

## COMPONENTS OF ECONOMIC GROWTH IN JAPAN AND THE UNITED STATES

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### ABSTRACT

*The historical development of Japan in relation to its current deflationary condition serves as an indicator of potential developments in the U.S. in light of its current financial crisis. The economic impact of recent cross-border investment expenditures between the two economies could help investigate the impact of capital expansion on growth in GDP under mild inflationary pressures. Under these conditions, in addition to population, the U.S. has enjoyed relative economic growth.*

### 1. INTRODUCTION

Japan's economy has slid into a Keynesian-type liquidity trap which was most likely amplified by the country's monetary and fiscal authorities. In the face of the financial crisis of 2008, there is fear that the U.S. economy may slide into a similar trap since monetary directives have become ineffective. Setting the target interest-rate higher than zero may help stabilize the monetary base. However, population growth parameters play an important role in selecting a correct policy target. Low growth in population requires a target below zero. That would not be necessary for the U.S. in which growth of GDP above Japan for more than a decade has been attributed to population differentials between these two economies. A reversal in population trends leads to scenarios in which growth in the U.S. converges to that of Japan. This study examines the effect of cross-border investments, in addition to differences in population growth, unemployment, and inflation, on U.S. growth in GDP relative to that of Japan. Cross-border investment between the U.S. and Japan has been favorable to U.S. economic growth above that of Japan under the conditions of (i) population growth in the U.S. that exceeded that of Japan, and (ii) investment amounts which did not produce inflation in the U.S., given that Japan has fallen into deflation. A reversal in these trends should erode this differential in favor of the U.S. of growth between these two economies.

#### 1.1 Literature Review

In conditions of liquidity trap investors prefer to hold large money balances in anticipation of future increases in interest rates and a reduction in bond prices (Keynes, 1964). Deflationary scenarios suggest that near-zero or negative real interest rates may not only fail to expand the monetary base, but may exacerbate the lack of liquidity (Katz, 2002). On the contrary, a monetary policy that confirms the existence of moderate inflationary expectations may lead an economy out of this liquidity trap. It has been suggested that a 4% inflation target for 15 years would have been enough for the Japanese economy to escape its liquidity trap, as well as thwart potentially skyrocketing inflationary pressures in the future. An important growth factor in a deflationary environment is population and the labor force (Krugman, 1998). The IS curve shifts to the left for structural reasons such as population aging. A negative real interest rate was correctly advocated by political leaders. However the resulting deflationary expectations may have pushed the economy further into the trap as channels for escaping it differ depending on structural and monetary factors (Itoh, 2000). In the case of the U.S. and Japan, monetary and structural factors may have recently caused a temporary growth advantage of the former. In view of the fact that both economic systems are now experiencing a collapse in their financial services sector this advantage may disappear if population growth between the two economies converges.

## 2. THE JAPANESE ECONOMY

The current state of the Japanese economy can be traced back to predominantly expansionary and unification elements of its distant past (Hall, 1968). Expansionary elements were associated with the high savings rate, increased domestic investment, and economic growth through exports, while unification elements helped incubate growth in sensitive industries with implementations of a protectionist policy. Through this process, Japan's two-tiered economy was formulated. The first tier consists of large multinational companies while the second accounts for the large number of mostly family owned enterprises. In the year 2000, 99.4% of manufacturing was undertaken by this second tier of companies of 300 or employees or less. Manufacturing is the most important component of Japan's economy, at around 20% of GDP. Investment expenditures (annual additions to Japan's capital plant and equipment) are very large, as a result of the very high private savings rate that has characterized Japan. Gross fixed investment both in the private and the public sector has accounted for 24 – 27% of GDP between 1995 – 2003, which was a lot higher than that of Germany and/or the United States. The Japanese economy has also gained strength through its low openness to foreign trade. In 2003 total foreign trade in Japan was 18% of GDP, whereas in Germany it was 54% of GDP. Japan's foreign trade has been restricted for merchandise of less efficient sectors which needed to gain some ground. This protectionist policy has persisted despite pressure from the US toward eliminating trade restrictions (Edward, 1999).

Growth of the Japanese economy had surpassed the United States in the mid 1970s (Valdes, 2003). Japan and the U.S. produce 30% to 40% of world output, but the Japanese economy is still only 42% of that of the U.S. while Japanese per capita income is 83% of the U.S. per capita income. Political and economic analysts had initially attributed growth in Japan to practices such as permanent employment and the seniority system. On the other hand, during the wave of U.S. deregulation in the 1980 the general propensity of the Japanese toward government regulation ran counter to explanations of their economy's having surpassed that of the United States. The argument was that, in order for any system to flourish, it must have maximum flexibility in the private sector. The high level of regulation had resulted in prices of goods and services that were at least 30% more than the U.S. But the general conclusion that Japan should remain competitive internationally by eliminating most of these regulations is not evident from data in this analysis.

The Japanese system has been characterized by (i) state-assisted capitalism where government plays an important role in reallocating resources toward the production of goods and services, (ii) a high savings rate and low inflation, originally as a result of U.S. policies in reference to the occupation of Japan, (iii) U.S. purchases which started throughout the Korean war and initially supported its economy, (iv) U.S. global policies toward free trade, (v) a surplus of well-educated workers, and (vi) a stable political system. Concerns that limit the perceived flexibility of the Japanese economy include: (i) employment, pension plans and government deficits, (ii) the social system which promotes equality but leads to an inefficient allocation of resources, (iii) the Japanese management style which has become obsolete compared to international standards, and (iv) the Japanese financial system which was marred by corruption (Mak, 1998). In the present analysis, a comparison between Japan and the U.S. in terms of real and demand-related economic variables helps attribute the relative GDP growth in the U.S. to population growth and non-inflationary expansions in its capital base due to cross-border investment. The effect of real economic variables is combined with that of short-term fluctuations around the full-employment GDP by measures of unemployment and inflation in each economy.

Population parameters may create bubbles in their upswing, and may lead to erroneous monetary policy in their downswing. There are economic dilemmas much worse than inflation, however, such as the concurrent condition of a liquidity trap and reduction in population growth in Japan (Hoshi, 2004). The United States is about to go through a major demographic change, from high, to low population growth (Krugman, 2005). If U.S. population was the main factor supporting relative economic growth, then a reversal in trends should affect the U.S. economy. This study shows that, on a comparable basis between the U.S. and Japan, population growth becomes a crucial factor which affects the relative economic growth between the two economies.

