This version: June 30, 2015xx

ACCOUNTING FOR COINCIDENT GROWTH COLLAPSES: BRAZIL AND MEXICO SINCE THE EARLY 1980s[1]

Edmar Bacha and Regis Bonelli[2]

1. Introduction[3]

It's a tribute to Albert Fishlow's economic acumen that as early as 1978 he argued in favor of Latin America's foreign debt restructuring when most economists and regional policy makers still believed that minor domestic and external policy adjustments were all that was required for economic growth to resume in the region.[4] It took more than a (lost) decade for debt restructuring to be put in place, but even then—and this is something that not even Fishlow could have predicted—growth resumption continued to elude Brazil and Mexico despite substantial domestic reforms.

The drama of Brazil's and Mexico's near stagnation—not secular, but already lasting for 35 long years—is particularly troubling because, after a period of economic populism extending into the 1980s, since the 1990s these countries have strived to put the house in order and follow the precepts of sound economic policy making. Brazil defeated hyperinflation, introduced a fiscal responsibility law, and implemented major income redistribution policies. Mexico opened up its economy, floated the peso, reprivatized its banking system, and executed relevant social programs. All this to no avail, as Graph 1 below tells us. Since the early 1980s Brazil and Mexico stopped catching up with the industrial countries, even though in purchasing power terms (PPP) their per capita incomes stand respectively at only 27% and 33% of that of the United States.

Academic articles began asking "Why isn't Mexico rich?" (Hanson, 2010) echoing the infamous dictum that "Brazil is the land of the future—and always will be".

A comparative analysis seems in order to better understand what went wrong, particularly because there aren't only similarities (as bureaucratic entanglements and entrained cronyism that hamper investment), but also important differences in the economic experience of these countries. Many analysts say that Brazil does not grow because it's a closed economy with very high taxes and interest rates that crowd out the private sector. The diagnostic on Mexico tends to the opposite view: the country does not grow because its opening up to foreign trade polarized the economy, delinking the rich

---

[1] Prepared for a conference in honor of Albert Fishlow at the Casa das Garças Institute for Economic Policy Studies, in Rio de Janeiro, on July 3, 2015.

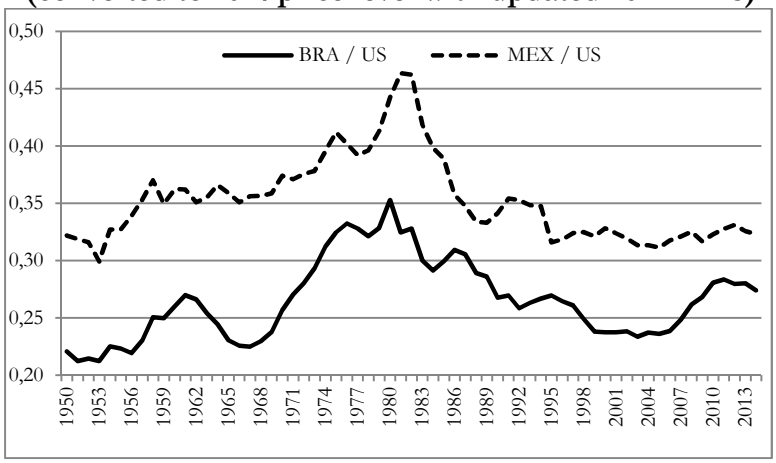
[2] Edmar Bacha is director of the Casa das Garças Institute for Economic Policy Studies, in Rio de Janeiro. Regis Bonelli is senior research associate of the Brazilian Institute of Economics (IBRE) of Getulio Vargas Foundation (FGV), in Rio de Janeiro.

[3] The authors thank Carolina Melchert Marques and Marina Goulart Lopes for competent research assistantship. Vinicius Botelho, from IBRE, offered helpful advice on statistical tests. Andres Hofman, from ECLA/UN, Aurelio Bicalho, from CSHG Gauss Investimentos, and Jesús Garza, from Itau BBA, developed useful statistical information. Jaime Ros Bosch advised on Mexican literature and data sources.

[4] Cf. Fishlow (1978), p. 67-68.

North from the poor South, and its government doesn't invest in infrastructure because it can't collect taxes.

Graph 1: Brazil and Mexico — GDP per capita in 2014 US$ relative to the US (converted to 2014 price level with updated 2011 PPPs)



Source: The Conference Board; internet site.

These are big issues that we'll touch upon but are under no illusion to be able to resolve. The contribution that we have to offer are accounting frameworks to analyze the historical evolution of relevant macro and "mesoeconomic" variables, in many cases making use of datasets that only recently have become available. In the process, we develop economic interpretations that are consistent with the empirical findings, while commenting on the controversies that the historical experience of these two countries have evoked in the literature.

The paper is organized as follows. The next section provides a periodization for the growth experiences of Brazil and Mexico since 1950, with emphasis on the years after their respective growth collapses in the early 1980s. Section 3 associates these GDP growth collapses to sharp falls in capital accumulation, and decompose the latter into variations in savings, capital-output ratios, and relative prices of investment. Adopting the proposed periodization, Section 4 estimates a neoclassical accounting framework for the growth of GDP per worker, analyzing the contributions of capital deepening and total factor productivity for the evolution of labor productivity since 1950. In the process, we use a simple econometric model to touch on the role of the terms of trade in Brazil's growth and productivity surge in 2004-2010. Section 5 introduces "mesoeconomic" variables into the picture, to complement the macro analysis of labor productivity in the previous section. In successive subsections, we consider the following dimensions of labor productivity growth: regional, sectorial, traded/non-traded, by firm size, and formal/informal. [5] Conclusions are summarized in Section 6. A [forthcoming] online appendix presents all data summarized in tables and graphs in the paper, and contains additional data and methodological material.

[5] A future version will discuss comparative macroeconomic policy-making and the evolution of critical macro variables such as: trade openness; terms of trade; real exchange rates; composition of foreign trade (manufactures v. primary products); share of manufactures in GDP; and bank credit to the private sector and real interest rates.

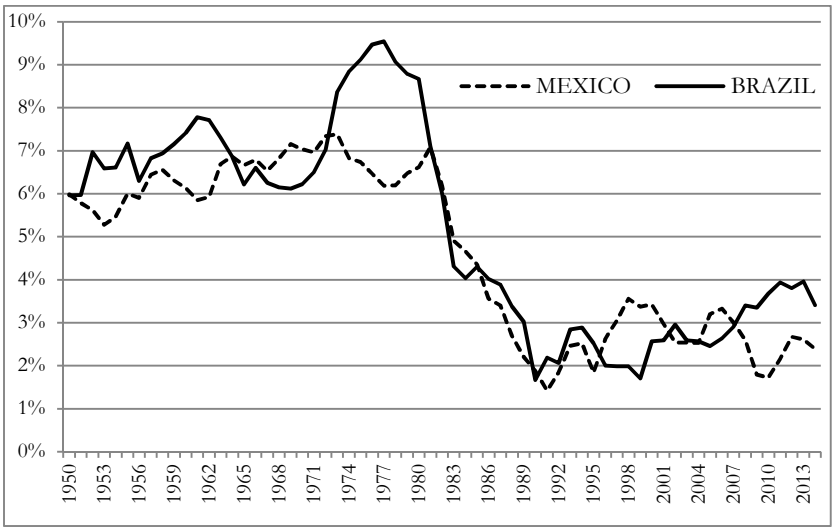
2. Growth collapses: a periodization

Since the 1930s Brazil and Mexico experienced economic growth golden ages that extended through the early 1980s. With the debt crisis, growth submerged in the two countries and remained to date at levels only one-third as high as before. Graph 2 displays the 10-year average GDP growth rates in Brazil and Mexico from 1950 to 2014. The graph makes the parallelism of the two countries' experience evident, either in terms of their pre-1980 fast-growth years, their growth collapses in the 1980s, and their meager growth outcomes since then.

Brazil and Mexico seem to have hit a wall in the early 1980s when they stopped catching up with the industrial countries. Brazil's performance was a little better than Mexico's in the 1970s and during the recent commodity boom. Nonetheless, Brazil's per capita income in PPP terms is still 15% lower than Mexico's.

Table 1 and Graph 3 identify five near-identical sub-periods in the GDP growth trajectories of the two countries since 1950. The first period is the golden age starting for our statistical purposes in 1950 and going through 1980 in Brazil and through 1981 in Mexico. Average GDP growth rates in this period were 7.4% in Brazil and 6.8% in Mexico. There follows the so-called lost decade after the debt crisis of the early 1980s, identified in the table as the period from 1981 to 1992 in Brazil, and from 1982 to 1993 in Mexico. In this phase, yearly GDP growth rates collapsed to 1.4% in Brazil and to 1.7% in Mexico. Next is the period of liberal reforms with subpar growth, characterized by inflation stabilization in Brazil (starting with the implementation of the 1993-94 Real Plan) and trade opening in Mexico (with the enactment of NAFTA in 1994). We denominate growth subpar, even though rates doubled from the period before, because they were lower than anticipated at the inauguration of these major economic reforms. From 1993 to 2003 GDP growth averaged 2.8% in Brazil, while in Mexico it stood at 3.0% from 1994 to 2001.

