China's Economic Rise—A Technical Note (Draft)

Albert Keidel[1]
Senior Associate, Carnegie Endowment for International Peace
July 9, 2008

Introduction

This draft technical note accompanies the release of the Carnegie Endowment policy brief No. 61, "China's Economic Rise--Fact and Fiction" [the policy brief] and is a minimal presentation of supporting statistical and other materials that explain and elaborate on the assertions and analyses in the policy brief. The sections are short and focused on the technical issue or issues at hand. This note does not try to replicate the narrative of the policy brief but is rather intended to be read with it, to the extent that related elements of the policy brief raise questions in the reader's mind.

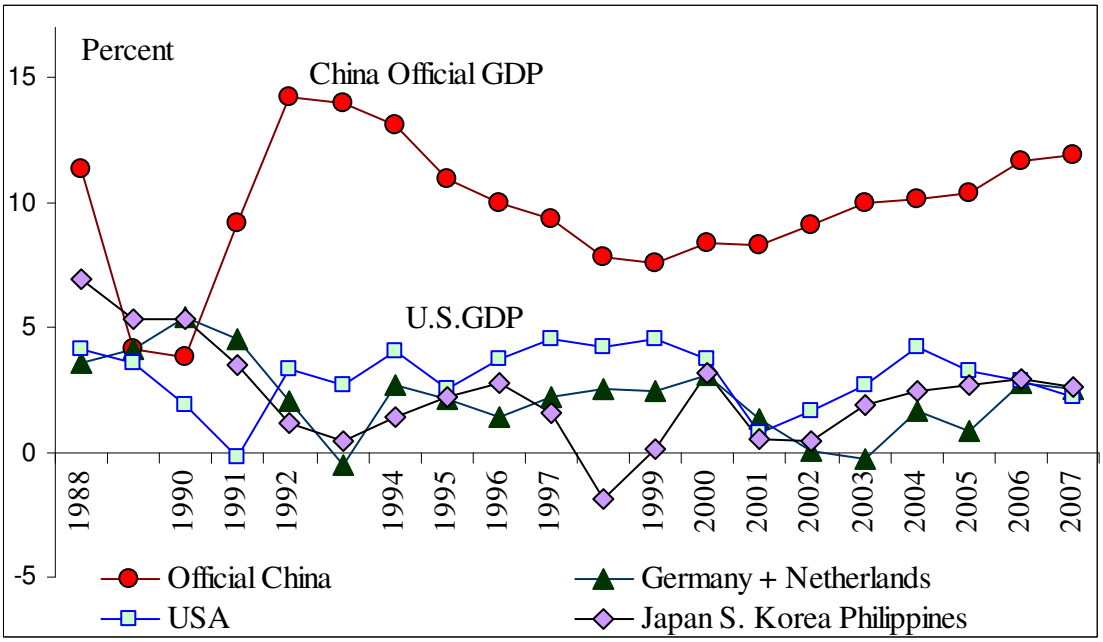
Domestic-led Growth

The policy brief's conclusion that China's growth is not export-led but is rather domestic driven rests on at least two sets of observations. The most intuitive explanation notes that China's fast and slow growth periods run against the grain of U.S. growth booms and recessions.

This can be seen in Figure 1, which shows that while important U.S. trading partners in Europe and East Asia exhibit GDP growth patterns similar to America's, often with a lag of one year or two. This pattern seems to be continuing in 2008, when the U.S. economy is slowing

Figure 1. Chinese GDP Growth Independence from U.S. GDP Fluctuations

European and non-China East Asian economies often shift with U.S. GDP fluctuations—sometimes lagged or interrupted, as during the Asian Financial Crisis. But China's GDP growth has surged when the U.S. economy slumped—just the opposite pattern from that for other U.S. trade partners.



Sources: IMF *International Financial Statistics* various issues, respective country statistical bureau web sites, China National Bureau of Statistics, and author's calculations.

[1] The author wishes to extend special thanks to Ms. Yang ZHANG of the Carnegie Endowment for outstanding research assistance. The policy brief and this technical note would not have been possible without her skillful efforts and good-natured patience.

Table 1. Causes of China's Periods of Fast and Slow Growth, Showing Dissociation from Trade Patterns, 1997–2007

1997–2000	Slow	Absolute declines in rural consumption over-powered urban safety net gains; increasingly severe government credit tightening after 1993 finally took hold; high interest rates and low or negative inflation; inventory declines; banks re-capitalized to cut corporate debt and bad loans	Surplus and exports increased in 1997; imports shrank 1997–1998; imports and exports recovered 1999–2000 as small surplus shrank; no trade impact from 1997–1998 Asian financial crisis
2001–2003	Fast	Lower interest rates; 2001 bank lending surge; 2001 inventory jump; WTO accession stimulated investment in 2002; 2003 anti-SARS investment stimulus caused overheating; real investment growth rate up from 5 percent in 2000 to 17 percent in 2003	2001 surplus was zero; export share in GDP declined; 2001–2003 surplus share in GDP was negligible; in 2002–2003 both export and import growth were rapid for assembly and processing trade with little Chinese value added
2004–2005	Pause	Government cooling-off policies cut 2005 domestic real demand growth from 10 to 8 percent; investment growth rate fell from 17 to 9 percent; grain price adjustments boosted rural consumption growth	Large surplus appeared as investment imports slowed significantly; rapid export growth rate little changed; 2005 surplus surge contributed 2.5 percentage points to 10.4 percent total GDP growth
2006–2007	Fast	Inflation initially controlled; domestic demand real growth recovered to 10 percent; trade surplus contributed 2.6 percentage points to 11.9 percent total GDP growth; interior provinces, many with little trade, all had double-digit growth; inflation threat appeared in 2007	Trade surpluses grew 35–40 percent, contributing just over one-fifth of 2007 total GDP growth of 11.9 percent

Sources: Albert Keidel, *China's Economic Fluctuations* (Washington, D.C.: Carnegie Endowment for International Peace, 2007) www.CarnegieEndowment.org/Keidel; National Bureau of Statistics, People's Republic of China, *China Statistical Abstract 2008* (in Chinese) (Beijing: National Bureau of Statistics, 2008), various tables, with supplemental calculations.

dramatically, but China is still expected to have growth close to 10 percent—even as a shrinking trade surplus contributes a negative component to overall effective demand. The drivers of Chinese growth are domestic demand for consumption and investment goods.

The second set of observations comes out of a detailed study of all the GDP growth turning points in China's economic history since reforms began in 1978.[2] A summary of each turning point appears in the policy brief, and the four most recent annual periods, through 2007, appear in Table 1. Of special interest are the first "fast" period in the decade, from 2001 to 2003, and the "pause" in growth acceleration in 2004-05, when Beijing felt it necessary to cool off the economy.

