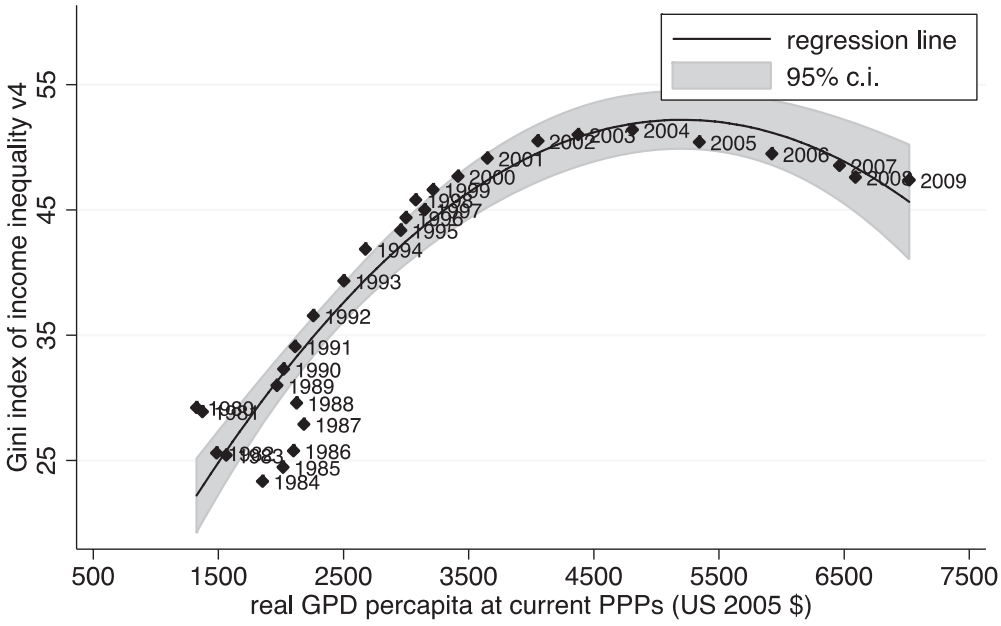

Figure 1. Gini Index of Income Inequality vs pc GDP. China: 1980–2009

Source: Authors' elaborations.

Thus, after a timid beginning (as early as the 1970s), of which the immediate effect was a lowering of inequality together with growth in pc GDP, the ensuing expansion conjugated growth with a steady increase of inequality, but high growth has been generating substantial social costs. In anticipation of the new 2011 Plan and probably as a delayed effect of the 1992 Plan (launched by Den Xiao Ping), both plans correcting for a larger domestic market, the resulting improvement in distribution of income could be seen to be starting in 2004 (it was an explicit target of the 2011 plan).

China's path since the 1980s to the middle of the first decade of the 2000s looks very much like the one Kuznets predicted for developing countries. Thereafter, a change of gear seems to have taken place. China, we will argue, seems to have moved onto a model more similar to Brazil's and, to some extent, to that of the EAM countries, growth going along with the improvement in people's lives (only indirectly captured by the Gini index, we have to acknowledge).

Such a switch took place at a value that may look like the inversion point of a Kuznets curve, a point to be discussed, albeit briefly, later.

Brazil

The model (growth with redistribution, social transfers and other social programs) is correctly claimed to have been followed by Brazil, at least from one point in time (after the liberal reforms of the 1990s) onwards, but more clearly as a result of a policy strategy by the recent Cardosos and, even more so, Lula da Silva, presidencies (Bourguignon, 2005; Rodrik, 2005).

This, however, completed a long process begun in the mid-1970s, and, for a time, frozen during the 1980s, the so-called lost decade with a hidden *marcha forcada*.[11] The decade was lost (if it existed at all) in the sense that no further inequality improvement accompanied the mild growth in pc GDP. Macroeconomic stability, abandonment of the exchange rate management and opening the economy, better fiscal management and (moderately successful) inflation-targeting policies starting with the Plano Real in 1994, curbing a roaring inflation, and together created a new more economically favorable scenario. Fueling investment from inside and outside, and thus growth, together with new trade ties (with China, in particular) converted Brazil into a commodities export giant, while generating employment as well as making extra resources available for social policies.

