An Analysis of Japan's Economic Development: Lessons for China

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Japan has played an important role in the global economy for several decades. This study comprehensively analyzes factors contributing to Japan's economic development using World Bank data and both expenditure and value-added approaches of gross domestic product measurement. Personal consumption and investment contributed the most to Japan's economic growth in the expenditure model, while the labor rate and service industry productivity were the most important in the value-added model. Further, this study examines changes in these economic factors to explore their impact on Japan's economy. Finally, this paper discusses lessons for China based on Japan's experiences.

Keyword: Japan economy, China economy, productivity, economic structure, labor rate

INTRODUCTION

From 1968 to 2010, Japan held the position of the world's second largest economy, behind the United States (US), until China surpassed it. In 2022, Japan's gross domestic product (GDP) was $4.3 trillion and the population of 125.1 million boasted a high living standard with a GDP per capita of over $34,000.

Japan has played an important role in the global economy for several decades. Post World War II, Japan embarked on a mission of rapid industrialization and modernization, experienced significant economic growth and prosperity through the 1980s, and threatened US economic dominance. The Japanese economy is known for its strong manufacturing sector, advanced technological innovation, and high productivity. Furthermore, the country has consistently been a world leader in international trade and numerous Japanese companies operate globally.

However, since the 1990s, Japan has experienced "the lost decades", a prolonged period of low economic growth accompanied by low or negative inflation. This economic outcome is attributed to numerous factors, including an aging population and negative population growth. The country has responded with a range of policy initiatives, including monetary and fiscal stimuli measures, structural reforms, efforts to boost female labor force participation, and strategies to attract more foreign workers. A few policies, such as female labor force retention, have worked marginally, but no improvement has been witnessed in overall economic growth. Japan continues to face the threat of a future economic recession and deflation. Table 1 provides summary statistics on the key variables of Japan's economy from 2018 to 2022.

TABLE 1
SUMMARY STATISTICS FOR JAPAN'S ECONOMY

Variable	2018	2019	2020	2021	2022
GDP per capita (USD)	39,751	40,416	40,041	40,059	34,017
Population (million)	126.811	126.633	126.261	125.682	125.125
Labor force (million)	68.387	69.046	68.898	68.881	69.114
Labor force, female (million)	30.163	30.684	30.565	30.718	31.008
GDP (USD trillion)	5.041	5.118	5.056	5.035	4.256
Economic growth (Nominal USD GDP, %)	2.23%	1.53%	-1.22%	-0.41%	-15.46%
GDP (JPY trillion)	556.630	557.911	539.808	552.571	559.710
Economic growth (Nominal JPY GDP, %)	0.64%	0.23%	-3.24%	2.36%	1.29%
Core Inflation (%)	0.19%	0.45%	0.11%	-0.73%	0.34%
Exports growth (USD %)	6.44%	-3.19%	-12.16%	16.24%	0.48%
Imports growth (USD %)	11.12%	-1.48%	-12.10%	17.54%	14.72%

Data Source: World Bank

It is crucial to identify the significant factors that contributed to Japan's past economic success, its challenges, and the resultant transformation that occurred. Understanding Japan's economy and its economic policies is valuable for Japan and the rest of the world, as Japan currently holds the position of the third largest economy in the world. Specifically, China can learn from Japan's experiences because it faces similar problems and challenges, such as slower economic growth, aging population, global trade disputes, and deflation.

Utilizing expenditure and value-added approaches to measure GDP and World Bank (WB) data, we established relevant econometric models. We identified the significant variables for these two models in this study. Further, we assessed the impact of these variables on Japan's prosperity over the past few decades. These econometric models are based on previous studies by Chen et al. (2017), Chen and Qiao (2022), and Qiao and Chen (2023).

Although, numerous studies have been conducted on the Japanese economy, this study contributes to the literature in several ways. First, this paper utilizes the latest data for Japan up to 2022. Second, both expenditure and value-added models for GDP measurements were used to analyze the relationships among the variables. Finally, the study provides a comprehensive comparison between China and Japan to investigate their similarities and dissimilarities, and further explores the lessons for China from Japan's economic history.

LITERATURE REVIEW

An extensive body of literature focuses on various aspects of the Japanese economy. Specifically, this part of the review focuses on studies examining Japan's prosperity after 1945 and through the 1980s. Lee (1993) concluded that efficacy in interactions between capitalism and socialism benefited Japan and other East Asian countries. Leitner (1999) focused upon Edwards Deming's campaign that helped to institutionalize quality control within the Japanese manufacturing sector, which improved Japan's ability to produce quality products resulting in its industrial resurgence in the 1980s. Phan et al. (2011) found that numerous Japanese companies have applied quality control methods persistently to enhance Japan's global manufacturing competitiveness. Bery (2011) explained that Japan's reconstruction was due to its integration with the US and Europe within the liberal trading and monetary order set up by the US after World War II. This successful path was later adopted by South Korea, Taiwan, Hong Kong, and Singapore in the 1970s and ASEAN economies in the 1980s. Beckley et al. (2018) demonstrated that the reason for Japan's economic miracle was due to its sudden and dramatic changes in its relationship with the United States in

the late 1950s. The authors found that although Japan could have accomplished solid economic growth without its alliance with the US, an economic miracle would not have been possible. Chen et al. (2019) demonstrated that Japan's manufacturing industry growth was mainly attributed to productivity and investment, whereas China's manufacturing industry growth was attributed to the exports of manufacturing products.

