Short Communication

Panagiotis Tsigaris*, Jaime A. Teixeira da Silva*, Masayoshi Honma*

Long-term economic outlook for Japan, as impacted by COVID-19

https://doi.org/10.1515/ohe-2023-0042
received April 27, 2024; accepted August 13, 2024

Abstract: Due to COVID-19, Japan's GDP decreased by 4.5% in 2020 from 0.7% in 2019. The economy increased by 1.7% in 2021, stagnated at 1.4% in 2022, and is expected to grow at 1.8% in 2023 and to slowdown to 0.9% in 2024, based on the January 2023 forecasts of the International Monetary Fund (IMF). IMF's January 2023 report is based on inflation peaking with low growth due to rising interest rates. In January 2021, a year into the COVID-19 pandemic period, the IMF was hopeful, predicting a V-shaped growth pattern of 3.1% for 2021 and 2.4% for 2022 due to policy stimulus and the availability of vaccines. However, this did not materialize due to various geopolitical and economic shocks. The economic costs of the COVID-19 pandemic relative to its absence are estimated to be at least US$1.1 trillion (¥160 trillion) until 2030 under a continued low economic growth future path. Moreover, the estimated US$1.1 trillion economic loss is equivalent to the erasure of approximately 30% of GDP produced in 2019 during the Abenomics era. If in the absence of the pandemic, the economy was assumed to have a high growth, the losses would reach US$ 4.8 trillion (¥706 trillion) due to the lost opportunity of a high-growth counterfactual trajectory.

Keywords: economic losses, great stagnation, gross domestic product, macroeconomic policies, SARS-CoV-2 pandemic

JEL codes: E02, E17, E63, E65, E66

*** Corresponding author: Panagiotis Tsigaris,** Department of Economics, Thompson Rivers University, 805 TRU Way, Kamloops, British Columbia, V2C 0C8, Canada, e-mail: ptsigaris@tru.ca
*** Corresponding author: Jaime A. Teixeira da Silva,** Independent Researcher, Ikenobe 3011-2, Kagawa-ken, 761-0799, Japan, e-mail: jaimetex@yahoo.com
*** Corresponding author: Masayoshi Honma,** Asian Growth Research Institute, 11-4 Otemachi, Kokurakita, Kitakyushu, Fukuoka, 803-0814, Japan, e-mail: honma@agi.or.jp

1 Introduction

Japan's economy faltered from 1992 until 2019 with a weak annual gross domestic product (GDP) growth rate of 0.9% while the economy from 1960 to 1991, in the previous 30-year period, grew at an annual rate of 5.8%. Failure to continue the golden period after WWII until the late 1980s is due to mainly structural problems of the economy and the Abenomics of aggressive monetary policy, flexible fiscal policy, and growth strategy, the so-called three "economic arrows," did little to stimulate growth to such levels of over 5% annual growth rate [1–3].

In addition to the three decades of slowdown, the COVID-19 pandemic, starting in 2020, has worsened any prospect of escaping long-term stagnation. The pandemic has disrupted an already fragile economy, leading to a sharp decline in GDP in 2020 and challenging the effectiveness of existing and new economic policies aimed at recovery. The economic measures deployed in response to the pandemic, including multiple fiscal stimuli, reflect the severity of the downturn and in the absence of such stimuli packages, the situation would be even worse.

During the 1990s and 2000s, Japan's government debt surged significantly as the government pursued expansive fiscal policies, including massive infrastructure projects, to stimulate the economy after the burst of the stock market bubble in December of 1989. In 1991, the central government debt was only 38.2% of GDP, but in 2022 the debt ballooned to 216.2% of GDP [4]. Such an increase in the ratio of debt to GDP raises the issue of the sustainability of Japan's government debt [5]. In addition, the banking sector's bad debt accumulation contributed to economic stagnation, with estimates suggesting taxpayers would need to cover financial system losses equivalent to 20% of GDP [6,7]. Failure of the Keynesian approach to stimulate the economy is due to many factors including the great recession in 2008, low consumer confidence, rising public debt, an inefficient corporate structure, labor market rigidities, and the demographic challenge of an aging society [1,8–13]. Studies show that long-term structural reforms are more crucial than short-term Keynesian policies for Japan's long-term economic recovery [10,14].

In terms of health impacts, the long-term stagnation and COVID-19 pandemic exaggerated the situation, affecting the well-being of the Japanese society, and that stagnation could continue into the future, until 2030, losing another decade. Several surveys showed a deterioration of the mental health of Japanese people induced by the pandemic and the economic downturn [15,16]. Such public health issues play an important role in labor productivity and hence the long-term economic growth of Japan.

