China's Economic and Energy Situation and an Impact Analysis of Appreciation of the Yuan♦

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Introduction

Since China adopted the "Reform and Liberalization Policy", the Chinese economy has been industrializing through its active acceptance of foreign investments, and achieved rapid economic growth over a quarter century. With low cost as its advantage, China increases rapidly exports mainly of light industrial products and machinery. Now China is called the "Workshop of the World". This economic growth leads to increase of energy demand, making China the 2nd largest energy consumer in the world.

Meanwhile, this rapid growth is having global impact. Imports of energy, especially oil, to China have increased rapidly to respond to China's tremendous economic growth, which exceeds indigenous production. This may be one factor in rising oil prices in recent years. On economic side, 1/4 of the United States' trade deficit is with China, the largest of any single country. China's strong tendency to exports leads to overt friction with the United States and Europe. One of the clear consequences of this economic friction is the exchange rate level of the Yuan, which is fixed substantively. Various political demands, remarks and speculations are banded about regarding the time, level, method and other matters on revaluation of the Yuan. The size of impact caused by the revaluation is drawing interest in China and around the world.

In this situation, we calculated, quantitatively, the impact on the Chinese economy when the Yuan was revaluated, and also impact on China's energy demand, looking at global energy supply and demand.

1. China's Incredible Economic Growth

1-1 Overview of the Chinese Economy

China's economic growth is stunning. China's GDP growth rates were beyond 9% in the last two years, at 9.3% in 2003 and 9.5% in 2004[1]. The sources of this strong growth are manufacturing trade, where China is very competitive, and its industrial production. China's exports and imports in 2004 rose by 35.4% and 36.1% respectively, while the added value of its industrial production rose by 16.7%, all strong increases.

Table 1-1: Major Economic Indices Growth Rates (% against the Previous Year)

	Real GDP	Mining and Manufacturing Value-added	Fixed-capital Investment	Societal Products Sales	Consumer Price Index	Export	Import
2003 Jan-Mar	9.9	17.2	31.6	9.3	0.5	33.5	52.2
Jan-June	8.2	16.2	32.8	8.3	0.6	33.9	44.4
Jan-Sep	8.7	16.5	31.4	9.5	0.7	32.2	40.4
Jan-Dec	9.3	17.0	28.2	9.1	1.2	34.6	39.8
2004 Jan-Mar	9.8	17.7	47.8	11.1	2.8	34.0	42.4
Jan-June	9.7	17.7	31.0	12.8	3.6	35.7	43.0
Jan-Sep	9.5	17.0	29.9	13.0	4.1	35.3	38.1
Jan-Dec	9.5	16.7	27.6	13.3	3.9	35.4	36.1
2005 Jan-Mar	9.4	16.2	25.3	13.7	2.8	34.9	12.2

Source: National Bureau of Statistics of China, "China Statistical Yearbook", the homepage of National Bureau of Statistics of China and

♦ This paper is based on information by 8th July 2005. Therefore this paper is not an analysis of the actual appreciation of the Yuan in 21st July 2005.

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[1] A '4-fold increase in total domestic production by 2020 was announced as an economic target at the 16th Communist Party Congress in November 2002. An annual growth rate of 7.2% is required to achieve these targets.

other sources.

Note: Excluding Hong Kong (same below)

Fixed capital investment growth has also been remarkable in recent years. In addition to investments in factories and facilities that are the driving force in China's strong production activities, many investments in social infrastructure such as roads are in progress for the 2008 Beijing Olympic Games and the Shanghai World's Fair in 2010. There is also a construction boom in the big cities that appears to be something of an economic bubble. The central government has reacted to this situation since April 2004 by taking investment control measures such as strengthening investment project authorization, bank teller guidance and raising interest rates. Though these measures have slowed this growth to some extent, yet fixed capital investments mark strong growth by exceeding 20%.

1-2 Presence of the Chinese Economy

China promoted its shift from planned economy to market one after the start of the "Reform and Liberalization Policy" at the end of 1978, and maintains strong economic growth. In particular, by promoting production equipment development through foreign investments, its industrial production grows rapidly, and exports also increase greatly. Thus China is now called the "Workshop of the World". Export-led economic activities with its strong manufacturing trade have led to over 25 consecutive years of high economic growth (the average GDP growth rate from 1978 to 2004 was 9.4%). China now not only has the world's largest population and a huge land mass, but its economic scale makes it a "superpower". China's GDP ranks 7th in the world at $1.417 trillion (2003), and its total trade stands at $1.155 trillion (2004), making it the world's 3rd largest, surpassing even Japan. With the expansion of China's economic activities comes increase in its energy demand, ranking 2nd next to the United States.

China's presence cannot be ignored when viewed from the global economic trends, as China is listed in the emerging BRIC powers (Brazil, Russia, India and China).

Table 1-2: China's Economic Presence in the World

	Population		Nominal GDP		Total Trade		Energy Consumption		Number of Automobiles	
	2003	Million	2003	Billion $	2004	Billion $	2004	Mtoe*	2002	1000 Cars
1	China	1,288	United States	10,949	United States	2,345	United States	2,332	United States	225,452
2	India	1,064	Japan	4,301	Germany	1,632	China	1,386	Japan	73,989
3	United States	291	Germany	2,403	China	1,155	Russia	669	Germany	48,225
4	Indonesia	215	United Kingdom	1,795	Japan	1,020	Japan	515	Italy	37,682
5	Brazil	177	France	1,758	France	915	India	376	France	35,144
6	Pakistan	148	Italy	1,468	United Kingdom	808	Germany	330	United Kingdom	32,924
7	Russia	143	China	1,417	Italy	695	Canada	308	Russia	24,352
8	Bangladesh	138	Canada	857	Netherlands	679	France	263	China (2003)	23,829
9	Nigeria	136	Spain	839	Canada	598	United Kingdom	227	Spain	23,048
10	Japan	128	Mexico	626	Belgium	596	Korea	217	Brazil	20,094
	World Total	6,273	World Total	36,461	World Total	18,582	World Total	10,224	World Total	814,887

Source: World Bank, "World Development Indicator", World Trade Organization (WTO), "Statistics Database",
BP Global, "Statistical Review of World Energy June 2005", data from the Japan Automobile Manufacturers Association, and National Bureau of Statistics of China, "China Statistical Yearbook".

Note: toe: ton of oil equivalent

1-3 From an Agricultural Nation to the "Workshop of the World"

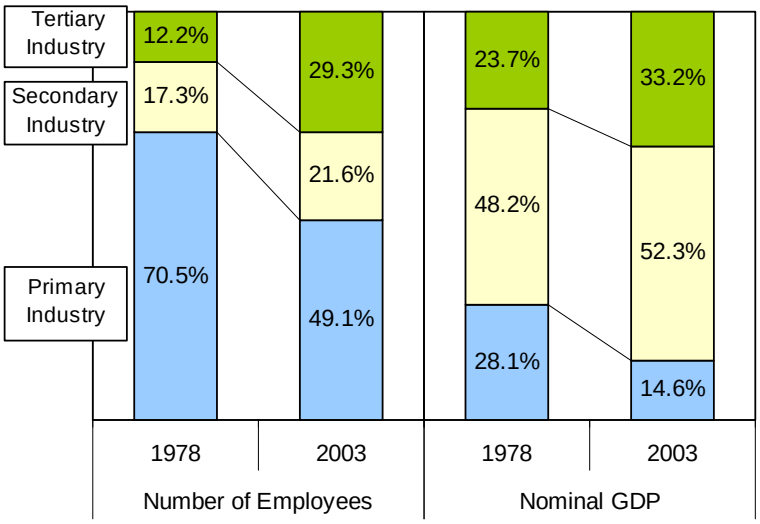
China was traditionally an agricultural nation, which formed the base of its socioeconomic development. Of its population of 1.3 billion, 780 million, or 60%, live in rural areas. Additionally, of China's 740 million workers, 360 million, or roughly half, work in the agricultural, forestry and fishing industries (primary industry). Nevertheless, the percentage of the primary industries making up the number of workers has dropped from the 70.5% of these workers in 1978 when the "Reform and Liberalization Policy" was launched, to less than half, or 49.1%, now. The percentage of primary industries making up the

GDP has also dropped to 15%. The weight of agriculture has fallen in relative terms.

Meanwhile, the mining & manufacturing industry and construction industry (secondary industry), and the service sector (tertiary industry) are growing. The percentage of secondary industries making up the number of workers has risen from 17.3% to 21.6%, and from 12.2% to 29.3% for tertiary industries (over 4-fold increase in the number) from 1978 to 2003. The percentage of secondary industries making up the GDP has also risen from 48.2% to 52.3%, and for tertiary industries from 23.7% to 33.2%.

Looking at the changes to labor productivity by sector, we see that productivity in secondary industries has risen rapidly from 1990. This may be due to the shifting of high manufacturing technology from foreign companies to China with the introduction of foreign capital. The "Reform and Liberalization Policy" accelerated by Deng Xiaoping's "Nanxun Lectures" in 1992, supported by foreign capital. Beijing actively promoted inviting export-oriented foreign manufacturers as part of its export promotion policies. Foreign companies (including joint ventures) were provided preferential treatment in the application of much lower corporate taxes and tariff rates than domestic concerns[2].