Next, the review focuses on Japan's serious economic problems after the 1990s and the "lost decades". Wevers (1998) called Japan the "troubled giant". They explained that Japan's economic and structural issues in the 1990s were caused by the mismanagement of its economic policies and political and administrative weaknesses. Alternatively, Koo (2001) argued that structural issues alone cannot explain the Japanese economy's poor performance in the 1990s because most of the structural problems have existed for decades. Further, the author noted that a huge deflationary gap has trapped the Japanese economy in a "balance sheet recession". Guo and Yakura (2009) argued that the cross-holding of company shares contributed to the spike and collapse of Japan's economy. Pasierbiak (2013) showed that robust government support and entrepreneurship led to the success of the Japanese high-technology industry and its world dominance. However, intense competition, particularly from other Asian countries, threatened Japan's global competitiveness, as it lost its advantage in high-technology goods. Yoshino and Taghizadeh-Hesary (2016) showed that structural problems, such as an aging population and diminished effectiveness of fiscal policy measures caused the stagnation in the Japanese economy.

The review now focuses on studies that solve Japan's economic problems. Saito (1999) emphasized a fundamental reform of Japan's economic and industrial structure to improve economic efficiency and create new investment opportunities. Boltho and Corbett (2000) assessed the benefits and costs of fundamental changes in Japan's economic system to resolve economic stagnation. The authors determined policy options are limited because orthodox methods have not revived the economy and unorthodox methods are unlikely to be implemented. Ihori and Nakamoto (2005) proposed that the Japanese government undertake a drastic revamp of the fiscal system to reduce the deficit for economic recovery. Analyzing Japan's guest worker program, İmrohoroğlu, Kitao, and Yamada (2017) concluded that this program may ease Japan's fiscal problems by generating more tax revenues and solving labor force shortage. Lee and McKibbin (2018) found enormous potential for service sector growth in Asia, which can benefit all sectors and contribute to sustainable growth in Asian economies. They suggested that Asian governments encourage domestic and foreign direct investments in the service sector to sustain long-term growth. Akram (2019) emphasized that Japan's structural reforms should aim to enhance living standards, human capital, and workforce capabilities.

Finally, we reviewed studies focusing on lessons from Japan that China and other countries have learned. Comparing Japan and China, Weede (2004) found that high savings, investment, and human capital formation in both countries contributed to their economic growth. Analyzing and comparing the successful development of China and East Asian economies, Baek (2005) concluded that these countries had many common characteristics, such as state control over finances, direct support for state-owned enterprises, import substitution, industrialization in heavy industries, heavy dependency on export markets, and a high rate of domestic savings. Murach and Wagner (2017) found that the change in China's structural pattern is similar to the historical developments in Japan and South Korea. The authors observed that the employment share of the service sector would surpass that of the agriculture sector and then the employment share of the industry sector would surpass that of the agriculture sector. Fukao and Yuan (2016) emphasized that China should learn from Japan's experience by improving its total factor productivity growth because growth based on rapid capital accumulation is unsustainable. Further, the authors recommended that China reduce its private savings rate to address the problem of excess savings with the slowdown in capital accumulation. Assessing China and Japan's economies, Wangping and Xiaolu (2018) found that China was more strongly impacted by Japan's economic fluctuations compared to Japan. Analyzing the US and Japan trade wars, Urata (2020) concluded that the US had some success in protecting and promoting US industries but failed to reduce its trade deficit with Japan. Based on the US-Japan experience, the author theorized that while the US may achieve some success in halting Chinese firms' unfair trade practices, but may fail to reduce the bilateral trade deficit. Thorbecke (2023) argued that the US would benefit from dollar

depreciation because it would improve the trade balance. Additionally, the author argues that East Asian countries would benefit from dollar depreciation because it would reduce import inflation and the local currency costs of imported oil, commodities, and food. The author recommended a coordinated dollar depreciation similar to the Plaza Accord of 1985.

This study aims to identify the significant factors that have contributed to Japan's past economic development and further assess the changes in these factors that have led to Japan's current economic problems. Subsequently, we compare the economies of China with Japan and explore the lessons for China from Japan's experiences.

RESEARCH METHODOLOGY

Econometric Models

An economy's total gross domestic product can be measured using an expenditure-, value-added-, or income-based approach. This study used expenditure and value-added approaches to develop relevant econometric models and examine the variables' significance.

Expenditure Econometric Model

Following the methodology of Chen and Qiao (2022), a country's GDP depends on personal and government consumption, investment, and net trade. Thus, we employed the following model, where r is the annual growth of the relevant variable:

$$GDP^r = a + b1*Personal\text{-}Consumption^r + b2*Government\text{-}Consumption^r + c*Investment^r + d*Change\text{-}In\text{-}Net\text{-}Exports \quad (1)$$

As explained by Chen and Qiao (2022), the change in net export proxies for net export growth, since net export growth is subject to dramatic changes and contains outliers, whereas the change in net exports is smoother over time.

Value-Added Econometric Model

Based on Chen et al. (2017) and Qiao and Chen (2023), we utilize the value-added approach in which a country's GDP per capita can be expressed as follows:

$$LN(gdp) = a + b1*LN(PA) + b2*LN(PM) + b3*LN(PS) + c*LN(LR) + d*LN(UR) + e1*LN(LA) + e2*LN(LM) + e3*LN(LS) \quad (2)$$

In the model, gdp is the GDP per capita; PA, PM, and PS are the productivity per employee in the agricultural, industrial, and service sectors, respectively; LR is the labor rate (total employees/total population); UR is the urbanization rate; and LA, LM, and LS are the labor shares in the agriculture, industrial, and service sectors, respectively.

Data and Variables

The regressions performed in the study utilized data from the World Bank. The GDP data in the World Bank are available from 1960–2022. For the expenditure model, data for the variables are available from 1970–2022. For the value-added model, data for many variables are available only from 1994–2022.