Graph 2: Mexico and Brazil — 10-year moving averages of real GDP growth rates, 1950-2014 (% p.a.)



Sources: National Accounts and Historical Statistics, Brazil and Mexico; elaborated by the authors.

Table 1: Growth periodization, 1950-2014 (% p.a.)

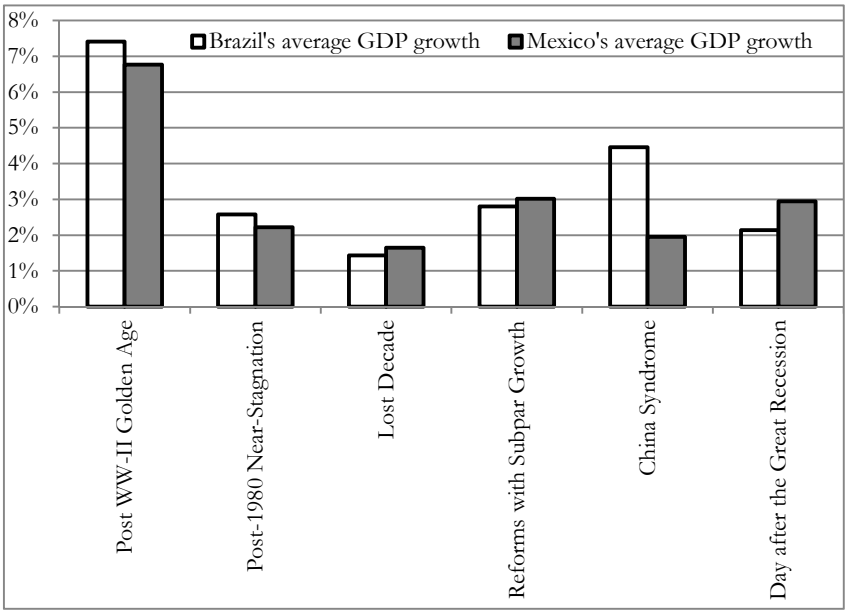
	Brazil	Mexico	Brazil's average GDP growth	Mexico's average GDP growth
Post WW-II Golden Age	1950-1980	1950-1981	7.4%	6.8%
Post-1980 Near Stagnation	1981-2014	1982-2014	2.6%	2.2%
Lost Decade	1981-1992	1982-1993	1.4%	1.6%
Reforms with Subpar Growth	1993-2003	1994-2001	2.8%	3.0%
China Syndrome	2004-2010	2002-2010	4.5%	1.9%
Day after the Great Recession	2011-2014	2011-2014	2.1%	2.9%

Sources: Same as Graph 1.

A disconnection in the growth experiences of Brazil and Mexico occurs in the first decade of this century, in a phase that we labelled "China Syndrome". As indicated by this title, the rise of China seems to us to be the major influence for the growth rate disparities in the two countries. China's growth had a very positive influence on Brazil (through a major boom in the prices of its exported commodities associated with large capital inflows) and a very negative impact in Mexico (through a tough competition in manufactured exports to a slowly growing US market). Brazil grew at a yearly average of 4.5% in the 2004-2010 period, whereas Mexico's growth lingered on at 2.0% per year from 2002 to 2010.

There is finally the more recent 2011-2014 period, when Brazil suffered from a reversal of the commodity boom and also from domestic economic mismanagement, whereas Mexico, while copying with the slow recovery of the US from the Great Recession, fared better than previously. In this Day After the Great Recession period, GDP growth averaged 2.1% in Brazil but recovered to 2.9% in Mexico.

Graph 3: Growth periodization, 1950-2014 (% p.a.)



Source: Table 1

Graph 3 makes the contrast between these countries' growth experiences before and after the early 1980s clear. During the Golden Age, Brazil and Mexico grew in the neighborhood of 7% per year; after the early 1980s, average GDP growth rates have been only one-third of that. It is true that population growth slowed down substantially between 1950-80 and 1981-2014, from 2.8% to 1.5% in Brazil and from 3.4% to 2.2% in Mexico. But that did not help to change the dismal picture: in per capita terms post-1980 incomes growth were only a fraction of their pre-1980 rates: Mexico per capita income grew 3.4% a.a. from 1950 to 1981 and 0.7% from 1981 to 2013, while in Brazil GDP per capita growth dropped from 4.5% to 1% a.a.

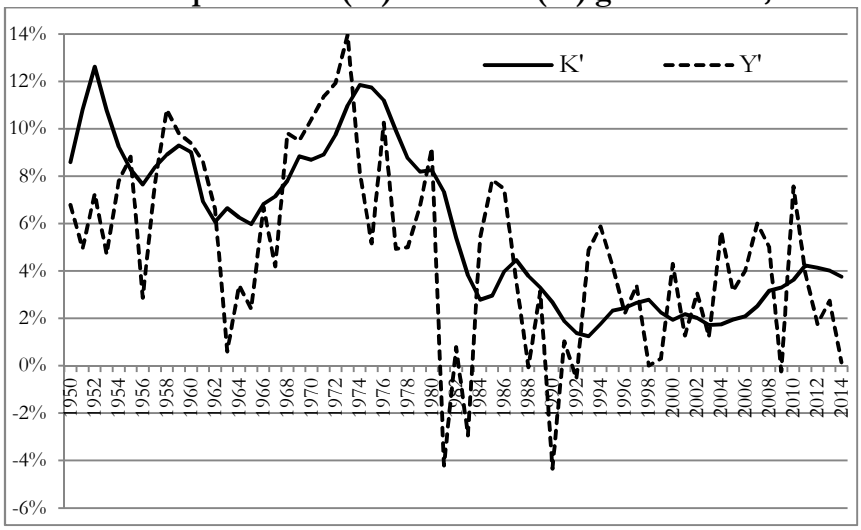
In the next section we investigate the relationship between the GDP growth collapses and capital accumulation.

3. Capital accumulation and the growth collapses

Both in Brazil and Mexico contractions in capital accumulation that were both deep and lasting are closely associated to the GDP growth collapses that started in the early 1980s.[6] We first discuss this association and then use a decomposition derived from the savings-investment identity to study the components of the capital stock changes.

Graphs 4 and 5 show the relationships between the GDP growth rates (dotted lines) and the capital stock growth rates (solid lines) respectively in Brazil and Mexico, from 1950 to 2014. During the Golden Age, the average yearly capital stock growth rate was 8.9% in Brazil and 8.0% in Mexico. In consonance with this rapid growth in the capital stock, average GDP growth rates of this period were 7.4% and 6.8%, respectively in Brazil and Mexico.

Graph 4: Brazil — Capital stock (K') and GDP (Y') growth rates, 1950-2014 (%)



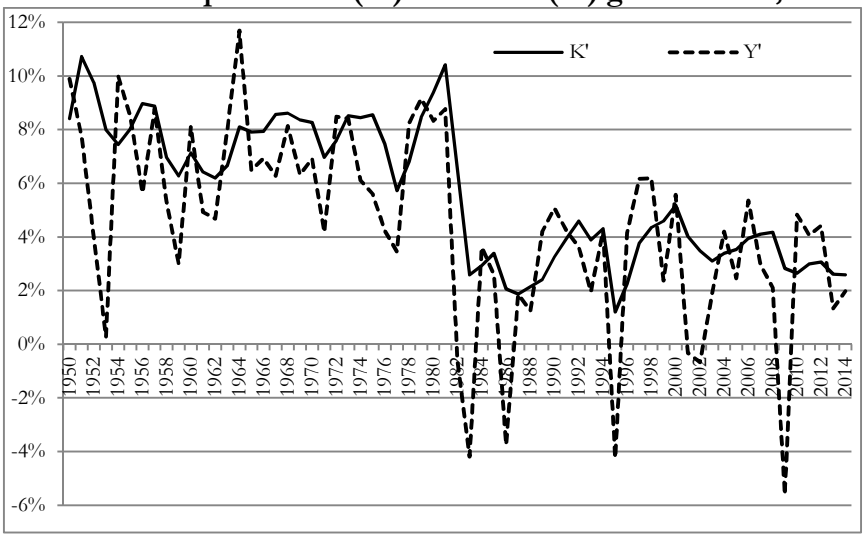
Source: National Accounts, Historical Statistics and authors' estimates

[6] Brazil's net capital stock estimates are preliminary. Mexico's data were kindly provided by André Hofman. Mexico's 2014 figure is our own estimate, based on the average depreciation rate implicitly observed in Hofman's figure for 2013 and INEGI's fixed gross investment estimate in 2014.

In Brazil, the capital stock growth rate started a descent after reaching a peak in 1975. The drop became sharper after 1981, and a through was reached only in 1992. In Mexico, the change of regime was much faster, as it took only one year—1983—for the capital stock growth rate to sink from a peak to a near through, from which it recovered only mildly in subsequent years. In the Near Stagnation era, the average capital stock growth rate stood at only 2.9% in Brazil and 2.8% in Mexico. Correspondingly, average GDP growth rates descended to 2.6% in Brazil and 2.2% in Mexico.

