

Japan's Productivity through the Lens of “Cheap Japan”

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I. Introduction

Historically, Japan was recognized as an expensive country, and the issue of the domestic–foreign price gap was subject to extensive discussion. However, in recent years, Japan has earned the reputation of “cheap Japan”, with prices no longer consistently ranking high among developed nations. It is often pointed out that the relative lack of productivity growth and the decline in innovation in Japan may be contributing to this trend¹. This paper aims to empirically examine higher or lower price levels in Japan relative to foreign countries. Based on this analysis, this work systematically investigates the structural factors behind the “cheap Japan” phenomenon by exploring the relationship between the real exchange rate—reflecting the disparity between domestic and foreign prices—and productivity, utilizing the Balassa–Samuelson hypothesis.

II. Current Status of “Cheap Japan”

1. Comparison by Big Mac Index

Japan is often characterized as a “cheap country”, but the extent prices are truly lower in Japan requires examination. Furthermore, Japan has been historically known as an expensive country, but exactly how expensive was it? Directly comparing prices in Japan with other countries proves challenging as the goods and services offered in Japan are not necessarily identical to those in other countries. Even if price comparisons were attempted, achieving meaningful results would require equivalence in the quality of brands and products. Hence, to initiate our analysis, we turn to the prices of Big Macs sold globally by the McDonald's Corporation.

¹ For example, Ito (2022) contends that the sluggish growth of Japanese productivity, particularly in the tradable industry, serves as the fundamental factor behind the “cheap Japan” phenomenon. Conversely, Watanabe (2022) explores U.S.-Japan relations and attributes the occurrence of the “cheap Japan” phenomenon to the yen's depreciation exceeding purchasing power parity and the discrepancy wherein real wages in the U.S. are increasing while those in Japan are not.

Based on *The Economist* magazine's survey of Big Mac prices (Big Mac Index) as of January 2023, the selling price in Japan was ¥410² (equivalent to US\$3.15), \$5.36 in the U.S., and €4.86 (equivalent to US\$5.28) in the eurozone.

The theory positing that exchange rates are established to equalize price levels at home and abroad is known as the purchasing power parity (PPP) hypothesis, with the nominal exchange rate at the time referred to as the PPP rate. Calculating the PPP rate using the price of a Big Mac, given that the Big Mac is sold for ¥410 in Japan and \$5.36 in the U.S., the PPP rate in yen-dollar amounts to $¥410 = \$5.36$, or

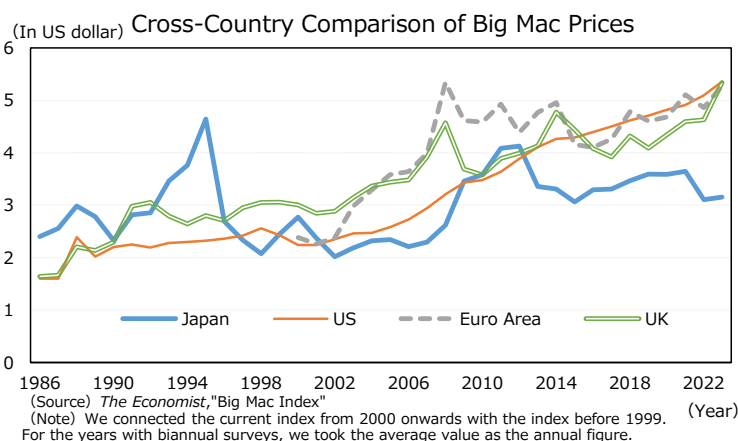
¥76.49 per dollar. However, the actual nominal (market) exchange rate at the time of the survey stood at ¥130.10 per dollar, representing a significant disparity. At least in terms of the Big Mac's price, the PPP hypothesis does not hold true.

An indicator of the difference between domestic and foreign prices is the real exchange rate, which is the ratio of the domestic to the foreign price converted at the market exchange rate. While the nominal exchange rate indicates the ratio of exchange (relative prices) between domestic and foreign currencies, the real exchange rate indicates the ratio of exchange (relative prices) between domestic and foreign goods and services. If the PPP hypothesis holds, the real exchange rate is 1 (times).

The real exchange rate, as measured by the price of a Big Mac, is the ratio of the selling price in Japan (¥410) converted to U.S. dollars at the market exchange rate (130.10 ¥/\$) (\$3.15) to the selling price in the United States (\$5.36), which is 0.59 (times). This indicates that the price of a Big Mac in Japan is about 60% of the U.S. price, that is, a situation where the price is about 40% lower than in the United States.

The same calculation for the euro shows that the PPP rate for yen-euro is ¥84.36 per euro, which is 0.6 (times) the real exchange rate.³ The United States was the sixth most expensive country, and the eurozone was the eighth most expensive country. Japan, on the other hand, ranked 42nd from the top, making it the 14th cheapest country to buy a Big Mac.