## 2.1 A Brief History of Japan

Few things are known about the origin of the Japanese culture and economy other than the fact that both go back thousands of years. This mixture of people has arrived to the same place at different times and from different parts of the world. Eventually their diverse characteristics were homogenized and their language, physical traits, religion, and political/social structure became distinct from that of the Chinese, Korean and Mongolian cultures. Two of the earliest versions of Japanese history, the Kojiki and the Nihon Shoki, date back to 712 to 720 B.C. Other versions start around 660 B.C. More recent histories lend support to the fact that political and economic unity in Japan started taking place at the end of the 3<sup>rd</sup> or the beginning of the 4<sup>th</sup> century A.D. with the appearance of the Kofun tumuli (tombs) in Japan. The history of Japan can be segmented into the following periods (National Museum of Japanese History, 2006).

Table 1: Time Periods of Japanese History

	Time Period	Characteristics of Time Period
1	10000 – 300 BC	Jomon, the prehistoric period of tribal organization.
2	300 BC– 300 AD	Yayoi, a period of rice cultivation, metalworking, and pot-wheel crafting which was introduced from China and Korea.
3	300 – 538 AD	Kofun, the first time period in which Japan was seen as unified.
4	1192 – 1333 AD	Kamakura, marked by the establishment of a military government.
5	1573 – 1603 AD	Azuchi-Momoyama, the period after a century of civil war in which Japan made an attempt toward reunification and embarked on an unsuccessful invasion of Korea.
6	1868 – 1912 AD	Meiji, the period of restoration of the emperor and the transition of Japan to a nation-state.
7	1912 – 1926 AD	Taisho, during which time Japan joins allied forces in WW1.
8	1926 – 1989 AD	Showa, when Japan surrenders after two atomic bombs, and eventually normalizes its relations with China. At the end of this period, Japan has developed a competitive advantage to the U.S.

In 1998 the Economic Strategy Council was created as an advisory board to discuss and propose visions for reviving the Japanese economy. The Council made the following recommendations.

1. The Japanese must be convinced that they are in an economic recovery, so that they are not worried about a fiscal crisis. The Japanese must also be shown the steps of structural reforms. Then, the economy will recover within two years.
2. The Japanese government must encourage a competitive society and eliminate regulations and over-protectionism. Also employment must be reformed, along with deregulation and improvements in the accounting methods.
3. The financial system must be reformed. A new financial system must be created, and the various institutions must be revised.
4. Industrial revitalization and international competitiveness can be achieved with the help of the government by allowing businesses to eliminate excess machinery and by investing heavily in promising industries.
5. The last recommendation focuses on general improvements in the standard of living for the 21<sup>st</sup> century.

Since June 2001 the United States and Japan have attempted to improve their respective foreign direct investments through the Investment Working Group of the Department of State. The 2008 report of the group refers to recommendations by Japan's Expert Committee on Foreign Direct Investment. The report assesses the impact of recently enacted rules about stock swaps on cross-border mergers and acquisitions, and discusses procedures related to national security. The U.S. and Japan continue to be committed to communication regarding investments in each other country (Investment Working Group, 2008).

### **3. STATISTICAL ANALYSIS**

The data utilized are unemployment and inflation rates which in Japan have been lower than those of the U.S. The data also include investment in the United States by Japan, and investment in Japan by the United States. This information allows for an estimation of increases in the capital base of respective economies due to efforts and initiatives in relation to cross-border investment. The resulting capital base expansion is analyzed with the rest of the data in examining the dimensions of inter-dependence between the two economies. The analysis of these sets of data involves estimation of this degree of inter-dependence, and the measurement of its effect on the relative growth in GDP between the two economies. The tables in the Appendix list the data used.

Several models measuring the impact of the U.S. economy on the Japanese economy and vice-versa pointed to possible inter-dependence between the U.S and Japan. However, this inter-dependence was isolated when differences in several economic variables were considered in the statistical model at the same time. On a single-variable basis the U.S. economic growth did not seem to have an impact on the Japanese economy, while Japanese investment in the U.S. did not impact U.S. economic growth. However, on a relative basis, measuring U.S. growth in GDP minus Japanese growth in GDP, the inter-dependence between the two economies became evident. Specifically, in a scenario of non-inflationary cross-border capital converge between economies the U.S. came out ahead of Japan while its population growth was relatively higher.

The difference in growth of GDP between the US and Japan is explained in terms of differences in the real variables of population and the capital base, as well as differences in demand-side deviations from equilibrium captured by unemployment and inflation. Results show that the difference in growth rates between the two economies depends heavily on differences in inflation and the capital base between the two countries. Unemployment plays a minor role, while population as a supply-side factor materially impacts growth on a relative basis. On the other hand, the Japanese economy makes better use of capital compared to the United States. When the cross-border accumulation of capital in the U.S. exceeds that of Japan the U.S. economy declines on a relative basis. Subsequently, the four differences between the two countries in (i) population, (ii) capital, (iii) inflation and (iv) unemployment are arranged in principal components. Roughly 85% of the variability in economic data is captured by a phenomenon in which growth in cross-border capital base converges between the two economies while inflation rates diverge, or capital growth rates diverge and inflation rates converge. During these instances the positive difference in economic growth between the U.S. and Japan increases. However, an additional 11% of the variability in economic variables accounts for a phenomenon in which differences in capital base growth rates and inflation rates both decrease. During those times, the difference in economic growth between the U.S. and Japan increases as well. The only times when economic growth in the U.S. relative to Japan decreases is when population growth has adverse effects.

#### **3.1 Difference in Economic Variables**

The size of the Japanese economy is less than 50% of that of the U.S, but its growth between 1980 and 1991 has been faster, with the exception of 1983 and 1984. More recently, the U.S. economic growth has been faster than that of Japan. Relative growth of the U.S. economy has generally been trending upward. On a single-country basis, the reasons for such growth are hard to pinpoint as economic variables move together leading to potential estimation errors from multi-collinearity among variables. However, using differences in economic variables between the two economies partly alleviates this issue and leads to interesting results. Specifically, population growth is higher in the U.S. than in Japan and has a strong but statistically non-significant effect on relative growth in the U.S. The almost trend-less difference in the capital base growth due to cross-border investments has a negative effect on U.S. relative growth. Thus, cross-border investments by themselves raise economic growth in Japan more than in the U.S. In addition, as inflation rates converge, relative U.S. growth decreases. As shown in the next section, principal components of differences in economic variables affect U.S. relative growth more succinctly.

