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Questioni di Economia e Finanza

(Occasional Papers)

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ASSESSING POTENTIAL GROWTH IN EMERGING COUNTRIES AFTER THE GLOBAL FINANCIAL CRISIS

by Enrica Di Stefano* and Daniela Marconi*

Abstract

We examine the growth performance of six emerging economies (Brazil, China, India, Indonesia, Russia and Turkey) in the last two decades and examine whether domestic structural constraints are affecting their present and future growth potential. In order to assess better the determinants of the recent synchronized slowdown of these economies, we concentrate on the dynamics of labor productivity (value added per worker, a synthetic measure of capital deepening, labor quality and total factor productivity) and of employment. We find that the ongoing slowdown in EMEs is largely structural, but there is still ample room for catching up in terms of output composition, reallocation of labor across sectors and within-sector productivity improvements. The scope for further reform and reform priorities differs across countries. In the longer run other structural factors will weigh on potential growth, particularly the evolution of the size and quality of the labor force.

JEL Classification: E32, O47, O57.

Keywords: emerging markets, growth, potential growth, productivity.

Contents

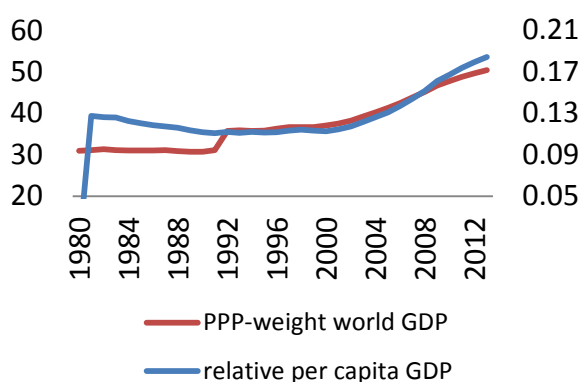
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* Bank of Italy, Directorate General for Economics, Statistics and Research; International Relations Directorate.
E-mail: enrica.distefano@bancaditalia.it; daniela.marconi@bancaditalia.it.

1. Introduction and main conclusions¹

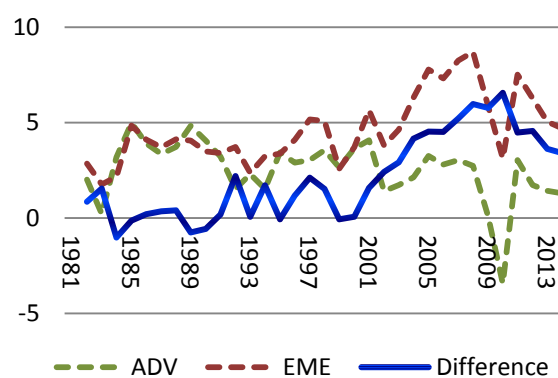
Following the financial crisis global growth declined by almost 2 percentage points (from 4.8% on average in the period 2000-07 to 3% in 2013); in EMEs, after a quick recovery in 2009-10, the fall was even starker (3 percentage points on average). Slowdowns in individual EMEs or regions are not unusual; indeed in the 1980s and 1990s their GDP growth was quite volatile, including in the largest and most successful countries, and pronounced accelerations were often followed by deep and at times protracted slowdowns. However, what makes this time different is that, after an extended period of almost synchronized and rapid growth (2000-07), which doubled per capita GDP and raised the global economic weight of EMEs by 10 percentage points (Fig. 1a), since the second half of 2011 EMEs have experienced an almost synchronized slowdown and the difference in growth rates between them and the advanced economies (ADV) has narrowed, reversing the long trend of rapid convergence initiated at the beginning of last decade (Fig. 1b).²

Fig. 1a EME relative GDP per capita (w.r.t ADV) and EME share of world GDP (in PPP terms)



Source: IMF, *WEO*, April 2014.

Fig. 1b Real GDP growth (annual % change) and difference in growth rates



Source: OECD, *Perspectives on global development*, 2014.

Today half of the world's GDP originates in EMEs, which is why understanding how much of the slowdown is cyclical, and therefore temporary, rather than structural, and thus more persistent, is extremely important. However, disentangling cyclical from structural components is no easy task, since it requires estimating potential output — a time-varying, pro-cyclical concept

¹ We wish to thank Pietro Catte, Marco Committeri, Riccardo Cristadoro and Giuseppe Parigi for their useful comments and suggestions. The views expressed in the paper do not necessarily reflect those of the Bank of Italy.

² Notwithstanding the growing importance of China in the EME group, the acceleration in GDP growth during the 2000-07 period is also discernible elsewhere within the group.

that depends on unobservable factors, and for which there exists a variety of estimation methods and models (Anand et al., 2014).

This note examines the growth performance of six emerging economies (Brazil, China, India, Indonesia, Russia and Turkey) in the last two decades, and discusses whether domestic structural constraints are affecting their present and future growth potential. In order to assess better the determinants of the recent synchronized slowdown of these economies, we concentrate on the dynamics of labor productivity (value added per worker, a synthetic measure of capital deepening, labor quality and total factor productivity) and of employment.