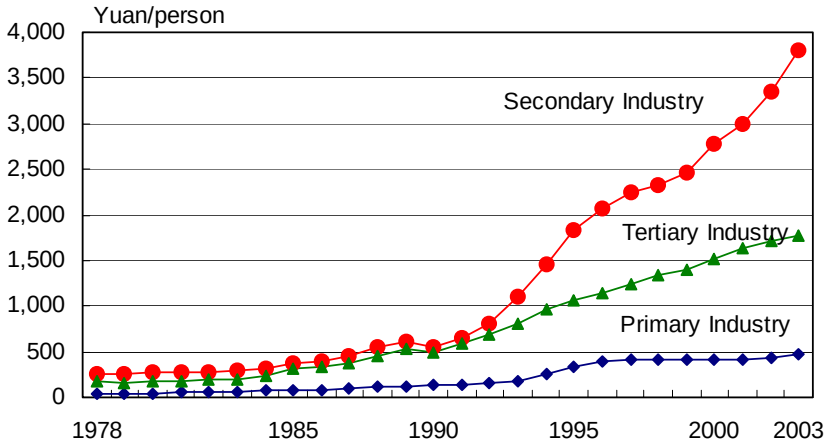
Figure 1-1: Percentage Distribution by Employed Population and Sector for GDP



Source: National Bureau of Statistics of China, "China Statistical Yearbook"

[2] According to statistics of the World Bank, the total direct net investments into China stood at $53.5 billion in 2003, surpassing other BRIC countries (Brazil at $10.1 billion, Russia at $8.0 billion and India at $4.3 billion).

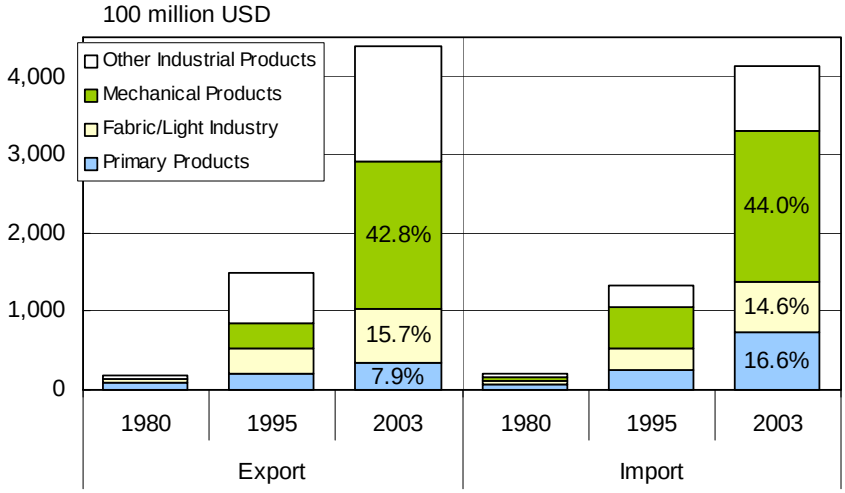
Figure 1-2: Changes in Labor Productivity (Nominal GDP per Worker)



Source: National Bureau of Statistics of China, "China Statistical Yearbook"

The production technology through foreign investment and the abundant, inexpensive labor force of China lead to rapid increases in exports mainly of light industrial products, such as textile products and toys, and machinery. However, around half of these are products by foreign companies. While China is comparatively adept at simple processes and assembly industries, it relies on imports for intermediary and capital goods, which require advanced technology. By the processing trade, which intermediary goods such as materials and parts are imported, and final consumer goods are exported, China has recorded rapid increases in both imports and exports from the middle of the 1990's. Now China is called the "Workshop of the World". China's total trade in 2004 reached $1.155 trillion, surpassing Japan to become the 3rd largest trading nation behind the United States and Germany. China became a member of the WTO at the end of 2001, and has partially eliminated non-tariff walls and lowered duties, which lead to even more active trade and investment. Meanwhile, China had an overall surplus in its balance of trade in 2004 of $31.9 billion, its trade imbalance with the United States, which is described later in this paper, has been spotlighted.

Figure 1-3: Changes and Percentage of Import/Export Receipts



Source: National Bureau of Statistics of China, "China Statistical Yearbook"

1-4 Improvements in the Standard of Living

The standard of living for Chinese citizens improves with its industrialization. Since the "Reform and Liberalization Policy"

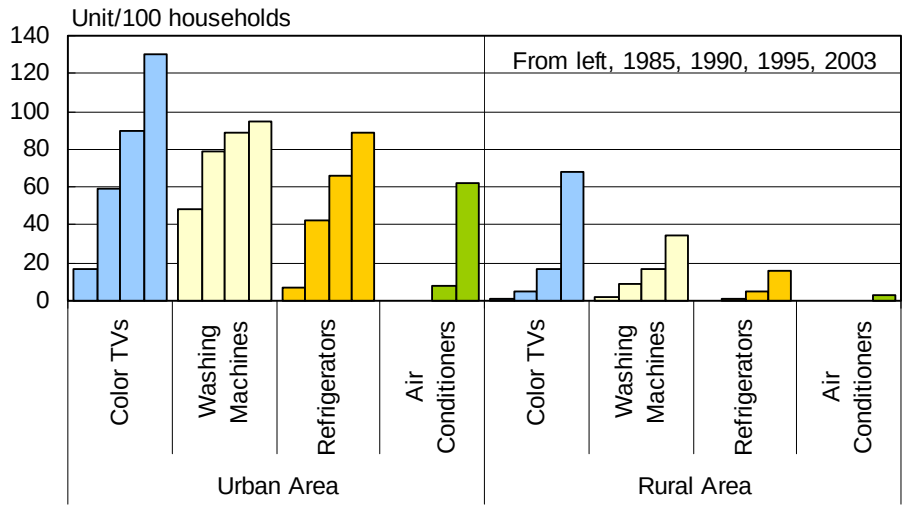
which was launched in 1978, the nominal GDP per capita has grown by an average of 13.6% annually, surpassing $1,000 for the first time at $1,100 in 2003[3]. Better productivity leads to progress in lowering prices of daily necessities, home electric appliances and other products, while purchasing power is risen. Thus consumption activity is strong, and the total societal product retail rose by 13.3% in 2004, beyond the growth in 2003. The core of the buying public is shifting from the wealthy to the middle class, with increased durable consumables such as cars and home electric appliances, as well as leisure consumption including overseas travel[4].

Prices for home electric appliances, which have a core presence in the processing trade, have fallen yearly with rapid improvements in productivity. The lower prices and increases in incomes support diffusion of home electric appliances. The number of households which have color televisions in the big cities has risen above 100 sets per 100 households to 130.5 (2003), while washing machines and refrigerators has progressed to about 100 sets per 100 households, at 94.4 and 88.7 units respectively[5].

The number of car hold has also risen sharply, having grown roughly 3-fold in the past 10 years to 23.83 million (2003). In 2002, China already ranked 9th in the world in number of car hold, and it may rise further in the rankings now. Passenger vehicles (cars, buses) in particular see remarkable growth, and the percent of those owned is shifting to the middle class users. Still, the diffusion rate of car per 100 households even in the big cities is low, at 1.4 autos[6]. Motorization is expected to accelerate with rises in income levels, bringing with it more focus from the automobile industry and the energy industry, especially the oil industry.

There is also tremendous consumption of IT goods. The Internet users reached 94 million, second only to the United States, while the number of cellular phone subscribers was top in the world at 335 million at the end of 2004.

Figure 1-4: Changes in Diffusion of Home Electric Appliances



Source: National Bureau of Statistics of China, "China Statistical Yearbook"

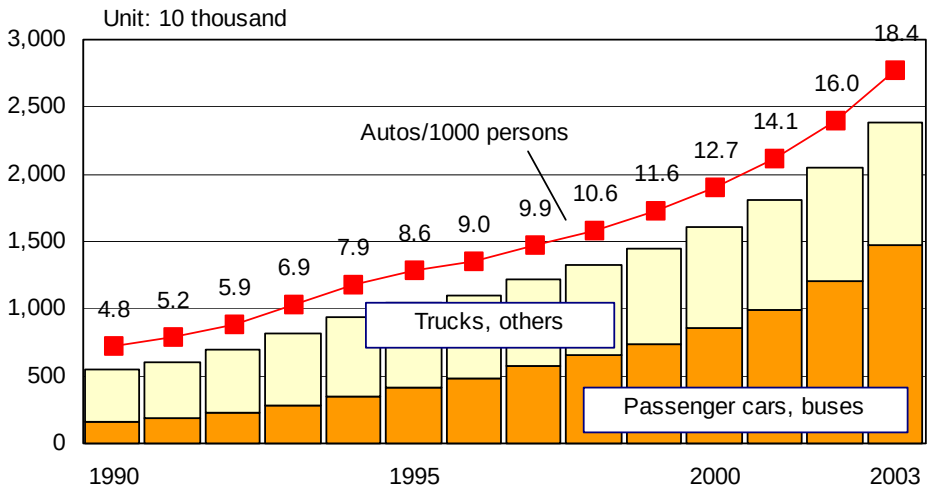
[3] The world nominal GDP average per capita was $5,813 (2003). In other BRIC countries, it was $3,018 in Russia, $2,788 in Brazil and $564 in India.

[4] Conditions for issuing visas for Chinese from foreign countries have been deregulated. For example, although the issuance of group tourist visas in Japan had been limited to residents of Beijing, Shanghai and Canton Province, this was expanded from September 2004 to include Liaoning, Zhejiang, Shandong, Jiangsu Provinces and Tianjin City.

[5] Despite improvements in the standard of living, these improvements are limited to the big cities along the coastal regions where the industrial regions are concentrated. The average disposable income per person in the big cities was 8,472 yuan (2003), yet the average net income per person in rural areas was 2,622 yuan, less than 1/3 that of the big cities. In addition, the number of households in rural areas with home electric appliances was still quite low, more than 10 years behind that of the big cities. This evident gap in the standard of living between the big cities and rural areas is a major concern.