The objective of this article was to analyze the economic consequences of COVID-19 in Japan by examining historical GDP growth as well as government measures taken and future economic forecasts until 2030. We utilized a counterfactual analysis method to determine the economic losses under two different potential economic trajectories in the absence of COVID-19 and policy relative to what happened in 2020 to 2023 with the pandemic and the impact of policy changes and assuming a continued low growth rate of 0.7 and 1.0% for 2024 and 2025 as predicted by the International Monetary Fund (IMF) in its World Economic Outlook July 2024 report (Table 1) and 0.9% per year from 2026 until 2030 as per 1992 until 2019 stagnation period. This methodology allows for an understanding of the direct, but more importantly, the opportunity costs incurred by the Japanese economy during this period.

This article is structured as follows. The first section provides a detailed examination of the immediate effects of the pandemic in Japan, analyzing fiscal responses made by the government to curb the economic decline, including adaptations to "soft" lockdowns and political transitions. The subsequent section employs a counterfactual approach to assess the long-term economic effects, exploring both pessimistic and optimistic growth scenarios absent the pandemic's disruption. Finally, the last section summarizes the broader implications for economic growth prospects with further considerations given to four key challenges the Japanese economy will face.

Table 1: Japan's GDP growth, actual, estimated, and projected by IMF Economic Outlook Report[1] (Annual Real GDP growth in %)

Year	Month	Title of the Economic Outlook Report	2017	2018	2019	2020	2021	2022	2023	2024	2025
2018	January	Brighter prospects, optimistic markets, challenges ahead	1.8	1.2	0.9						
2018	April	Cyclical upswing, structural change	1.7	1.2	0.9						
2018	July	A weakening global expansion	1.7	1.0	0.9						
2018	October	Challenges to steady growth	1.7	1.1	0.9						
2019	January	A weakening global expansion	1.9	0.9	1.1	0.5					
2019	April	Cyclical upswing, structural change	1.9	0.8	1.0	0.5					
2019	July	Less even expansion, rising trade tensions	1.9	0.8	0.9	0.4					
2019	October	Global manufacturing downturn, rising trade barriers		0.8	0.9	0.5					
2020	January	Tentative stabilization, sluggish recovery?		0.3	1.0	0.7	0.5				
2020	April	The great lockdown			0.7	−5.2	3.0				
2020	June	A crisis like no other, an uncertain recovery			0.7	−5.8	2.4				
2020	October	A long and difficult ascent			0.7	−5.3	2.3				
2021	January	Policy support and vaccines expected to lift activity				−5.1	3.1	2.4			
2021	March	Managing divergent recoveries				−4.8	3.3	2.5			
2021	July	Fault lines widen in the global recovery				−4.7	2.8	3.0			
2021	October	Recovery during a pandemic				−4.6	2.4	3.2			
2022	January	Rising caseloads, A disrupted Recovery, and higher Inflation				−4.5	1.6	3.3	1.8		
2022	April	War sets back the global recovery				−4.5	1.6	2.4	2.3		
2022	July	Gloomy and more uncertain				−4.5	1.7	1.7	1.7		
2022	October	Countering the cost-of-living crisis					1.7	1.7	1.6		
2023	January	Inflation peaking amid low growth						1.4	1.8	0.9	
2023	April	A rocky recovery						1.1	1.3	1.0	
2023	July	Near-term resilience, persistent challenges						1.0	1.4	1.0	
2023	October	Navigating global divergences						1.0	2.0	1.0	
2024	January	Moderating inflation and steady growth: Open path to soft landing							1.9	0.9	0.8
2024	April	Steady but slow: Resilience and divergence							1.9	0.9	1.0
2024	July	The global economy in a sticky spot							1.9	0.7	1.0
2024		OECD forecasts[2]				−4.1	2.6	1.0	1.9	0.5	1.1

[1]Source: https://www.imf.org/en/Publications/WEO.

[2]Source: https://www.oecd.org/en/data/indicators/real-gdp-forecast.html.

2 COVID-19: Impacts on the Japanese economy in 2020 and 2021

Under the Abe administration, the average annual GDP growth rate from its inauguration to December 2019, before COVID-19, was 0.9%, calculated as an annual compound rate of real GDP changes from 2012 to 2019. However, because of COVID-19, the growth rate turned negative, with the IMF showing a 4.5% reduction in GDP for 2020 in its January 2023 World Economic Outlook Report [17]. In the same report, the IMF predicted a slow growth of 1.1% in GDP for 2023–2024.

Unlike other countries around the world, where harsh lockdowns were imposed, Japan implemented "soft," voluntary or "interventional" lockdowns, such as personally decided or government-recommended stay-at-home measures, in April–May 2020, January–March 2021, and April–June 2021, in which restrictions of different levels were put in place [18–20].