However, this was not always the case for Japan. For example, in April 2000, the selling price of a Big Mac in Japan was ¥294 (US\$ equivalent: \$2.77), which was higher than in the United States (\$2.24) and the euro area (€2.56, US\$ equivalent: \$2.38). The PPP rate at that time was 131.25 ¥/\$ and 114.84 ¥/€, respectively, meaning that the real exchange rate was 1.24 times that of the United States and 1.16 times the eurozone rate. That is, the Big Mac was about 20% more expensive in Japan than in the United States or the euro area. In April 2000, prices were surveyed in 28 countries, and Japan ranked

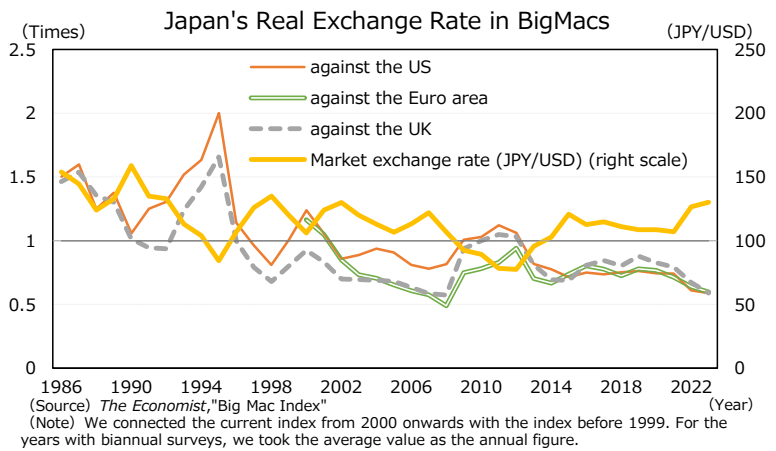


² On January 16, 2023, the price increased to 450 yen.

³ The eurozone is treated as a single entity or country.

fifth as the most expensive country for the Big Mac (compared with the euro area, ranked 10th, and the United States, ranked 12th).

The Big Mac is sold with the same quality worldwide. However, Big Macs are sold at different prices around the world. Of course, it would be difficult to standardize prices in every country at the market exchange rate considering the daily fluctuations in exchange rates and the associated costs of frequent price revisions. Nevertheless, in the long run, such a significant price gap between countries seems unlikely. In fact, prices in Japan have remained relatively cheap for at least the last 10

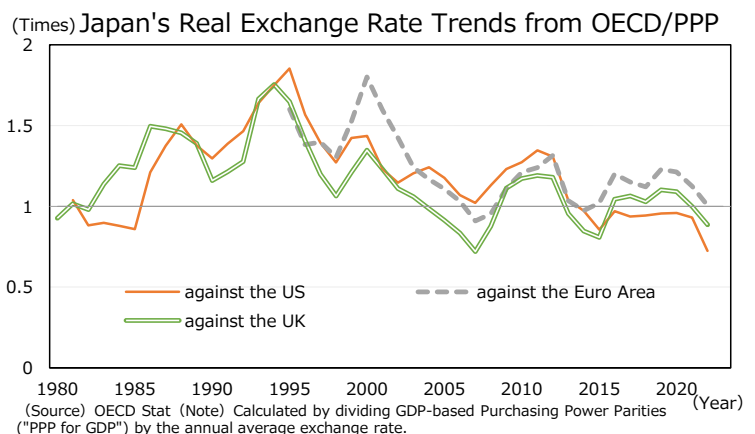


years. It should be noted, however, that during the period of yen depreciation since the early 2000s, the price of Big Macs in Japan was cheaper than in the United States and Europe (real exchange rate depreciation), just as it is now. On the other hand, during the period of yen appreciation around 2010, the price was higher than in the United Kingdom and United States (real exchange rate appreciation). Nevertheless, in the long run, the trend suggests a depreciation of the real exchange rate.

2. Comparison of Total Prices Using OECD Purchasing Power Parity (PPP) Exchange Rates

The Big Mac is only one product, and the difference in domestic and foreign prices indicated by the real exchange rate calculated for the Big Mac may differ significantly from the overall price differences for a wide range of goods and services.

However, comparing overall prices using price indices is not a straightforward task. Price indices, such as the Consumer Price Index (CPI) and the Producer Price Index (PPI), represent the price level at each specific point in time, with the price level at a particular reference point set at 100. Additionally, the items consumed in each country and their proportions may vary, making direct comparisons challenging.



As a result, when calculating the PPP rate or real exchange rate using these price indices, the rate of change is typically used, but it can be influenced by the choice of the base year.