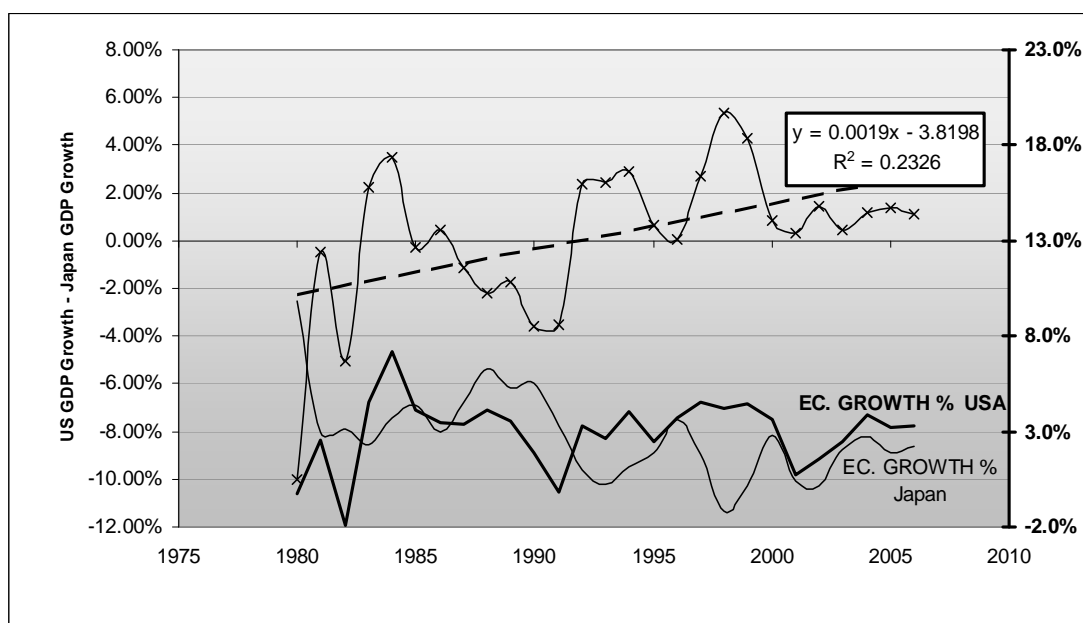


Figure 1: Difference in GDP Growth between the U.S. and Japan

Figure 1 shows the difference in growth rates of GDP between the two economies. Based on the trend line, the United States has surpassed Japan in mid-1991. If continued, the U.S. economy should grow by 0.19% faster than Japan every year. The reasons for the higher growth rate are analyzed in Table 2 in terms of real economic variables, that are population and the capital base, as well as variables that capture deviations from a long-term equilibrium, such as the inflation and unemployment rates. The difference in population growth seems to play the most important role toward the upward trend in Figure 1 (see coefficient 3.7969 in Table 1). This effect of population differences is counteracted by the differences in unemployment between the two economies (coefficient -0.3269 in Table 1). Unemployment has been higher in the U.S., while the difference has been trending downward. Both population growth and unemployment differences between these two economies lend support to the hypothesis that growth in the labor resource affects relative growth. As shown in Figure 2 the U.S. population has been growing faster than that of Japan. On the other hand, the unemployment rate has been declining in the U.S. relative to Japan in Figure 3. When multiplied by coefficients in Table 2, both the difference in population growth and that in the unemployment rate appear to have contributed to the higher growth rate in U.S. GDP relative to Japan. Although large, these effects are not statistically significant.

Table 2: Regression Analysis of U.S. – Japan Difference in Economic Growth

ANOVA				
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>
Regression	4	0.0144	0.0036	6.9114
Residual	22	0.0115	0.0005	
Total	26	0.0259		

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0.0298	0.0508	0.5869	0.5633
Difference in Population Growth	3.7969	5.1213	0.7414	0.4663
Difference in Capital Base Growth	-1.8656	1.0084	-1.8501	0.0778
Difference in Inflation	-1.6335	0.4664	-3.5027	0.0020
Difference in Unemployment	-0.3269	0.4194	-0.7795	0.4440