On a yearly basis, output growth was rather more volatile than capital growth as can be seen in Graphs 4 and 5. As a result the correlations between the capital and output growth series were not particularly high: 0.58 in Brazil and 0.68 in Mexico. Interestingly enough, the correlation between the capital stock growth rates of Brazil and Mexico themselves was a much higher 0.83, which highlights the kinship between the post-WW-II macroeconomic histories of these two countries.

Graph 5: Mexico — Capital stock (K') and GDP (Y') growth rates, 1950-2014 (%)



Sources: Estadísticas Históricas de Mexico, A. Hofman's estimates and INEGI's internet site.

Next we use a simplified expression developed in Bacha and Bonelli (2015) to decompose the components of capital stock growth, and identify for each of the periods in Table 1 the roles of savings, the relative price of investment, and the capital-to-output ratio in the evolution of the capital stocks.

The decomposition for the growth rate of the capital stock can be easily derived from the investment and savings identity in current prices, and is expressed as:[7]

$$K' = s(1/p)v - \delta \qquad (1)$$

[7] We start from the National Accounts identity: $P_I I = S$, where P_I is the implicit price deflator of gross capital formation, I is gross real investment, and S is total savings in current prices. Inventory changes are assumed equal to zero. First divide both sides by $P_I K$ (where K is the capital stock), then divide and multiply the right-hand side by $P_Y Y$ (where P_Y is the implicit price deflator of GDP and Y is real GDP), then subtract the capital stock depreciation rate (δ) from both sides, and rearrange to obtain equation (1), where $K' = I/K - \delta$, $s=S/P_Y Y$, and $p = P_I/P_Y$. See Bacha and Bonelli (2015) for the derivation of a slightly more elaborate version of this equation that allows for a varying degree of capital stock utilization.

where: K' is the growth rate of the capital stock, s is the sum of the domestic with the foreign savings rate (which we denominate simply as the savings rate), p is the relative price of investment (ratio of the implicit price deflator of gross capital formation to the implicit price deflator of GDP), v is the aggregate output to capital stock ratio, and δ is the depreciation rate of the capital stock.

Equation (1) shows that the impact of the savings rate on the growth rate of the capital stock depends on the relative price of investment and on the output-to-capital ratio. The higher is the relative price of investment (the lower is 1/p) and the lower is the output-to-capital ratio, the lower will be the growth rate of the capital stock for a given savings rate. The depreciation rate also needs to be taken into account — except that, as it varies little in the series we use, it does not contribute to explain the changes in capital accumulation through time.[8]

Tables 2 and 3 show the figures for equation (1) respectively for Brazil and Mexico in the periods identified in Table 1.

Table 2: Brazil — Capital Stock Growth Decomposition, Selected Periods

Table 2: BRAZIL	Years	K'	s	v	p	δ*
Post WW-II Golden Age	1950-1980	8.8%	19.4%	0.506	0.784	3.6%
Lost Decade	1981-1992	3.3%	20.9%	0.357	1.009	4.1%
Reforms with Subpar Growth	1993-2003	2.1%	18.3%	0.352	1.013	4.2%
China Syndrome	2004-2010	2.8%	18.5%	0.382	1.024	4.1%
Day after the Great Recession	2011-2014	4.0%	20.3%	0.383	0.973	4.0%
Post-1980 Near Stagnation	1981-2014	2.9%	19.5%	0.364	1.009	4.1%

(*) Residual

Source: Authors' calculations; see text.

Table 3: Mexico — Capital Stock Growth Decomposition, Selected Periods

Table 3: MEXICO [9]	Years	K'	s	v	p*	δ **
Post WW-II Golden Age	1950-1981	8.0%	16.4%	0.656	0.795	5.6%
Lost Decade	1982-1993	3.3%	17.3%	0.470	0.915	5.6%
Reforms with Subpar Growth	1994-2001	3.7%	17.5%	0.443	0.842	5.5%
China Syndrome	2002-2010	3.5%	22.2%	0.410	0.967	6.0%
Day after the Great Recession	2011-2014	2.8%	21.5%	0.391	0.919	6.3%
Post-1980 Near Stagnation	1982-2014	3.4%	18.5%	0.438	0.887	5.8%

* Residual; ** Depreciation implicit in Hofman's estimates

Source: Authors' calculations; see text.

[8] Mexico's depreciation rates, as calculated from Hofman's capital data series, turned out to be substantially higher than Brazil's, estimated by us as a residual (but which are in line with the values computed by Lucilene Morandi, from UFF, in a forthcoming paper). We were unable to detect the sources of these differences.

[9] A direct calculation of p yields results only slightly different from those in Table 3. Thus, for instance, p in 1950-81 estimated directly from the PENN World Tables is equal to 0.833 with 1980=1.0. It equals 0.943 in 1982-93 and 0.910 in 1982-2014. Therefore, from Table 3 we conclude that the relative changes are similar under both alternatives. The savings rate in current prices (s) for Mexico was estimated by the authors from Hofman's investment rate in 1980 prices multiplied by relative price of investment goods in the PENN Tables, with 1980 set equal to 1.0.

The most surprising result in Tables 2 and 3 is that the sharp fall of the capital stock growth rate between the Golden Age and the Near Stagnation period is not accounted for either in Brazil or Mexico by the evolution of the savings rate. In the thirty-some years before the early 1980s, the average savings rate was 19.4% in Brazil and 16.4% in Mexico. From the early 1980s to 2014, the average savings rate was in fact a bit higher at 19.5% in Brazil and 18.5% in Mexico. This did not prevent the average growth rate of the capital stock to sink between these two long periods, from 8.9% to 2.9% in Brazil and from 8.0% to 3.4% in Mexico.

The main culprit (by far the main one in the case of Mexico) for the sharp fall in the capital stock growth rate was a deep reduction in the output-to-capital ratio. This seems to have been partly a technological phenomenon, as both economies became much more urbanized and capital intensive in the more recent period. A composition effect may also have had a role, as the share of construction increased at the expense of machines. Investment misallocation is a further reason for the decline in the output-to-capital ratio, as we'll discuss below. But, particularly in the case of Mexico, the drop in the capital stock growth rate was too sudden to be explained simply by such structural factors.

Apparently, cost-increasing and demand-depressing factors associated to the early 1980s debt crisis forced a sharp reduction in aggregate output, thus turning idle part of the preexistent capital stock.[10] Initially, the drop in foreign savings also exerted a depressing effect on capital accumulation, as a compensatory increase in domestic savings did not immediately occur. Subsequently, domestic savings recovered, but this happened in a context (particularly in the case of Brazil) in which an inefficient import substitution of capital goods contributed not only to depress the output-to-capital ratio but, more importantly to substantially increase the relative price of investment.[11]

More capital intensive production and higher relative investment price became permanent features of Mexico's and Brazil's economies since the early 1980s. Together they explain why the capital stock growth rate sank to such lower levels in spite of higher savings rates. Brazil, being a more closed economy, suffered from a sharper rise in the relative price of investment. Mexico's opening up seems to have been able to hold back the rise in the price of investment, but it did not prevent the output-to-capital ratio from falling continuously and even more deeply than in Brazil in the decades following the early 1980s.

Levy (2008, p. 213) argues that the social programs created after the 1980s tilted the investment ratio in Mexico towards the informal sector and this raised the incremental capital-to-output ratio. Ros Bosch (2013, Ch. 2) agrees that informality expanded since the 1980s but argues that this was a consequence not a cause of the low growth rate of the capital stock. We'll have more to say about the role of informality in a subsequent section.

We now turn to the consequences of the evolution of the capital stock for the growth rate of output per worker. The focus on output per worker is justified because changes in the growth of the labor force were a minor factor in the GDP growth collapses in the two countries. In the Golden Age, labor grew at nearly similar rates in Brazil and Mexico, respectively, at 3.1% and 3.2% per year. In the Near Stagnation age, yearly labor

[10] A simple measure based on actual versus trend GDP suggests a rather large drop (8%) in capacity utilization between 1981 and 1983.

[11] Bacha and Bonelli (2015) discusses the causes of the rise in the relative price of investment and of its role in the explanation of the contraction of the capital stock growth rate in Brazil.

force growth was less, but still a respectable 2.2% in Brazil and an even higher 2.5% in Mexico. These relatively small changes in labor force growth rates permit us to draw attention to the growth of aggregate output per labor, as explained by capital deepening and TFP.

4. Periodization for the growth of output per worker

This section presents a standard growth decomposition exercise, using an aggregate Cobb-Douglas production function with capital and labor as production factors. Our interest is in the evolution of GDP per worker. The log-linearization of a function of this type results in:

$$y' = \alpha k' + TFP' \qquad (2)$$

where y' is the growth rate of GDP per worker, α is the capital share in GDP, k' is the growth rate of capital per worker, and TFP' is the growth rate of total factor productivity.

Tables 4 and 5 below respectively for Brazil and Mexico show the behavior of the variables in this formula for the periods identified in Table 1. For completeness, the tables also show the values of labor force growth (L') in these periods. In both countries, we set $\alpha = 0.45$. For Brazil, this value is in line with our previous work (Bonelli and Bonelli, 2012) and for Mexico with a forthcoming productivity study of the KLEM-Latin American project[12].