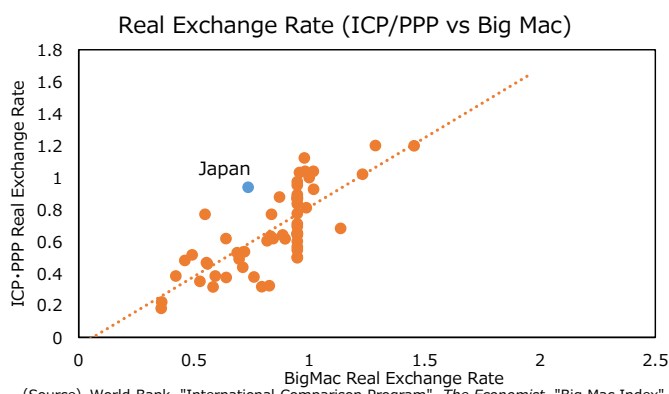
In the following analysis, we utilize the PPP rate calculated by the OECD based on a survey of

approximately 3,000 goods and services⁴ to examine the trend of Japan's real exchange rate. It's important to note that the PPP rate represents the nominal exchange rate that equalizes the price level of the home country with other countries, and the real exchange rate reflects the ratio of the home country's price level to that of other countries, converted at the market exchange rate. Consequently, the real exchange rate is determined by dividing the PPP rate by the market exchange rate. Referring back to the previous example of the Big Mac price comparison between Japan and the U.S., the PPP rate in January 2023 would be 76.49 ¥/\$, and the market exchange rate would be ¥130.10, resulting in a real exchange rate of 0.59 (calculated as 76.49/130.10), which aligns with our earlier calculation.

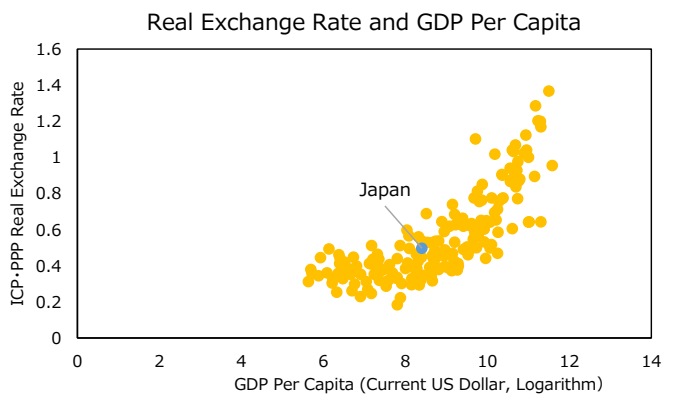
Using this relationship, we computed Japan's real exchange rate from the OECD PPP rate and observed that Japan's price level, which was 1.85 times that of the United States in 1995, declined to 0.72 times that of the United States in 2022, albeit with fluctuations along the way.⁵

This trend is consistent with the movement of the real exchange rate as measured by the Big Mac. In fact, on a global scale, there is a positive correlation between the difference in domestic and foreign prices of Big Macs and the real exchange rate, as is confirmed by an analysis based on the 2017 results of the International Comparison Program (ICP), in which the OECD also participates, and which calculates the PPP rate for the world as a whole.

Furthermore, in general, the more a country's GDP per capita increases due to economic development, the more the real exchange rate tends to appreciate, meaning prices become relatively more expensive. However, in Japan, the real exchange rate has shown a tendency to depreciate, that is, prices have become cheaper relative to other countries since the late 1990s, both in terms of the price of a Big Mac and overall prices averaged over the period. The underlying factors for this trend warrant further investigation.



(Source) World Bank, "International Comparison Program", *The Economist*, "Big Mac Index"
 (Note) Data is for the year 2017. The Big Mac Real Exchange Rate for 2017 represents the annual average value.



(Source) World Bank, "International Comparison Program" (Note) The data is in 2017.

⁴ The OECD conducts comprehensive price surveys encompassing approximately 3,000 goods and services. Utilizing this extensive dataset, the organization publishes PPP (purchasing power parity) rates triennially. For years other than the publication year, PPP rates are derived through supplementary calculations using price deflators.

⁵ Since approximately 2010, there has been a discernible trend of real exchange rate depreciation against the United States, evident not only in the euro area and the United Kingdom but also in countries with relatively high price levels, such as Switzerland and Norway. This observation implies a relative increase in price levels in the United States.

III. The Relationship Between the Real Exchange Rate and Productivity: The Balassa-Samuelson Hypothesis

1. Balassa-Samuelson Hypothesis

In this section, we delve into the relationship between the real exchange rate and productivity through the Balassa–Samuelson hypothesis, aiming to analyze the factors contributing to the long-term depreciation of Japan's real exchange rate.