[6] The number of car hold per capita in 2002 was 16.0 per 1,000 people, quite low compared to the 132.4 world average. In other BRIC countries, Russia stood at 169.0 autos, Brazil at 115.2 autos, and 11.3 autos in India.

Figure 1-5: Changes in Number of Car Hold

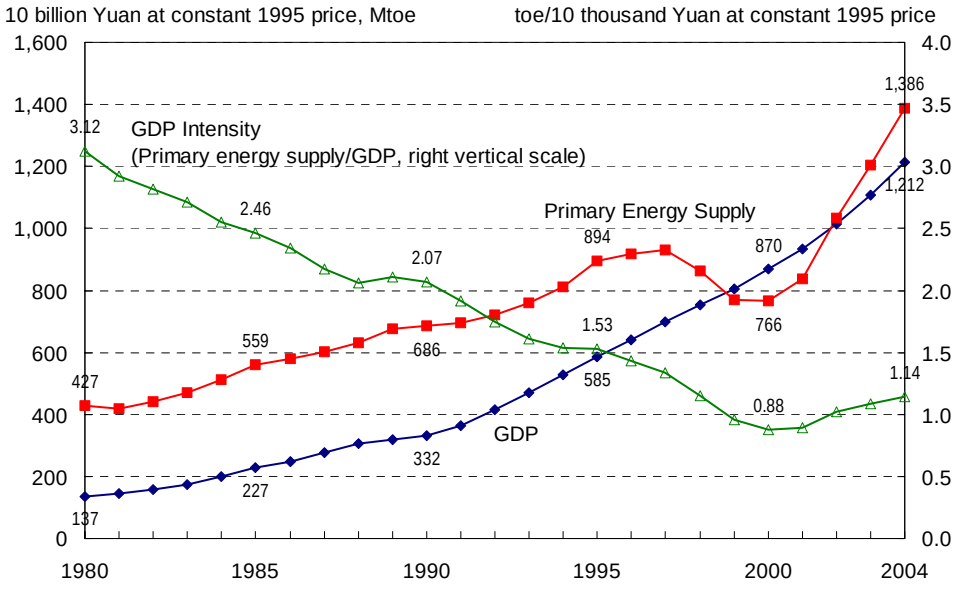


Source: National Bureau of Statistics of China, "China Statistical Yearbook"

1-5 Rapid Growth of Energy Demand

With economic growth, energy consumption increases. Even still, up to the mid 1990's, with graduate improvement of China's low energy efficiency, often witnessed in socialist countries, the growth rate of energy consumption was slower than one of the GDP. Simply put, GDP intensity (the energy required to produce 1 GDP unit) gradually declined, thus keeping GDP elasticity low. With the gradual slowdown in improvement of GDP intensity in recent years, rapid economic growth led rapid increase of energy consumption, an average of 5.5% yearly in the past 10 years. To be noted is that, however, decreases in primary energy supplies from 1998 where caused by statistical problems such as underreporting of coal production from small to mid-sized coal mines. This issue is being resolved, thus growth in recent years is seemed stronger than the real life.

Figure 1-6: Changes in GDP and Primary Energy Supply



Source: National Bureau of Statistics of China, "China Statistical Yearbook" and BP, "BP Statistical Review of World Energy June 2005"

Note: Decreases in primary energy supplies from 1998 must be taken note of due to the statistical problems.

Table 1-3: Changes in GDP and Primary Energy Supply

(Annual Rate)

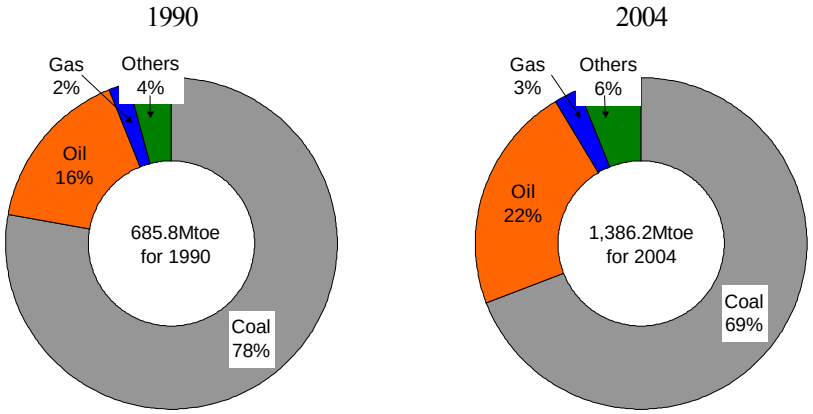
	1985/ 1980	1990/ 1985	1995/ 1990	2000/ 1995	2004/ 2000
GDP	10.7%	7.9%	12.0%	8.3%	8.6%
Primary Energy Supply	5.5%	4.2%	5.4%	-3.0%	16.0%
GDP Intensity	-4.7%	-3.4%	-5.8%	-10.4%	6.8%
GDP Elasticity	0.52	0.53	0.45	-0.37	1.85

Source: National Bureau of Statistics of China, "China Statistical Yearbook", BP, "BP Statistical Review of World Energy June 2005"

GDP intensity, typical for macro energy efficiency indices, is currently 9 to 10 times one of Japan[7]. Even if the fixing of a weaker Yuan by Beijing is discounted, China has not nearly reached a level where its improvements in energy efficiency are at an impasse level. To maintain economic growth and conserve energy consumption, China will have to change its economic and energy consumption structure, what it called "Oil-swilling", and improve its energy efficiency.

When we look at the primary energy supply by energy sources, we see that, despite a drop in the gradual share of coal, coal still makes up roughly 70% of China's energy consumption. China has a sufficient supply capacity of coal, and exports it to Japan and other countries yet it covers its domestic demand. Oil is China's second largest energy source after coal, making up roughly 20% of the total. In terms of its indigenous oil production, with the decline of its large existing oil fields such as Daqing and Shengli, and frustrations in new oil field development, production has basically stalled with very little growth. On the other hand, demand is rapidly increasing, leading to China becoming a net oil importing country in 1994[8]. Thereafter, China's oil imports increase yearly, leading to their greater presence in the global oil market. Natural gas, nuclear and hydroelectric power do not even reach 10% of China's total energy consumption, despite their increases.

Figure 1-7: Primary Energy Supply Structure

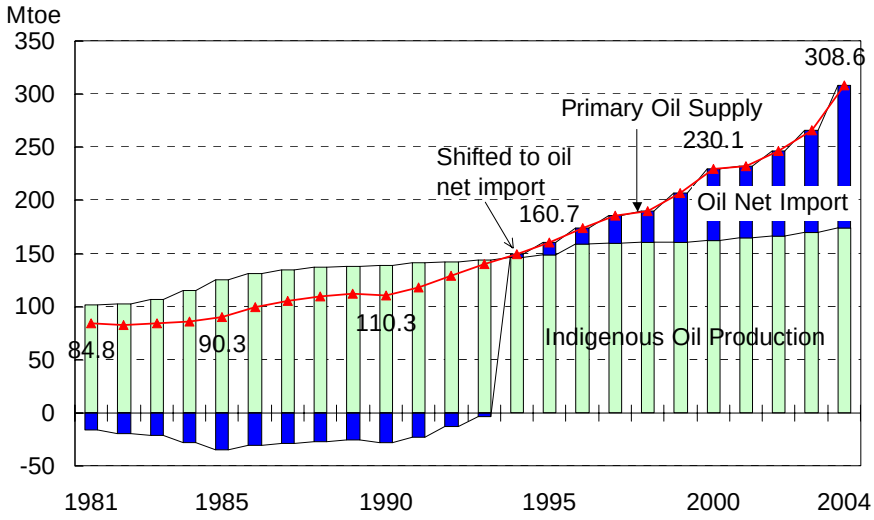


Source: BP, "BP Statistical Review of World Energy June 2005"

[7] In terms of GDP intensity in 2002, it was 837 toe/million $US at constant 1995 price in China, 90 toe/million $US in Japan, and the world average of 262 toe/million $US.

[8] By IEA statistics and China OGP, it was in 1993.

Figure 1-8: Changes in Oil Supply Structure



Source: BP, "BP Statistical Review of World Energy June 2005"

When looking at final energy consumption by sector (2002), we see that the industrial sector makes up over half, thus being the major energy consumption sector in China. The non-metallic minerals, the chemical and the steel industries, which are energy intensive industries, make up 42% of China's final energy consumption. The share of coal for the non-metallic minerals and the steel industries are high, 73% and 75% respectively. In the chemical industries, naphtha is used as a raw material for petrochemicals, thus its share of oil and coal is 37% and 26% respectively. The coal share for the entire industrial sector is 50%[9].

The energy consumption for the transport sector stands at 13% of final consumption, as the number of car hold in China is still low. With higher incomes per capita in the future, and the factors for promoting auto ownership such as lower auto prices due to China's membership in the WTO, progress in China's motorization and increases in oil demand are expected[10].