Table 4: Brazil — Decomposition of Labor Productivity Growth, Selected Periods (% p.a.)

Periods	y'	L'	alfa*k'	TFP'
1951-1980	4.2%	3.1%	2.5%	1.7%
1981-1992	-0.8%	2.2%	0.7%	-1.4%
1993-2003	0.3%	2.5%	-0.2%	0.4%
2004-2010	2.2%	0.5%	0.2%	2.0%
2011-2014	1.1%	1.0%	1.3%	-0.2%
1981-2014	0.4%	2.2%	0.4%	0.0%

Source: Authors' calculations; see text.

Table 5: Mexico — Decomposition of Labor Productivity Growth, Selected Periods (% p.a.)

Periods	y'	L'	alfa*k'	TFP'
1951-1981	3.4%	3.2%	2.1%	1.3%
1982-1993	-1.7%	3.4%	0.1%	-1.8%
1994-2001	0.7%	2.3%	0.6%	0.1%
2002-2010	0.3%	1.6%	0.9%	-0.5%
2011-2014	1.0%	1.9%	0.4%	0.6%
1982-2014	-0.2%	2.5%	0.5%	-0.7%

Source: Authors' calculations; see text.

The data in Tables 4 and 5 summarize the extraordinary loss of dynamism of the two economies from the Golden Age to the Near Stagnation era. Between these two long

[12] Cf. Hofman et al., forthcoming.

periods, average growth of output per worker fell from 4.2% to 0.4% in Brazil and from 3.4% to -0.2% in Mexico.[13]

Contractions in the growth rates of capital per worker and of TFP divide the responsibility for this collapse, with the former being relatively more important in Brazil and the latter more prominent in Mexico. This proposition is valid for the Near Stagnation era as a whole. In it, output per worker growth was less than zero in Mexico, in spite of a higher contribution of capital to growth than in Brazil, because the Solow residual became very negative in Mexico in this era.

Roles of capital and TFP are nonetheless reversed in the two countries in the more recent Day After the Great Recession phase (2011-14). In this period, growth of output per worker was equally mediocre in the two countries, but in Brazil capital accumulation recovered while TFP growth sank. In Mexico, on the contrary, capital accumulation dropped while TFP growth improved. The speculation is that, more recently, Mexico may be dealing with more success than in the past with the structural sources of its traditional low productivity, but is suffering from a low propensity to invest, associated with the economic slowdown of its main trading partner, the US. Meanwhile, in Brazil the end of the commodity boom and government meddling with critical relative prices and resource misallocation led TFP growth to become negative, even as capital accumulation recovered from the low levels prevailing since the 1980s.

This interpretation needs to be squared off with the high growth rate of TFP in Brazil in the China Syndrome period (2004-2010). Lisboa and Pessoa (2013) argue that this was a deferred consequence of the economic reforms of the 1990s and early 2000s. However, the temporary boost in TFP growth may also have been a consequence of the major commodity boom from which Brazil benefitted in this period. The statistical association between terms of trade changes and variations in measured TFP is well documented in the literature, as is the procyclicality of this variable.[14]

The next graph shows the close association between the percentage changes in TFP and in the terms of trade in Brazil from 1981 to 2014. The correlation coefficient between the two series is 0.64.

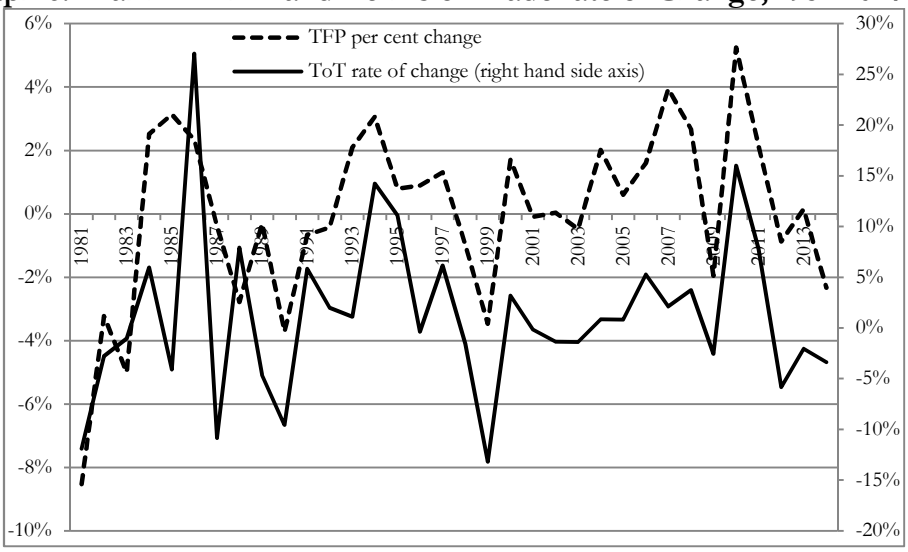
An instrumental variable regression, whose second stage is summarized in Table 6 below, suggests that changes in measured TFP' in the 1981-2014 period can be partially

[13] Neither labor nor capital were corrected for utilization in these exercises.

[14] Kehoe and Ruhl (2008) argue that the close positive association of terms of trade changes with TFP growth observed in the historical data cannot be derived in a model with perfect competition and constant returns to scale. However, following on the footsteps of Hall (1990), several authors have recently demonstrated in models with monopolistic competition, multi-good settings, trade costs, and/or search environments that both aggregate demand and factor prices are important determinants of measured TFP, independently of true technological factors (cf., for example, Bai, Ríos-Rull, and Storesletten (2012), Burstein and Cravino (2015), Feenstra el al. (2013), Gopinath and Neiman (2014), Kim (2011)). On the procyclicality of measured TFP in the US, besides Hall (1990) see Basu and Fernald (2001) and Basu, Fernald and Kimball (2006).

accounted for by the gap in capacity utilization (GAP BRA) and changes in the terms of trade (TOT').[15]

Graph 6: Brazil — TFP' and Terms of Trade rate of Change, 1981-2014 (%)



Source: Authors' results.

Table 6: Regression Results IV Estimation*

Dependent Variable: TFP'				
Method: Two-Stage Least Squares				
Sample: 1981 2014			Included observations: 34	
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)				
Instrument specification: TOT' G' GAP WORLD DUMMY 1995-2014				
Constant added to instrument list				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.847.874	0.918665	3.100.012	0.0041
TOT'	0.183663	0.065264	2.814.154	0.0084
GAP BRA	-0.417569	0.153389	-2.722.293	0.0105
R-squared	0.460854	Mean dependent var		0.030714
Adjusted R-squared	0.426071	S.D. dependent var		2.791.523
S.E. of regression	2.114.805	Sum squared resid		1.386.445
F-statistic	1.546.873	Durbin-Watson stat		1.747.453
Prob(F-statistic)	0.000022	Second-Stage SSR		1.187.910
J-statistic	1.693.531	Instrument rank		5
Prob(J-statistic)	0.428800			

*instrumental variable estimate

According to these results, with constant terms of trade (ToT' = 0) measured total factor productivity increases by approximately 2.8% when the economy is operating at full capacity — something which it actually never did. Again, under constant terms of trade and at the average capacity utilization gap in the observation period (7%), the regression indicates that the growth rate of TFP would be zero. A dummy for the 2004-10 period had a non-significant coefficient, which suggests that the high growth rate of TFP observed in

[15] In the first stage we obtained an instrument for the capacity utilization gap (GAP BRA), regressing the original variable on the output gap for the world economy, the growth rate of real Brazilian government spending, and a dummy variable for the post-Real Plan period. All coefficients were significant and with the right sign; with R^2=0.81. Details are in the appendix (forthcoming).

this period was entirely a consequence of increased terms of trade and a high degree of capacity utilization.

5. Growth and structural heterogeneity[16] in five dimensions

In the previous sections, we identified a number of parallelisms between the growth experiences of Brazil and Mexico since 1950. In this section, we are interested in the more recent period, in which both countries not only failed to recover their previous high growth rates but saw their respective productivities per worker linger on a state of near stagnation.

In general terms, there is a basic similarity in these countries' post-1980 macroeconomic experience, which is that either because of policy failures of structural conditions, Brazil and Mexico were unable to undo the increases in the relative price of investment and in the capital intensity of production observed since the early 1980s. They're also unable to raise their respective savings rates sufficiently high to compensate for such investment-depressing factors. The result is that investment contracted and growth lost strength after the 1980s.

Beyond this, there are relevant differences in these countries' recent slow-growth experiences. Briefly stated, Mexico opened up its economy to trade with the outside world (mostly to the US) and thus succeeded in developing a first-class industrial sector in the country's richer Northern region. However, a similar domestic integration didn't accompany this external integration. The dynamism of the large exporting firms in the North did not feed back to the non-traded, informal, small and medium-sized firms in the country's poorer Southern regions. Since the latter generate not only most of the country's jobs but also a substantial part of its output, the consequence was a very low aggregate labor productivity growth rate.

