China's Growth Model:

Problems and Alternatives

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1. Introduction

China's rapid economic growth process in recent decades has been impressive. However, it also poses a number of serious problems including the environmental sustainability of its growth trajectory, the rising level of inequality, the high degree of exploitation of the migrant labor force, and the weak oversight of product safety. This paper addresses one more problem of China's growth process -- its high and growing dependence on exports, and secondarily on investment, to maintain economic growth.

China's huge trade surpluses in recent years have drawn much attention (Lardy, 2006). In 2007 China's trade surplus reached 8 percent of GDP (National Bureau of Statistics of China, 2008). While such an enormous trade surplus appears unsustainable, not least for political reasons, it is a relatively recent phenomenon.[1] During 1999-2004 China's export surplus, including goods and services, was modest, ranging from 2.1 percent to 2.8 percent of GDP. Except for two large surpluses for goods and services of 4.4 and 4.2 percent of GDP in 1997 and 1998, China previously did not run large export surpluses.[2]

The furor over the recent Chinese trade surplus obscures a more long-standing, and ultimately more problematic, dependence of China's rapid growth on external sources of demand, in ways that cannot be measured by the size of its trade surplus. Following the adoption of its policy of "market reform" and opening to the world market in 1978, China experienced rapid growth. We will show that China's rapid growth was initially based on its domestic market, specifically rising consumption by households and government. However, starting in the 1990s China's growth model began to shift toward reliance on external demand and also fixed investment, a shift that intensified after 1999. We will raise questions about the sustainability of this growth model, one which is historically unprecedented for a large, rapidly developing country.[3]

The theoretical approach in this paper regards aggregate demand as an important

determinant of long-term economic growth. Conventional neoclassical analysis assumes full employment of resources and the validity of Say's Law, which lead to the conclusion that long-run growth depends entirely on supply side factors. We reject such assumptions as contrary to the actual situation normally faced by market economies. Typically significant resources are unutilized or underutilized, and a higher level of aggregate demand -- or in a dynamic context, a higher growth rate of aggregate demand -- will call forth increased output (or faster growth in output). In the long-run, additional labor can be obtained by increasing the use-rate of underutilized labor, putting the official or disguised unemployed to work, or in-migration. Investment can be increased, and with it the growth rate of the capital stock increased, without the need to squeeze additional saving by depressing another component of demand, because increased investment can raise the growth rate of output and income which generates the necessary additional saving. Furthermore, faster demand growth tends to promote faster productivity growth, as factors of production are shifted from less to more productive sectors and innovation is stimulated. This is not to say that supply side constraints cannot be binding -- rather, we argue that normally they are not, particularly in the long-run.

Rapid growth requires rapidly growing aggregate demand, which can derive from various sources. Rising consumer demand can be an active source of economic growth, if, for example, household spending increases due to a change in the distribution of income in favor of households with a high spending propensity, or due to a rise in the propensity to consume resulting from policy or institutional changes. Private investment, driven by profit expectations, can propel economic growth, which has the effect of increasing productive capacity as well as providing demand stimulus. Public investment, driven by policy considerations, can equally well drive economic growth. Government current consumption can also drive growth. Finally, external demand can be a significant source of growth, which has the advantage of earning the foreign exchange that may be needed to permit efficient increases in the other components of

aggregate demand by loosening the balance of payments constraint (McCrombie and Thirlwall, 2004).

It matters which source, or sources, of growing aggregate demand are mainly driving economic growth. There is no single best composition of aggregate demand growth for all countries and all times. However, for a particular country, facing a particular domestic and international context, one composition of growing aggregate demand may be favorable for long-run growth while another poses problems. This paper develops an analysis, and an assessment, of China's particular growth model, which has changed over time, in light of its particular circumstances. Our central concern is external versus domestic demand, and to a lesser extent, the share of investment in China's growth model.

Section 2 considers how to measure dependence on external demand. We argue that some conventional measures, such as the export surplus, or total trade, relative to GDP, are misleading. Section 3 analyzes the evolution of China's growth model since 1978, including consideration of the reasons why its growth model has shifted over time. Section 4 examines the reasons why export-dependent growth is problematic for China. Section 5 offers concluding comments.

2. Measuring Dependence on External Demand

Unfortunately the national income account categories were not designed with the measurement of external demand in mind. In traditional national income accounts, the gross domestic product (GDP) is represented as follows:

$$Y = C + I + G + NX \qquad\qquad (2\text{-}1)$$

where Y = GDP, C = household consumption, I = gross investment, G = government purchases of goods and services (government expenditure for short), and NX = net exports, or exports less imports of goods and services. It is usual to assume that aggregate demand for GDP equals actual output, in which case equation (2-1) is written as

$AD = C + I + G + NX$ (2-2)

where AD = aggregate demand.[4]

It is sometimes useful to replace net exports by its two components, resulting in the common equation

$Y = C + I + G + X - M$ (2-3)

where X = exports of goods and services and M = imports of goods and services. It would be misleading to say that there are five components of AD or GDP, since imports are a negative entry in GDP.

From the above equations, it might appear that the usual national income accounting identity does offer a clear indicator of foreign demand for GDP, namely the proportion of NX in GDP. However, that is not the case. Exports represent foreign demand for goods and services whose final production takes place in a country. However, not all of exports represent foreign demand for the output of domestic factors of production since exports include the value of imported inputs used to produce exported goods and services. Subtracting M subtracts all imported imported intermediate inputs as well as imports that are destined for consumption, government purchases, and investment.

That NX is an inappropriate measure of dependence on external demand is best shown by a hypothetical example. Suppose Y = 100, C = 60, I = 20, G = 20, X = 30, and M = 30. Since NX = 0, does that mean that there is no foreign demand for the country's output? Suppose that all imports are consumer goods. In that case, total foreign demand for the country's output would clearly be 30, the value of exports. While the country's demand for foreign output is also 30, and hence exports and imports balance, this does not mean that foreign demand is zero.

To extend the above example, suppose exports increase by 10, and the income from the increased exports ends up in the hands of households which spend it on 10 more of consumer goods imports. Then C would rise from 60 to 70, X would be rise from 30 to 40 and M would

also rise from 30 to 40. Thus, the increased exports expanded GDP by 10 without any change in the still-zero trade balance.

If NX =0, this has a monetary meaning. It means that the country's exports are earning exactly the amount of foreign exchange required to purchase its imports. If NX is greater than zero, that means that the country earns more from exports than it is paying for imports. Such statements are relevant for certain issues, but not for the matter of measuring foreign demand for output.

In the trade literature one sometimes encounters, as a measure of "openness" to international trade, the ratio $(X + M)/Y$. This measure is of no use for our purposes. It is not a very coherent variable, since imported intermediate goods form part of the value of exports, so that $X + M$ involves double counting.

The variable X/Y might appear to be a way to measure foreign demand for output. However, like the other expenditure components of GDP, X is an imperfect measure because, as we noted above, part of its value does not constitute demand for (or part of) GDP since exports are produced using both domestic and imported inputs. The part of the value of exports that represents imported inputs does not constitute part of GDP. If a country must import 3 units of inputs to produce 10 units of exports, then only the difference, of 7 units, constitutes foreign demand for that country's GDP, or alternatively, only 7 units makes up domestic value added that is part of GDP.

The appropriate measure of foreign demand for a country's output is the domestic content of its exports, X_d. X_d is the value of exports less the value of all of the imported inputs that are directly or indirectly used in the production of exported goods and services. That is, to calculate X_d, one must subtract the value of imported inputs used directly to produce exports, and also subtract the value of imported intermediate goods used to produce domestically produced inputs that are used to produce exports, and so on back through the chain of production. Like GDP, X_d

is a value-added concept that includes only domestic value-added.

Thus, we can write

$$Y = C_d + I_d + G_d + X_d \hspace{3cm} (2\text{-}4)$$

where each of the above four components of GDP is the domestic content of its respective associated traditional component of aggregate demand or GDP. Equation (2-4) simply distributes the output attributable to domestic factors of production (which is the GDP) among the four categories of purchasers of the GDP. Conceptually, the best measure of the share of external demand in total demand (or in total output) is X_d/Y.

Unfortunately, the measure that is most conceptually appropriate is not always practical to utilize.[5] To actually measure X_d would require an input-output table so detailed that it tracked every imported intermediate good through all of the successive stages of production including the final disposition of all relevant goods into either domestic sale or export. No country compiles such detailed input-output tables. Many countries do produce less detailed input-output tables, from which it is possible to estimate the domestic content of exports.[6]

In recent years China has produced input-out tables annually, but most are at a relatively aggregated level. In 1997 and 2002 it produced somewhat more detailed tables, which were used in a recent study to estimate the domestic content of its exports (Dean, Fung, and Wang, 2007). That study estimated the domestic content share of China's exports in those two years at 71.7% in 1997 and 64.1% in 2002 (Dean, Fung, and Wang, 2007, table 1). The decline in estimated domestic content share between 1997 and 2002 suggests that China's exports shifted somewhat toward an export-platform type of exports, in which relatively little local value is added to imported inputs. An example is computer assembly from imported components using cheap domestic labor. However, some observers of China's business development have argued that recently China has been aggressively substituting domestic for imported inputs. This suggests that one cannot assume that the trend implied by the above estimates has continued since 2002 --

it is possible that the trend has reversed.

In this paper we use the estimates of Dean, Fung, and Wang (2007) in our effort to determine the dependence of China's growth on foreign demand. However, since we want to trace the changes in China's growth model over a period of almost 30 years, since 1978, we will be forced to use estimates for most years. We are also interested in the extent to which China's growth is dependent on investment. We will also use the estimates of X_d from Dean, Fung, and Wang (2007) to estimate the domestic content of fixed investment over the period.

3. China's Changing Growth Model since 1978

During 1978-2006 China's growth model shifted from one based primarily on rapidly growing domestic consumption to one driven by exports and investment. This shift did not take place gradually or evenly. One can identify several stages in China's growth model during this period. In this section, we identify seven sub-periods in the growth model based on changes in the leading sectors of aggregate demand, and we examine the policy and institutional changes that underlay the shifts in demand which define the sub-periods.

A component of GDP is considered to be leading GDP growth over a period if it meets two conditions: 1) the component is growing significantly faster than GDP over the period; 2) the component's share in GDP is large enough that its "contribution" to GDP growth over the period is a significant share of cumulative GDP growth over that period.

The "contribution" of any component of GDP -- for example, household consumption -- to GDP growth is defined as follows:

$$CON_C = \frac{\Delta C}{C} \times \frac{C}{Y} \qquad\qquad (3\text{-}1)$$

The sum of the contributions of all of the components of GDP over a period is identically equal to the growth rate of GDP. The contribution of each component is traditionally measured in "percentage points."

We define the "contribution share" of any component of GDP as its contribution divided by the growth rate of GDP over the period. Thus, if the GDP growth rate over a period is 10 percent and the contribution of consumption is 5 percentage points, then the contribution share of consumption would be 50 per cent -- that it, consumption would have contributed half of GDP growth over the period.