In general, goods and services can be categorized into tradable goods (tradables), those that can be exchanged with foreign countries, and non-traded goods (nontradables), those that cannot. It is reasonable to assume that certain services, like haircuts, are nontradables since people are unlikely to travel abroad solely for cheaper haircuts.⁶ General prices, therefore, comprise both prices of tradables and nontradables.

Tradables are subject to foreign trade; therefore, their prices are influenced by competitive forces.⁷ Consequently, the real exchange rate is determined by the disparity between domestic and foreign prices of nontradables. That is, in a bilateral comparison, the greater the increase in the price of nontradables relative to tradables in a country, the more the real exchange rate appreciates.

The real exchange rate can be expressed in a formula⁸: $E = SP/P^*$, where E denotes the real exchange rate, S represents the nominal exchange rate (market rate), P indicates the price level in the home country, and P^* represents the price level in other countries. Prices can then be further expressed in terms of tradables and nontradables as $P = P_T^{1-\omega} P_N^\omega$, where P_T denotes the prices of tradables, P_N denotes the prices of nontradables, ω symbolizes the weight of nontradables in the home country, and ω^* signifies the weight of nontradables in the foreign country. Then, $E = SP_T^{1-\omega} P_N^\omega / (P_T^{*1-\omega^*} P_N^{*\omega^*})$. By transforming this formula into logarithms and organizing it, we obtain the following expression: $e = (s + p_T - p_T^*) + \omega(p_N - p_T) - \omega^*(p_N^* - p_T^*)$, assuming the law of one price for tradeables, i.e, $s + p_T - p_T^* = 0$, the real exchange rate can be simplified as $e = \omega(p_N - p_T) - \omega^*(p_N^* - p_T^*)$, representing the ratio of the relative prices of tradables and nontradables .

Furthermore, we explore the relationship between the real exchange rate and productivity. Assuming that the productivity is equally determined by real wages, $A_T = W/P_T$, indicating the productivity of tradables where W denotes the nominal wages and $A_N = W/P_N$, which represents the productivity of nontradables. If we substitute the logarithms of both equations, $p_T = w - a_T$ and $p_N = w - a_N$, into the above expression for the real exchange rate, we derive $e = \omega(a_T - a_N) - \omega^*(a_T^* - a_N^*)$, signifying that the real exchange rate reflects the difference in the productivity ratio of tradables and nontradables between two countries. Consequently, the real exchange rate appreciates more in a country where the

⁶ The classification of services does not inherently designate them as nontradables. For instance, when considering educational services, it becomes evident that a significant population of foreign students enroll in universities, resulting in the export of educational services.

⁷ Regarding tradables, the law of one price cannot be universally assumed to hold true. For instance, when companies establish different markups (the ratio of selling price to marginal cost) for tradables depending on the country of sale, that is, when they adopt the pricing-to-market strategy, it deviates from the principle of one price (Itskhoki, 2021).

⁸ See Schmitt-Grohe, Uribe and Woodford (2022), Itskhoki (2021), Kawai et al. (2003), and others.

productivity of tradables increases more than that of nontradables.

This hypothesis, known as the Balassa–Samuelson hypothesis, posits that the real exchange rate is determined by reflecting bilateral differences in the productivity of tradables and nontradables. Its mechanism can be illustrated with an example:⁹ Let us consider a scenario where the productivity increases in an industry producing tradables in the home country. This increase in the productivity could result in a decline in the selling price of the tradables because the increased productivity allows for cheaper production. Alternatively, the selling price of the tradables may remain unchanged, but the wages of the workers involved in their production are raised.

First, we examine the case where the home country's tradable industries lower the prices of the goods and services it produces due to higher productivity. The intensified price competition in the home tradable industries may exert downward price pressure on foreign tradable. If there is no change in productivity in the foreign tradable industries, sales in those industries might decline, leading to a decrease in wages for workers in the foreign tradable industries. If the lower wages cause workers in the tradable industries to switch to the nontradable industries, the labor supply in the nontradable industries will increase, resulting in downward pressure on wages in the nontradable industries. As nontradable industries, such as service industries, are often labor-intensive, and labor costs constitute a significant portion of production costs, lower wages can lead to lower prices. Consequently, the decline in the price of tradables due to their productivity growth can trigger a chain reaction of declining wages and prices in the foreign country.

Likewise, if the home country's tradable industries raise the wages of workers instead of adjusting the selling price, the labor supply in the nontradable industries may decrease as workers in the industries seek employment in the tradable industries for higher wages. Consequently, there will be upward pressure on wages in the nontradable industries, leading to higher prices of nontradables and causing a general rise in prices in the home country.

2. Data Verification

This section examines whether the Balassa–Samuelson hypothesis aligns with the empirical data. To start, we analyze data on prices, wages, and productivity for both tradables and nontradables in Japan and other countries. However, precisely distinguishing industries between tradables and nontradables is not always straightforward. While manufacturing is generally considered a tradable industry and services as nontradable, some services such as internet-based services easily transcend national borders. For this study, we follow the classification by Cardi and Restout (2015) to categorize industries of tradables and those of nontradables.¹⁰ We utilize data from the EU KLEMS database for Japan, the

⁹ The following description is based on Shimizu et al. (2016).

