Transformation of The World Economy and Evolution of Global Power

by

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Abstract

The Uni-Polar moment began with the collapse of the Soviet Union in 1990. A decade later talk started about the emergence of a multi-polar World. This paper argues that a multi-polar world is merely an interregnum or transitional phase in the transformation of the Global economy and polity. Because of the convergence of per capita incomes unleashed by globalization and economic policy reforms in the last half of the 20th century, the gap between country shares of population and their shares of World GDP will narrow during this century. Based on the economic growth history of China, India and other high growth economies, the paper projects these two economies to equal the USA in real size in five and twenty five years respectively. Further, based on the demographic and growth projections and the authors' index of economic power/ power potential (VIP^2) and National Power (VIP) the World will most likely return to a Bi-polar configuration by the end of the first quarter of this century and will evolve into a tri-polar configuration by the middle of the 21st century.

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1 Introduction

The World Balance of Power and its manifestation in Asia, will be transformed during the 21st Century. The most important reason for this transformation is the process of Economic Globalization and economic reforms during the second half of the 20th

century and particularly since 1980, which have accelerated the process of economic convergence between a sub-set of large poor countries and the set of rich ones. Many have written on this transformation from different perspectives, such as the decline of the traditional Western powers, the rise of new ones in the East and other parts of the World and the emergence of a Multi-polar World.[1] This paper shows why this multi-polar world is paradoxically a transition to a bi-polar world and eventually a tri-polar one.[2]

This paper focuses on 'capabilities' and 'potential power.'[3] To make a judgment about these and related predictions, we need to first define and measure a nation's 'power' and then project it into the future. The nature of the current economic transformation is best captured by an index of economic power based on the economic concepts of aggregate production and economic growth. The simple index (VIP^2) can not only be used to measure the past evolution of power going back two millennia, but to project it into the future. These projections, bridge the gap between impressionistic forecasts based on intuition and general knowledge buttressed by selected data, and earlier forecasts based on short term trends (such as the rise of Japan). Our projections are grounded in economic theory and empirical studies of economic growth, fully recognizing their strengths and limitations. They should not therefore be seen as precise forecasts but as indicators of quantitative trends. These provide a reasonable basis for developing each country's approach to International relations with major countries, identifying and addressing potential international security issues and reforming Global governance institutions. More sophisticated and complex analysis/indices such as those by Tellis et al (2000) will likely still be needed for detailed national security planning and weapons development.

The rest of the paper is as follows. Section 2 defines and calculates an index of 'economic power' or 'power potential' (VIP^2), which is grounded in economic theory and empirical analysis. Section three outlines the economic trends based on economic growth analysis, that have influenced the evolution economic size and power of countries in the last three decades. Keeping in mind the underlying forces of economic change and evolution section 4 presents some simple predictions about the evolution of relative power of the rich countries vis-à-vis the heavily populated countries. Section 5 reviews the projections made by different analysts and section 6 presents the latest projections of the author. These projections confirm and reiterate the authors earlier projections about the emergence of first a bipolar and subsequently a tri-polar world order. Section 7 discusses issues of military power and strategic technology and assets. It shows how the general technological capabilities, included in the index of 'power potential,' need to be combined with measures of strategic technology and assets, to obtain an index of 'National power" (VIP). Section 8 discusses some socio-political aspects of power and how these may influence the evolution of the global balance of power. Section 9 concludes the paper.

2 Economic Power and its Determinants

[1] Mahbubani (1995), Zakaria (2008), Khanna(2008).
[2] First developed in Virmani (2004) and Virmani (2005).
[3] It skips issues of political capability/competence/stability that determine use of power [see Waltz(1979)].

Organsiki and Kugler (1977), Kennedy (1987), Gelb (2010) and others have emphasized the importance of a nations' economy to its power. Following this tradition, the author believes that economic strength is the foundation of national power,[4] and its definition and measurement could benefit from an economist's perspective.[5] Modern economics shows that the simplest measure of economic power is the size of the economy. Thus the size of an economy relative to a benchmark economy can be used to measure economic power.[6] Virtually all elements such as population, industry, natural resources, pool of technical experts, technological capability that have been thought to affect economic or national economic power, are summarized in this measure. Economic theory tells us that aggregate output is a function of population, human resources and skills, capital (or assets or wealth), technology and skills and natural resources (land, oil) - which are '*factor inputs*' into the '*aggregate production function*.'[7] The precise form and importance of these generic factors in the economy have changed over history, a fact that non-economists may not have fully appreciated. Thus for instance before the industrial revolution, fertile land was one of the most important elements of economic power. With the arrival of the Industrial revolution, non-human energy became a vital factor of production and consequently, first sources of energy such as flowing water and subsequently coal became an important factor in national power. Over time the technology, the aggregate production function and consequently the critical natural resources (minerals, energy sources), skills and capital goods also changed. The conceptual basis of the 'aggregate production function' has however, remained unchanged despite changes in its form and the relative importance of different 'factor inputs.' Thus relative size of an economy, is consequently the best summary measure of relative economic capability of an economy.[8]

There is however one important factor that is under-represented when using relative size as a measure of 'economic power', that is technological capability. The foundation of technological capability is what we term '*general technological capability*', on which both production capability as well as defense technology ('strategic technology') is built. General technological capability is a combination of technology, human skills and advanced machinery. Many analysts have designed multifaceted and sophisticated indices to measure various elements of technology. The aggregate production function (in per capita terms) helps us in defining a simple measure of this capability. The per capita GDP of a country, is made up of (dis-embodied) technology (T), average level of

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[4] That is, the economy forms the base of a power pyramid, whose middle layer is "strategic assets and strategic technology,' and the top layer is a 'socio-political dimensions (internal and external)' that has both positive and negative dimensions in the 21st century. The second is a generalization of military power to take account of technologies in whose generation, use and trade the government exercises a veto power and thus are not part of the commercial market for technology [Virmani(2006)]. The third is a generalization of the concept o political power to take account the globalization and integration of domestic and international politics in democratic countries in the 21st century, in which such power is a double edged sword having both positive and negative effects [Virmani (2010)].

[5] In contrast to a historian's or political scientist's or international relation expert's perspective.

[6] As indicated by Meerchimer (2001) power is always relative.

[7] Y = T F(aK, bH, R, L), where Y is GDP, T is the level of technology or total factor productivity, a and b represent biased technical change, F is a function of different factors of production such as K the stock of physical capital, H the stock of human capital (education & skills), R is natural resource input and L the size of the labor force(often replaced by population P.

[8] Relative real size of countries is best measured by GDP at purchasing power parity prices (PPP).

skills (h) and the capital-labour ratio (k) which also represents technology embodied in machinery & equipment. As power is always relative (Mearschimer (2001)), the index for each country uses the value of a variable relative to that of the USA.[9] Thus relative per capita GDP is a useful summary measure of the general technological capability relative to the benchmark country (usually the most advanced). This is combined with a country's aggregate/total production capacity (measured by relative size) and its 'general technological capability' (measured by relative per capita GDP) into a single index of economic power VIP^2. As GDP (at PPP) is the product of Population and Per capita GDP (at PPP), the index simply gives a higher weight to the latter variable than does relative size.[10]

The great advantage of this index is that it depends on two variables that are widely used in economic analysis and data for which exist for most countries for centuries.[11] These variables are also basic to economic analysis and medium term economic forecasting. Population dynamics depends on demographics, so the demographic past and outlook is an important element of a Nation's future GDP as well as its economic power. The degree of precision required will determine the degree/depth of demographic detail that has to be assembled and analyzed, such as the age and skill composition of the labor force/population. Per capita GDP (y) is a fundamental variable in growth theory. The sources of economic (y) growth, such as technology, human capital (education and skills) and investment (capital deepening) are therefore vital elements of a country's current and future GDP but also its economic power. The index should be fairly accurate in ranking countries that differ by more than 10%. Within this 10% range, however, a more detailed analysis of demographics and other factors (skills, technology, macro stability) that go into/ underlie the per capita GDP growth numbers and projection would be indicated.

The relative economic power (or overall power potential) of the top 15 countries (as of 2011) as measured by this index are shown in table 1. Note, that China's power potential is still less than a third of the USA, while Japan has fallen below a fourth of the USA. Given what was said in the previous paragraph, the 2011 indices for countries within each of the two sub-sets (a) Russia, UK and France, and (b) Canada, India, Spain and Korea, are almost identical.

Table 1: **Economic power as measured by VIP^2**

[9] $y = T\, f(ak, bh, rR$, where y is per capita GDP, k stock of physical capital per capita, h the stock of human capital (education & skills) per capita, r is natural resource input per capita.

[10] GDPppp = population(P) * per capita GDPppp (y); $VIP^2 = (Y/Y_{usa})*(y/y_{usa})^{\alpha}$, where $0 \leq \alpha \leq 1$ or $VIP^2 = (P/P_{usa})*(y/y_{usa})^{\beta}$, where $1 \leq \beta \leq 2$.