Neither the growth rate nor the contribution by itself is a good indicator of which components are the leading components of GDP growth. If a component is growing faster than GDP, its growth can be thought of as "pulling up" the overall GDP growth rate, but if that component is a small share of GDP, then the "pull" would be very weak. On the other hand, a growing component that is a large share of GDP will make a relatively large contribution to GDP growth, yet if it is growing more slowly than GDP, it would be "pulling down" the GDP growth rate.[7]

As was noted in section 2 above, there is a problem with the traditional components of GDP considered as demand for GDP. The four positive components of GDP -- C, I, G, and X -- are all hybrids, which include demand for GDP as well as demand for imports. Despite this problem, we will examine the traditional components of GDP, since data are not available for each year for more appropriately defined components. However, since we are particularly interested in the roles of exports and investment, we will supplement the data on the traditional components of GDP with estimated series for the domestic content of exports (X_d) and the domestic content of fixed investment (IF_d). See Appendix sections A and B for the methodology for estimating X_d and IF_d.[8]

Figures 1 and 2 show the shares of GDP for C (household consumption), G (government consumption), IF (fixed investment), X (exports of goods and services), and M (imports of goods and services) for each year from 1978-2006.[9] Figure 3 shows the annual growth rate of real GDP during that period. If the share of a component rises from one year to the next, that

means it has grown faster than GDP and is a candidate for a factor that is leading growth. Table 1 provides the annual growth rates of GDP and its components including the estimated components X_d and IF_d.[10] For a component whose share of GDP is rising over a sub-period, one can consult table 1 to see how much faster it is growing than GDP as a whole.

[Insert Figures 1, 2, and 3, and Table 1 here]

We identified 7 distinct sub-periods of China's growth model: 1978-81, 1981-88, 1988-90, 1990-93, 1993-94, 1994-99, and 1999-2006.[11] To supplement the information in figures 1-3 and table 1, which are based on annual data, tables 2 and 3 provide data on each of the 7 sub-periods. Table 2 shows the average annual growth rate of GDP and of each component for the 7 sub-periods, as well as the average rate of change over the sub-period in the value of the RMB against the US dollar and the average value of official net exports as a percentage of GDP over the sub-period. Table 3 provides the contribution shares of each component over the 7 sub-periods. Note that table 3 includes the contribution share of the component "increase in inventories," a component that cannot be included in the growth rate tables since that variable can assume a negative or zero value.

[Insert Tables 2 and 3 about here]

1. 1978-81 Consumption-Led Growth: The past three decades have witnessed a transition in the Chinese economy from central planning to a market economy, accompanied by fundamental changes in the ownership of the means of production, income distribution, and the pattern of economic growth. In 1978, under the leadership of Deng Xiaoping, China entered the "reform and opening up" era. At that time, China had a centrally planned economy, with almost all the means of production publicly (state or collectively) owned and income quite equally distributed.

This first sub-period was the only sub-period of consumption-led growth during 1978-2006. Figure 1 shows that the household consumption share rose significantly during 1978-81, as C rose 2.6 percentage points faster than GDP (table 2). During 1978-81 the share of

government consumption also rose, although the increase was all in the first year. The fixed investment share trended downward in that sub-period. The export share rose rapidly, from 4.5% to 7.7% of GDP, but its impact on GDP growth was lessened by the still-small share of exports in GDP.

Table 3 shows that household consumption contributed 69.2 per cent of GDP growth in this sub-period, with government consumption contributing an additional 20.7 per cent of GDP growth. Thus, total household and government consumption growth accounted for just under 90 per cent of GDP growth. Exports contributed 23.1 per cent of GDP growth, a large share given the small size of exports relative to GDP.[12] The estimated domestic content of exports contributed only 18.1 per cent of GDP growth, with the remainder accounted for by growth of the domestic content of domestic expenditure.

The reform, which began in this sub-period, started in the agricultural sector. In order to gain political support for the reform, the government carried out policies to increase the income of common people, especially the peasants. This was done by increasing the price of agricultural produce purchased by the state. The result can be seen in Table 4, column 2, which shows very rapid growth of per capita net real income of rural households from 1978 through 1982, after which the growth rate slowed. As Table 5 shows, from 1978 to 1981 the per capita net income of rural households grew at a rate of 14.1% per year, compared to a GDP growth rate of 6.9% per year over that period.[13] Aggregate household income grew rapidly in both the urban and rural sectors, as Table 5 shows, which far outweighed a reduction in the ratio of consumption to household income during this period (table 6).[14] The rapid increase in the income of ordinary people in this sub-period, with their high propensity to consume, accounts for the rapid rise in household consumption. At the same time, the sharply increased government consumption and intentionally slowed fixed investment contributed to producing the initial consumption-led growth during 1978-1981.

[Insert Tables 4, 5 and 6 about here]

2. <u>1981-88 Balanced Growth</u>: This was a sub-period of relatively balanced growth, with fixed investment playing a modestly leading role. During this sub-period the consumption share remained almost unchanged, falling from 52.5% to 51.1% of GDP, and the G share fell slightly from 14.7% to 12.8% of GDP. The fixed investment share rose moderately; while IF rose 2.1 percentage points faster than GDP, the impact was smaller than a similar growth rate gap for consumption would have been because, in that period, the share of IF in GDP was a much smaller than that of C. The export share rose gradually, from 8.3%to 12.7% of GDP, but it still remained too small to have much impact on GDP growth.

Table 3 shows that fixed investment contributed about one-third of GDP growth over the period, while the estimated domestic content of fixed investment contributed just under 30 per cent of GDP growth. The estimated domestic content of exports contributed about 11% of GDP growth, implying that the other 89% was accounted for by growth in the domestic content of domestic expenditure.

This second sub-period, of relatively balanced growth, reflects the slowdown in the growth rate of household income. As table 4 shows, total household income growth, while trending downward after 1982, remained above the GDP growth rate in the early part of the period but fell below it after 1983. For the subperiod as a whole, the average growth rate of household income was 10.1% per year, somewhat below that of GDP (see table 5), while the ratio of consumption to household income rose slowly (table 6). This accounts for the nearly constant share of consumption in GDP, contributing to the balanced growth over this sub-period.

But this does not mean that there were not important changes in the Chinese economy in this sub-period. In the financial sector, the banking system was separated from the fiscal system, and the People's Bank of China became the central bank, with its commercial banking functions and branches transferred to other newly established state-owned commercial banks. In 1984 the government announced that the loan quota of these commercial banks would be based on the

loans the banks made in the previous year, and this policy would be implemented in 1985. This caused a 49.4% increase in the money supply (M0) in 1984 (Department of Comprehensive Statistics at the China Statistical Bureau, 2005) and consumer price inflation of 13-15% per year during 1984-85 (see figure 4). At the same time, the market mechanism was allowed and encouraged to play a more and more important role. Lifting price controls became an important item in the reform agenda. This was not only due to the pro-market direction of the reform, but also due to the budget burden of the large subsidies necessary for the price controls. In 1988, the central government partially lifted the price controls, which caused a burst of inflation, as consumer price inflation reached 18.8% and 18.0% in 1988 and 1989. This rapid inflation would play a role in setting off the Tiananmen Square Event.

[Insert Figure 4 about here]

It was during this sub-period that the gini coefficient first began to register rising income inequality. As figure 5 shows, the gini had remained relatively stable at the low level of 0.29 to 0.31 during 1978-82, followed by a decline to 0.24 in 1984. Starting in 1985, as marketization gathered steam and rapid inflation began, the gini coefficient reversed course and began to rise. However, it was not until the last year of this sub-period, 1988, that it spiked above its previous range, reaching 0.38 in that year.

[Place figure 5 about here]

3. 1988-90 Investment-Led Slowdown: During this sub-period GDP growth slowed down significantly, to a rate far below the overall period average (figure 3 and tables 1 and 2). The main factor slowing growth was a collapse in fixed investment. The share of IF fell sharply in 1989 (figure 1); the level of IF fell by 13.0 per cent in 1989 and rose only by 1.5% in 1990 (table 1). The share of consumption fell slightly while that of government rose slightly. Working against the growth slowdown was a very large jump in the export share in 1990; over this sub-period exports rose at a 19.7% annual rate.

Table 3 shows that fixed investment contributed -44.6% of GDP growth -- that is, it contributed a 3.6 percentage point rate of decline in GDP while GDP actually rose by 8.1 per cent over the sub-period. Exports contributed 68.1% of the reduced rate of GDP growth in this sub-period. The domestic content of exports contributed 52.6% of GDP growth, or just over half. Note that increases in inventories in this sub-period contributed a remarkable 52.5 per cent of GDP growth, which suggests a severe shortage of aggregate demand relative to output.[15]

The very rapid inflation of 1988 and 1989, discussed above, led the government to cut state investment and use other measures to cool down the economy. These policies were quite effective against inflation, which quickly fell to 3.1% in 1990 (figure 4). At the same time, it caused the investment-led growth slowdown in 1989 and 1990 that we have observed. The economy grew at the lowest rate of the whole reform period, only 4.1% and 3.8% respectively in the two years. The large jump in exports during this period, which rose by 40.3% in 1990 alone, was directly and indirectly due to the government's devaluation of the RMB that year by 21.3%.[16] 4. 1990-93 Investment-Led Domestic-Market-Based Growth: This was a sub-period of investment-led growth. Figure 1 shows a very sharp rise in the fixed investment share, from 25.0% to 36.0% of GDP, as investment more than recovered from two years of depressed levels. During this sub-period, IF grew at an average rate of 27.1 per cent per year. Table 3 shows that IF contributed 62.3 per cent of GDP growth, and the growth of domestic content of IF contributed 52.9 per cent of GDP growth. Government spending grew faster than GDP in this sub-period while consumer spending grew substantially more slowly.

Unlike in the 3 preceding sub-periods, during 1990-93 exports grew more slowly than GDP, and as figure 2 shows, imports grew twice as fast as exports over the sub-period, despite a continuing decline in the value of the RMB. The growth of the estimated domestic content of exports contributed only 7.6% of GDP growth over the sub-period.

The investment-led growth that began in 1991, and picked up speed in 1992, can be

explained by a combination of the after-effects of temporarily conquering inflation and, more importantly, a shift in government policy. Having stopped the rapid inflation, the government was free to ease its policy and promote faster GDP growth. The market mechanism began playing a more and more important role and market forces grew stronger. The state-owned and collectively owned enterprises were required more and more to follow the market mechanism, and the private sector of the economy was growing. By 1991 private enterprises accounted for 9.8% of the industrial output, up from zero in 1979. The market forces inevitably influenced the government and academia. The demand for a liberal market economy grew stronger.

It was against this background that Deng Xiaoping gave his famous series of talks in January, 1992, during a tour of South China. He called for the establishment of a market economy and faster GDP growth. His talks gave a big shock to the Chinese society and government. Soon, the 14th CPC National Congress officially adopted the market economy as the objective of the reform, which, in turn, encouraged rapid growth of the market forces in the Chinese economy. Figure 5 shows that the gini coefficient rose rapidly during this sub-period , from 0.33 to 0.39, when the role of market forces and the private sector was growing. Household income grew 6.6 percentage points slower than GDP (table 5), which can account for the relatively slow growth of consumer spending, although this was partially compensated by a rising ratio of consumption to household income (table 6).