Table 2 provides summary statistics for the key variables used in the expenditure model. From 1970–2022, the average annual growth for personal and government consumption was greater than the average annual GDP growth. By contrast, the average total investment growth was lower than the average GDP growth. Further, the average change in net exports was negative.

Table 3 provides summary statistics for the key variables used in the value-added model. Japan's average GDP per capita was $38,914 with a standard deviation of $4,104. Japan's average annual agricultural productivity from 1994–2022 was $21,786, which is low, compared with the average annual

productivity of $79,137 and $74,808 for the industrial and service sectors, respectively. Japan has a very high average urbanization rate of 86.43%.

TABLE 2
SUMMARY STATISTICS FOR EXPENDITURE MODEL VARIABLES (1970–2022)

Variable	Average	Standard Deviation
GDP Growth	6.66%	13.29%
Personal Consumption Growth	7.05%	13.23%
Government Consumption Growth	8.10%	13.58%
Total Investment Growth	5.80%	14.16%
Change in Net Exports	-0.09%	1.01%

Data Source: World Bank

TABLE 3
SUMMARY STATISTICS FOR VALUE-ADDED MODEL VARIABLES (1994–2022)

Variable	Average	Standard Deviation
GDP per Capita (USD)	38,914	4,104
PA (USD)	21,786	2,945
PM (USD)	79,137	10,188
PS (USD)	74,808	8,872
Labor Rate (%)	52.94%	1.11%
Urbanization Rate (%)	86.43%	5.66%
LA (%)	4.20%	0.84%
LM (%)	27.96%	3.44%
LS (%)	67.85%	4.27%

Data Source: World Bank

REGRESSION RESULTS

Table 4 presents the regression results for Japan based on the expenditure and value-added approaches. The results for the expenditure approach in Table 4 Panel A show all the coefficients for the independent variables are significant. The estimated coefficient for the change in net exports is the largest, while the coefficients for personal consumption and total investment growth are the second and third largest, respectively. However, from 1971 to 2022, the average value of the net exports to GDP ratio was only 0.76% (Table 9) while the average value for the personal consumption-to-GDP ratio was 52.91% (Table 8) and average value for total investment to GDP was 30.07% (Table 10). Thus, personal consumption and investment have contributed the most to Japan's economic growth. In addition, the estimated coefficient for personal consumption is almost twice that of total investment.

Regarding the value-added approach, Table 4 Panel B indicates that the labor rate significantly affected Japan's economy. In contrast, labor share in the agricultural sector did not significantly impact economic growth. Further, the estimated coefficient for the urbanization rate is insignificant, indicating that urbanization did not significantly contribute to Japan's economic growth. This result is reasonable because Japan has experienced urbanization for many decades. Among the three sectors in Japan, the estimated coefficient for service sector productivity is the largest, and is almost three times the coefficient for industrial sector productivity. Productivity in the service sector contributed the most to economic growth, compared with the other two sectors. Additionally, labor share in the service sector had the largest estimated coefficient among the three sectors. Therefore, compared to the agricultural and industrial sectors, the shift of labor to the service sector had the greatest effect on Japan's economy.

TABLE 4
PANEL A: MODEL 1 EXPENDITURE APPROACH REGRESSION RESULTS (1970–2022)

Variable	Estimated Coefficient
Intercept	0.00
Personal Consumption Growth	0.60***
Government Consumption Growth	0.09***
Total Investment Growth	0.31***
Change in Net Exports	1.01***
Observations	52
F-Statistic	21,625***

***1% significant

PANEL B: MODEL 2 VALUE-ADDED APPROACH REGRESSION RESULTS (1994–2022)

Variable	Estimated Coefficient
Intercept	-6.31***
LN(PA)	0.01***
LN(PM)	0.28***
LN(PS)	0.71***
LN(LR*100)	0.99***
LN(UR*100)	0.01
LN(LA*100)	0.00
LN(LM*100)	0.12***
LN(LS*100)	0.30***
Observations	29
F-Statistic	136,556***

*** 1% significant

JAPAN'S KEY ECONOMIC INDICATORS

Economic Structure

Table 5 depicts Japan's economic structure from 1994–2022. Japan's labor and GDP share in the service sector increased in the 2000s, but such changes have been marginal since the 2010s. In the past decade, Japan's economy has not benefited much from changes in its economic structure. Thus, future potential changes in Japan's economic structure may not contribute to Japan's future economic growth.

TABLE 5
JAPAN'S ECONOMIC STRUCTURE

Time Period		Agriculture Labor Share	Agriculture GDP Share	Industrial Labor Share	Industrial GDP Share	Service Labor Share	Service GDP Share
1994–2000	Average	5.41%	1.63%	32.87%	33.69%	61.73%	64.68%
	Standard deviation	0.30%	0.13%	1.04%	0.79%	1.32%	0.88%
2001–2010	Average	4.30%	1.18%	28.42%	29.46%	67.28%	69.36%
	Standard deviation	0.26%	0.13%	1.54%	1.11%	1.79%	1.20%

2011–2020	Average	3.46%	1.07%	24.92%	28.02%	71.62%	70.91%
	Standard deviation	0.19%	0.04%	0.55%	1.07%	0.74%	1.07%
2021–2022	Average	3.14%	1.02%	23.63%	28.09%	73.23%	70.89%
	Standard deviation	0.05%	0.00%	0.11%	1.66%	0.16%	1.66%
1994–2022	Average	4.20%	1.24%	27.96%	29.89%	67.85%	68.87%
	Standard deviation	0.84%	0.25%	3.44%	2.48%	4.27%	2.71%

Data source: World Bank

Population, Aging Rate, and Labor Rate

Table 6 shows Japan's population growth, aging, and labor rates from 1991–2022. Japan's population growth has slowed down substantially over the last few decades and average population growth has been negative since the 2010s. Japan's aging rate (% of people over 65 or above) was approximately 15% in the 1990s and has increased to over 27% in the 2010s, which poses a serious economic and social problem. Population aging affects the labor force and total demand (Qiao & Chen, 2023). We project that Japan's population will continue to decline and its aging rate will rise persistently. All these changes together will negatively impact Japan's future economic growth.