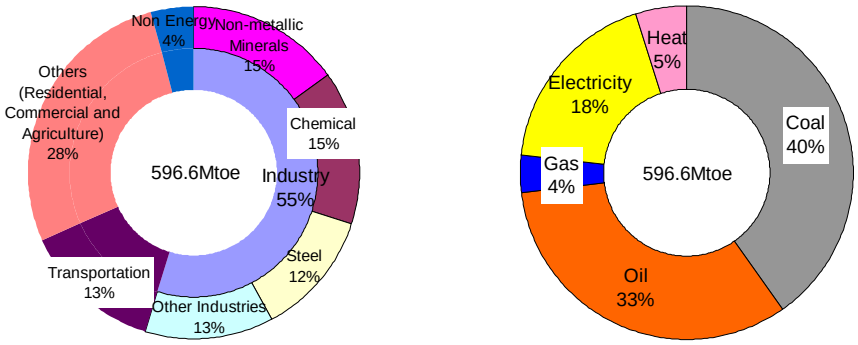
The share of other sectors (residential, commercial and agriculture) is 28%. In the other sectors, coal is dominant energy now, and increased income is promoting shift to LPG, gas and electric power.

Figure 1-9: Final Energy Consumption by Sector (2002)

Figure 1-10: Final Energy Consumption by Energy Source (2002)

[9] From the viewpoint of production trends and energy imports & exports, we see that China has established an independent supply system, thus imports will not increase regardless of production trends. In terms of their chemical industry, as China is 100% self-sufficient in the naphtha it uses in its chemical industry, they will not be importing this material. Although diesel and heavy oil take up tremendous weight in their industrial demand, China has found itself in a position of being a large importer from the end of the 1990's. In recent years, they have reached a somewhat export position due to efforts at improving diesel oil yields rate. In terms of China's heavy oil, it imports over 15 million toe, and is expected to import even further if its production activity becomes stronger. Moreover, from January 2004, China's major oil products are outside of its import control.

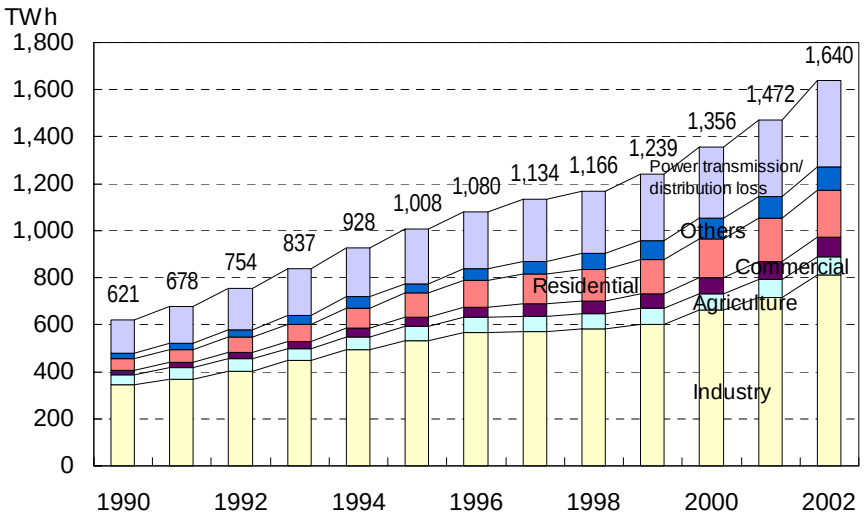
[10] China still exports gasoline, at around 6 million toe.



Source: The International Energy Agency (IEA), "Energy Balances of Non-OECD Countries"

Although China's 10th 5-year plan (2000-2005) estimates a 5% increase yearly in electric power demand, in reality, the demand is increasing rapidly at a pace outstripping the plan. Electricity demand is strong, in particular, in the industrial sector and the residential sector, where home electric appliances such as air conditioner are being spread. This results in (planned) blackout at peak seasons of power demand. Blackout is caused by complex factors such as a shortfall of power generating capacity, transport issues with coal, which also has difficulties in purchase price negotiations. After these obstacles are removed, blackout, that is compulsory energy reductions, will be a thing of the past, and further growth in power demand may be manifested.

Figure 1-11: Changes to Power Demand by Sector



Source: IEA, "Energy Balances of Non-OECD Countries"

2. Revaluation Pressure on the Yuan

2-1 Rapidly Increasing Trade

In China's trend towards trade liberalization due to it becoming a WTO member in December 2001, it has ever-increasing exports and imports. China recorded astounding growth of more than 20% compared to the previous year in 2002, then between 35% to 40% in 2003 and 2004. From January to March 2005, China's imports slowed somewhat to 12.2% for the same period of the previous year, yet exports continuined to grow rapidly at 34.9% in the same period. By country, export growth to the United States and the European Union exceeded total export growth. On the contrary, import growth from them

were less than total import growth.

Figure 2-1: Changes in Exports

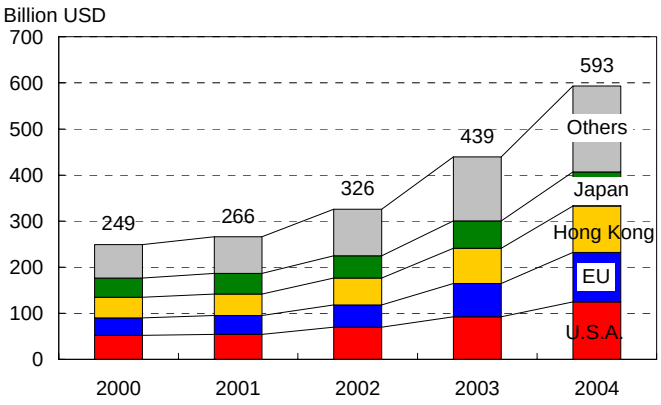
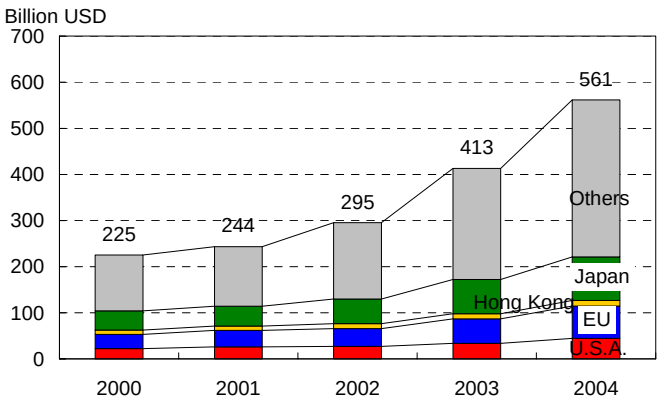


Figure 2-2: Changes in Imports



Source: Ministry of Commerce, "Customs Statistics"

Table 2-1: Imports and Exports from January to March 2005

Compared to the same period of the previous year

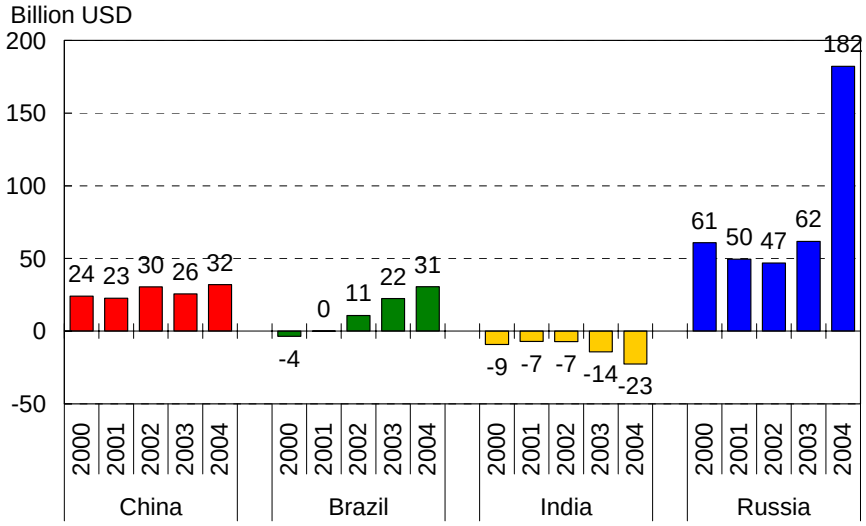
	U.S.A.	EU	Hong Kong	Japan	Others	World Total
Exports	36.9%	41.8%	25.0%	22.8%	39.7%	34.9%
Imports	-2.1%	3.4%	13.1%	4.0%	18.1%	12.2%

Source: Ministry of Commerce "Customs Statistics"

According to WTO statistics, China's balance of trade in 2004 was at a surplus of $31.9 billion[11]. This was at a scale within the BRIC countries right after Russia. Yet, half of Russia's exports are oil, gas and other natural resources, 90% of China's exports are industrial products. Thus, despite China's smaller trade surplus than Russia's, this structure makes friction with the developed countries (and their manufacturing industry) more likely to occur. In 2004, the effect of rising crude oil and other energy prices roughly tripled Russia's trade surplus, yet this has not been raised as a concern. On the other hand, China's trade surplus is often cited in relation to the United States in particular.

[11] Japan has a $111.0 billion surplus. The United States has a $707.4 billion deficit, and the Euro area has a $164.9 billion surplus.