Thus, the structural heterogeneity between "modern" and "traditional" sectors seems to have widened in Mexico in the post-reform period. In Brazil, in several dimensions this dualism decreased: the poorer North grew faster than the richer South; the lower-productivity agriculture did better than the higher-productivity industry;[17] bigger manufacturing firms did not outflank medium and small firms; informality decreased in the last decade. Brazil's problem seems to have been that in contrast to Mexico's her high-productivity large-manufacturing firms did not integrate into the world economy and thus saw their productivity grow slowly, except in a few selected subsectors. This provided a weak lever to move the rest of the economy up. Therefore, the country lingered on in a low overall productivity path, except when the commodity lottery dictated otherwise.

To illustrate this story, in the following we explore five disaggregated dimensions of the evolution of labor productivity in the two countries, as a complement to the aggregate

[16] Structural heterogeneity is a term made popular by Anibal Pinto (1970) in Latin America, to denote the extreme inter- and intra-sector differences in productivity provoked by import substitution industrialization in the continent.

[17] Productivity in agriculture (including stock breeding) increased by a substantial 5.2% yearly average rate between 1995 and 2013, while in services the average rate was only 0.4% p.a. and in manufacturing nearly zero. For the economy as a whole the corresponding rate was 1.1%. These results are from an ongoing research by F. Veloso, S. Marques and B. Coelho, from IBRE/FGV, to whom we express our gratitude.

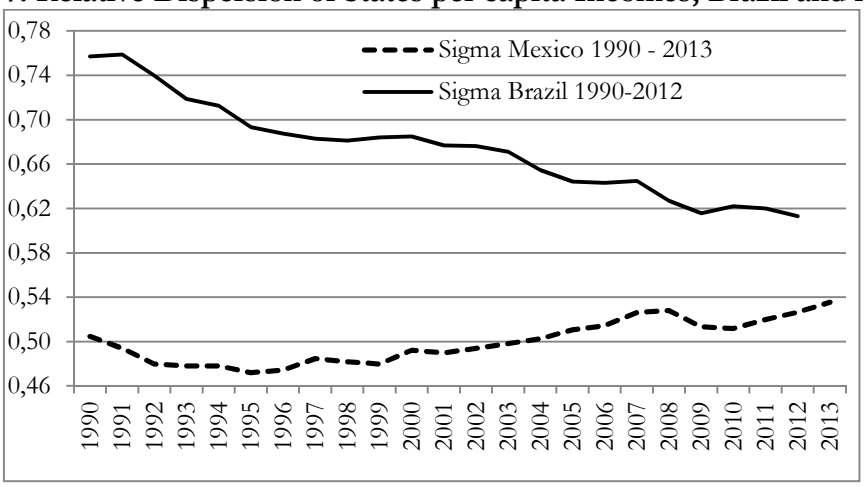
analysis in the previous section. The dimensions are: geopolitical units, economic sectors, tradability, firm size, and informality.

a. Regional dimension

In this subsection we investigate the evolution of the dispersion of State real per capita incomes in Brazil and Mexico. The analysis considers the 27 Brazilian states and the 32 Mexican federative entities. The periods for which we were able to obtain apparently reliable and uniform data were 1990-2012 for Brazil and 1990-2013 for Mexico.

We use the ratio of the standard deviation to the average real per capita State income (sigma, for short) to answer the question of whether the distribution of per capita income among States became narrower or wider over time. The answer is shown in Graph 7 below.

Graph 7: Relative Dispersion of States per capita Incomes, Brazil and Mexico



Sources: IBGE and INEGI. Adapted by the authors.

Graph 7 shows that—as is well-known in the personal dimension— Brazil has a more unequal income distribution than Mexico in the States dimension as well: Brazil's "sigma" is always higher than Mexico's. However, in the period under consideration the dispersion of States per capita income diminishes in Brazil, with its sigma falling from 0.79 in 1990 to 0.61 in 2012. In Mexico, a reverse widening pattern is observed since 1996. Initially, Mexico's sigma falls, from 0.50 in 1990 to 0.47 in 1995, but then it increases almost continuously, to end at a value of 0.54 in 2013.[18]

Thus, in the regional dimension we observe a tendency for income inequality to increase in Mexico and to decrease in Brazil since the 1990s. The speculation is that manufacturing activity blossomed in Northern Mexico, well integrated to the U.S. but with little linkage with the rest of the country. Meanwhile, oil production stagnated in the country's Southern region. In Brazil, on the contrary, manufacturing activity, which is inward looking and highly concentrated in the country's richer state, São Paulo, lost dynamism. Meanwhile, agriculture and mining, which are outward looking and better

[18] Mexico's sigma of State per capita incomes seems to have fallen in the previous 1970-1989 period, from 0.76 to 0.55, but we are unsure of the comparability of this data with that presented above for the subsequent 1990-2013 period. Brazil's State real per capita incomes data previously to 1990 seem totally unreliable. We thank Bernardo Coelho, from IBRE, for the Brazilian data.

disseminated regionally, gained traction with the commodity supercycle. Additionally, minimum wage policies and income transfers through the Bolsa Família program, which benefited Brazil's poorest Northern states, were more effective at income redistribution than similar programs in Mexico[19].

b. Economic sector dimension

In this subsection, we investigate aspects of the evolution of labor productivity in ten one-digit economic sectors. The data we use is from the 10-Sector Database of the Groningen Growth and Development Center (GGDC).[20] This database covers the ten main sectors of the economy as defined in the International Standard Industrial Classification, Revision 3.1. These ten sectors cover the total economy and are as follows: 1. Agriculture, hunting, forestry and fishing; 2. Mining and quarrying; 3. Manufacturing; 4. Electricity, gas and water supply; 5. Construction; 6. Wholesale and retail trade, hotels and restaurants; 7. Transport, storage, and communication; 8. Finance, insurance, real estate and business services; 9. Government services; 10. Community, social and personal services. Productivity is defined as gross value added per persons employed, in constant 2005 national prices. The period covered by the database is from 1950-2011.

The first analysis is on the evolution of the dispersion of labor productivity levels in these sectors in the two countries. Below, we graph the evolution from 1950 to 2011 of the ratio between the standard deviation and the (unweighted) average productivity level — sigma, for short — in the ten sectors in Brazil and Mexico. It is apparent from Graph 8 that the dispersion of sectorial productivities not only increased through time but became much more pronounced in the Near Stagnation Era.

It is noteworthy that during most of the import substitution period, the dispersion of sectorial productivities remained relatively constant in Brazil. This comes as a surprise, as we expected to find more heterogeneity in that phase. After 1980, however, there is a very noticeable trend of increasing dispersion in productivity levels among sectors.

In Mexico a downward trend in sigma is observed in the first two decades in Graph 8, followed by a pronounced increase that lasted for three decades. After 2003 the movements of Mexico's sigma are not uniform: there is a sharp decrease up to 2008, followed by an increase thereafter. If we exclude mining (that is, oil extraction) from the analysis, the picture that emerges is totally different, however. In this case, there is a slight downward trend in Mexico's sigma throughout the period. That is, both the extraordinary increase in the dispersion of productivity levels after the late 1970s and the declines and increases of this dispersion after 2003 are mostly due to the ups and downs in the oil sector.

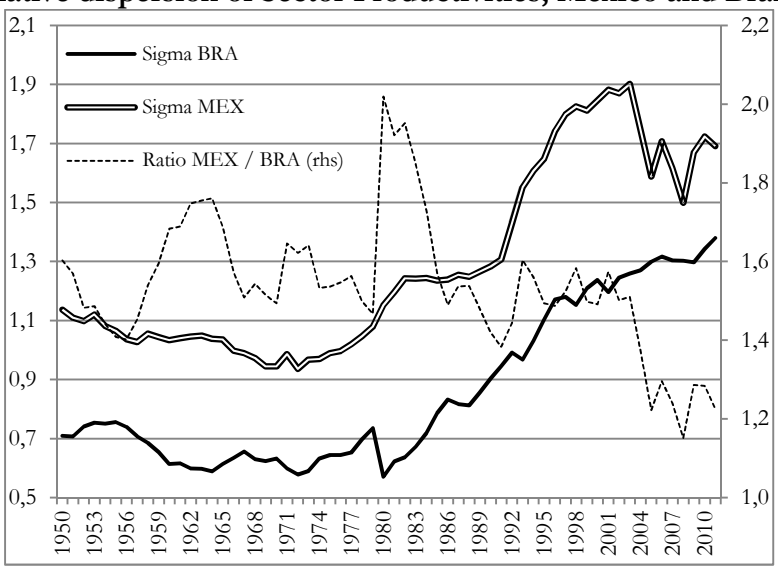
The ratio between the sigmas (MEX/BRA) is consistently higher than one, implying higher dispersion in sectorial productivities in Mexico. But the discrepancy

[19] See Lustig (2010) for a perceptive analysis of the impact of twenty-five years of reforms on Mexico's poverty and inequality.
[20] Cf. Timmer, deVries, and deVries (2014).

between the countries' sigmas tends to decrease through time: the average ratio between them falls from 1.5 in 1950-59 to 1.3 in 2002-2011. Again, most of these movements can be explained by the ups and downs of Mexico's oil sector.