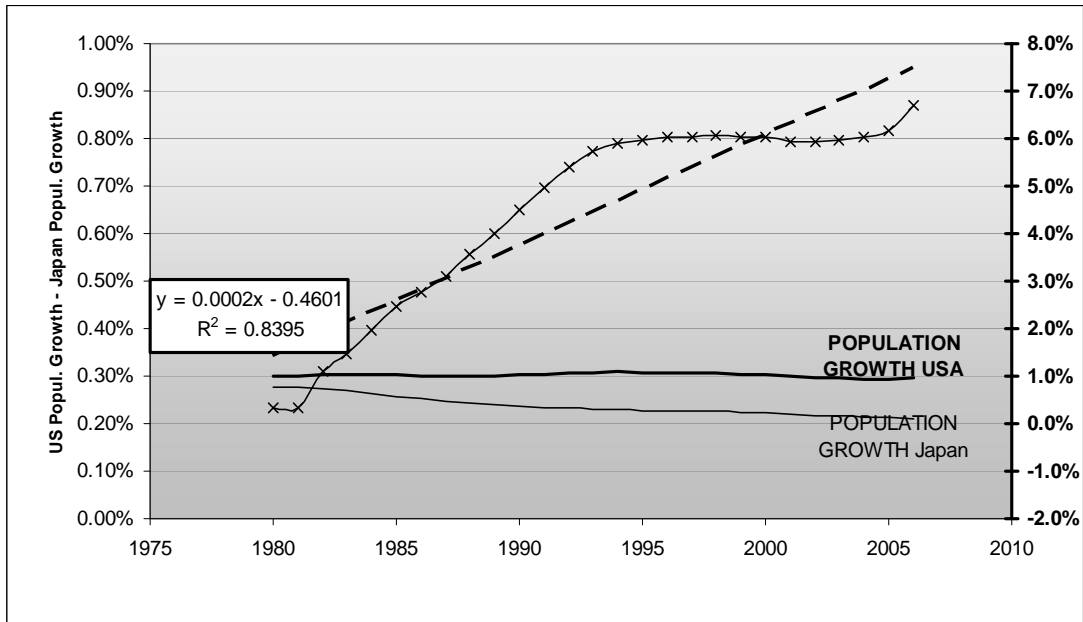


Figure 2: Difference in Population Growth between the U.S. and Japan

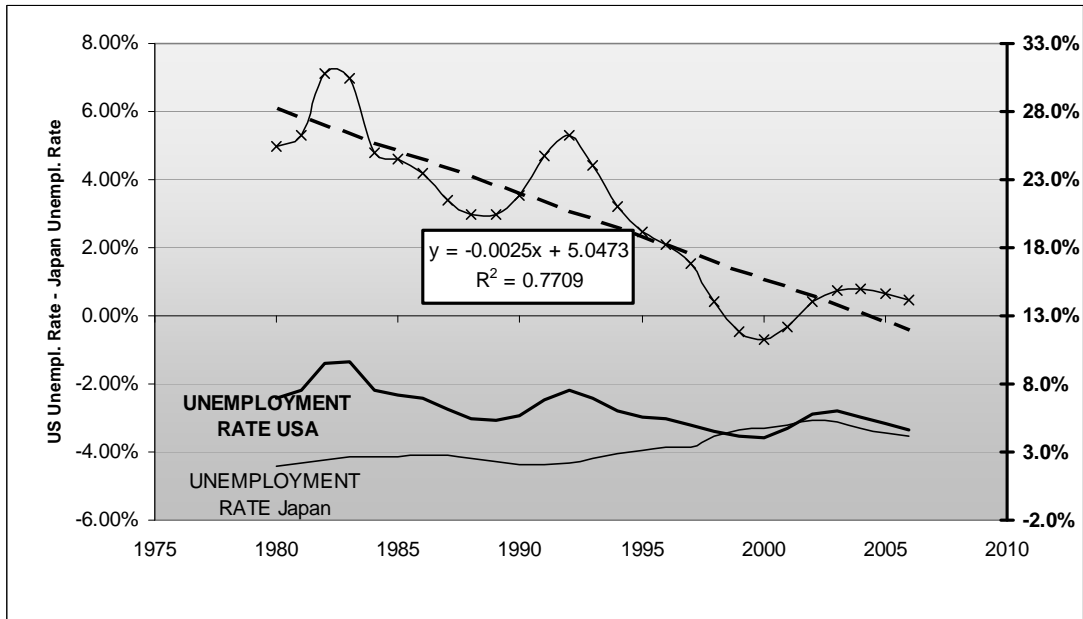


Figure 3: Difference in Unemployment Rate between the U.S. and Japan

The middle two variables in Table 2 (Difference in Capital Base Growth and Difference in Inflation) detract from the relatively higher growth of the U.S. economy. Capital base growth in this analysis refers to increases in productive capacity in an economy solely as a result of cross-border investments. Based on the results above as the difference in capital base growth increases the relative growth of U.S. GDP decreases. Also, as the difference in inflation increases, the relative growth of U.S. GDP decreases as well. The effect of the difference in capital base growth is somewhat difficult to interpret, since cross-border investment between the two economies has averaged to about the same amount. Figure 4 shows a slight positive trend in the difference in capital growth between the two economies. Such increase should explain the higher economic growth in the U.S. However, the coefficient in Table 2 is negative (-1.8656)

pointing to the fact that equal amounts of cross-border investments benefit Japan more than the United States. This effect is significant at the 10% level. The difference in inflation rates is also difficult to interpret, although statistically significant. Based on Table 2 an increase in relative U.S. inflation affects relative productivity negatively (coefficient -1.6335). As expected, the U.S. economy becomes susceptible to inflationary pressures more than Japan which has fallen into a deflationary state since 1991. Figure 5 shows a negative trend in the difference in inflation between economies. Multiplied by the coefficient in Table 2, this decline in the U.S. inflation relative to Japan still affects the GDP growth difference positively. A potential reduction in U.S. interest rates and inflationary expectations below zero, as is the case in Japan, could lead to actual convergence of growth rates in GDP between the two economies.

