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SIZE MATTERS: JUST HOW BIG ARE THE BRICS?

INTRODUCTION

In recent years, an extraordinary amount of attention has been given to the BRIC (Brazil, Russia, India and China) economies. And for good reason. Aggregated, their economies recently surpassed the United States in size. While there is little dispute over the economic potential of these emerging economies (particularly China and India), there is widespread confusion over their actual size. For example, by one World Bank and IMF measure, China's economy is currently the third largest in the world and is one-third the size of the US economy. Yet according to another metric from the same institutions, China's GDP is closer to 60 percent the size of America's and has been the world's second largest since 2001. India, by one measure, is now the world's fourth largest economy but by another it does not even rank in the top ten. This confusion extends to measuring the standards of living in these countries. For example, while China's economy is considered large by any metric, China is still widely considered a "poor" nation. But is it really? This paper provides a brief discussion of the true sizes of these emerging giants

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MEASURING GDP:
PURCHASING POWER PARITY VERSUS MARKET EXCHANGE RATES

Market exchange rate (MER) approach is an easy and popular way to quickly convert the GDPs into the same currency

Gross domestic product (GDP) is the broadest measure of economic activity and calculating it just involves aggregating all of the goods and services produced in a country and multiplying each by the appropriate price and then adding them. To compare a nation's GDP measured at two different points in time economists construct price indexes, such as the consumer price index (CPI) or the GDP deflator which take into account price changes over that period of time. Comparing GDPs in different countries, with different currencies, however, is much more problematic. While the **market exchange rate (MER)** approach is an easy and popular way to quickly convert the GDPs into the same currency, there are two distinct problems with this approach. First, market exchange rates are capable of fluctuating by huge margins over relatively short periods of time. For example, if we were comparing per capita GDPs between Mexico and the United States and the peso depreciated 40 percent against the dollar almost overnight, then we would have to conclude that Mexicans were suddenly 40 percent poorer than Americans even though the total amount of output produced between the two nations had not changed.

The second shortcoming of MERs is more nuanced. It is an established fact that the price of goods traded in international markets relative to goods not traded tends to be much higher in poor or developing countries than in rich countries. It is also generally true that the price of traded goods will be approximately the same when converted to a common currency at the market exchange rate (often referred to as the **law of one price**) [1]. Travelers to developing countries will quickly notice that the price of non-tradables, such as haircuts or dining out, are relatively cheap while goods that are heavily traded (such as airline tickets) are not cheap. **As a consequence of this, comparisons of GDP at MERs consistently understate the relative income and output of developing economies** [2]**.**

To tackle this issue, economists utilize a measurement called Purchasing Power Parity or PPP. PPP exchange rates are based on a standardized basket of goods and services (both traded and non-traded goods) that

[1] The law of one price states that differing prices of a traded good will tend to equalize in the absence of tariffs, other barriers to trade and high shipping costs

[2] Another shortcoming for MERs is that currencies are traded for purposes other than trade in goods and services, e.g., to buy capital assets who prices vary more than those of goods and services.

take into account the differences in the price levels of goods and services between nations[3]. PPP is the measure most economists prefer when looking at per-capita welfare and when determining a country's potential to achieve superpower status. However, many journalists, politicians and business people don't seem to realize this, and continue using MERs instead to compare levels of real GDP. Thus Japan is frequently cited as having the world's second largest economy and India as having a smaller economy than Canada.

While a strict version of MERs seriously understates the size of developing economies, this does not mean that MERs are not appropriate measures for converting some economic magnitudes. For example, when the debt of a country is to be repaid in foreign currency, using MERs is best. And most obviously, a nation's exchange rate determines its purchasing power in the global economy. When China buys its military hardware from Russia, for example, it purchases those items at some MER, not PPP. The appendix provides a measurement example for PPP, a discussion of its shortcomings and the World Bank's improved measurement methodology

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3/ Purchasing power parity is often called absolute purchasing power parity to distinguish it from a related theory, relative purchasing power parity, which predicts the relationship between two countries' relative inflation rates and the change in the exchange rate of their currencies.