Figure 2-3: Changes in Balance of Trade of BRIC Countries



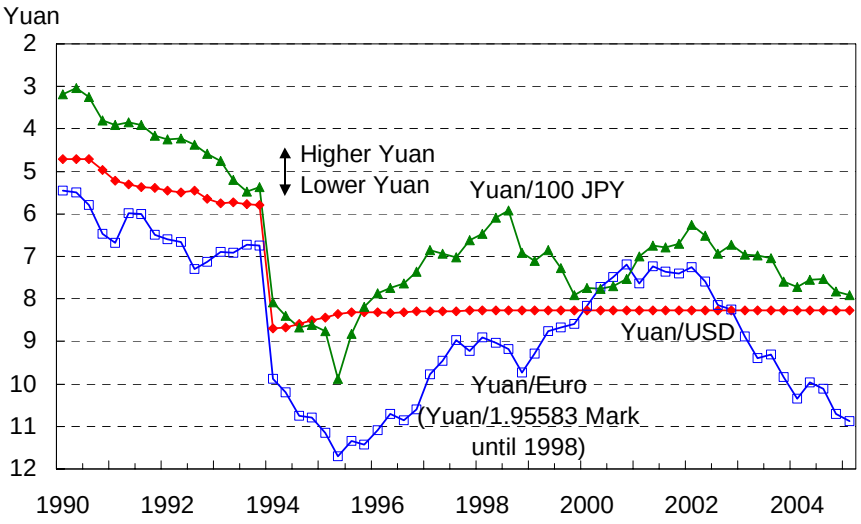
Source: WTO, "Statistics Database"

2-2 Fixed Exchange Regime

The Yuan rate was devalued from 5.8068 Yuan/$ (average in December 1993) to 8.7000 Yuan/$ (average in January 1994) by roughly 50% when the dual rates regime was eliminated in 1994. Since 1995, it has been at about 8.3 Yuan/$, despite its current surpluses and the accepting of direct investments. Thus the fixed exchange rate regime against the US dollar has continued.

While there were some expectations that the Yuan would be devalued due to a chain reaction when the Asia currency crisis, which began with the Thai baht in 1997, hit, the Yuan stayed at between 8.28-8.29 Yuan/$.[12].

Figure 2-4: Changes in the Yuan Rate (against US Dollar, Euro, and Yen)



Source: International Monetary Fund (IMF), "International Financial Statistics"

[12] The fact is that massive foreign currency reserves and accumulating trade surpluses have been factors, conversely, in promoting the revaluation of the Yuan.

The Yuan has a fixed rate against the US dollar, thus it has shifted to the lower value in these past 3 to 4 years against the Euro and the Yen. It has lost roughly 50% of its value against the Euro in particular. This is seriously affecting the Euro area more than the United States, where the Yuan/$ rate is basically fixed apart from a problem of the level.

Of the top 10 ranked countries in terms of total trade in 2004, all countries (OECD countries) except China adopts a full floating exchange regime. Malaysia (ranked 18th), which strengthened its currency controls after the Asian currency crisis, is another country after China that adopts a fixed exchange regime (in fact). However, Malaysia's trade totals are 1/5 those of China, thus its effect on global trade is remarkably small.

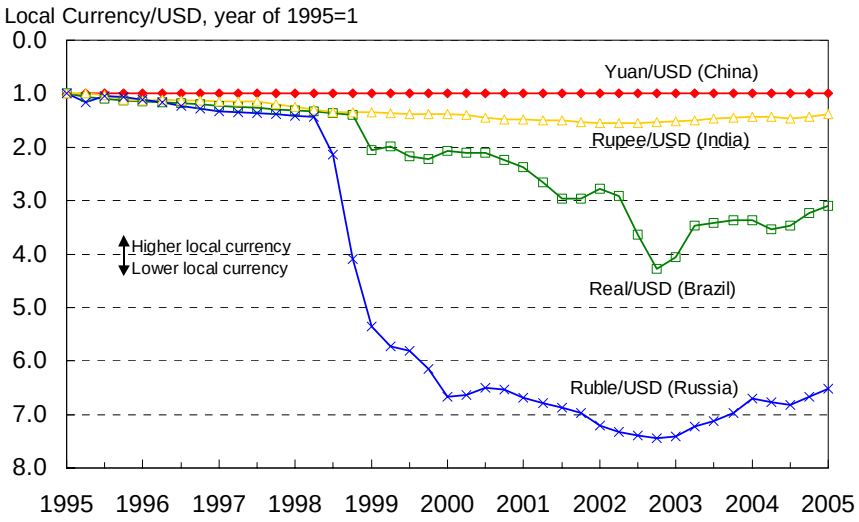
Table 2-2: Top 10 Countries in Trade Total (2004)

Rank	Country	Total Trade (Billion USD)	Share	Currency Unit	Exchange Regime
1	U.S.A.	2,345	12.6%	USD	Floating exchange rate regime
2	Germany	1,632	8.8%	Euro	Floating exchange rate regime
3	**China**	**1,155**	**6.2%**	**Yuan**	**Managed floating exchange rate regime (fixed exchange rate regime in fact)**
4	Japan	1,020	5.5%	JPY	Floating exchange rate regime
5	France	915	4.9%	Euro	Floating exchange rate regime
6	U.K.	808	4.3%	Pound	Floating exchange rate regime
7	Italy	695	3.7%	Euro	Floating exchange rate regime
8	Netherlands	679	3.7%	Euro	Floating exchange rate regime
9	Canada	598	3.2%	CAD	Floating exchange rate regime
10	Belgium	596	3.2%	Euro	Floating exchange rate regime
...	...				
18	Malaysia	232	1.2%	Rinngit	Fixed exchange rate regime since Sep 2, 1998 (1USD=3.8 Rinngit)

Source: WTO, "Statistics Database" and other sources

In other BRIC countries, India and Brazil adopt a floating exchange regime. Their exchange rates may be the ones that reflect economic growth, balance of trade, fiscal balance, the inflation rate and other factors in the mid-long term. Although Russia adopts a managed floating exchange regime, their fluctuations are much greater than those for China.

Figure 2-5: Changes in Exchange Rates in the BRIC Countries

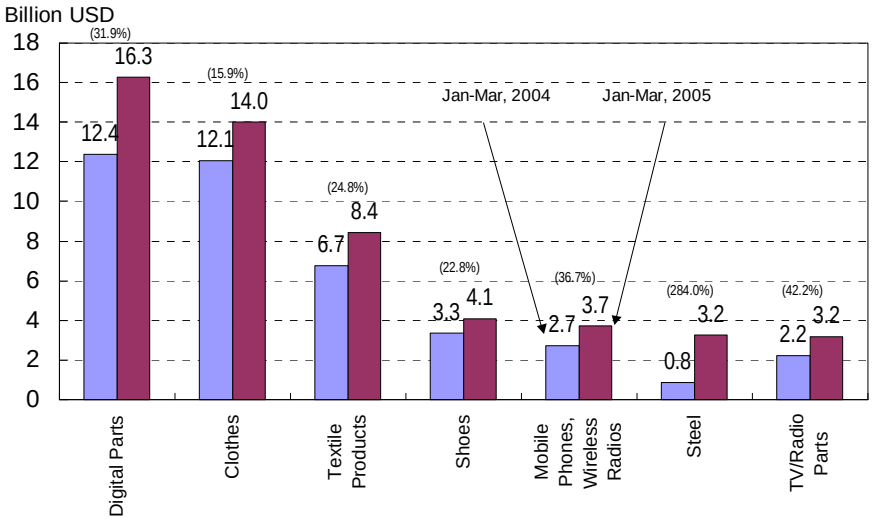


Source: IMF, "International Financial Statistics"

2-3 Increasing Economic Friction

In recent years, there have been calls for re-evaluation of the exchange rate level of the Yuan, expansion of its fluctuation range, or the introduction of a currency basket system, further capital transfer deregulation and others for Yuan reform. One reason why the exchange rate level is focused on is rapid increases in the export of Chinese made textile products in this year. Moreover, looking at January to March 2005, we see that digital parts has risen by 31.9% of the same period of the previous year, with an increase of $3.9 billion, rising more rapidly than clothing and textile products.

Figure 2-6: Major Product Exports from January to March 2005



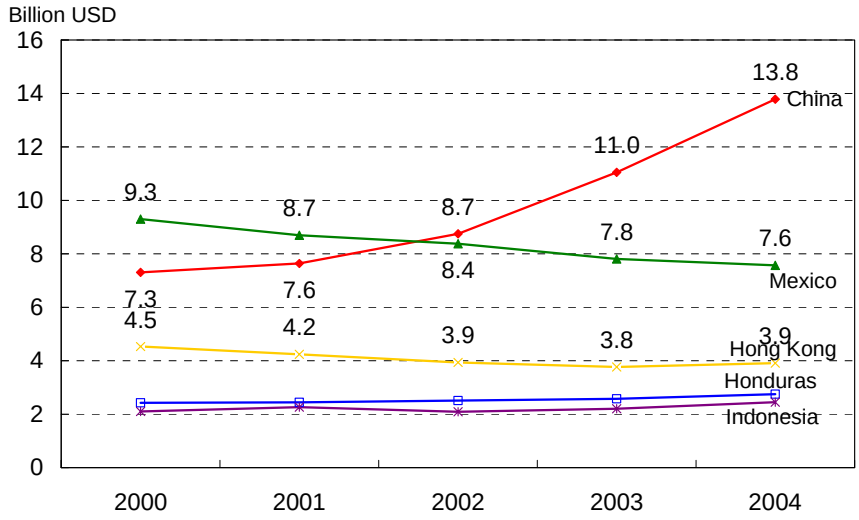
Note: The numbers in parentheses indicate the rate (%) compared to the same period of the previous year.

Source: Ministry of Commerce's "Customs Statistics"

One reason for the rapid increase in textile product exports is the changes of the WTO system. The trade quota system for textile products by the WTO was abolished in January 2005. This led China to impose export duties in order to control rapid export increases. Nevertheless, the desired effect never materialized, and Chinese textile products imports increased more rapidly in the United States and the European Union. This led the United States to put into motion emergency import restrictions (safeguards) against Chinese textile products in May 2005[13]. China responded to this by eliminating export duties, and friction is increasing. Meanwhile, the European Union also launched a study on imposing safeguards, but this action was avoided as China placed voluntary regulations on its exports in June to last to the end of 2007.