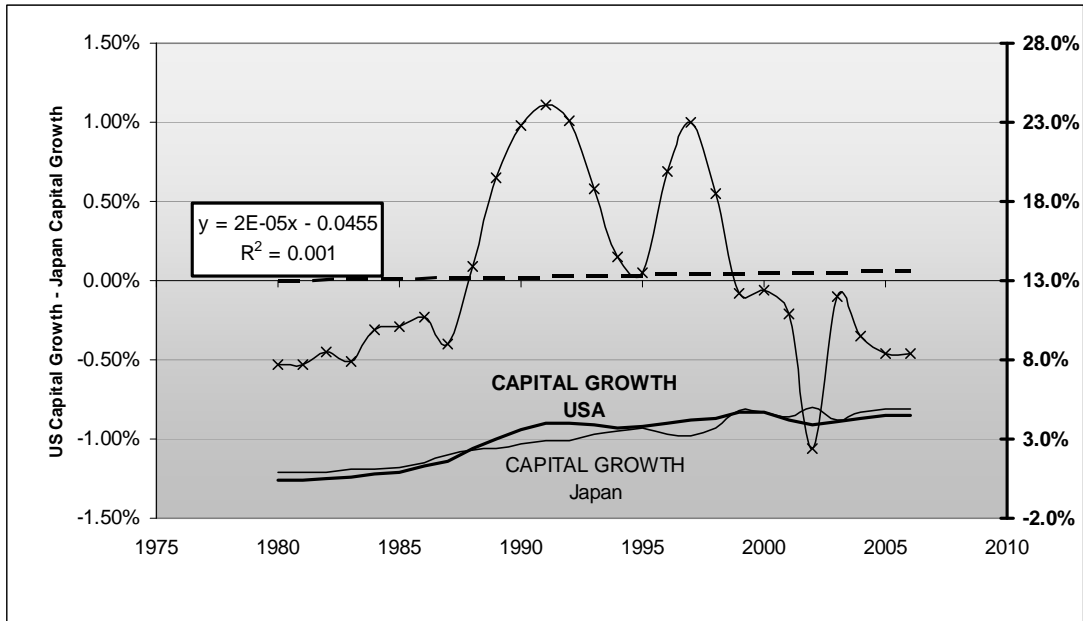


Figure 4: Difference in Capital Growth between the U.S. and Japan

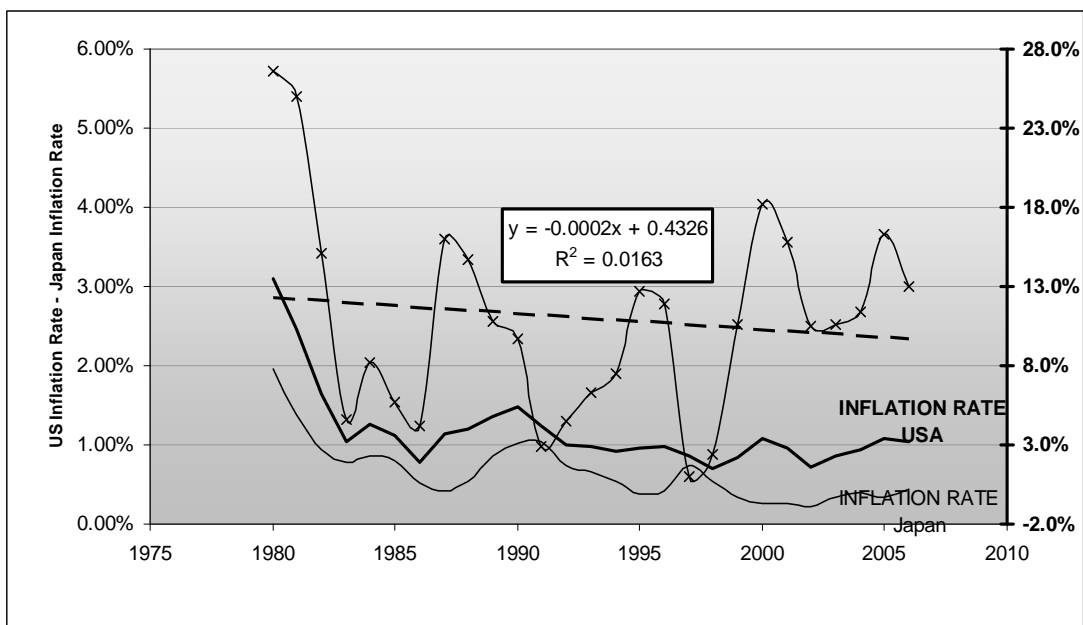


Figure 5: Difference in Inflation Rate between the U.S. and Japan

In summary, the real economic variable of population growth predominantly accounts for the recently higher GDP growth rate in the U.S. relative to Japan, although its effect is not statistically significant. At the same time, the difference in capital base growth between the two economies seems to have an adverse and statistically significant effect on this difference in economic growth. Aggregate demand variables of inflation and unemployment seem to affect relative economic growth as expected, however, the effect of relative inflation is statistically significant at  $\alpha = 1\%$ . It is confirmed that inflation rates in the U.S. have stayed in positive territory, relative to Japan. As relative inflation declines, GDP grows faster in the U.S. provided that the economy has not yet fallen into a deflationary state. At the point when it does, some sort of a regime-switching adjustment may take place. Based on the effects of cross-border investment, which may or may not be inflationary, it seems that U.S. monetary policy has sustained expectations on inflation in a low, but positive level that has not exacerbated any existing liquidity restrictions up to this point.

Some elements of the above relation of relative GDP growth to real and demand-side variables require more analysis. Initially, population and unemployment seem to explain the higher U.S. growth rate, but the corresponding coefficients in Table 2 are statistically non-significant. Also, the capital base and the inflation rate seem to explain the higher U.S. growth rate in a statistically significant manner. However, the interaction between these variables is difficult to discern from Table 2. Lower inflation in the U.S. affects GDP growth positively. However, the concurrent effect of growth in the capital base is vague. In this analysis, the growth in the capital base is derived as an accumulation of investment expenditures in each economy. Based on the Solow-growth model higher savings and investment should produce a higher GDP growth rate for a given population growth rate (Solow, 1957). Figure 4 shows that the capital base in the U.S. has grown faster between 1988 and 1998. Roughly around the same time period the difference in inflation rates between the two economies in Figure 5 has moved above and below the trend. The -52% correlation coefficient between these variables suggests that a relative capital expansion in the U.S. causes relative deflation as well. On the other hand, the -78% correlation between differences in population and unemployment suggests that U.S. population growth also leads to temporary unemployment. Principal components of all differences in economic variables between the two economies portray these phenomena in a separate dimensionality. Cross-multiplication of eigenvectors with the new coefficients results in the originally estimated coefficients of Table 2.

### 3.2 Principal Components of Economic Variables

Principal component analysis (PCA) reveals the internal structure of independent variables in a way that explains total variance while reducing dimensionality by transforming them into linear combinations. Table 3 shows the weights for each independent variable of Table 2 in the eigenvectors of principal components. A progressively smaller portion of the variance in the original variables is explained by these components. The weight of an independent variable in each eigenvector helps describe the effect that a particular principal component is capturing.

Table 3: Principal Component Eigenvectors of U.S. – Japan Difference in Economic Growth

	PC1	PC2	PC3	PC4
Difference in Population Growth	-0.6553	-0.2525	0.0093	0.7118
Difference in Capital Base Growth	-0.4261	0.5252	-0.7099	-0.1966
Difference in Inflation Rate	0.4174	-0.5373	-0.7043	0.2029
Difference in Unemployment Rate	0.4634	0.6097	-0.0052	0.6430
Variance Explained:	50.00%	35.61%	11.91%	2.48%
Total Variance:	50.00%	85.61%	97.52%	100.00%

Component PC1 portrays a phenomenon in which the difference in real variables of population and the capital base between the two economies goes down while the difference between the demand-side variables of unemployment and inflation increases. It is reasonable to presume that growth in U.S. GDP would decrease relative to that of Japan if U.S. population and its capital base decreased while inflation and unemployment increased on a relative basis. The effect of this phenomenon is evident in its coefficient in Table 4 (please refer to -2.5266). As population (labor force) and capital in Japan catch up, the U.S. advantage in growth diminishes. Also, as U.S. inflation and unemployment rise above those in Japan, the U.S. economy slows down. The phenomenon captured by the first component, while very prevalent (it explains half of all variability) has been diminishing through time as shown in Figure 6. In other words, U.S. real productive variables have increased, and inflation/unemployment decreased relative to Japan. The U.S. has thus maintained its economic advantage over that of Japan as the difference in real variables has widened, and that in demand-side variables narrowed. Figure 6 shows that this trend may have reversed as early as the time of the Russian bond default and the Long-Term Capital Management crisis of 1998 (Black, 2004). If continued on that same path established after 1998, the U.S. advantage in growth over Japan may eventually disappear.

Table 4: Component Regression of U.S. – Japan Difference in Economic Growth

ANOVA				
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>
Regression	4	0.0144	0.0036	6.9114
Residual	22	0.0115	0.0005	
Total	26	0.0259		

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0.0298	0.0508	0.5869	0.5633
U.S Falls Behind (Exceeds) in Supply (Demand)	-2.5266	2.9213	-0.8649	0.3964
U.S. Exceeds (Falls Behind) in Capital (Inflation)	-1.2605	1.4815	-0.8508	0.4040
Differences in Capital Base and Inflation Diminish	2.5118	0.8576	2.9291	0.0078
Differences in Population/Unemployment Increase	2.5280	4.0216	0.6286	0.5361