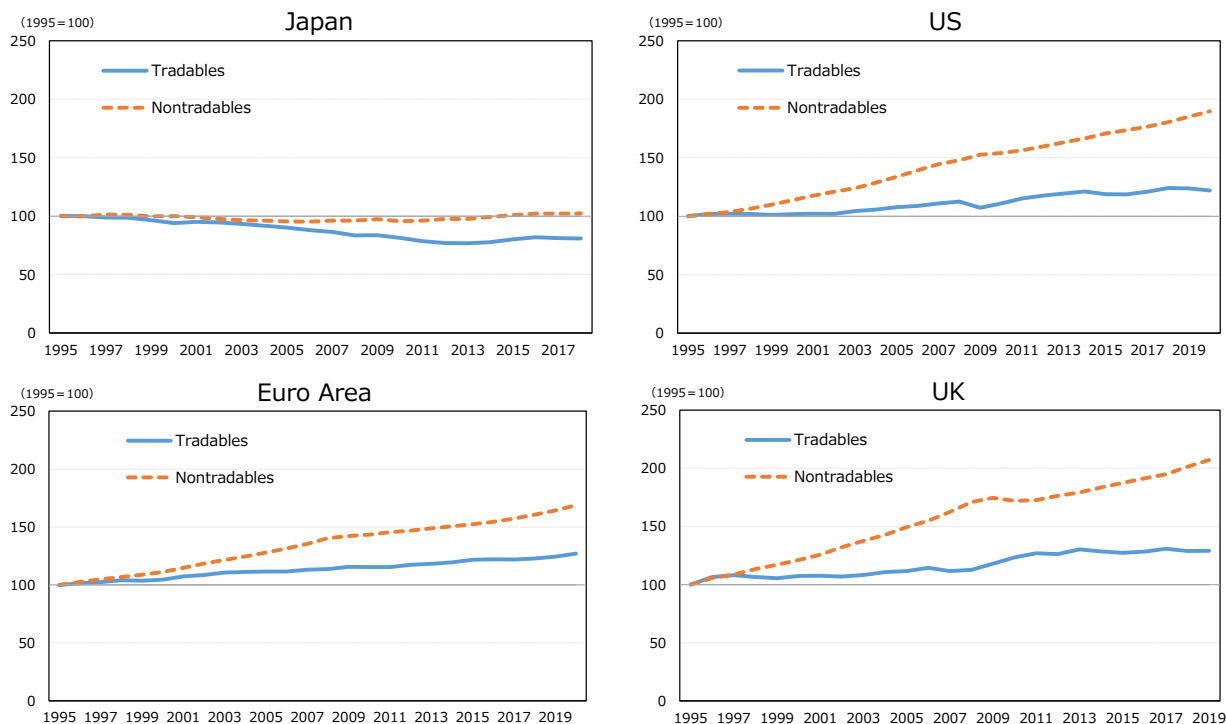
¹⁰ The industries classified as tradable include “agriculture, forestry, and fishing”, “mining and quarrying”, “manufacturing”, “transportation and storage”, “information and communication”, and “financial and insurance activities”. On the other hand, the nontradable industries encompass “electricity, gas, steam, and air conditioning supply”, “water supply; sewerage, waste management, and remediation activities”, “construction”, “wholesale and retail trade; repair of motor vehicles and motorcycles”, “accommodation and food service activities”, “real estate activities”, “professional, scientific, and technical activities; administrative and support service activities”, “public administration and defense; compulsory social security”, “education”, “human health and social work activities”, “arts, entertainment and recreation”, and “other

United States, the euro area, and the United Kingdom.

To calculate prices of tradables and nontradables, we divided the total nominal gross value added of each industry by the total real gross value added. Nominal wages were determined by dividing the total compensation of employers in the tradable and nontradable industries by the total number of employees. Regarding productivity, real labor productivity was computed by dividing the total real gross value added of the industries by the total labor input (i.e., the total hours worked by employees).¹¹

Upon analyzing the price trends of tradables and nontradables, it becomes evident that in the United States, the euro area, and the United Kingdom, prices for both tradables and nontradables have been continuously increasing, with nontradables experiencing a particularly substantial price surge. Conversely, in Japan, the prices of tradables experienced a decline until the mid-2010s, stabilizing thereafter, while the prices of nontradables have remained relatively steady and flat since 1995, representing a marked contrast.

Trends in Prices of Tradables and Nontradables



(Source) EU KLEMS. (Note) The classification of industries into tradable and nontradables is based on Cardi and Restout (2015). The figures are computed by dividing the total nominal gross value added of each category by the total real gross value added. The eurozone includes 19 countries.