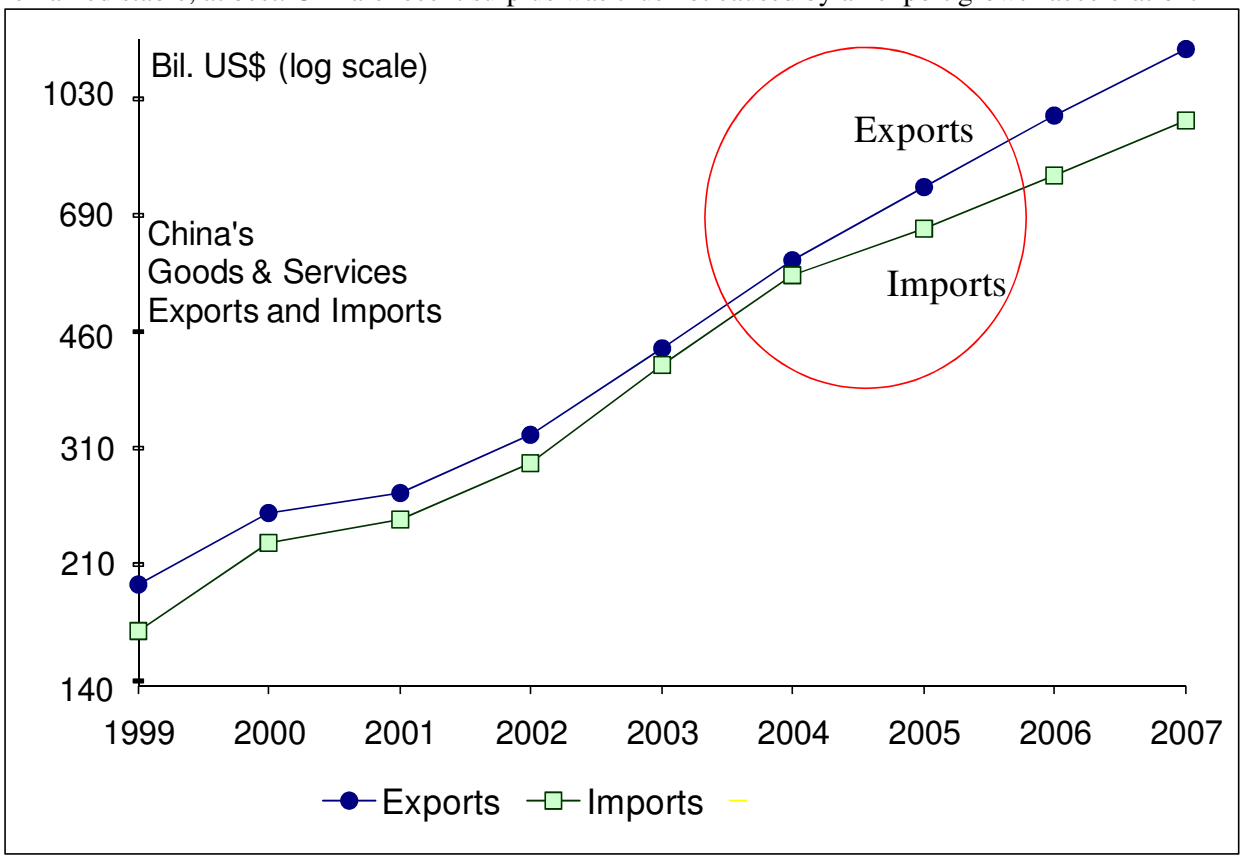
The trigger for growth recovery after the 1997-2000 growth slump came initially from a build-up in inventories financed by the just-completed cleansing of the corporate sector of its bad debts to China's banking system, and, symmetrically, the matching improvement in bank balance sheets from government recapitalization. At the same time, nominal bank lending rates, which had remained quite high even though inflation was negative, had finally come down to levels that helped stimulate investment demand.

The trade impact on this strong 2001-03 growth recovery was weak and possibly negative as the trade surplus as a share of GDP remained insignificant. The growth surge in this period gained power from government spending in 2003 intended to counter the expected negative impact of the SARS epidemic. When SARS' economic impact turned out to be weak, the economy overheated, causing both accelerated growth and inflation pressures. These stimuli were thus clearly not principally from trade, although China's WTO accession in late 2001 added to the buoyant business psychology of the period.

[2] See Albert Keidel, *China's Economic Fluctuations: Implications for the Rural Economy*, Carnegie endowment for International Peace, 2007.

Figure 2. China's Export and Import Trends in Log Form, 1999-2007

Data in log form such as these indicate the rate of growth by the slope of the line. Hence, in 2001, the year of China's take-off this decade, the growth rates of both exports and imports slowed dramatically. In 2005-07, a trade surplus opened up because import growth rates slowed while export growth rates remained stable, at best. China's recent surplus was thus not caused by an export growth acceleration.



Sources: Balance of payments data from IMF *International Financial Statistics* and China National Bureau of Statistics *Statistical Abstract 2008* (in Chinese).

Threatened with overheated inflation pressures, the government in 2004-05 took corrective steps, as described in Table 1. Since 1978, efforts to cool overheating—not export slumps—have always been the reason for a slowing of GDP growth in China. The 2004-05 period was no exception. The effort to cool overheating in 2004-05 resulted in weaker import growth, not accelerated export growth. Figure 2 is in logarithmic form so that the slopes of the lines can be interpreted as the growth rates of exports and imports. Clearly, the trade surplus that opened up in 2005 resulted from slowing imports, not accelerated exports.

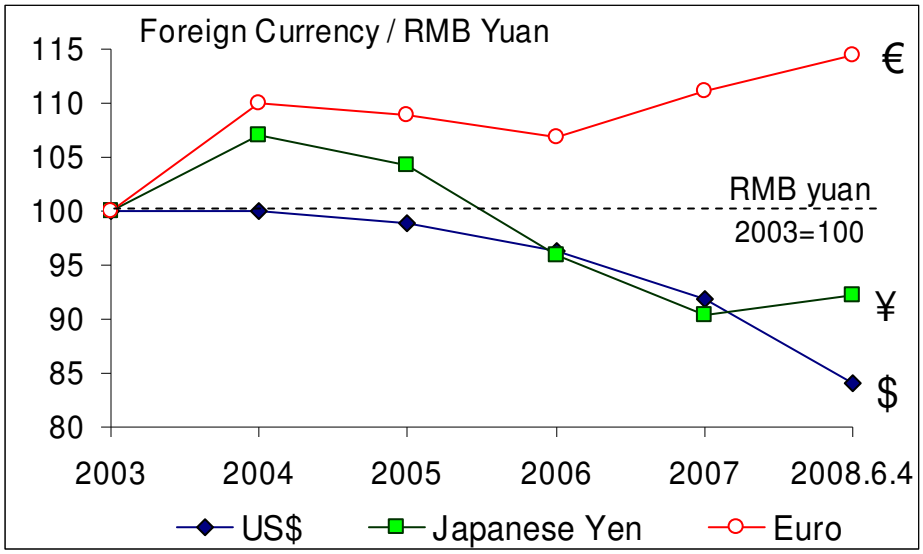
China's Exchange Rate--A Secondary Influence at Best

As seen from the earlier discussion, China's recent trade surplus, which opened up in 2005, has strong domestic origins. China's currency, the RMB, actually began to appreciate against the U.S. dollar in 2005, so there is no obvious correlation for the surplus with a change in the exchange rate—especially in an appreciating direction.

The policy brief notes that even China's nominal appreciation against the U.S. dollar is part of a larger appreciation of Europe's major currency, the euro, against the dollar. The RMB has in a sense split the difference between the euro and the U.S. dollar. This can be seen in Figure 3, which indicates that the U.S. dollar depreciation versus the RMB is roughly matched by the euro's appreciation, not accounting for differences in domestic inflation in the various economies. In this crude, but nevertheless meaningful sense, the RMB has changed much less than would

Figure 3. Major Currency Movements Relative to the Chinese RMB, 2003-2008

China's revaluation with respect to the U.S. dollar, beginning in 2005, is better seen as a move to maintain a balance for the RMB between the currencies of two of its major trading partners, Europe and the United States.



Source: IMF *International Financial Statistics* and *China Daily*.

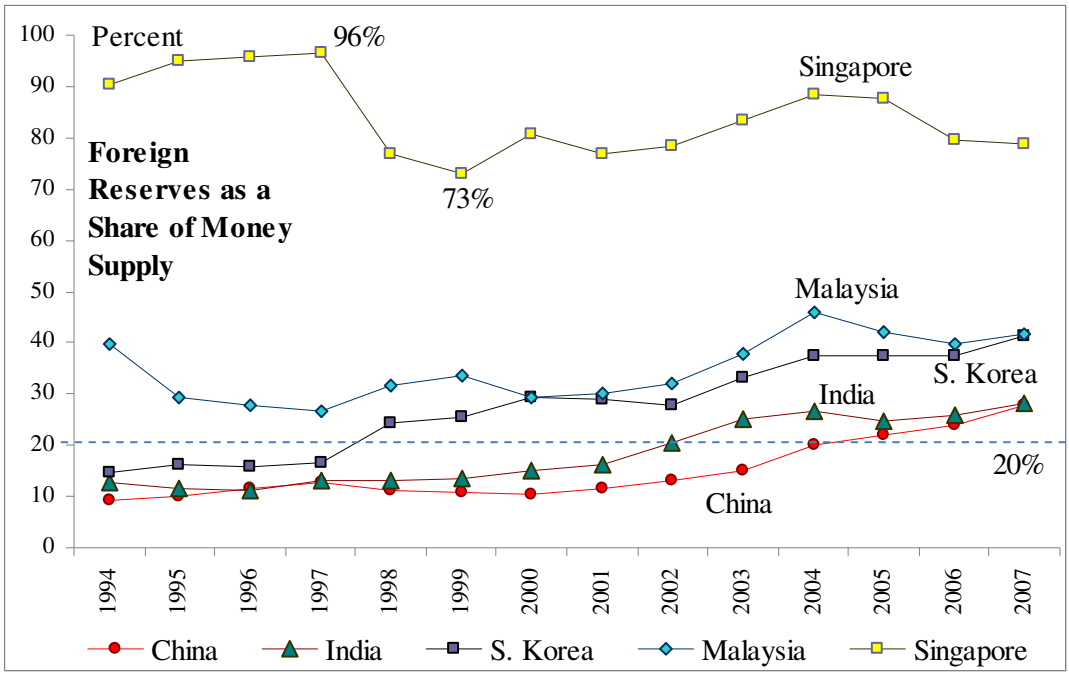
seem the case by only looking at its relationship with the U.S. dollar. Europe is now China's major export market, so the movements of multiple currencies, rather than only the relationship to the dollar, is the preferred analytical framework.