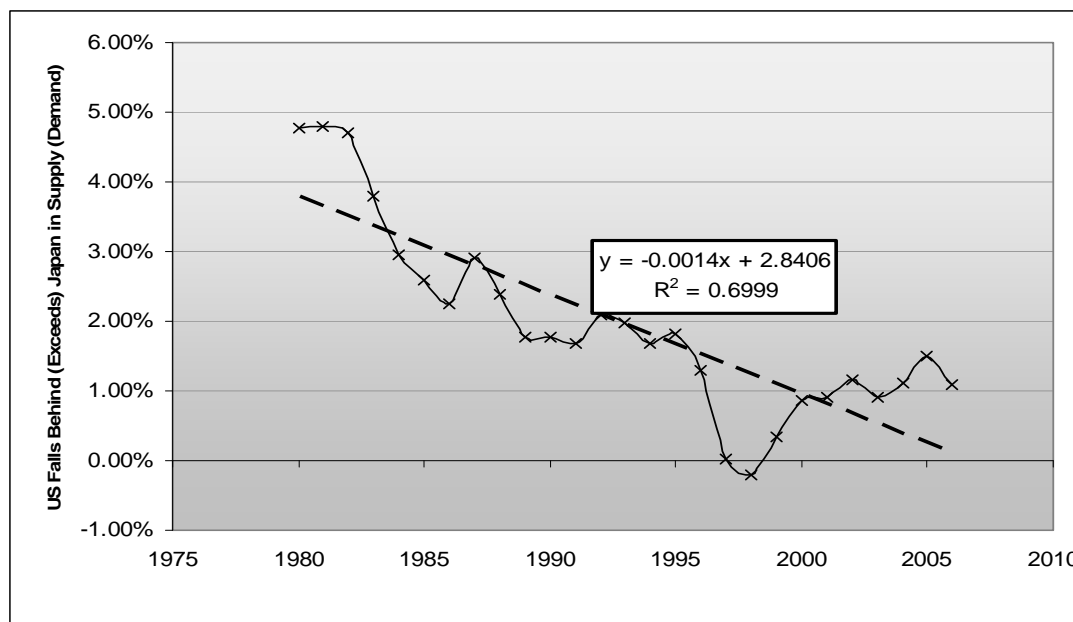


Figure 6: First Principal Component of Independent Variables over Time (PC1)

Component PC2 captures a scenario which is similar to PC1 as far as population growth and unemployment are concerned, but differs in the weights of the capital base growth and inflation. In this second component the difference in capital base increases while inflation decreases. This mixed bag of greater capital with lower inflation at the expense of higher unemployment in the U.S. relative to Japan occurs roughly 35% of the time. Table 4 indicates that the associated unemployment-inducing, non-inflationary capital-for-labor substitution retards U.S. growth in relation to Japan. Also, the corresponding inflationary labor-for-capital substitution raises growth in Japan (-1.2605). Figure 7 shows that this component has traveled an equal distance from positive to negative over the time period of this analysis, thus adding to the U.S. advantage in GDP growth over Japan. Above zero, this component is interpreted as higher productivity of labor accompanied with much-needed relative inflation in Japan. Since 1994 this component has moved below zero, indicating a reversal of roles in these economies as Japan slid into deflation. When this phenomenon starts regressing toward zero the U.S. advantage may decrease as well.

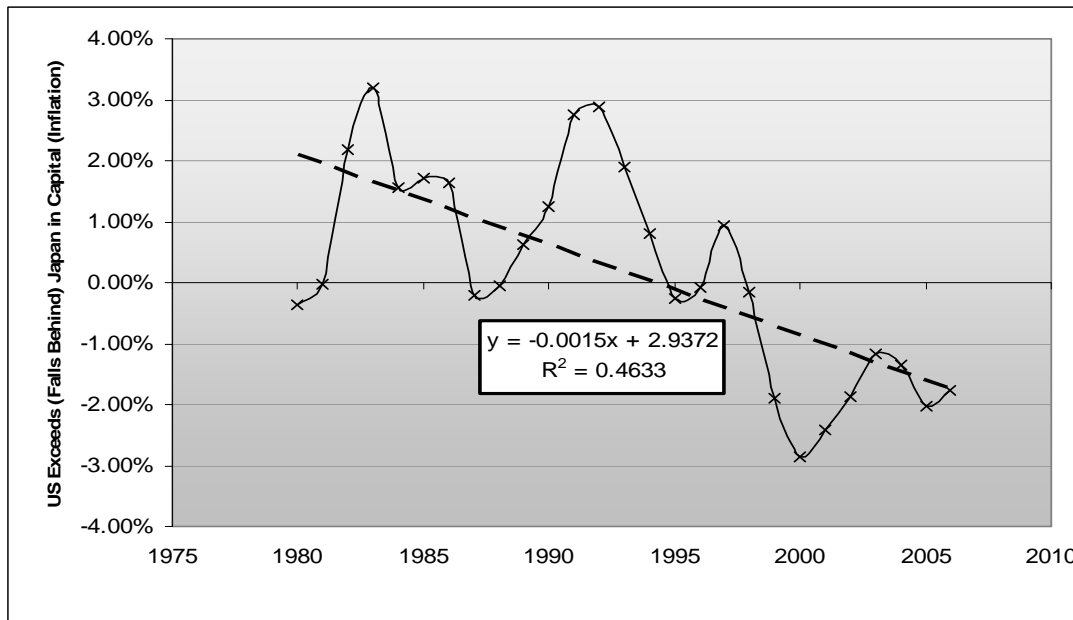


Figure 7: Second Principal Component of Independent Variables over Time (PC2)

The third principal component of the independent variables (PC3) captures the convergence in the capital base and inflation between the two largest world economies which is not adequately portrayed by the negative correlation between these two variables. Due to agreements between the two economies, it is unlikely that the difference in the cross-border investment-induced capital base changes will deviate from zero for very long periods of time. Based on its eigenvector in Table 3 this third component captures a phenomenon in which the inflation rate follows this cross-border investment. Thus, 12% of the time the capital base shrinks and inflation goes down in the U.S. relative to Japan, and vice-versa. The fact that the component values are negative in Figure 8 confirms the presence of inflation-inducing capital expansion in the U.S. relative to Japan during this period of study, with an upward trend (capital expansion and inflation decrease in the U.S.). Table 4 shows that such changes in this inflation-inducing capital expansion affects economic growth positively in the U.S. and is statistically significant at  $\alpha = 0.01$  (2.5118). This component isolates a process that is not obvious from fluctuations in capital growth and inflation in Figure 4 and 5. The fluctuation around a trend in Figure 8 is relatively wide, but the upward trend suggests that inflation-inducing capital expansion in the U.S. is reduced, benefiting U.S. growth. This third component suggests that the two economies converge in their growth of capital and their inflation rates. Given its deflationary state, Japan should eventually benefit from such convergence given that its capital base would also grow in the process. For the period in this analysis, the U.S. gains from the lower inflation more than Japan benefits from the higher capital.