Japan's labor rate increased slightly in the 2010s, which is an advantageous trend for Japan, because a higher labor rate implies an increased labor supply. However, this increase in the labor rate could be caused by unfavorable economic conditions. When financial support from the social system worsens, many retirees or seniors are forced to look for jobs and consider postponing retirement. Therefore, a rise in the labor rate could signal poor economic conditions.

TABLE 6
JAPAN'S POPULATION GROWTH, AGING RATE, AND LABOR RATE

Time Period		Population Growth	Aging Rate	Labor Rate
1991–2000	Average	0.27%	15.29%	53.54%
	Standard deviation	0.08%	1.65%	0.38%
2001–2010	Average	0.10%	21.02%	52.26%
	Standard deviation	0.10%	1.78%	0.41%
2011–2020	Average	-0.14%	27.22%	52.66%
	Standard deviation	0.07%	1.97%	1.26%
2021–2022	Average	-0.45%	29.86%	55.02%
	Standard deviation	0.01%	0.10%	0.30%
1991–2022	Average	0.04%	21.72%	52.96%
	Standard deviation	0.22%	5.51%	1.06%

Data Source: World Bank

Productivity

Table 7 compares the annual labor productivity growth of Japan, the US, and Germany from 1985–2022. Japan's annual labor productivity has slowed over the last few decades. For 1995–2014, the contribution of capital investment to overall labor productivity was more than total factor productivity (TFP). For the 2015–2022 period, TFP contributed more to overall labor productivity. Of the three countries, Japan had the highest annual labor productivity growth during the 1985–1994 period. However, the relationship has reversed and Japan's labor productivity growth is currently the lowest for 2015–2022. Low productivity is harmful to Japan's economy. Therefore, Japan requires practical and effective strategies to improve its productivity, specifically TFP, to stimulate its economy.

TABLE 7
COMPARISON OF LABOR PRODUCTIVITY GROWTH

Country	Time Period	Total Factor Productivity	Capital Deepening	Total Labor Productivity
Japan	1985–1994	1.65%	1.85%	3.49%
	1995–2004	0.71%	1.39%	2.10%
	2005–2014	0.38%	0.39%	0.78%
	2015–2022	0.40%	0.34%	0.75%
US	1985–1994	0.76%	0.68%	1.44%
	1995–2004	1.27%	0.98%	2.24%
	2005–2014	0.59%	0.72%	1.31%
	2015–2022	0.68%	0.48%	1.15%
Germany	1985–1994	1.69%	0.81%	2.50%
	1995–2004	0.79%	0.73%	1.53%
	2005–2014	0.54%	0.29%	0.83%
	2015–2022	0.54%	0.30%	0.85%

Data Source: Organization for Economic Cooperation and Development (OECD)

Personal Consumption

Table 8 presents statistics for personal consumption and related ratios for Japan from 1971–2022. Personal consumption annual growth and the personal consumption to government consumption ratio have decreased while the personal consumption to total GDP ratio has increased over the decades.

Japan's ratio of personal consumption to total GDP averaged 52.91% from 1971 to 2022, which is lower than that of many developed economies. For example, this ratio was approximately 69% for the US in 2022. Thus, Japan can increase its personal consumption levels to stimulate its economy.

TABLE 8
JAPAN'S PERSONAL CONSUMPTION MEASURES

Time Period		Personal Consumption Annual Growth (%)	Personal Consumption / GDP Ratio (%)	Personal / Government Consumption Ratio
1971–1980	Average	19.86%	49.21%	3.66
	Standard deviation	12.54%	1.84%	0.22
1981–1990	Average	11.56%	51.35%	3.68
	Standard deviation	15.12%	0.72%	0.08
1991–2000	Average	5.72%	52.37%	3.50
	Standard deviation	10.85%	1.26%	0.16
2001–2010	Average	2.32%	55.40%	3.08
	Standard deviation	7.45%	1.04%	0.06
2011–2020	Average	-1.46%	55.91%	2.81
	Standard deviation	8.45%	1.58%	0.10
2021–2022	Average	-6.80%	54.56%	2.55
	Standard deviation	7.69%	1.44%	0.04
1971–2022	Average	7.05%	52.91%	3.31
	Standard deviation	13.23%	2.82%	0.39

Data source: World Bank

Exports

Table 9 presents statistics for Japan's exports and related ratios from 1971 to 2022. Exports are crucial to Japan's economy. Japan's annual exports growth and merchandise exports growth have been decreasing over the decades and were negative in the 2010s. However, average exports and merchandise exports growth were positive in 2021–2022 because of growth in 2021. The net exports to GDP ratio has decreased since its peak in the 1980s and was negative in the 2010s. The exports to GDP ratio fell in the 1990s but has been increasing since the 2000s.

In the future, Japan must increase and expand its exports to international markets. However, net exports are unlikely to significantly contribute to economic growth. Nevertheless, stabilizing international trade, particularly exports, should be prioritized to avoid the negative effects on economic growth.