[13] As interim measures against China, a WTO member can take safeguards against rapid increases in imports of Chinese products until 2013, and safeguards against Chinese textiles and textile product imports until 2008. Antidumping/countervailing tariff measures may also be imposed until 2016.

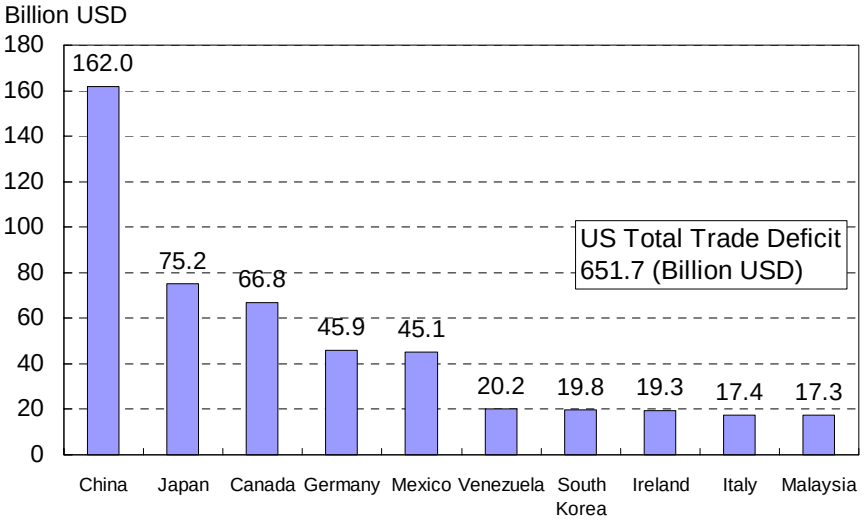
Figure 2-7: Changes to United States Clothing Imports - Top 5 Countries



Source: Department of Commerce

The view that the Yuan is being set low is strengthened, and this is pressure on China to revaluate its currency. For example, John Snow, US Secretary of the Treasury, has repeatedly called on China to shift to a flexible exchange regime for the Yuan, and Alan Greenspan, US Federal Reserve Chairman, has stated that while this action would not translate into improvements in the United States balance of trade, the Yuan should still be revaluated.

Figure 2-8: United States Trade Deficits by Country - Top 10 Countries (2004)



Source: Department of Commerce

Over 25% of the United States trade deficit is with China, making it the nation with the largest trade deficit with the United States. Yet, clothing is less than 10% of the trade deficit with China. Taking the total economy into perspective, we find that the assertion that the rapid increase in exports of Chinese clothing and textile products being the main factor in the widening trade deficit with the United States is weak, and has largely emerged from a political backdrop. However, China is the 3rd largest country in trade now. Keeping the rate of the Yuan in a level advantageous for its exports is being a problem which cannot be overlooked either in terms of the economic friction it causes with developed countries, or in terms of the possibility for this to

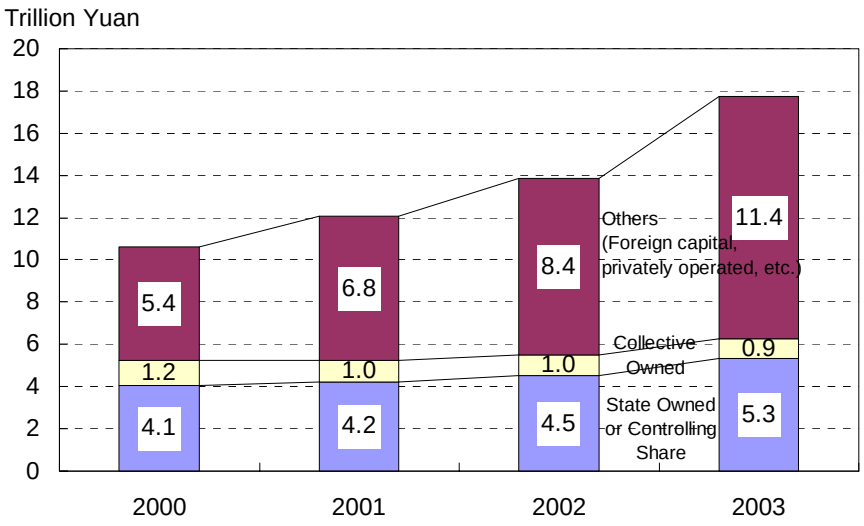
rob opportunity for other developing countries to export.

2-4 Factors for Yuan Revaluation Lurking Inside China

Pressure to revaluate the Yuan is not only coming from overseas. The cost to operate a fixed exchange regime continues to grow based also on domestic factors.

One logical example of this is the "Trilemma in open economy (*The Impossible Triangle of Robert Mundell*)". Simply put, (1) free capital mobility across borders, (2) a fixed exchange rate, and (3) an independent monetary policy do not stand simultaneously. China, at present, adopts the fixed exchange regime and the independent monetary policy, and it abandons free capital mobility across borders. Nevertheless, with the growth of China's global economic influence, its admission to the WTO, and the trends toward globalization, the demand for free capital mobility is unavoidable. When China makes capital mobility free, Beijing has to choose either the fixed exchange regime or the independent monetary policy. It is difficult, generally, for a great power to maintain a fixed exchange market or to abandon an independent monetary policy. In China, which adopts the "socialist market economic system", the effects of directives and regulations on economic control are relatively large compared to full market economy, while playing a small role in carrying out financial policies. Despite this, the role of foreign companies and private sector entrepreneurs from the liberalization of China's economy has grown. Thus increasing importance of financial policies in China in the future is expected. In any event, the imminent abandonment of the fixed exchange regime is expected.

Figure 2-9: Changes in Industrial Production by Company Type



Source: National Bureau of Statistics of China, "China Industrial Economic Statistical Yearbook"

There are also problems taken from different points of view. The low established value of the Yuan results in China's current international balance of payment surplus, yet this will lead to pressure for domestic monetary ease. In this situation, enormous investments were made in the real estate, steel and cement industries in the first half of 2004. Tightening of investment project authorizations from the central government and controlling its bank lending position have moderated the sharp increases in the fixed asset investments, yet strong growth above 20% is still being demonstrated. These may become indirect factors causing an economic hard landing or inflation, and become a destabilizing element in the fixed exchange regime.

2-5 How Low is the Yuan Valued?

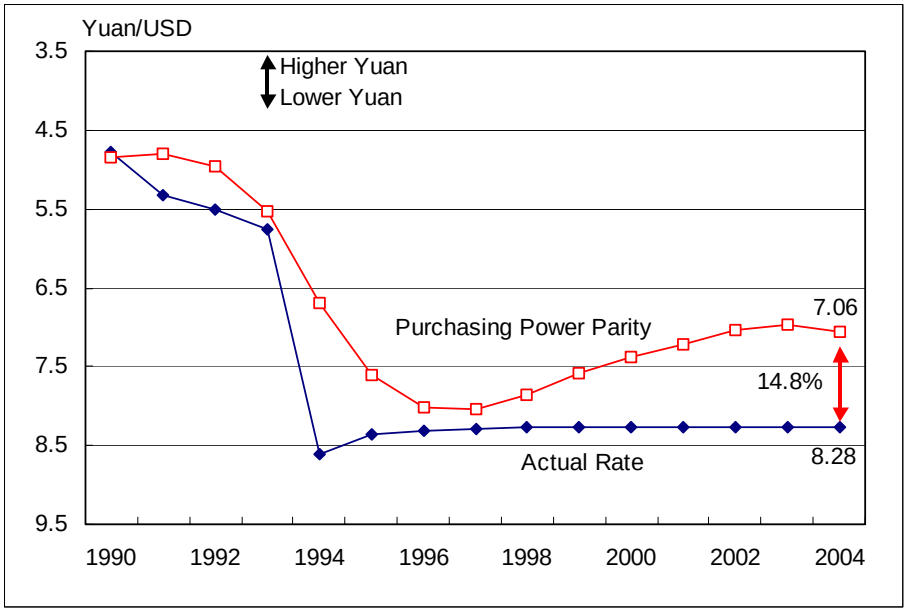
The question now is how low the Yuan is valued at. If China adopted a full floating exchange rate regime, the rates would be set to levels deemed appropriate by the market through market transactions. Although the Yuan is not set based on a full

floating exchange rate regime, in terms of the NDF (Non-Deliverable Forwards) price in the Hong Kong market[14], the Yuan was traded at 7.8 Yuan (1 year futures) per one dollar as of June 2005[15]. Simply put, the market traded at an expected revaluation of around 5% to 6% against the actual rate, 8.28 Yuan per one dollar.

Meanwhile, one of the rationales for assessing an appropriate level of the exchange rate is the Purchasing Power Parity Theory. This theory is based on the concept that the exchange rate would be set in the level where the purchasing power of two different currencies to become equal. And the actual exchange rate is regarded that it is consistent with the purchasing power parity in the long term.

Based on this theory, we estimated the "relative" purchasing power parity measured by the rate of change in the purchasing power according to a certain equilibrium. Taking the 5-year period from 1989 to 1993 when China's balance of trade was averagely balanced, the estimation was performed based on the change rate of consumer prices in China and the United States. Although the purchasing power parity estimation trended the same as the market rate in the first half of the 1990's, this changed in the latter half of the 1990's to where the gap with the market rate grew larger. The rate stood at 7.06 Yuan/$1 as of 2004, 14.8% higher than the actual 8.28 Yuan/$1 rate[16].