At the same time, policies of economic growth that were implemented (more aggressively after 2002, with Lula da Silva's Presidency) had the target of promoting the expansion of the formal labor market, increasing wages, and redistributive public policies such as passive and active labor market policies. Along with massive cash transfer programs targeting poor households.[12]

It is in this new economic atmosphere (and because of it) that, since about the year 2000, Brazil actually returned to growth with redistribution. In the meantime, as a joint result of this process, it graduated to the rank of a middle-income country, more recently, climbing into the club of the upper-end middle-income countries with a pc GDP of a little over US$8500 (at PPP). A middle class was born.

This is the story that we believe lies behind Figure 2 that plots the time series of the two variables for Brazil in the Kuznets-plane.

Figure 2 exhibits an almost flat central piece, whereby the income index is confined within a corridor with a mid-value around 50% showing the growth without redistribution of the 1980s, which continues the pattern begun in the mid-1970s (at a much higher income concentration). Per capita GDP continued to grow well into the 2000s,

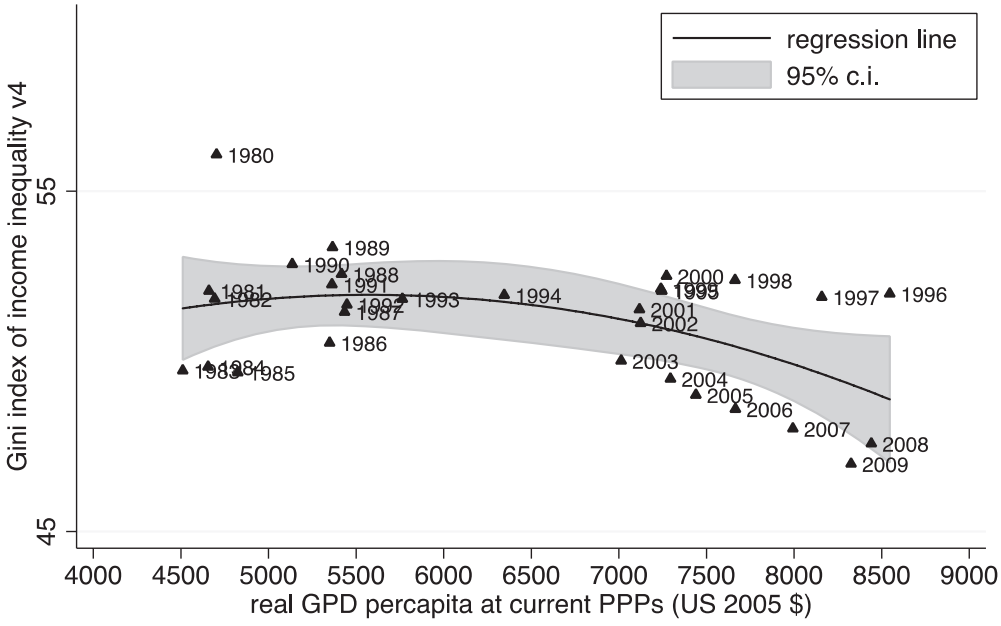

Figure 2. Gini Index of Income Inequality vs pc GDP. Brazil: 1980–2009

Source: Authors' elaborations.

while since the time of the stabilization policies and the opening of the economy, as early as the mid-1990s, income concentration began to decrease. (Its shape[13] appears as a type of anti-K curve.) From 1993 to around 2009, the Gini index fell by 9%, the decline considerably accelerating after 2000.

Is such a virtuous process to be imputed to the domestic market expansion generated by the above-mentioned redistributive and social policies? Is it to be imputed to the positive growth performance driven by commodities exports and federal direct investments (FDIs), mostly to China and by Chinese? In fact, the picture would be very incomplete without recalling that the Brazilian and Chinese economies are bound together in many ways, in particular, the latter being the first importer of Brazil's various commodities as well as the first in FDIs oriented towards extraction and general infrastructure (Cardoso and Teles, 2010; Lattimore and Kowalski, 2008). This has permitted a faster Brazilian growth since 2000 than any other Latin American country (at an average rate of 3.2%), but still, definitely, slower than that of China.