TABLE 9
JAPAN'S EXPORTS STATISTICS

Time Period		Exports Annual Growth	Net Exports / GDP Ratio	Exports / GDP Ratio	Merchandise Exports Growth
1971–1980	Average	21.32%	0.54%	11.43%	21.70%
	Standard deviation	12.74%	1.29%	1.26%	13.41%
1981–1990	Average	8.55%	1.85%	11.80%	8.52%
	Standard deviation	8.52%	1.09%	1.98%	8.22%
1991–2000	Average	5.22%	1.47%	9.60%	5.50%
	Standard deviation	7.47%	0.52%	0.65%	7.59%
2001–2010	Average	6.38%	1.20%	13.65%	6.12%
	Standard deviation	16.28%	0.55%	2.57%	16.59%
2011–2020	Average	-0.64%	-0.68%	16.48%	-1.58%
	Standard deviation	7.49%	1.19%	1.34%	7.12%
2021–2022	Average	8.36%	-2.14%	19.83%	8.34%
	Standard deviation	11.15%	2.29%	2.42%	13.50%
1971–2022	Average	8.17%	0.76%	12.87%	8.06%
	Standard deviation	12.72%	1.44%	3.15%	13.10%

Data source: World Bank

Investment

Table 10 presents summary statistics for investment from 1971–2022. Japan's average annual investment growth has been low since the 1990s and it was negative in the 2000s and 2021-2022 period. Investment's contribution to total GDP has been on a decline since the 1970s. In the 2021-2022 period, investment's contribution to GDP was approximately 26%. Low investment directly affects economic growth. In addition, poor economic prospects further lower investors' interest. Japan needs to break this vicious cycle to transition back to the path of normal economic development.

TABLE 10
JAPAN'S ANNUAL INVESTMENT GROWTH

Time Period		Investment Annual Growth	Investment / GDP Ratio
1971–1980	Average	16.76%	36.86%
	Standard deviation	16.99%	2.90%
1981–1990	Average	12.08%	32.84%
	Standard deviation	16.93%	1.63%
1991–2000	Average	2.70%	31.14%
	Standard deviation	9.84%	2.17%
2001–2010	Average	-0.43%	25.39%
	Standard deviation	9.20%	1.59%
2011–2020	Average	0.14%	24.89%
	Standard deviation	8.52%	0.71%
2021–2022	Average	-5.58%	26.15%
	Standard deviation	9.94%	0.61%
1971–2022	Average	5.80%	30.07%
	Standard deviation	14.16%	4.93%

Data source: World Bank

R&D and FDI

Table 11 compares Japan's research and development (R&D) with that of the United States, China, Germany, South Korea, France, and the United Kingdom in 2021. R&D is crucial to an economy's competitiveness and long-term development. Japan's R&D to GDP ratio of 3.28% was higher compared to all other countries except the United States and South Korea.

TABLE 11
COMPARISON OF JAPAN'S R&D WITH OTHER COUNTRIES (2021)

Country	Total R&D Spending (PPP US$ million)	R&D / GDP Ratio (%)
US	821,811	3.48%
China	669,429	2.43%
Japan	183,467	3.28%
Germany	161,232	3.13%
South Korea	123,460	4.91%
France	80,917	2.22%
United Kingdom	102,609	2.90%

Data source: Organization for Economic Cooperation and Development (OECD)

Table 12 presents summary statistics for Japan's R&D growth and foreign direct investment (FDI) to GDP ratio. Japan's annual R&D growth has been low and unstable with an average annual R&D growth of 1.24% and a standard deviation of 7.37% from 1997–2021. Additionally, negative R&D growth is observed for many years. This decline in R&D investment has affected Japan's long-term economic development, which may explain why many Japanese industries, especially consumer electronics, semiconductor, and information technology, have been lacking behind the US since the 2000s.

Attracting FDI directly helps the economy. In addition, the ability to attract FDI and the FDI-to-total GDP ratio are reliable indicators of a country's economic prospects. Japan's average FDI-to-GDP ratio was 0.32%, with a standard deviation of 0.31%, from 1997– 2021. This FDI to GDP ratio is low compared to

other countries such as the US and China, which boasted an average FDI-to-GDP ratio of 1.82% and 3.13%, respectively in the same period.

Thus, Japan needs to maintain high R&D investment despite unfavorable economic conditions. In addition, Japan should be more open to foreign investment and firms. Foreign entry into Japanese markets may hurt many Japanese companies in the short term. However, increased competition will benefit Japanese industries and the economy long-term.

TABLE 12
R&D GROWTH AND FDI

Country	Time Period		R&D Growth	FDI / GDP
Japan	1997–2021	Average	1.24%	0.32%
		Standard Deviation	7.37%	0.31%
China	1997–2021	Average	19.99%	3.13%
		Standard Deviation	8.85%	1.09%
United States	1997–2021	Average	5.82%	1.82%
		Standard Deviation	2.97%	0.70%

Data source: World Bank

A COMPARATIVE ANALYSIS OF THE ECONOMIES OF CHINA AND JAPAN

In addition to both being located in East Asia, China and Japan share other similarities. Japan was once the second-largest economy in the world and challenged US economic dominance in the 1990s. Currently, China is the second-largest economy in the world and is likely to surpass the United States to become the world's largest economy in the next ten years approximately.

Table 13 comprehensively compares the key economic factors in China and Japan in 2020. Both countries have relatively low arable land per capita and their exports to GDP and trade-to-GDP ratios are relatively high compared with many other nations. China and Japan's labor rate are close at 54.12% and 54.57%, respectively, although China is still a developing economy. China lags far behind Japan in a few areas. For example, China's GDP per capita and urbanization rate in 2020 were far below the level of Japan in 1994. However, China has a significantly larger economy than Japan. Further, China's total exports and export-to-GDP ratio are higher than Japan's.