The policy brief doesn't mention it, but a related trend, the growth of China's foreign exchange reserves, is often taken as proof that China's currency is undervalued and therefore a factor in both its very recent trade surpluses and in its recent rapid growth. But notions of what constitutes an adequate or reasonable level of foreign exchange reserves has changed rapidly in recent years, especially since the Asian Financial Crisis of 1997-98. Foreign reserves were once considered to be like a household's cash and checking account – liquid funds kept ready for short-term needs. Foreign exchange equivalent to three months of imports was taken as prudent liquidity to keep on hand.

But the explosive increase in the scale and speed of international financial flows has changed dramatically such notions of reserve adequacy. Figure 4 shows what happened to Singapore's foreign exchange reserves during the Asian Financial Crisis. As foreign exchange left the country during the Asian Financial Crisis, reserves fell by the equivalent of 23 percent of Singapore's total money supply. That is how much of its domestic currency was converted to foreign currency by businesses and citizens, requiring a drawdown in total reserves. How many countries could withstand such a sudden demand surge? During the Asian Financial Crisis, a number of Asian countries required large amounts of foreign exchange assistance when their reserves proved inadequate.

Figure 4. Foreign Reserves as a Share of Money Supply (%)

In the Asian Financial Crisis, Singapore lost foreign reserves worth more than 20 percent of its money supply. China's reserves today are finally greater than 20 percent of its money supply.



Source: IMF *International Financial Statistics* and various national statistical bureau web sites.

Could China survive a demand on its foreign reserves equivalent to 23 percent of its money supply? The answer is, until recently, no. Even recently, it would barely be able to do so, as shown in Figure 4. The size of China's economy and money supply on a world scale would qualify this analysis, but if 20 percent of total money supply in foreign reserve equivalents is now a useful benchmark for prudent foreign exchange management, all the countries shown in Figure 4 are now over that benchmark. Note that China is until very recently the lowest of the countries shown in terms of this benchmark. Even India's reserves in recent years have been larger than China's when compared to their respective economic sizes, as indicated by total money supply. China's reserve accumulation, in this light, does not appear excessive.

How Large is China's Economy, and How Large Could it Become?

The policy brief mentions that in commercial terms (that is, at the commercial exchange rate) in 2007, China's total economy was less than one-quarter of America's—roughly 3 trillion U.S. dollars for China versus 14 trillion for the United States. Until recently, this ratio would have been dramatically reduced by long-standing estimates of China's purchasing power parity (PPP) GDP. But with the release by the World Bank and its sister organizations this winter of PPP data for the first time based on proper price survey techniques, we now know that even by this expansive measure, China's total economy is still only half the size of the U.S.

For commercial and military purposes, it is important to mention that PPP measures are not really very useful. PPP measures of a country's GDP are useful almost exclusively for assessing its standard of living. PPP values are based on surveys of prices for goods and services in different countries and are thus by definition different from what one would actually have to pay for those goods and services—that is, they are purposely differentiated from their commercially significant counterparts.

Table 2. PPP versus Exchange Rate Values, 2005

		1	2	3
		PPP Conversion		Value per
		Yuan per US$	US$ per Yuan	Exchange-rate Value
a	GDP	3.45	.29	2.37
b	Average Household	3.46	.29	2.37
c	Poor Household	2.73	.37	3.00
d	Food & Beverages	5.52	.18	1.48
e	Clothing & Footwear	6.86	.15	1.19
f	Shelter & Utilities	3.37	.30	2.43
g	Healthcare	.69	1.45	11.87
h	Machinery & Equipment	8.79	.11	.93
i	Commercial Exchange Rate, 2005	8.19	.12	≡ 1.00

Source: World Bank ICP Report, February 2008. Note, as China's RMB/US$ exchange rate changes over time, so does the "Value per Exchange-rate Value," but the 2005 PPP US$-RMB conversion rates over time change in accordance with relevant inflation rates in both countries.

PPP Conversion and Military Equipment Valuation

For comparing military capabilities, especially capabilities involving advanced technologies, PPP measures also fall significantly short. Table 2 presents the World Bank's new PPP conversion factors for various GDP subcategories. Notice that in all the categories but one in column 3 the PPP value is larger than what one would get using the commercial exchange rate. For machinery and equipment, however, shown in row h, when estimating the actual usefulness or practical value in dollars of such items, one should *reduce* the value one calculates from the exchange rate.

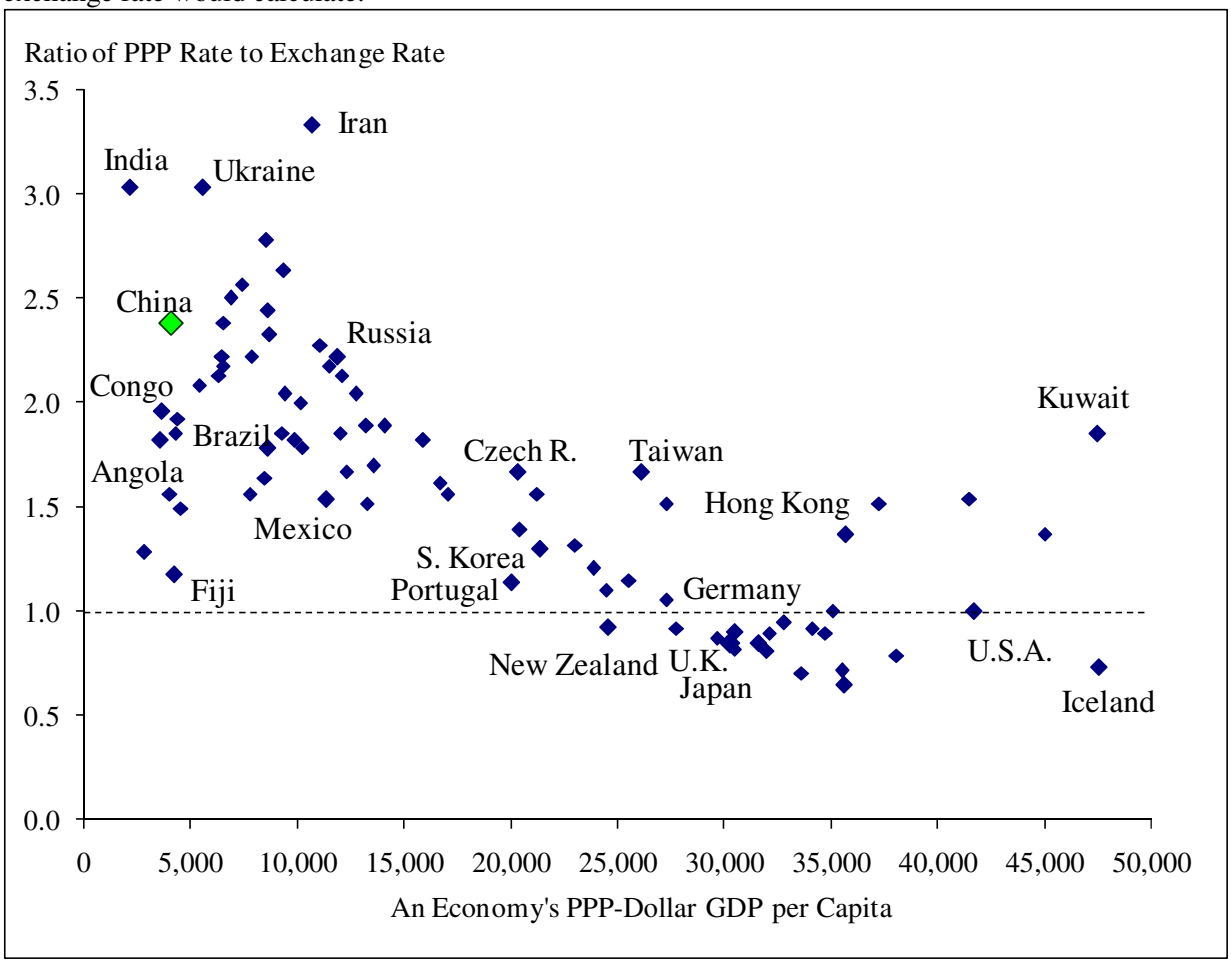
The straightforward meaning of this is that if one bought a representative piece of equipment in RMB yuan and then went and bought equipment with the identical functionality and quality in the United States, it would cost less in the United States than the RMB-yuan price converted at the exchange rate. You could get it cheaper in America. This "machinery & equipment" statistic is for the average of all run-of-the-mill equipment produced as part of China's GDP, and the underlying economic explanation is that China doesn't have the necessary skilled labor, productive capability, quality control, engineering, or affordable materials to meet the average price of comparable machinery and equipment that one can find in the United States.