Deng's talk and the government's new move led to a huge increase in investment. In 1992 and 1993, the growth rate of fixed investment was over 30% and the GDP growth rate reached 14.2% and 14.0% in those two years. However, this would give rise to another round of rapid inflation in the following years.

5. <u>1993-94 Export-Led Growth</u>: This brief sub-period was characterized by purely export-led growth. This one-year interval deserves to be considered a distinct sub-period because it saw a huge single-year-only increase in exports, along with the largest devaluation of

the RMB of the whole period. In 1994 the export share rose from 16.1 per cent to 23.6 per cent of GDP. Exports rose by 66.4 per cent that year and contributed 81.4 per cent of GDP growth, while the estimated domestic content of exports contributed 47.3 per cent of GDP growth. Thus, almost half of GDP growth was contributed by external demand that year. In 1994 the RMB was devalued by one-third, going from 5.76 per dollar to 8.62 per dollar. The shares of C, IF, and G all declined somewhat.[17]

From Figure 2 we can see that between 1978 and 1989 China had an export surplus on goods and services only in three years, during 1981-83. This encouraged the Chinese government to devalue the RMB, from 1.68 RMB/USD in 1978 to 3.77 RMB/USD in 1989, 4.78 RMB/USD in 1990, and 5.32 RMB/USD in 1991. Together with the sluggish economic growth and slow import demand growth in 1989 and 1990, the depreciation of the RMB led to an export surplus in 1990. The surplus lasted for three years. But in 1993, although the government depreciated the RMB against the USD again from 5.51 to 5.76, China suffered a serious trade deficit of around 2 percent of GDP. During 1992 and 1993 import growth far outpaced export growth, and exports actually declined in 1993 (table 1). This led the Chinese government to accept the argument that the RMB was still over-valued and might cause a dangerously high trade deficit in the following years. Therefore, the Chinese currency was sharply depreciated in 1994 to 8.62 RMB/USD. This was accompanied by export-promotion policies such as a full value-add tax rebate for exports. These policies, along with the large depreciation of the RMB, explain the very sharp increase in exports in 1994, which made 1993-1994 an export-led growth period.

Throughout sub-periods 3 through 5, from 1988-1994, the share of consumption in GDP decreased steadily. One reason was surging income inequality. Figure 5 shows that, apart from a one-year upward jump in 1988, from 1987 to 1994 the gini coefficient trend was upward, from 0.32 to 0.40. During the period 1988-94 GDP growth averaged 9.6% per year, while household

income rose at the slower rate of 7.2% and the ratio of consumption to household income declined gradually at -0.4% per year. These factors underlay the declining consumption share of GDP, which fell from 51.1% in 1988 to 43.5% in 1994.

6. <u>1994-99 Balanced Domestic-Market-Based Growth</u>: These five years represented a second sub-period of relatively balanced growth. Household consumption grew 1.2 percentage points faster than GDP, as the gini coefficient stopped rising and instead was flat over the period and household income growth somewhat exceeded GDP growth (tables 2, 5, and figure 5). Government consumption grew slightly faster than GDP, while fixed investment grew somewhat more slowly than GDP. By 1999 the share of IF had fallen from 34.5 per cent to 33.5 per cent of GDP, still a very high share for investment. The shares of both exports and imports declined over the period, with imports falling faster, opening up a significant export surplus of 2.2 per cent to 3.9 per cent of GDP in the last 3 years of the period. The domestic content of exports contributed only 11.9 per cent of GDP growth over the sub-period, indicating that growth was overwhelmingly based on growing domestic demand. The domestic content of IF contributed 29.2 per cent of GDP growth.

While economic growth was balanced according to our definition, this balance was achieved at greatly different shares for the major components of GDP compared to the 1980s. Consumption averaged only 45.1% of GDP during this sub-period, well below the 51.3% average in 1981-88. By contrast, the share of investment averaged 33.0% of GDP in 1994-99, up from 28.9% in 1981-88. The share of exports averaged 21.0% of GDP in 1994-99 compared to 10.1% of GDP in 1981-88. Although the trend toward greater dependence on exports and investment temporarily halted in this sub-period, it halted at much higher levels than those of the preceding decade. Also, it is worth noting that, as figure 3 shows, during this period of balanced growth the annual rate of GDP growth declined continuously, from 13.1 per cent in 1994 to 7.6 per cent in 1999.

As in the other sub-periods, the above trends were strongly affected by government policies. With the sharp increase in investment and the rapid growth of GDP in 1992 and 1993, the consumer price inflation rate surged to 14.7% and 24.1% in 1993 and 1994 (figure 4). Facing high inflation and a lot of chaos accompanying the super-fast growth, the Chinese government initiated another round of cooling-down policies in the second half of 1993 by cutting public investment, tightening the money supply, increasing interest rates, and other measures. At the same time, in the second half of 1995, the exchange rate of the RMB was revalued. The export tax refund rates were lowered in late 1995 and early 1996 and then the export tax refund was indefinitely delayed later in 1996 All these factors discouraged exporters and led to a slow-down of export growth. In 1996, in real terms, according to our calculation, exports even decreased by 4.6%.

As these policies took effect, fixed capital investment grew by only 8.2% in 1994 and 6.3% in 1995 (table 1). The GDP growth rate declined to 10.0% and consumer price inflation fell to 8.3% in 1996. In 1997, the government declared they successfully achieved a "soft landing". But the Asian financial crisis of that year furthered this downward trend, and GDP growth declined steadily to 7.6% in 1999. Starting in 1998 China experienced a period of several years of price deflation for the first time in the reform era.[18]

7. <u>1999-2006 Export- and Investment-Led Growth</u>: It was during this sub-period that China's current pattern of growth based on a combination of external demand and investment demand was firmly established. Fixed investment and exports were the main factors accounting for growth during this sub-period.

As figure 2 shows, after 1999 the export share began a rapid rise, increasing every year except 2001, when there was a recession in many of China's main export markets. Over the sub-period, the export share rose from 20.1 per cent to a remarkable 38.3 per cent of GDP, despite a fixed exchange rate for the RMB relative to the US dollar from 1999-2004 and a 3.8%

strengthening of the RMB relative to the dollar in the last two years of the sub-period. Exports grew at an average rate of 20.2 per cent per year. Imports grew almost as rapidly, by 19.2 per cent per year. However, as the two grew rapidly relative to GDP, so did the difference between them, and the export surplus for goods and services rose to 6.1 per cent of GDP in 2006.[19] Exports contributed 58.4 per cent of GDP growth, and the domestic content of exports contributed 30.7 per cent of GDP growth, over the sub-period. Thus, our favored measure of external demand indicates that close to one-third of GDP growth over the sub-period was accounted for by growth in foreign demand for China's output.

Fixed investment also grew rapidly in this sub-period. The IF share rose from 33.5 per cent to a truly remarkable 41.0 per cent of GDP from 1999 to 2005, falling slightly to 40.8 per cent of GDP in 2006. IF grew 3.1 percentage points faster than GDP growth, and it contributed 48.8 per cent of GDP growth. Our estimated domestic content of fixed investment contributed 38.6 per cent of GDP growth. Thus, exports plus fixed investment, measured by domestic content, together contributed 69.3 per cent of GDP growth.

The share of household consumption fell sharply during this sub-period, from 46.0 per cent to a remarkably low level of 36.2 per cent of GDP. (By comparison, in the USA household consumption is about 70 per cent of GDP.) The share of government expenditure also declined, from 15.1 per cent to 13.7 per cent of GDP. Since we noted above that the domestic content of exports plus fixed investment together contributed almost 70 per cent of GDP growth over the sub-period, we can infer that the domestic content of total domestic consumption, by households and government, contributed only just over 30 per cent of the growth in GDP.

We note that, over the sub-period 1999-2006, the GDP growth rate had an increasing trend, from 7.6 per cent in 1999 to 11.1 per cent in 2006. China's export and investment led growth has been successful at producing accelerating GDP growth.

What explains the above features of China's growth in this last sub-period? In 1999,

although the GDP growth rate was still high by international standards, the lingering price deflation mentioned above indicated that the Chinese economy had entered a difficult period. The Chinese government recognized that insufficient domestic demand was a serious problem and adopted monetary, fiscal, and trade policies to encourage economic growth in 1998 and thereafter. For example, starting in 1998 the government carried out a huge infrastructure investment program, which entailed building ports, airports, subways, and a new highway system. At the same time, the government carried out policies to commercialize the healthcare and education system and develop the commercial real estate industry, apparently believing these would increase consumer spending (although it appears the former two policies had the opposite effect, as explained below).

Facing losses on the part of the state-owned and collectively owned enterprises in the early 1990s, the government initiated a wave of layoffs and privatizations in the mid-1990s. Although the layoffs began in 1996, in the first two years the number was relatively low, 1.5 million and 3.3 million respectively. Then in 1998 the number increased to about 29 million, and in the following 4 years, more than 27 million more workers were laid off. From 1995 to 2005, almost 83 million state-owned or collectively-owned enterprise workers were laid off, while total employment increased by 78 million during the same period.[20] This led to the informalization of the Chinese labor market and sluggish wage increases. The privatization movement was carried out at the same time, and most of the public enterprises fell into the hands of private owners.

These factors had a fundamental and lasting impact on income distribution. As figure 5 shows, the gini coefficient rose from 0.39 in 1999 to 0.46 in 2006. While GDP growth averaged 9.6% per year, the growth rate of household income slowed to 7.8% per year, with rural income growth falling to only 1.9% per year (table 5). Furthermore, the high level of income inequality, accompanied by the growing burden of privatized healthcare, education and housing, led to a

rising saving ratio. As table 6 shows, the ratio of consumption to household income fell at a 2.3% per year rate during1999-2006. All these factors can account for the low and decreasing consumption share in GDP in this last sub-period.

With a falling consumption share after 1999, the Chinese economy could continue to grow rapidly only by relying on rapid increases in other components of demand -- and this requirement has been met by rising export and investment shares after 1999. How was this accomplished? First, in 2001 China joined the WTO. This encouraged international trade, especially exports, in the following years. In 2006, exports reached more than 38% of GDP, as China's manufacturing sector was increasingly drawn toward the export market. Second, starting in 2002 a real estate bubble developed in China. This promoted more investment in the economy. Third, state infrastructure investment continued to grow rapidly. The last two factors explain why the fixed investment ratio rose to almost 41% of GDP by the end of the sub-period.

Considering the changing structure of demand over entire period 1978-2006, we observe in figure 2 that X/Y first rose to a high level, over twenty percent of GDP, in 1994. Fixed investment first rose above 35 percent of GDP in 1993 (figure 1). It was in 1993 that exports plus fixed investment first rose above fifty percent of GDP, a level which the two components together never fell below in succeeding years. This closely followed Deng Xiaoping's 1992 speech and the resulting policy and institutional changes in China's economy discussed above.

By 2006 exports had risen to 38.3 percent of GDP, and the domestic content of exports reached 21.9 percent of GDP, up from 4.4 percent in 1978. This is a very high level of dependence on external demand for a very large, rapidly growing economy. By 2006 the fixed investment share was 40.8 per cent of GDP, up from 29.8 per cent in 1978, which is a very high rate of investment even given China's high GDP growth rate. The domestic content of fixed investment had reached 33.8 percent of GDP. Thus, the sum of X and IF reached almost four-fifths of GDP, while the domestic content of the sum of those two components was well

over half of GDP.