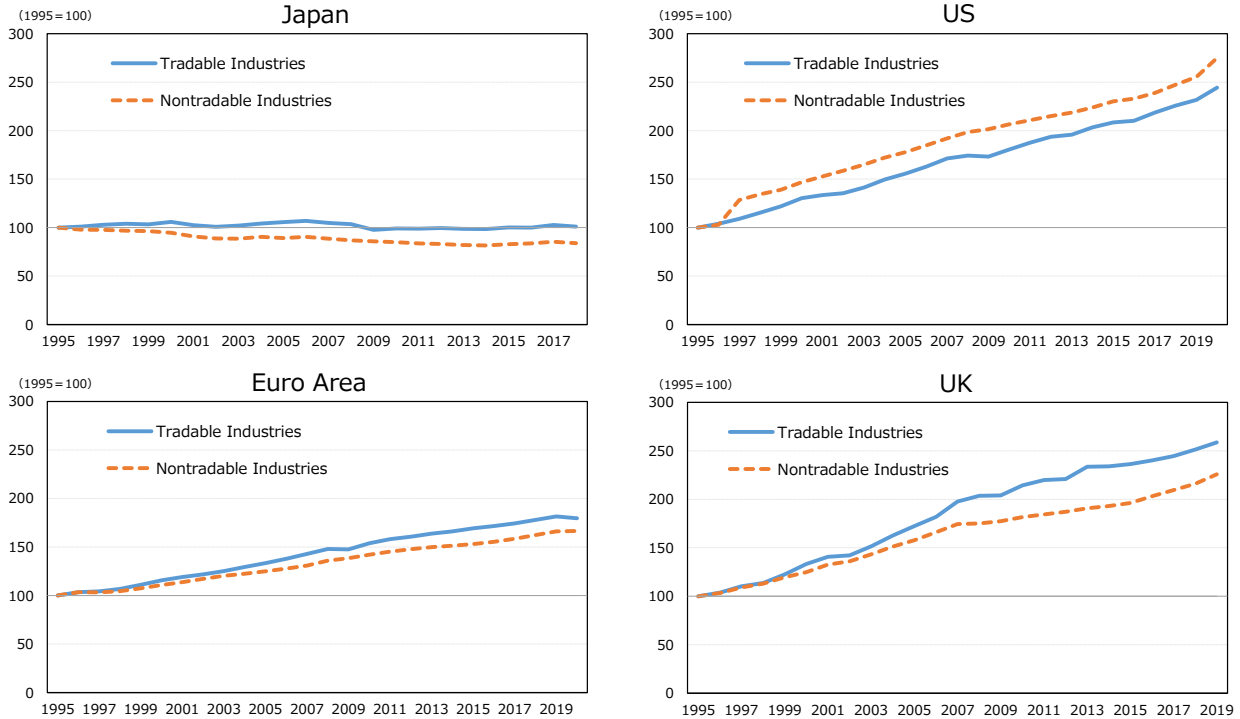
Regarding the trend in nominal wages, we observe that wages in Japan have generally remained stable in the tradable industries, while they have tended to decline in nontradable industries. On the other hand, in the United States, the euro area, and the United Kingdom, wages have continued to rise

service activities”.

¹¹ In this study, we have chosen to concentrate on labor productivity as a productivity metric due to its ease of measurement. Note, however, that productivity is ideally assessed using total factor productivity, which accounts for both labor and capital inputs. Labor productivity is influenced by both total factor productivity and the level of capital per worker. In the context of Japan, there has been a noticeable decline in the investment rate (the ratio of capital investment to GDP), coupled with sluggish growth in private capital stock. These developments have raised concerns about their potential impact on economic growth (Hiraguchi, 2022).