GDP RANKINGS

Table 2 lists GDP measured at MERs versus PPP for the world's largest economies. For the developed economies like the United States, Japan and Germany, there are no significant differences between GDP at MERs and PPP because the price of their nontraded goods and services are roughly comparable (notice the figures for the US are exactly the same because all GDPs are measure here in US dollars). The developed nations' share of world output, however, falls when valued at PPP due to the greater shares captured by the emerging market economies. At MERs, the United States currently accounts for 25 percent of world output while this figure drops 20 percent when valued at PPP.

TABLE 2: 2009 GDP AT MERS AND PPP (IN US BILLION $)

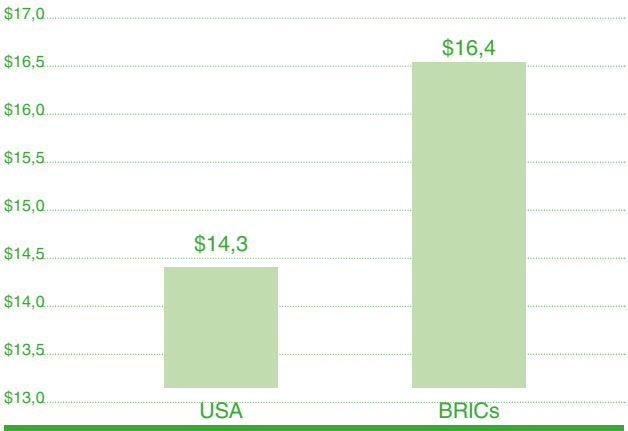
		GDP at MERs	World Share				GDP at PPP	World Share
US	1	14,266.20	24.9		US	1	14,266.20	20.0
Japan	2	5,048.63	8.8		**China**	**2**	8,734.71	12.1
China	**3**	4,757.74	8.3		Japan	3	4,186.70	6.2
Germany	4	3,235.46	5.7		**India**	**4**	3,528.61	4.9
France	5	2,634.82	4.6		Germany	5	2,806.99	4.1
UK	6	2,198.16	3.8		UK	6	2,163.53	3.3
Italy	7	2,089.56	3.7		**Russia**	**7**	2,126.39	3.1
Brazil	**8**	1,481.55	2.6		France	8	2,112.32	3.0
Spain	9	1,438.36	2.5		**Brazil**	**9**	2,002.04	2.9
Canada	10	1,319.14	2.3		Italy	10	1,750.90	2.6
Russia	**11**	1,254.65	2.2		**BRIC**			**23.0**
India	**12**	1,242.64	2.2					
BRIC			**15.3**					

Source: 2009 IMF forecasts

For the developing nations, however, the differences between GDP at MERs and PPP can be quite significant. In 2009, China, Brazil, Russia and India were ranked third, eighth, eleventh and twelfth, respectively, by MERs GDP (at both MERs and PPP, Russia and India are essentially the same size). The BRIC countries (the four largest emerging markets) are expected to account for 15.3 percent of 2009 world GDP at MERs. Valued at PPP, this figure rises to 23 percent, exceeding America's 2009 global share of 20 percent (the BRIC economies, collectively, first exceeded the US global share in 2007). Almost all of this difference, however, is accounted for by China and India