In early 2020, with hopes of a positive 2–3% economic growth as exports kept on growing, public sector investment spending rising, and a booming tourism industry had brought the unemployment rate to its lowest level since 1993 (2.4% in 2018–2019) but rising again to 2.8% in 2020–2021 [21]. The sudden economic shutdown caused by COVID-19 cancelled or reversed any gains and aspirations that Abenomics created to end the period of great stagnation. Moreover, the economy would have collapsed further had there not been two economic relief packages, one in April 2020 and one in late May 2020 of ¥117 trillion (US $871 billion) each, from the Abe administration, totaling ¥234 trillion (US$1.74 trillion) [22]. After serving as the longest Prime Minister of Japan, PM Shinzo Abe resigned on 28 August 2020.

The new PM, Yoshihide Suga, who took over from PM Abe in the midst of the 2020 COVID-19 pandemic, stated that he would follow Abenomics, and from among the three arrows of the Abe administration's monetary policy, fiscal policy, and growth strategy, PM Suga focused on the growth strategy, especially regulatory reforms that increase growth potential [23]. On 8 December 2020, the Suga administration announced a ¥73.6 trillion (US$708 billion, projected scale) economic stimulus package to aid the ailing economy from the pandemic, with investment targeting green technology and digital innovation [24].

In early October 2021, PM Suga was replaced by a new PM, Fumio Kishida, due to poor public support of PM Suga's response to the fifth wave of the pandemic [25]. Under Kishida's administration, the Cabinet decided on 19 November 2021, to spend ¥19.8 trillion in the third quarter for launching a "New Form of Capitalism" to open up a future society to put the economy back on a self-sustaining growth path [26]. In addition, the government decided on 26 April 2022 to spend ¥6.2 trillion for "Comprehensive emergency measures such as crude oil prices and rising prices" under COVID-19 [27].

Japan's massive new stimulus package amounting to 56 trillion yen for the 2021 year, which included direct financial aid to businesses and households impacted by the pandemic [26,28]. In October 2022, another major economic package was unveiled by Prime Minister Fumio Kishida, targeting the rising cost of living and the recovery from the pandemic's economic impacts. This ¥39 trillion package (including [27]) had subsidies to reduce the costs of energy, aid small to medium businesses, and support families with children, among other initiatives [29]. In June 2023, a draft policy framework of PM Kishida indicated an end to the crisis-mode stimulus spending [30].

In summary, the Abenomics period from 2013 onwards, even with its three arrows, did not achieve significant economic growth that is distinguishably different from the earlier great stagnation period. However, during 2020, a total of three economic relief packages were implemented totaling almost US$3 trillion (¥403 trillion), the equivalent of approximately 60% of GDP for that year.

3 Models analyzing the impact of COVID on Japan's long-term economic growth

To predict the economic impact of COVID-19 on Japan, various models have been employed, including artificial neural networks [31], dynamic conditional correlation multivariate GARCH models [32], deep learning models [33], state-space modeling combined with the susceptible-infected-recovered (SIR) model [34], and an input-output table analysis [35]. These models, as expected, showed a negative impact, be it social, health and economic, from the COVID-19 pandemic. Chudik et al. performed a counterfactual economic analysis using a threshold-augmented dynamic multi-country model, showing long-lasting decline in world output, with advanced economies having more severe impacts from COVID-19 relative to emerging nations [36].

In the next section, we follow a simple counterfactual approach that was also employed by Cutler and Summers [37] to estimate economic losses for the US economy. They estimated economic losses at US$7.6 trillion from 2020 until

2030 using only one scenario of projections that the Congressional Budget Office conducted on July 2, 2020.[1]

4 Possible economic losses in Japan over the next decade

In this section, an attempt is made to estimate how COVID-19 has impacted the Japanese economy thus far, and to project its impact on GDP in the medium- to long-term. Economic losses were estimated from 2020 to 2030 based on the yearly projected GDP path in the presence of COVID-19 less the GDP path without the presence of the COVID-19 pandemic to account for the counterfactual.

The scenario in the presence of COVID-19 assumes a continued low future average growth rate for the period 2020 to 2023 as per the IMF actual growth rates and those predicted for 2024 and 2025, after which the economy stabilizes at 0.9% per year until 2030, as per the historical average during the Abenomics period. Basically, an assumption that COVID-19 and the events aftermath, such as the Russia-Ukraine War, supply chain issues, and inflationary pressures, will keep the economy until the end of the decade stagnated at a low growth path (Table 1). This path is called the IMF.LG. Given the latest July 2024 IMF Report, the 0.9% annual growth rate assumption can be considered as optimistic since from 2020 to 2025 the Japanese economy is expected to grow only by 0.3% on average annually (Table 1). Thus, the estimated economic losses in this article can be considered as an underestimation since it assumes under the pandemic the economy will grow at 0.9% annually on average in the future.