[11] It is not intended to exaggerate the value of the index. To distinguish between the power of countries with very similar levels of per capita income and population more sophisticated measures of general technological capability become useful and necessary.

	1981		1991		2001		2011	
Country Name	VIP^2 index		VIP^2 index		VIP^2 index		VIP^2 index	
	rank	value	rank	value	rank	value	rank	value
United States	1	1.00	1	1.00	1	1.00	1	1.00
China	29	0.01	16	0.03	7	0.09	2	0.31
Japan	2	0.30	2	0.39	2	0.28	3	0.24
Germany	3	0.25	3	0.25	3	0.19	4	0.19
Russia (recovery)			7	0.11	12	0.05	5	0.13
United Kingdom	6	0.13	6	0.14	4	0.14	6	0.13
France	4	0.16	5	0.16	5	0.14	7	0.13
Italy	5	0.16	4	0.16	6	0.13	8	0.11
Canada	7	0.09	8	0.08	8	0.08	9	0.08
India	23	0.02	19	0.03	16	0.04	10	0.08
Spain	9	0.07	9	0.07	9	0.07	11	0.08
Korea, Rep.	26	0.02	14	0.04	10	0.06	12	0.08
Brazil	8	0.08	10	0.07	11	0.06	13	0.07
Mexico	11	0.06	11	0.05	14	0.05	14	0.06
Australia	14	0.04	12	0.05	13	0.05	15	0.05

3 Globalization and Convergence: Catch-up Growth

One more issue is relevant to explain the recent past and project into the future. That is the difference in the technology (T) that is relevant to low and middle income countries (like China and India) versus that which is relevant to high income countries (such as US, Japan and Germany). The latter is at the frontier of technology and therefore must invent technology to enhance its general technological capability. In contrast, the primary challenge for Low and middle income countries is to identify, import and adapt technology (already invented and available in the high income countries) and use it to enhance its productive capabilities and capacity. In the second half of the 20th century, Globalization facilitated and/or freed up the flow of technology, skills and capital form the high income countries to the low and middle income countries. Economic reforms in the latter created an environment for its efficient and productive use and thus accelerated the growth of these economies. This has begun to narrow the gap between the two sets of countries ("catch up growth" for short) after several decades of 'divergence'.

A look at recent growth history in terms of their per capita GDP (PcGdpPpp) growth performance during the decade ending 2011 is instructive. If we ignore years in which a country was merely recovering from depression (i.e. per capita GDP below previous peak), then there are only eight countries with average per capita GDP growth exceeding 6% during the last decade (Virmani(2012)); China (10%), Equatorial Guinea(9.1%), Myanmar(10.6%); Cambodia (6.5%), India(6.3%), Maldives(6.3%), Bhutan(6.0%) and Vietnam(6.0%). These countries have been the ones with the fastest convergence to per capita GDP level of the USA during the past decade. The population of these countries varies from about 0.01% of World population for Bhutan and 0.02% for Equatorial Guinea to over 15% for China and India, so the relative impact of a country's growth on the World economy cannot be gauged merely by comparing growth rates.

The simplest metric for measuring the impact of an economy on the World economy is the contribution of a countries' growth to World growth.[12] Using this benchmark we find the following ranking (contribution during past decade in bracket): China(30%), India(10%), US(9.6%), Russia(3.7%), Brazil(2.9%), Korea(2.1%), Indonesia(1.9%), Turkey(1.9%), Argentina, Mexico, Germany, UK (1.3% each), Poland(1.1%) and Japan(1%),. Thus China contributed about 1/3rd of global growth while India and the USA contributed about 1/10th or 1/3rd of China, while Russia and Brazil in turn contributed about a 1/3rd of India/USA (table 2).

Table 2: Contribution to World Growth

	Contribution to Growth			
	1981 to 1991	1991 to 2001	2001 2011	1981 to 2011
China*#	8.7%	17.9%	29.6%	21.6%
India*#	4.4%	6.5%	10.1%	7.8%
United States	21.2%	26.3%	9.6%	17.0%
Russia(recovery)		-3.6%	3.6%	
Brazil	2.2%	2.4%	2.9%	2.6%
Korea, Rep.	3.3%	3.0%	2.1%	2.6%
Indonesia	2.0%	1.4%	1.9%	1.8%
Turkey	1.8%	1.2%	1.9%	1.6%
Mexico	1.2%	2.4%	1.3%	1.6%
Germany	5.5%	2.9%	1.3%	2.7%
Argentina	0.1%	0.7%	1.3%	0.8%
United Kingdom	3.2%	3.9%	1.3%	2.4%
Poland		1.3%	1.1%	
Japan	11.4%	2.4%	1.0%	3.7%
Canada	1.5%	2.2%	1.0%	1.5%
France	3.2%	2.5%	1.0%	1.9%
Spain	2.3%	2.1%	1.0%	1.6%
Australia	1.1%	1.4%	1.0%	1.1%
Saudi Arabia	-0.1%	0.5%	0.9%	0.6%

A number of analysts have confused the rising importance of some countries (e.g. S. Korea, Turkey, Poland) as a destination for private capital flows (investment) from rich countries, with their importance as economic powers.[13] Our simple measure shows that the contribution of such 'new/middle powers' was a fifth or less than that of India's. Among the reasons for an exaggerated perception of the contributions of these 'middle powers' is that the established powers like Japan, Germany, UK and France's contribution has declined dramatically over the last three decades. For instance in the decade 1981 to 1991 their contributions to global growth were Japan (11.4%), Germany (5.5%), UK (3.2%) and France (3.2%). The relative decline of Europe can be seen most dramatically by comparing its contribution to that of India. India's contribution to world

[12] This corresponds to the use of relative size of economies as a measure of relative power.

growth increased from 1/4th of the Euro Area's during 1981 to 1991, to 1/3 in the next decade and to 2 times that of the Euro area during 2001-2011.[14] Over the three decades from 1981 to 2011 India's contribution to World growth was 3/4th that of the Euro Area's.

Another factor that seems to have been overlooked is that contributions of some of these "new middle powers" have already peaked (Poland: 1981-91) Mexico (1991-2001).[15] Others such as Indonesia and Turkey have fluctuated, recovering after reaching a trough during the decade 1991 to 2001.[16] With the exception of Indonesia all these have a negative share gap i.e. a world GDP share higher than their world population share, so their medium-long term prospects are limited, even though in the short-medium run they may continue to perform reasonably well in terms of both convergence and impact.

The above measure of contribution corresponds to the use of relative size as an index of relative economic power. A change in the index of economic power (or overall 'power potential') VIP^2 is a better measure: It identifies two sub-sets of countries whose economic power has increased during the last decade. The first sub-set consists of countries (increase in bracket) like China(0.22), India(0.05), Turkey (0.02), Korea(0.02), Poland, Spain, Singapore, Indonesia, Hong Kong SAR-China, Australia, Malaysia and Thailand (0.01 each) whose power has also increased over the past three decades (Table 3). The second sub-set consists of countries like Russia, Mexico, Brazil, Argentina, Romania, Saudi Arabia and Germany, whose gain during the last decade represents partial recovery of losses in the previous two decades. Russia and Mexico did however see a net gain of about 0.01 over the three decades. The major losers of economic power over the last decade were Japan (-0.04), Italy(-0.03), France(-0.01) and UK(-0.01). The losses of the first three were on top of losses in the previous decades, while Japan and Germany had a net loss of -0.06 and -0.05 respectively over the three decades.[17]

Table 3: Change in Economic Power / Overall Power Potential

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[13] See example Sharma (2012).
[14] China's contribution went from ½ to 1.3 times to over 6 times over the same decades.
[15] Russia also peaked at 10% during the decade 1981to1991 and has a negative gap.
[16] Brazil also reached a trough during the same decade and has a negative gap.
[17] As the Euro Area/EU is not a 'Virtual State' (Virmani(2006)) the VIP^2 index will overstate its economic power.