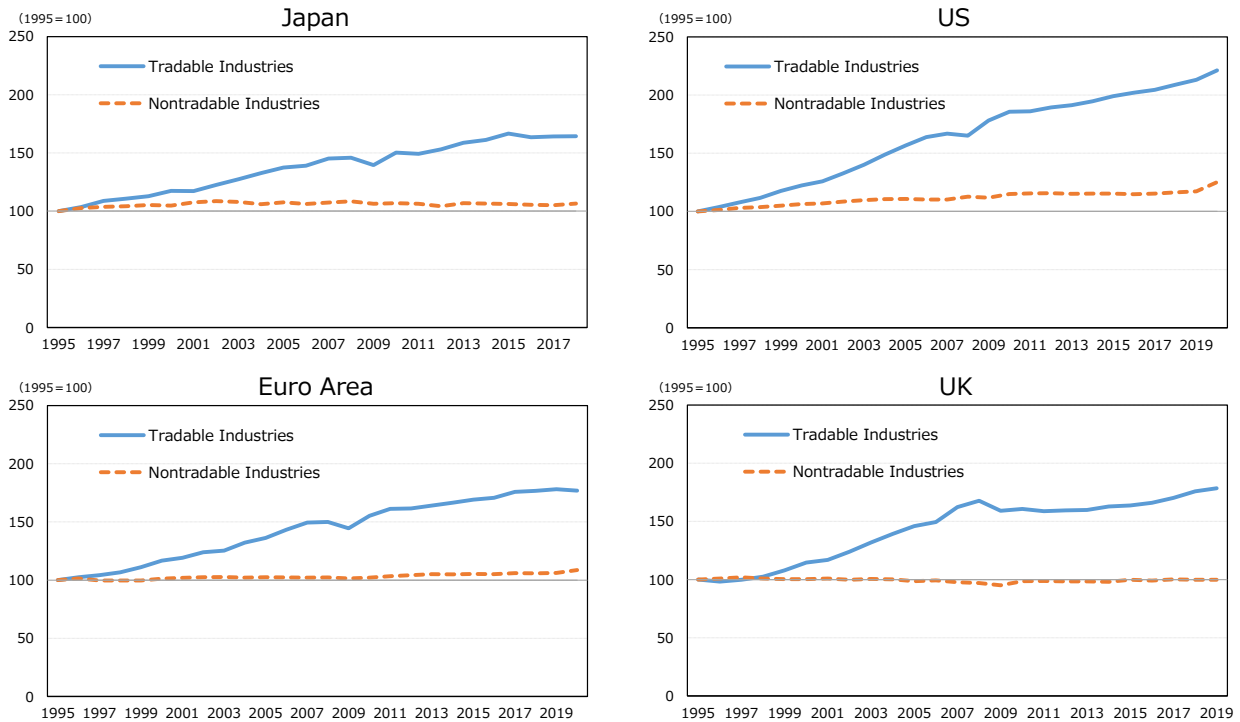
in both tradable and nontradable industries.

Nominal Wages for Tradable and Nontradable Industries



(Source) EU KLEMS. (Note) The classification of industries into tradables and nontradables is based on Cardi and Restout (2015). The figures are computed by dividing the total nominal labor compensation by the total number of employees. The eurozone includes 19 countries.

Real Labor Productivity Trends for Tradable and Nontradable Industries



(Source) EU KLEMS. (Note) The classification of industries into tradables and nontradables is based on Cardi and Restout (2015). The figures are computed by dividing the total real gross value added of each category by the total labor hours. The eurozone includes 19 countries.

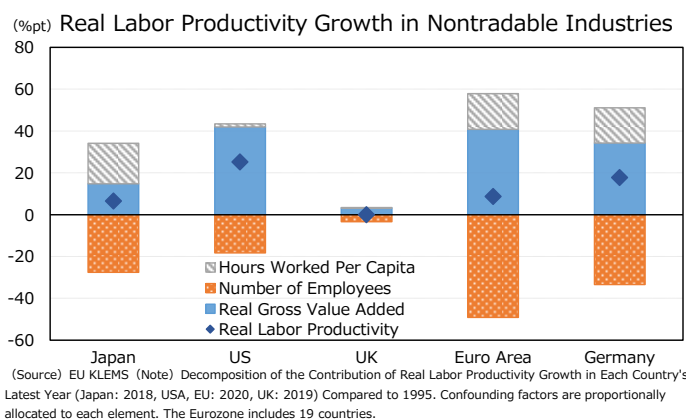
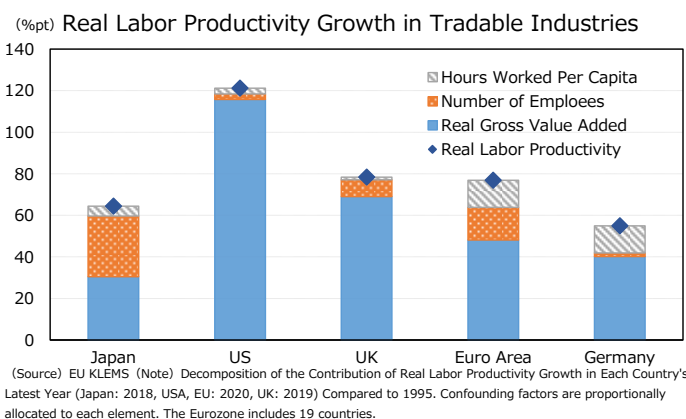
Finally, a comparison of real labor productivity reveals that labor productivity in the tradable industries has increased in Japan, the United States, the euro area, and the United Kingdom, while productivity in the nontradable industries has remained relatively unchanged.

