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THE EMERGING MIDDLE CLASS IN DEVELOPING COUNTRIES

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PREFACE

Over the last twenty years, economic and political power has been shifting towards emerging economies. A number of developing countries have become centres of strong growth, raising their shares of global income significantly, which has made them major players in regional and global affairs. Furthermore, flows of trade, aid and investment *between* emerging and developing countries have all intensified.

The Global Development Outlook 2010 presents the evidence which documents these changes, what we call 'Shifting Wealth'. As the world emerges from the crisis, the report clarifies this new global reality and what it means for development. Clearly, it implies that development strategies need to be rethought in the new international environment. The GDO 2010 suggests ways in which developing countries can best take advantage of the new economic landscape and supports calls for global governance to be reformed, making it more inclusive.

The Global Development Outlook has been guided by and contributed to by eminent scholars from developing and emerging countries, our Non-Residential Fellows. This paper, by Homi Kharas, from the Brookings Institute in Washington, is one of the first to be published in the series. The theme is a fascinating one, looking at the potential growth of the global middle class in the developing world. In the aftermath of the financial crisis, Homi's paper carries an important message - over the coming decades Asia's emerging middle class will be large enough to become one of the main drivers of the global economy.

The story told here is representative of the changing dynamics of the global economy, whereby accepted wisdoms need to re-examined and reconsidered in the light of the 'Shifting Wealth of Nations'.

Javier Santiso

Director, OECD Development Centre

January 2010

RÉSUMÉ

La répartition mondiale de la production industrielle en faveur de l'Asie est un phénomène largement démontré. Quant à la demande de consommation mondiale, elle provenait jusqu'ici des économies riches des pays de l'OCDE. Au fur et à mesure que les pays d'Asie s'enrichissent, cette demande de consommation va-t-elle à son tour se déplacer en leur faveur? Dans ce document de travail, la classe moyenne est définie comme foyers à revenus moyens par tête entre USD10 et USD100, en termes de pouvoir d'achat. En associant des données récoltées lors d'enquêtes auprès de ménages à des projections de croissance dans 145 pays, on s'aperçoit que l'Asie représente moins d'un quart de la classe moyenne d'aujourd'hui. Cette proportion pourrait doubler d'ici 2020. Plus de la moitié de la classe moyenne mondiale se situerait alors en Asie, et les consommateurs asiatiques pourraient représenter plus de 40 pour cent de la consommation mondiale des classes moyennes. Cela est dû au fait qu'un grand nombre de foyers asiatiques perçoive aujourd'hui des revenus les positionnant juste en dessous du seuil de la classe moyenne mondiale. Pour cette raison, il est prévu que, dans les dix prochaines années, de plus en plus d'Asiatiques fassent partie de la classe moyenne. Ce document de travail analyse la manière dont ce phénomène peut contribuer à maintenir, au moyen terme, la croissance globale, qui est provoquée par la différentiation des produits, le marquage et le marketing dans les nouveaux marchés émergents d'Asie.

Mots clés : classe moyenne, pays asiatiques, consommation, croissance globale, centre de gravité
Classification JEL : F01, O10, O12

ABSTRACT

The shift in global goods production towards Asia is well documented. But global consumer demand has so far been concentrated in the rich economies of the OECD. Will that also shift towards Asia as these countries get richer? This paper defines a global middle class as all those living in households with daily per capita incomes of between USD10 and USD100 in PPP terms. By combining household survey data with growth projections for 145 countries, it shows that Asia accounts for less than one-quarter of today's middle class. By 2020, that share could double. More than half the world's middle class could be in Asia and Asian consumers could account for over 40 per cent of global middle class consumption. This is because a large mass of Asian households have incomes today that position them just below the global middle class threshold and so increasingly large numbers of Asians are expected to become middle class in the next ten years. The paper explores how this can help sustain global growth in the medium term, driven by product differentiation, branding and marketing in the new growth markets of Asia.

Keywords: middle class, Asian countries, consumption, global growth, centre of gravity
JEL Classification: F01, O10, O12

I. INTRODUCTION

For forty years between 1965 and 2004, the G7 economies accounted for an average of 65 per cent of global GDP measured at market exchange rates. Despite major events in the global economy—the collapse of the Bretton Woods fixed exchange rate arrangement in 1971, oil price spikes in 1973 and 1979, stagflation, the fall of the Berlin Wall and dismantling of the Soviet Union—the share of the G7 in the global economy always stayed within three percentage points of 65 per cent. This remarkable stability also ushered in a period known as the Great Moderation to describe the reduced volatility of major macroeconomic outcomes in the developed world.

Underpinning the performance of the G7, and indeed driving the global economy, is a large middle class. The middle class is an ambiguous social classification, broadly reflecting the ability to lead a comfortable life. The middle class usually enjoy stable housing, healthcare and educational opportunities (including college) for their children, reasonable retirement and job security, and discretionary income that can be spent on vacation and leisure pursuits.

The middle class has played a special role in economic thought for centuries. It emerged out of the bourgeoisie in the late fourteenth century, a group that while derided by some for their economic materialism provided the impetus for an expansion of a capitalist market economy and trade between nation states. Ever since, the middle class has been thought of as the source of entrepreneurship and innovation—the small businesses that make a modern economy thrive. Middle class values also emphasize education, hard work and thrift. Thus, the middle class is the source of all the needed inputs for growth in a neoclassical economy—new ideas, physical capital accumulation and human capital accumulation.

More recently, the consumption role of the middle class has been emphasized. Juliet Schor (1999) has argued that it is a "new consumerism" that defines the middle-class: a constant, "upscaling of lifestyle norms; the pervasiveness of conspicuous, status goods and of competition for acquiring them; and the growing disconnect between consumer desires and incomes." In a more academic vein, Murphy, Shleifer and Vishny (1989) emphasize the willingness of the middle class consumer to pay a little extra for quality as a force that encourages product differentiation and thereby feeds investment in production and marketing of new goods.

It is this latter role that has become more pronounced with the expansion of global trade and new trade theories have evolved to explain the stylised fact that most trade expansion has been occurring at the extensive margin - that is through the expansion of new goods rather than greater trade of existing products (Hummels and Klenow 2002). In the world of the 21st century, the middle class consumers of North America and Europe have been the source of demand, while low and middle income countries in Asia have been the source of supply.

With the exception of Japan and Oceania, Asia's rapid growth has not been driven by a large domestic middle class. The expansion of factors of production driving potential output has happened without a significant middle class. Saving and education have been willingly undertaken even by poor households, in the face of large returns to such activities in a globalised world, as well as by governments. Technology has been imported from abroad by corporations through FDI, imported machinery and participation in global supply chains.

The unlocking of the spending power of the middle class in rich countries was achieved in part by financial innovations that allowed for rapid growth in consumer credit, mortgages for an ever-larger segment of the population and home equity withdrawals. Because household wealth grew faster than income, these innovations permitted households to tap into their wealth for current consumption and led to a decline in household saving rates. But the current downturn has brought this process to a halt. US households are saving again in an effort to rebuild lost wealth. The consensus forecast is that this will be a lasting effect of the global financial crisis[1].

How can the world economy fill this void in global demand brought on by the retrenchment of the American consumer? All eyes are now turning to Asia, and specifically to the emerging middle class in China and other countries, to become the next global consumers. Within Asia there is significant talk of rebalancing towards domestic demand (more specifically domestic consumption) as a way of sustaining growth in the face of potentially sluggish exports. But the policy prescriptions to achieve such a rebalancing are not easy. They involve creation of a social safety net, medical insurance schemes, and better public education services. In short, Asian consumption is tied in the minds of many analysts to long-term institutional changes. Given the difficulties of implementing such changes, it is hard to be very confident that this rebalancing will happen in the medium term.

That is why policymakers such as Olivier Blanchard, the IMF's Chief Economist, worry that "sustaining the nascent recovery is likely to require delicate rebalancing acts, both within and across countries"[2]. In this paper I trace out whether such fears are justified or whether there is reason to believe that Asia's emerging middle class will be large enough to replace the US as a driver of the global economy.

The paper argues that there is good reason to be optimistic about a new Asian consumerism emerging at a scale and timing sufficient to replace the forecast shortfalls in US consumer demand growth. Indeed, I argue that several Asian countries, in particular China and India, have reached a tipping point where large numbers of people will enter the middle class and drive consumption.

The approach followed in this paper has three steps. First, I define a global middle class. There are two schools of thought as to how to do this, divided by whether to take an absolute global definition or a relative definition for each country. I adopt the absolute definition, using a

[1] See, for example, Galston (2009).

[2] Olivier Blanchard, "Sustaining a Global Recovery" Finance and Development, September 2009.

range of USD10 to USD100 in purchasing power parity per capita per day to characterise middle class households.

Second, based on this definition, I compute the current size of the global middle class by separately estimating the size of the middle class for each of 145 countries, accounting for 99 per cent of the world's GDP and 98 per cent of its population. To do this, I take the distribution of income from latest available household surveys of both developing and developed countries, available from the World Bank. From this data I estimate the distributional parameters of a Lorenz curve. The mean of the distribution is adjusted to reflect household consumption given in the national income accounts for each country. These parameters are used to estimate the number of people falling into the range of incomes that define the middle class.

Third, I make projections for the size of the middle class for each country. I make the strong assumption that income distribution in the middle of the population (roughly deciles 5 to 9) remains unaltered, so the size of the middle class falls out of GDP projections. If inequality were to increase, as has been the case recently, the size of the middle class would probably expand more rapidly than what I show, because the emerging countries currently have very few people that surpass the lower threshold of USD10/day/person. More inequality would suggest that those at the upper end of the distribution, with high levels of education and entrepreneurial talent, are actually making more money than GDP growth would suggest, propelling them faster into the ranks of the middle class. Thus, although I do not perform sensitivity tests, the bias from the assumption of no change in inequality is likely to be towards showing a smaller global middle class.

Separate sections on China and India are designed to buttress the global argument with more country specificity.

The paper concludes with observations about risks to the base scenario which shows the global middle class growing by 4.6 per cent in real terms in spending power, and by 5.3 per cent in terms of number of people between now and 2020.

II. DEFINING THE MIDDLE CLASS

In defining the middle class, the purpose of this paper must be kept in mind. I am interested in measuring the size of a group of people who contribute in a discrete fashion to economic growth. Banerjee and Duflo (2007) make a useful distinction between four distinct contributions that the middle class make. I choose to focus on only one of these contributions and that influences why I define the middle class in a particular way. There are other legitimate ways of defining the middle class, but I wish to focus on what may be termed "the consumer class".

First, Banerjee and Duflo note the links between the middle class and democracy. If democracy is then causally linked with growth, one can infer that the middle class causes growth. If this were the channel through which the middle class had an impact on growth, I would want to look at people that are active political participants. For example, the World Values Survey identifies people who are active in political parties and other organisations, those valuing freedom of choice, and those believing politics is important. If these are defined as middle class attributes, such data could be used to construct an estimate of the size of the middle class. However, Barro (1996) finds only a weak (and slightly negative) impact of democracy on economic growth, in a panel regression of 100 countries from 1960 to 1990, conditional on maintenance of the rule of law, free markets, small government consumption and high human capital. Given this finding, defining the middle class in terms of variables likely to induce political participation does not appear promising for explaining global growth.

Second, Acemoglu and Zilibotti (1997) emphasize the role of the middle class as a source of entrepreneurs. This follows the original tradition of defining the middle class in terms of occupation and differentiating them from the nobility or peasants who characterised the feudal economy. But Banerjee and Duflo (2007) find that the average middle class person is not an entrepreneur in waiting. If they do run a business, it is usually small and not very profitable. In most countries, the number of business owners/entrepreneurs is small, while the middle class is large (at least in successful countries). Accordingly, trying to define the middle class in terms of entrepreneurial occupation seems to miss the point.

Third, Doepke and Zilibotti (2007) emphasize the contribution of the middle class to human capital and to saving. But Kenny (2008)[3] finds evidence of beta convergence in most human capital variables—education, infant mortality, life expectancy—implying that the lower the starting point the more rapid the rate of accumulation of human capital. Similarly, studies on countries like China find that households save a considerable portion of their income even when

[3] "What's Not Converging", Asian Economic Policy Review.

they are near poor[4]. Thus, there is nothing special about the middle class in terms of their contribution to human capital. If anything, the evidence points to a slowing down in the rate of human capital formation (albeit from a much higher base) as households enter the middle class.

The fourth hypothesis about what makes the middle class special focuses on consumption. Here the evidence is more persuasive. Business houses, such as Nomura (2009) argue that there is a kink in consumer demand curves around USD6000 per capita. Above this level, the income elasticity for items like consumer durables as well as for services like insurance rises well above one. This remains the case until income levels surpass USD25000[5]. At that point, the income elasticity drops again.