Figure 2-10: Market Rate and Purchasing Power Parity of the Yuan



Source: Authors' estimation from IMF, "International Financial Statistics"

The following is a detailed description of the Cabinet Office's "Global Economic Trends, Spring 2005" related to assessing the Yuan. According to this paper, there are great differences in the estimates based on the approach taken, i.e. the Yuan is underestimated by 58%, or it is neither undervalued nor overvalued. In terms of the approaches by the Purchasing Power Parity Theory, based on the long-term view, the Yuan is tending towards being valued lower. Meanwhile, the overall balance of payments approaches, the mid-term view, conclude that the Yuan is discounted by 15% to 30% than its true value.

3. Impact of Yuan Revaluation on the Chinese Economy and Energy Demand

3-1 Impact of Yuan Revaluation and Valuation Method

What would be impact of Yuan revaluation? Table 3-1 summarizes impact on China's domestic economy. Despite the rise of

[14] There was no transfer of local currency, and was transacted where only the gap with the rate set before the set period was settled.
[15] The 7.77 Yuan/$1 recorded on May 3, 2005 was the highest value ever recorded.
[16] The relative purchasing power parity can be estimated with comparative ease, yet the results based on the set base year and the adopted price index are very different. Moreover, if the price index is limited to tradable commodities, the purchasing power parity may appreciate more due to the strong growth in productivity for tradable commodities in China.

purchasing power mainly for import products, there will, generally speaking, probably be many negative impact on the domestic economy.

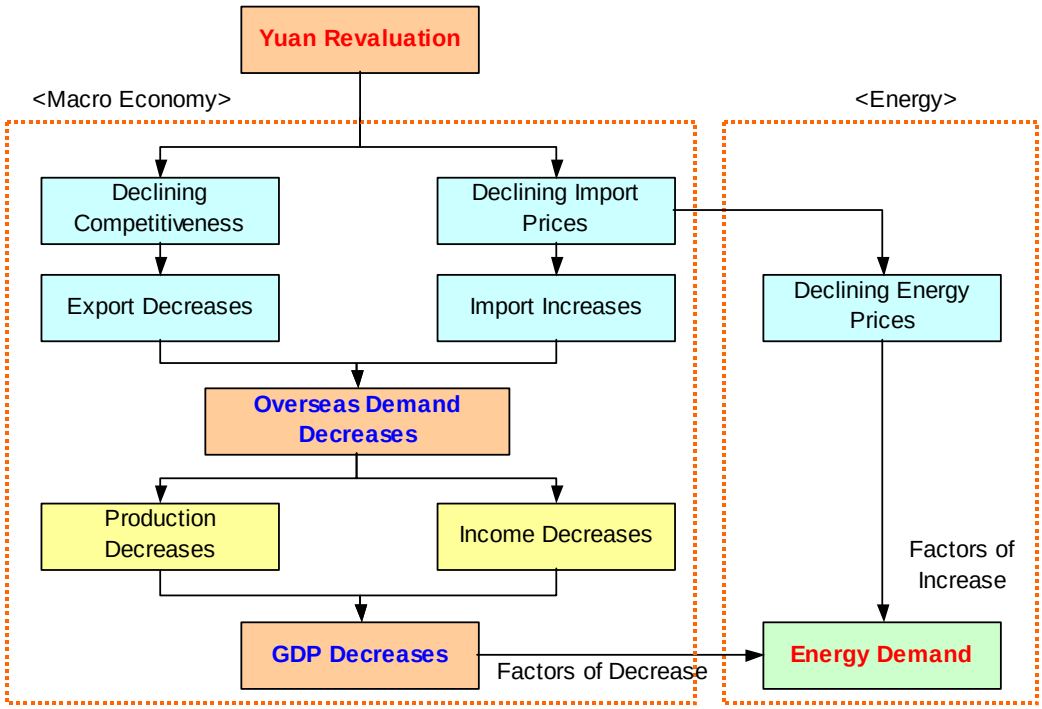
Table 3-1: Example of Impact of Revaluating the Yuan

Consumption, Industrial Activity	Lower overseas demand due to increased imports, decreased exports and smaller trade surpluses
	Slowdown of domestic economic activity due to lower overseas demand
	Pressures on industry and regions (mainly the inland) where there is no competitiveness against imports
Prices, Domestic Finances	Decreased companies profit caused by lower export prices
	Pressure to reduce personnel and other costs
	Lower costs due to falling import prices and reduce of inflationary pressures
	Declining monetary ease pressure caused by shrinking trade surpluses
	Reduce of pressure to increase money supplies
International Finances	Outflow of speculative funds which had flowed in due to expected Yuan revaluation
	Decrease in value of Yuan for dollar based assets such as in United States Treasury Bonds
	Decreased direct investment in China, increased investment overseas
International Politics	Greater global impact caused by growing economic scale evaluated in dollars (increased presence)

When considered based on the relationship to energy, the important thing, in particular, is the impact on consumption and industrial activity. The impact of the revaluation of the Yuan here was simulated using China's macro economy/energy supply & demand model developed by LI Zhidong[17] and the EDMC. Figure 3-1 shows a simple impact flow of the Yuan's revaluation in this model. A revaluation of the Yuan will give rise to lower export competitiveness and lower import prices, and then reduce overseas demand. These effects will reduce production and income, thus reducing GDP and would be expected to negatively impact on the macro economy. In terms of energy, although reduced economic activity effects towards reducing energy demands, lower energy prices have the effect of boost up energy demand. Ultimately, whether energy demand will rise or fall depends on the income (production) and price elasticity.

[17] Associate Professor, Nagaoka University of Technology, IEEJ Visiting Research Fellow.

Figure 3-1: Major Channels for the Impact of a Yuan's Revaluation in the Model



Concerning the simulation, firstly we estimated the economy and energy demand in the constant Yuan rate (base case), then estimated a case, in which the Yuan was revaluated. The impact of the revaluated Yuan were measured by observing the difference. With respect to the revaluation range, as shown in the previous section, while there are various estimates for the Yuan, Beijing is expected to take a gradual response. Thus we assumed that the Yuan was appreciated by 10 % against the US$.

3-2 Impact on Macro Economy

In case there is no revaluation of the Yuan (base case), real GDP in the 1st year (2005) would rise by 8.8% of the previous year. Meanwhile, in case the Yuan appreciates by 10%, real GDP would drop by 1.7% vis-à-vis the base case.

We will take a closer look at the specifics below. Firstly, for exports, if the exchange rate is revaluated, this will lead to lower export competitiveness, which supported by lower cost. This tends, therefore, to exporters make to control rises in dollar-based export prices in order to alleviate the decline in export quantities. Thus exports will stand at a 1.9% decrease. Meanwhile, imports will rise slightly by 0.3%. Exchange rate revaluation will lower import prices, and is a factor for increasing imports. However reductions in exports work to reduce intermediary and capital good imports. The result is that the impact contributions on real GDP for imports/exports (overseas demand) become -1.0%. This is the primary impact of the Yuan's revaluation.

Production activities shrink due to decreased exports and increased imports, which suppresses capital investments, while fixed capital formation decreases by 0.9%. Although a drop in domestic prices influenced by falling import prices is a factor in increased consumption, by the effects of lower incomes exceeds it, and consumption expenditures decline by 0.2%. The result is that the contribution to real GDP of domestic demand, which has a secondary effect, goes to -0.7%.

Although a shrinking of the trade surplus due to a revaluation of the Yuan is expected, shrink is $500 million in the 1st year (2005) and $7.9 billion in the 2nd year (2006) in case the Yuan is appreciated by 10%. Compared to the $31.9 billion trade surplus in 2004, the impact of the revaluation is not as large as one might expect. Currently, the United States' trade deficit with China counts $162.0 billion. Even if a reduction in the China's surplus of $7.9 billion was all with the United States, the effects of this decrease would only be 5%.

Table 3-2 Impact of Yuan Appreciation by 10% on Macro Economy

(Unit: 1 Trillion Yuan at constant 1995 price)

	2004	First year (2005)			Rate of deviation from base case	
		Base case without revaluation	10% revaluation	Difference	First year	Reference: 2nd year
Real GDP	12.1 (9.5%)	13.2 (8.8%)	13.0 (6.9%)	-0.23	-1.7%	-2.1%
Consumption expenditures	5.9 (3.1%)	6.1 (3.2%)	6.1 (3.0%)	-0.01	-0.2%	-0.3%
Fixed capital formation	5.1 (11.3%)	5.6 (9.9%)	5.6 (8.9%)	-0.05	-0.9%	-1.6%
Export	6.6 (27.1%)	8.0 (20.7%)	7.9 (18.5%)	-0.15	-1.9%	-1.6%
Import	5.4 (25.4%)	6.3 (18.0%)	6.3 (18.3%)	0.02	0.3%	0.5%
(Domestic demand contribution)					-0.7%	-1.3%
(Overseas demand contribution)					-1.0%	-0.8%