For military machinery and equipment, especially machinery and equipment with high technical and quality standards, the appropriate PPP conversion would thus not be at the average PPP for all GDP (row a in Table 2)—far from it. It would instead be something like the machinery and equipment rate, or a rate even lower in dollar-per-RMB terms, depending on the level of difficulty and scale of resource requirements China encountered in production.

These PPP machinery and equipment value conversions to U.S. dollars based on actual functionality are relevant when disaggregating China's RMB military budget into equipment procurement and other components. Other components are heavily based on remuneration for labor, which is best converted to dollars in a functional sense at a rate based on the skill levels of the personnel—arguably something greater than the exchange rate in dollar-per-yuan terms. But equipment, as we have shown would go the other way. Hence, after conversion to U.S. dollars in a functional PPP sense, the share of China's military budget committed to equipment procurement should arguably be reduced and the share of non-procurement increased. Later in this technical brief, Table 4 reports dollar values for China's accumulated stocks of military "equipment and machinery" (i.e., weapons systems) procurement. The conversion is at the commercial exchange rate, which means that, if anything, these values are a bit too high.

Figure 5. China's PPP GDP per Capita in its Global Perspective, 2005

Along the horizontal axis, this plot of major global economies ranks them by their PPP average output per person, a rough proxy for standard of living. The measure is different from this kind of calculation made with commercial exchange rates depending on how high on the plot the economy finds itself. The higher the country's symbol on the plot, the greater its PPP GDP per capita is compared to what a commercial exchange rate would calculate.



Source: World Bank, ICP report, January 2008

PPP Conversion and China's Standard of Living

China's place in the global constellation of average living standards as measured by their new PPP per-capita output levels appears in Figure 5. Even at PPP conversion, China's per-capita GDP was less than 5,000 dollars in 2005, while the comparable level in the United States was more than 40,000 dollars. Figure 5 also shows that the poorer an economy is, generally the larger the upward PPP correction in valuing its living standard, as shown on the left-hand axis (the ratio of PPP conversion rates to exchange-rate conversions). For the casual observer of China's economic progress, Figure 5 confirms that despite its rapid growth over the past 30 years, China's average living standard is only somewhat higher than India's and is still significantly below that of economies like Brazil's, Mexico's and Russia's. It is far below living standards in South Korea, Taiwan and Hong Kong.

China's Future Economic Scale

Table 3 replicates the policy brief's table (page 6 of the policy brief) presenting projections for U.S. and Chinese economies in the 21st century. The projections rely most heavily, of course,

Table 3. U.S. and China GDP Growth Potential, Twenty-First Century

	1	2	3	4	5	6	7	8
	Real Growth (annual percent)		Total GDP (trillion 2005 dollars[a])			GDP per Person (thousand 2005 dollars[a])		
Year	United States	China	United States	China (X-rate $[a])	China (PPP $[a])	United States	China (X-rate $[a])	China (PPP $[a])
2005	3.0[b]	9.6[b]	12	2	5	41	1.7	4.1
2010	2.0	9.5	14	4	8	43	2.9	6.1
2020	3.0	8.5	18	10	18	52	6.9	12.7
2030	3.0	7.5	24	22	35	64	15	24
2040	3.0	6.5	33	45	63	78	30	42
2050	3.0	5.5	44	82	104	95	53	67
2060	3.0	4.3	59	131	152	116	83	96
2070	3.0	3.0	80	178	199	142	109	123
2080	3.0	3.0	107	244	262	174	146	159
2090	3.0	3.0	144	335	348	214	197	208
2100	3.0	3.0	194	466	466	262	271	271

a. "2005 dollars" means future current-valued dollars--either domestic U.S. values or converted from current China RMB values by either commercial exchange rates (X-rate $) or PPP conversion (PPP $)--deflated to 2005 constant dollars with assumed future U.S. inflation rates.

b. Growth rate figures for 2005 represent historical 1985–2005 average real growth rates.

Note: All growth rates after 2005 are projected. PPP = purchasing power parity.

Sources: 1985-2005 GDP growth rates from IMF *International Financial Statistics* and China State Statistical Bureau *2008 Statistical Abstract of China* (in Chinese); 2005 PPP values from World Bank ICP Report (2007 and 2008); projections from a computational model using author's assumptions about growth rates, GDP composition and domestic relative price changes for each country.

on the growth rates in columns 1 and 2. But PPP comparisons to exchange-rate values from Figure 5 also play an important foundational role in generating the projections.

PPP and exchange-rate trends matter for long-term projections because an additional source of long-term growth, interestingly, comes from shifts in relative prices within China (and other rapidly growing economies, for that matter). Such shifts are precisely what determine the relationship between PPP and exchange-rate conversions to dollars.

The general trend in Figure 5's scatter plot is from the upper left to the lower right. To make projections, the accounting framework used for the policy brief employed a somewhat different calculation. It estimated, along this general upper-left to lower-right path, a comparison of the PPP-to-exchange-rate ratio with the exchange-rate-calculated ratio of a country's per-capita GDP to the U.S. per-capita GDP.

In other words, projecting both the United States' and Chinese economies into this century, China's PPP ratios will depend in part on how relative prices in the United States and China will have changed. Hence, China's PPP-to-exchange-rate comparison with the United States will arguably not reach parity until the per-capita GDP levels of the two countries also reach parity—towards the end of the century according to the projections in Table 3. To remain consistent with this relationship, the accounting framework used to estimate future growth explicitly modeled domestic prices in both countries, distinguishing between prices for "traded goods" and "non-traded goods." Admittedly, in real life, this distinction is difficult to pin down, it is essentially what is behind price differences found by PPP surveys, and as a conceptual approach it can be imagined to correlate heavily with a related distinction—that between services and physical goods.

In short, as an economy matures, its "traded" physical goods prices remain roughly close to what they would be in dollars at the exchange rate. The "non-traded" services prices, however,

Table 4. Possible Chinese and U.S. Military Budgets and Sophisticated Weapons Stocks to 2100

Military budget as share of GDP (percent)			Annual Military Budgets (billion constant 2005 U.S.$)			Accumulated Stock of Weapons Systems (billion 2005 U.S.$)		
	U.S.	China	U.S.	China	Ratio	U.S.	China	Ratio
2005	4.7	3.4	581	77	7.5	1,086	81	13.5
2010	3.8	3.6	524	129	4.1	1,120	139	8.1
2020	3.8	3.6	700	322	2.2	1,297	368	3.5
2030	3.6	3.6	893	729	1.2	1,654	885	1.9
2040	3.6	3.6	1,200	1,491	0.8	2,157	1,927	1.1
2050	3.6	3.6	1,612	2,739	0.6	2,879	3,797	0.8
2060	3.6	3.6	2,167	4,370	0.5	3,868	6,653	0.6
2070	3.6	3.6	2,912	5,934	0.5	5,198	10,156	0.5
2080	3.6	3.6	3,913	8,101	0.5	6,986	14,245	0.5
2090	3.6	3.6	5,259	11,145	0.5	9,388	19,552	0.5
2100	3.6	3.6	7,067	15,483	0.5	12,617	26,960	0.5

Important: The figures in this table are not *projections* of what is likely to happen. Instead, they are merely illustrations of what *might be possible* if China's economy expands as predicted in the policy brief *and* if China decides to devote the indicated share of its GDP to acquiring military capabilities.

Note: China's military budget figure for 2005 is 2.5 times the official budget figure, consistent with middle-to-high estimates in Office of the Secretary of Defense, *Annual Report to Congress: Military Power of the People's Republic of China 2008*; conversion to dollars is at the commercial exchange rate for 2005; U.S. military budget data for 2005 do not include supplementals for the wars in Iraq and Afghanistan. The results do not include valuation of U.S. status-of-forces agreements and military basing rights around the world; China effectively has none. These calculations are illustrations only; they should be read as an invitation to those with better information concerning data and obsolescence characteristics to generate and publish their own, improved, versions.

rise more quickly than physical goods prices (some of which even decline). As a result, when calculated at the exchange rate for that future period, values of "non-traded" services *appear* to be increasing in exchange rate terms faster than when measured at some domestic local-currency base-year price. To capture this real-world effect, the accounting framework used in these projections first calculates future nominal U.S. dollar values based on future nominal RMB values and future exchange rate estimates (which depend on differences in inflation in both countries for "traded" goods). It then uses the estimated U.S. GDP inflation rate to convert those dollar values back to constant 2005 U.S. price terms, so that comparisons over time can be meaningful.