The conclusion is that the structural heterogeneity of labor productivity at the sectorial level became more pronounced in both countries accompanying the slump in GDP growth rates after 1980. From a sectorial perspective, because of the oil sector Mexico is structurally more heterogeneous than Brazil, but the difference between the sigmas of the two countries has decreased recently.

Graph 8: Relative dispersion of Sector Productivities, Mexico and Brazil, 1950-2011

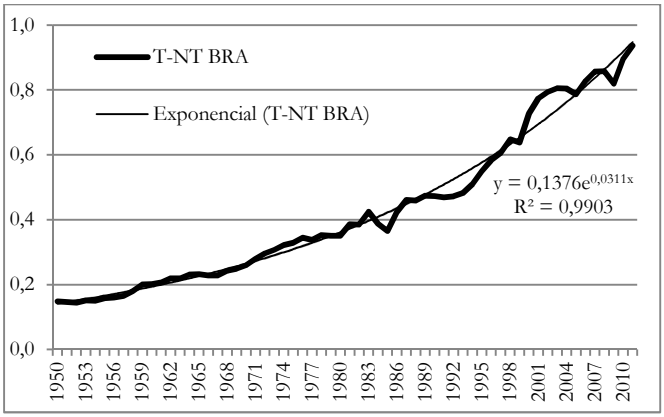


Source: Authors' calculations; see text.

Using the same database we aggregated the ten sectors into two: mainly traded (agriculture, mining, and manufacturing) and mainly non-traded (the remaining seven). Except for the inclusion of construction in the latter, this division is roughly similar to one between goods-producing vs. service-producing sectors. We then computed the evolution of the ratio of the labor productivity of the traded to that of the non-traded sector in 1950-2011 in the two countries.

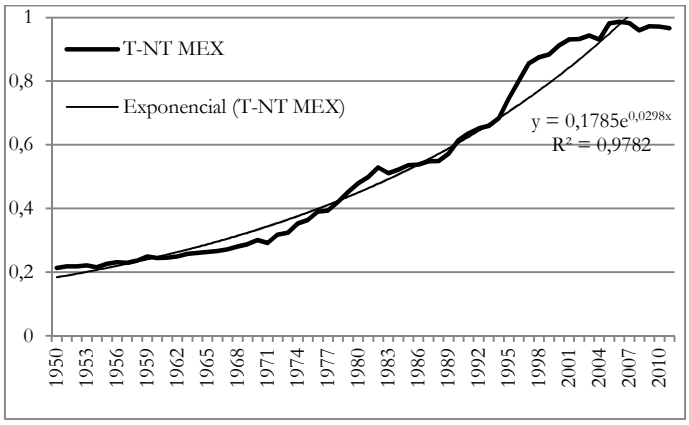
The results are shown separately in the two graphs below and are also somewhat surprising. First, the relative productivity in the traded (or goods-producing) sector starts from a very low basis. In 1970, the productivity in the traded sector in both countries is only around 15% of the productivity in the non-traded (or service-producing) sectors. Second, starting from this low basis the relative productivity of the traded sector increases exponentially at roughly 3% a.a. in both countries throughout the period under consideration. Thus, toward the end of the series the productivities of the two sectors are roughly at the same level in Mexico and Brazil. In Mexico, the relative productivity of the traded sector seems to be tapering off at this unitary level while in Brazil it continues to increase but not yet reaching the same productivity as that of the non-traded sector.

Graph 9: Brazil — Ratio of Traded to Non-Traded Sector Productivities, 1950-2011



Source: see text.

Graph 10: Mexico — Ratio of Traded to Non-Traded Sector Productivities, 1950-2011



Source: see text.

The picture that emerges from this aggregate two-sector exercise is only apparently at odds with our first exercise above. There we visualized a dispersion of sectorial productive levels. Here, we witness a convergence of productivity levels between the (less productive) traded and the (more productive) non-traded sectors. In fact, as we show in (a forthcoming) appendix, for the ten sectors as a whole there's little relationship between initial productivity levels and subsequent growth rates of labor productivity. The relevant point is that in both countries labor productivity in the three mainly traded sectors increased faster than in the remaining (non-traded) ones.[21]

c. Tradability dimension

In this subsection, we use a more disaggregated dataset recently produced by the IMF staff,[22] to investigate in more detail the behavior of labor productivity in the traded and non-traded sectors of Brazil and Mexico in the 1989-2009 period. In this case, the data

[21] Productivities in Mexico increased by 1.8%, 2.3%, and 1.2% in Agriculture, Mining and Manufacturing, respectively, the overall average being 1.2% p.a. for all sectors — thus, smaller than in each of the traded sectors. In Brazil, the corresponding figures were 3.2%, 5.1%, and 2.0%, yielding an overall mean of 2.1% p.a.

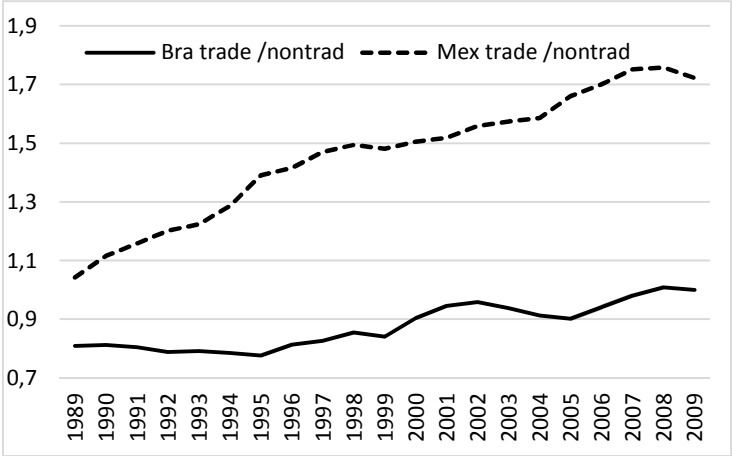
[22] Cf. Mano, R. and M. Castillo (2015). We used the data made available by the authors at: https://sites.google.com/site/ruimano/home/ManoCastillo2015.

originates from a 35-industry series, with tradability being defined by a cut-off rate of a minimum of 10% of exports in gross valued added. Productivity is measured as real value added per worker in constant 2005 Purchasing Power Parity (PPP) U.S. dollars. Hence, productivity levels (not only growth rates) can be compared across countries.

The two lines in Graph 11 displays the evolution of the ratios of labor productivity of the traded to the non-trade sectors for Brazil and Mexico. The top line shows the evolution of the productivity ratio (trade to non-trade) in Mexico. In 1989, the two sectors have a similar productivity level, but that of the traded sector grows faster than in the non-trade sector so that by 2009 it is 70% higher than the later (whereas in the Groningen dataset the respective productivities are at a similar level by this date). The second line shows a similar traded/non-traded productivity ratio for Brazil. Initially, the productivity of the trade sector is 20% lower than that of the non-traded sector. But the tendency is for convergence, so that by 2009 the productivity in these two sectors becomes equalized in Brazil. Hence, for Brazil this dataset confirms the tendency for sectorial productivity convergence (although at a lower speed than in the Groningen project data), whereas in Mexico the trend is one of divergence, with the non-traded sector lagging well behind the traded sector. This result is consistent with the view that in Mexico the traded sector is very dynamic but this dynamism does not spread to the non-traded sector. Meanwhile, in Brazil the trade sector struggles to reach the productivity levels of the non-traded sector. Although agricultural productivity increases rapidly since after 1970, it's productivity still lags behind the other sectors of the economy and it is this that explains the relatively lower productivity of the traded sector in Brazil.

Making use of the fact that this dataset is in comparable 2005 PPP U.S. dollars, we also compared the productivities of each sector in Brazil and Mexico (the graph is not shown here but is available online in a statistical and methodological appendix). We concluded that in both sectors Mexico's productivity is higher than Brazil's, with its advantage being more pronounced in the traded sector. We also checked that this is not only because of the importance of agriculture in Brazil's traded sector. A comparison only for the manufactured sector also indicates a higher productivity in Mexico. Moreover, there is hardly a tendency in the 1989-2009 period, as the productivity of Brazil relative to Mexico's in both sectors remained more or less at the same levels as they initially had throughout the period.

Graph 11: Ratio of Traded sector to non-traded sector productivities — Brazil and Mexico



Source: Mano and Castillo (2015)

d. Firm-size dimension

In this subsection, we use the results from a recent report on Mexico by the McKinsey Institute (2014), as well as special tabulations for the industrial sector from IBGE for Brazil[23], to investigate the behavior of labor productivity of small-and-medium vs. large firms (establishments, strictly speaking). The data for Brazil cover the 1996-2007 period and is only for manufacturing. The data for Mexico is for 1998 and 2008 and is for manufacturing, services, and wholesale and retail commerce[24].

Table 7 shows the yearly productivity growth by firm size groups in Mexico from 1998 to 2008, summarized from the McKinsey study.[25] The data shows a very clearly pattern: both productivity levels and productivity growth rates increase very substantially with establishment size. According to this data, the smallest firms in the sample, those with up to 10 employees (and which responds for roughly 19% of total employment) saw their productivity decrease by 6.5% per year (which implies that their productivity at the end of the period was only one-half of their initial productivity—which if true is very impressive indeed). The productivity of the immediately following size group (firms with 11 to 30 employees) also fell in the period. Productivity growth then becomes increasingly more positive as size grows, reaching a respectable 5.9% a.a. for firms with more than 500 employees.