Murphy, Shleifer and Vishny (1989) formalize this argument[6]. In their paper, industrialisation has fixed costs. Because international trade is costly, there must be a domestic market of a certain size to overcome these costs. That only happens if income is concentrated in a middle class. Too much equality and income levels do not rise to a level which can support the demand for manufactures. Too much inequality, and there are not enough people to cover the fixed costs. In the modern world, one can think about this as growth on the extensive margin. Middle income countries grow by producing a greater number of goods (Imbs and Wacziarg, 2000) up to a threshold income level when they have sufficient scale to overcome the fixed costs of international trade and specialise in production.

For this reason, although recognising that the middle class is as much a social designation as an economic classification, I choose to measure the middle class in terms of consumption levels.

The middle class can be defined in relative or absolute terms. Easterly (2000) and Birdsall, Graham and Pettinato (2000) take a relativist approach, defining the middle class as those between the 20th and 80th percentile of the consumption distribution and between 0.75 and 1.25 times median per capita income respectively. Bhalla (2009) takes an absolute approach, defining the middle class as those with annual incomes over USD3900 in purchasing power parity terms. Banerjee and Duflo (2007) use two alternative absolute measures—those with daily per capita expenditures between USD2 to USD4 and those with daily per capita expenditures between USD6 and USD10. Ravallion (2009) takes a hybrid approach, defining a "developing world middle class" as having one range of incomes (between the median poverty line of countries in the developing world and that of the USA) and a "Western world middle class" (above the US poverty line). The World Bank (2007) also uses an absolute definition, arbitrarily defining the middle class as those with incomes falling between the mean level in Brazil and Italy, or USD4000 to USD17000 in 2000 purchasing power parity terms.

The choice between these various approaches depends on the purpose at hand. As I am interested in whether the emerging Asian middle class can compensate for falling growth in the US middle class, it makes sense to take an absolute approach with a common threshold range for

[4] World Bank China Poverty Assessment, 2009.

[5] Actually, the Nomura analysis plots "per capita analysis of almost anything" against GDP per capita.

[6] "Income Distribution, Market Size, and Industrialization", Quarterly Journal of Economics.

all countries. It would make no sense to compare Indians earning USD2 per day with Americans earning USD50 per day and claim that both are comparable in terms of purchasing power, and as drivers of global growth, because both are middle class.

Taking an absolute approach, I define the global middle class as those households with daily expenditures between USD10 and USD100 per person in purchasing power parity terms. The lower bound is chosen with reference to the average poverty line in Portugal and Italy, the two advanced European countries with the strictest definition of poverty. The poverty line for a family of four in these countries is USD14533 (USD9.95 per day per capita in 2005 purchasing power parity terms). The upper bound is chosen as twice the median income of Luxemburg, the richest advanced country. Defined in this way, the global middle class excludes those who are considered poor in the poorest advanced countries and those who are considered rich in the richest advanced country.

To some extent the choice of a middle class range is rather arbitrary. I could have defined the range in a number of different ways but the trend results would be similar.

This last statement is more than a throw-away. The fact is that regardless of the chosen range, data to permit global comparisons are not that robust, so a degree of arbitrariness is inevitable at this point in time. All absolute approaches to defining the middle class are made in purchasing power parity terms, using the new results of the 2005 International Comparison Program, a joint exercise of the UN-OECD-World Bank-regional development banks. These estimates compare prices for 1000 goods and services across 146 countries. The exercise has been described as "the most extensive and thorough effort ever to measure PPPs across economies"[7]. But serious questions remain about the significant changes that have resulted from the 2005 measure, as compared to previous estimates. In Asia, prices were adjusted upwards by almost 40 per cent on average, with price changes for large Asian economies being severe: China, +38.7 per cent; India, +37.2 per cent; Bangladesh, +47.3 per cent, Philippines, +40.8 per cent; Vietnam, +31 per cent.[8] For developed countries, such as the USA (+1.5 per cent), the changes were marginal.

There are many reasons to doubt the results of the ICP 2005. In China, for example, prices were only collected from a handful of cities and, according to some reports, only from the most expensive areas within those cities. As most Chinese still live in rural areas, the prices collected are unlikely to be representative of those facing the population as a whole. On the other hand, prior to the ICP 2005, China had never participated in a survey at all, and price levels were inferred from other data. The choice between inferred data, versus direct, if imperfectly measured data, is not easy to make.

One implication of the new series is that historical per capita GDP figures have also been revised down in PPP terms. Taking the new Chinese GDP per capita and extrapolating backwards with official Chinese real growth yields a GDP per capita of less than USD300

[7] World Bank (2008) p. 9 [Global Purchasing Power Parity].

[8] A positive sign means that prices were raised by the specified amount, also implying that real incomes in PPP terms are reduced by a corresponding amount.

(2005 PPP) in the 1960s. That would mean that at that time China had one-fifth the income level of the average poor country today, or one-third of Ethiopia or Malawi today. Such figures do not seem credible. This would place China's income level at just a bit over half of what Angus Maddison (2009)[9] estimated in his detailed accounting of Chinese growth.

The point being made is that globally comparable data is not very accurate. We can probably be more confident of changes over time than in levels of income when comparing across countries. It is therefore less interesting to place too much emphasis on a precise definition of the middle class range. The focus should be on changes over time of the number of individuals falling into a specific category, even if that has an element of arbitrariness about its boundaries.

[9] Angus Maddison "Statistics on World Population, GDP and per capita GDP, 1-2006 AD" (updated March 2009).

III. MEASURING THE GLOBAL MIDDLE CLASS

The global middle class has been measured by looking at the cross-country distribution of income. Quah (2002) graphs this and suggests that there is an emerging "twin peaks" in global income. This approach, however, neglects country size and intra-country income distribution. It implicitly assigns the same weight to China as to Timor Leste.

To get around this problem, Milanovic (2009) uses population weights to estimate international inequality. This measure is useful when considering the welfare implications of changes in international inequality. It certainly makes a difference to our concept of what is happening to inequality in the world if the 2.5 billion people in China and India are converging with the West in terms of living standards, compared to what happened when the city states of Hong Kong and Singapore were converging rapidly in the 1970s.

International inequality differs from global inequality. The former refers to population-weighted changes in the distribution of mean country per capita incomes. It does not concern itself with within country inequality. Global inequality, on the other hand, tries to position every individual in the world on the same scale. Milanovic suggests that the global Gini coefficient using this measure may amount to 70 per cent in 2002.

Sala-i-Martin (2002) was the first to combine micro household survey data with macro data to derive the global distribution of income. He notes that this exercise requires, in principle, knowledge of the income level of every person in a common currency. That is obviously not available in practice. He estimates a kernel density function for each country from available income share data, and uses this to derive estimates of each individual's income.

I follow this approach. I develop estimates of the size of the middle class for 145 countries, accounting for 98 per cent of the world's population and 99 per cent of its GDP. These countries have both household surveys, from which household income distribution can be measured, and national income accounts from which total household consumption expenditures can be measured. For 14 small countries, household surveys are not available. For completeness, I assign the same income distribution to these countries as the mean for the surrounding region[10]. From the World Bank's household surveys, I obtain the distribution of household

[10] The countries are small and do not affect global trends. The alternative would have been to simply discard the countries, but the option of interpolation seems preferable. This is the approach followed by Bourguignon and Morrisson (2002).

income by decile[11]. This is then inputted into the World Bank's PovCal software to estimate the distributional parameters of a quadratic Lorenz curve[12].

The remaining parameter to be estimated is the mean of the distribution. World Bank (2007) uses the mean from household surveys. Sala-i-Martin (2002) uses GDP per capita. I choose to use the national income accounts measure of total household consumption expenditure in 2005 PPP dollars[13]. This best reflects the concept of purchasing power and the market for consumer goods and services which I have focused on as the key characteristic of the middle class. Mostly, the trends in these variables follow each other closely, so changes over time are not affected too much by the choice of mean. But in some cases, there can be a significant difference. India is one of those cases which has been analysed in detail by Deaton and Drèze (2002), who make adjustments to both household surveys and national accounts data to come up with comparable estimates of poverty changes over time[14].

Given the mean and distribution parameters, PovCal generates a headcount of those living below any given expenditure threshold. The number in the middle class is defined as the difference between the number of people with expenditures below the USD100 per day threshold and the number with expenditures below the USD10 per day threshold.

Using this measure, there are 1.8 billion people in the global middle class (Table 1), concentrated in North America (338 million), Europe (664 million) and Asia (525 million). The US leads among individual countries, with some 230 million. The EU has almost 450 million middle class consumers and Japan has a further 125 million. Not surprisingly, there are very few middle class in sub-Saharan Africa: about 32 million or roughly the same as Canada.

The numbers of the global middle class hide the differences in purchasing power. The range for what constitutes a middle class consumer is quite broad, so someone in the Chinese middle class does not spend as much as someone in the US middle class. The data bear this out. The North American middle class accounts for substantially more of global spending than its population share, while the reverse is true of Asia's middle class. The US is home to 12 per cent of the world's middle class in terms of absolute numbers of people, but it accounts for USD4.4 trillion (21 per cent) of the USD21 trillion in global spending by middle class consumers. The difference is because the US middle class is much wealthier than the average global middle class consumer.

[11] World Bank household survey data for developing countries are found in the PovcalNet database (http://go.worldbank.org/NT2A1XUWP0); data on advanced countries are found in "Inequality Around the World: Globalization and Income Distribution Dataset" (http://go.worldbank.org/0C52T3CLM0). Both accessed December 2008.

[12] The PovCal software can be downloaded at http://go.worldbank.org/YMRH2NT5V0. For a full discussion of the calculations involved, see Datt (1998).

[13] National income accounts data are from the World Bank's World Development Indicators (http://go.worldbank.org/U0FSM7AQ40). Accessed August 2009.

[14] "Poverty and Inequality in India: A re-examination", Center for Development Economics, Working Paper #107.

Table 1. **The Global Middle Class, 2009: People and Spending**

	Number of People (millions and global share)		Consumption (billions PPPUSD and global share)	
North America	338	18%	5602	26%
Europe	664	36%	8138	38%
Central and South America	181	10%	1534	7%
Asia Pacific	525	28%	4952	23%
Sub-Saharan Africa	32	2%	256	1%
Middle East and North Africa	105	6%	796	4%
World	1845	100%	21278	100%

IV. PROJECTING GDP AND TRENDS IN THE GLOBAL MIDDLE CLASS

To understand trends in the global middle class, I develop a scenario for GDP growth for each country and assume that the income of each household in a country grows at this rate. The details of the scenario methodology are provided in Annex 1, but broadly speaking I use the same techniques as Goldman Sachs in their pioneering scenario work, starting in 2003[15].

I develop separate growth projections for 145 developed and developing countries, comprising 98 per cent of global output. Taking a stylised view of the world, I classify these countries into one of four categories, each with GDP growth drivers that have different parameters—hence the model is called the Four Speed World[16].

At the outset, it is important to emphasize that like all long-run models, the purpose is illustrative, to foster debate through presentation of a scenario rather than predict the future. Within broad analytical categories that might shape country economic performance, there will inevitably be large variations between countries, which we leave unexplained, and equally large variations for any given country over time. The purpose is not to develop forecasts or projections for any country or any time period, but to indicate a scenario of the contours of the global economy over the next three decades.

The basic framework is a constant-returns-to-scale Cobb-Douglas production function with growth for each country dependent on capital accumulation, labour force growth, and technological improvements[17]. Capital accumulation is determined by investment which is assumed to remain at the average rate of the ten years, 1998-2007. Labour force growth is taken from UN population projections of the working age group of 15-64 year-olds.

What remains is the estimation of technological improvements.

Following Goldman Sachs and others, I assume that the rate of technological improvement in each country has two components. First, the global technology frontier is shifting out with new advances in science, new products and new processes. Second, most countries are operating within this global frontier and can catch-up rapidly. I assume, like others, that the rate at which catch-up occurs is inversely proportional to the gap between the per capita income level of the country and that of the United States which is represented as the global

[15] "Dreaming with BRICs: the path to 2050", Goldman Sachs.