Accumulated Military Capabilities Now and Going Forward

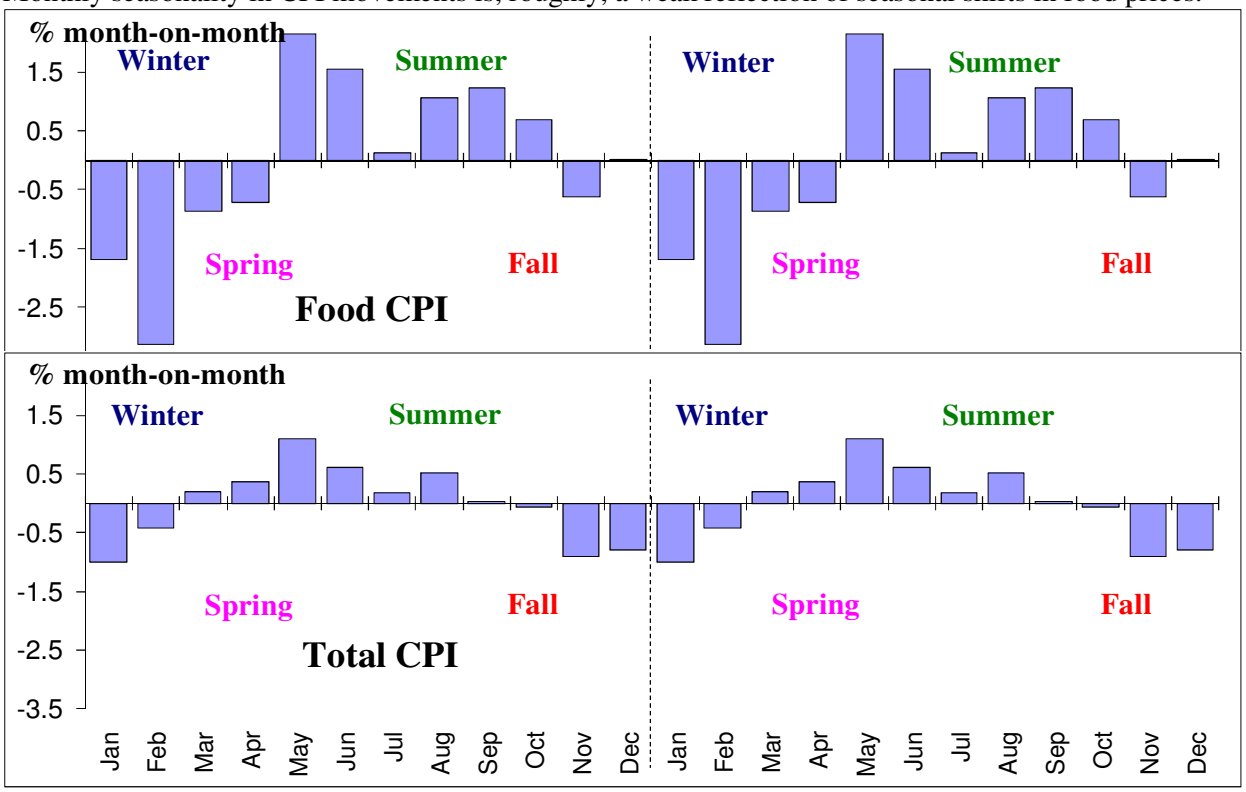
What is the military significance of these likely future economic trends? The figures mentioned in the policy brief say that accumulated U.S. capabilities are now roughly thirteen times as great as China's, not counting for the value of foreign bases and status of forces agreements. This compares to the policy brief's estimate for U.S. annual effective military budget spending of roughly eight-to-one.

In economic terms, estimating military power by comparing China's annual military budgets to U.S. military budgets is not satisfactory—either in theory or in practice. Productive power, or capacity for production, especially in relatively capital-intensive settings, depends not on annual budgets but on accumulated stocks of productive capacity—plant, equipment and accumulated human skills and experience. Such accumulated stocks can be calculated by conducting inventories, or they can be estimated by summing up the total of purchases and construction of productive capacity in previous years, allowing for obsolescence and scrapping schedules. The historical and contemporary results mentioned in the policy brief and those illustrated for future decades here in Table 4, use this second methodology, with conservative assumptions.

It is important to emphasize that this technical note's calculations are not *predicting* that China will acquire military capabilities on the indicated scale. It only makes a correspondence between what looks to be a highly likely level of economic output for China and what certain

Figure 6. Seasonality in China's Food and CPI price trends

Monthly seasonality in CPI movements is, roughly, a weak reflection of seasonal shifts in food prices.



Sources: China National Bureau of Statistics long-term price series and author calculations.

assumptions about procurement ratios and obsolescence indicate is a *possibility*, should China want to or see the need to make decisions to apply economic capabilities to military purposes.

Skillful Macroeconomic Management and Inflationary Crisis Avoidance

The policy brief mentions that China's economic policy makers have acquired skills and experience over time that makes a repetition of previous sudden slumps and booms unlikely going forward, at least unlikely on a scale that risks disturbing long-term growth.

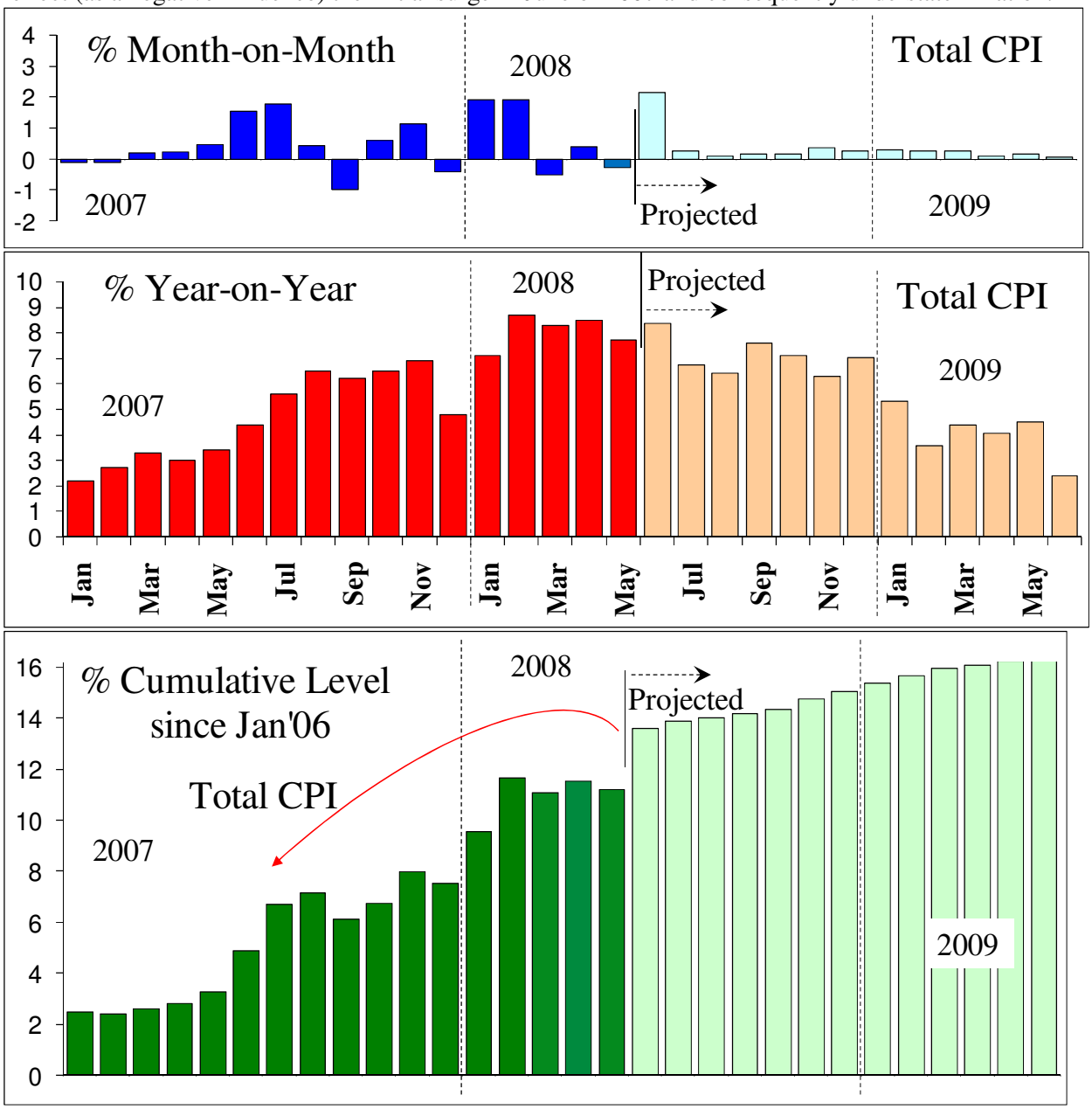
This evaluation is illustrated by the current inflationary threats that China has faced since the middle of last year. The policy brief mentions that seasonally adjusted month-on-month analysis of China's recent price changes provides a better assessment than the officially reported year-on-year statistics, which only report recent changes against a backdrop of what was happening twelve months earlier.