This adds interest to our comparison and also raises the question as to the reason(s) for the difference in performance of the two countries.

5. Brazil versus China

A closer look at the comparative evolution of Gini indices in the two countries is definitely useful (Figure 3).

For China, one sees a process of steady increase, starting at a lowest value in 1984, the immediate result of the 1980 reforms or the delayed result of the previous economic order, until a value around 49% is reached, in 2001. In contrast, after an all

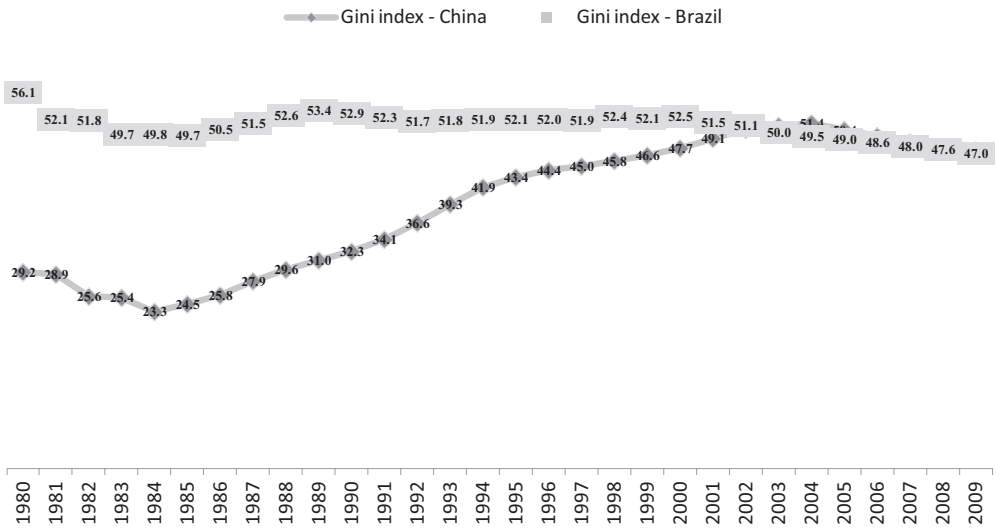

Figure 3. Income Inequality in Brazil and China: 1980–2009

Source: Authors' elaborations.

time high in 1976 (years of the Import Substitution Policies, ISI), and a second one in 1988 (year of the second "miracle"), Brazil's index declines first softly (throughout the years of the liberal reforms) and then decidedly after 2000, the years across the Cardoso–Lula da Silva mandates. China's Gini overtakes that of Brazil around 2001, and thereafter the two countries stay close, at a value slightly above 49%, but with a tendency to decrease.

Such "convergence in income distribution" is all the more interesting if one plots China and Brazil together, in the K-plane.

Figure 4 represents the time evolution of two low-income countries graduating to the middle-income club. It allows us to draw some cautious conclusions. It is there that one may appreciate the difference between the experiences of the two countries, possibly relevant also for other emerging economies, and one can see the sense and purpose of our exercise.

First of all, we see both countries reaching the same value of the Gini index, although at different times. Moreover, we see that "convergence in Gini" accompanied the better known convergence in pc GDP only for a time.