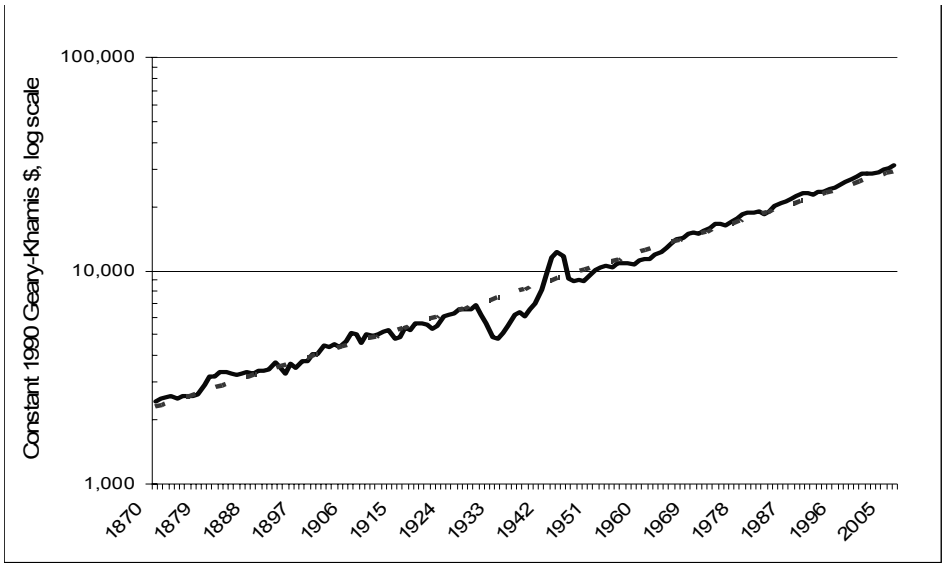
[16] See *The Four Speed World,* Wolfensohn Center for Development (forthcoming) for more details.

[17] That is, $Y = AL^{\alpha}K^{\beta}$, where $\alpha + \beta = 1$.

leader in technology. That is, countries with very low income levels can catch-up fast, while countries which are closer to the United States will see their technological improvement slow down.

The rate at which the global technology frontier moves out is taken as 1.3 per cent per year. Given the historical rate of capital deepening in the United States, this parameter yields an estimate for US labour productivity growth of 1.8 per cent, the average long-run, rate which has been observed for the past 125 years. As Figure 1 shows, this rate has been very stable over time and can therefore be taken as a good proxy for future potential technology growth. In this sense, the model does not rely on any "new economy, information technology" assumptions and is calibrated to replicate the long-run history of global growth.

Figure 1. **Real US GDP per capita, 1870-2006**



Source: Maddison, A.

By assigning rapid catch-up technological progress to all countries with income levels below that of the United States, the model would tend to produce fast rates of convergence in income levels across the world. As a matter of practice, this has not occurred. Convergence has actually been limited to a small sub-set of developing countries. These countries have shifted resources into high productivity activities demanded by the world. In this way, their productivity growth has been driven by domestic structural changes that have leveraged the global economy to produce rapid technical change. It is useful to call this group of countries "convergers" because the strategies they have adopted, including an outward orientation, appear to have resulted in long-run income convergence with advanced countries[18].

[18] See Phillippe Aghion and Peter Howitt, "Appropriate Growth Policy," Schumpeter Lecture, *Journal of the European Economic Association, Papers and Proceedings* (2006) on why Europe converged with the US after WWII, but more recently has faced slower tfp growth.

There is also a group of middle income countries which appear to have become trapped and are either not converging with the rich countries or converging very slowly. The "middle income trap" is a name for countries that appear squeezed between low wage, poor developing countries that can outcompete them in standardized manufacturing exports, and high-skilled, rich countries that grow through innovation. Countries in the middle income trap have yet to find a growth strategy that can navigate between these other competitors.

Last, there are a number of poor countries which, for reasons of conflict, poor governance or adverse geography have stagnated in poverty. Paul Collier identifies a number of "low income traps" that these countries have been unable to escape[19].

The classification of non-convergers into low and middle income groups is done based on the World Bank's classification of their Gross National Income per capita levels as of 2005. The cut-off income level is USD875[20].

This gives a typology of four groups of countries:

- Affluent, advanced economies, with rather low rates of technological progress.
- Converging developing economies closing the income gap with the United States.
- Stalled, middle income developing economies with no convergence trends.
- Poor, low income developing economies with no convergence trends.

The classification of countries into these categories depends on (i) their income level in 2005 (our base year); and (ii) their demonstrated tendency towards convergence.

We consider countries that have had sustained growth of more than 3.5 per cent per capita over 25 years to be included in the convergence group[21]. This implies that Russia, India and China are included as convergers, but not Brazil where per capita income growth has been much more limited even since the stabilization programme of the mid-1990s.

There are several surprises in the category of converger countries. Many would dispute the inclusion of Russia and the exclusion of Brazil (especially given its recent discovery of massive oil deposits) and South Africa, for example. We would like to emphasize that the classification does not necessarily represent our views of country prospects. But we felt it preferable to have a quantitative formula to drive the allocation, rather than to attempt to impose our own predispositions and beliefs about countries. What is more, we do not have the expertise to seriously review all 145 countries, so some quantitative shortcut method is inevitable. Figure 2 shows how each country is classified into our Four Speed World categories. Each colour represents one of the four country groupings.

[19] Paul Collier, *The Bottom Billion,* (New York: Oxford UP, 2007).

[20] Data taken from World Develoment Indicators, on-line, accessed 2008.

[21] For transition economies, the criterion is 3.5 per cent per capita growth or more between 1995 and 2005.

Figure 2. **The Four Speed World**

Once potential growth rates are formulated, I apply them to a base year to generate a series that can be projected into the future. The base year is taken as the three-year average GDP in 2005 to 2007, all measured in PPP terms. To build global output, I simply aggregate individual country output.

To summarise the model, I identify four drivers of global economic growth:

- Technological advance of the global production frontier at the rate of 1.3 per cent per year[22].
- Catch-up technology in a group of fast-growing convergers who are in the midst of a process of shifting resources from low to higher productivity activities; the speed of catch-up depends on each country's income level relative to the US.
- Capital accumulation, derived by assuming each country maintains its investment rate at its historical average.
- Country specific demographic changes of the 15-64 age group, assuming constant labour force participation rates in each country.

[22] This tfp rate is consistent with the US long-term labour productivity growth of 1.8 per cent.

What are the main differences between this Four Speed World model and other global models?

- I have a sample of 145 countries[23]. Many countries have small GDP but large populations and the larger sample allows a better understanding of the interaction between demographic trends and economic trends. It also means I can compute trends for geographic regions and local neighbourhoods, like South Asia.
- I do not assume all countries converge with the US. Importantly, I classify Brazil and Mexico for now as being caught in the middle-income trap rather than as being part of the group of converging globalizers.
- I base parameters for capital accumulation and total factor productivity growth on actual data and estimations, rather than on *ad hoc* assumptions. For example, in their 2003 study, Goldman Sachs assumed an investment rate for India of 22 per cent of GDP and a growth rate of 6 per cent. In actuality, India's investment rate today has risen to 36.7 per cent and even in the face of the current crisis, 6 per cent growth seems low[24].

The modelling framework may appear overly deterministic and devoid of policy content, but several of the variables reflect policy choices. For example, some analysts emphasize the role of undervalued exchange rates in promoting rapid growth over long periods of time[25]. In our model, this same outcome is achieved as undervalued exchange rates lower a country's income level relative to the United States and induce more rapid technological growth. As another example, openness and other reform measures may show up in higher investment rates as businesses enter new sectors or may be captured by a demonstrated track record of convergence, boosting projected tfp growth. Implementation effectiveness, governance and institutional development are captured by giving higher rates of technical progress to countries with demonstrated high levels of growth which are indicative of their institutional depth. Indeed, the countries in the four tiers show a pattern of governance that reflects their performance: affluent countries do best, followed by the convergers, stalled and poor, in that order[26]. Thus, deep policymaking structures are captured in our model through higher rates of technological change and investment, even though actual policies themselves are not specified.

[23] Goldman Sachs first looked only at 6 developed countries and 4 BRIC countries, and then extended their analysis to a further 11 emerging economies. PWC look at 30 emerging economies.

[24] Indeed, in their 2007 update, Goldman Sachs analysts Poddar and Yi raise their sustainable growth forecast for India to 8 per cent through 2020. See Tushar Poddar and Eva Yi, "India's Rising Growth Potential," *Goldman Sachs Global Economics Working Paper*, No 152 (2007).

[25] Surjit Bhalla, "Indian Economic Growth, 1950-2008", (October, 2008), available at: http://oxusresearch.com/downloads/CE140309.pdf.

[26] Means of governance values in the Kaufmann, Kraay, Mastruzzi index. The pattern of mean values by tier is the same across all six of the KKM indicators.

Global Growth Results

The global economy may fall in size to USD53 trillion, measured at market exchange rates, in 2009, dominated by the United States, with a USD13.6 trillion economy, just over one-quarter of the global total. In PPP terms, global output may reach almost USD63 trillion. North America (24 per cent), Europe (27 per cent) and Asia (34 per cent) dominate the world economy.

The BRICs accounted for about 24 per cent of 2009 global output in PPP terms, a post-war historical high. This is a recent phenomenon, one driven largely by China which has expanded its global market share to almost 13 per cent. Even at market exchange rates, China is set to overtake Japan as the world's second largest economy, either this year or next. Importantly, the rich countries of the world only account for 53 per cent of global output now, compared to 70 per cent in 1990. This is one reason why global growth (calculated using a chain-weighted method) may actually accelerate: the share of fast growing economies is much higher than was the case twenty years ago.

By 2034, 25 years from now, the global economy may be USD200 trillion in PPP dollars[27].

Such a world is very different from the one we see today. It is significantly wealthier, with per capita incomes averaging USD21300 as compared to USD8000 today. The economic centre of gravity would shift to Asia, which accounts today for 34 per cent of global activity, but by 2034 could account for 57 per cent of global output. Three giant economies, China, India and Japan, would lead Asia's resurgence. But other large countries like Indonesia and Vietnam would also have significant economic mass. Even Thailand and Malaysia could have economies larger than France has today.

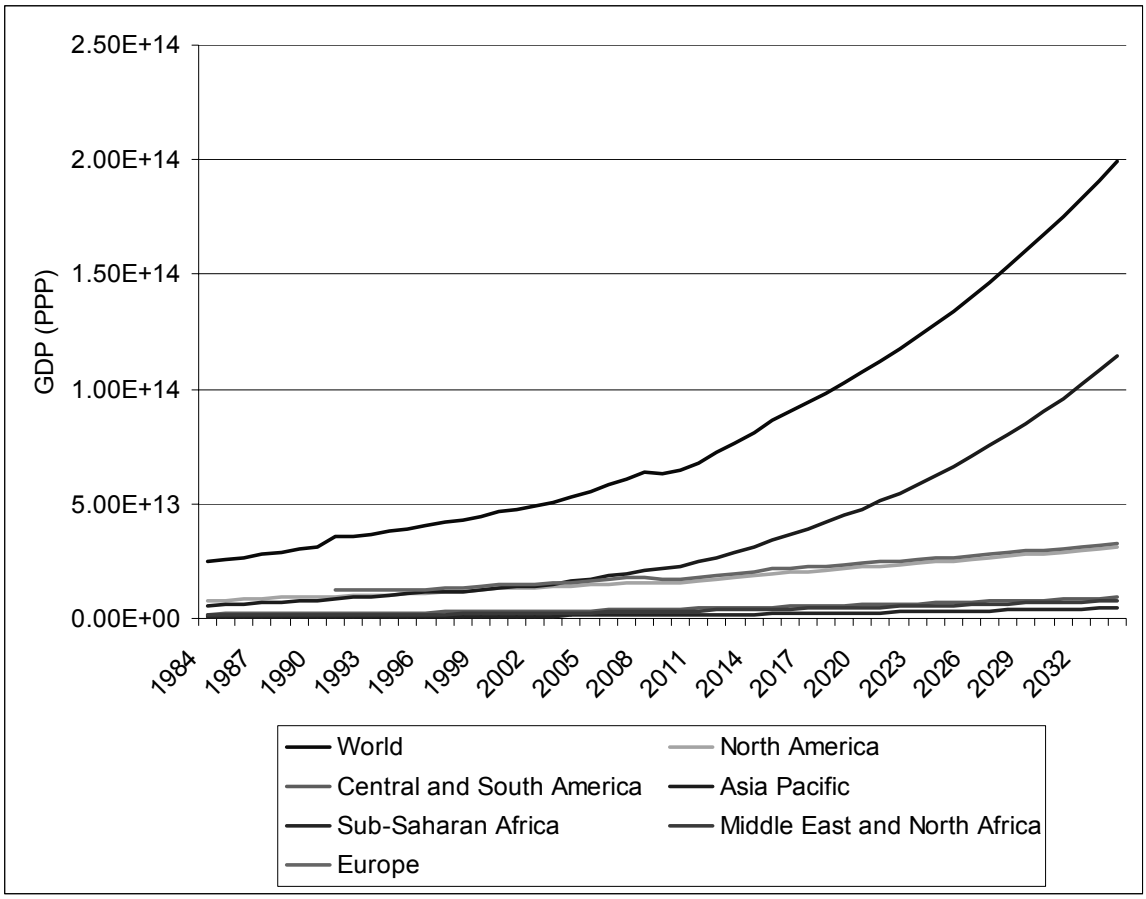
The rise of Asia would not be unprecedented. Indeed, it would bring Asia's economic share into line with its population share and restore the balance of global economic activity to that in the 18th and early 19th centuries, before the Industrial Revolution led to the great divergence of incomes across countries.