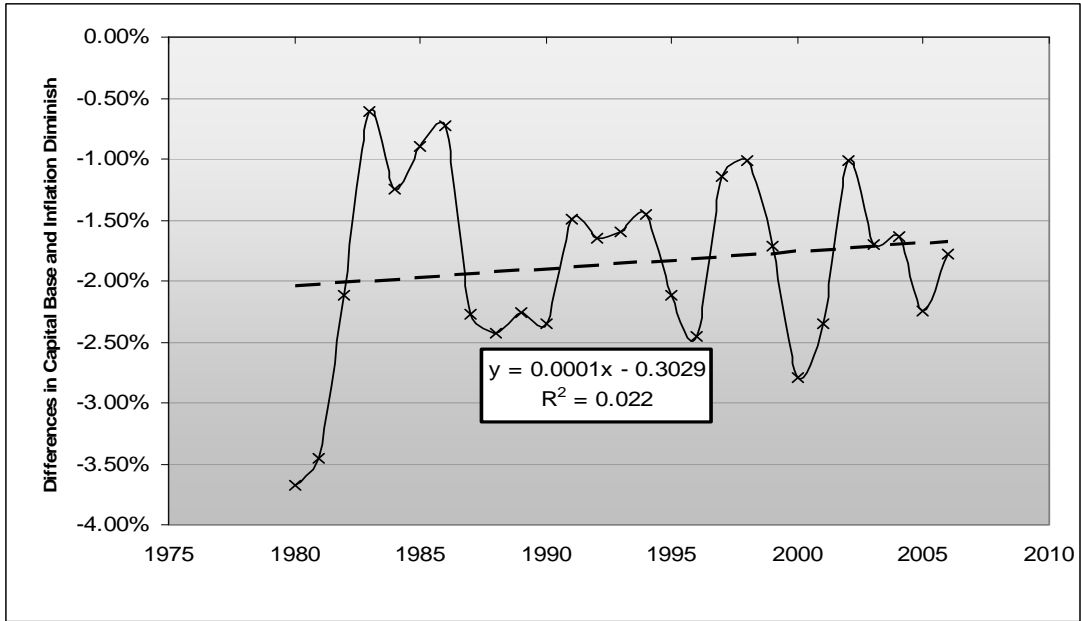


Figure 8: Third Principal Component of Independent Variables over Time (PC3)

The fourth component of independent variables (PC4) captures an increase in population growth, unemployment, and inflation as well as reductions in U.S. capital compared to Japan. This phenomenon which combines population growth in the U.S. with some undesirable increases in unemployment and inflation and a decline in capital relative to Japan occurs 2.5% of the time. Irrespective of its detrimental effects to the U.S. economy, this fourth component has a positive, although not statistically significant effect on U.S. growth over Japan as shown in Table 4 (coefficient 2.5280). One possible explanation is that population growth in the U.S., even when combined with undesirable changes in unemployment, inflation and capital, still raises GDP growth above that of Japan. However, this fourth component has been declining toward zero in the last 30 years, or at least until the LTCM crisis as shown in Figure 8. Therefore this population effect counteracts the positive effect of the first component on relative growth in the U.S.

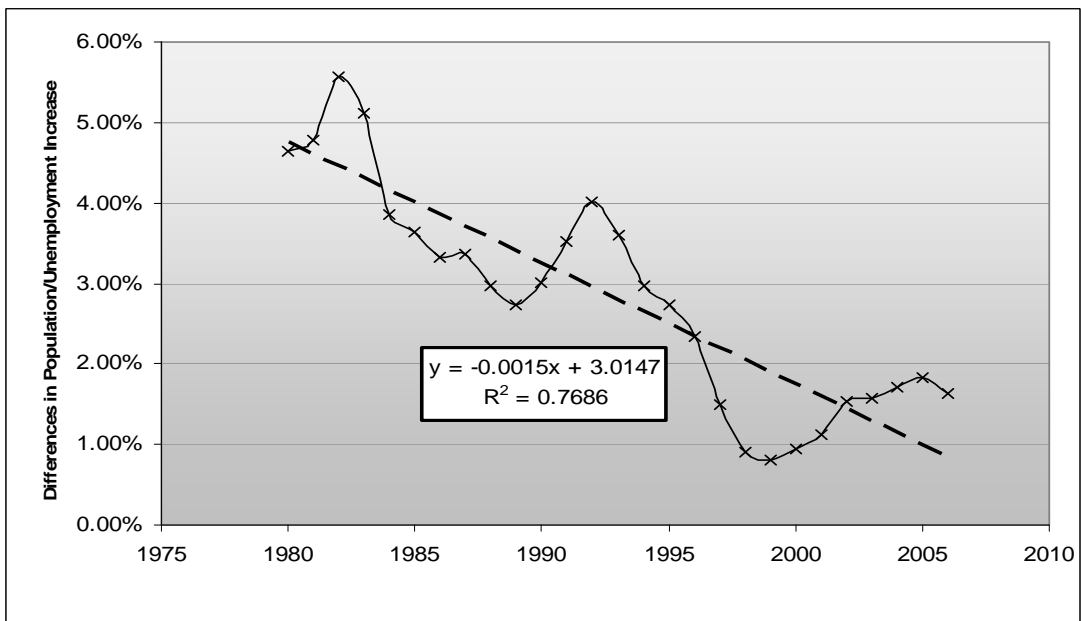


Figure 9: Fourth Principal Component of Independent Variables over Time (PC4)

#### 4. CONCLUSION AND RECOMMENDATIONS

In the last thirty years economic growth in the U.S. has moved from negative to positive in relation to Japan. Cross-border investment has had a strong impact on growth in both economies. The growth in U.S. GDP above that of Japan can be explained in terms of differences in population, capital growth, unemployment and inflation. The higher population growth in the U.S. has pushed growth above that of Japan in 1991. This population effect is strong but not statistically significant. When accompanied by convergence in unemployment and inflation between the two economies, the U.S. population growth raises GDP above that of Japan, as evident by the first principal component of differences in economic variables. On the other hand, population growth that goes along with relatively higher unemployment and inflation and lower capital formation due to cross-border investment detracts from economic growth in the U.S. as shown in the fourth component. There is little guarantee that U.S. population will continue to grow above that of Japan. In fact, the reduction of projected population growth in the U.S. may necessitate the implementation of a sub-zero rate target by the Federal Reserve. A substantial reduction in inflation may drive the U.S. economy into a deflationary spiral similar to that of Japan.

The capital base from cross-border investment expenditures has contributed to relative economic growth in the U.S. However, it is possible that cross-border investment expenditures may have created temporary upward inflationary pressures in either one, or both countries. Since Japan has fallen into a deflationary spiral, such pressures seem to have affected the U.S. more. Such dislocations in the price level, when accommodating investment expenditures from one economy into the other, may cancel the growth effect that stems from expansion in the capital base. One scenario in which cross-border investment expenditures benefit the U.S. is that of a reversal in such inflationary expansion in the capital base due to cross-border investments. This effect takes place because of the relatively higher inflation rate of the U.S. as well as the collapse of financial markets in Japan. This collapse has triggered a prolonged period of deflation from which Japan's economy has not yet recovered. If that is the case, then the recent advantage in U.S. growth may be solely attributed to the comparative stability of its financial system, a conclusion that would surely need revisiting after the U.S. financial collapse of 2008. It would be interesting to revisit the recommendations of the Economic Strategy Council to Japan to the Prime Minister at the time, since similar ones may be applicable to the U.S., but emanating from the corresponding authority.