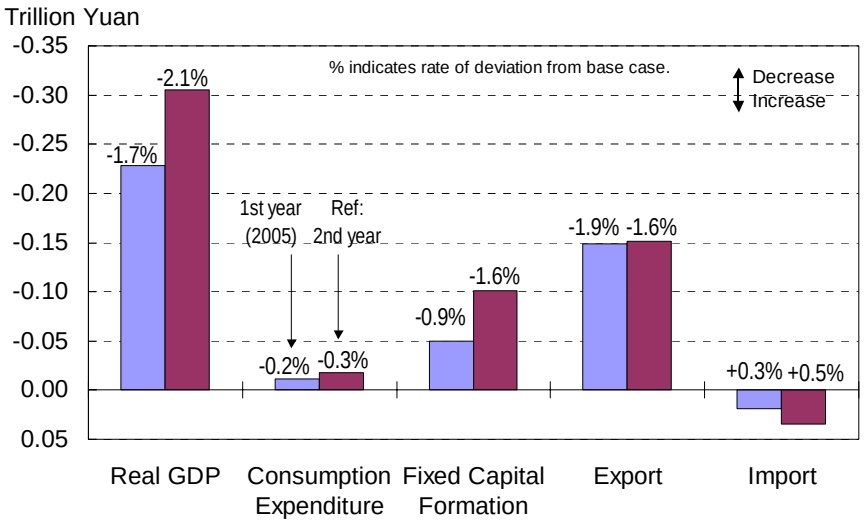
Note: The numbers in parenthesis indicate the rate (%) compared to the previous year

	Rate of deviation from base case First year
Consumer price	-0.6%
Industrial product shipment price	-1.4%
Exchange rate	-10.0%

(Unit: Million USD)

	Difference	
	First year	Ref: 2nd year
Trade balance	-524	-7,921

Figure 3-2: Impact of Yuan Appreciation by 10% on Macro Economy



3-3 Impact on Energy Demand

The impact of the Yuan appreciation by 10% would result in final energy consumption vis-à-vis the base case by 0.8%, while the primary energy supply would drop by 0.9%. The result shows that the reduction effects in energy demand due to the deceleration of economic activities exceed the increases effects in demand caused by energy price drops.

Looking at final energy consumption by sector, the industrial sector drops by 1.0%, the largest percent reduction. The industry directly, particularly, the processing and assembly industries where there are strong export ratios, is affected by less production that cascades out from export decreases. Additionally, the percent reduction for power is larger in comparison to fuel for the industrial sector because of the high percentage of power in the processing and assembly industries. The effects after those on the industrial sector are the 0.8% reductions in the transport sector. This is due to a decrease in the energy demand in the freight transportation sector, because bulk shipment demands have a close relationship with production activity trends. The impact on the passenger transportation sector is smaller than those on the freight sector. The impact on the residential and commercial sectors is relatively lower than those on the transport sector, standing at a 0.2% decrease. Taking a look at energy sources, the drop in the energy demand in the industry sector has impact on power which drops by 1.1%. Fuel drops by 0.7%.

Table 3-3: Impact of Yuan Appreciation by 10% on Final Energy Consumption

(Unit: Million ton of oil equivalent)

	2004	First year (2005)			Rate of deviation from base case	
		Base case without revaluation	10% revaluation	Difference	First year	Reference: 2nd year
Final energy consumption	691 (7.9%)	738 (6.9%)	733 (6.1%)	-5.6	-0.8%	-1.0%
Industry	388 (8.5%)	418 (7.9%)	414 (6.8%)	-4.2	-1.0%	-1.4%
Transportation	97 (14.7%)	106 (9.7%)	105 (8.8%)	-0.9	-0.8%	-0.9%
Residential, commercial and agriculture	166 (4.1%)	173 (4.2%)	173 (4.0%)	-0.3	-0.2%	-0.4%
Fuel	548 (6.3%)	577 (5.3%)	573 (4.5%)	-3.9	-0.7%	-0.8%
Electricity	142 (14.6%)	161 (13.4%)	159 (12.2%)	-1.7	-1.1%	-1.6%

Note: The numbers in parenthesis indicate the rate (%) compared to the previous year

Looking at primary energy supplies by energy sources, we see that oil is the most impacted, dropping 1.2% (3.9 Mtoe, 80,000 B/D reduction). Besides lower demand in the industrial and transport sectors, there may be a tremendous impact on autoproducing of electricity with diesel oil, which has grown rapidly in recent years due to power shortfalls. About half of coal, which makes up 70% of total energy demand, is consumed for power generation, thus it drops by 0.9% due to the lower power demand as well as the reduction in final consumption.

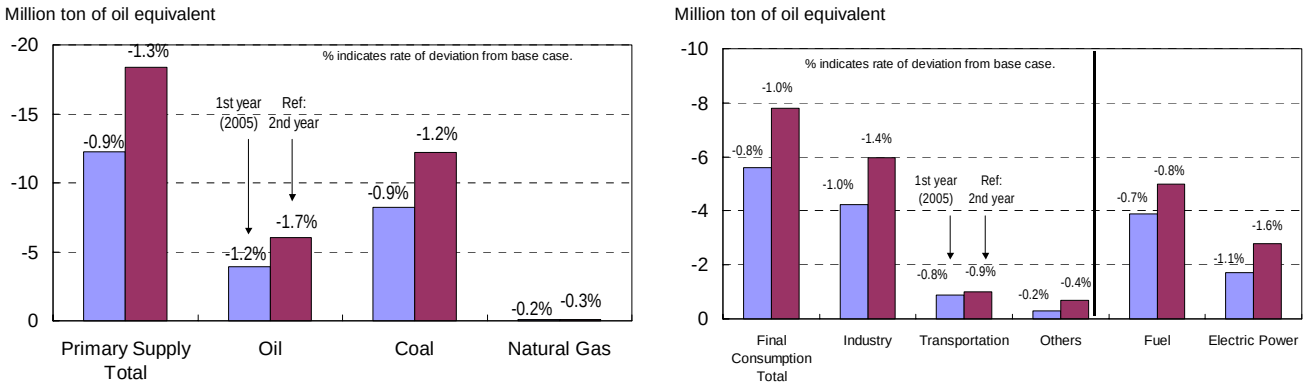
Table 3-4: Impact of Yuan Appreciation by 10% on Primary Energy Supply

(Unit: Million ton of oil equivalent)

	2004	First year (2005)			Rate of deviation from base case	
		Base case without revaluation	10% revaluation	Difference	First year	Reference: 2nd year
Primary energy supply	1,228 (9.4%)	1,342 (9.3%)	1,330 (8.3%)	-12.2	-0.9%	-1.3%
Oil	300	325	321	-3.9	-1.2%	-1.7%
(10,000B/D)	*600*	*651*	*643*	*-8*		
	(10.6%)	(8.4%)	(7.1%)			
Coal	842 (8.8%)	924 (9.8%)	916 (8.8%)	-8.2	-0.9%	-1.2%
Natural gas	35 (5.8%)	37 (5.7%)	37 (5.5%)	-0.1	-0.2%	-0.3%

Note: The numbers in parenthesis indicate the rate (%) compared to the previous year

Figure 3-3: Impact of Yuan Appreciation by 10% on Energy Demand



One of the factors in rising oil prices in recent years is the demand for oil in China. Global demand for oil in 2003 rose by 1.77 million B/D compared to the previous year, then by 2.7 million B/D in 2004. The increased demand in China was 550,000 B/D and 860,000 B/D respectively, thus China made up roughly 30% of the increase in global demand. China's oil demand is expected to grow even more in the future, making it a cause for concern about the tightening of global supply-demand situation for oil.

The estimated reduction in China's oil demand caused by the 10% appreciation in the Yuan is 80,000 B/D. This decrease is small compared to the increase in global demand in recent years[18] and the rapidly growing oil imports into China (2.4 million B/D in 2003, 3.2 million B/D in 2004). Even if the demand for oil in China decreases due to the 10% appreciation in the Yuan, this degree of decrease would have a limited effect on alleviating the global supply-demand situation for oil.

Conclusion

China's rapid economic growth is remarkable. China's GDP grew with a quarter century average beyond 9% since Beijing

[18] According to the IEA, "Oil Market Report", June 10, 2005, global oil demand is expected to increase by 1.78 million B/D in 2005.

adopted the "Reform and Liberalization Policy". China currently ranks 7th in nominal GDP worldwide, and its total trade ranks 3rd, with the world's largest populations and vast amounts of land, making it a "superpower" from economic standpoint. Energy demand also increases with economic growth. Although China has always been enjoying energy resources, in terms of oil, enormous demand surpasses its domestic production. Thus its imports have grown rapidly in recent years. These increases in oil demand are one factor in the rising price of crude oil in recent years.

One of the major factors supporting China's rapid economic growth is processing trade, with low cost as its advantage. The growth rate of exports has gone beyond 30%, while the balance of trade in 2004 reached a surplus of $31.9 billion. Meanwhile, the United States trade deficit reached $651.7 billion, with China making up $162.0 billion of this deficit. Thus there are rising calls for China to reform and substantially revaluate the Yuan from the United States and the other countries.

There are various proposals made with respect to exchange rate regime reforms such as increasing the fluctuation range of the Yuan, and adopting a currency basket. There are arguments also over evaluating the Yuan. If revaluation range of the Yuan is narrow and regarded as being insufficient, there may be further revaluation pressure on China. Even still, Beijing is expected to take a gradual response.

Given this situation, we quantitatively analyzed impact on the Chinese economy of a revaluated Yuan and on energy demand. If the Yuan is appreciated by 10%, real GDP drops by 1.7%, and energy demand (primary supply) falls by 0.9%. Oil demand also drops by only 80,000 B/D, thus there is a limited impact on alleviating global supply-demand situation for oil.

As the focus in this estimation was on a short-term impact analysis, the result showed negative impact on the domestic economy such as a drop in GDP. However, it may be too early to pass a negative judgment on a revaluation of the Yuan based on these results. Without drawing on Japan as an example, appreciation of the currency, in the long run, will promote conversion to an effective and sturdy economic system, having some desirable effects such as enhanced competitiveness and energy efficiency, as well as increased presence is needed in the world.

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