	Change in VIP^2			
	1981 to 1991	1991 to 2001	2001 2011	1981 to 2011
China*#	0.02	0.05	0.22	0.30
Russia(recovery)		-0.07	0.08	0.02
India*#	0.01	0.01	0.05	0.06
Turkey	0.00	0.01	0.02	0.03
Mexico	-0.01	0.00	0.02	0.01
Korea, Rep.	0.03	0.02	0.02	0.06
Brazil	-0.01	-0.01	0.02	0.00
Poland		0.00	0.01	0.02
Argentina	-0.01	0.00	0.01	0.00
Spain	0.01	0.00	0.01	0.02
Singapore	0.00	0.00	0.01	0.02
Indonesia	0.00	0.00	0.01	0.01
Hong Kong SAR, China	0.01	0.00	0.01	0.01
Australia	0.00	0.00	0.01	0.01
Romania	-0.01	0.00	0.01	0.00
Saudi Arabia	-0.03	-0.01	0.01	-0.03
Malaysia^	0.00	0.00	0.01	0.01
Germany	0.00	-0.06	0.01	-0.05
Thailand	0.01	0.00	0.01	0.01
United States	0.00	0.00	0.00	0.00
Canada	-0.01	0.00	0.00	-0.01
France	-0.01	-0.02	-0.01	-0.03
United Kingdom	0.00	0.00	-0.01	0.00
Italy	0.00	-0.02	-0.03	-0.05
Japan	0.09	-0.11	-0.04	-0.06

The question is raised in the USA and the West, whether the USA is in absolute or relative decline or other countries are rising relatively. Power is always relative (Mearschimer(2001)), so absolute values have little meaning in the context of international relations and security. If the VIP^2 index of all countries (except the USA which as the benchmark, is always '1' for different years is added, we find that the (paired) sub-total decreased by 0.27 during the 1990s and increased by 0.53 over the 2000s.[18] Thus over the last twenty years, the power of other countries has increased by 0.26 (about 10%) relative to the USA (symmetrically, the power of the US has decreased by an equivalent amount). This sub-total is however less than the increase in China's economic power (relative to the USA) during the two decades, implying that for all other countries the gains and losses have balanced out in aggregate. As much of the losses were by allies (Japan, Germany, Italy, France, Saudi Arabia, UAE, Canada, Greece, U.K.)

[18] Paired comparisons are used to adjust for a change in the number of countries. The change was 0.03 for the 1980s. As a number of new countries were formed with the break up of the USSR, the number of countries in our sample increased from 140 in 1981 to 173 in 1991.

while the gains were to friendly countries such as India and Indonesia. The adverse effect on US power therefore comes from the relative gain of China, which is a potential rival of the USA. One implication, which has been noted by perceptive Western scholars, is the need for the USA to intensify partnership with 'gainers' such as India and Indonesia to offset any loss in relative power.

4 Simple Predictions

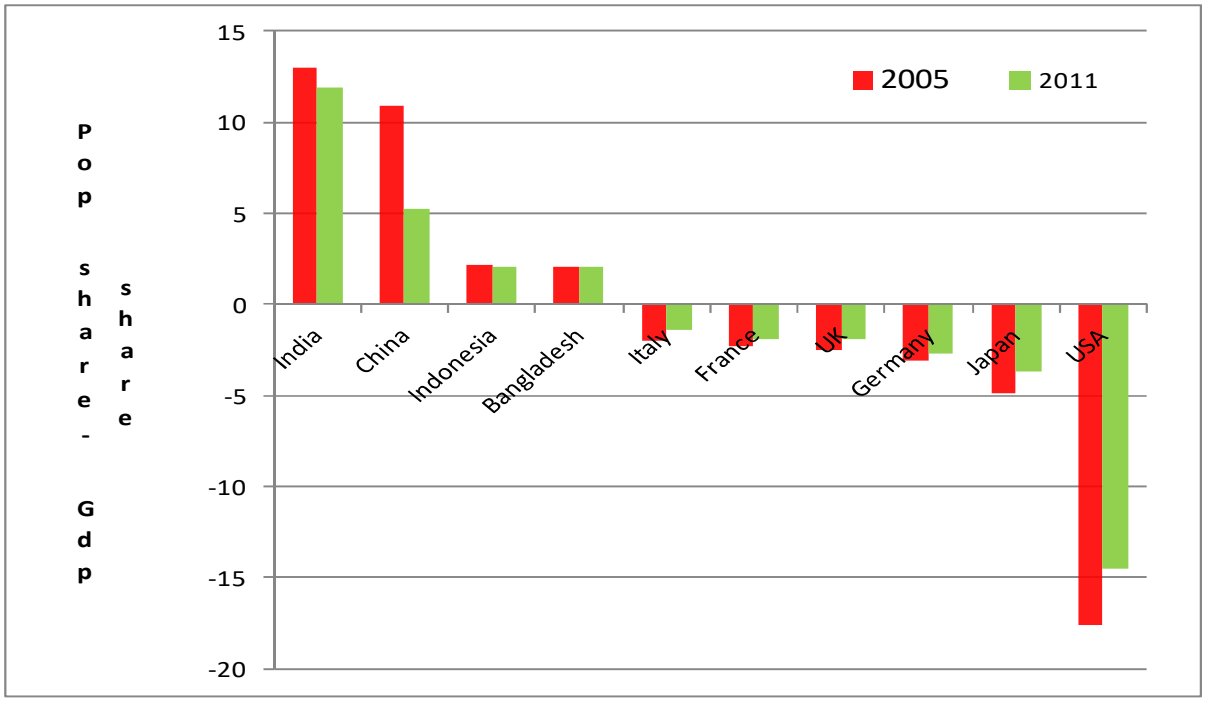
An understanding of the nature of this "catch-up growth' and potential convergence in per capita GDP, allows us to forecast it into the future without making mistakes of the kind that accompanied geopolitical forecasts of the rise of Japan during the 1960s-1970s. Based on simple analysis and conservative projection of this catch-up growth we can make one broad prediction: That the gap between rich and poor countries share of world population and their share of World aggregate GDP will narrow and that economic power will gradually shift from those with a negative gap to those with a positive gap. Figure 1 shows that this has already happened since the author first made this prediction (Virmani(2005a)).[19] The four countries with the largest gap were India, China, Indonesia and Bangladesh and those with the largest negative gap were the USA, Japan, Germany, UK, France and Italy. The gap has narrowed in all these countries, with the largest change being for China on one side and USA on the other. In power terms our analysis predicted and continues to predict a shift in global economic power from the rich countries (USA, Japan, Germany, UK, France and Italy) to poorer countries (India, China, Indonesia and Bangladesh).[20]

Another prediction that can be made on the basis of our model, the broad demographic trends and potential convergence of per capita GDP, is that there are at most two countries that can potentially equal the US in 'economic size' or 'economic power' (as measured by VIP^2) during the first half of this century. UN projections show that in 2050 the populations of China and India will be 3.5 and 4 times the population of the USA, respectively.[21] Thus their real per capita GDP needs to increase to $1/3^{rd}$ and $1/4^{th}$ (respectively) of that of the USA for them to equal it in 'economic size' and about 40% of US per capita GDP to equal it in 'economic power' (as measured by the VIP^2). This degree of convergence is not only feasible, but highly probable. In contrast the next most populated countries, Indonesia and Brazil are projected to have 70% and 50% of the population of the USA in 2050. They would need to have 1.4 (1.25) times and 1.8 (1.4) times the per capita GDP of the USA to equal it in economic size (economic power). Japan, which political analysts thought would challenge the USA, reached a peak per capita GDP level in the early 1990s that was 81% of that of the USA. Given Indonesia's current level of development and prospects it is unlikely to reach let alone exceed the

[19] Population data and projections are from UN population statistics, GDP shares are based on IMF WEO data.
[20] The narrowing is fairly small for Bangladesh, which is why it has not yet come on the international radar. Our analysis and predictions contrast with those of Fareed Zakaria (2008) and Parag Khanna(2008) .
[21] From 4.3 and 3.9 times currently.

relative level attained by Japan.[22] Given Brazil's resource riches, it is not unthinkable that it could attain a per capita GDP level equal to that of the USA, thus reaching about half the size of the US economy, but there is little likelihood of having a per capita GDP 50% more than that of the USA! Thus, through a process of elimination, we conclude that by the middle of the 21st century there are only two countries (China and India) that have a *possibility (reasonable probability)* of equaling the USA in 'economic size' and 'economic power' in the next 50 years.[23]

Figure 1: Catch-up Growth Potential; Country Share of Population – Share of World GDP



5 Review of Past Projections

The US National Intelligence Council, in its report of December 2004 made the following predictions about the evolution of the World economy and economic power:

– That China's GDP(US$) *could* be the 2nd largest by 2020
– India's GDP(US$) *could* be 3rd largest by 2035

Virmani(2004) pointed out that this was based on an erroneous methodology used by Goldman Sachs (2003) that projected US$ GDP growth rates and exchange rates (vis-à-vis the US dollar) and used these to predict the real economy in terms of GDP PPP. The correct methodology for comparative predictions was to apply real growth rates to the

[22] Other heavily populated countries like Bangladesh which has converged very slowly or Nigeria and Pakistan which diverged further are even less likely to catch up.
[23] The European Union has to become a "Virtual State," (Virmani 2006) to become a global power; The Euro crisis has reduced the likelihood of this happening.

real economic size (i.e. GDP PPP) and use these to compare relative size. Such an exercise based on the analysis presented above, showed (Virmani(2004) that,

– China and India's economic growth would be much faster than predicted by USNIC (2004). In particular, China's real GDP would equal that of the USA by around 2015.[24]

– That demographic decline in countries like Russia, Japan, Germany and several countries (old powers) in Western Europe would limit their growth and result in relative decline.

– The European Union (EU) was not a "virtual State" like the former USSR or even the former Eastern Bloc and therefore could not be a 'power'.

– China's "economic power" or overall "power potential" would be 70% of that of the USA by 2035 and it would become a super power well before that, resulting in a Bi-polar World order.