To model the scenario without the presence of COVID-19, for the counterfactual (CFL), we simulated two different scenarios. The first counterfactual scenario (CFL.LG) is for GDP to grow at 0.9% per annum, as has been the case under the Abenomics period from 2013–2019 and during the "Great Stagnation" period from 1992–2019. This counterfactual path will give a low estimate of the economic losses since the assumed future path is similar with the assumed path in the presence of the pandemic making the opportunity cost to be low. The second counterfactual scenario (CFL.HG) assumes that the GDP growth path from 2019 to 2030 rises towards a steady state growth rate of 3.6% following the AR1 model (Supplementary Methods, Table S1). This scenario reflects the possibility that Abenomics, as well as the Suga/Kishida administration policies, in the absence of the pandemic and other economic shocks that occurred during the four years 2021–2024, would eventually have a positive impact on the economy (CFL.HG).

Each counterfactual path of GDP was compared with the actual and future assumed scenario (2024–2030) under COVID-19. One counterfactual path CFL.LG takes on a pessimistic approach, while CFL.HG is an optimistic scenario. The GDP data were obtained from the World Bank and was in constant local currency (see Supplementary information: Data sources and definitions). Figure 1 shows the historical path of real GDP annual growth rate since 1961 and projections to 2030. The green counterfactual path without COVID-19 assumes the economy will grow faster after 2019 and approach a steady-state growth rate (SSGR) of 3.6% without any other shock (CFL.HG). Under this scenario, the economic losses are highest due to the opportunity cost of losing out on high growth under the counterfactual (IMF.LG – CFL.HG). They are estimated at US$4.8 trillion (present value) (Table S2). Figure 1 also shows (blue line) the SSGR of the Japanese economy with or without COVID-19 remaining at the "Great Stagnation" long-run growth rate of 0.9%. The only difference in growth rates under this scenario was the 2020 COVID-19 economic lockdown shock and the small economic recovery during the 2021–2025 period. The least losses in this case are US$1.1 trillion. The reason is that the opportunity cost had low growth as opposed to high growth under the counterfactual.

5 Concluding remarks

In this article, we offer a brief overview of the impact of COVID-19 on the Japanese economy under the Abenomics model at a time when its three-arrows policy may have begun to have had a positive impact. Using a simple counterfactual-based model and IMF data, we estimated the economic costs or losses to the Japanese economy caused by the pandemic. Table 1 shows that the IMF was hoping for a V-shaped recovery when forecasting COVID-19 impact in 2020 and 2021 with the policy support and availability of vaccines like an AR1 adjustment growth model. In fact, Pujol [38] had estimated a 16.8% loss in GDP for Japan for 2020–2025, translating to about US$0.7 trillion, estimates that relied on a V-shaped recovery. However, in 2022, the IMF gave up on the V-shaped recovery and downgraded growth until 2025 due to factors such as: "War Sets Back the Global Recovery" [39], a "Gloomy and More

1 The US Congressional Budget Office projections had convergence of GDP levels with and without the pandemic. In contrast, for Japan, there is convergence of GDP growth rates with and without the pandemic.