4. Why is Export-Dependent Growth a Problem for China?

It is widely agreed that China's very large export surplus represents a serious problem and is probably not sustainable for very long. However, as was noted above, China's large export surplus is a recent phenomenon, while its high dependence on exports arose in the mid 1990s and has increased steeply since 1999. Intuitively it would seem that there should be a problem if a very large country is growing at about 10 per cent a year heavily dependent on exports when the markets to which it exports grow at only 2-3 per cent per year.[21]

However, it is not so obvious why China's large export share should be a problem as long as its imports equal its exports. At the level of abstraction of the argument so far, one could ask, "So what if one large country has exports that become very large relative to the rest of the world's GDP, as long as that country is buying an equal value of imports from the rest of the world. That just means a high (and rapidly growing) degree of economic integration, and division of labor, has developed between that country and the rest of the world."

In our view, such a high, and growing, degree of economic integration poses both short-run and long-run problems for China. Both kinds of problem stem from the fact that nation-states remain relevant entities in the world as it is. Even in the globally interconnected economy of today, major economic events, and the policy responses to those events, typically originate within countries and states. States make economic policies based on government officials' perception of the interests of the constituencies they serve within the country.[22]

There has not been a serious economic recession in China's major markets since China's export share first grew large in the mid 1990s. In 2001 there was a very mild recession in the USA in which GDP declined for only part of the year, with the annual GDP actually rising slightly compared to 2000. In 2001 US imports of goods and services declined by just 2.7 per cent (U.S. Bureau of Economic Analysis, 2008).

A severe recession in the US and other major Chinese export markets now appears likely in the immediate future (as of October 2008). China's high export dependence makes it highly vulnerable to a serious recession in its export markets. This is a change from the early period of China's rapid post-1978 growth, when growth was mainly dependent on growing domestic demand. During that period the Chinese authorities were able to maintain rapid growth through control over the main elements of demand that were leading its economic growth. However, the Chinese authorities would not be able to maintain export growth if a serious recession occurred in its major markets.

A simple analysis of the export multiplier can illustrate this problem. Ignoring the effect of taxes, the conventional Keynesian export multiplier is

$$m = \frac{1}{1 - C' + M'} \qquad (4\text{-}1)$$

where m is the export multiplier, C' is the marginal propensity to consume and M' the marginal propensity to import relative to GDP.

To estimate the multiplier impact on China's GDP growth rate from a given percentage change in its exports, the "percentage change export multiplier" m* can be defined as

$$m^* = m \times \frac{X}{Y} \qquad (4\text{-}2)$$

The percentage change export multiplier estimates the percentage change in GDP that would result from a given percentage change in exports (see Appendix D for the derivation of m*). Table 7 illustrates two different hypothetical situations for China. Case 1 is a stylized representation of China's current situation, based on the composition of China's GDP in 2006.[23] In case 1, we find m* = 0.33. This means that, if a recession in China's export markets caused its exports to decline by 10 per cent, the impact on China's GDP would be to subtract 3.3 percentage points from its growth rate.

[Insert Table 7 about here]

Case 2 represents a hypothetical alternative domestic-demand-based balanced growth model in which C/Y = 55%, with X/Y = M/Y = 10% which are reasonable shares for a large economy.[24] In case 2, m* = 0.18, which is just over half of its value in case 1. In case 2, the impact of a 10 per cent decline in China's exports would be a reduction in China's growth rate of only 1.8 percentage points.

The full impact of a serious recession in China's major export markets, under current conditions, would be likely to be more severe than the above estimate for case 1. A significant share of China's fixed investment is presumably tied to the growth of exports, since exports are such a large share of China's GDP. A sudden decline in exports, causing significant excess capacity in export sectors, would presumably cause a significant decline in investment, resulting in a further slowing of China's growth rate. If exports were a smaller share of China's GDP, as in case 2, this effect would be reduced.

Apart from the short-run problem of a high export multiplier in time of recession in China's export markets, what problems might exist in the long-run from China's high export dependence? Even if China is able to reduce or eliminate its export surplus by importing more, in our view its high export ratio would remain a serious problem. The long-run problem stems from the following conditions: 1) China has a large economy that has been growing very rapidly; 2) the world economy to which China exports has been growing, and is likely to continue to grow, at a rate far below China's recent growth rate; 3) despite China's shift toward a capitalist economy, there remain significant economic and political differences between China and the developed capitalist countries that have long dominated the global economy; 4) the particular way in which China has become inserted into the world division of labor, as an exporter primarily of manufactured goods and increasingly as an importer of raw materials, poses threats to the interests of the dominant capitalist powers.

A country, large or small, can grow more rapidly than the world economy for a long

time, without running into problems from this situation, if its growth is based primarily on its internal market. Rapid growth brings both rising output and rising income. If the output is largely sold within the country, the rising income can buy the rising output. However, even if trade is balanced, a problem will eventually arise for a rapidly growing economy if the country's exports represent a significant share of world trade.

China's exports now are about 2% of the rest of the world's GDP. If China continued to grow much faster than the rest of the world economy while maintaining its current high export ratio relative to its GDP, China's exports would grow rapidly relative to the GDP of the rest of the world. A simple model based on China's current growth rate and export ratio would project that, after ten years, China would surpass the USA as the largest exporter of goods and services in the world. It seems unlikely that the rest of the world would be willing to absorb Chinese exports at such a high level relative to their GDP within a decade.

As was noted in the introduction to this section, such a large increase in the share of China's exports relative to world GDP would imply a significant increase in the degree of economic integration, and mutual interdependence, between China's economy and that of the rest of the world, including the leading capitalist powers. There are two reasons why that is likely to be a problem.

First, a very high degree of economic integration and mutual dependence is unproblematic only if the countries involved have similar economic and political institutions. If that is not the case, then the high degree of mutual economic dependence that would arise with such a trading relationship may be seen as unacceptable by the rest of the world. While China has dismantled central planning, and private companies now produce a majority of its output, it remains a country in which a (nominally) Communist Party controls the state, the state plays a very active role in guiding the economy, and state enterprises continue to play an important role in key sectors. This has led the capitalists in the developed capitalist countries to have a

contradictory attitude toward China. On the one hand, the transnational corporations and banks are enthusiastic about investing in China and reaping the potential profits from such investments. On the other hand, the still existing institutional differences between the Chinese system and that of the leading capitalist countries makes the capitalists leery of excessive interdependence with China.[25] In the U.S. the current degree of economic dependence, due to the high and rising share of Chinese exports in consumer purchases, has already generated a rising political backlash. If that share continued to grow, it is almost certain that protectionist sentiments toward Chinese imports would become politically dominant.

Second, the nature of the exchange between a country and the world market makes a difference. If goods moving back and forth across a country's border are a relatively diverse subset of all goods, a problem would be less likely to develop. However, China mainly exports manufactured goods, particularly consumer goods. In 2007 94.9% of China's total exports were manufactured goods (Ministry of Commerce of China, 2008a). As is well known, China has a huge reserve of very low wage, relatively healthy, and relatively skilled and well-educated labor. This has enabled China, with suitable accompanying state-directed investments, to rapidly displace other sources of manufactured goods in many parts of the world. Manufactured goods were a smaller share of imports, making up 74.6% of imports in 2007 (Ministry of Commerce of China, 2008b). China has increasingly imported raw materials while exporting finished products. Also, China appears to be rapidly moving up the ladder from relatively low-wage, low-technology sectors of manufacturing toward more technologically sophisticated production processes.

This configuration of exports and imports is likely to be particularly threatening to the interests of capital in the leading capitalist powers. Traditionally the dominant capitalist countries have exported manufactured goods, particularly the most technologically sophisticated ones, while importing raw materials and less technologically sophisticated goods. China's rising

exports threaten to disrupt the conventional trade patterns of the global capitalist system, which are the basis of the economically dominant position of today's leading capitalist states.

In light of the realities of China's export-dependent growth model, in the world as it exists, it is difficult to avoid the conclusion that China is on a path that cannot be sustained in the long-run.

As was noted above, China's growth has recently been dependent on a very high investment rate as well as a very high export rate. Fixed investment has risen above 40 per cent of GDP in recent years. A simple model of investment and GDP growth suggests that such a level of investment may be excessive. Consider the following model:

$$Y = a \times K$$

where Y = GDP, K = capital stock, a is the output-capital ratio which is assumed to be constant. Taking changes in Y and K, we have

$$\Delta Y = a \times \Delta K$$

Dividing both sides by Y, we obtain

$$\frac{\Delta Y}{Y} = a \times \frac{\Delta K}{Y}$$

Now ΔK is net investment. Gross investment is

$$Ig = \Delta K + d$$

where d is depreciation.

Thus,

$$\frac{\Delta Y}{Y} = a \times \frac{Ig - d}{Y} = a \times \frac{Ig}{Y} - a \times \frac{d}{Y}$$

Rearranging,

$$\frac{Ig}{Y} = \left(\frac{1}{a} \times \frac{\Delta Y}{Y} \right) + \frac{d}{Y}$$

We assume the following parameter values:[26]

$$\frac{1}{a} = 2$$

$$\frac{d}{Y} = 0.10$$

The investment ratio required for a given GDP growth rate is then as follows:

ΔY/Y	Ig/Y
5%	20%
8%	26%
10%	30%

Based on the simple model above, fixed investment in China has been 10 percentage points too high for China's roughly 10% growth rate. China's very large infrastructure investments would elevate the investment rate above that suggested by our simple fixed output-capital ratio model, since infrastructure capital is very long-lived. However, a large part of capital formation in China does go into creation of new plant and equipment. The likely explanation of why the planners have pushed investment to such a high share of GDP is to provide the demand needed to maintain a high rate of GDP growth, in the face of a steady decline in the share of C in GDP. Another factor may be the effects of China's recent asset bubble in the real estate sector, which has been spurring investment in construction.

If this analysis is correct, then China's very high investment ratio spells trouble ahead. It means that excessive productive capacity is being created and/or there is a very low efficiency of investment. It could lead to an economic crash at some point.

5. Concluding Comments

It has become increasingly apparent that the current growth model of China cannot be sustained. We presented a case in the last section that China's export growth must be slowed down. In fact, recent data show that such a trend has already developed. Measured in RMB, the year-to-year export growth rate slowed to 10.8% in the second quarter of 2008, down from a

peak of 40.5% in the 4th quarter in 2003.[27]

The second problem of China's growth model considered here is the increasing dependence on investment. Although part of China's investment has gone into infrastructure, which contributes to increasing productive capacity only indirectly and over a long period of time, a large portion of the investment has been in plant and equipment which directly increases current production capacity.

Given the constraints on exports and the limits to investment-led growth, if consumption cannot increase to play a much larger role in aggregate demand, then China's rapid growth will slow down or even stop at some point of time in the future. Therefore, the growth model of China has to be changed to rely more on domestic consumption, especially when the bursting of the real estate bubble becomes more evident.