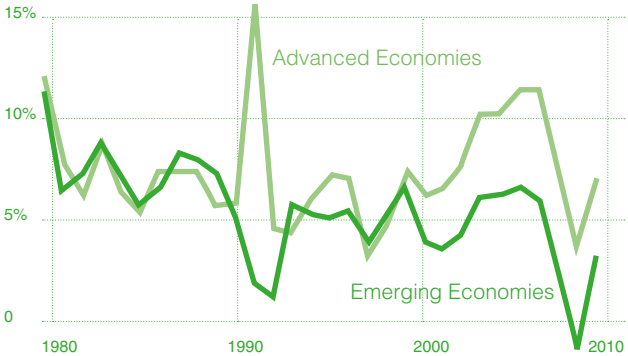
BRICS NOW BIGGER THAN THE UNITED STATES

2009 GDPs measured in PPP, Trillions $



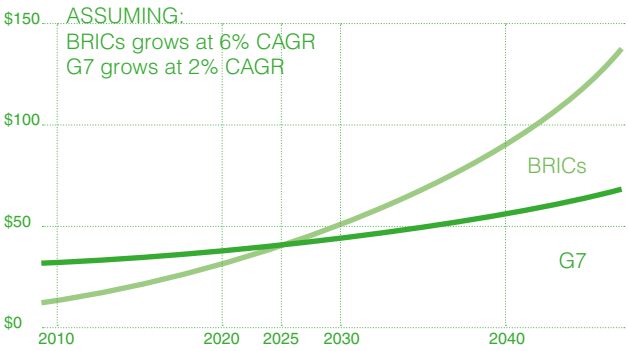
Source: IMF

The Emergence of Emerging Economies
A Recent Phenomenon (Real GDP Growth Rate)



Source: IMF

The Future?
(all data in 2008 Trillon Dollars)



Source: SKOLKOVO

While the BRIC economies collectively are already a force to be reckoned with, what distinguishes them is their growth potential. The BRIC economies are currently one-half the size of the rich G-7 economies. By 2025, however, the BRICs are projected to surpass the G-7 economies in total size and to be 50 percent bigger by 2035.

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Interestingly, the emerging economies as a whole really did not begin outperforming the advanced economies in any significant way until the beginning of this decade. From 1980 until the turn of the century, the real GDP growth rates of the emerging and developing economies roughly matched those in the developed world (they did briefly outperform the rich economies during the recessionary early 1990s). Starting in 2000, an increasingly number of developing countries (e.g., India, Russia, Brazil, Indonesia) joined China in supercharging their growth rates. Over the past decade, these economies have been enjoying a growth advantage of roughly 6 percent

INDIA

For India, switching from MERs to PPP raises its estimated GDP by almost a factor of three (from $1.2 to $3.5 trillion), sharply increasing its 2009 global GDP ranking from twelfth to fourth and more than doubling its share of world output. How soon could India surpass Japan as the world's third largest economy? With an average annual growth advantage of 5 percent (which it has roughly averaged the past decade), this could be accomplished in as little as four years.

Per capita GDP (GDP divided by population) is a good measure of a nation's average standard of living[4]. India's per capita income rises from $1,032 to $2,932 when converted from MERs to PPP dollars making the average Indian look a little less destitute. Remember, however, that the PPP figure converts foreign incomes into the US dollars, taking into account the differences in price levels. An income at this level would be considered abysmally poor by American standards (to provide some scale, per capita GDP in the US is projected to be $46,500 in 2009).

While India has recently risen from the ranks of a "low income" to "lower middle income" nation, it remains a country mired in extreme poverty

The World Bank classifies each economy as either low income, medium income (subdivided further into lower middle and upper middle) or high income[5]. While India has recently risen from the ranks of a "low income" to "lower middle income" nation, it remains a country mired in extreme poverty

[4] The higher the level of income inequality, the less reliable an indicator per capita income becomes of a nation's welfare.
[5] While the World Bank figures are based on gross national income and not PPP dollars, each of the developing countries is ranked, giving a reasonable approximation of relative prosperity.

CHINA

Measured at MERs, China is the world's third largest economy ($4.8 trillion in 2009). If China exceeds Japanese economic growth by at least 6 percent in 2010 (a likely scenario), it will overtake Japan as the world's second largest economy. At MERs, China's economy is approximately one-third the size of US GDP. It will take China several decades of significantly faster relative growth to displace the United States as the world's largest economy. Naturally, a rapid appreciation of the Chinese Yuan (vis-a-vis the US dollar) would quicken this process.