Our preliminary findings and conclusions are as follows:

- Most of the ongoing slowdown in EMEs is structural, except for Indonesia, where potential growth has recently increased. Our estimations show that: (i) in 2011-13 potential growth was on average 1.7 percentage points lower than in 2006-07 (6.6%, from 8.2%); (ii) the reduction in potential growth was most pronounced in Russia (3.5 percentage points), China (2.4) and India (2.0). The dynamics of labor productivity has dropped everywhere, contributing negatively to GDP growth potential.
- In the period of rapid growth (2000-07) labor productivity was driven by within-sector improvements, particularly in the service sector, and by the shift of workers out of agriculture mainly toward the service sector. The crisis has hit the within-sector component particularly hard.
- The structural transformation of these economies is far from complete: there is still ample room for catching up in terms of output composition, reallocation of labor across sectors and within-sector productivity improvements. The scope for further reform and reform priorities differs across countries.
- In the longer run other structural factors will weigh on potential growth, particularly the evolution of the size and quality of the labor force. As regards labor force size, the population is ageing fast in China and Russia, given low fertility rates; the margins to avoid a reduction in the labor force appear limited, since both male and female participation rates are already rather high. By contrast, labor force prospects are more favorable in India, Indonesia and Turkey, in terms of demographic dividends as well as female participation. Brazil is somewhere in the middle as far as both fertility and participation rates are concerned.
- As regards labor quality, the increasing complementarity between technological progress and human capital accumulation (skill-biased technological change) implies that a high initial endowment of human capital allows countries to absorb more advanced technologies and obtain greater productivity improvements; in the long run human capital accumulation is another key factor for continued productivity gains. In China and Russia population ageing is partially mitigated

by a relatively large endowment of human capital. By contrast, in Brazil, India, Indonesia and Turkey the endowment of human capital is small compared to their stage of development and could weigh negatively on their catching-up process.

2. The recent growth phases of EMEs

Since the beginning of last decade one can identify three growth phases.

- A protracted and broad-based period of robust growth (**2000-07**), driven by strong external tailwinds. Between 2000 and 2007 EMEs' aggregate growth averaged 6.7% a year, 2 percentage points higher than the average observed during the previous decade; the six countries in our sample (Brazil, China, India, Indonesia, Russia and Turkey) grew by 8.1%, more than 3 percentage points faster than in the previous decade. According to Cubeddu et al. (2014) about 25% of the higher growth registered in this period (compared to the previous decade) in the group of non-commodity EMEs was due to the contribution from external demand. The development of global supply chains, also reflecting the accession of China into the WTO, spurred global trade, which increased by more than 10 percentage points of GDP, while inflows of foreign capital into EMEs, particularly in the form of foreign direct investment (FDI), doubled in terms of GDP, surpassing 8%. In this period, as a consequence of faster growth in rapidly industrializing countries, commodity exports and prices surged (figs. 2a and 2b). For the group of commodity-exporting EMEs terms of trade improvements explain about a quarter of the higher growth seen in the 2000s (Cubeddu et al., 2014).
- The second phase (**2008-10**) saw a sudden reversal in the underlying trends of the aforementioned variables brought about by the global financial crisis which, however, was followed by a very fast recovery in EMEs. This recovery, driven by domestic fiscal and monetary expansion and invigorated by abundant global liquidity, was indeed faster than what had been envisaged in 2009. As a consequence of these stimulus policies, however, macroeconomic domestic imbalances deepened almost everywhere, and financial vulnerabilities built up, notably in China, but also in Brazil, India, Indonesia, Russia and Turkey, where corporate leverage increased substantially (IMF, 2014).
- After 2011 the upside surprise of the previous two years was followed by a downside one, as EMEs entered a phase of unexpected synchronized slowdown. The effects of domestic fiscal and monetary stimuli faded, while external drivers have not recovered to pre-crisis levels. In this less favorable external environment, domestic impediments to growth are becoming more evident.

Before turning our attention to the factors that impede growth, we first assess the weight of cyclical and structural factors in the recent slowdown.

Fig. 2a Trade and commodity prices development

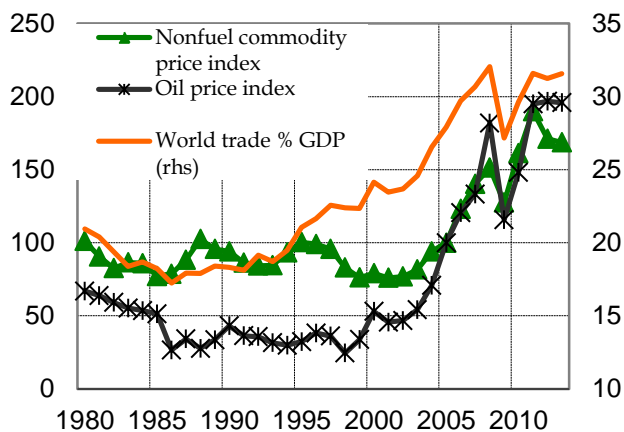
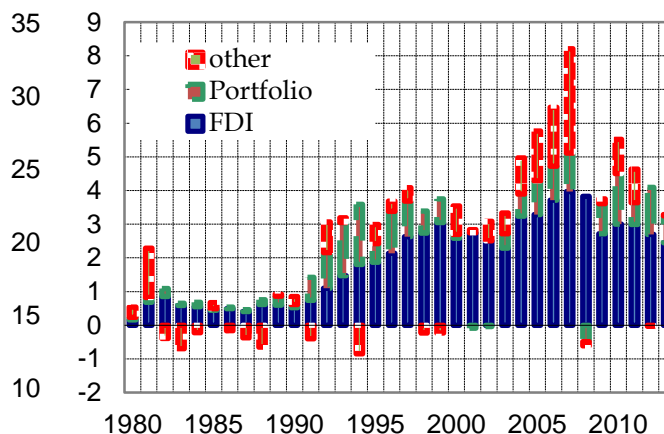


Fig. 2b Gross capital inflows to EMEs



Source: IMF, *WEO*, April 2014.