The picture shows that something important may be going on in the associated income distribution. In the K-plane, there is no evidence that Brazil was (mid-1980s) in the so-called "middle-income trap", as often said, nor that China was on the verge of falling into it. A so-called "trap" may hide a growth model switch.[14]

In fact, China is also seen to to have followed an expansion path that, until around 2004, conjugated pc GDP growth with steadily increasing income concentration. Ever since, the relation has not stabilized around a value of pc GDP, but has reversed: growth continued with diminishing income concentration. This appears to be the path Brazil has been following (though with bumps and other irregularities) at least since the 1980s. Recently, both economies decelerated, with Brazil almost zeroing its average growth rate. (China ran at a "low" 7%.) Such a phenomenon has been variously interpreted; one version being that, together with other Latin American and

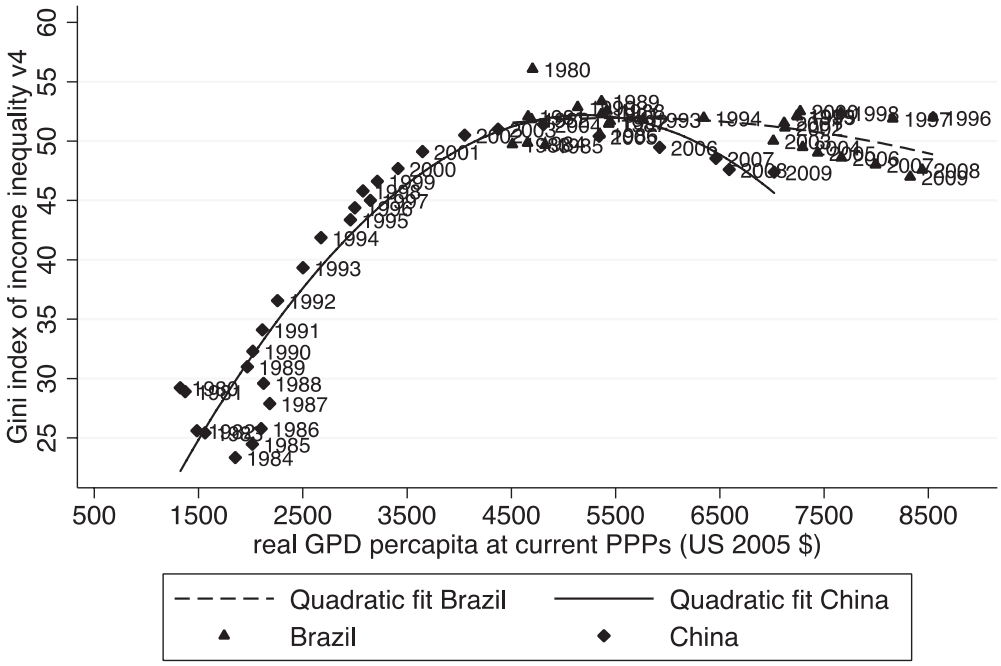

Figure 4. Gini Index of Income Inequality vs pc GDP in the K-plane

Source: Authors' elaborations.

South African countries, Brazil would have been caught now in the aforementioned "middle-income trap countries",[15] which would be the fate in the near future of China.

Our explanation is different. China would have been following a certain model of growth since the mid-1970s until a switch took place that may resemble the turning point of a Kuznets curve. However, by comparison with other countries in an ongoing study, the value at which the switch takes place seems to be determined not so much by the level of pc GDP (as it would be in the latter), but rather by the level of income concentration (or by the pair of coordinates, with income concentration as the trigger[16]). Such a value (roughly 50%) also belongs to Brazil's path (and to, for example, Argentina's).

Thus, the figure suggests the existence of two distinct models of growth, prevailing in a different country and/or in different times. Moreover, it seems to suggest that the process of growth generates forces that make certain income disparities (socially, politically, not to say economically) unsustainable. This might be the relevant lesson for LDCs.

One can conclude that in China a Kuznets-like structural change mechanism has indeed been at work,[17] a fact that seems to set the country apart from all other countries of the EAM, as Stiglitz depicts it. Its model would be one that is capital-accumulation driven, with a mix of public and private investment and major structural changes that altered the equilibrium between country and town, and agriculture and industry. This is a classical picture very much in the mind of Kuznets, whereby development goes along with increases in inequality, the historical experience of many countries.

In contrast, the reverse (Granger) causal relation found for Brazil appears more similar to the one operating in EAM countries, growth in pc GDP feeding into the reduction of inequality, and the latter further feeding into growth. An explanation was found in the redistributive policies, but also in the liberalization policies at the end of the 1980s that created a stable and more international business-friendly environment, and of course in the importance of trade in commodities and FDIs with certain countries—China to begin with.