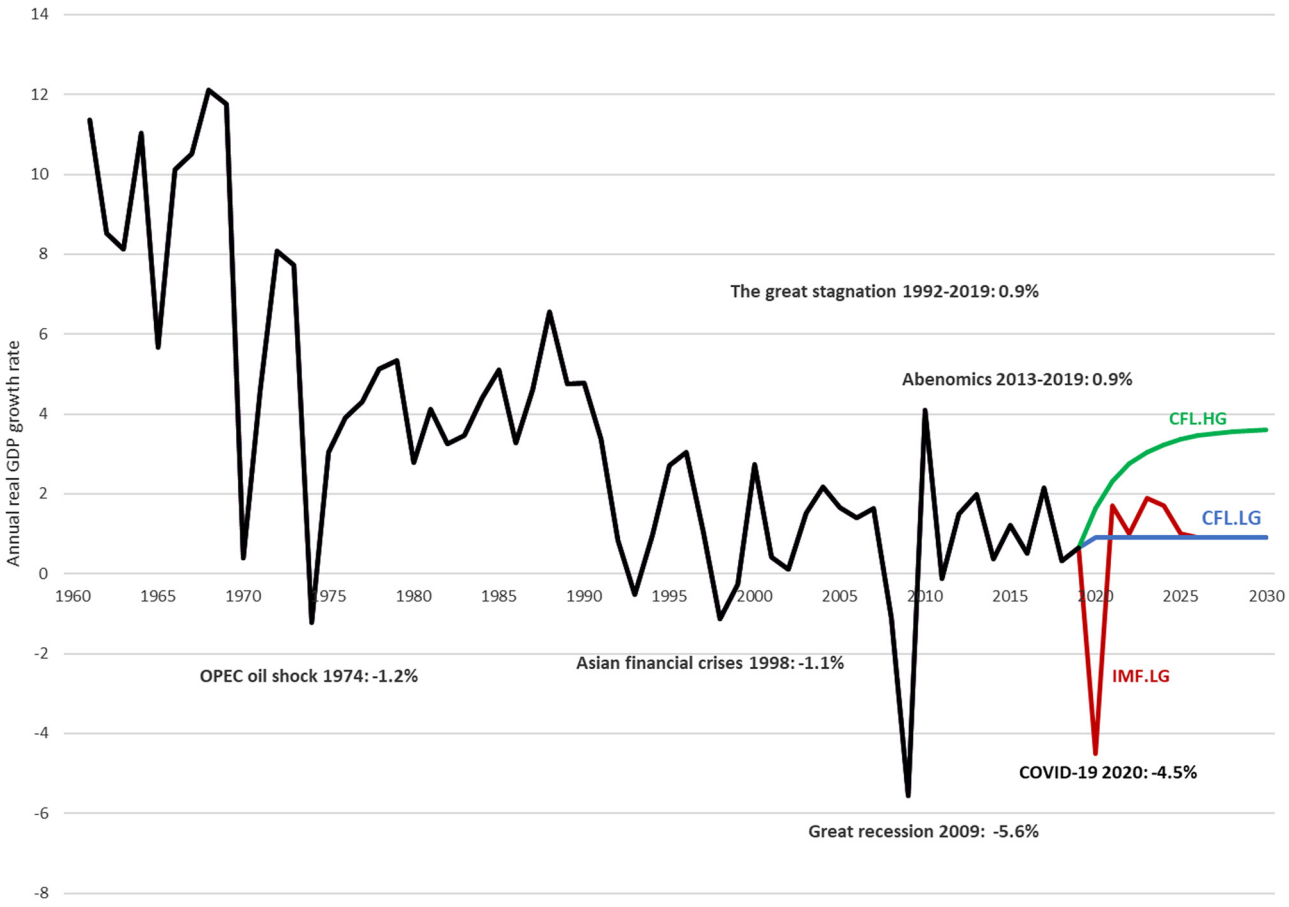

Figure 1: Historical path of real GDP in Japan since 1961 and projections to 2030 using IMF.LG (red until 2025 and blue afterwards) and as the counterfactual marginal growth (CFL.LG, blue line from 2019) and high growth for the counterfactual (CFL.HG, green line from 2019). The red line indicates actual growth rates from 2020 to 2023 and for the year 2024 and 2025 as projected from the July 2024 IMF Report.

Uncertainty" [40], "Inflation Peaking amid Low Growth" [17] and "The global economy in a sticky spot" [41]. The COVID-19 pandemic has had an impact that is just as large as the 2008–2009 great recession and will have an economic cost of at least US$1.1 trillion (¥160 trillion) over this decade, i.e., 2020 to 2030 (or 30% of 2019's GDP), showing continued stagnation, with or without the pandemic. However, if without COVID-19 there was growth, economic losses could reach US$4.8 trillion.

Based on the model's results and the observed historical stagnation, Japan faces several key challenges in accelerating economic growth from 2024 to 2030 and beyond. First, the post-COVID-19 pandemic effects, such as supply chain disruptions and inflationary pressures, will continue to pose significant risks to the Japanese economy [42–46]. Second, Japan's aging population presents a long-term challenge, impacting labor force participation and productivity gains [1,47]. Promoting automation and technological innovation can somewhat counterbalance the declining working-age population [48–51]. Third, the need for fiscal sustainability is necessary to foster growth as discussed previously. Japan's high public debt levels, reaching 216% of the GDP in 2022, exacerbated by extensive fiscal stimulus during the pandemic, could lead to the crowding out of the private sector through higher real interest rates, which would lead to further escalation of the public debt to GDP ratio [52–56]. Research suggests that when debt-to-GDP ratios exceed 90–95%, there can be a negative effect on economic activity [57,58]. Finally, global geopolitical uncertainties and large-scale shocks, such as the Russia-Ukraine war, natural disasters from the intensification of climate change, earthquakes and tsunami shocks, and nuclear threats could create a future economic instability in Japan and elsewhere [59–61].

Hence, the Japanese government faces numerous challenges to increase its economic growth from 2024 to 2030. Addressing demographic shifts, enhancing digital innovation, promoting sustainable development, and ensuring sustainability of public debt with macroeconomic stability are key areas that require strategic interventions. In

closing, the COVID-19 pandemic not only wiped out any small gains made with Abenomics' three arrows, but potentially extended the period of "Great Stagnation" for another decade.

Funding information: The authors state that no funding was involved.

Author contributions: All authors have accepted responsibility for the entire content of this manuscript and consented to its submission to the journal, reviewed all the results and approved the final version of the manuscript. All three authors contributed to the intellectual discussion, literature exploration, writing, reviews, and editing. The authors are equal contributors and co-corresponding authors. PT, JT, and MH conceived the ideas. PT conducted the projection analyses and validation, with additional input by JT and MH.

Conflict of interest: Authors state no conflict of interest.

Data availability statement: All data supporting the findings of this study are available at: http://doi.org/10.17605/OSF.IO/FH4PD.

Disclaimer: An earlier version of this article was published as a preprint [62].