In order to encourage consumption, at least two things have to be done. First, the income of ordinary people has to be increased and income inequality must be reduced. This can be done mainly in the primary and secondary stages of the income distribution process. In order to improve the primary distribution, the Chinese government could, first of all, nationalize or renationalize private and foreign firms, and secondly promulgate, and enforce, stricter regulations in the labor market. The former policy can prevent the surpluses from falling into the hands of a small group of individuals or being sent abroad, instead distributing them to the working people. The latter can secure decent wages and other benefits for the workers, including the large numbers of internal migrant workers who face very low wages and intolerable working conditions. Together, these measures would improve the workers' bargaining power and increase their income. At the same time, the government should increase taxes so that it will have enough revenue to transfer to the people. The share of government revenue in GDP is still low by comparison to international standards, which leaves room for it to grow.

Second, the government should take steps to lower the saving ratio. Or, in other words, it

should make the people confident about consuming. To accomplish this, the welfare system has to be improved, the health care and education systems must be de-commercialized, and the system for providing housing for the population should be much less profit-oriented. Today many people regard the cost of health care, education, and housing as "three new mountains" on top of them. Therefore, they have to save for possible health problems of themselves and their family members, for their children's education, and for a decent place to live. Although apparently the Chinese government already recognizes these problems, the policies carried out have either not been effective enough, or too slow. The Chinese leadership has stressed that measures to address these problems are necessary to quell the dissatisfaction of the people and to attain a "harmonious society," but resolving these problems is also necessary for achieving maintaining economic growth.

If the common households have enough money to spend and are sufficiently confident to consume, then consumption will grow faster and the consumption share will recover. More consumption, with appropriate investment and exports, could provide sufficient demand and could potentially lead to a balanced growth model, with an adequate consumption share, in China.[28]

However, such measures would face serious challenges. The analysis in section 3 of the emergence of China's current growth model demonstrated that the current growth model arose in response to obstacles to continuing rapid growth that resulted from the basic features of the reform and opening policy as it evolved in an increasingly capitalist direction. Shifting to a different growth model of the type suggested above would require challenging the direction of the structural changes since 1978.

The most serious opposition would come from those groups that have been benefiting from the current growth model. Both domestic and foreign capitalists would resist a nationalization policy to defend their ownership and control of the means of production and

the**ir** right to take the surpluses. They would resist the implementation of strong regulations in the labor market to keep their dominant bargaining position and their freedom to extract as much surplus value as possible. They would try their best to evade taxes to defend their already extracted surpluses. Those people getting rich from the health care, education, and housing sectors would try their best to defend their profits. And those officials enjoying spending government revenue on the so called "administrative expenditure" would resist devoting the revenue to improving the public welfare.

However, the most serious challenge is that it is the beneficiaries of the current growth model who currently control the most political, economic, and cultural resources and have important influence on the making and implementation of laws and policies. Therefore, in order to secure the necessary changes in the growth model, a more democratic political, economic, and cultural system would be required. If our analysis is correct, it would appear that China faces a choice. Either significant changes will take place in China's current political and institutional structure relatively soon, or the thirty years of rapid economic growth will come to an end. The latter outcome would itself be likely to result in new political pressures for a change in China's direction of development. Thus, one way or another, it would seem that significant political and economic changes lie in China's future.

Appendix

A. <u>Estimating the Domestic Content of Exports</u>

The domestic content of exports (X_d) for a country is the part of the value of exports which is added by domestic factors of production. As was noted in the text, X_d can be estimated using a relatively detailed input-output table for a country. Dean, Fung, and Wang (2007) estimated the import content of exports (X_m) for China for two years, 1997 and 2002, when relatively detailed input-output tables were available. They found X_m/X for China to be 29.3 per cent in 1997 and 35.9 per cent in 2002. Hence, $X_d/X = 1 - X_m/X$ was 70.7 percent in 1997 and 64.1 per cent in 2002 according to their estimate.[29]

To estimate the value of X_d/X for the other years during 1978-2006, we followed a several-step procedure. Total domestic expenditure E is

$$E = C + I + G \qquad\qquad (A1)$$

Total imports, which include both final goods and intermediate goods, are distributed among the components of domestic expenditure and exports (X). It is reasonable to assume that, for a developing country such as China, the import content share of exports, defined as X_m/X, is greater than the import content share of domestic expenditure, since exports presumably must meet a higher standard than goods produced for the domestic market, and hence it is likely that exports rely more on imported inputs. We can check this assumption for the years 1997 and 2002 by utilizing the identity

$$X_m + E_m = M \qquad\qquad (A2)$$

where

$E_m =$ import content of domestic expenditure. Equation A2 is an identity because all of imports either become part of a component of domestic expenditure or part of exports.

Having an estimate of X_m/X for 1997 and 2002, we can calculate the estimated value of E_m/E and compare the two ratios. It can be shown that

$$\frac{E_m}{E} = \left(\frac{1}{E/Y}\right) \times \left(\left(\frac{M}{Y}\right) - \left(\frac{X_m}{X}\right) \times \left(\frac{X}{Y}\right)\right) \qquad \text{(A3)}$$

Utilizing equation A3, we find the following:

1997: $\dfrac{X_m/X}{E_m/E} = 2.53$

2002: $\dfrac{X_m/X}{E_m/E} = 2.41$

As expected, the import share of exports was much greater than the import share of domestic expenditure, by an average factor of 2.5 for the two years. What is useful in this result is that, despite the significant difference between X_m/X in the two years -- a difference of 22.5 percent, the ratios of the import content shares above are very close, differing by only 5.0 per cent.

To estimate the import content of exports in the remaining years, we assumed that the above ratio was 2.5 in every year during 1978-2006. This assumption is probably closer to the mark in the years close to the two years above. For the early part of the period, when China was less developed, the ratio is likely to have differed significantly from 2.5. Hence, our estimates are probably better for the later part of the period than for the earlier part.

Based on the above assumption of a constant ratio of 2.5 for the import content of exports to the import content of domestic expenditure, one can derive the following expression:

$$\frac{X_m}{X} = \left(\frac{1}{\left(1 + \left(\frac{2.5}{E/Y}\right)\left(\frac{X}{Y}\right)\right)}\right) \times \left(\frac{2.5}{E/Y}\right)\left(\frac{M}{Y}\right) \qquad \text{(A4)}$$

Since $X_d/X = 1 - X_m/X$, from A4 it is simple to calculate the estimated domestic content of exports for every year in our period.

B. The Domestic Content of Fixed Investment

To estimate IF_d (the domestic content of fixed investment), we assume that the ratio IF_m/IF is the same as the ratio E_m/E. Using that assumption and the methodology explained in Appendix section A above, we have

$$IF_m/IF = (1/2.5)(X_m/X) \qquad\qquad\qquad (A5)$$

where

IF_m = import content of fixed investment.

As above, $IF_d/IF = 1 - IF_m/IF$.

C. Series for the Components of GDP and for Household Income

1. Exports and Imports

The National Bureau of Statistics of China provides series for GDP, household consumption, government consumption, fixed investment, changes in inventories, and net exports in current RMB, from which the shares of the domestic components of GDP were calculated. However, it does not publish separate series for exports and imports of goods and services as part of the national income accounts. The United Nations Conference on Trade and Development (UNCTAD, 2008) provides series for exports and imports of goods for 1978-2006 and for exports and imports of services for 1982-2006 for China. The authors calculated series for X/Y and M/Y (including goods and services) using the UNCTAD series.[30] The ratios for 1978-81 were estimated. Due to differences in definitions of variables between foreign trade and national income accounts, our series for X and M are likely to have some differences from the unavailable national income account values of X and M. We checked our series for net exports as a percentage of GDP from the UNCTAD data against the series for net exports as a percentage of GDP from the official national income accounts data. The difference between the two series was less than 1% of GDP every year during 1978-2002 and between 1% and 1.5% of GDP during 2003-06.

2. Calculating Growth Rates of Components of GDP

The National Bureau of Statistics of China provides growth rates for GDP in constant RMB but does not provide such growth rates for the components of GDP nor does it provide price indices for components of GDP. We derived the implicit price deflator for GDP and used that price index to calculate series for the growth rate of each of the components of GDP in constant RMB. This is a reasonable procedure for conducting an aggregate demand analysis.

3. Household Income

The National Bureau of Statistics of China does not provide a series for disposable personal income that is comparable to its series for GDP and its components. However, it does provide separate series for the per capita disposable income of urban households and the per capita net income of rural households, as well as population series for urban and rural residents (*China Statistical Yearbook*, 2008). From these series we calculated aggregate series for household income for rural residents, for urban residents, and for the two combined, which are used in tables 4, 5, and 6. It is likely that the total household income series which we derived would not be identical to a series for disposable personal income based on the national income account conventions, if such a series were available. To obtain real growth rates for our aggregate household income series (used in tables 4 and 5), we deflated the current RMB series using the GDP deflator. Since the resulting real household income growth series is constructed using the GDP price deflator rather than a consumer price index, these real series do not accurately reflect changes in consumer welfare, but they can reasonably be compared to real GDP growth for the purposes of aggregate demand analysis.

To obtain a series for the ratio of household consumption to household income, we used C (household consumption) from the national income account data and our aggregate household income series explained above, both in current RMB. We refer to this as the ratio of consumption to household income, rather than using the common term "propensity to consume,"

since the consumption and household income series are compiled differently. Our series for the

ratio of consumption to household income is not an ideal measure, but it was the best available

one for analyzing the effects on the share of C in GDP coming from changes in our variable C

relative to household income.

D. Deriving the Percentage Export Multiplier

For an autonomous change in exports, we have

$$\Delta Y = m \times \Delta X$$

where Δ means change in a variable and m is the export multiplier. Hence,

$$\frac{\Delta Y}{Y} = m \times \frac{\Delta X}{X} \times \frac{X}{Y} = m \times \frac{X}{Y} \times \frac{\Delta X}{X}$$

Therefore,

$$m^* = m \times \frac{X}{Y}$$

where m* is the percentage export multiplier.