– Kissinger(1994) prediction of five future great powers (USA, EU, Russia, Japan, China) and possibly six (including India) was therefore partly wrong (EU, Japan) and partly correct (USA, China, Japan).

Based on the index of economic power, Virmani(2005a) while confirming the predictions for China, fleshed out the prediction regarding India:

– India would become the third largest economy by 2015,

– Its real GDP would equal that of the USA by around 2040

– Its Power potential would be around 80% of that of the US by 2050. Consequently it would become a superpower before then,

It concluded that, ""the (current) uni-polar world will be transformed into a bipolar world during the first quarter of this century and into a tri-polar one (China, USA, India) during the second quarter of the century."

The main risks to this future for India, came from poor governance, particularly in terms of the pathetic state of supply of "public goods,"(Virmani(2006).[25] In the case of China the main threat to this achievement was identified as coming from its over dependence on, "Investment-Export led growth model" or paradigm/approach, which despite its ability to adapt over time would eventually come to the end of its utility when either investment become too large a share of its economy and/or exports became too large a share of the World exports!

The US National Intelligence report of November 2008, implicitly moved closer to the authors forecasts by stating that,

- "The eight largest economies in 2025 will be, in descending order: the US China, India, Japan.."
- "By 2025 China will have the world's second largest economy and will be a leading military power."
- "A global multi polar system is emerging with the rise of China, India, and

[24] Real GDP for international comparisons is GDP measured at Purchasing power parity (PPP).

[25] What the author called "Public and Quasi Public Goods and services," which classic economic theory shows have to be either provided by government or be subsidized by it to compensate for externalities that cannot be captured by private providers/sellers.

others."

– "The development of a globalized economy in which China and India play major roles"

In our view however, the 'multi-polar system' mentioned by the NIC and by many other writers from the emerging economies, is merely a transitional phase between the Uni-polar system of the 1990s and the emergence of a bi-polar and subsequently a tri-polar system (Virmani(2009)).

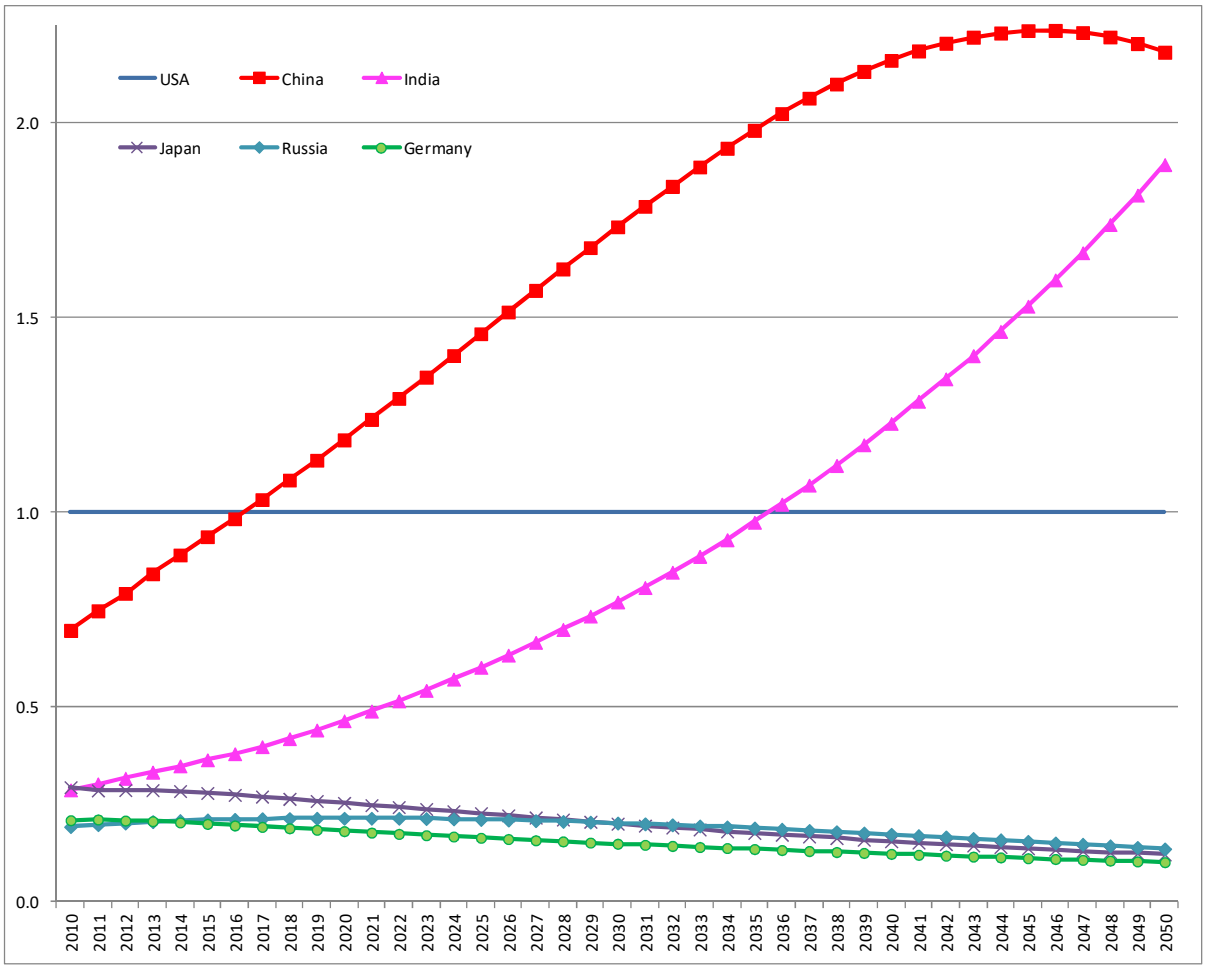
6 Projections: Bi-polar to Tri-polar

Many dramatic developments have taken place since 2007, such as the boom in oil/energy commodity prices and the US-Euro financial crises that sent ripples across the world. It is therefore useful to redo the earlier forecasts based on the same modeling and approach and see how much they differ from earlier ones![26] The relative size of economies is presented in the two graphs below. These show that the Chinese economy will equal that of the USA around the middle of this decade, while the Indian economy is now bigger than that of Japan (figure 2). This is marginally ahead of predicted date for India and marginally after the predicted date for China.

Figure 3 shows (more clearly) the predicted decline of the economic power of Japan Germany and other European powers. The author's 2004 and 2005 prediction regarding Russia was thrown off the mark by the sustained rise in oil prices since 2007-2008 and its differential impact on Russia. Consequently we now expect a relative rise of Russia's economic power till the beginning of the next decade before it starts declining (relative to the US). The oil-energy price trends also result in a post-2008 forecast for Brazil that is much higher than those made before 2008.

Figure 2: Relative Size of Systemically Important Economies

[26] Population growth rates are based on the UN population projections (2010 revision). Per capita GDP growth forecasts are from IMF WEO April 2012 till 2017 (modified by author for India) and from OECD till 2026 (modified for India and China by author). Subsequent projections are the authors. Average per capita growth rates for the 2010s and 2020s are China (8.3%, 7.1%) and India(6.7%, 7.6%).



It is useful to digress briefly to define the term "*Super Power*." This word has been bandied about very loosely in the media and by non-experts, particularly in the rising powers. The VIP^2 index can be used to give precision to these concepts. A Global Economic Power or potential 'Great Power' is defined as one which has a VIP^2 of 0.25 or higher, and a potential 'Super power' as one which has a VIP^2 of 0.5 or higher.[27] This is based on historical analysis measuring the value of this index for various powers in the 20th century (Virmani (2005b)). The USSR reached the peak of its economic power in the 1970s with a VIP^2 index value of 0.27 and in the same year the Eastern Bloc (assuming it could be treated as a "virtual state") had an index value of 0.37.[28] This compares with a peak index value of 0.24 for Germany in 1991 and a peak value of 0.35 for Japan in 1982. It needs to be kept in mind, however, that the USSR/East Bloc was not part of the global economic system in the way that China is today, and that Germany and Japan were deliberately constrained by alliances, by the victors of World War II. Because of the heightened degree of economic and socio-political globalization and increased interdependence, the index value required to be a Super Power is likely to be

[27] A regional power could be defined as one with $VIP^2 \geq 0.125$.

higher than that achieved by these States in the 20th century.[29] According to these definitions, in 2011 China became a potential Great power, while Japan fell below this threshold.