3. Cyclical and structural components of the slowdown in major EMEs

Cubeddu et al. (2014) estimate that about half of the recent slowdown in EMEs has reflected structural factors, though with large variations across countries. According to the IMF and OECD, respectively, about 40% and 20% of the 2011-13 slowdown (relative to the pre-crisis period 2000-07) for the six large EMEs in our sample was on average due to structural components.³ However, average numbers mask sizable variations across these countries: structural factors can explain 60-70% of the slowdown in China and Russia, while they play a minor role elsewhere. Also, it is difficult to draw firm conclusions, as estimates of potential output growth sometimes differ significantly between the IMF and the OECD, as for example in the case of Brazil, Turkey and Russia, reflecting methodological differences as well as the difficulty of evaluating potential GDP in real time, particularly when structural adjustment processes are at play (see Table A1 in the appendix).

Simple statistical filters might perform quite well in estimating potential output compared to other approaches (production function or model-based), particularly in the case of EMEs, where data constraints pose serious limits with respect to richer estimation techniques.⁴ Applying a

³ See IMF (2014) and OECD (2014). The structural component is computed as the ratio of the difference between the growth potential in the two periods (2000-07 and 2011-13) and the difference between the actual growth rates in the same two periods.

⁴ For a brief review of the most popular approaches to estimate potential output, see Anand et al., 2014.

standard Hodrick-Prescott (HP) filter to annual GDP series at constant prices for the period 1960-2013 (with a smoothing parameter of 6.25, as suggested in Ravn and Uhlig, 2002) we find that our estimates lie between those of the IMF and the OECD, the only exception being a tendency of the filtered series to amplify growth cycles for China and India in concomitance with the 2006-07 peak (see Fig. 3).⁵

Table 1 reports estimates of potential output growth before and after the global financial crisis, obtained taking the average between the HP-filtered series and the IMF and OECD estimations. Figure 4 reports the breakdown into the cyclical and structural components of the change in GDP growth rates between the 2011-13 and 2006-07 peaks. These estimates confirm that on average about half of the slowdown has been due to structural factors; one notable exception is Indonesia, where potential GDP in 2011-13 accelerated from pre-crisis levels. In Russia structural factors played a decisive negative role, accounting for 65% of the slowdown. In Brazil, instead, where the potential rate of growth was already relatively low at the peak, cyclical factors accounted for the largest share of the slowdown (63%).

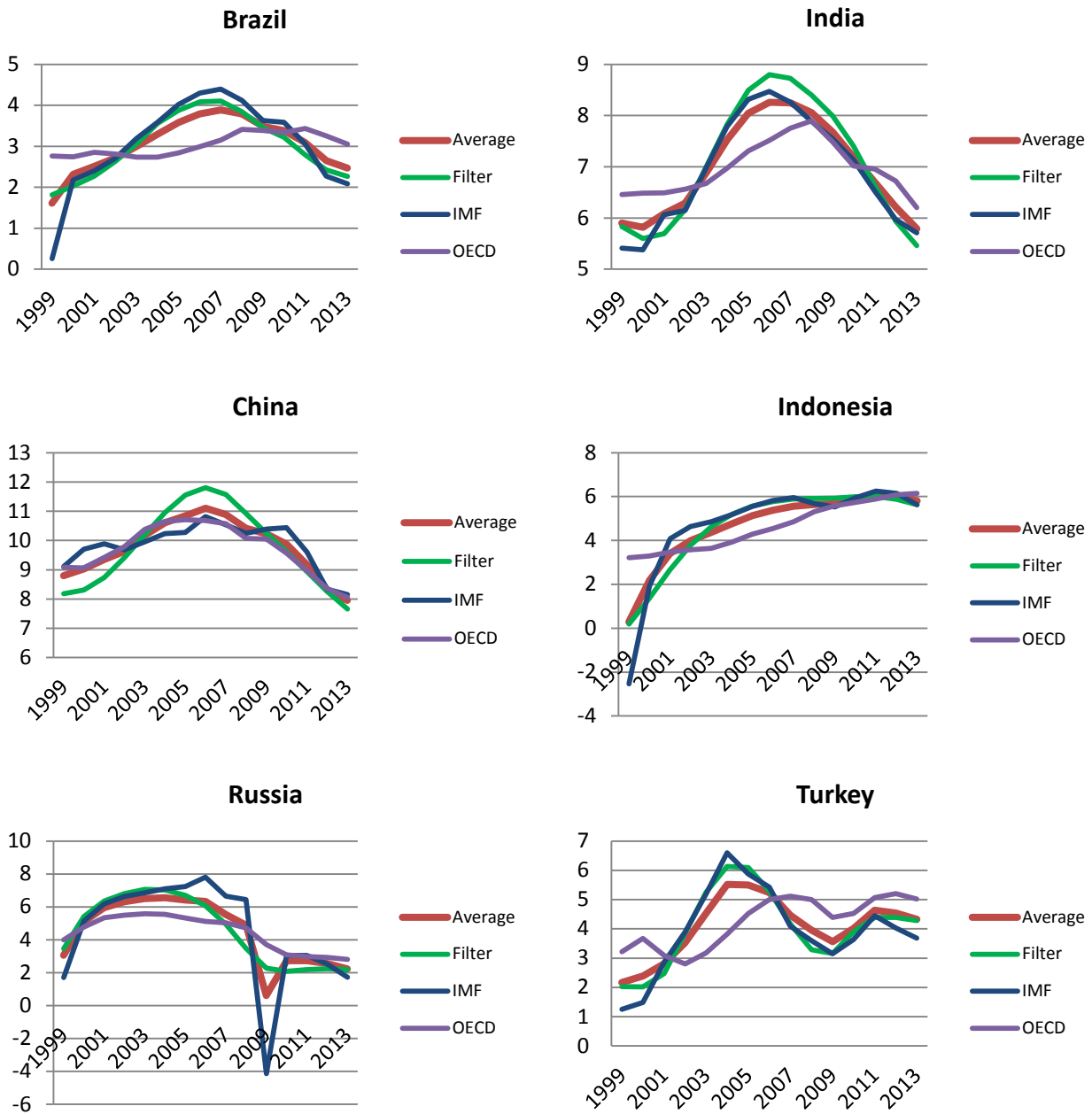
Table 1 **Real and potential GDP growth rates in selected emerging countries**