3. Implications for Japan

Based on the presented data, we rigorously explore the implications for the development of Japan's real exchange rate. Specifically, we focus on the difference in the dynamics of prices and wages between Japan's tradable and nontradable industries. Since the late 1990s, the economic landscape in Japan has undergone substantial changes

due to economic globalization, with a notable expansion of trade involving China and other emerging Asian economies. As a result, Japan's tradable industries have encountered fierce price competition, leading to a state of price stagnation for tradables. Concurrently, the tradable industries experienced a downturn, prompting a significant workforce migration from these industries to the nontradable industries, consequently resulting in a decline in wages in nontradable industries. This phenomenon led to the moderation of wages in the nontradable industries, preventing substantial price increases for nontradable.¹² Despite witnessing an increase in real labor productivity in Japan's tradable industries, the negative impact of declining labor input (total hours worked by workers) outweighed the positive effect of value-added growth. Consequently, the overall value added proved insufficient to stimulate significant changes in prices.

On the contrary, in the United States, the euro area, and the United Kingdom, the growth of real labor productivity in the tradable industries was predominantly fueled by value-added expansion. While these countries would have faced comparable influences from the growth of the tradable industries in China and other emerging Asian economies, both the prices and wages within their respective tradable industries exhibited an upward trend.¹³



¹² Japan is notable among advanced countries for its pronounced tendency to exercise significant restraint in implementing price increases in response to rising production costs, including soaring commodity prices. This cautious approach toward raising prices has resulted in income leakage to foreign markets and is also considered to have played a role contributing to wage reductions (Saito, 2023).

¹³ The Balassa-Samuelson hypothesis posits that tradables adhere to the law of one price. However, empirical evidence indicates that while the prices of Japan's tradables have been declining, the prices of tradables in Europe and the United States have been rising. This observation

When examining this aspect, it is evident that the United States, the euro area, and the United Kingdom may have made notable advancements in product differentiation through technological innovation and new product development. For instance, the Cabinet Office (2011) highlights contrasting trends in terms of trade (the ratio of export prices to import prices) between Japan and Germany, two countries with similar industrial structures. The report suggests that Germany has a higher proportion of intra-industry trade, wherein goods from the same industry are both exported and imported, indicating significant progress in product differentiation. This progress in product differentiation empowers Germany to more effectively pass on the price increases of raw materials, such as natural resources, to the prices of its export goods.

The data do not provide explicit evidence of a direct shift of workers to the tradable industries in pursuit of higher wages. However, considering the persistent stagnation of labor productivity in the nontradable industries and the growing workforce in the industries, driven by factors such as the ongoing shift of the economy toward services, it is plausible to consider that higher wages in the tradable industries might have influenced the rise in wages within the nontradable industries. This relationship implies the possibility of a spillover effect from the wage increase in the tradable industries to wages in the nontradable industries, subsequently leading to an increase in prices in the nontradable industries.

In Japan, prices of nontradables remained unchanged, while in the United States, the euro area, and the United Kingdom, they experienced an upward trajectory. This disparity contributed significantly to the depreciation trend observed in the Japanese real exchange rate. The validity of this interpretation requires further elaboration.

Nevertheless, as mentioned above, if the depreciation of Japan's real exchange rate, commonly referred to as “cheap Japan”, is indeed a result of the failure of Japan's tradable industries to generate sufficient value added relative to its overseas counterparts, and this deficiency is due to a lack of innovation in new product development and product differentiation, then the “cheap Japan” phenomenon should be viewed as a warning to Japan's tradable industries.

4--Conclusion

This paper confirmed that prices in Japan have become cheaper. The relationship between the real exchange rate and productivity was examined through the Balassa–Samuelson hypothesis. The paper also pointed out that the long-term depreciation trend of the real exchange rate, or the “cheap Japan” phenomenon, was caused by the failure of Japan's tradable industries to generate sufficient value added amid economic globalization and the migration of workers from tradable to nontradable industries, which led to lower wages in nontradable industries and prevented the prices from rising.

Lower prices have the benefit of increasing Japan's attractiveness as a production location and

presents several potential explanations, including disparities in the competing tradables between Japan and Europe/United States, as well as variations in the level of competition. As noted in footnote 7, companies employ pricing-to-market strategies, which potentially challenges the applicability of the law of one price to tradables. This observation could imply that tradable industries in Europe and the United States have experienced increased markups while Japan witnessed a decrease in markups. Notably, Nakamura and Ohashi (2019) have highlighted that advanced countries tend to exhibit an increasing trend in markups, whereas Japan does not display the same upward trend.

drawing more foreign tourists. In particular, an increase in foreign direct investment will provide an opportunity to acquire superior foreign technology and promote innovation.

If the decline in Japan's ability to add value in the tradable industries is a challenge for Japan, the country must improve its competitiveness in non-price aspects through product differentiation and the development of new products while taking advantage of “cheap Japan”.

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