The picture may be exaggerated, but the message is clear: in Mexico the biggest firms not only have a higher productivity (which is to be expected) but also display a much higher productivity growth than smaller firms—the productivities of the smallest of which, small as they are, fell substantially in the period. According to McKinsey, the sample of

[23] We are thankful to Jaana Remes, from McKinsey, for additional Mexican data, and to Silvio Sales, from IBRE/FGV, for the special tabulations for Brazil.

[24] The original sources are the Mexican Economic Censuses of 1999 and 2009, with data collected respectively in 1998 and 2008. For details, see Busso, Fazio, and Levy (2012).

[25] Productivity is defined as value added (revenue less purchased raw materials and intermediate products) per worker, using "deflators from Instituto Nacional de Estadística y Geografía" (McKinsey, 2014, p. 20). In a forthcoming version, the table will also indicate the employment shares of each size group at the beginning and end of the period, as well as the average value added per worker in 2008 in 1000 USD.

firms under consideration comprise 41% of the economy's valued added but if they're a representative sample the implication is that Mexico's low productivity growth problem resides squarely with its small and medium size firms (those with up to 500 employees), that respond for 42.5% of total value added and 85% of total employment. A sizable proportion of these firms' employment is informal, which is the reason why it's important to consider the role of informality in the Mexican economy that is done in the next subsection.

Table 7: Mexico — Productivity growth by Firm Size, 1998-2008

Firm size	Mexico: Productivity growth 1998-2008 (% p.a.)
0 - 10	-6,5%
11 -30	-2,2%
30 - 100	0,2%
101 - 250	2,9%
251 - 500	2,4%
501 +	5,9%
Total	2,0%

Source: McKinsey (2014)

For Brazil, productivity by firm size is only available for the manufacturing sector. Table 8 contains a preliminary computation for the 1996-2007 period. The figures for the smallest firms (0 to 29 employees) are only for a very small sample, and should not be considered (we are in the process of obtaining the data for the universe of these firms). The figures for firms with 30 employees and more are representative. They indicate that productivity increases with size, as expected, and also that the growth rate of productivity increases with size. But the differences in productivity growth according to size are much smaller than in Mexico: between 1996 and 2007 the growth rate of productivity of the firms with 500 and more employees is practically the same as that for all firms. In Mexico, the productivity growth of the big firms was three times as high as for all firms.

Table 8: Brazil — Productivity growth in Manufacturing by Firm Size, 1996-2007 [Preliminary]

Firm size	Productivity 2007	Productivity 1996	Productivity1996 (2007 prices)	Brazil: Productivity growth 1996-2007 (% a.a.)
0 - 10	3.153	1182.6	2967	0.6
10 - 29	168	33.9	85	6.4
30 - 99	92	36.5	92	0.0
100 - 249	156	55.6	139	1.0
250 - 499	219	67.6	170	2.3
500 +	325	100.4	252	2.3
Total	242	76.6	192	2.1

Source: PIA, IBGE (see text)

e. Informality dimension

In this subsection, we investigate aspects of the evolution of labor market informality in Brazil and Mexico. Informality is defined as the ratio of informal workers in total employment. In both countries, the definition of informal workers follow ILO norms.[26]

We perform two exercises. The first is a regression shown in Table 9 below, in which the dependent variable is the rate of informality in each of the States of Brazil and Mexico in 2012 and the independent variable is the per capita income level of these States. Two dummy variables are included. One for Mexico, to test if this country has a different informality rate than Brazil. Another for the southern Mexican state of Campeche, which proved to be an extreme outlier—very high income, very high informality—, quite probably because oil extraction is a substantial part of its economic activities.

The regression shows a clear inverse relationship between informality and income. For each 10% increase in per capita income, the informality rate declines by 2.28pp. Furthermore, despite being 15% richer, Mexico has an informality rate 10.5pp higher than Brazil's.

Table 9: Regression results, informality rate 2012

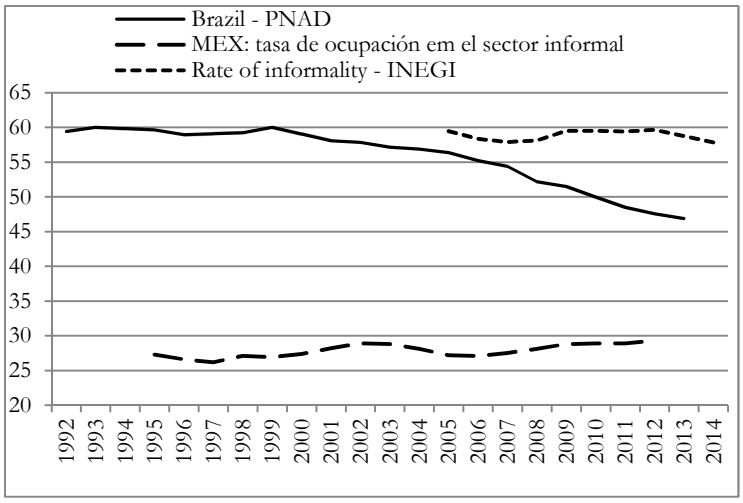
Regression statistics				
Adjusted R-squared	0.730			
Standard error	6.208			
Observations	59			
	Coefficients	*Standard error*	*Stat t*	*P-value*
Intercept	266.8	17.8	15.0	0,000%
log (PIB pc PPP)	-22.8	1.9	-12.0	0,000%
Dummy MEX	10.5	1.7	6.3	0,000%
Dummy Campeche	50.0	7.4	6.7	0,000%

The second exercise is summarized in Graph 12 below that shows the evolution of the informality rate in the two countries. Three lines are shown. The bottom line is for a very restrictive definition of informality as previously adopted by INEGI in Mexico. It covers the 1995-2012 period. The other two lines are in compliance with the ILO definition of informality. The middle one is for Brazil and covers the 1992-2013 period. The upper one is for Mexico and covers the 2005-2014 period.

[26] See ILO(2014) for some comparative data. For Brazil, informal workers are: non-registered employees, non-registered domestic servants, self-employed workers, workers in the production for own-consumption, workers in the construction for own-use, unpaid workers. This classification is not official, but is the one generally adopted by researchers and by the ILO. In Mexico, there is now an (ILO compliant) official definition of informal workers which is: "...besides the component that works in non-registered economic units or informal sector, other analogous modalities such as those employed in paid domestic work without social security, self-employed workers in subsistence agriculture, and unpaid workers, as well as paid workers without social security whose services are used by registered economic units." Freely translated from INEGI (2014), p. 36.

This data confirms that Mexico has a higher rate of informality than Brazil. Moreover, the impression arising from both the earlier restrictive definition and the more recent ILO compliant definition is that informality in Mexico remained roughly constant throughout the period. This is in contrast to Brazil, where the informality rate declined substantially more recently: from 60% of total employment in 1999 to 47% in 2013.

Graph 12: Labor Informality Rates, Brazil and Mexico, Selected Years (%)



Source: IBGE (PNAD), INEGI and Ros (2013).

6. Conclusion

We found a close association between the GDP and capital growth rates in both Brazil and Mexico since 1950. We also identified in both countries contractions in capital accumulation that were both deep and lasting and were closely associated to the GDP growth collapses that started in the early 1980s. The slumps in capital accumulation were not, however, associated with declines in savings rates, as these either remained constant or increased in the period after 1980. The culprits for these slumps were substantial increases in the capital-output ratio in Mexico and in the relative price of investment in Brazil. Both factors seem to have been associated to the debt crisis of the early 1980s and the subsequent policy responses to it: capital goods import substitution in Brazil, informality-inducing policies in Mexico.

We next drew attention to the evolution of aggregate output per worker as explained by capital deepening and total factor productivity (TFP). Our data shows the extraordinary loss of dynamism of the two economies after the early 1980s. Between 1950-1980(or 1981) and 1981(or 1982)-2014, the yearly growth of output per worker fell from 4.2% to 0.4% in Brazil and from 3.4% to -0.2% in Mexico. Contractions in the growth rates of capital per worker and of TFP divide the responsibility for this collapse, with the former being relatively more important in Brazil and the latter more prominent in Mexico.

Roles of capital and TFP are nonetheless reversed in the more recent 2011-2014 period. Growth of output per worker was equally mediocre in the two countries, but in Brazil capital accumulation recovered while TFP growth sank. In Mexico, on the contrary, capital accumulation dropped while TFP growth improved. The speculation is that, more

recently, Mexico may be dealing with more success than in the past with the structural sources of its traditional low productivity, but is suffering from a low propensity to invest. Meanwhile, in Brazil the end of the commodity boom and government mismanagement seems to have led TFP growth to become negative, even as capital accumulation recovered from the very low levels prevailing since the 1980s.

An econometric exercise that we performed only for Brazil suggests that the changes in measured TFP growth in the 1981-2014 period can be at least partially accounted for by the gap in capacity utilization and changes in the terms of trade. According to this exercise, under constant terms of trade and at the mean capacity utilization gap, the growth rate of TFP in Brazil would have been close to zero in the period.