References

[1] Dekle R. The deteriorating fiscal situation and an aging population. In: Blomstrom M, Corbett J, Hayashi F, editors. Structural impediments to growth in Japan. Chicago, IL: University of Chicago Press; 2003. doi: 10.7208/chicago/9780226060231.003.0004.

[2] Ito T, Iwata K, McKenzie C, Urata S. Did abenomics succeed? Editors' overview. Asian Econ Policy Rev. 2018;13(1):1–22. doi: 10.1111/aepr.12215.

[3] Grabowiecki J. Abenomics: From the "great stagnation" to the "three-arrows strategy". Int J Manag Econ. 2019;55(3):201–11. doi: 10.2478/ijme-2019-0018.

[4] World Bank. Central government debt, total (% of GDP) - Japan [Internet]. Available from: https://data.worldbank.org/indicator/GC.DOD.TOTL.GD.ZS?locations=JP Cited 2024 Aug 11.

[5] Sakuragawa M, Sakuragawa Y. Government fiscal projection and debt sustainability. Jpn World Econ. 2020;54:101010. doi: 10.1016/j.japwor.2020.101010.

[6] Lincoln EJ, Friedman BM. Japan's financial problems. Brookings Papers Econ Act. 2, 1998. p. 347. https://www.brookings.edu/wp-content/uploads/1998/06/1998b_bpea_lincoln_friedman.pdf.

[7] Hoshi T, Kashyap AK. Japan's financial crisis and economic stagnation. J Econ Perspect. 2004;18(1):3–26. doi: 10.1257/089533004773563412.

[8] Kuttner KN, Posen AS. The great recession: Lessons for macroeconomic policy from Japan. Brookings Papers Econ Act. 2. Washington D.C., USA: The Johns Hopkins University Press; 2001. p. 93–160. https://www.jstor.org/stable/1209135.

[9] Kim S. Macro effects of corporate restructuring in Japan. IMF Work Pap. 2003;3(203):1. doi: 10.5089/9781451874471.001.

[10] Ihori T, Nakazato T, Kawade M. Japan's fiscal policies in the 1990s. World Econ. 2003;26(3):325–38. doi: 10.1111/1467-9701.00525.

[11] Sakamoto T. Japan's political economy in comparative perspective: macroeconomic policy and wage coordination. Eur J Polit Res. 2004;43(3):421–47. doi: 10.1111/j.1475-6765.2004.00160.x.

[12] Saxonhouse G, Stern R. Reversal of fortune: Macroeconomic policy, international finance, and banking in Japan. Int Econ Econ Policy. 2005;2(2-3):91–100. doi: 10.1007/s10368-005-0042-0.

[13] Koo RC. The other half of macroeconomics and the three stages of economic development. Real-World Econ Rev. 2016;75(27):2–48. http://www.paecon.net/PAEReview/issue75/Koo75.pdf.

[14] Ihori T, Nakamoto A. Japan's fiscal policy and fiscal reconstruction. Int Econ Econ Policy. 2005;2(2-3):153–72. doi: 10.1007/s10368-005-0031-3.

[15] Ueda M, Stickley A, Sueki H, Matsubayashi T. Mental health status of the general population in Japan during the COVID-19 pandemic. Psychiatry Clin Neurosci. 2020;74:505–6. https://onlinelibrary.wiley.com/doi/10.1111/pcn.13105.

[16] Nakao T, Murayama K, Takahashi S, Kayama M, Nishi D, Horinouchi T, et al. Mental health difficulties and countermeasures during the coronavirus disease pandemic in Japan: A nationwide questionnaire survey of mental health and psychiatric institutions. Int J Env Res Public Health. 2021;18(14):7318. doi: 10.3390/ijerph18147318.

[17] IMF. World economic outlook update [Internet]. Washington (DC): International Monetary Fund; 2023 Jan. https://www.imf.org/en/Publications/WEO/Issues/2023/01/31/world-economic-outlook-update-january-2023.

[18] Kubota S. The macroeconomics of COVID-19 exit strategy: The case of Japan. Jpn Econ Rev. 2021;72(4):651–82. doi: 10.1007/s42973-021-00091-x.

[19] Watanabe T, Yabu T. Japan's voluntary lockdown. PLoS ONE. 2021;16(6):e0252468. doi: 10.1371/journal.pone.0252468.

[20] Watanabe T, Yabu T. Japan's voluntary lockdown: Further evidence based on age-specific mobile location data. Jpn Econ Rev. 2021;72(3):333–70. doi: 10.1007/s42973-021-00077-9.

[21] World Bank. Unemployment, Total (% of Total Labor Force) (Modeled ILO Estimate) – Japan [Internet]. https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS?locations=JP. Cited 2023 Feb 19.

[22] Tashiro A, Shaw R. COVID-19 pandemic response in Japan: What is behind the initial flattening of the curve? Sustainability. 2020;12:5250. doi: 10.3390/su12135250.