Figure 3: Relative Size of Middle Economies

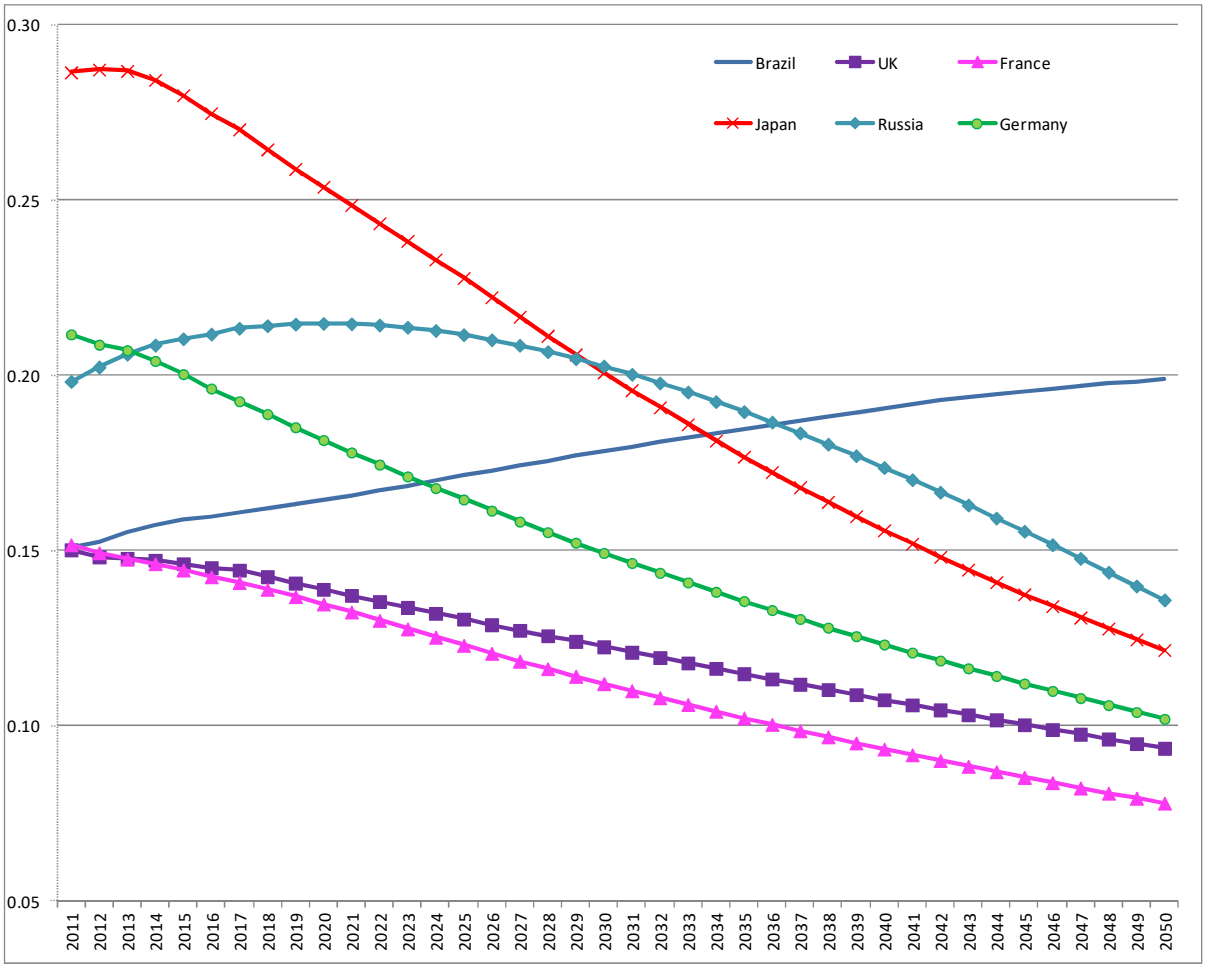


Figure 4 and table 4 present the latest version of the author's projections of economic power (VIP[2]), which show that China will become a "potential Super power" around 2017, followed by India 20 years later ("great power" around 2027). At that time (2038) the next two economic powers, Russia(0.13) and Japan (0.12) with a power potential less than a 1/3rd of India's will not even be classified as "Great powers" (Table 4).[30] By *mid-century* Brazil, with 1.8 times the population of Russia, may replace it in fourth position (with a power potential around that of UK and France in 2011). We will also see the likely emergence of two new middle powers, Indonesia and Turkey with economic power

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[28] The VIP value had fallen to 0.2 in 1989 before the disintegration of the USSR in 1990.

[29] In general, these thresholds have probably increased over time with the greater integration of the World economy and polity and the gradual evolution of the Nation State!

[30] Japan , the next largest economy, will likely have an index value of 0.23 in 2017 and 0.13 in 2036. The sum of the values of the index for the five largest European countries is projected to be around 0.53 in 2017 and 0.35 in 2036. As the EU will not become. a "Virtual State" by 2017, 0.5 does not make it a super power.

equal to that of India and Brazil respectively in 2011 (table 4 and 1).[31] Our economic power projections therefore suggest that the *World is likely to become bi-polar around 2020 and Tri-polar around 2040*.[32]

Figure 4: Trends in Evolution of Power Potential (VIP²)

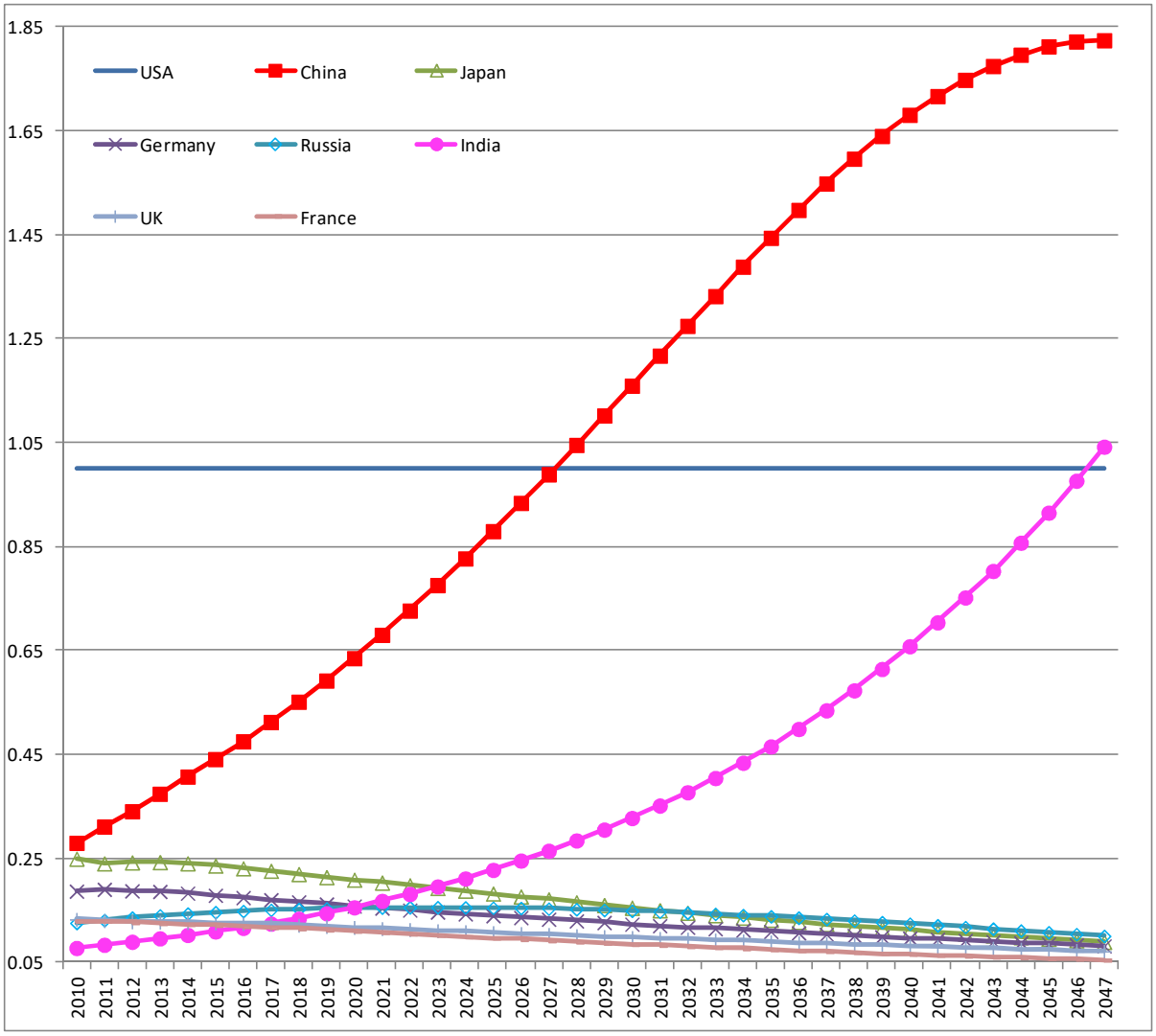


Table 4: Economic Power (Index VIP²) Projection

[31] Poland and Saudi Arabia are other potential middle powers. Iran which earlier showed potential is a drop out.

[32] This forecast is with minor variations, identical to the projections made by the author from 2004 to 2009. Virmani(2007) analyzed the rise of Asia and the shift of power from the Atlantic to the Pacific .