Removing from China's month-on-month price trends those seasonal ups and downs in prices shown in Figure 6 gives a much clearer picture of what has actually been happening than what one gets from the year-on-year data. The comparison appears in Figure 7. Once prices have increased (as shown in month-on-month data), the year-on-year statistics make it look like that level is persisting for twelve months. The "guess" in this chart is that if CPI prices jumped in month-on-month terms last month (June), as shown in the top panel of Figure 7, this means that price levels have increased by that much, as shown in the third panel. But the year-on-year data, because comparisons are no longer with the pre-June'07 statistics but with the higher June'07 level, will show a much more moderate "headline" inflation rate (the middle panel of Figure 7).

Hence, the *appearance* of inflation levels reported for June (2008) will be less than the actual fact, and the timing of the price increases in gasoline and diesel that month looks like it skillfully used the oddities of year-on-year reporting to keep *expectations* of inflation, the real danger, under control. It is of course a curiosity that although Chinese statisticians have been calculating

Figure 7. China's Seasonally Adjusted Month-on-month CPI Trends

Price changes in China over the past 12 months have come in spurts, especially in June and July 2007 and early in 2008 during snow storms in the south. The year-on-year picture is very different. Now that we are back to June again, the statistics for this June, with its 20-percent gasoline and diesel price hikes, will also reflect (as a negative influence) the initial surge in June of 2007 and consequently understate inflation.



Sources: China National Bureau of Statistics long-term price series and author calculations.

such month-on-month price movements in-house for ten years, they still officially report only the year-on-year data. This reflects in large part the way grass-roots data are reported up their statistical system and varying levels of comfort with the reliability of seasonal adjustment estimates.

Most fundamentally, using a combination of timing, selective price controls and targeted limits on spending by sector (e.g., real estate), China's economic leaders appear to be trying to allow relative prices to adjust in healthy and necessary ways (e.g., higher food and energy prices), without allowing this structural shift to trigger damaging runaway inflation.

Table 5. New and Old China Poverty Estimates, 2004

	Old definition (All-households PPP)	New definition* (Poor-households PPP)
	(million persons)	
Old PPP	130	60
New PPP*	360	200*
	(% of population)	
Old PPP	10.0	4.5
New PPP*	27.0	15.0*

* Note: The World Bank reported new-PPP poverty incidence levels in a range. The new-PPP "New-definition" figures in this table reflect the midpoint of the World Bank range.

Source: World Bank China update report, January 2008, author calculations of new and old PPP poverty lines and the World Bank *PovCal* interactive web-based calculation facility.

Poverty and Inequality

The policy brief makes the case that China has dramatically reduced poverty, while at the same time inequality has increased in a number of dimensions. Such calculations have been complicated by the recent announcement of new PPP figures for major countries around the world, including the first for China based on actual PPP price surveys.

At the same time that it announced new PPP statistics for China that resulted in dramatic increases in the estimate for poor people in China by the dollar-a-day international standard, the World Bank also introduced a new "dollar-a-day" poverty line standard based on improved measurements of contemporary subsistence levels in poor countries. Table 5 differentiates the various effects of using the new PPP statistics versus using the new "dollar-a-day" poverty standard.

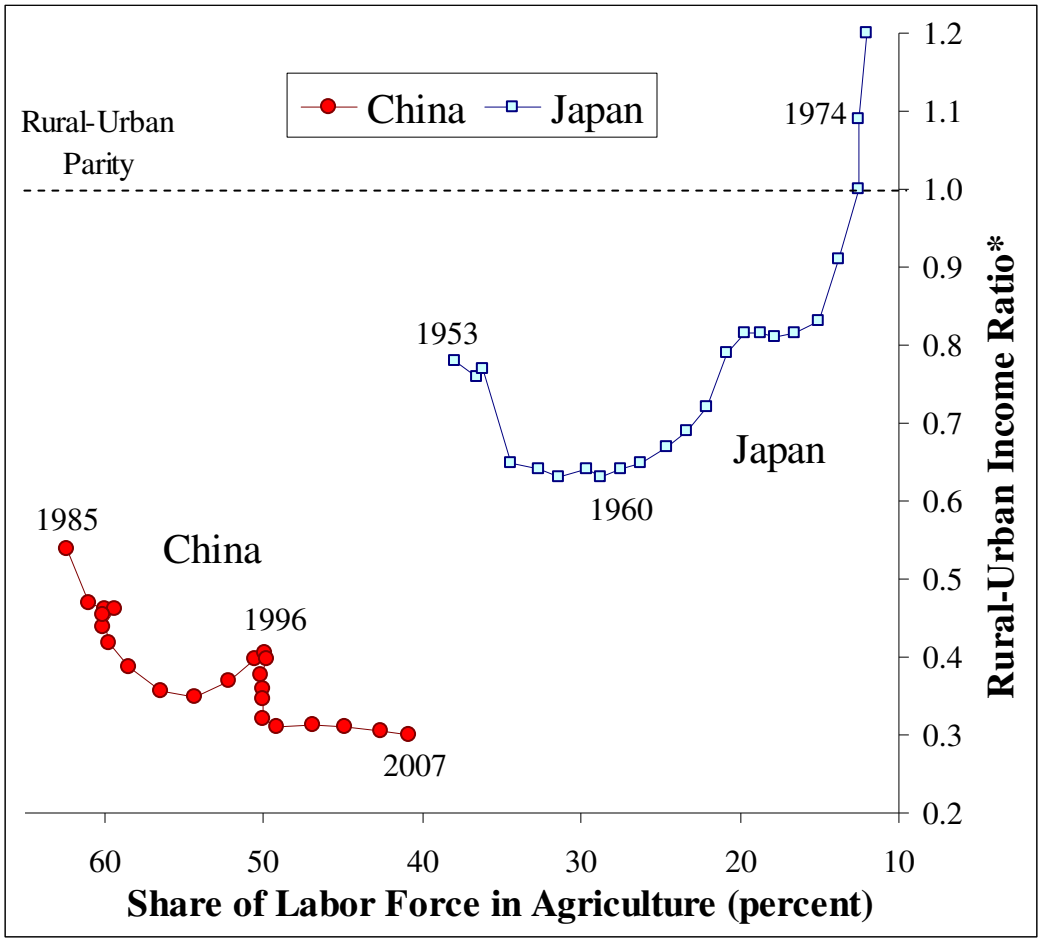
Whichever poverty standard one uses, the effect of the more accurate PPP data is a substantial increase in what we know to be the numbers of Chinese still living at very low levels of subsistence. And even if one disagrees in various interpretations of the new PPP statistics and whether one can apply the "new" poverty definition to earlier PPP data, the conclusion of World Bank specialists is that China, despite its extraordinary success in reducing poverty, still has 200 million persons, or 15 percent of its population, living below the global poverty standard.

The policy brief's analysis of inequality – the appearance and increase of gaps between various regions and groups of Chinese society – suggests that inequality increases have a good chance of being temporary, and that both because of the rapid reduction in poverty levels and because of the valuable incentive effects of China's brand of inequality, it cannot be taken as a threat to sustained GDP growth—indeed, the shape of Chinese inequality appears to help growth.

Evidence for the reversal of inequality increases is controversial—beginning with studies of growth in North America, Europe and Japan in the 19th and 20th centuries and continuing with more recent analysis of large amounts of cross-country and time series data on inequality trends in developing countries. Much of the skepticism is based on data from countries that have not shown much sustained success in growing fast for extended periods of time. Problems of statistical definitions and historical survey coverage are also daunting. One possible recent exception is Japan, but even in Japan, the limitations on survey coverage for the 1950s and 1960s makes straightforward inequality calculations unhelpful.