Measured at PPP, however, China's GDP has been the world's second largest economy since 2001. At $8.7 trillion[6], it is projected to account for 12 percent of world output in 2009, behind the 20 percent share of the United States. Its economy has more than doubled in size since 2003.

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China's current size and average growth rates means that it is already contributing more to global economic growth than the United States. With an average growth rate of 8 and 3 percent for China and the US, respectively, they are currently contributing $700 billion and $430 billion (in PPP) in global output. With slightly faster Chinese growth (or slower US growth), the Chinese economy is adding almost twice as much to global GDP than the US.

So how soon could the Chinese economy eclipse the United States in size? In 2009, the US economy was approximately 63 percent larger measured by PPP. From 1999 to 2008, the Chinese economy grew, on average, 7 percent faster than the US. Assuming this trend holds for the next decade, China would reach parity with the United States by 2016. It is entirely possible that China's growth advantage could begin to narrow in the coming years[7]. Table 3 lists the range of the most likely growth gap scenarios moving forward. If China's growth advantage falls to 5 percent then parity would be reached in 10 years (2019). A sharper narrowing to 3 percent would push the year of parity back to 2026. In other words, the Chinese economy is reasonably expected to reach parity with the United States sometime in the next seven to seventeen years.

[6] According to the IMF, the 2007 PPP exchange rate was 3.6 yuan = 1 US dollar, in contrast to the current official exchange rate of 6.83 yuan per dollar.
[7] According to UBS economist Jonathan Anderson, China's rapidly aging population could soon be reducing its long-run growth rate by 2 percent.

Despite its three decade economic miracle, China is still widely viewed as a poor nation. But is it? In its 2008 rankings, the World Bank classifies China as lower middle income, the same category as India (the World Bank "promoted" China from low income to lower middle income during the late 1990s). Yet China's 2009 per capita GDP at MERs is 3.5 times larger ($3,565) than India's. This gap narrows to over twice as large measured at PPP ($2,932 for India versus $6,546 for China). This is a significant difference considering both nations had roughly equal incomes as recently as 1990. So while the World Bank may couple India and China together, China has become a lot less poor than India. It's often said that China is now a combination of a first, second and third world nations. This is a simple but reasonably accurate description. While most of India remains poor, a majority of China's population has escaped poverty

TABLE 3: TIME IN CLOSING THE GAP

Chinese-US Real GDP Growth Difference	Years to close gap	Year of Parity
7 percent	7	2016
6 percent	8	2017
5 percent	10	2019
4 percent	13	2022
3 percent	17	2026

Source: Author's calculations

BRAZIL AND RUSSIA

Russia's 2009 GDP ranking rises from 11th to 7th place when valued at PPP, giving it an economy approximately equal in size to the UK and France. This is remarkable progress considering Russia was 40 percent smaller (at PPP) than those nations as recently as 1999. Measured at MERs, Russia's economy has grown from $196 billion in 1999 (ranking 23rd) to $1.7 trillion in 2008 (ranking 8th). Brazil, a largely urban nation, does not get the same bump as the other BRIC countries when its GDP is measured at PPP (its 2009 GDP rises from $1.5 trillion to $2 trillion) but its economy is roughly the size of Russia, France and the UK. Assuming an annual growth advantage of only two percent, both Brazil and Russia would surpass Germany as the world's fifth and sixth largest economies by 2025. That would place the BRICs as four of the world's top six largest economies.