	2017		2027		2038		2049	
Country Name	VIP^2 index		VIP^2 index		VIP^2 index		VIP^2 index	
	rank	value	rank	value	rank	value	rank	value
United States	1	1.00	1	1.00	2	1.0	2	1.00
China	2	0.51	2	0.97	1	1.6	1	1.77
Japan	3	0.23	4	0.17	5	0.12	7	0.08
Germany	4	0.17	6	0.13	6	0.10	8	0.08
Russia	5	0.15	5	0.15	4	0.13	5	0.09
India	6	0.13	3	0.25	3	0.52	3	1.02
United Kingdom	7	0.12	7	0.10	8	0.08	9	0.07
France	8	0.12	9	0.09	10	0.07		0.05
Korea, Rep.	9	0.09	10	0.09	9	0.07		0.06
Italy	10	0.09	11	0.07		0.05		0.04
Brazil	11	0.08	8	0.09	7	0.11	4	0.12
Canada	12	0.08	13	0.06		0.05		0.04
Spain	13	0.07	14	0.06		0.05		0.05
Mexico	14	0.07	12	0.07	13	0.06		0.05
Turkey	15	0.05	15	0.06	12	0.07	10	0.07
Indonesia				0.05	11	0.07	6	0.09

A useful cross check is to look at the trajectory of the two countries' per capita GDP relative to the USA.[33] China's per capita GDP is projected to be only a quarter that of the USA in 2017 and a little over half that of the USA in 2036. Similarly India's per capita GDP in 2036 will be a little less than half that of the USA. Thus unlike alarmist projections for Japan in the 1990s, both these are eminently feasible through the demonstrated processes of "catch up growth". 'Feasible' and 'likely' does not however mean inevitable: There is enough historical evidence to show that high growth economies can slow significantly if they do not respond adequately to domestic and international shocks and do not continue to adapt to the changing domestic and international economic environment (Virmani(2012)).

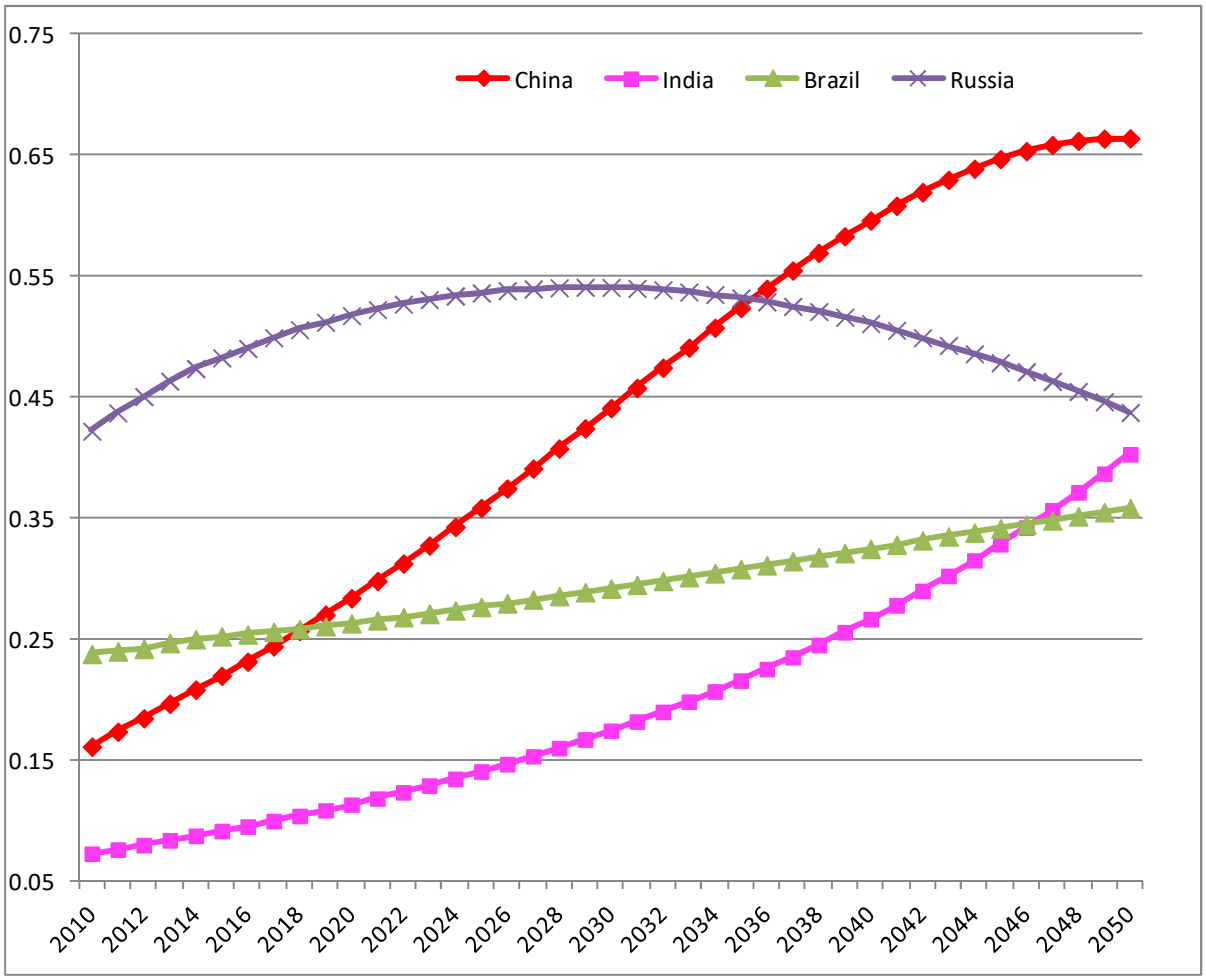
The same fact, however gives rise to a conundrum; as per capita GDP is a measure of 'general technological capability' of the economy. How can China's economy be more powerful than the USA when this capability is 45% of that of the USA. Though our simple projection is very useful for visualizing the broad trends, a much more detailed analysis of all the factor inputs into the aggregate production function, that go into the determination of per capita GDP, is necessary to determine more precisely the point at which China's economic power would exceed that of the USA. There is also a practical aspect of this conundrum. Ignoring for a moment the limitation of the projection, the economic power of the Chinese economy will exceed that of the USA by around 2028. From that point on, it would become useful to recalculate the index relative to China rather than the USA. This would imply that, as per the definition of super power(0.5), India would become a potential super power about a decade later than indicated above,

[33] Recall that this is a projection based on an assumption that the growth rate will slow as these fast growing countries close the gap with the advanced countries such as the USA.

i.e. in the mid-2040s, and the USA's index value would be only a little higher at 0.55.

While recognizing the limitations of the index and the projections, one should not exaggerate them. One of the reasons for raising the bar for the definition of a potential super power (above the Soviet Blocs peak of 0.37), was to account for the fact that China and India's relative population and per capita GDP were so different from that of the USA. As China and India are much more similar on these dimensions, a lower index value of 33%, which India is projected to attain relative to China in 2036 may be sufficient to make it a potential 'Super power'.

Figure 5: Growth Sustainability- Trends in Per Capita GDPppp (relative to USA)



7 National Power (VIP): Strategic Technology

Even if a country attains economic power, it does not follow that it will necessarily use it to enhance its economic well being at the cost of others,[34] as the example of post-

[34] Geo-economics: Looking at the World economy as a Zero sum game or seeking out or creating zero sum situations to exploit.

war Japan and Germany suggests. Whether and to what extent this happens depends on domestic politics, institutions, history and culture. The last three also determine the domestic politics and its link to international relations. The history of China and India suggest that at least in the next fifteen years the former is much more likely to use economic power for geo-economic and geo-political ends than the latter.

Economic power is also the foundation of overall power and constitutes the bottom layer of a pyramid (the power potential), in which the middle layer is strategic assets and technology, including weapons and defense technology.[35] This consists more broadly of assets and technology, skills, materials and equipment that is not developed and sold in free/open competitive markets, but is financed, developed and controlled by country governments (weapons platforms and systems, nuclear, space, submarine technology). The concept of capital accumulation, investment in (strategic) equipment and machinery, expenditures on (strategic) R&D and depreciation of assets over time, can be used to define a stock of strategic assets. This can then be combined with the index of economic power or power potential VIP^2 to form an overall index of economic power VIP (Virmani(2006)).[36] An initial assumption could be to weight relative economic power and relative strategic assets equally. As an illustration consider the case of China. Assume that China's (and India's) relative strategic assets mirror the evolution of its relative per capita GDP.[37] In this case China's National power (as measured by VIP) would become 0.5 in 2023 and equal that of the USA in 2039, while India's would become 0.5 in 2043. This implies that the World would (actually) become bi-polar by 2025 and become Tri-polar by 2045.

The importance of the concept of accumulation and depreciation of strategic assets is critical to understanding the overall power of Russia despite the fact that its economic power had collapsed to 0.05 in 2001 and it ranked 13th behind Canada, Spain and Brazil (table 1). The USSR had invested heavily in Strategic technology and assets during the cold war and still retained a large part of these assets when it broke up and Russia inherited these assets. The old strategic assets will slowly depreciate over time, and without sufficient new investment, Russia's relative position on this aspect will decline over time. However, currently its overall power ranking remains much larger than its economic power ranking because of this strategic legacy.