Figure 8. Agricultural Labor Force Decline and Rural-Urban Income* Gaps

China's agricultural labor force, at 40 percent, has not yet declined to Japan's level in the middle 1950s; Japan's rural-urban income disparities only began improving after 1960, when its agricultural labor force dropped below 30 percent of the total labor force.



* Note: Chinese income data are rural-urban, while Japanese are agricultural and non-agricultural definitions.

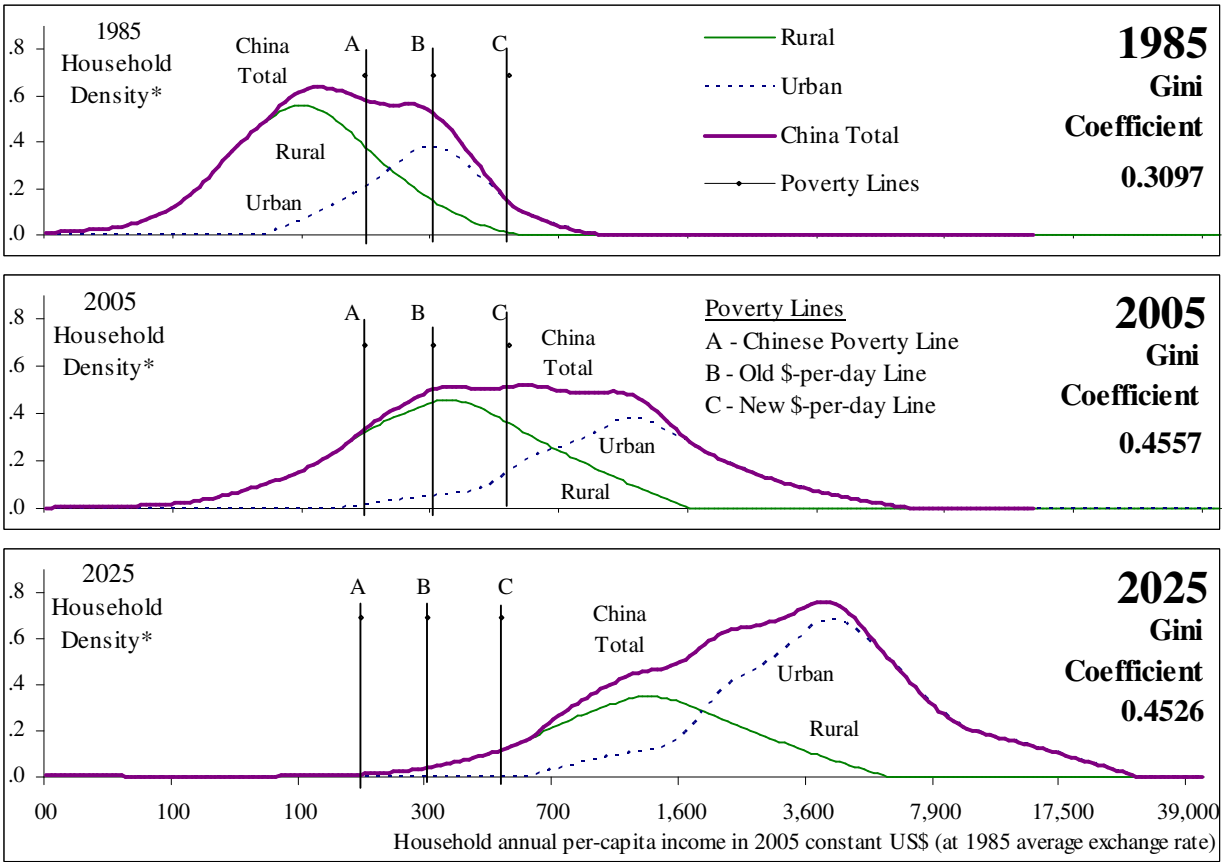
Sources: Mizoguchi and Takayama, *Equity and Poverty Under Rapid Economic Growth* (1984), www.stat.go.jp, and China National Bureau of Statistics, *Statistical Abstract 2008*

One of the best studies of Japan's inequality, by Mizoguchi and Takayama, concludes that inequality did improve in the 1960s after worsening in the 1950s and gives the major cause as a shift in rural-urban standard-of-living ratios.[3] The study's reported pattern is replicated in Figure 8, along with roughly comparable data for China. The important patterns to note are that China in 2007 has still not reached the level of economic maturity in Japan in 1953, as indicated by the share of its labor force in agriculture. Takayama and Mizoguchi note that when the farming share of Japan's labor force fell below 30 percent and as it got closer to 20 percent, rural wages and revenues from renting suburban farmland began to have a systematic effect raising farm household incomes faster than those in urban areas. Is this same pattern likely to repeat itself in China? It is impossible to say, of course, but recent reports of migrant labor tightness leave open the possibility that China could indeed follow in Japan's footsteps.

[3] See Toshiyuki Mizoguchi and Noriyuki Takayama, *Equity and Poverty under Rapid Economic Growth: The Japanese Experience*, 1984, Tokyo: Kinokunia Company Ltd.

Figure 9. Rural-Urban Migration and Inequality

As migration shifts population concentrations from rural to urban areas, China's income distribution shifts from a low-inequality single (rural dominated) hump to a high-inequality spread-out balance between urban and rural areas, and then possibly to a more concentrated lower inequality (urban) hump at some point in the future. A key factor is what happens to the gap between urban and rural average household incomes.



Sources: China National Bureau of Statistics published size distribution of income data and author calculations.

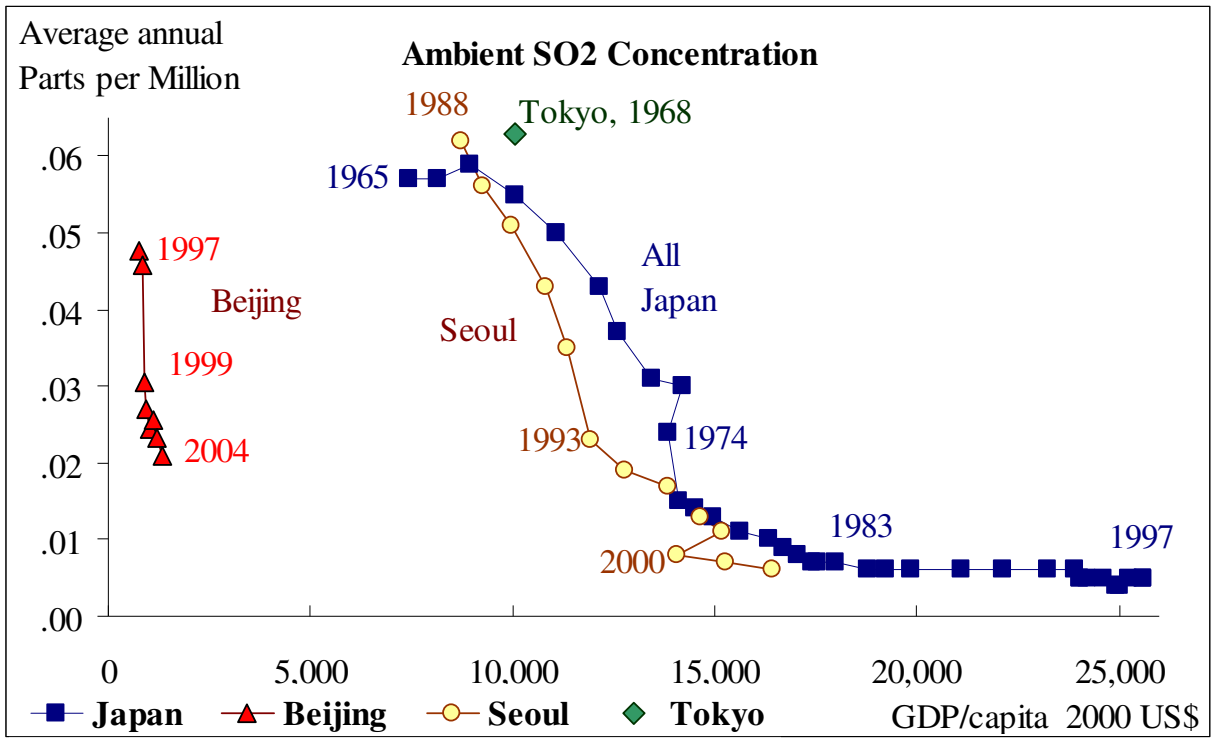
A second illustration of how the increase in Chinese inequality might slow if not reverse points out the greater inequality when the population is evenly balanced between (poor) rural citizens and (better-employed) urban residents. This illustration appears in Figure 9, which reports rural, urban and total income distributions in China in density-function form for 1985 and 2005, supplemented with a hypothetical density function for 2045 that reflects continued rural-urban migration and a continued increase in inequality *within* the urban population. The conclusion is that inequality will stabilize at a Gini coefficient of roughly .45 as the overall distribution becomes more single-humped. The result is not dramatic, but if migration is more rapid, the concentration of residents in cities with comparable urban income levels could also come more quickly.