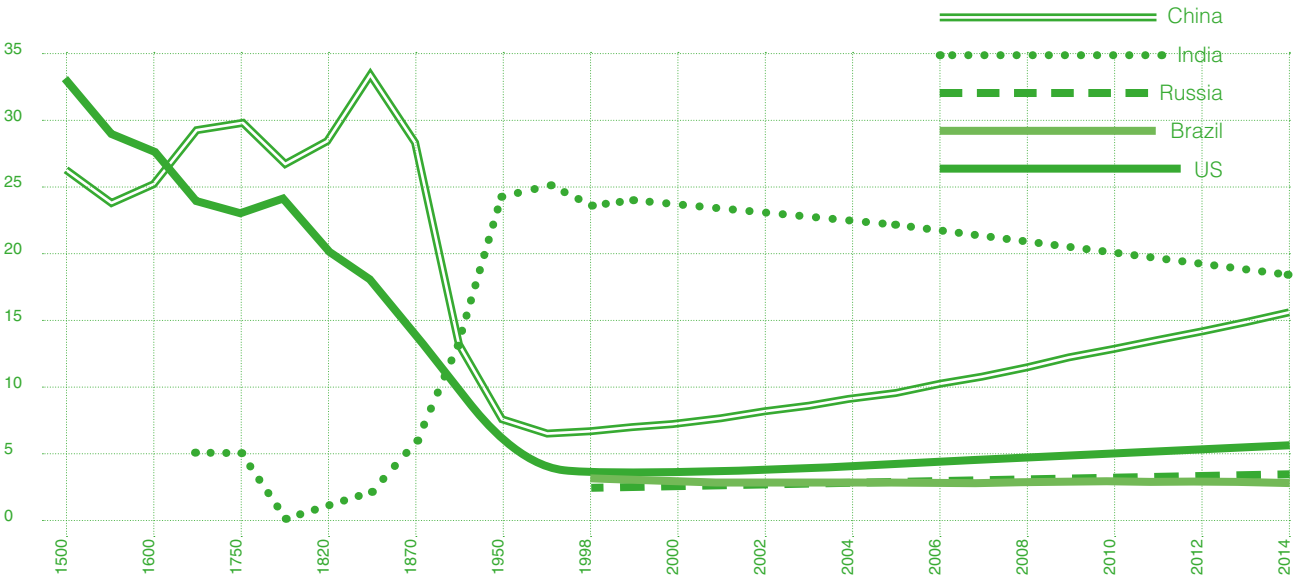
Although widely considered to have less economic potential than India and China, Brazil and Russia are classified as upper middle income nations by the World Bank. In 2009, their projected PPP per capita GDPs were $15,000 and $10,500 for Russia and Brazil, respectively

Both Brazil and Russia would surpass Germany as the world's fifth and sixth largest economies by 2025

BACK TO THE FUTURE?

PPP data provide a common measuring rod that allows comparison, not only of China and America today, but of India and Great Britain before the industrial revolution. Viewed from a long historical perspective, China's and India's rising share of world output is really a return to normality. On the eve of the industrial revolution, China and India were the world's first and third largest economies, accounting for close to half of global output. With labor-intensive agriculture dominating the global economy, what matter then was the number of hands. With the industrial revolution and the rise of the west, their shares fell steadily for two centuries reaching a bottom around 1980. The introduction of free market economic reforms, first starting in China in the late 1970s and then in India a decade later, began reversing this slide. Their shares are expected to continue rising for some time to come

Share of World Output, 1500-2014 AD. Measured in PPP



Sources: Maddison (2003), IMF (2009)

APPENDIX

A SIMPLE PPP EXAMPLE

A simple example will help illustrate the differences in GDP measured at MERs and PPP[8]. Consider two economies, one highly developed (Richland) and the other poor and developing (Poorland). For simplicity, assume each produces two goods: televisions, which are traded, and haircuts which are not (see table1). Richland produces four times as many televisions per capita as Poorland, and four times as many haircuts. It seems straight forward that per capita output in Richland should be four times as high as in Poorland. The fourth and fifth columns of the table show the prices of televisions and haircuts measured in **local** currency. Notice that the price ratio of traded to nontraded goods in Poorland (10 to 1) is twice as high as the ratio in Richland (10 to 2). The last column shows GDP per capita in the two countries, also calculated in units of the local currency.

Because televisions are traded, the exchange rate will be such that the prices of televisions will be the same when converted into a common currency. In this example the exchange rate would be one-to-one. If we use this exchange rate to convert Poorland's nation's GDP into the currency of the developed nation, we would conclude that GDP per capita in Poorland is one-sixth the level of Richland. The difference is the ratio of prices of traded and nontraded goods leads to an **understatement** of the relative income of Poorland.