The converse of Asia's rise would be a fall in the share of the G7 economies. Their global income share has already fallen to new post-World War II lows, and by 2034 it could be just under one-quarter of the world, or 24 per cent.

To appreciate the likelihood of this enormous change, consider the following facts. Taking out the effect of general inflation, the global economy reached USD20 trillion, in terms of 2005PPP dollars, in 1977. It took 19 years to double to USD40 trillion by 1996—with 3.6 per cent annual growth. Over the next 10 years, from 1996 to 2006, annual growth has been 3.7 per cent. To get to USD200 trillion by 2034, global growth from today would need to be 4.7 per cent.

[27] I have ignored natural resource constraints and the effects of climate change in this scenario. This may prove to be quite unrealistic but to take these into account would require a far more sophisticated model of global growth.

Figure 3. **World Economic Output Over 50 Years, 1984-2034 (2005 PPP dollars)**

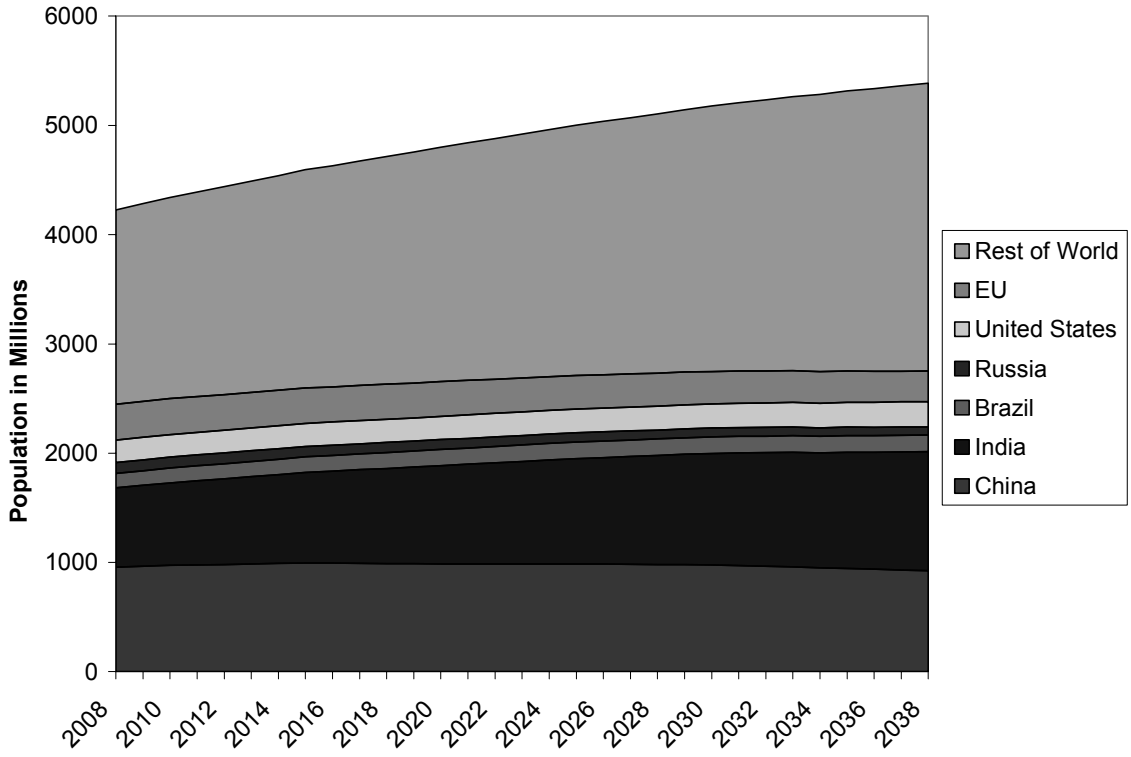


The reason for expecting an acceleration of global growth is that the share of rapidly growing economies has now risen to almost one-half of total output, while the share of slow growing countries has fallen. Our model assumes that rich country real potential output growth will slow in the next 30 years to 2.3 per cent, from 2.5 per cent over the last 10 years. Meanwhile the "convergers" could also slow to 8.2 per cent, close to the 8.4 per cent over the last 10 years.

In other words, although growth is slowing in individual country groups, overall global growth (chain-weighted) will accelerate simply because of the larger share in global output from fast-growing countries.

One reason developing countries are growing faster than developed countries is that they are younger, still at an early phase in their demographic transition. Global demographic shifts are inexorably changing the distribution of global economic activity. Today's rich countries accounted for 22 per cent of the world's people in 1965, but only account for 15 per cent today, and their share is forecast to shrink to 13 per cent of the world total by 2034. Overall, the world will add 1.6 billion people by 2034. But the population in today's rich countries will grow by only an estimated 90 million. Ninety-five per cent of the population increase (excluding migration) will be in developing countries.

Figure 4. **The Global Labour Force, 2008 to 2039**



The Impact of the Global Economic Crisis

The fallout from the economic crisis has been quick and painful. In September 2008, the year-long tremors in the US housing market developed into a full-fledged financial crisis that quickly spread to all developed countries. When the real economies of advanced countries stalled, so did global demand, dashing hopeful talk of 'decoupling' even in rapidly growing emerging economies. In a matter of months the IMF revised downward its global growth forecast for 2009, from 3.0 per cent last October to 2.2 per cent in November to just 0.6 per cent in January and now -1.3 per cent in April. This makes 2009 the first year of global economic contraction since World War II. Global output is expected to decline back to 2007 levels.

The depth and the duration of the global recession are currently being hotly debated amongst academics and policymakers. Most take the experience of the Great Depression as indicative of what may happen. Then, as well as in post-War recessions, growth exceeded its long run average during a recovery phase before returning to trend, compensating for the down period[28]. There was little impact on permanent long-run income levels. But that period was

[28] For example, see the report of the US Council of Economic Advisers, "Economic Projections and the Budget Outlook," (28 February 2009), available at: www.whitehouse.gov/administration/eop/cea.

exceptional, given the level of destruction of human and physical capital during the war. Separating the "natural" recovery from the Great Depression from the effects of World War II spending is almost impossible. The relevance of that recovery for the current crisis may well be questioned.

Notwithstanding, the post-War experience with recessions is that as the recovery gathers steam, countries grow faster than potential output. While the depth and the duration of the global recession are hotly debated amongst academics and policymakers, many do not foresee a permanent impact. When the crisis does abate, growth is likely to exceed its long run average during a recovery phase before returning to trend, compensating for the down period[29].

This premise remains controversial. The IMF has reviewed the history of financial crises and concludes that while medium term growth recovers to trend levels, output remains below trend, by an average of 10 per cent[30]. However, the IMF analysis is simply a description of what has happened compared to pre-crisis trends. This kind of analysis has a systematic bias: the pre-crisis trend (which the IMF takes as ten to three years prior to the crisis) may be part of a longer-term boom which in turn precipitates the crisis, and as such should not be counted as the long-term trend growth rate.

These debates underline an essential point of this paper. The forward looking figures are one scenario of what the world could look like, not a projection or forecast.

The Shift to Asia

The changes represented above mark a significant shift in the global economy towards Asia. Figure 5 graphically depicts this by pin-pointing the centre of gravity of the world's economic mass. For simplicity, I assume each country's economic mass is concentrated in its capital city. If the world is thought of as a two-dimensional plane, with its origin at zero degrees latitude and zero degrees longitude, then one can plot the point where the centre of gravity would lie, and trace the shift over time of that point[31].

In 1965, the global economic centre of gravity was somewhere in Spain. This is not surprising. The three great masses in the global economy were in Europe, the United States and Japan. All of these are in the Northern Hemisphere. The actual centre of gravity actually lay very close to an axis connecting Washington DC and Beijing (shown in orange on the map). Over time, two drifts in global growth are apparent: a slight movement to the south and a dominant one to the east. These shifts reflect the growth in the large emerging economies of the southern

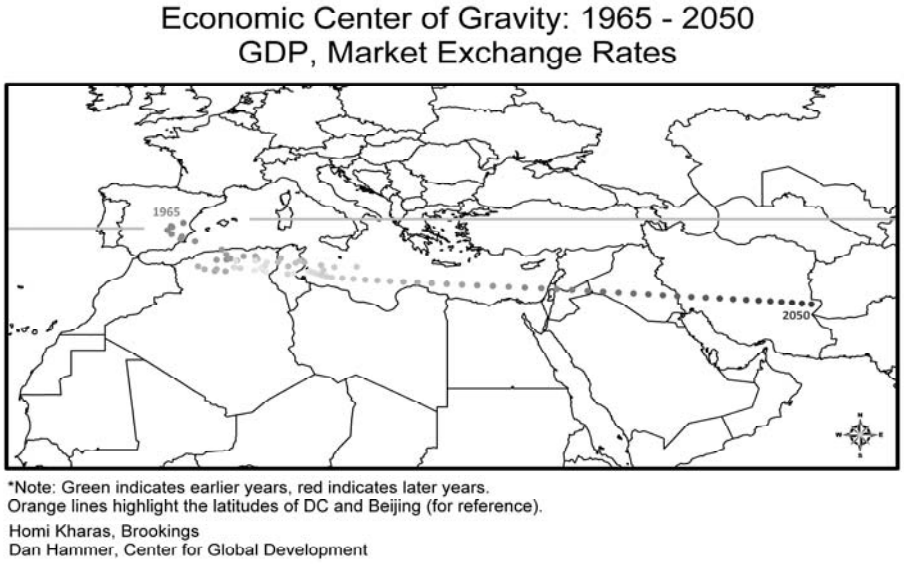
[29] *Ibid* footnote above.

[30] "World Economic Outlook", IMF, September 2009 Ch. 4.

[31] One degree of either latitude or longitude is not the same distance anywhere in the world, so an adjustment needs to be made. For this calculation, coordinates of global capital cities are projected onto a two-dimensional plane where the x- and y- coordinates are in meters, via the Global Sinusoidal (0) projection. The centre of gravity is then computed and plotted and presented in terms of the standard WGS84 map. Dan Hammer, Center for Global Development, graciously provided the maps and projections.

hemisphere. Brazil, Mexico and South East Asia became more prominent during this period. Even Japan and Korea are located south of the Beijing-Washington axis. Over time, in our scenario for the future, it is India, China, Indonesia and Vietnam that keep pulling the centre of economic gravity in the world to the East.

Figure 5. **The Global Economic Centre of Gravity Shifts East**



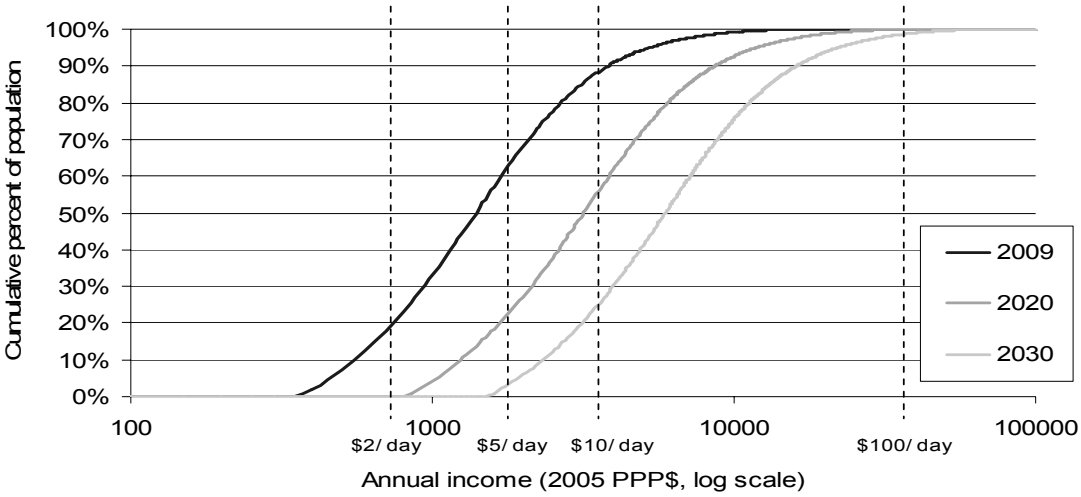
The Global Middle Class in the next 25 years

The growth scenario leads directly to a scenario for the global middle class. The mean of the household income distribution is given the same growth rate as GDP growth. The distributional parameters of the Lorenz curve are kept constant. The distribution therefore simply shifts to the right. Figure 6 illustrates for China. The graph shows the cumulative density function for household incomes, plotted against income thresholds on the horizontal axis. Each point on the graph represents the percentage of the population with incomes below the corresponding point on the x-axis. The graph shows that 20 per cent of China's population today lives in households with per capita income of less than USD2/day.