Pollution Levels in Developmental Perspective

The policy brief considers pollution levels in China and concludes that for its still low level of development, China is responding to the demands placed on it by pollution in ways that appear ahead of its time when compared to Japan and South Korea. The statistical evidence for this is stronger for some pollution than for other kinds, as mentioned in the policy brief. The three figures presented below provide available comparisons that also emphasize how far behind China is in per-capita-GDP terms relative to its performance in alleviating pollution.

Figure 10. Ambient SO_2 Concentrations, Beijing, Seoul, Japan and Tokyo, 1965-2007

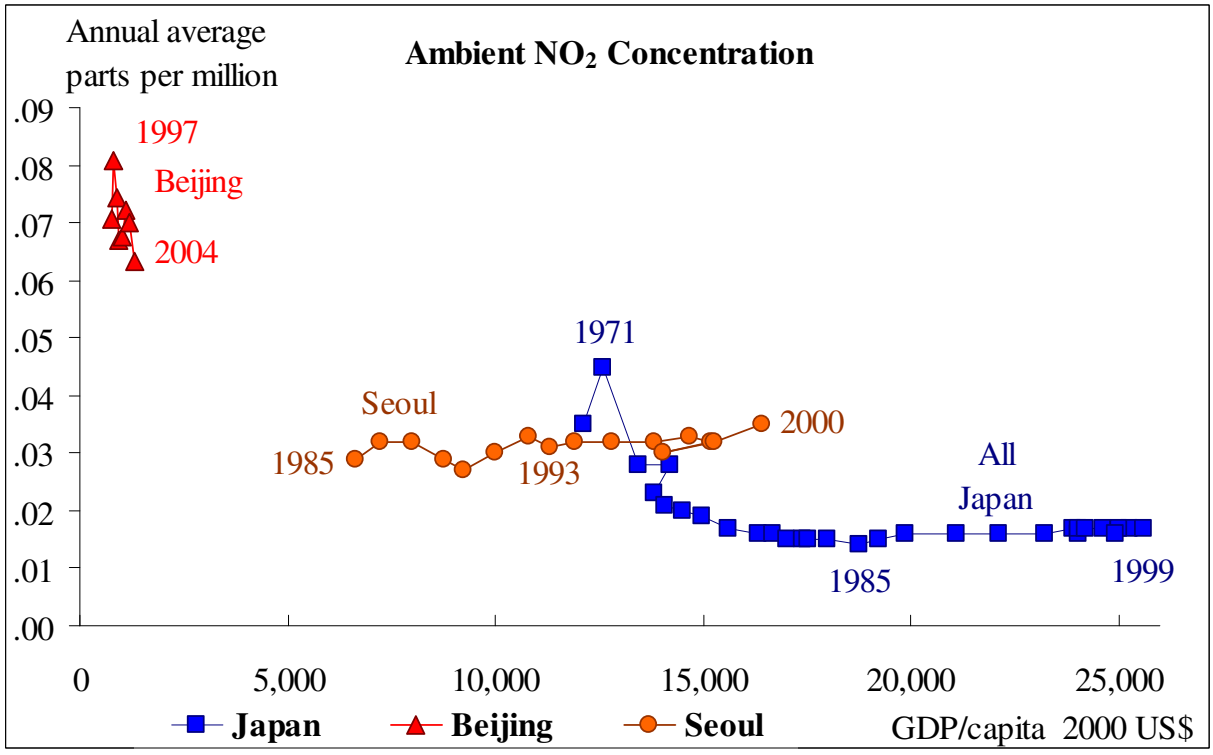
Beijing has the highest reported SO_2 levels in China for reported cities, and at a much lower level of per-capita GDP maturity, it seems to have brought SO_2 levels down below levels in Japan and South Korea at a more advanced development stage. Note that the horizontal axis is per-capita GDP.



Sources: See sources listed under Figure 12.

Figure 11. Ambient NO_2 Concentrations, Beijing, Seoul and Japan, 1970-2004

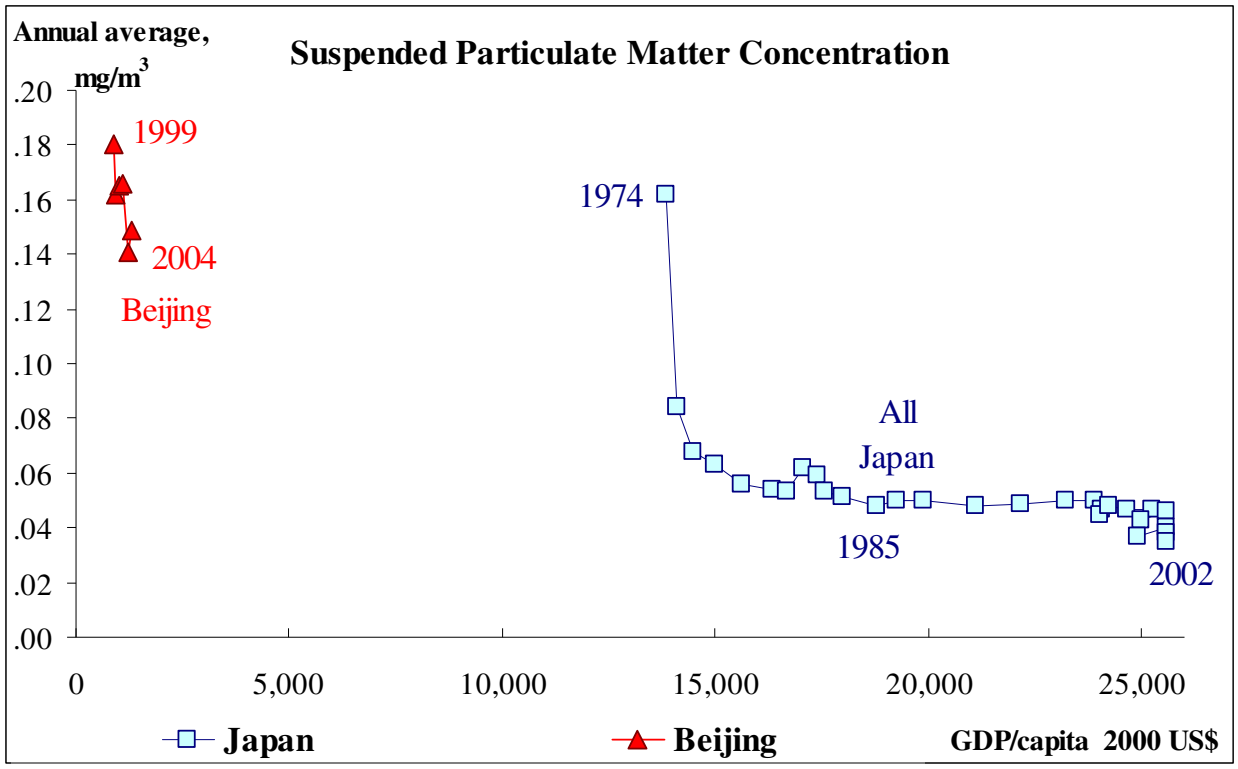
China's NO_2 pollution has not yet dropped to prior levels in Korea and Japan (but at higher GDP/capita).



Sources: See sources listed under Figure 12.

Figure 12. Suspended Particulate Matter, Beijing and Japan, 1974-2004

Particulate matter levels in Beijing appear to have already dropped below the average for Japan in 1974 (that is, not for Tokyo, which might be higher than the national average), but there are questions about the standards for discerning particulate matter in the two cases—China might not be measuring particles the same size as those detected by Japan's technology at the time.



Sources: - OECD Stats online portal; World Development Indicators online database; Ministry of Environment website, Japan (http://www.env.go.jp/doc/toukei/contents/index.html); OECD, *Environmental Policies in Japan*, Paris, 1977 (pg. 60, Table 17); Asian Development Bank, *Country Synthesis Report on Urban Air Quality Management: People's Republic of China*, Dec. 2006 (pg.13, Table 3.2); Seoul Metropolitan Government, *Environmental Protection in Seoul*, Seoul (quoted in Kim, Woon-soo, *Air Quality Management in Seoul: Development and Implementation of Strategic Frameworks*, Ch.10 "Urban Management in Seoul : Policy Issues and Responses", Seoul Development Institute:2001, (pg. 233, Table 10.1))

The end