	Real GDP growth rate		Potential GDP growth rate	
	2006-07	2011-13	2006-07	2011-13
BRA	5.0	2.0	3.9	2.7
CHN	13.4	8.2	10.9	8.5
IND	9.5	5.2	8.3	6.2
IDN	5.9	6.2	5.5	6.0
RUS	8.3	3.0	6.0	2.5
TUR	5.8	5.0	4.8	4.5
<i>Average (PPP-weighted)</i>	<i>10.1</i>	<i>6.2</i>	<i>8.2</i>	<i>6.6</i>

Source: Author's estimations based on World Bank, *World Development Indicators databank*, and National statistics; IMF, *WEO*, April 2014; OECD, *Long-Term Projections*, May 2014. The data reported in the table correspond to the line "Average" represented in Fig.3.

⁵ Similar results are obtained by applying other time-series filtering techniques, such as the Christiano and Fitzgerald (2003) filter. Results are available from the author upon request.

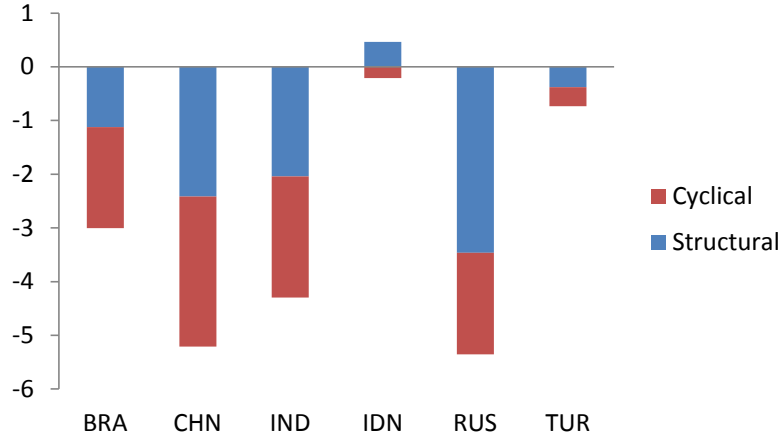
Fig.3 Comparison of potential GDP growth rate estimates



Source: IMF, *WEO*, April 2014; OECD, *Long-Term Projections*, May 2014; author's estimations based on World Bank, *World Development Indicators* databank, and National statistics.

Note: The IMF adopts a production function approach; the OECD a model-based approach (NAIRU). The "Filter" figures are obtained by applying a Hodrick-Prescott filter to GDP data over the period 1960-2013, with smoothing parameter $\lambda=6.25$.

Fig. 4 Cyclical and structural components of the change in GDP growth between 2011-13 and 2006-07



Source: Author's estimations based on World Bank, *World Development Indicators* databank, and National statistics; IMF, *WEO*, April 2014; OECD, *Long-Term Projections*, May 2014. The decomposition is based on the "Average" results reported in Fig. 3 and Table 3.

To summarize: a large part of the ongoing slowdown in EMEs is structural, except for Indonesia where potential GDP growth increased, and Brazil, where the cyclical component played a greater role, as the potential GDP growth rate was already relatively low before the crisis. Our estimations show that: (i) in 2011-13 potential growth was on average 1.7 percentage points lower than in 2006-07 (6.6%, from 8.2%); (ii) the slowdown has mostly affected Russia, China and India (3.5, 2.4 and 2.0 percentage points, respectively).

4. Labor productivity

To assess the determinants of the structural slowdown we focus on the behavior of labor productivity and employment, so we start from the output identity that includes these two terms:

$$Y_t \equiv \frac{Y_t}{E_t} * E_t \quad [1]$$

Where Y_t and E_t indicate total value added and employment, respectively. According to a standard production function representation, such as the Cobb-Douglas production function, with physical capital (K), human capital (h) labor (L) and technological progress (A), $Y_t = A_t K_t^\alpha (h_t L_t)^{1-\alpha}$, labor productivity ($\frac{Y_t}{E_t} \equiv \frac{Y_t}{h_t L_t}$) is a synthetic measure of the combined effects of capital deepening (K/L), labor quality (h) and total factor productivity (A):

$$\frac{Y_t}{E_t} \equiv \frac{Y_t}{h_t L_t} = A_t \left(\frac{K_t}{h_t L_t} \right)^\alpha \quad [2]$$

To evaluate the role of labor productivity in explaining the structural slowdown, we apply the HP filter to aggregate labor productivity to extrapolate the long-run trend and we decompose

potential GDP growth into the growth rate of labor productivity (which reflects the combined effect of capital deepening, labor quality and TFP improvements) and the growth rate of employment.

As shown in Table 2, labor productivity recently slowed down everywhere, generally by more than employment growth, which remained positive everywhere and quite strong in some countries (such as in Brazil, Indonesia and above all Turkey). Calculating the contribution of the two components to trend GDP growth we find that the slowdown in labor productivity explains much of the slowdown in potential output in all countries (Fig. 5).