Actually, the exercise here does not strictly require holding income distribution constant. Rather, it requires that the share of income of those around the middle class in developing countries be held constant. This is a weaker assumption and, as suggested by Palma (2007), actual changes in income distribution have been dominated by changes in the top and bottom percentiles, rather than in the share accruing to the middle eight deciles. Those have remained relatively constant over time.

This procedure is repeated for all countries to derive the number (and spending power) of the middle class falling within our threshold levels of USD10/day to USD100/day per capita.

Figure 6. **China's Middle Class is Small, but Quickly Rises**



The figure shows why the growth of the middle class can differ so much from the growth of GDP or GDP per capita. If there are many people clustered just below the threshold level of USD10/day, then a small increase in income level can tip many of these people into the middle class income range.

Globally, the size of the middle class could increase from 1.8 billion people to 3.2 billion by 2020 and to 4.9 billion by 2030. Almost all of this growth (85 per cent) comes from Asia. The size of the middle class in North America is expected to remain roughly constant in absolute terms. This is because as many people graduate out of the middle class and become rich as move into the middle class from being poor. Europe enjoys some early growth in the numbers of the middle class, but then sees a fall as populations decline in Russia and elsewhere.

Table 2. **Numbers (millions) and Share (percent) of the Global Middle Class**

	2009		2020		2030	
North America	338	18%	333	10%	322	7%
Europe	664	36%	703	22%	680	14%
Central and South America	181	10%	251	8%	313	6%
Asia Pacific	525	28%	1740	54%	3228	66%
Sub-Saharan Africa	32	2%	57	2%	107	2%
Middle East and North Africa	105	6%	165	5%	234	5%
World	1845	100%	3249	100%	4884	100%

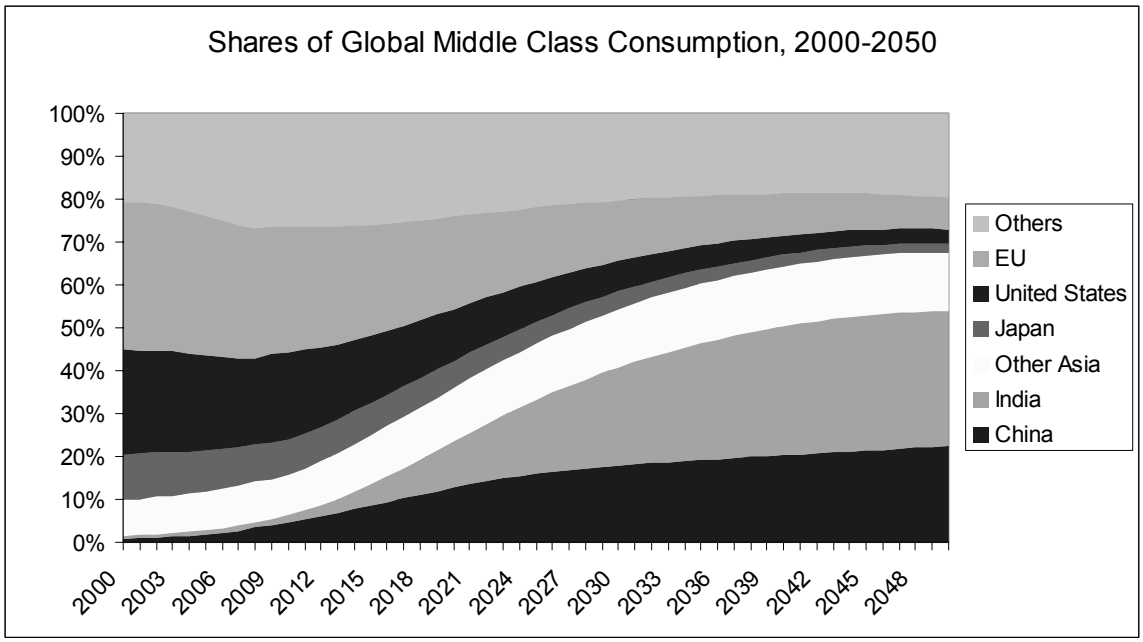
Equally striking is the growth in purchasing power of the middle class. Globally, demand from the middle class may grow from USD21 trillion to USD56 trillion by 2030. Again, over 80 per cent of the growth in demand comes from Asia. This shift in demand may well be disruptive of existing supply chains. The fact that Asian consumers may substitute for US consumers tells us simply that in numerical terms Asia could become large enough to offset the stagnant purchasing power most analysts see as likely in the developed world. It does not tell us anything about the nature of this demand in terms of what products will be consumed and where they will be made. But if the Asian middle class does rise, Asian savings may fall and redress current global imbalances to some degree.

Table 3. **Spending by the Global Middle Class, 2009 to 2030 (millions of 2005 PPP dollars)**

	2009		2020		2030	
North America	5602	26%	5863	17%	5837	10%
Europe	8138	38%	10301	29%	11337	20%
Central and South America	1534	7%	2315	7%	3117	6%
Asia Pacific	4952	23%	14798	42%	32596	59%
Sub-Saharan Africa	256	1%	448	1%	827	1%
Middle East and North Africa	796	4%	1321	4%	1966	4%
World	21278	100%	35045	100%	55680	100%

Figure 7 illustrates the shift. In 2000, Asia (excluding Japan) only accounted for 10 per cent of the global middle class spending. By 2040, this could reach 40 per cent, and it could continue to rise to almost 60 per cent in the long-term. The steep increase in Asian demand, and the replacement of US demand by Asian demand, is clearly seen as a trend that accelerates in the coming decade.

Figure 7. **India and China Make Waves in the Global Middle Class**



V. A NOTE ON CHINA AND INDIA

By far the most important countries in driving the trend towards higher middle class consumption in Asia are China and India. It is therefore worth discussing each country in some detail to understand the shifts that are described here.

China

China's middle class today is already large in absolute terms – at 157 million people, only the United States has a larger middle class. This is why so many retailers and businesses are already eager to penetrate the Chinese market. Though retail sales in the country have slowed from the 20+ per cent growth achieved in mid-2008, they continue to rise by a robust 15 per cent. In certain key industries reflective of middle class consumption, China is already rising to overtake the United States as the most important market. As recently as 2000, for example, the US accounted for 37 per cent of global car sales, while China accounted for barely 1 per cent. This year China is expected to account for 13 per cent of global car sales. Including trucks and buses, vehicle sales in China may surpass 13 million in 2009, which would make China the world's largest vehicle market. Five years ago General Motors sold 10 cars in the US for every one car sold in China; the ratio is now quickly approaching one to one, and soon China will be a bigger market than the US for America's largest automaker (People's Daily Online, 2009).

Similarly, China has recently emerged as the world's biggest cell phone market, home to an estimated 700 million subscribers (Lau and Menn, 2009). Last year Nokia, the largest cell phone maker in the world, had net sales of USD8.2 billion in China, more than three times its US revenues (Nokia 2008).

Survey evidence also suggests China's new middle class is eager to become the world's leading consumers. A 2007 survey of 6000 Chinese shoppers found that Chinese consumers spend 9.8 hours per week shopping, as compared to only 3.6 hours for the typical American (Chan and Tse, 2007). Additionally more than 40 per cent of Chinese survey respondents said shopping was a favourite leisure activity. It is such attitudes that have led global retailers to bet on the future of China's domestic market: in the 13 years since opening its first store in China, Wal-Mart has gone on to open an additional 257 retail units (Wal-Mart, 2009).

The issue in China is that its middle class is still very small (less than 12 per cent) as a percentage of the total population. That is one reason why China has been so reliant on investment and exports as drivers for its growth. If exports slow, the middle class is probably not yet big enough to take up the slack and propel growth forward at the rapid pace of the past.

In this regard, China would do well to look to the contrasting experiences of Brazil and South Korea. Between 1965 and 1980, Brazil grew at an average of 5.6 per cent per capita per year, becoming a middle-income country with a per capita income level of USD7600 (PPP). Yet due to its high income inequality, Brazil's middle class made up only 29 per cent of the country's population in 1980. This made it impossible for the country to rely on middle-class consumption to drive the transformation into an innovation-based economy. Since 1980 the country has remained primarily a commodity exporter, and has struggled to sustain growth. Per capita incomes today are only slightly higher than they were thirty years ago (0.7 per cent annual growth), and the middle class never took off, currently accounting for just 38 per cent of total population. Brazil's recent growth performance is more hopeful and it may yet join the club of convergers, especially if it can leverage recent oil finds into sustained growth.

South Korea followed a path similar to that of Brazil through the 1960s and 1970s, only a few years behind, growing by 6.5 per cent per capita annually between 1965 and 1986. By 1986, it too was a middle income country, achieving a similar per capita income of USD7700 PPP. Unlike Brazil, however, Korea's evenly-distributed growth had produced a sizeable middle class, which accounted for 53 per cent of the population. Even though luxury import goods were not available in Korea (and provision of foreign exchange for foreign holidays was not allowed until the late 1980's), the country capitalised on the demand from this large middle class to grow its services industries and create the building blocks for a knowledge economy, and has continued its strong per capita growth at a 5.5 per cent rate for another twenty years, in the process become one of the most advanced economies in the world. Today 94 per cent of Korea's population is middle class.

Japan also benefited from a sizeable middle class when growing from a middle income country to a rich country. In 1965, Japan's per capita income was USD8200 and its middle class was 48 per cent of the population. Japan was able to achieve per capita growth of 4.8 per cent per year for the next twenty years.

Today, China looks more like Brazil in 1974 (when Brazil also had a per capita income of around USD6000) than South Korea in 1983 (when per capita income was USD6300).

What can China do to increase the size of its middle class? At first glance, addressing income inequality may appear to be a solution. China's Gini coefficient (adjusted for spatial cost of living differentials) has risen to 45.3 by 2005. But in the short term this may not have the desired effect. The new middle class are coming from the group of those making USD5 to USD10 per day, outliers in China's income distribution. Lower inequality may mean that this group would see their incomes grow slower than average.

This is not to say that China's leaders should embrace income inequality: indeed there is a significant danger that China may fall into an inequality trap. Because access to health care and education are increasingly linked to income levels, with local governments unable to provide a public option, areas and groups with low income levels tend to have reduced rates of human capital formation which in turn propagate into further income inequalities over a lifetime of reduced earnings. In fact, differences in schooling and educational attainment are already the most significant determinants of income inequality in China (World Bank, 2009).

So addressing basic issues of equality of educational access and opportunity is a central long-term strategy. But in the medium term, the best strategy for increasing the size of China's middle class may lie not in attacking inequality but rather in increasing the share of consumption in GDP. In this respect, China's economy is famously unbalanced. Household final consumption today accounts for only 37 per cent of total output, well below the global average (61 per cent) and that of economies such as Vietnam (66 per cent), Indonesia (63 per cent), India (54 per cent) and Thailand (51 per cent).

The best way of increasing consumption is to increase the share of household income in GDP. Here there is more scope for direct and indirect policy action. In terms of direct measures, China is now enjoying a considerable accumulation of profits from state enterprises that in theory belongs to the people. In 2005, state enterprise profits totalled around 5 per cent of GDP and they have been increasing more rapidly than GDP since then. These profits do not get funnelled to the Treasury where they could substitute for income taxes and fees[32]. Instead they are retained in the enterprises and get directly reinvested. According to the US Bureau of Labor Statistics, the average take home pay of a Chinese worker is only 65 per cent of total compensation, with the difference being made up of social insurance costs, government mandated labour taxes, and a variety of insurance provisions (health, occupational safety, unemployment and the like) (Banister, 2005). If the profits from state enterprises were used to reduce these kinds of labour taxes, China's middle class, most of whom are salaried workers, would increase instantly.

Indirectly, if the same savings were channelled into public services that are currently paid for by households, such as health and education, similar effects could be achieved.

Financial sector reform can be another way that China can use to boost the share of household income. Some analysts argue that China's private sector firms have limited access to finance and so tend to limit employment (Aziz and Cui, 2007). As a result, the wage share in GDP has fallen from two-thirds in 1980 to just over one half of GDP today. This fall in the wage share is all the more remarkable as the growth of human capital in China has been very rapid over the period and as a large part of China's extraordinary growth has been due to the reallocation of labour from low productivity rural occupations to higher productivity occupations in manufacturing and services.

The World Bank's *Doing Business* survey found China ranking 61st in the world in terms of ease of access to credit. Investment climate surveys suggest that less than half of SMEs have a bank loan. Econometric results indicate that there is less employment growth in firms facing greater difficulties in accessing credit. According to Aziz and Cui (2007), the programme of bank restructuring in China emphasized stricter rules to minimize non-performing loans, leading firms to cut back further on employment. The corollary is that as banking reforms take root, and as privatisation and private enterprise growth moves ahead, employment growth could accelerate. This would raise the share of labour in national income and the share of household disposable income in GDP.