6. Final Remarks

We have commented on empirical evidence after carrying out an exercise in comparing two emerging economies against the backdrop of an extensive literature on less developed countries vs developed ones. Some of this literature refers to the K curve and the related theory of development stages; some provides reformulations or gives alternative growth-inspired explanations.

Most literature is however critical with some questioning the very foundations of a cross-country regression over a pool of heterogeneous economic structures.[18] Sharing this critical attitude, we have studied the time evolution and the long-run relationship between income inequality and pc GDP over the period 1980–2009.

In terms of Kuznets-like curves, while we seem to have China on a classical one (vindicating Kuznets in a sense), we have Brazil on a type of "anti-K curve" (and the same would be true of the EAM countries).[19] Evidence for both an inverted U (or a Kuznets curve) and anti-K curves can be used to support the thesis of the "end of the K curve", or of its outright non-existence, i.e. rejecting the thesis that "things have to get worse before getting better". The tales of these two countries seem to show that we can encounter both curves, and probably a whole variety of curves if we look at a broader picture.

Our main results have been summarized in the previous section. Hereafter, we need only add a few remarks.

Most of the past Chinese growth has gone on with huge deferred social and environmental costs, trading the future for the present, the bill for which has come due recently. At the same time claims have been made against income inequalities, with demand for higher wages particularly on the surge, and with cheap labor becoming in short supply. In the mid-2000s, and definitely since 2011, there has been a re-orientation of the economy towards a stronger domestic market with a lesser dependence on a weaker international market in order to face the growing unaccounted-for costs of growth. This being so, the current slowdown in China may not be a short-term phenomenon and may reflect a serious re-orientation of the economic policy.

Brazil's redistributive and socially integrative income policies of the early 2000s, showing up in the decline in the concentration index, have financed a stronger consumption demand, with the birth and growth of a low-middle and middle class, with higher services demands. To cater for such new demands, the Brazilian economy will have to grow and diversify, tilting its economy balance towards the production of services rather than the extraction of resources to export (the international slack could help in this direction). More importantly, most of the new demand reckoned in the statistics to be household consumption is in fact household investment for the future: education, health, more home computers, etc. Brazil has been statistically "consuming", to be able to grow more in the future. It has traded the present for the future. However, it is difficult to see it now, in the middle of the present turmoil.

It is clear that in an exercise like ours with the technical instruments and the approach we have chosen, many phenomena (and "explanatory variables") are left out. The most relevant are those related to the interdependence between the two economies, which through trade of commodities (Brazil to China) and FDIs (China to Brazil) have created a symbiotic, albeit asymmetric system of the two, as mentioned earlier. This has fueled the Chinese with key raw materials for growth and even food to cater for the new wealthier population. In addition, it has permitted Brazil to fare rather well even through the earlier years of the downturn.

Asymmetries imply dependence, which Brazil has known all along in its history as the "curse of natural resources".