We concluded that there is a basic macroeconomic similarity in these countries' post-1980 experiences: either because of policy failures or structural conditions, Brazil and Mexico were unable to undo the increases in the relative price of investment and in the capital intensity of production from which they suffered since the early 1980s. They were also unable to raise their respective savings rates sufficiently high to compensate for such investment-depressing factors. The result is that investment contracted and growth lost strength after the 1980s.

The second part of the paper explores five disaggregated dimensions of the evolution of labor productivity in the two countries. The dimensions are: geopolitical units, economic sectors, tradability, firm size, and informality.

In the regional dimension, we observe a tendency for income inequality to increase in Mexico and to decrease in Brazil since the 1990s. The speculation is that manufacturing activity blossomed in Northern Mexico, well integrated to the U.S. but with little linkage with the rest of the country. In Brazil, on the contrary, manufacturing activity, which is highly concentrated in the country's richer state, lost dynamism. Meanwhile, agriculture and mining, which are better disseminated regionally, gained traction with the commodity supercycle. Additionally, cash transfers and minimum wage policies were more effective at income redistribution than similar programs in Mexico.

We considered next the evolution of labor productivity in ten economic sectors that cover the whole economy. The conclusion is that the heterogeneity of labor productivity at the sectorial level became more pronounced in both countries accompanying the slump in GDP growth rates after 1980. From a sectorial perspective, basically because of the oil sector, Mexico is structurally more heterogeneous than Brazil, but the difference between the two countries seems to have decreased recently.

Subsequently, we use a more disaggregated dataset to investigate in more detail the behavior of labor productivity in the traded and non-traded sectors of Brazil and Mexico in the 1989-2009 period. This dataset confirmed the tendency for sectorial productivity convergence in Brazil, whereas in Mexico the trend is one of divergence, with the non-traded sector lagging well behind the traded sector. This result is more consistent with the view that in Mexico the traded sector is very dynamic but this dynamism does not spread to the non-traded sector. Meanwhile, in Brazil the traded sector struggles to reach the productivity levels of the non-traded sector.

The next exercise was a comparison of the recent evolution of labor productivity according to firm size. The picture that emerges for Mexico is clear: the biggest firms not

only have a higher productivity but also display a much higher productivity growth than smaller firms—the productivities of the smallest of which, trifling as they are, fell in the 1998-2008 period. The implication is that Mexico's low productivity growth problem resides squarely with its small and medium sized firms, a large proportion of the employment of which is informal.

Finally, we confirmed that Mexico has a higher rate of informality than Brazil in spite of its higher per capita income. Moreover, the impression arising from our data is that informality in Mexico remained roughly constant since the mid-1990s. This is in contrast to Brazil, where the informality rate declined substantially: from 60% of total employment in 1999 to 47% in 2013.

The conclusion is that there are relevant "mesoeconomic" differences in these countries' recent slow-growth experiences. Mexico opened up its economy to trade with the outside world and thus succeeded in developing a first-class industrial sector in the country's richer Northern region. A similar domestic integration didn't accompany this external integration. The dynamism of the large exporting firms in the North did not feed back to the non-traded, informal, small and medium-sized firms in the country's poorer Southern regions. Since the latter generate not only most of the country's jobs but also a substantial part of its output, the consequence was a very low aggregate labor productivity growth rate.

Thus, the disparity between "modern" and "traditional" sectors seems to have widened in Mexico. In Brazil, in several dimensions this dualism decreased: the poorer North grew faster than the richer South; the lower-productivity agriculture did better than the higher-productivity industry; bigger manufacturing firms did not outflank medium and small firms; informality decreased in the last decade. Brazil's problem seems to have been that in contrast to Mexico's her high-productivity large-manufacturing firms did not integrate into the world economy and thus saw their productivity grow slowly. This provided a weak lever to move the rest of the economy up. Therefore, the country lingered on in a low overall productivity path, except when the commodity lottery dictated otherwise.

References

Bacha, E. and Bonelli, R. 2015. "Accounting for the rise and fall of post-WW-II Brazil's growth". In: Macroeconomics and development: Roberto Frenkel and the economics of Latin America, ed. Mario Damill, Martin Rapetti, and Guillermo Rozenwurcel. New York: Columbia University Press, forthcoming.

Bonelli, R. and Bacha, E. 2012. "Crescimento brasileiro revisitado". In: F. Veloso et al., Desenvolvimento Econômico: Uma Perspectiva Brasileira. Rio de Janeiro: Campus, 236-262.

Bai, Y., Ríos-Rull, J.V., Storesletten, K. 2012. "Demand shocks as productivity shocks". Under revision for the Journal of Political Economy. Available at: https://docs.google.com/file/d/0B107mzf0jBOgRDZGTEs3QTk3SFU/edit.

Basu, S., and Fernald, J. 2001. "Why is productivity procyclical? Why do we care?" In: New Developments in Productivity Analysis. Eds. Charles R. Hulten, Edwin R. Dean, and Michael J. Harper. 224-296. NBER. Available at: http://www.nber.org/chapters/c10128.

Basu, S., Fernald, J., and Kimball, M. 2006. Are technological improvements contractionary? American Economic Review 96(5): 1418-1448.

Burstein, A., Cravino, J., 2015. Measured aggregate gains from international trade. American Economic Journal: Macroeconomics 7(2), 181-218.

Busso, Matias, Fazio, M.V., and Levy, S. 2012. (In)formal and (Un)productive: the productivity costs of excessive informality in Mexico. Inter-American Development Bank Working Paper IDB-WP-341. August.

Feenstra, R. C., Mandel, B. R., Reinsdorf, M. B., Slaughtyer M. J. 2013. Effects of terms of trade gains and tariff changes on the measurement of US productivity growth. American Economic Journal: Economic Policy 5(1): 59-93.

Fishlow, A. 1978. "A new international economic order: what kind?" In: Rich and Poor Nations in the World Economy. Ed. A. Fishlow et al. New York: McGraw Hill.

Gopinath, G. and Neiman, B. 2014. Trade adjustment and productivity in large crisis. American Economic Review 104(3), 793-831.

Hall, R. E. 1990. Invariance properties of Solow's productivity residual. In Growth/productivity/unemployment: Essays to celebrate Bob Solow's birthday, ed. Peter Diamond. Cambridge, Mass.: MIT Press.

Hanson, G. H. 2010. "Why isn't Mexico rich?" Journal of Economic Literature 48(4): 987-1004.

Hofman, André, Matilde Mas, Claudio Aravena, Juan Fernandez de Guevara, "LA KLEMS: Economic Growth and Productivity in Latin America," in Dale W. Jorgenson, Kyoji Fukao and Marcel P. Timmer, eds., The World Economy: Growth or Stagnation? Cambridge, Cambridge University Press, forthcoming.

Instituto Nacional de Estadística y Geografía (INEGI). 2010. Estadísticas Históricas de México. Mexico.

Instituto Nacional de Estadística y Geografía (INEGI). 2014. La informalidad laboral: Encuesta Nacional de Ocupación y Empleo: marco conceptual y metodológico. México.

International Labor Office (ILO). 2014. Informality and the quality of employment in G20 countries. Report prepared for the G20 Labor and Employment Ministerial Meeting Melbourne, Australia, 10-11 September.

Kehoe, T.J., Ruhl, K. J., 2008. Are shocks to the terms of trade shocks to productivity? Review of Economic Dynamics 11, 804-819.

Kim, S. T. 2011. The price of imports and TFP: application to the Korean crisis of 1997-98. Review of Economic Dynamics 17, 39-51.

Levy, S.. 2008. Good intentions, bad outcomes: social policy, informality, and economic growth in Mexico. Washington, DC: Brokings Institution Press.

Lisboa, M. and Pessoa, S. 2013. "Uma história sobre dois países (por enquanto)". INSPER Working Paper WPE 309.

Lustig, N. 2010. "El impacto de 25 años de reformas sobre la pobreza y la desigualdad". In N. Lustig (ed.), Crecimiento Económico y Equidad (Los Grandes Problemas de México, v. 9). México, D.F.: El Colegio de México.

Mano, R. C. and M. Castillo. 2015. "The level of productivity in traded and non-traded sectors for a large panel of countries". IMF Working Paper 15/48. February.

McKinsey Global Institute. 2014. A tale of two Mexicos: Growth and prosperity in a two-speed economy. By Eduardo Bolio, Jaana Remes, Tomás Lajous, James Manyika, Morten Rossé, and Eugenia Ramirez. March. Avaliable at: http://www.mckinsey.com/insights/americas/a_tale_of_two_mexicos.

Pinto, A. 1970. Naturaleza e implicaciones de la 'heterogeneidad estructural' de la América Latina. El Trimestre Económico 37, n. 145, pp. 3-69.

Ros Bosch, J. 2013. Algunas tesis equivocadas sobre el estancamiento económico de México. México, DF: El Colegio de México-Universidade Nacional Autónoma de México.

Timmer, M.P., G. J. deVries, and K. deVries. 2014. "Patterns of structural change in developing countries". GGDC research memorándum 149. Available at: www.ggdc.net.