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Figure 1. Components of Domestic Expenditure as Shares of GDP
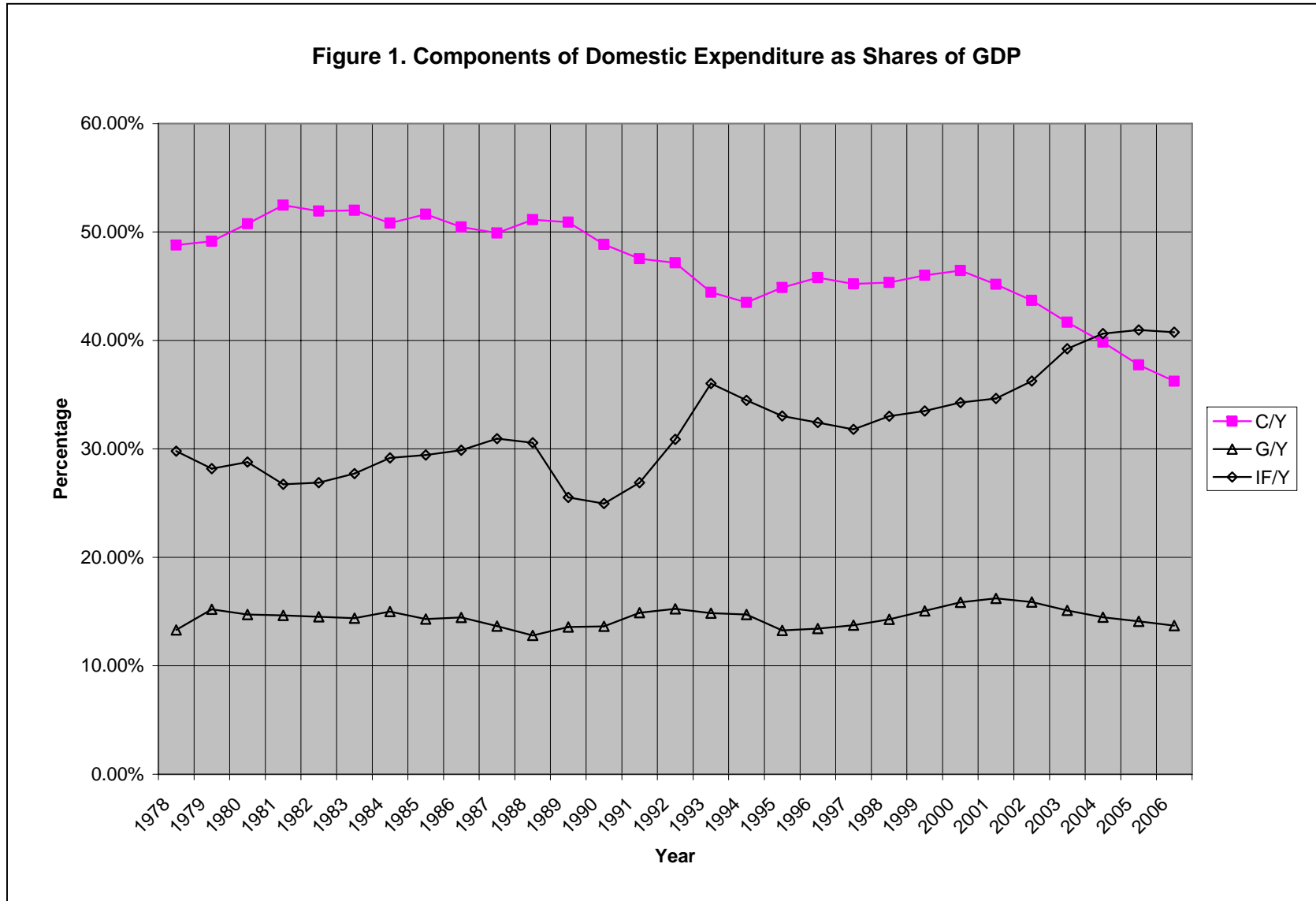
Source: *China Statistical Yearbook*, 2007, tables 3-15, 3-16.

Figure 2. Exports and Imports as Shares of GDP
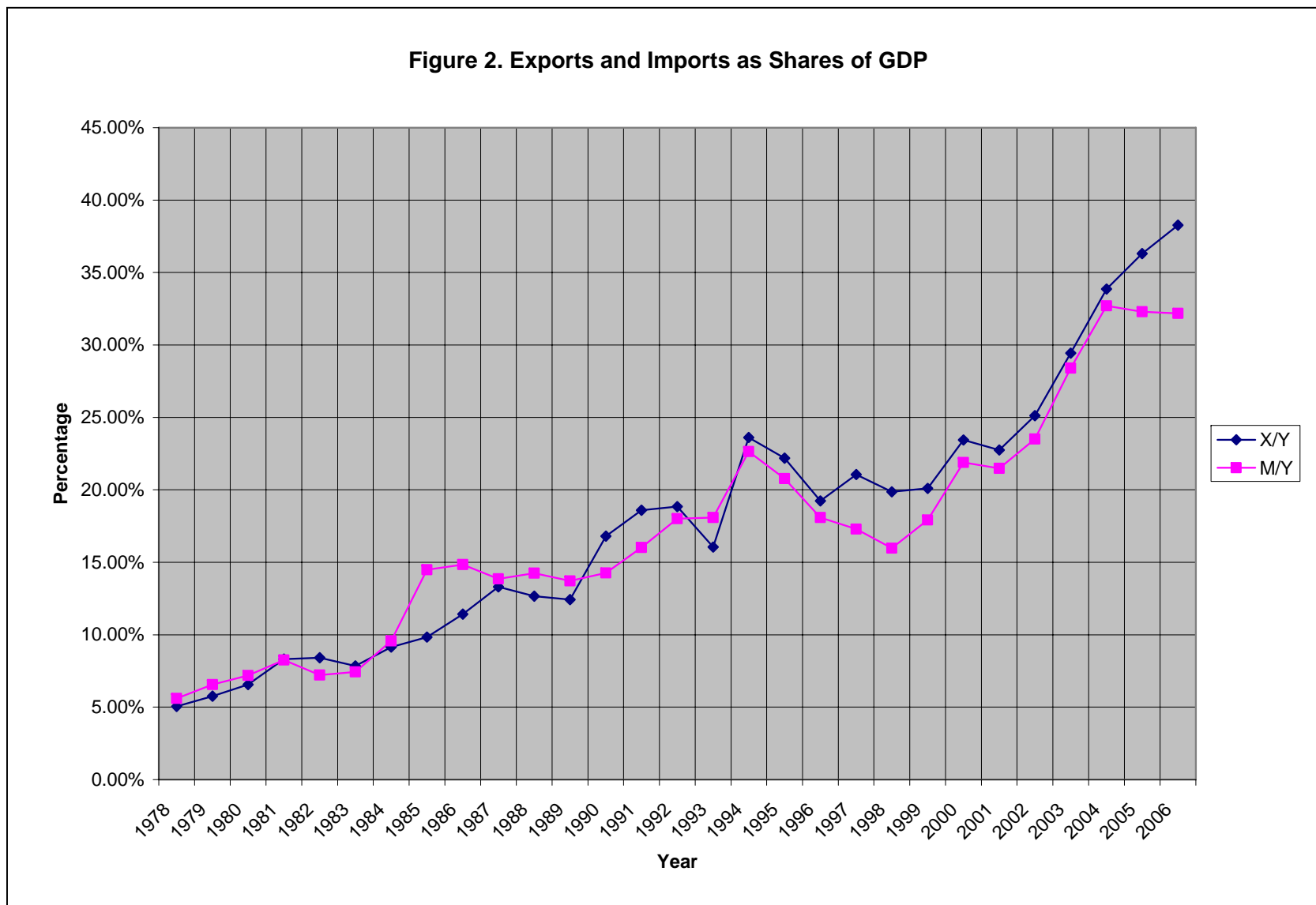
Figure 3. Annual Growth Rate of GDP in Constant RMB
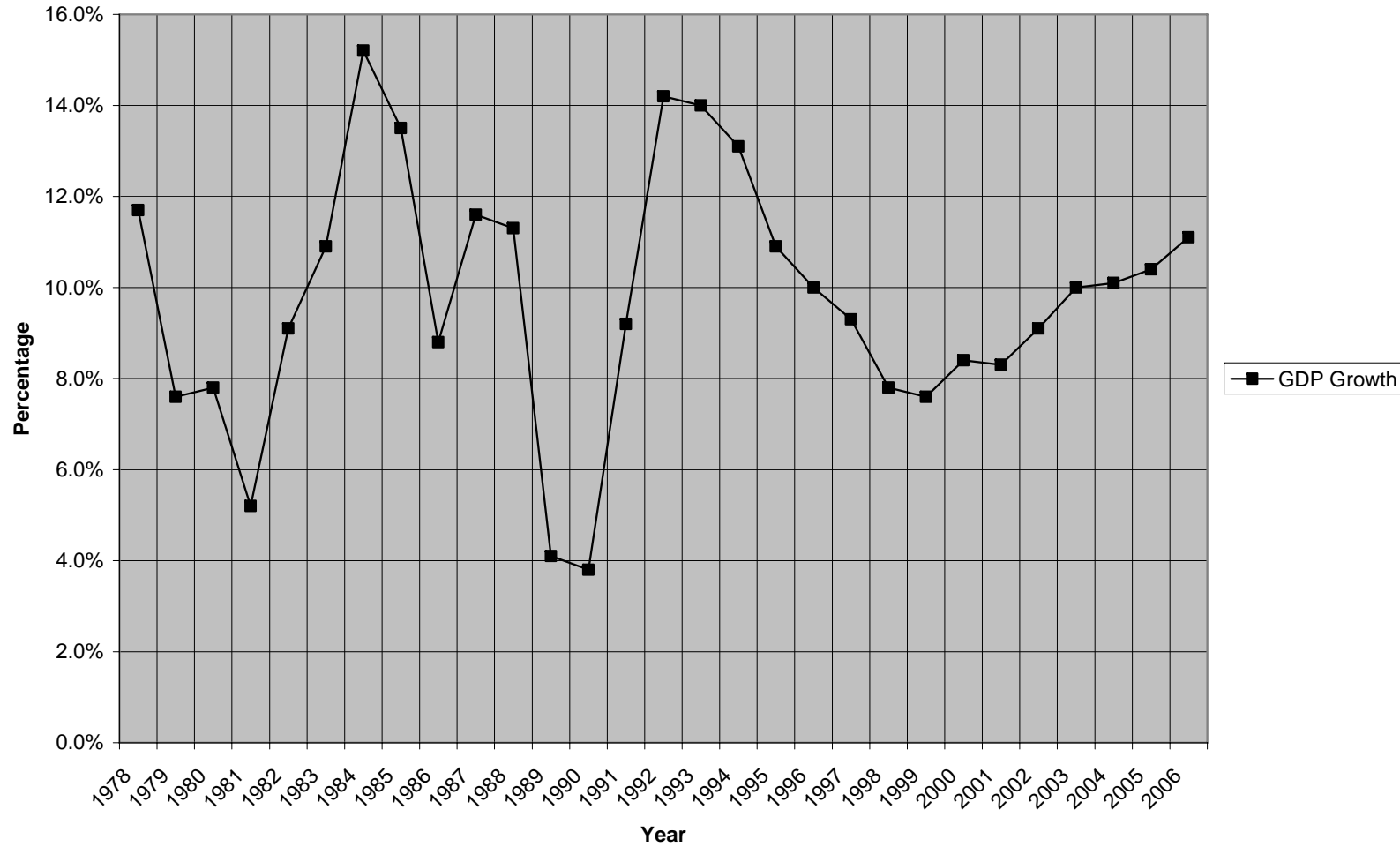
Source: *China Statistical Yearbook*, 2007, table 3-3.