[32] China did abolish all taxes and fees on agricultural incomes as a result of strengthened public finances, but this has helped strengthen poverty reduction programmes rather than the middle class.

India

India faces many obstacles to sustained growth:

- The current economic crisis.
- Deficiencies in human capital and public infrastructure.
- Weak bureaucracy and judiciary.
- The middle-income trap.
- Social problems of poverty, migration and unemployment.
- An unstable regional neighbourhood.
- Global resource constraints.

It has, however, found a way to navigate through these problems since 1991. Every developing country faces a set of structural constraints that can potentially hold it back. If the country is sufficiently motivated and far-sighted, it can overcome such obstacles. That is why the track record of sound performance is so important in indicating the likelihood of continued success.

What is more, there are several reasons to be optimistic about accelerating Indian growth:

- The global economy could be set for faster long-term growth, thanks to the structural change towards developing countries.
- Growth in Asia will dominate, with India benefiting from neighbourhood effects—the fastest growing markets in the world will be closer to home.
- Indian investment levels and manufacturing growth have started to pick up.
- India has turned the corner on public sector debt—the share of interest to GDP that must be financed from budget resources has fallen since 2002, leaving more fiscal space for infrastructure spending.
- Indian demographics and urbanization are favourable.
- India's emerging middle class can drive growth in the same way as in other countries.
- The shift in values that underpins the political economy of reform appears to be well in hand in India.

To understand the effect of the shift of global economic mass towards Asia, look at what has been happening to India-China trade[33], growing at more than 50 per cent a year since 2002, to reach about USD37 billion in 2007. While overall trade was growing rapidly in both countries, the growth rate of bilateral India-China trade was twice the average growth in total exports from either country. China is already India's top trading partner. After adjusting for partner GDP, the propensity to trade between China and India is also higher than for any other major trading partner. Already, there are major acquisitions by Indian companies in China and vice versa. As these business ties deepen, the underpinnings of future trade growth will become stronger.

In other words, India's proximity to China, and by extension to the whole of East Asia, will factor in its projected growth acceleration.

[33] Anil Gupta, "The Future of India-China Trade," *Economic Times* (January 2008).

One factor that has traditionally held back aggregate growth in India has been the mediocre performance of its *manufacturing* and the relatively low level of investment and gross capital formation. From 1960 to 2005, Indian manufacturing never put together 10 consecutive years averaging more than 7 per cent growth. Many other countries, including such underperformers as Brazil, Côte d'Ivoire, Ethiopia, Kenya, Mexico, Pakistan, Philippines and Tanzania, had peak decadal manufacturing growth that exceeded India. As a result, Indian industry's share of GDP in 2006 was just 26 per cent (compared with 48 per cent in China). That may have changed. Indian manufacturing growth in 2007 reached 12.5 per cent. And subsectors dependent on engineering and information technology show considerable strength—autoparts, machinery, chemicals and other areas where supply chains with international firms are important.

Many reasons have been given for India's faster manufacturing growth. Some emphasize reforms and an outward orientation. Others point to macroeconomic factors such as low inflation, a depreciated rupee and low real interest rates. Still others point to the resolution of infrastructure bottlenecks. Doubtless all have played their role. What is important is that it is no longer necessary to question whether India can be unique in achieving rapid growth without strong manufacturing growth. The Indian model of service-led growth is giving way to a more traditional development model where both industry and services drive growth and job creation.

Reflecting this movement, Indian fixed investment has sharply increased in the past few years, steadily rising from 22 per cent of GDP in the 1980s to 25 per cent in the 1990s to more than 35 per cent in recent years. While still short of the levels attained in China and Vietnam, the acceleration of capital formation in India should position it well for future growth.

Bhalla has argued persuasively that investment in India has responded to a more depreciated real exchange rate (increasing the rate of return on tradeables like manufacturing) and to lower real interest rates (reducing the cost of capital)[34]. Such analysis underpins the notion that proper policies are required to sustain Indian growth at the levels outlined here. Growth will not happen automatically.

Investment has risen largely because of private sector response. But the public sector has also played a role. Public deficits have come down from around 6 per cent of GDP in the 1980s and 1990s to less than 4 per cent in the last four years (excluding the current stimulus packages). With the government investing only about 5 per cent of GDP each year in infrastructure, the bottlenecks have risen to significant proportions. But India now has the fiscal space to expand infrastructure spending as well as the ability to develop new partnerships with the private sector to provide funding and expertise. Public-private partnerships have been a model for rapid infrastructure expansion throughout the successful East Asian development experiences.

India is set to reap a demographic dividend. Its labour force should grow by more than 1.7 per cent a year over the next 30 years, while population growth is just over 1.2 per cent. So, the ratio of working age population to total population is on the upswing. In addition, India still has a relatively low labour force participation rate of 61 per cent. As the population becomes

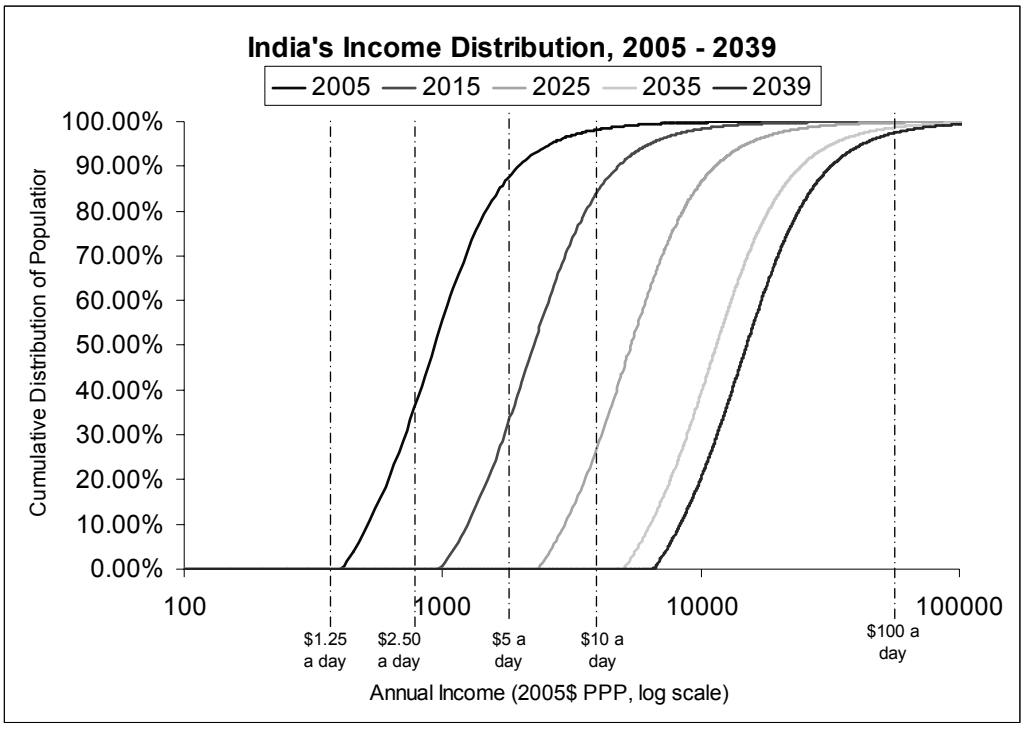
[34] Surjit Bhalla, *op. cit*.

more urban, rich and educated, participation rates are likely to rise. Goldman Sachs forecasts that 500 million people will be added to India's cities by 2039. It notes that 10 of the world's fastest-growing 30 urban areas are in India. To see the impact of demographics and urbanisation on labour force participation, look at China, which has a labour force participation rate of 82 per cent and a labour force of over 800 million, compared with India's 516 million. There is a possibility that higher labour force participation could add another full percentage point to India's labour force growth over the next 20 years bringing it up to 2.7 per cent.

The demographic dividend takes many forms. It provides for a rapid reduction in poverty as the dependency ratio shrinks. It gives families the means to save, accumulate and invest in their own well-being. Perhaps most important, it permits greater investment in children and human capital—the foundation for Indian growth for the next generation.

India could witness a dramatic expansion of its middle class, from 5-10 per cent of its population today to 90 per cent in 30 years. With a population of 1.6 billion forecast for 2039, India could add well over 1 billion people to its middle class ranks by 2039 (Figure 8). The figure shows that today very few Indian households would have incomes exceeding even USD5 per day. In fact, the mean per capita household expenditure in 2005 was just USD3.20 per day, according to the World Bank. But between 2005 and 2015, half the population will cross the USD5 per day line. Between 2015 and 2025, half the population will surpass the USD10 per day line, our definition of the middle class.

Figure 8. **India's income distribution**



Others have also highlighted India's burgeoning middle class. The McKinsey Global Institute, in a 2007 report[35], suggested that India's middle class would rise from 50 million to 583 million by 2025. According to McKinsey, this middle class comprises government officials, college graduates, rich farmers, traders, business people and professionals. These groups choose what they will consume, rather than be driven by the necessities of life. Such discretionary choices, reflecting the tastes of the new Indian middle class, will dominate consumption patterns.

Most analysts think about the middle class in terms of values as well as incomes. The World Values Survey provides some information on how Indian society is changing (Table 4). In 1995, 60 per cent of the Indian sample of 1275 respondents believed that in a democracy (such as India's) the economic system was doomed to run badly. A mere six years later, in 2001, this pattern was reversed: 60 per cent of respondents disagreed with the statement.

In 1995, only 47 per cent of respondents felt it important that their job be interesting. They valued pay and security as the only important elements of jobs. By 2001, while pay and security remained important, 74 per cent called job interest important. The percentage of respondents who felt that the opportunity to use initiative in a job was important rose from 46 to 64 per cent between 1995 and 2001. These data suggest a changing work ethic. Where interest and initiative are important, it is likely that labour productivity and job satisfaction will also be high.

Parents also feel that the qualities their children will need to get ahead have changed. From 1990 to 2001, there has been a striking increase in those answering that the following quality was important for their children: independence (30 per cent to 56 per cent); hard work (67 per cent to 85 per cent); thrift and saving (24 per cent to 62 per cent); and determination and perseverance (28 per cent to 46 per cent). In other words, the changing values associated with middle income families are already visible in India, and these changing values are conducive to economic development.

[35] Diana Farrell and Eric Beinhocker, "Next Big Spenders: India's Middle Class", Business Week, 19 May 2007. McKinsey's definition of the middle class is between USD23000 and USD118000, a somewhat narrower band than what we propose.

Table 4. **Changing Indian values**

Values	1990	1995	2001
Is Democracy good for the economy? (% No)		60	40
Is it important that your job be interesting (% Yes)		47	74
Is it important to be allowed initiative in your job? (%Yes)		46	64
What is most important for your child to get ahead?			
Independence (%Yes)	30		56
Hard Work (% Yes)	67		85
Thrift and Saving (%Yes)	24		62
Determination and perseverance (%Yes)	28		46

Source: World Values Survey, various years

VI. CONCLUSION

"The most important development, I believe, of the 21st century will be the rise of Asia. China has already trebled its share of world GDP over the past two decades and India has doubled it. Both these giant economies of Asia are bound to gain a considerable part of their share of world GDP that they had lost during the two centuries of European colonialism. . . . "[36]. This quote from India's Prime Minister, Manmohan Singh, encapsulates the optimism that continues to dominate economic scenarios for India, China and indeed Asia and the world.

In this paper, I have discussed one such scenario where China and India lead a global recovery. This scenario, importantly, does not depend on a rebound in US consumer demand. Instead, it depends on a sharp upsurge in demand from a new Asian middle class. I suggest that this new Asian middle class is large and growing rapidly, and that it is of sufficient size to provide the impetus for demand growth that the world needs.

The middle class has long had a special role in economic thought, and various roles have been attributed to it. I focus on the consumption role and define a global middle class as people with consumption in the range of USD10/day to USD100/day. Within this range, the income elasticity of consumption appears to be greater than one, and a range of new goods and services is demanded. Growth is driven by product differentiation, branding and marketing.

There are many uncertainties surrounding this scenario. Foremost is whether China's middle class will develop fast enough to sustain rapid growth in China if exports start to falter. Given China's unequal income distribution and the small current share of the middle class, it is not at all certain that this will be the case. There have been previous examples of large unequal economies failing to grow beyond middle income levels even after decades of strong performance. China risks falling into this trap. I propose several policy measures through which it could reduce the risk of this happening.

India, although poorer than China, has a sizable middle class that could overtake China's by 2020, even though India would still be much poorer than China at that time. India has a more even distribution of income than Chain and a much higher share of household income in GDP, so its middle class is larger given its income level. As India has the potential to grow rapidly for some years to come, its emerging middle class will strengthen and reinforce its growth.