TABLE 13
A COMPARISON OF CHINA AND JAPAN'S KEY ECONOMIC VARIABLES

Variable	China 2020	Japan 1994	Japan 2020
Population	1,411,100,000	125,178,000	126,261,000
Total GDP ($)	14,687,744,162,801	4,998,797,547,741	5,055,587,093,502
GDP per capita ($)	10,409	39,934	40,041
Arable land per capita (hectares)	0.0772	0.0372	0.0325
Fresh water per capita (cubic meter)	402.86	716.74	620.94
Total consumption ($)	8,126,794,319,530	3,373,095,791,124	3,792,824,016,905
Total consumption / GDP ratio (%)	55.33%	67.48%	75.02%
Total consumption per capita ($)	5,759	26,946	30,040
Total trade ($)	5,104,622,037,956	790,325,200,229	1,583,702,754,129
Total trade / GDP ratio ($)	34.75%	15.81%	31.33%
Total export ($)	2,729,884,575,149	441,885,061,610	785,057,625,362
Total export / GDP ratio (%)	18.59%	8.84%	15.53%

Total import ($)	2,374,737,462,807	348,440,138,620	798,645,128,767
Total import / GDP ratio (%)	16.17%	6.97%	15.80%
Total investment ($)	6,369,586,163,393	1,532,256,833,627	1,276,349,643,448
Total investment / GDP ratio (%)	43.37%	30.65%	25.25%
Agriculture GDP (%)	7.70%	1.89%	1.07%
Industrial GDP (%)	37.84%	34.55%	29.07%
Service GDP (%)	54.46%	63.55%	69.86%
Labor participation rate (%)	54.12%	53.48%	54.57%
Senior rate (%)	12.60%	14.44%	29.58%
Agriculture labor (%)	23.60%	5.81%	3.15%
Industrial labor (%)	31.59%	34.19%	24.05%
Service labor (%)	44.81%	60.00%	72.80%
Agriculture productivity ($)	6,274	24,331	24,856
Industrial productivity ($)	23,038	75,472	88,714
Service productivity ($)	23,375	79,096	70,410
Urbanization rate (%)	61.43%	77.88%	91.78%
Core Inflation rate (%)	0.73%	0.88%	0.11%
Stock market total value ($)	12,276,766,270,000	3,592,193,910,000	6,718,219,550,000

Data source: World Bank

These comparisons indicate that China has great potential for improving its economic growth and development. First, China exhibits lower productivity levels compared to that of Japan. Second, China's service industry has considerable room for further growth. Third, China's urbanization rate can significantly grow. Finally, China's total consumption-to-GDP ratio is comparably low to Japan's.

Given its similarities with Japan, China can learn from Japan's past successes and failures. However, these two countries are different and face different global environments. Therefore, China must be cautious in applying Japan's experience to solve its own problems.

Japan has had serious trade disputes with the US and other Western countries for many years, particularly during the 1980s. In 1985, the G5 nations, including France, Germany, the United States, the United Kingdom, and Japan, signed the Plaza Accord. Consequently, Japan was forced to appreciate its currency. The rising yen caused a major short-term shock to Japanese export-based industries. Therefore, the Japanese government adopted expansionary monetary and fiscal policies to boost its domestic economy. This policy led to real estate and stock markets bubbles. Consequently, Japan experienced "the lost decade" and currently "the lost decades" in which both economic growth and inflation were extremely low and even negative. Scholars have held different opinions on the factors that contributed to Japan's economic problems and their potential solutions. However, the fact remains that Japan has yet to overcome these economic hurdles.

China faced similar trade disputes when heavy tariffs were imposed on Chinese imports during the presidency of US President Trump. Although, the US presidency has changed since 2020, these tariffs remain in place. The US and other Western nations have taken additional measures against China to protect their economic interests, such as providing government subsidies to encourage the construction of manufacturing plants and limiting the sharing of advanced technologies with China.

Thus, China faces more challenges than Japan in dealing with Western countries. However, China's advantages lie in its huge domestic market and rising demand for foreign-made products. Additionally, China does not face pressure to appreciate its currency. Over the past several years, the Chinese Yuan has generally depreciated. Therefore, China should follow the global trade rules set by the World Trade Organization and other internationally recognized organizations it is a member of. Additionally, China should reduce government interference in the working of its economy and open its markets globally. It is significant to note here that China's markets are more open than many other countries, including developed economies such as Japan.

LESSONS FOR CHINA

Economic Policy

China can learn from Japan's experience with economic policies. First, economic policies must consider the long-term effects. From 1986–1988, the Japanese government implemented dramatic fiscal and monetary policies to stimulate its economy after the Plaza Accord and the appreciation of the Yen. Table 14 shows that Japan's net exports to GDP ratio decreased from 1986 to 1988, but the ratio remained positive at 1.93% in 1988. Net exports are directly related to GDP. Thus, currency appreciation did not negatively affect Japan's economic growth.

The Yen's significant appreciation caused panic and led the government to take extreme measures based on traditional economic theories and models. Consequently, personal consumption, government consumption, and total investment sharply decreased. These measures had severe consequences such as bubbles in fixed and financial assets, which eventually caused the economy to crash.