Table 2 **Decomposition of potential GDP growth into labor productivity growth and employment growth (HP filter; % changes)**

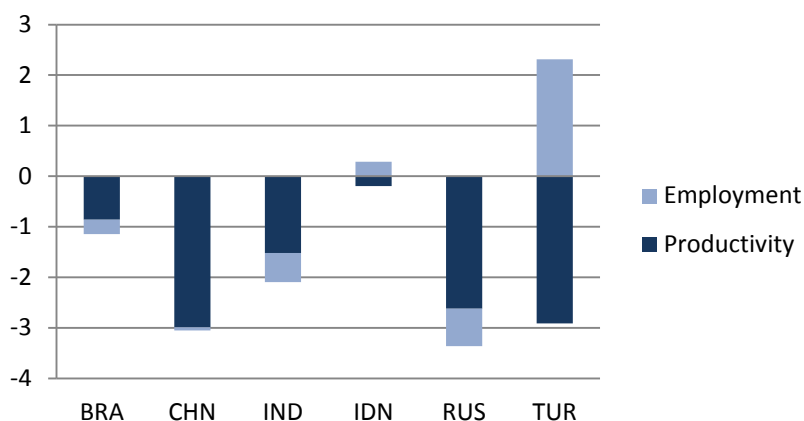
Country	year	Total economy	of which:	
			Labor productivity	Employment
Brazil	2006-07	4.1	1.9	2.1
	2011-12	2.8	1.0	1.8
China	2006-07	11.6	10.9	0.7
	2011-12	8.5	7.9	0.6
India	2006-07	8.7	7.8	0.9
	2011-12	6.6	6.3	0.3
Indonesia	2006-07	5.8	3.7	2.0
	2011-12	5.7	3.5	2.3
Russia	2006-07	5.6	4.6	1.0
	2011-12	2.2	2.0	0.3
Turkey	2006-07	4.7	3.0	1.7
	2011-12	4.2	0.1	4.0

Source: Author's estimations based on World Bank, ILO and NSBC data.

Note: "Total economy" figures may differ from those reported in Tab. 1 because they are computed on different time spans due to limited data availability on employment (1960-2013 in Tab. 1; 1991-2012 in this table).

Fig. 5 **Contribution of productivity and employment to potential GDP growth**

(% changes: 2011-12 relative to 2006-07)



Source: Author's calculations based on World Bank, ILO and NSBC data.

The slowdown in labor productivity can surely be traced back to the marked slowdown in capital accumulation, which was very pronounced everywhere, except for Indonesia; the slowdown was particularly intense in countries such as Brazil, Turkey and Russia, where the investment to GDP ratio was already below the middle-income countries' average (Table 3).

Table 3 Gross fixed capital formation in selected EMEs

	Gross fixed capital formation		
	Average annual rate of growth (%)		as % of GDP
	2000-08	2012-13	2013
Brazil	4.8	1.2	18.9
China	12.0	9.2	46.0
India	10.2	5.4	30.6
Indonesia	8.3	7.2	31.7
Russia	13.0	2.6	21.4
Turkey	6.6	0.8	20.0
Memorandum:			
Middle income countries	9.2	6.1	30.1

Source: IMF, WEO 2014 and World Bank, WDI, 2014.

Since the slowdown in capital accumulation has not been followed by a comparable slowdown in employment, capital deepening has been affected negatively (see also OECD, 2014).

5. Labor productivity gains: within- and across-sector effects

We have shown that compared to pre-crisis peaks, the trend growth rate of labor productivity has fallen across EMEs and is the single biggest cause of the structural part of the slowdown. By contrast, labor productivity was an important driver of growth in the previous period. It follows that in order to understand what factors could help sustain growth in the years to come we must first of all focus on this component.

We perform a shift-share analysis (cfr. Bosworth and Collins, 2007 and OECD, 2014) to decompose aggregate labor productivity growth into a within-sector effect and a between-sector (or reallocation) effect (Table 4 and figs. 6a and 6b). During the period of rapid growth 2000-07 we observe a generalized pick-up in productivity in the service sector and in some cases also in agriculture and industry. At the same time, the shift of workers from less productive to more productive activities, in particular out of agriculture and toward the service sector (reallocation

effect or shift effect), made an important contribution to overall productivity improvements. The shift effect dominated the within-industry effect in Brazil, especially in the period 2008-12; in China, India and Indonesia, too, the shift effect gained weight recently, while it contributed negatively in Russia, indicating the increasing inefficiency of the economy in allocating its productive resources (see also the appendix Table A2). The cross-term effect, which captures the simultaneous effect of within-sector productivity changes and the shift of labor across sectors, indicates that only in China and India the sectors with stronger productivity growth are gaining employment, while in all other countries, particularly in Russia, the two effects tend to be substitute rather than complementary (figs. 6a and 6b).

Table 4 Labor productivity growth: contribution of within-sector productivity growth and across-sector labor reallocation

of which:

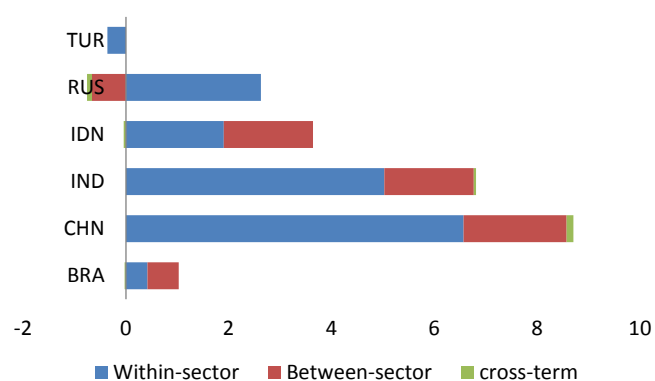
Country	Period	Total Economy	<i>of which:</i>			<i>Allocation Effect</i>
			<i>Agriculture</i>	<i>Industry</i>	<i>Services</i>	
Brazil	1992-99	0.89	0.22	0.58	-0.46	0.55
	2000-07	1.07	0.26	-0.32	0.54	0.59
	2008-12	0.96	0.30	0.07	0.02	0.56
China	1992-99	9.17	1.26	4.26	1.61	2.05
	2000-07	10.10	0.97	3.84	3.49	1.80
	2008-12	8.85	0.81	3.41	2.74	1.89
India	1992-99	4.48	0.54	1.16	2.36	0.42
	2000-07	5.29	0.62	0.72	2.90	1.06
	2008-12	6.76	0.92	0.36	3.95	1.53
Indonesia	1992-99	0.54	0.40	-0.99	-0.88	2.00
	2000-07	3.84	0.48	0.87	1.87	0.62
	2008-12	3.45	0.70	0.00	1.23	1.52
Russia	1992-99	-3.60	-0.24	-0.10	-3.14	-0.12
	2000-07	4.98	0.47	1.46	2.67	0.39
	2008-12	1.85	-0.31	1.21	1.78	-0.84
Turkey	1992-99	1.69	0.02	0.44	0.63	0.60
	2000-07	4.37	0.77	0.96	0.97	1.67
	2008-12	-0.44	0.03	-0.06	-0.43	0.01

Source: Author's calculations based on World Bank and ILO data.

Fig. 6a Shift-share decomposition of productivity growth, average annual growth over 2000-07 (%)



Fig. 6b Shift-share decomposition of productivity growth, average annual growth over 2008-12 (%)



Source: Author's calculations based on World Bank and ILO data.

As a first approximation, the scope for further gains in productivity arising from labor reallocation can be judged from simple sector shares of value added and employment: despite the important transformations that our selected sample of EMEs have gone through in the last 20 years, the share of employment in agriculture is still high everywhere, even when compared to that of the US in 1950 (Table 5), and the labor productivity gap with respect to the US remains quite high across sectors, but particularly so in agriculture (Table 6). It is to be expected that shifts of workers out of agriculture towards more productive sectors will continue to play a very important role in productivity gains.

Table 5 Shares of agriculture, industry and services in value added and employment in 2012

	Agriculture		Industry		Services	
	VA	Employment	VA	Employment	VA	Employment
Brazil	6	14	27	22	67	64
China	8	33	50	30	42	37
India	14	47	27	25	59	28
Indonesia	11	33	43	22	46	45
Russia	4	13	33	25	62	61
Turkey	10	24	29	26	61	50
<i>USA (2012)</i>	<i>1</i>	<i>2</i>	<i>19</i>	<i>18</i>	<i>79</i>	<i>80</i>
<i>USA (1950)</i>	<i>7</i>	<i>5</i>	<i>36</i>	<i>35</i>	<i>58</i>	<i>60</i>

Source: Author's calculations based on World Bank, ILO and Bureau of Economic Analysis data.

Table 6 Labor Productivity gap in 2012

	Total economy	Agriculture	Industry	Services
Brazil	22.8	16.2	27.6	25.4
China	17.7	8.0	28.0	21.8
India	9.0	5.0	9.4	19.8
Indonesia	9.9	6.2	18.7	10.8
Russia	27.0	15.5	34.1	29.2
Turkey	37.5	27.8	40.8	48.1
<i>USA</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>

Source: Author's calculations based on World Bank and ILO data.

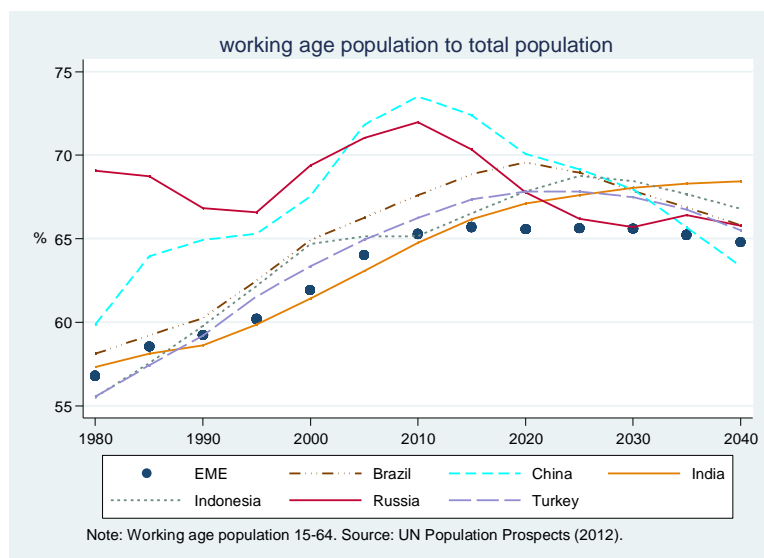
The big question is, however, whether the transformation engines have lost power, especially if in the past those engines had been fuelled primarily by external demand. If this were the case, the EMEs' catching-up process may be at risk, calling for appropriate policies to revive those engines and to avoid a *middle-income trap*. The low-hanging fruits arising from global integration processes may have been exhausted, leaving EMEs more vulnerable to domestic structural constraints weighing on the efficient allocation of resources.