Figure 4. Rate of Change in Consumer Price Index
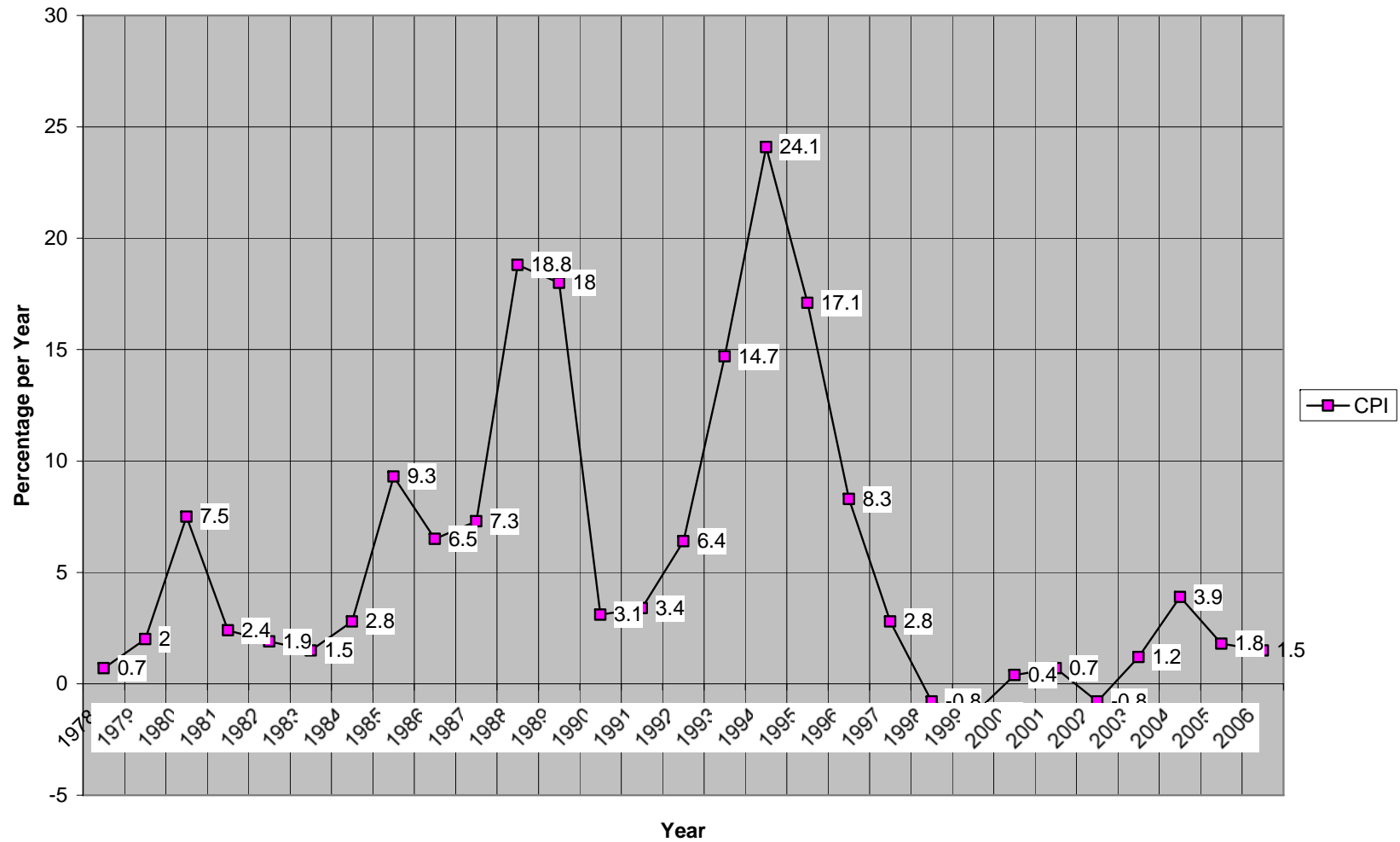
Note: Retail price index for years prior to 1985.

Source: *China Statistical Abstract,* 2008.

Figure 5. Income Gini Coefficient of China: 1978-2006

Source: He, Ya, 2007, 23-27.

Table 1. Growth Rate of GDP and its Components for China

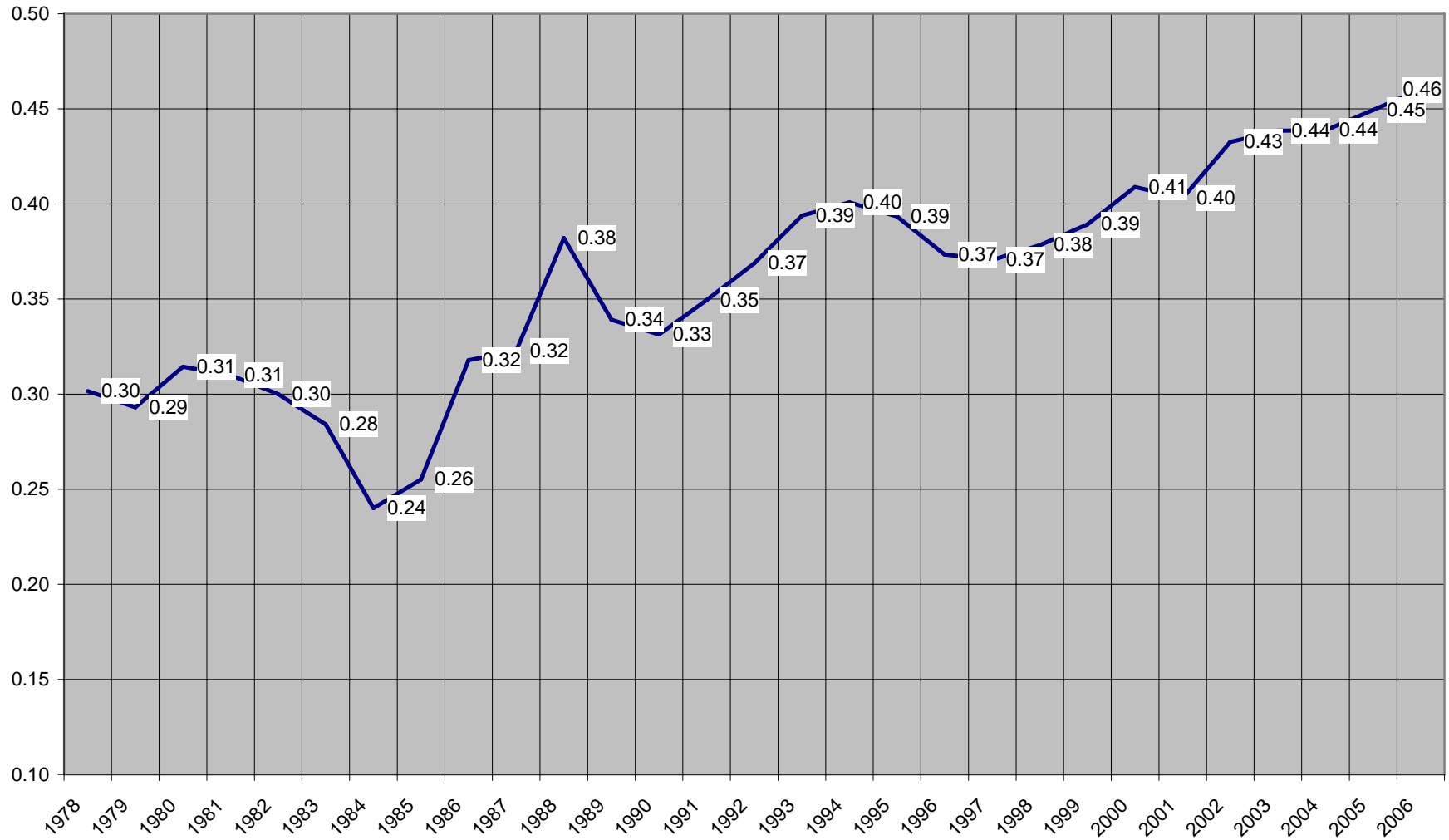| Year	GDP	C	G	IF	X	M	Xd	Id
1979	7.6%	8.4%	22.9%	1.8%	22.7%	26.1%	20.0%	1.0%
1980	7.8%	11.3%	4.5%	10.2%	22.8%	18.2%	21.2%	9.6%
1981	5.2%	8.7%	4.6%	-2.3%	33.3%	20.7%	30.6%	-3.0%
1982	9.1%	8.0%	8.2%	9.7%	10.2%	-4.6%	12.9%	10.7%
1983	10.9%	11.0%	10.0%	14.3%	3.6%	14.2%	2.9%	14.1%
1984	15.2%	12.6%	20.0%	21.2%	34.2%	48.3%	28.1%	19.2%
1985	13.5%	15.3%	8.3%	14.6%	22.0%	71.9%	8.9%	10.3%
1986	8.8%	6.3%	10.0%	10.4%	26.4%	11.5%	26.0%	10.3%
1987	11.6%	10.4%	5.5%	15.6%	29.9%	4.2%	34.1%	16.8%
1988	11.3%	14.0%	4.3%	9.9%	6.0%	14.4%	4.8%	9.5%
1989	4.1%	3.6%	10.4%	-13.0%	2.1%	0.3%	3.4%	-12.7%
1990	3.8%	-0.4%	4.2%	1.5%	40.3%	8.0%	41.0%	1.6%
1991	9.2%	6.3%	19.2%	17.7%	20.9%	22.6%	17.3%	16.5%
1992	14.2%	13.3%	17.0%	31.2%	15.7%	28.4%	10.9%	29.4%
1993	14.0%	7.4%	11.1%	33.0%	-2.9%	14.5%	-4.3%	32.4%
1994	13.1%	10.7%	12.1%	8.2%	66.4%	41.5%	56.6%	6.2%
1995	10.9%	14.4%	-0.2%	6.3%	4.1%	1.8%	7.6%	7.3%
1996	10.0%	12.2%	11.5%	8.0%	-4.6%	-4.2%	-0.5%	9.4%
1997	9.3%	7.9%	11.8%	7.2%	19.6%	4.4%	22.7%	8.1%
1998	7.8%	8.1%	12.1%	11.9%	1.7%	-0.4%	4.2%	12.8%
1999	7.6%	9.2%	13.4%	9.2%	8.8%	20.8%	4.4%	7.7%
2000	8.4%	9.4%	14.2%	10.9%	26.5%	32.4%	18.0%	8.6%
2001	8.3%	5.3%	10.7%	9.5%	5.1%	6.3%	5.6%	9.6%
2002	9.1%	5.5%	6.9%	14.2%	20.5%	19.4%	16.9%	13.1%
2003	10.0%	4.9%	4.6%	19.0%	28.8%	33.0%	19.1%	16.3%
2004	10.1%	5.2%	5.4%	14.1%	26.7%	26.8%	19.2%	12.2%
2005	10.4%	4.6%	7.5%	11.3%	18.4%	9.0%	21.3%	12.1%
2006	11.1%	6.6%	7.9%	10.5%	17.1%	10.7%	18.7%	11.0%

Source: China Statistical Yearbook, 2007, tables 3-3, 3-15, 3-16; UNCTAD, 2008; Dean, Fung, and Wang, 2007. See Appendix C2.

Table 2. Average Annual Growth Rate of GDP and its Components over Sub-periods

Period	GDP	C	G	IF	X	M	Xd	IFd	RMB Exchange Rate Growth	Average NX/Y Official*
1978-81	6.9%	9.5%	10.3%	3.1%	26.2%	21.6%	23.8%	2.4%	-0.42%	-0.20%
1981-88	11.5%	11.1%	9.4%	13.6%	18.4%	20.5%	16.3%	12.9%	-10.55%	-0.82%
1988-90	3.9%	1.6%	7.3%	-6.1%	19.7%	4.0%	20.7%	-5.8%	-11.79%	0.78%
1990-93	12.4%	8.9%	15.7%	27.1%	10.8%	21.7%	7.6%	25.9%	-6.02%	0.63%
1993-94	13.1%	10.7%	12.1%	8.2%	66.4%	41.5%	56.6%	6.2%	-33.15%	1.26%
1994-99	9.1%	10.3%	9.6%	8.5%	5.6%	4.1%	7.4%	9.0%	0.81%	2.97%
1999-2006	9.6%	5.9%	8.2%	12.7%	20.2%	19.2%	16.9%	11.8%	0.54%	3.54%

* The column for "Average NX/Y Official" is an average, not a growth rate. It is based on the official series for net exports of goods and services.