Though the Chinese communist party system was much more decentralized than that of the USSR in terms of economic decision making, it shared some of the strategic culture and approach of the Soviet Union till the latter's breakup. Therefore it is very likely to

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[35] The top of the pyramid consists of socio-political power, including 'Soft Power"(Nye) and those which constrain the use of power e.g. democratic constraints on civilian deaths in hostile countries'(Virmani(2009)).

[36] $VIP_i = (VIP_i^2)^{(1-a)} + (S_i/S_{usa})^a$, where S is the stock of strategic asset and $0 < a < 1$. $S(t) = E(t) + (1-d)\,S(t-1)$, where E(t) is the expenditure in year t on, R&D in and purchase of, strategic technology and assets, d is the rate of depreciation and S(t-1) is the stock at the end of the previous year.

[37] If China either spends the same % of its GDP on development and acquisition of Strategic technology as the USA and its quality adjusted efficiency is a quarter that of the USA, or it spends half of USA as % of GDP and is half as efficient, then China's strategic assets will be around half of the USAs in 2040, around the same as its per capita GDP relative to USA.

take steps to ensure that its strategic assets and power is commensurate with its economic power, though the limitations on its general technological capability will entail longer gestation lags (of a couple of decades) with respect to strategic technology and assets.[38] Given that it has developed enormous expertise in domestic surveillance, the temptation to use these capabilities externally to reduce the technology gap (both general and strategic) appears irresistible.[39] One estimate of Relative Military Strength in 2011 (without taking account of Nuclear capability), however still ranks Russia 2nd followed by China (3rd) and India(4th).[40]

8 Balance of Power and Coalition Formation

Weapons systems have long lead times and institutions (including governments and their armed forces) take a long time to change. Thus programs and policies have inescapably to be based on imagined futures. The projected evolution of the world from a uni-polar to bipolar and subsequently to a tri polar one will inevitably lead to shifting alliances and search for new allies. Further, present actions are greatly influenced by the past as embodied in institutions and culture. There are three unique elements to this new global situation that are likely to influence international behavior;

(1) Strategic Technology and Assets

The two new super-powers will have very different levels of general economic and technological capability from the first. The latter clearly therefore has a technological advantage that it can use as a policy lever to tilt (directly or indirectly) the balance between the other two to optimize its own position.

(2) Socio-Political Dimension[41]

A different sub-set of (two) countries will be modern democracies based on individual rights and thus have substantively different (internalized) norms of behavior from the third.[42] This has both advantages and disadvantages for the latter; It is virtually unconstrained by global human rights concerns in using whatever tools of war (conventional or unconventional) that it uses and can make international security decisions more quickly and act more sustainably than is possible in a democratic polity. On the other side of the same coin, it is dis-advantaged in terms of soft power in a democratizing world.

(3) History and Culture

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[38] That is, even if its economic power equals that of the USA by 2030 its strategic and overall power may not equal it for several decades more!

[39] The interplay between domestic politics and geopolitics in Indian democracy ensures that the incredible diversity of views and objectives in domestic politics are carried over into decisions about geopolitical issues (to a much greater extent than in non/semi -democratic countries).

[40] http://www.globalfirepower.com/. A ranking of 'Combat Powr' by James Dunnigan, "The Ten Most Powerful Armed Forces on the Planet," June 2004, puts China in 2nd place and Russiain 5th place behind India. http://www.strategypage.com/militaryforums/478-946.aspx#startofcomments.

[41] Joseph Nye's analysis of US "soft power" is a notable contribution. However, it tends to draw attention away from the negative aspects, such as the effect of US anti-war protests and other domestic critiques on foreign perceptions ('The Ugly American').

[42] Based on the principle that all human beings are created equal and have the same fundamental rights. Friedberg (2011) refers to, deep ideological differences between the USA and China.

Yet another (different) sub-set of two will have ruling elites that believes they have a 'God Given right' or 'Heavenly Mandate' to rule a country formed by their founding fathers through conquest of other's land and people, while the third is still diffident (/sensitive) about its sovereignty after easing out a foreign ruler through non-violent means. This leads to two opposite possibilities. One, that the first two try to divide the world into 'spheres of influence' where each recognizes the other's "Suzerainty," an un-appealing prospect for the third.[43] The other, that they compete actively and possibly violently with each other on international security issues, with the third power inclined to take a relatively neutral stance on hot issues, particularly in areas outside its immediate neighborhood! In any realistic situation both 'competition' and 'co-operation' are likely, with the balance between competition and co-operation for each pair, influenced by issues (1) and (2) and their conventional homeland/ national security concerns.

These factors will also influence to some extent the 'middle powers.'

The balance of power between the two super-powers in a bi-polar world or the three powers in a tri-polar World will depend not only on the competition and co-operation between them, but also on the relationship of the middle powers towards the two/three super-powers. Peace will in turn depend on the evolution of a stable balance of power between the three and their partners and allies. The existence of two (three) super-powers need not however, necessarily result in the creation of a Bipolar (tri-polar) world. This can happen if the middle powers perceive that the benefit-cost ratio of forming a coalition among themselves, is higher than from joining a coalition with one of the super-powers. The formation of super-power coalitions and a polarized system is however very likely if the aggressive actions of one super power are seen as a threat by a number of countries. This imposes a cost on the latter that can be minimized by joining a coalition of a rival super power which offers some protection against these threats. History suggests that the rising super power is most likely to challenge the existing super power and its allies and friends, with the challenged super power resisting vigorously, leading to the consolidation/ coagulation of opposing coalitions.[44] Thus the creation of Bipolar world is very likely by 2025.

How far will the USA and China take account of an imagined future (as against immediate problems and concerns) in determining their policies and programs? The evolution of US policy over the past seven years clearly demonstrates recognition of the emerging and potential future balance of power in Asia.[45] China, which became a potential great power recently and is projected to become a potential super power within this decade, clearly expects to close its power gap with the USA.[46] However, it does not show much recognition of the analogous (potential) rise of India with a lag of two

[43] A version of the so far short lived G2!
[44] Meerschimer(2001), Huntington (1991), Swaine and Tellis (2000).

[45] Since the first prediction of the rise of China to a challenging position vis-à-vis USA [Virmani (2004)] the US has signed the historic Indo-US nuclear agreement and also 'Pivoted to Asia'.
[46] The hardened public stance on disputes with ASEAN countries in the South China Sea, Japan in the East China Sea, India on its Southern border and its wide cyber espionage initiative. See Shambaugh (2011).

decades. Thus its time horizon seems to be more limited than that of the USA, and what might (or might not) happen twenty years from now appears currently to be of relatively little concern to it.

Though India has entered the ranks of the middle powers, it is projected to take another 15 years to break out of this category and become a potential 'great power'.[47] India's power potential relative to China, is approximately the same (ratio) as China's power relative to USA and will during the 2010s and 2020s be the same as that of the USSR relative to USA in the 1970s and 1980s. India is therefore constrained not by its economic / technological capability but by its strong pacifist tradition and the political force this creates, that make it very difficult to take decisive unilateral action on external provocations and much easier to adopt a cooperative strategy of building global coalitions on issues on which interests overlap.[48] Further, India is projected to close the power gap with China much more slowly than China has closed (and will continue to close) its power gap with the USA. This may have been a reason for hawks in China to argue for a strategy of balancing and containing India through nuclear-missile proliferation to Pakistan.[49] Such a policy will, however, eventually persuade even the socialist/communist forces in India to stop viewing China as a champion of the poor and the USA as a neo-colonialist.

There will likely be three relevant sub-sets of middle powers by mid-century. (a) European (UK, France, Germany, Russia).[50] (b) Asian (Japan, Indonesia, Korea, Turkey)[51] (c) Latin American (Brazil). Countries in the neighborhood or periphery of the rising power(s) (namely, Russia, Japan, Korea and Indonesia) are likely to be most affected by the consequent changes. All are politically attractive coalition partners for India, though actual coalition formation will depend on the degree of overlap.