Several obstacles may be delaying the reallocation of resources and factors across sectors in EMEs e.g. price-setting policies and exchange rate regimes that distort internal and external competition, labor market rigidities, and underdeveloped financial markets that impede the efficient allocation of capital. In a context of weaker external drivers such obstacles tend to become more manifest, and targeted structural reforms to remove them more urgent. Challenges across countries vary and policy priorities differ according to national peculiarities. For instance, in some countries the priority is to expand domestic consumption and upgrade the service sector (China and Indonesia), while in others it is more urgent to build up infrastructures and to remove supply-side bottlenecks by diversifying the production structure and expanding the manufacturing sector (Brazil, India and Russia). Also, countries differ considerably in terms of physical and human capital endowments, as well as in market structures, financial market development, labor market participation, demographic features and social safety nets.

6. Labor supply: quantity and quality issues

The process of economic upgrading depends crucially on the quantity and quality of labor available in each country. Since the mid 1990s EMEs have been enjoying important demographic dividends as the share of working-age population to total population has increased rapidly, allowing the rapid expansion of manufacturing and service activities while keeping wages relatively low and stable. Also the increasing weight of the working-age population has facilitated domestic saving formation and capital accumulation, particularly in China (Cristadoro and Marconi, 2013). However, declining fertility rates imply a progressive reduction of such dividends. According to UN projections, in China and Russia, where fertility rates are remarkably low, the share of working-age population peaked around 2010 (surpassing 70% of the total population; Fig. 7) and started declining thereafter. In other EMEs with higher fertility rates the demographic transition is still favorable, as the share of the working-age population continues to grow, albeit at decreasing rates. Population aging can affect economic growth through its impact on labor supply and saving. The negative effects of ageing can be alleviated through behavioral changes, namely increased labor-force participation and human capital investment (Bloom et al. 2010).

Fig. 7 Demographic transition in selected EMEs



In some countries there is still plenty of room to increase female participation (Turkey, India, Indonesia; Table 7), while in others this margin is tight (China and Russia); Brazil is somewhere in the middle, both in terms of fertility rates and participation rates. Second, in many countries, including China, labor supply may still grow because unemployed or under-employed working-age

populations could be drawn into the labor market due to labor shortages. Third, as life expectancies increase working lives can be extended as well.

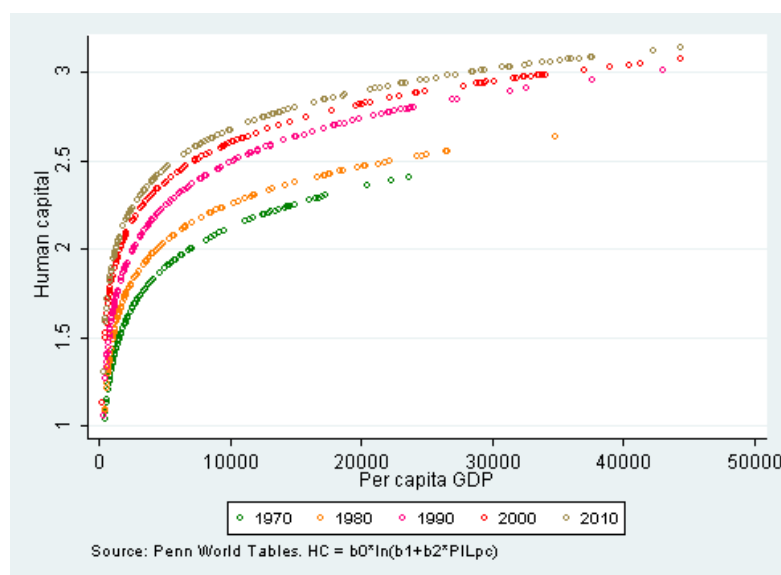
Table 7 Labor market participation rates and fertility rates

	Participation rates	Participation rates	Fertility rates /1	Life expectancy at birth (years)	Per capita GDP at PPP (US\$ 2005)
	% Female 15-64	% Male 15-64			
Brazil	63.9	85.5	1.9	72.8	9456
China	69.9	83.1	1.6	74.7	6207
India	31.8	83.9	2.7	65.4	2861
Indonesia	53.2	86.7	2.5	69.9	3695
Russia	68.6	77.5	1.4	68.6	13616
Turkey	28.4	75.3	2.2	73.9	11754
<i>Memo:</i>					
United States	67.9	78.7	2.1	78.1	43234

Source: World Bank, World Economic Indicators, and United Nations. Note:- /1 average number of children that the actual generation of women would have under the hypotheses of no child mortality and constant fertility.

Nonetheless, as technological change is increasingly biased towards high-skilled labor, increased labor-force participation per se may not be enough to raise a country’s growth potential, as it needs to be complemented with greater investment in human capital (Aghion and Howitt, 2006; Acemoglu et al. 2006). There is plenty of evidence (Soares, 2005) of the growing complementarity between technological progress and human capital, known as skill-biased technological change (Acemoglu 2009). In figure 8 we report the fitted lines obtained from a non-linear regression of the log of the human capital index (taken from the Penn World Tables) on the log of per capita GDP, over a sample of 134 countries: as is evident from the chart, the positively-sloped curve relating the two variables has shifted upwards over time, suggesting that the level of human capital associated with a certain level of per capita GDP has increased over time.