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Notes

1. Because our analysis ends with 2009, it is worthwhile mentioning the current situation (2015). Brazil and China have been hit in varying degrees by the global economic downturn and have responded in distinct ways. Public reaction and perceptions of living standards do not appear to have been the same. We surmise that inequality is a part of the reason. However, country-specific factors, such as trade relations and FDIs (Rodriguez-Pose and Gill, 2006; Castilho et al., 2012; Rodriguez-Pose, 2012), play a role too, but will only tangentially be examined hereafter. (Current research by Rodrik (2010) and Zhu (2012) are basic starting points for the case of China, while Loayza and Fajnzylber (2005) and Adrogué et al. (2010) relate to Brazil.)
2. Where a better distribution would be associated with further growth.
3. Shin (2012) offers an exhaustive review.
4. It may be worth remembering that such a conception crucially relies on the idea that it is capital accumulation that drives growth, an idea only partially shared by the neoclassical approach that includes technological progress as the productivity driver for the long run.
5. Banerjee and Duflo (2003) find an interesting result: when one regresses growth (or changes in growth) non-parametrically on changes in inequality, the relationship has a U-shape. This idea will be discussed later in this paper.
6. A similar idea seems to be implied also by certain remarks of Barro (2000) and especially Shin (2012), where low-income countries are compared with high-income ones (USA, France), both showing high-income concentration. This again seems to indicate the existence also of a kind of U-shaped curve.
7. The marginal effect of *trend* on GDP, say, the derivative of GDP with respect to *trend*, is computed by summing the estimated coefficient for *trend* to *2*trend*the estimated coefficient for trend squared*. It is then possible to compute the marginal effect of *trend* at each level of *trend*, which goes from 1 (1980) to 30 (2009). This marginal effect changes sign between a level of *trend* of 18 and 19, which corresponds to years 1998 and 1999.
8. Reforms were made in four major areas: trade liberalization, exchange rate (partial) liberalization and devaluation, promotion of FDI and FIE (foreign invested enterprises), and accession to the World Trade Organization.
9. After establishing the new reforms the government had stabilized prices and cost of living. Ever since the agrarian reform, however, inflation had become a problem, fueled by many causes (food prices related to increased demand from city dwellers, excess liquidity owing to the enormous trade surplus, excess lending that more recently supported a housing price boom, the monetary control over the exchange rate). Until a certain point of time, the Central Bank reacted by implementing controls and price caps. More recently cautious monetary policy has been implemented. Price stability has been declared a priority. Surely, inflation had a role in

income redistribution. One can surmise that its cost was born by wage earners during a long first phase of the growth process, while now wage demand supported by labor shortage is trying to catch up with the increasing cost of living.

10. Song et al. (2011) offer a growth model consistent with China's economic transition, with high output growth, sustained returns on capital, reallocation within the manufacturing sector, and a large trade surplus.

11. See Barros de Castro and Pires de Souza (1985).

12. Ravallion (2009) shows that Brazil has complemented market-oriented reforms with progressive social policies aimed directly at poverty reduction. That is, after its market-oriented reforms of 1994, it implemented active pro-poor distributional policies, notably, social assistance spending, that were critical to a substantial reduction in poverty. Of course, a natural reference is to its main pillar, the Bolsa Familia program (whose distributional implications are assessed in, e.g. Soares et al. (2010)).

13. Taking into account the behavior during the 1970s, not represented hereafter, this curve would be closer to a slanted S. Hence, its name.

14. A model of growth is defined as a two-dimensional description of the growth phenomenon, the variables being chosen depending upon the interests.

15. The trap would be connected with loss of competitiveness *vis-à-vis* lower income countries, and the incapacity of climbing up the technological ladder. Its implication is a slowing down in the long-term growth. See Eichengreen, Park and Shin (2012, 2013), and Eichengreen, Perkins and Shin (2012).

16. In the specific case of these two countries, levels too coincide. Argentina shows the same switch value in the Gini though at a much higher level of pc GDP.

17. For an interpretation of the evolution of the Brazilian economy in terms of structural growth patterns, see Feijo et al. (2012).

18. This is actually the main point in Palma (2011). According to his 2005 evidence, a large number of countries (China among them, accounting for almost 80% of the total population) line up inside a cloud expanding horizontally in the K-plane within a Gini corridor with a middle value around 40%. Associated values of the pc GDP may thus vary greatly with the rich countries on the far right side creating a vertical cloud along the Gini axis. Latin American countries (with Brazil) would be outliers with a much higher Gini value. However, in our interpretation, the picture taken in 2005 freezes an ongoing process of change.

19. Our considerations, however, refer to the dynamic implications of the K and anti-K relationship, in other words, to the relationship between differences in pc GDP and differences in Gini indices. We will call the latter the "dynamic K" and "(dynamic) anti-K curves." The ambiguity of the approach is in that, while stated in terms of point variables (levels of pc GDP and of Gini indices), the interpretation almost always refers to the rates of change of the former.