TABLE 1: Production and Prices in Richland and Poorland

Country	Production of TVs per capita	Production of Haircuts per capita	Price of TVs in local currency	Price of haircuts in local currency	GDP per capita in local currency
Richland	4	40	10	2	120
Poorland	1	10	10	1	20

Source: "Economic Growth", David Weil, Boston: Addison-Wesley, 2005

Measuring output by PPP exchange rates, however, can resolve this problem. This is done by constructing a standardized basket of goods and services (both traded and nontraded). In our example, a natural basket of goods to use would be 1 television and 10 haircuts (since this is the ratio in which these products are consumed worldwide). Such a basket would have a price of 30 dollars in Richland and 20 dollars in Poorland. The prices of the basket in the two countries suggest a purchasing power exchange rate of two Poorland dollars for every three Richland dollars. Using this exchange rate, Poorland's GDP per capital (20 Poorland dollars) would be worth 30 Richland dollars. Based on PPP exchange rates, Poorland's GDP per capita is one-quarter of Richland's, not one-sixth as measured by MERs.

8/ This example is borrowed from the appendix of David Weil's book, "Economic Growth", Boston: Addison-Wesley, 2005.

PPP SHORTCOMINGS

Naturally the PPP methodology does have its own drawbacks. While making price comparisons between developed economies is relatively straightforward because the same goods and services are widely similar, this is not necessarily the case among developing countries. Many goods and services that are widely consumed in rich countries are not available at all in poor countries or are only available at high-priced stores in a few large cities. Generally speaking, comparisons become less reliable the more different the structures of GDP of the countries being compared.

Another common criticism of the PPP method is the belief that it does not accurately account for **differences in quality.** Items with lower quality in poor countries were often matched to higher quality items in rich countries, leading to an **overstatement of their output and income levels.** Chinese machine tools, for example, rarely match the quality of those produced in the US or Germany.

NEW METHODOLOGY

Fortunately, the deficiencies of the PPP methodology mentioned above have been at least partially addressed by the World Bank's **International Comparison Program (ICP),** which provides estimates of internationally comparable price levels and the relative purchasing power of currencies for 146 economies. The ICP's most recent round in 2005 (published in 2008) was the most extensive and thorough effort ever to measure PPPs across countries. Prices were collected for more than 1,000 goods and services and new and innovative data validation tools were implemented to improve data quality.

The new results made substantial revisions to previous data, most notably **revising downwards the size of the Chinese and Indian economies by about 40 percent.** Attempts to control for quality differences through more careful matching are likely to have contributed to the reductions in the size of the Indian and Chinese economies.

That said, price collection by China in 2005 took place in only 11 cities (no rural prices were collected) because they were most likely to have outlets carrying the types of products and brands in the ICP classification. It is generally thought that those urban prices are likely to be unrepresentatively high. If true, it is now possible that prices in China for some items are overstated in the ICP, tending to understate GDP this time.

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SKOLKOVO Institute for Emerging Market Studies (SIEMS). Headed by Professor Seung Ho "Sam" Park and based in Beijing, China, SIEMS aims to be a leading think tank on fast-growing economies, with a special emphasis on Russia, China, and India. The work of the institute is focused on providing guidance to society, corporate managers, and policy makers through rigorous but practical knowledge creation across a broad range of areas, including macro-economic and public policy, industry and technology, and corporate strategies.

SIEMS' research is interdisciplinary, covering various fields of social science with a comparative approach across the three countries, and network-based, involving scholars from all around the world. Its researchers include full-time members from or working on the three main countries, as well as fellows from other areas currently involved in active research on fast-growing markets. The institute aims to be a hub for the creation, distribution and sharing of knowledge among scholars and managers working with fast-growing markets worldwide through regular roundtable meetings and forums. Its research output is distributed chiefly through working papers, reports, books and articles, and conferences devoted to special topics.

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