[36] Manmohan Singh, "Remarks at the LSE Asia Forum," (New Delhi: 7 December 2006), available at http://pmindia.nic.in/speech/content.asp?id=463.

A second uncertainty relates to how the world will manage the shifting relative economic power towards Asia. Historically, there have been periods when major shifts in economic power were accommodated easily by the existing powers (as was the case for Japan's rapid post-war growth), but equally cases where frictions emerged and the transitions in economic power were highly disruptive. The scenario I develop assumes that such frictions will be managed, and the emergence of the G20 as an economic steering group for the global economy offers some hope that this will be the case, but it remains to be seen whether the domestic politics of the major economies are robust enough to adjust to the major structural shifts that are envisaged.

The scenario depicted here is optimistic. In a sense, it suggests that the current economic crisis is a sign of success, not failure, in the global economy. It came about because of the euphoria that rapid global growth was unstoppable. The imbalances that resulted have been costly. But they will hopefully result in more robust structures being put in place to manage the global economy. If that is indeed the case, then the underlying structural forces for global growth may be able to reassert themselves and usher in a new era of rapid progress, this time based on an Asian middle class.

ANNEX 1. PROJECTIONS METHODOLOGY[37]

Step 1: Historical database

Our first step was to create a country-level database covering the period 1965 – 2007, which both forms the basis for our projections and is useful for historical comparisons.

We begin by obtaining data on real GDP growth rates for each country from the World Bank's World Development Indicators 2007 (WDI)[38]. Where there are gaps, this is supplemented with data from the IMF's World Economic Outlook, Angus Maddison's historical dataset, the IMF's International Financial Statistics, and national sources.[39]. Real GDP in constant 2007 USD for the years 1965 – 2007 is calculated by taking current GDP in USD for 2007, again from WDI, and projecting backwards using these growth rates[40].

Data on GDP at current exchange rates is primarily sourced from WDI with missing data once again supplemented for certain countries and years as detailed in footnote 2. GDP at market

[37] Prepared by Geoffrey Gertz.

[38] Accessed July 2008.

[39] The IMF World Economic Outlook is used as the source for all growth rates for the years 2006 and 2007, as at time of writing World Development Indicators did not yet include this data. Angus Maddison's historical dataset (Maddison Historical Statistics, World Population, GDP, and Per Capita GDP, 1-2003 AD: Last Update August 2007 (http://www.ggdc.net/maddison/); Variable: GDP in million 1990 International Geary-Khamis dollars, 1820-2003) is used for Bahrain to 1979, Germany to 1970, Kuwait to 1993, UAE to 1972, Cambodia to 1986, Bosnia 1991-93, Indonesia to 1966, Mauritius to 1979, Mozambique to 1979, Vietnam to 1984, Angola to 1984, Jamaica to 1965, Jordan to 1974, Paraguay to 1988, Saudi Arabia to 1967, Serbia 1991-92, Swaziland to 1969, Turkey to 1967, Ethiopia to 1980, Gambia to 1965, Mali to 1966, Tanzania to 1987, Uganda to 1981 and Yemen to 1990. Prior to 1990, data for Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Uzbekistan, and Ukraine are combined under the heading former USSR, and data for East Germany, Albania, Bulgaria, Czech Republic, Slovak Republic, Hungary, Poland, Romania, Slovenia, Serbia & Montenegro, Croatia, and Bosnia & Herzegovina are combined under the heading Eastern Europe. These data series are constructed by summing the 1991 GDP values of the individual countries in the groupings and projecting backwards using Maddison's growth rates for Eastern European countries and former Soviet countries for the years 1965 to 1990. Cyprus data for the years 1965 to 1974 are from the IMF's International Financial Statistics. Taiwan data for the years 1965 to 2005 are from National Statistics, Republic of China (Taiwan), available online at http://eng.stat.gov.tw.

[40] Accessed July 2008.

exchange rates is calculated by deflating GDP at current exchange rates by US CPI obtained from the US Bureau of Labor Statistics[41]. GDP at purchasing power parity is obtained by taking the most recent World Bank estimates of GDP at PPP (for 2005) and projecting backwards using real growth rates[42]. All of our measures of GDP are also expressed in per capita terms, using population estimates from the United Nations Population Prospects dataset (2006)[43].

The database also includes information on each country's capital stock, which is necessary for our future projections of GDP. Our data coverage varies by country based on data availability, but in each case we calculate capital stock from an initial year (the earliest year for which data is available for that particular country) up to 2005.

For each country the initial capital stock (K_0) is calculated according to the following equation, following the method of Caselli and Feyrer (2007)[44]:

$$K_0 = \frac{I_0}{(\delta + g)} \quad (1)$$

where I_0 is investment in constant 2000 USUSD for the initial year, as provided by WDI[45]; δ is the depreciation rate, set at 0.06 following Caselli and Feyrer and based on economic consensus; and g is the average real GDP growth rate for the ten year period *following* the initial year, again taken from WDI[46].

Given the initial capital stock, the capital stock in each subsequent year up until 2005 is calculated according to the following equation:

$$K_t = K_{t-1} \bullet (1- \delta) + I_{t-1} \quad (2)$$

[41] United States Bureau of Labor Statistics Databases and Tables accessed July 2008 (http://data.bls.gov/PDQ/servlet/SurveyOutputServlet); Variable: Consumer Price Index - All Urban Consumers, not seasonally adjusted, US city average, All items, with base period 1982-1984=100, for years 1965-2007.

[42] "Global Purchasing Power Parities and Real Expenditures", 2005, International Comparison Program, World Bank, 2008.

[43] The United Nations Population Prospects dataset (2006) provides estimates for every fifth year (e.g. 1965, 1970, 1975, etc). Estimates for between years are calculated using compound annual growth rates (CAGR).

44 "The Marginal Product of Capital," Francesco Caselli and James Feyrer, Quarterly Journal of Economics, May 2007.

[45] Accessed July 2008.

[46] Accessed July 2008. We have investment data for two-thirds of the countries from at least 1975, and for all but three (Bosnia & Herzegovina, Serbia, and Liberia) from 1992. For those countries where current USD investment is available more than 15 years before constant 2000 USD investment, we use the current USD investment and convert it into constant 2000 USD by multiplying the figure by the ratio of constant 2000 USD GDP to current USD GDP for the relevant year.

The depreciation rate (δ) remains constant across time at 0.06. As with initial investment I_0, investment (I_t) is given in constant USUSD and comes from WDI[47].

Step 2: Constant GDP projections, 2007-2050

The heart of our model is constant GDP projections for the years 2008 through 2050, using a simple Cobb-Douglas function in which GDP is a function of labour (L), capital (K), and technological progress or total factor productivity growth (TFP). For each year GDP is estimated according to the following equation:

$$Y = TFP \bullet L^{\alpha} \bullet K^{(1-\alpha)} \tag{3}$$

where α equals 2/3 based on historical evidence and economic consensus. We follow an iterative process to obtain GDP projections based on estimates of labour, capital and total factor productivity for each subsequent year.

For labour (L) projections we again turn to the United Nations Population Prospects (2006) dataset to obtain estimates of the working age population (15-64) by country for every fifth year up to 2050. Figures for intervening years are calculated using CAGR. We calculate the size of the economically active population for each country by multiplying these figures by the labour force participation rate from WDI[48].

Our capital (K) projections build on our capital stock estimates from the historic database. As an initial step, we convert our estimated 2005 capital stock levels from constant 2000 USD to constant 2007 USD to ensure compatibility[49]. Capital stock projections follow a similar approach to equation (2). However, whereas previously the accumulation of new capital was based on actual investment, in our forward projections the accumulation of new capital is estimated by multiplying the previous year's GDP by the country's estimated *long run investment rate* $i_{95\text{-}05}$, equal to the average investment rate for the period 1995 to 2005[50].

$$K_t = K_{t-1} \bullet (1-\delta) + i_{95\text{-}05} \bullet Y_{t-1} \tag{4}$$

[47] Accessed July 2008. As with initial investment, where current USD investment data is available more than 15 years before constant 2000 USD investment data, we employ current USD investment data and convert it into constant USD using the same method.

[48] Accessed July 2008. Labour force participation rate data is available for all countries other than Serbia, Seychelles, Taiwan for which regional averages were used.

[49] We use a conversion ratio of 2005 GDP in constant 2000 USD to 2005 GDP in constant 2007 USD.

[50] The investment rate for each year is obtained by dividing investment by GDP (both in constant prices). Data from WDI, accessed July 2008. For Serbia and Liberia, we use a shorter average investment period due to data restrictions.

Total factor productivity (*TFP*) is our most complex calculation. The initial level of TFP for the year 2007 is calculated by re-arranging the Cobb-Douglas formula above (3), filling in actual GDP, labour, and capital figures for 2007. Future levels of TFP are then calculated according to the following equation:

(5)
$$TFP_t = TFP_{t-1}(1.013 - \beta ln(\frac{GDPpc_{i,t-1}}{GDPpc_{US,t-1}}))$$

Changes in TFP occur through two channels. As a first step, the basic rate of long-term technology growth is assumed to be 1.3 per cent, based on historical data[51]. This is the starting point for all countries' changes in TFP.

As a second step, we model changes in TFP as a process of convergence with the United States, with the assumption that as an economy grows closer to the per capita income levels of the United States, its productivity growth rate slows[52]. The speed of convergence (β) is set to 0.015 for all countries in tiers 1 and 2, based on their strong historical productivity and GDP growth rates. For all countries in tiers 3 and 4, β equals zero. This reflects the fact that these countries have struggled to produce dynamic growth and have failed to converge with United States living standards over recent years. For countries in tiers 3 and 4, the rate of TFP growth is therefore equal to 1.3 per cent.

Step 3: GDP at market exchange rate projections, 2007-2050

Once we have constant 2007 USD GDP projections using the Cobb-Douglas formula (3), we then estimate changes in exchange rates to express our forecasts at market exchange rates.

Real exchange rates are expected to appreciate as economies grow, approaching PPP exchange rates as economies converge with US living standards, as posited by the Balassa-Samuelson effect[53].

To project changes in the real exchange rate (RER), we begin by estimating the relationship between the real exchange rate and relative income levels by running the following simple OLS regression for all available countries, using mean data for the years 2005 through 2007 to smooth over short-term fluctuations[54].

[51] Note, this is broadly in line with the Goldman Sachs paper by Wilson & Purushothaman, "Dreaming with BRICs: The Path to 2050" (2003), which assumes long run US TFP growth of 1.33 per cent.

[52] Given the process of convergence, countries that begin with living standards above the US will see their TFP growth begin below that of the US but rising towards US levels (of 1.3 per cent) as their living standards converge.

[53] For a discussion of the Balassa-Samuelson effect see: I. Kravis & R. Lipsey, "Towards an Explanation of National Price Levels", Princeton Studies in International Finance, No. 52, 1983.

[54] Data from WDI, accessed January 2009. We include all countries in our regression for which there is data, excluding: countries whose population in 2007 was under 1 million; four countries who have rebased

(6) $$RER_{i,t} - RER_{i,t\ \ 1} + (1.174 - RER_{i,t\ \ 1})(\frac{RER_t^* - RER_{t-1}^*}{1.174 - RER_{t-1}^*}))$$

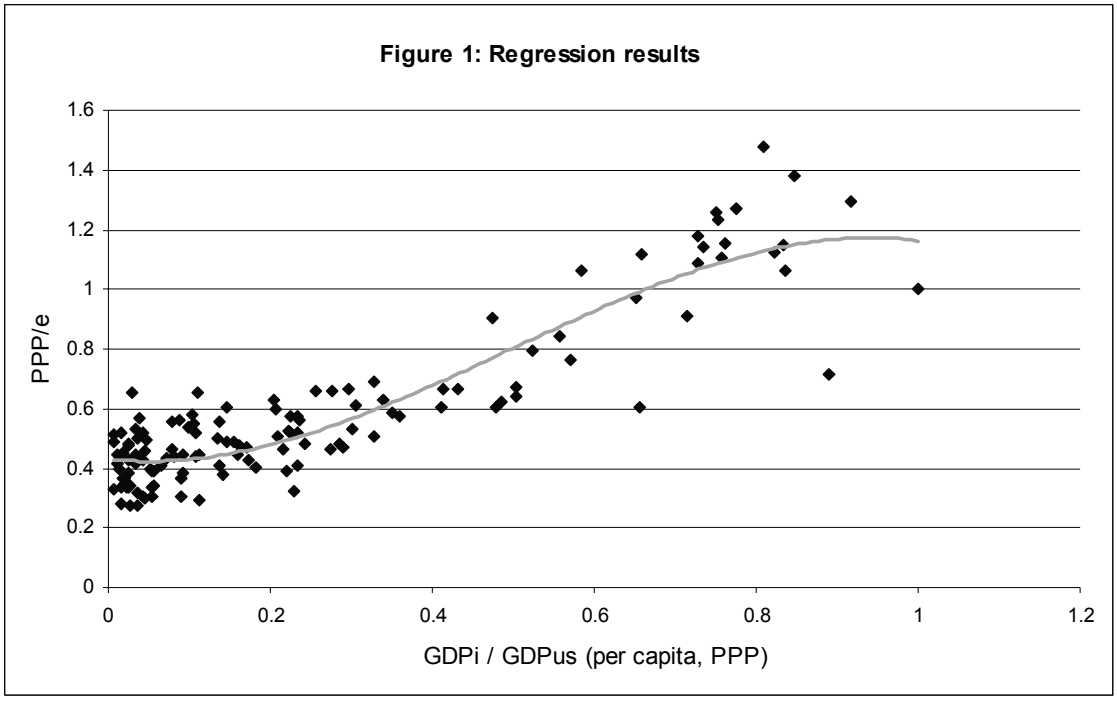
where PPP_i is the PPP conversion factor for country i with respect to the US (USD=1); e_i is the exchange rate of country i with respect to the US (USD = 1); $GDPpc_i$ is the GDP per capita (constant 2005 US dollars PPP) of country i; $GDPpc_{US}$ is the GDP per capita (constant 2005 US dollars PPP) of the US; α, β, γ and δ are coefficients and ε_i is the error term for country i.