Source: *China Statistical Yearbook*, 2007, tables 3-3, 3-15, 3-16; UNCTAD, 2008; Dean, Fung, and Wang, 2007. See Appendix C2.

Table 3. Contribution Shares of Components of GDP to GDP Growth over Sub-periods

Period	Cumulative GDP Growth	C	G	IF	X	M	Change in Inventories	Xd	IFd
1978-81	22.0%	69.16%	20.70%	12.91%	23.14%	-20.30%	-6.10%	18.09%	9.47%
1981-88	113.8%	49.96%	11.20%	33.91%	16.49%	-19.50%	7.08%	11.35%	29.35%
1988-90	8.1%	20.52%	23.97%	-44.58%	68.06%	-14.57%	52.52%	52.61%	-38.13%
1990-93	42.2%	33.96%	17.74%	62.30%	14.30%	-27.18%	-1.54%	7.25%	52.88%
1993-94	13.1%	36.38%	13.78%	22.60%	81.36%	-57.34%	2.29%	47.26%	14.95%
1994-99	54.7%	50.58%	15.64%	31.72%	13.64%	-9.29%	-3.51%	11.86%	29.24%
1999-2006	90.3%	25.39%	12.19%	48.80%	58.40%	-47.96%	0.82%	30.68%	38.62%

Note: The sum of the contribution shares do not add exactly to 100% because the series for X and M, which are from trade data, do not exactly match the national income accounts definitions of those variables. See Appendix C-1.

Source: *China Statistical Yearbook*, 2007, tables 3-3, 3-15, 3-16; UNCTAD, 2008; Dean, Fung, and Wang, 2007. See Appendix C2.

Table 4. Annual Growth Rates of Urban Household Income, Rural Household Income, and GDP (percentage)

Year	(1) Disposable Income of Urban Households	(2) Net Income of Rural Households	(3) Total Household Income	(4) GDP
1979	19.9%	13.7%	15.9%	7.6%
1980	17.2%	15.5%	16.1%	7.8%
1981	6.5%	13.1%	10.6%	5.2%
1982	11.4%	18.6%	16.0%	9.1%
1983	9.1%	15.2%	13.1%	10.9%
1984	21.1%	11.0%	14.4%	15.2%
1985	9.0%	3.6%	5.5%	13.5%
1986	20.4%	0.6%	7.9%	8.8%
1987	11.5%	4.9%	7.6%	11.6%
1988	8.3%	5.6%	6.7%	11.3%
1989	11.0%	3.1%	6.5%	4.1%
1990	4.3%	7.2%	5.9%	3.8%
1991	8.9%	-2.8%	2.3%	9.2%
1992	14.9%	4.0%	9.1%	14.2%
1993	11.6%	0.4%	5.9%	14.0%
1994	16.2%	10.6%	13.6%	13.1%
1995	11.1%	14.2%	12.5%	10.9%
1996	12.3%	13.3%	12.8%	10.0%
1997	11.9%	6.6%	9.4%	9.3%
1998	12.8%	3.9%	8.7%	7.8%
1999	15.9%	3.1%	10.2%	7.6%
2000	12.6%	0.5%	7.6%	8.4%
2001	12.2%	1.4%	8.1%	8.3%
2002	15.9%	1.6%	10.7%	9.1%
2003	11.4%	1.0%	7.9%	10.0%
2004	8.0%	3.4%	6.5%	10.1%
2005	8.2%	2.4%	6.4%	10.4%
2006	9.0%	3.3%	7.4%	11.1%

Source: *China Statistical Abstract*, 2008; China *Statistical Yearbook*, 2007, table 3-3. See Appendix C3.

Table 5. Compound Average Growth Rates of Real Urban Household Income, Rural Household Income, and GDP in Sub-periods (percentage)

Year	Aggregate Disposable Income of Urban Households	Aggregate Net Income of Rural Households	Total Household Income	GDP
1978-81	14.4	14.1	14.2	6.9
1981-88	12.9	8.3	10.1	11.5
1988-90	7.6	5.2	6.2	3.9
1990-93	11.8	0.5	5.8	12.4
1993-94	16.2	10.6	13.6	13.1
1994-99	12.8	8.1	10.7	9.1
1999-2006	11.0	1.9	7.8	9.6

Source: *China Statistical Abstract*, 2008; *China Statistical Yearbook*, 2007, table 3-3. See Appendix C3.

Table 6. Annual Average Rate of Change in the Ratio of Consumption to Household Income

Year	Annual Rate of Change in the Ratio of Consumption to Household Income
1978-81	-4.1%
1981-88	0.9%
1988-90	-4.4%
1990-93	3.0%
1993-94	-2.5%
1994-99	-0.3%
1999-2006	-2.3%

Source: *China Statistical Abstract*, 2008; *China Statistical Yearbook*, 2007, table 3-3. See Appendix C3.

Table 7. The Percentage Change Export Multiplier

Case	M/Y	M'	C/Y	C'	m	X/Y	m*
1	0.32	0.44	0.36	0.29	0.87	0.38	0.33
2	0.10	0.10	0.55	0.55	1.82	0.10	0.18

Source: See text

Notes

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[1] Some observers argue that the sudden jump in the trade surplus after 2004 was partly driven by hot money entering China in response to the appreciating RMB.

2. Apart from the trade surplus cited for 2007, which is for goods only, the other figures given in this paper for exports and imports include both goods and services. The figures cited here for 1997-2004 are from the official series for net exports of goods and services as a percentage of GDP. See Appendix section C1.

[3] In this paper, by sustainability we are referring to the economic and political viability of China's export and investment led growth model. As was suggested above, several other problems, such as environmental effects, also call into question the sustainability of China's current growth process. Addressing the other problems of China's growth model is beyond the scope of this paper.

4. Technically speaking, the difference between AD and GDP is that GDP includes "unintended" increases in inventories which are excluded from AD. Hence, if AD is less than GDP, the resulting shortage of demand relative to output is assumed to take the form of unintended increases in inventories.

5. Larudee (2006) also argues for the use of domestic content to measure the impact of trade on an economy, although her interest is the degree of openness rather than the assessment of a particular growth model. She proposes a methodology to estimate the domestic content of exports, called "value added destined for export."

6. It requires significant resources to get access to an input-output table and perform the complex calculations based on it (usually involving other data as well) to derive an estimate of

the domestic content of exports. It is not similar to making calculations based on national income account data.

7. The underlying relations here are identities. The GDP growth rate is a weighted average of the growth rates of its components, which underlies the concept that a component whose growth rate rises above the GDP growth rate is "pulling up" that rate. Secondly, as was noted in the text, the GDP growth rate is the sum of the contributions of its components. One cannot infer causality from identities. Strictly speaking, our procedure is a kind of growth accounting.

8. For the investment variable, we use fixed investment rather than total investment. Total investment includes changes in inventories, which are determined by different forces from those determining fixed investment.

9. Since G covers only government current consumption while IF includes both private and public investment in China's national income accounts, we have changed the traditional order of the components to place G before IF in figures and tables, since C and G together indicate total current domestic consumption.

10. See Appendix section C2 for the methodology used to obtain series for the growth rate of the components of GDP.

[11] For growth analysis we follow the convention of dating a period starting with the base year. For example, the period 1978-81 includes growth in variables starting with 1979 relative to 1978. Growth during the first year listed is not included in the period's growth. Using this convention, each successive period has the same beginning year as the ending year of the preceding period and each year's growth is counted only once.

12. The sum of contribution shares from C, IF, G, and X can be over 100% since M normally has a negative contribution.

[13] Over those 3 years, per capita rural net income rose by an astonishing 48.9%. Although both rural, and total, household income continued to rise rapidly in 1982, in that year the ratio of consumption to household income fell, causing the rise in the consumption share of GDP to come to a halt that year.

[14] See Appendix C3 for the method of deriving series for household income and the ratio of consumption to household income.

15. The very large size of the official figures for changes in inventories during 1988-90 suggests that they may be inaccurate. In no other period were increases in inventories a significant factor in GDP growth.

[16] The dollar value of exports rose by 18.9% in 1990, while the RMB devaluation that year caused that increase to represent 40.3% more constant RMB worth of exports.

17. The large devaluation of the RMB occurred on January 7-8, 1994, when the RMB fell from 5.81 per US dollar to 8.72 per US dollar. Later in the year the RMB strengthened slightly to 8.45 per US dollar.

[18] The change in the consumer price index was negative, or positive but less than 1%, from 1998-2002. The change in the GDP price deflator was negative from 1998-2000.

19. The official figure for net exports of goods and services was 7.5% of GDP in 2006.

[20] These numbers are calculated by the authors with data from various years of the China Statistical Yearbook. The number of layoffs refers to the decrease of employment of state-owned

and/or collectively-owned enterprises and the total employment refers to urban employment.

[21] The GDP of the world economy grew at 3.0% per year during 2000-2006 (World Bank, 2008, p. 341). However, at this time it appears that world GDP will be growing more slowly in the immediate future.

22. In some states, particularly those that are relatively weak and less economically developed, outside groups have significant influence over state policies as well.

23. For case 1, the assumed shares of C, X, and M in GDP are their actual values in 2006. The estimates of M' and C' are from a simple regression analysis for the period 1999-2006, which is the last sub-period of China's growth model, in which export-led growth was fully established.

24. For case 2, in which the shares of C and M remain constant, the marginal propensities are equal to the shares. The assumption of a 55% consumption share allows for a 25% investment share and a 20% government consumption share.

[25] This is reflected in the generally critical treatment of China in the mainstream mass media in the US.

[26] The output-capital ratio in China has varied between 0.46 and 0.53 in recent years, so we used 2 for the capital-output ratio. The Chinese government has estimated the depreciation rate on capital at 5%, which would make depreciation 10% of GDP given the output-capital ratio of 2.

[27] These numbers were calculated by the authors based on data from Customs Agency of China (2008), Ministry of Commerce of China (2008c) and People's Bank of China (2008).

[28] A balanced growth model would eliminate the problems of an export and investment led growth model that have been considered in this paper. As we noted at the beginning of this paper, China faces other problems with its growth model, particularly its environmental costs.

We cannot address this enormously important problem here.

[29]   A recent study by Koopman, Wang, and Wei (2008, table 3, p. 24), using a different methodology, estimated a lower domestic content of China's exports in 2002, 53.9%, compared to the 64.1% estimate of Dean, Fung, and Wang (2007). The Koopman et. al. study sought to take account of the special features of "processing exports," which are exported goods made using largely imported components. While their results are interesting, the Koopman et. al. study had to supplement the input-output data with trade data to form estimates for the various sectors they defined for China's exports. This paper uses the Dean et. al. estimates based on the standard methodology which relies on input-output data.

30. The UNCTAD series for goods trade were identical to those for goods trade from the Chinese Trade Ministry.