[23] Nohara YY, Urabe E. Suga Expected to Formalize Bid for Japan Prime Minister's Job [Internet]. Bloomberg. 2020 Sep 2. https://www.bloomberg.com/news/articles/2020-09-02/suga-expected-to-formalize-bid-for-japan-prime-minister-s-job. Cited 2024 Aug 11.

[24] Government of Japan, Cabinet Office. Economic Measures for Overcoming Coronavirus and Preparing for the Next Era [Internet]. Tokyo: Government of Japan; 2020 Dec 8. https://www5.cao.go.jp/keizai1/keizaitaisaku/2020-2/20201208_economic_measures.pdf.

[25] Nikkei Asia. Fumio Kishida Becomes Japan's 100th Prime Minister [Internet]. Nikkei Asia. 2021 Oct 4. https://asia.nikkei.com/Politics/

Japan-election/Fumio-Kishida-becomes-Japan-s-100th-prime-minister.
[26] Government of Japan, Cabinet Office. Economic Measures for Overcoming Coronavirus and Preparing for the Next Era [Internet]. Tokyo: Government of Japan; 2021 Nov 19. https://www5.cao.go.jp/keizai1/keizaitaisaku/2021/20211119_economic_measures.pdf.
[27] Government of Japan, Cabinet Office. Summary of Economic Measures for Overcoming Coronavirus and Preparing for the Next Era [Internet]. Tokyo: Government of Japan; 2022 Apr 26. https://www5.cao.go.jp/keizai1/keizaitaisaku/2022/20220426_taisaku_gaiyo.pdf.
[28] DW. Japan unveils record stimulus package to fix economy [Internet]. DW. 2021 Nov 19. https://www.dw.com/en/japan-unveils-record-stimulus-package-to-fix-economy/a-59875128.
[29] Japan Forward. Japan Unveils Economic Package to Tackle Rising Cost of Living [Internet]. Japan Forward. 2022 Oct 28. https://japan-forward.com/japan-unveils-economic-package-to-tackle-rising-cost-of-living/.
[30] Yamaguchi T, Kajimoto T. Japan keeps growth focus but signals end to crisis-mode fiscal largesse [Internet]. Reuters. 2023 Jun 7. https://www.reuters.com/article/japan-economy-policy-idUSL1N2XU0BI.
[31] Jena P, Majhi R, Kalli R, Managi S, Majhi B. Impact of COVID-19 on GDP of major economies: Application of the artificial neural network forecaster. Econ Anal Policy. 2020;69:324–39. doi: 10.1016/j.eap.2020.12.013.
[32] Kanno M. Assessing the impact of COVID-19 on major industries in Japan: A dynamic conditional correlation approach. Res Int Bus Financ. 2020;58:101488. doi: 10.1016/j.ribaf.2021.101488.
[33] Rashed E, Hirata A. Infectivity upsurge by COVID-19 viral variants in Japan: Evidence from deep learning modeling. Int J Env Res Public Health. 2021;18(15):7799. doi: 10.3390/ijerph18157799.
[34] Kobayashi G, Sugasawa S, Tamae H, Ozu T. Predicting intervention effect for COVID-19 in Japan: State space modeling approach. Biosci Trends. 2020;14(3):174–81. doi: 10.5582/bst.2020.03133.
[35] Kitamura Y, Karkour S, Ichisugi Y, Itsubo N. Evaluation of the economic, environmental, and social impacts of the COVID-19 pandemic on the Japanese tourism industry. Sustainability. 2020;12(24):10302. doi: 10.3390/su122410302.
[36] Chudik A, Mohaddes K, Hashem Pesaran M, Raissi M, Rebucci A. A counterfactual economic analysis of Covid-19 using a threshold augmented multi-country model. J Int Money Financ. 2021;119:102477. doi: 10.1016/j.jimonfin.2021.102477.
[37] Cutler DM, Summers LH. The COVID-19 pandemic and the $16 trillion virus. JAMA. 2020;324(15):1495–6. doi: 10.1001/jama.2020.19759.
[38] Pujol T. The long-term economic cost of Covid-19 in the Consensus Forecasts. In: Covid Economics: Vetted and Real-Time Papers. Vol. 44, London: Centre for Economic Policy Research; 2020. p. 225–40
[39] IMF. World economic outlook update [Internet]. Washington (DC): International Monetary Fund; 2022 Apr. https://www.imf.org/en/Publications/WEO/Issues/2022/04/19/world-economic-outlook-april-2022.
[40] IMF. World economic outlook update [Internet]. Washington (DC): International Monetary Fund; 2022 Jul. https://www.imf.org/en/Publications/WEO/Issues/2022/07/26/world-economic-outlook-update-july-2022.
[41] IMF. World economic outlook update [Internet]. Washington (DC): International Monetary Fund; 2024 Jul. https://www.imf.org/en/Publications/WEO/Issues/2024/07/16/world-economic-outlook-update-july-2024.