We include power terms of the independent variable to capture the changing speed with which the real exchange rate appreciates as economies converge on US per capita income levels. Changes in the real exchange rate at different levels of convergence (or development) are expected to follow an S-shaped (logistic) curve, reflecting changes in the relative price of tradeables and non-tradeables as economies develop[55].

The regression results bear out this relationship, as illustrated by the fitted line of the regression results (Figure 1). The regression obtains coefficient values of 0.4317912 for α; -0.3184848 for β; 3.190494 for γ; and -2.140511 for δ. The R-squared value is 0.8248, demonstrating the regression's high explanatory power.

their currency regimes during the 3 year period (Sudan, Mozambique, Venezuela and Ghana); three countries for which the currency and PPP data are at odds (El Salvador, Syria, Myanmar); and 8 countries whose average per capita income between 2005 and 2007 (constant 2005 US dollars PPP) exceeded that of the US (Macao, Kuwait, Singapore, United Arab Emirates, Brunei, Norway, Qatar and Luxembourg). This leaves a total sample of 132 countries.

[55] Second Among Equals: The Middle Class Kingdoms of India and China; Surjit. S. Bhalla, 2008.



The regression results suggest that an economy's real exchange rate, as measured by PPP/e, typically peaks at around 1.174. This is consistent both with our base year data, where a number of advanced countries are found to exceed parity with the US, and with others' estimates[56].

For 2007, the real exchange rate is approximated by the three-year average (2005-07) value of PPP/e. For each subsequent year changes in the real exchange rate for each country are projected using the following equation:

(7) $$RER^* = \frac{PPP_i}{e_i} = \alpha + \beta(\frac{GDPpc_i}{GDPpc_{US}}) + \gamma(\frac{GDPpc_i}{GDPpc_{US}})^2 + \delta(\frac{GDPpc_i}{GDPpc_{US}})^3 + \epsilon_i$$

where RER_i^* is an estimate of the real exchange rate, as determined by the regression results, given the ratio of an economy's average per capita income to that of the US at time *t*.

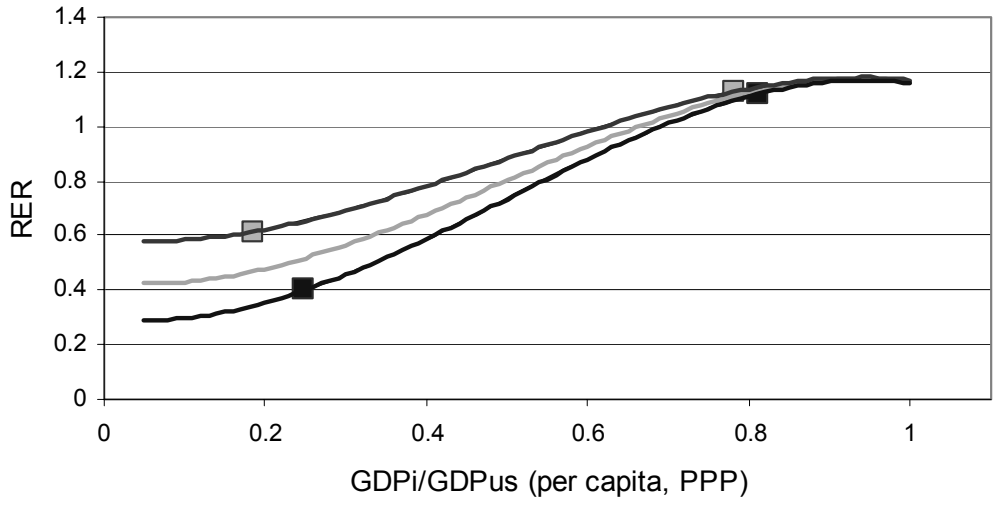
The projected real exchange rate level, for country *i* and time *t*, is a function of the estimated level in the previous year and an incremental change predicted by the regression curve based on changes in relative incomes. The final double-bracket term estimates the closure of the "real exchange rate gap" - the difference between the real exchange rate and its estimated maximum – in response to a change in relative incomes according to the regression. This rate of closure is then applied to the gap between the estimated maximum and the estimated RER_{it} for

[56] *Ibid* footnote above.

the previous year (the first bracket term) to obtain projected values of the real exchange rate for all countries on a yearly basis[57].

This results in estimated real exchange rate values which approach the fitted line of the regression as incomes converge with that of the US. For example, Figure 2 below traces the real exchange rate path of two outlier countries, Belize (red) and Belarus (blue), whose initial RER (as estimated by PPP/e) differs markedly from the fitted line. The markers indicate the years 2007 and 2050, illustrating how the RER deviation from the fitted line diminishes during the convergence process.

Figure 2: RER convergence process



The estimated real exchange rate values are based to 2007=1 and multiplied by our growth projections in constant dollars to obtain projections at market exchange rates.

[57] For countries whose real exchange rate is above the regression curve's highest point in the base year, the real exchange rate is assumed to remain constant. For countries whose per capita income level exceeds that of the US in the base year, the real exchange rate is assumed to remain constant. For countries whose per capita income level overtakes that of the US over the series, the real exchange rate is assumed to remain constant from the year in which it reaches its peak. For Ghana, Mozambique, Sudan and Venezuela, adjustment is made to accommodate the rebasing of currencies. For Myanmar, Syria, Taiwan, Turkmenistan and Uzbekistan, for whom accurate e values cannot be obtained from the WDI, we use 2005 real exchange rates obtained or derived from "Global Purchasing Power Parities and Real Expenditures - International Comparison Program", World Bank, 2005. For Zimbabwe, for which no estimate of the current real exchange rate can be obtained, we assume no change in the real exchange rate over the series.

Step 4: GDP at PPP exchange rate projections, 2008 - 2050

In addition to market exchange rates, we convert our constant GDP projections into purchasing power parity (PPP) terms. Our approach here is the same as that used to obtain historical data in PPP terms; we simply apply our future growth rates to the 2005 levels of GDP PPP as estimated by the World Bank.

Step 5: Per capita projections, 2008 – 2050

As with our historical data, all three of our GDP units (constant 2007 USD, market exchange rates, and PPP rates) are also expressed in per capita terms. We again rely on the UN Population Prospects projections of total population for each country.

Step 6: Poor, Middle, and Rich Class Projections

We next estimate how the size and make-up of the global poor, middle and rich classes will evolve between now and 2050 based on our growth projections. We define the global poor class as those living on less than USD10 a day, the global middle class as those living on between USD10 and USD100 a day, and the global rich class as those living on more than USD100 a day, all figures in 2005 USD PPP terms. To calculate the share of each country's population which belongs to each class, we require, in addition to our existing dataset, inequality measures and current estimates of mean consumption per capita (rather than simply GDP per capita) for all countries.

We begin by assembling a database on the share of total income accruing to each decile of the population for each country in our dataset. This data is obtained from two World Bank sources: the PovcalNet database, which contains the most up-to-date data (most frequently from 2005) for a wide-range of developing countries, and the Inequality Around the World: Globalization and Income Distribution Dataset, which contains data for both developed and developing countries (most frequently from 1998)[58]. From these two sources we choose the most recent data available for each country in our dataset. There are a total of 14 countries which are not represented in either database, primarily countries in the Middle East and small island economies. For each of these countries, we use the average available inequality data of the country's neighbours[59].

[58] The PovcalNet database and the Inequality Around the World: Globalization and Income Distribution Dataset can be found at http://go.worldbank.org/NT2A1XUWP0 and http://go.worldbank.org/0C52T3CLM0, respectively. Both accessed December 2008.

[59] Data are missing for Bahrain, Kuwait, Libya, Oman, Saudi Arabia, Syria and the United Arab Emirates; for these countries we use the average of Middle Eastern countries for which data are available: Algeria, Egypt, Iran, Jordan, Morocco, Tunisia and Yemen. Data are also missing for Belize (for which we use the average of Guatemala, Honduras, and Mexico), Fiji (for which we use Papua New Guinea data),

We transform this income share by decile data into Lorenz curves – graphs which plot the cumulative distribution of income against the cumulative population, moving from poor to rich – for each country using the World Bank's Povcal software[60]. The Povcal software produces three parameters – a, b and c – for the generalised quadratic (GQ) Lorenz curve for any given income distribution dataset[61]. These parameters are then used in the following equation to calculate the *headcount index* - the share of the population below any given income level:

(8)
$$H_z = -\frac{1}{2m}\left[n + r(b+2z/\mu)\ \{(b+2z/\mu)^2 - m\}^{-1/2} \right]$$

$$\begin{aligned} \textit{Note:}\quad & e = -(a+b+c+1) \\ & m = b^2 - 4a \\ & n = 2be - 4c \\ & r = (n^2 - 4me^2)^{1/2} \end{aligned}$$

where H_z is the headcount index for the income line z; a, b and c are parameters of the Lorenz curve computed using the Povcal software; and μ is the mean consumption level.

To obtain current estimates of mean consumption per capita, we use the World Bank's 2005 International Comparison Program database, which provides estimates of real per capita private consumption expenditure based on national accounts data, measured in 2005 international dollars (PPP)[62]. Plugging these mean consumption figures into the equation above enables us to calculate the percentage of the population living on less than USD10 a day and less than USD100 in every country. We multiply these values by our population data to derive the number of people in the global poor, middle, and rich classes in 2005.

To calculate projections of the evolving poor, middle, and rich classes, we simply apply our real GDP per capita growth rate projections to our 2005 consumption figures to obtain projected consumption per capita numbers and then recalculate the percentage of people living

Iceland (for which we use the average of Denmark, Finland, Norway, and Sweden), Malta (for which we use the average of Cyprus, Greece, and Italy), Mauritius and Seychelles (for which we use the average of Kenya, Madagascar, Malawi, Mozambique and Tanzania) and Sudan (for which we use the average of Central African Republic, Chad, Egypt, Ethiopia, Kenya and Uganda).

[60] This software can be downloaded from http://go.worldbank.org/YMRH2NT5V0.

[61] For a full explanation and discussion of these computations, see Gaurav Datt, "Computational Tools for Poverty Measurement and Analysis", FCND Discussion Paper No. 50, International Food Policy Research Institute, October 1998.

[62] There are 18 countries in our database for which the ICP does not provide this data: United Arab Emirates, Belize, Algeria, Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Honduras, Jamaica, Libya, Nicaragua, Panama, Seychelles, Trinidad and Tobago, Turkmenistan, Haiti, Uzbekistan and Burundi. For all these countries other than Burundi, we use the ICP estimates of PPP GDP per capita (see Table 8 in the methodology section of the ICP report), multiplied by the share of household consumption in GDP for each country taken from the World Development Indicators. For Burundi we do the same, except we use the 2005 GDP per capita PPP figure from the World Development Indicators as none is available in the ICP report.

on less than USD10 and USD100 a day using equation (7)[63]. Note that this implicitly assumes a) that consumption grows at the same rate as GDP, i.e. the share of consumption in GDP will remain constant over time, and b) that the Lorenz curve remains constant over time, i.e. that growth is distributionally neutral. Finally, we calculate the number of poor, middle class, and rich individuals in each country using our population projections.

[63] We also use past real GDP per capita growth statistics to calculate consumption per capita data back to 1991. We do not attempt to go back further than this due to data limitations from the Soviet era.

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