9 Conclusion

The Uni-Polar moment began with the collapse of the Soviet Union in 1990. In the subsequent decade (1990s), there was a single super power with one potential great power Japan (Germany only for two years) a host of middle. The membership and ranks of these middle powers gradually changed over the subsequent decade (2000s), with the rise of China, Brazil and India and the transformation of 'USSR' into 'Russia'. This also gave rise to talk about the emergence of a multi-polar World, which this paper shows is but a

[47] Another decade is expected to pass before it becomes a potential super-power.
[48] This approach echoes the "Sheriff's Posse" analogy used by Haass (1998). Tharoor (2012) proposes "*multi-alignment*" as the appropriate strategy for a rising India, and contrasts it with the "non-alignment" pursued by a much poorer and weaker India.
[49] See Virmani (2006b) for comprehensive documentation of nuclear proliferation by China and Europe.
[50] As Russia spans both Europe and Asia, there may be a degree of Schizophrenia in its behavior, with its interest in the latter geography varying between regimes.
[51] Turkey is in West Asia and has a historical interest in the Middle-east and Central Asia.

transitional interregnum. China has in the last few years replaced Japan as the sole potential 'Great Power' and is projected to become a super power during the next two decades. During this period the churning among the ranks of middle powers will continue with some declining and others rising in rank, and India breaking out of the middle powers to become a potential 'great power' by the end of the 2020s. At the start of this decade, with the US hobbled by fiscal and other problems, there is increasing talk of Apolarity / power vacuum [Fergusan (2004)], 'G-zero world' [Bremmer (2012)] or 'non-polar world'(Haass). The analysis of this paper suggests that this too is merely a transitional stage, as all powers adjust to new challenges.

Because of the convergence of per capita incomes unleashed by Globalization and economic policy reforms in the last half of the 20th century, the gap between country shares of population and their shares of World GDP will narrow during this century. Demographic projections indicate that by mid-century, China and India will have three and four times the population of the USA respectively, while Indonesia and Brazil will have about 3/4th and 0.56 of the population of the USA respectively. This means that China and India can equal the USA in size (economic power) with only 0.3 (0.5) and 0.2 (0.4) the US per capita GDP, while Indonesia needs 1.4 (1.2) times and Brazil 1.8(1.5) times the USA's per capita GDP. The former is highly likely while the later appears implausible. Based on the economic growth history of China and India and of that of other high growth economies, these two economies are expected to equal the USA in size in five and twenty five years respectively. Further, based on the demographic and growth projections and the authors' index of economic power/power potential (VIP^2) and National Power (VIP) the paper confirms the author's earlier prediction that the World will return to a Bi-polar configuration by the end of the first quarter of this century and will evolve into a tri-polar configuration by the middle of the 21st century.

Based on the fact that the Euro area/European Union is not a "Virtual State" (Empire or Bloc) with a unitary external face (international relations and international security policy and operation) and is unlikely to become one in the near future, the World will not become Quadri-polar. Can there arise a "Terrorist State" that uses a combination of Nuclear Weapons (WMD) and Terrorism as instruments of State Policy (through deterrence and blackmail) to achieve great-power status, even without having the economic power of a great-power(as defined in this paper)? Despite the globalization of the international economy and polity such a possibility cannot be ruled out if it is technologically and/or economically assisted by a super power for its own designs. This will in fact remain the second threat to World peace!

A peaceful evolution will also be helped by reconciling these differing perspectives and developing international rules of external behavior, which are acceptable to and accepted by all three powers, and on the fairness with which these rules are applied by Global institutions and the Global Community to each of these countries.

10 Appendix 1: History of Economic Power

As indicated in the text the simple index of power allows us to look at history going back to the beginning of the millennium for which economic data exists (Madison; Virmani(2005b). Appendix Table A1 shows the share of world GDP for the major countries from 1 AD to 1900. India and China were the two largest economies in the World till 1870, with the former gradually being over taken by the latter over the

millennia. The USA had overtaken both by 1900, starting from virtually nowhere fifty years before. Surprisingly even in 1900 the size of the Indian economy was about the same as that of the UK which had ruled India for more than a century. Clearly relative economic size is not an adequate measure of economic power as acknowledged earlier.

Table A1: Major Country's Share of World GDP

	1	1000	1500	1600	1700	1820	1870	1900
China (total)	0.25	0.23	0.25	0.29	0.22	0.33	0.17	0.11
India (total)	0.32	0.28	0.24	0.22	0.24	0.16	0.12	0.09
United States	0.00	0.00	0.00	0.00	0.00	0.02	0.09	0.16
USSR(former,total)	0.01	0.02	0.03	0.03	0.04	0.05	0.08	0.08
United Kingdom	0.00	0.01	0.01	0.02	0.03	0.05	0.09	0.09
Japan	0.01	0.03	0.03	0.03	0.04	0.03	0.02	0.03
Germany	0.01	0.01	0.03	0.04	0.04	0.04	0.06	0.08
France	0.02	0.02	0.04	0.05	0.05	0.05	0.06	0.06
Italy	0.06	0.02	0.05	0.04	0.04	0.03	0.04	0.03
Spain	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02
Netherlands	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01

Before looking at the economic power or overall power potential of these same powers, as measured by our index VIP^2, it is useful to consider another factor that is important when examining a period of history before the formation of the modern State. Our index can only be applied to modern States or "Virtual States) that approximate the former in one important dimension: A "*Virtual State*" is defined as an institutional entity (empire or union or conglomeration of governments) that acts in its external relations (geo-economic, geo-political or strategic) as a single entity (or voice). The various Indian empires like the Ashoka/Maurya, Gupta/Chola, Mughal and Maratha, as well as the various Chinese Dynasties/empires such as the Han, Tang (Tibetan), Yuan (Mongol), Ming, Qing (Manchu) were probably of this nature. However the size of the economy under the sway of these empires/dynasties varied over time and it is unclear how much of the territory/population of modern China/India formed part of these empires or 'Virtual States'. The numbers shown in tables A1 and A2 treat the entire economy of China and India as coming under a single virtual state respectively. To the extent that this was not so, they overstate the economic power and power potential of even the strongest empires in China and India during this period!

Table A2: Major Country's Economic Power or overall Power Potential (VIP^2)

	1	1000	1500	1600	1700	1820	1870	1900
United States	0.01	0.01	0.01	0.01	0.01	0.08	0.86	1.00
United Kingdom	0.01	0.02	0.05	0.08	0.18	0.27	1.00	0.62
France	0.07	0.08	0.19	0.19	0.28	0.21	0.55	0.31
China (total)	0.79	0.83	1.00	1.00	0.95	1.00	0.77	0.25
India (total)	1.00	1.00	0.94	0.74	1.00	0.46	0.55	0.21
Germany	0.03	0.04	0.14	0.15	0.19	0.16	0.55	0.44
USSR(former,total)	0.04	0.08	0.12	0.11	0.19	0.18	0.45	0.27
Japan	0.03	0.09	0.11	0.09	0.17	0.10	0.12	0.09
Italy	0.26	0.07	0.25	0.20	0.23	0.13	0.29	0.13
Netherlands	0.00	0.00	0.01	0.03	0.09	0.03	0.09	0.05
Spain	0.06	0.05	0.08	0.09	0.10	0.07	0.12	0.07
Base Economy	India	India	China	China	India	China	UK	USA
Note: Super power ≥ 0.5; Great Power ≥ 0.25; Regional Power ≥ 0.125(?).								

If we assume that China(total) and India(total) were "virtual States" during the

period shown, then their economic power remained high till the mid 19th century and declined rapidly thereafter (table A2). However, history tells us that colonial powers were able to chip away at the periphery because they were not "Virtual States" at that time. It is however, very likely that the largest Indian/Chinese Empires were the strongest countries in the World till around 1500 when the power of Italy (the strongest European economy) was about a quarter of Virtual China and India.[52] Even in 1700 the strongest Chinese/Indian empire had to have about 30% of the population of China(total)/India(total) to be equal to the strongest European power(table A3). By 1820, the power of the strongest economy, the UK surged, while that of India(total) had declined rapidly.[53] So the strongest Chinese and Indian empires had to have 1/5th and 3/5th of the populations of China(total) and India(total) respectively to equal the UK(table A3). Such an Indian 'Princely State' would still be classified as a 'Super Power,' and even a princely state with half its population would still be a potential 'Great Power.' However, a policy of conquering the peripheral/coastel/weaker 'sub-states' of India would have succeeded in the 18th century, even though the Maratha empire ruled much of India in 1760 (except parts of the West/Bengal and the South/Carnatic). By mid-century India(total) was half of the UK's power (table A2) and the East India Company used the policy of "divide and rule," to control most of India.

Balance of Power considerations come into play when there are other Super powers, Great Powers or even Regional powers in the neighborhood, and the effective power of a State can be magnified or weakened depending on whether they are allies/friends or rivals/enemies! Just as the dominant Empire or State in India or China was surrounded by smaller States on its periphery, so the power of the dominant European country was undermined by rivalry with other European States. Thus for instance in 1900, though the primary super power was the USA (1), the UK (0.62) was still classified as a 'Super power.' The USA also faced three 'Great powers,' Germany (0.44), France (0.31) and USSR (0.27) as rivals or potential enemies (table 2), and the power of Germany relative to it had increased strongly while that of Japan had increased somewhat.

Table A3: Empire population(% of total) for VIP^2 : China/India = strongest European power

Year	1	1000	1500	1600	1700	1820
China	32%	10%	25%	20%	29%	27%
India	26%	8%	27%	27%	28%	58%

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[52] The average income of Western Europe was about a third higher than that of China in 1500.
[53] Following the Industrial revolution, Western Europe's per capita income surged to more than twice China's by 1820.

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