[42] Cai M, Luo J. Influence of Covid-19 on manufacturing industry and corresponding countermeasures from supply chain perspective. J Shanghai Jiaotong Univ Sci. 2020;25(4):409–16. doi: 10.1007/s12204-020-2206-z.
[43] Todo T, Inoue H. Geographic diversification of the supply chains of Japanese firms. Asian Econ Policy Rev. 2021;16(2):304–22. doi: 10.1111/aepr.12337.
[44] Obashi A. Comment on “Geographic diversification of the supply chains of Japanese firms”. Asian Econ Policy Rev. 2021;16(2):325–6. doi: 10.1111/aepr.12340.
[45] Maharjan R, Kato H. Logistics and supply chain resilience of Japanese companies: perspectives from impacts of the Covid-19 pandemic. Logistics. 2023;7(2):27. doi: 10.3390/logistics7020027.
[46] Chau V, Conesa Martinez M, Kim T, Spray J. Global value chains and inflation dynamics. IMF Work Pap. 2024. 2024/62. doi: 10.5089/9798400268847.001.
[47] Oliver M. Population ageing and economic growth in Japan. Int J Sociol Soc Policy. 2015;35(11/12):841–63. doi: 10.1108/ijssp-02-2015-0018.
[48] Wagner C. “Silver robots” and “robotic nurses”? Japan’s robot culture and elderly care. In: Schad-Seifert A, Shimada S, editors. Demographic change in Japan and the EU: Comparative perspectives. Berlin, Boston: Düsseldorf University Press; 2010. p. 131–54. doi: 10.1515/9783110720044-006.
[49] Damioli G, Roy V, Vértesy D. The impact of artificial intelligence on labor productivity. Eurasian Econ Rev. 2021;11(1):1–25. doi: 10.1007/s40821-020-00172-8.
[50] Narvaez Rojas C, Alomia Peñafiel C, Loaiza Buitrago DF, Tavera Romero CA. Society 5.0: A Japanese concept for a superintelligent society. Sustainability. 2021;13(12):6567. doi: 10.3390/su13126567.
[51] Li J, An Z, Wang Y. On the substitution and complementarity between robots and labor: Evidence from advanced and emerging economies. Sustainability. 2023;15(12):9790. doi: 10.3390/su15129790.
[52] Doi T, Hoshi T, Okimoto T. Japanese government debt and sustainability of fiscal policy. J Jpn Int Econ. 2011;25(4):414–33. https://www.nber.org/papers/w17305.
[53] Hoshi T, Ito T. Is the sky the limit? can Japanese government bonds continue to defy gravity? Asian Econ Policy Rev. 2013;8(2):218–47. doi: 10.1111/aepr.12023.
[54] Ogawa K, Sterken E, Tokutsu I. Public Debt, Economic Growth and the Real Interest Rate: A Panel VAR Approach to EU and OECD Countries [Internet]. SSRN. 2016 Jan 29. doi: 10.2139/ssrn.2726367.
[55] Corden W, Jayasuriya S. The Japanese macroeconomic mystery. In: Hill H, Menon J, editors. Managing globalization in the Asian century: Essays in Honour of Prema-Chandra Athukorala. Singapore: ISEAS Publishing; 2016. p. 297–332. doi: 10.1355/9789814762281-015.
[56] Armstrong SP, Okimoto T. Fiscal Sustainability in Japan [Internet]. AJRC Working Paper No 2. Canberra (Australia): Australia-Japan Research Centre, Crawford School of Public Policy, The Australian National University; 2016 May 1. doi: 10.2139/ssrn.2795327.
[57] Reinhart C, Reinhart V, Rogoff K. Public debt overhangs: Advanced-economy episodes since 1800. J Econ Perspect. 2012;26(3):69–86. doi: 10.1257/jep.26.3.69.

[58] Baum A, Checherita-Westphal C, Rother P. Debt and growth: New evidence for the euro area. J Int Money Financ. 2013;32:809–21. doi: 10.1016/j.jimonfin.2012.07.004.
[59] Kajitani Y, Chang SE, Tatano H. Economic impacts of the 2011 Tohoku-Oki earthquake and tsunami. Earthq Spectra. 2013;29(1_suppl):457–78. doi: 10.1193/1.4000108.
[60] Tokui J, Kawasaki K, Miyagawa T. The economic impact of supply chain disruptions from the Great East-Japan earthquake. Jpn World Econ. 2017;41:59–70. doi: 10.1016/j.japwor.2016.12.005.
[61] Tolliver C, Fujii H, Keeley A, Managi S. Green innovation and finance in Asia. Asian Econ Policy Rev. 2020;16(1):67–87. doi: 10.1111/aepr.12320.
[62] Tsigaris P, Teixeira da Silva JA, Honma M. The impact of COVID-19 on Japan's economic outlook [Internet]. SSRN. 2023. doi: 10.2139/ssrn.4372146.