TABLE 14
MAJOR INDICATORS OF JAPAN'S ECONOMY

Year	GDP Growth	Total Consumption Growth	Personal Consumption Growth	Government Consumption Growth	Total Investment Growth	Net Export / GDP	Total Export Growth
1986	48.57%	47.64%	47.61%	47.76%	48.25%	3.60%	16.73%
1987	21.73%	21.70%	21.84%	21.19%	25.24%	2.72%	10.95%
1988	21.12%	18.90%	19.21%	17.73%	28.61%	1.93%	16.85%

Data source: World Bank

Population and Labor Rate

Second, population growth and labor rates are crucial to the economy. It is challenging for an economy to recover with sluggish population growth and low labor rates. Thus, the government must strategize and recognize the importance of human capital accumulation. China has waited too long to take the necessary actions to avoid a slowdown in population growth. China's population has been declining since 2022 and its labor rate peaked in the 2000s. To slow this downward trend, China needs to gradually extend its retirement age and attract foreign workers to compensate for eventual labor shortages. Most importantly, China needs to continuously improve its labor quality and productivity, as Chen (2022) and Qiao and Chen (2023) emphasized.

Manufacturing Industry

Table 15 compares the manufacturing value-added GDP shares for Japan, China, the US, Germany, and the world. Among developed economies, Japan has maintained a strong and competitive manufacturing industry. The share of the manufacturing industry in Japan's GDP was high and stable at 20.86% in 2021, which is higher than the shares for the US and Germany.

China's manufacturing GDP share was greater than 27% in 2021. China is the world's manufacturing center. Therefore, it is crucial for China to maintain its strong and competitive manufacturing industry. Increasing wages and other costs have recently pushed many manufacturers out of the country. The trade war with the US and political issues between China and other Western countries have also negatively influenced foreign investment in China. Chen (2015); Chen (2016a); Chen (2016b); Chen et al. (2017); Chen (2019); Chen (2022), Chen et al. (2022); Chen and Qiao (2022); and Qiao and Chen (2023) have repeatedly emphasized that the service and agricultural sectors are important, but it is the industrial sector, particularly manufacturing, that will decide China's future.

TABLE 15
MANUFACTURING SECTOR'S GDP SHARE BY COUNTRY

Country	2005	2010	2015	2020	2021
Japan	21.42%	20.77%	20.46%	20.05%	20.86%
China	32.09%	31.61%	28.95%	26.29%	27.55%
US	12.98%	11.91%	11.66%	10.63%	10.71%
Germany	20.07%	19.70%	20.35%	18.74%	18.91%
World	16.31%	15.92%	16.44%	16.03%	16.55%

Data source: World Bank

Entrepreneurship

Economic development relies on businesses, particularly entrepreneurs. The US has several top companies with a total market value of over $1 trillion. It is entrepreneurship that differentiates these companies from their competitors. These companies are more innovative and risk-taking with a great vision and strategic perspective, which makes them successful. In the past, many of Japan's famous consumer, chemical, and IT companies owe their success to its entrepreneurs. However, many of these companies lost competitiveness and failed in the 2000s. Japan is calling for new entrepreneurs to lead its companies and industries to compete globally.

Since its opening and reforms in the 1980s, China has produced many successful entrepreneurs, who have led their companies with a strong vision to emerge as formidable competitors in the world. Currently, many of these leaders have retired or are close to retirement. Thus, China needs a new generation to take over the role of globally recognized entrepreneurs.

The strength of an economy lies in its businesses and entrepreneurs, not governments. It is the duty of the governments to motivate its people and boost entrepreneurship to ultimately improve the economy.

Market Economy and Government's Role

Market competition determines winners and losers. The free-market system is generally the most efficient way to allocate limited resources, but it is occasionally subject to flaws and failures. Therefore, government interference in businesses and economies becomes necessary. Additionally, the government is responsible for providing necessary public goods. However, in principle, a market system works more efficiently than a central planning system and free market competition creates a conducive business environment that encourages innovation and risk-taking, leading to a booming economy.

Japan's market is not open to outsiders. Its traditional culture and practices such as cross-sharing company stocks prohibit competition. Japanese seniority-based promotion and wage systems are inconsistent with modern free-market systems. The good news is that many Japanese companies have transformed their management practices, with a few companies adopting US companies' practices by providing stock options to employees.

China's rapid economic growth since 1978 is majorly attributed to its open policies and reforms, particularly market-oriented reforms. In future, it is crucial for China to establish an efficient, market-oriented economic system. Additionally, China should enhance its level of openness and undertake further reforms. Businesses adopt management styles and practices based on their country's social values and culture. However, to emerge as global leaders, companies must learn from others and benchmark against other cultures' best business and management practices.

Productivity and Innovation

Productivity determines a company's competitiveness as well as a country's economic growth. To thrive in an industry, leaders must be innovative and productive. Japan has a well-established reputation in manufacturing products because of their high quality and low cost. Consequently, Japanese products became popular worldwide from the 1970s to the early 1990s. Although the Japanese manufacturing

industry is still strong, it has lost its competitive advantages in consumer electronics and semiconductors. Japan is expected to continue to play an important role in the global economy because of its strong manufacturing industry, high productivity, and solid innovation.

China needs to invest more in R&D, particularly in basic sciences. Simultaneously, China must improve its innovation and patent adoption rates to benefit consumers, society, and the economy. Thus, China has tremendous potential in improving its productivity.

Innovation originates from individuals, businesses, and entrepreneurs and is associated with well-functioning economic systems. Government support for innovation and small start-ups is valuable, but the market system, including a sufficient financial system, supports and drives innovation.

Personal Consumption

In 2022, Japan's personal consumption was less than 56% of its total GDP, which was lower than that of most Western countries. Like other Asian economies, Japanese people's strong inclination to save money is challenging to change. Thus, trying to push personal consumption to increase economic growth is often futile and will result in limited outcomes.