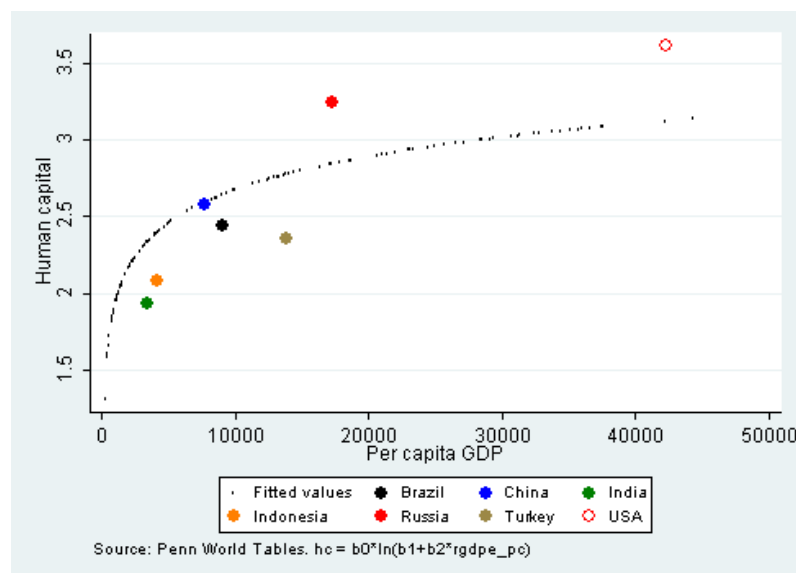
Fig. 8 Human capital and per capita GDP: 1970-2010



Isolating the fitted values for the year 2010 and highlighting the relative position of the six EMEs (see Fig. 9) we find that countries' relative positions vary considerably: on the one hand, China and Russia are relatively well positioned in terms of human capital endowment, which could potentially allow for faster absorption of more advanced technologies, facilitating the catching-up process and alleviating the negative effects of population aging. By contrast, in Brazil, India, Indonesia and Turkey human capital endowments appear low relative to their stage of development; as a result, here skill shortages could inhibit the continuation of the catching-up process.

Investing in human capital is therefore crucial, but again priorities may differ: in countries closer to the technological frontier, such as Russia and China, the investment should concentrate on tertiary education, while in others primary and secondary education, essential to absorb more basic technologies, should have the priority (Aghion and Howitt, 2006).

Fig. 9 Human capital and per capita GDP: Selected countries in 2010



Medium- and long-run projections put out by the main international institutions and private analysts forecast a definitive drop in potential output, particularly for China and Russia (Table 8), likely reflecting the hypothesis of reduced technological spillovers and catching-up potential (OECD, 2014b) as well as unfavorable demographic factors. According to Pritchett and Summers (2014) long-term outcomes for fast growing countries such as China and India could even be worst if one believes that *regression to the mean is the empirically most salient feature of economic growth*.

Table 8 **Medium- and long-run projection of potential output growth**

Country	Medium-term projections		Long-term projections	
	(IMF)\1	(OECD)\2	(OECD)\2	(Consensus)\3
	2019	2019	2020-24	
Brazil	3.5	2.5	2.5	3.7
China	6.0	5.5	4.6	5.9
India	6.8	5.8	5.9	7.2
Indonesia	6.0	5.8	5.6	5.4
Russia	2.6	2.7	2.8	2.6
Turkey	3.5	4.3	4.1	4.5
<i>Average</i>	5.4	4.9	4.5	5.5

\1: IMF, *WEO*, April 2014.

\2: OECD, *Long-term Projections*, May 2014.

\3: Consensus Economics, *Consensus Forecasts*, March and April 2014.

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Appendix Tables

Table A1: Effective and potential GDP growth rates in selected EMEs

Country	Effective annual growth rate \1			Potential growth rate					
	2000-07	2008-10	2011-13	2000-07		2008-10		2011-13	
				(IMF)\1	(OECD)\2	(IMF)\1	(OECD)\2	(IMF)\1	(OECD)\2
Emerging	6.7	5.3	4.7		
<i>of which:</i>									
Brazil	3.5	4.1	2.0	3.3	2.9	3.8	3.4	2.5	3.2
China	10.5	9.8	8.2	10.1	10.2	10.4	9.9	8.7	8.5
India	7.0	7.5	5.2	7.2	7.0	7.5	7.5	6.1	6.6
Indonesia	5.0	5.6	6.2	4.7	3.9	5.7	5.5	6.0	6.0
Russia	7.2	0.5	3.0	6.7	5.3	1.7	3.8	2.4	2.9
Turkey	5.1	1.5	5.0	4.4	3.9	3.5	4.6	4.1	5.1
Average (PPP-weighted)	7.9	6.8	6.2	7.7	7.3	7.3	7.4	6.6	6.7

\1: IMF, WEO April 2014.

\2: Long-term Projections, May 2014.

Table A2: Potential growth rate by sector and trend growth of labor productivity in 2012
(HP filter)

Country	All sectors	Agriculture	Industry	Services
	Value added			
Brazil	2.7	1.9	1.9	3.1
China	8.2	4.1	8.9	8.1
India	6.4	3.4	4.9	7.8
Indonesia	5.6	3.5	4.6	7.2
Russia	2.2	0.7	1.5	2.8
Turkey	4.1	3.6	4.6	4.0
Labor productivity				
Brazil	0.9	5.1	0.9	-0.3
China	7.8	7.6	6.1	6.2
India	6.0	5.9	0.7	5.6
Indonesia	3.5	6.0	-1.5	2.9
Russia	2.0	-9.9	4.2	2.9
Turkey	0.1	-0.3	0.7	-0.1
Employment				
Brazil	1.8	-3.2	1.0	3.3
China	0.3	-3.4	2.8	2.0
India	0.4	-2.5	4.2	2.2
Indonesia	2.1	-2.6	6.1	4.3
Russia	0.3	10.5	-2.7	-0.1
Turkey	4.0	3.9	3.9	4.1

Source: World Bank, World Economic Indicators, ILO, NBSC and our calculations.

Notes: Potential growth figures arises from a Hodrick-Prescott filtering of the real value added figures over the period 1960-2012, with smoothing parameter $\lambda=6.25$. – The trend in productivity arises from a Hodrick-Prescott filtering of the annual time series of the value added per worker over the period 1991-2012.