Generally, to the extent that the U.S. population growth stayed above that of Japan, cross-border investment would benefit its economic system as long as inflation remained moderate. This is the main result of the analysis. By extension, the near-zero level of interest rates of Japan, albeit not wholly attributed to the collapse of the financial services sector, will not guarantee economic advancement out of a prolonged recession in the presence of negative population growth, on a relative basis. The U.S. economy has benefited from moderate inflationary expectations above that of Japan, and from cross-border investment expenditures between the two economies that have not materially exacerbated price levels. However, this economy may also be slowly sliding into a Keynesian-type liquidity trap due to its recent financial crisis. Because of projected changes in its upward population trend, lower or negative inflation rates may exacerbate liquidity issues.

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## APPENDIX

Appendix Table 1A: U.S. and Japan Data on Economic Growth

Year	GDP BIL. US \$		EC. GROWTH %		TOTAL TRADE BIL. US \$		
	USA	Japan	USA	Japan	X TO JPN	M FR JPN	Xn
1980	2,789,500	1,072,744	-0.23	9.8	20.8	30.7	-9.9
1981	3,128,430	1,183,607	2.52	3	21.8	37.6	-15.8
1982	3,255,020	1,100,262	-1.94	3.1	21	37.7	-16.7
1983	3,536,670	1,202,377	4.52	2.3	21.9	41.2	-19.3
1984	3,933,170	1,283,498	7.19	3.7	23.6	57.1	-33.5
1985	4,220,250	1,365,798	4.13	4.4	22.6	68.8	-46.2
1986	4,462,800	2,023,190	3.47	3	26.9	82	-55.1
1987	4,739,470	2,460,190	3.38	4.5	28.2	84.6	-56.4
1988	5,103,750	2,977,550	4.13	6.3	37.7	89.5	-51.8
1989	5,484,350	2,968,905	3.54	5.3	44.5	93.6	-49.1
1990	5,803,070	3,039,705	1.88	5.5	48.6	89.7	-41.1
1991	5,995,920	3,475,944	-0.17	3.33	48.1	91.5	-43.4
1992	6,337,750	3,793,827	3.32	0.95	47.8	97.4	-49.6
1993	6,657,400	4,354,701	2.67	0.2	47.9	107.2	-59.3
1994	7,072,230	4,794,194	4.02	1.13	53.5	119.2	-65.7
1995	7,397,650	5,283,055	2.5	1.88	64.3	123.5	-59.2
1996	7,816,820	4,688,258	3.7	3.62	67.6	115.2	-47.6
1997	8,304,330	4,305,585	4.5	1.79	65.5	121.7	-56.2
1998	8,746,980	3,933,249	4.17	-1.18	57.8	121.8	-64
1999	9,268,430	4,455,354	4.45	0.19	57.5	130.9	-73.4
2000	9,816,970	4,649,637	3.66	2.82	64.9	146.5	-81.6
2001	10,127,900	4,087,722	0.75	0.41	57.5	126.5	-69
2002	10,469,600	3,904,827	1.6	0.14	51.4	121.4	-70
2003	10,960,700	4,231,267	2.51	2.07	52.1	118	-65.9
2004	11,712,500	4,584,865	3.91	2.74			
2005	12,455,800	4,562,824	3.22	1.87			
2006	13,246,600	4,389,413	3.32	2.21			

Source: IMF International Financial Statistics (IFS); National Income in the Republic of China, The Directorate General of Budget, Accounting and Statistics, Executive Yuan, Department of Statistics, MOEA, Republic of China, the National Bureau of Statistics Of China (PRC) Singapore Department of Statistics

IMF International Financial Statistics (IFS); National Income in the Republic of China, the Directorate General of Budget, Accounting and Statistics, Executive Yuan, Economic and Social Research Institute, Economic Planning Agency, Japan

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Appendix Table 2A: U.S. and Japan Demand/Supply-Side Economic Data

Year	UNEMPL. %		INFLATION %		PER CAP. GDP		INVESTMENT	
	USA	Japan	USA	Japan	USA	Japan	IN US	IN Jap
1980	7	2	13.51	7.78	12,080	9,184	4,723	6,225
1981	7.5	2.2	10.32	4.91	13,412	10,055	7,697	6,762
1982	9.5	2.4	6.16	2.74	13,812	9,280	9,677	6,930
1983	9.6	2.6	3.21	1.88	14,853	10,072	11,336	8,063
1984	7.5	2.7	4.32	2.27	16,348	10,683	16,044	8,374
1985	7.19	2.6	3.56	2.02	17,363	11,303	19,313	9,467
1986	6.99	2.8	1.86	0.62	18,178	16,656	26,824	11,839
1987	6.19	2.8	3.74	0.13	19,115	20,157	34,421	16,141
1988	5.49	2.5	4.01	0.67	20,381	24,290	51,126	18,546
1989	5.27	2.3	4.83	2.28	21,683	24,123	67,319	19,911
1990	5.62	2.1	5.4	3.06	22,709	24,606	83,091	22,599
1991	6.82	2.1	4.23	3.24	23,219	28,039	95,142	25,403
1992	7.51	2.2	3.03	1.73	24,282	30,503	97,769	26,591
1993	6.9	2.5	2.95	1.28	25,233	34,906	100,721	31,095
1994	6.08	2.89	2.61	0.71	26,516	38,316	98,513	34,117
1995	5.61	3.15	2.81	-0.13	27,439	42,105	104,997	37,309
1996	5.42	3.35	2.93	0.14	28,684	37,264	116,144	34,578
1997	4.95	3.4	2.34	1.73	30,150	34,133	125,041	33,854
1998	4.51	4.11	1.55	0.66	31,423	31,103	134,340	41,423
1999	4.22	4.68	2.19	-0.34	32,952	35,149	153,815	55,120
2000	4	4.72	3.38	-0.67	34,548	36,602	159,690	57,091
2001	4.7	5.03	2.83	-0.73	35,288	32,113	149,859	55,651
2002	5.78	5.38	1.59	-0.92	36,124	30,620	147,372	66,468
2003	5.99	5.26	2.27	-0.25	37,457	33,125	157,716	57,794
2004	5.53	4.72	2.68	-0.01	39,648	35,841	175,728	68,071
2005	5.08	4.43	3.39	-0.27	41,768	35,623	190,279	75,491
2006	4.62	4.14	3.23	0.24	43,993	35,565		

Source: IMF International Financial Statistics (IFS); National Income in the Republic of China, the Directorate General of Budget, Accounting and Statistics, Executive Yuan  
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