In 2022, China's personal consumption-to-GDP ratio was less than 40%. This ratio is low compared to many developed economies and is gradually expected to increase as China's economy advances. In the near future, personal consumption will become essential to the economy. However, China, like Japan, cannot rely on rising personal consumption to protect the economy from a possible recession.

Investment

Investment is fundamental to economic development. When an economy encounters recession, massive unemployment, or huge economic shock, the government must take firm action to stimulate the economy through fiscal and monetary policies. The government typically spends and invests more money in infrastructure to facilitate economic recovery. In majority of the cases, these actions work well. However, overspending and overinvestment have serious side effects, as demonstrated in Japan's case in the 1980s and 1990s.

Private investment is generally more efficient than government investment because private investors assess risks and returns more cautiously because investments with low or negative returns are unsustainable. Therefore, the government must trust and rely on the private sector for investment. To accomplish this, governments should create fair, transparent, supportive, and competitive markets in which entrepreneurs can compete, take risks, and earn returns if successful.

China must learn from its own experience as well as from Japan's experience with investments. Economic growth depends on both private and government investments. Further, effective and efficient investment is key to maintaining sustainable and steady economic development. Therefore, the government must limit its own investment and encourage private investment. Governments, in principle, should not compete against private investors but should focus on investment in public goods and long-term strategic projects.

Exports

Every country encourages export of products and services as exports create jobs and increases a country's foreign currency reserves. Additionally, exports promote economic growth and wealth. Government policies and support are crucial in promoting exports. In most economies, more exports lead to a corresponding increase in imports due to globalization. Consequently, net exports remain stable in many economies. Therefore, the net effect of exports on economic growth is limited.

Japan has demonstrated its strength and competitive advantage in global trade. As Chen (2015) and Chen et al. (2022) demonstrated, China must further strengthen its manufacturing industry and maintain stable exports of its products and services, particularly manufacturing products. However, China's future sustainability and rapid growth rely on other economic factors such as improving productivity.

Urbanization

Urbanization has been critical in China's rapid economic and social development in recent decades (Chen et al., 2021). China has the potential to increase its urbanization rate in the coming years. However, in Japan, urbanization did not directly or significantly contribute to economic growth after reaching a certain level. In the near future, China is expected to experience a similar situation to Japan. China must invest consistently in improving urbanization and living conditions and change its views and purpose for doing so. Thus, urbanization should not push economic advancement, but rather it should promote social justice and meet people's needs better.

Inflation

Inflation is a dangerous disease that affects individuals, businesses, and society (Chen, 2022). In recent years, many countries have experienced extremely high inflation rates with Japan and China being exceptions with low inflation rates and concerned about the risk of deflation.

Chen (2022) indicates that deflation could be more harmful than inflation, as demonstrated in the case of Japan. Economic policies are completely different when dealing with deflation compared to inflation. Additionally, inflation-controlling policies are more effective than deflation-eliminating policies. For example, raising the interest rate generally slows down inflation, but lowering it often does not push inflation up.

An appropriate inflation level can also increase the economy's GDP per capita and living standards (Chen et al., 2017; Chen, 2022). China, which is currently facing deflation, must take firm and corrective actions to avoid the side effects of low inflation or deflation to avoid repeating Japan's mistakes.

Exchange Rate

The exchange rate influences trade, foreign direct investment, foreign reserves, and economic growth. Additionally, the exchange rate directly affects the economy's GDP and level of economic development (Chen et al., 2017). Thus, countries should develop relevant economic and financial policies to achieve sustainable and steady exchange rates. The Japanese Yen was forced to appreciate dramatically after the Plaza Accord, leading to a substantial drop in Japan's manufactured product exports. Japan would have been in a superior position if it had taken strong and timely actions to gradually appreciate its currency before the Plaza Accord.

The Chinese currency has recently depreciated. However, in the long term, China will be pushed by other Western countries to significantly raise the yuan value, similar to what happened to Japan in the late 1980s. China needs to have a strategic vision in place to determine the appropriate exchange rate in the long term to not repeat Japan's mistake of being forced by outsiders to appreciate its currency value.

CONCLUSION

In this study, we applied expenditure and value-added GDP models to analyze Japan's economy. The variables of personal consumption, private and government investment, changes in net exports, economic structure, labor rate, labor productivity, and urbanization rate were tested employing econometric models utilizing World Bank data. The results of the expenditure model demonstrate that personal consumption and investment have contributed the most to Japan's economic growth.

In the value-added model, labor rate and productivity in the service sector were the most important variables. In contrast, the effects of urbanization and labor share in the agricultural sector were insignificant for Japan's economic growth in the value-added model. Subsequently, we discussed the changes in these economic variables and their effects on Japan's development.

The current global economic conditions differ from those of the 1950s and 1980s. China's population is more than 11 times that of Japan and its domestic markets are much larger than Japan's. However, all countries face similar challenges and issues during their industrialization, modernization, and urbanization stages. Similar economic development targets exist, such as maintaining rapid growth, increasing exports, and attracting foreign investment. There are also similar governmental economic actions such as using

fiscal and monetary policies to stimulate economic growth. Therefore, China should learn from Japan to avoid repeating the mistakes made by Japan.

This study's limitation is that the value-added model data was available from 1994. More advanced analyses could have been conducted if data were available for the 1970-1993 period for the value-added approach. For example, our study could have successfully examined the effects of the Plaza Accord on Japan's economy and further compared the changes in the estimated coefficients changed between the pre-Plaza Accord (1970-1985) and post-Plaza Accord (1986-2000) sub-periods.

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