
Mizuho Economic Outlook & Analysis

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How Far Will the Yen Fall?

What the industry average equilibrium rate tells us

< Summary >

- ◆ The gap between two yen/dollar equilibrium exchange rates, one based on Japan-U.S. purchasing power parity (sales-price basis) and the other on production costs in the two countries, has widened significantly since the late 1990s, when the Japanese economy plunged into deflation.
- ◆ This widening occurred as Japanese companies resorted to (or had no other choice but to resort to) price competition amid continuing deflation by suppressing margins.
- ◆ If Japan escapes deflation and Japanese firms come to secure proper margins on par with their U.S. counterparts, an exchange rate of 100 yen or weaker to the dollar may well become justifiable.

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1. Introduction—currency rates should be viewed in comparison to the equilibrium exchange rate

The Japanese yen, after trading in the 75 to 80 yen range to the dollar in the autumn of 2012, has weakened to the mid-90 yen level amid market expectations for “aggressive monetary easing” under Prime Minister Shinzo Abe’s administration.

Lately, the question of how far the yen can weaken comes up for discussion from time to time. To gain insight, we need to make comparisons to what is known as the equilibrium exchange rate, which is determined by factoring in the economic fundamentals of the concerned countries. The real-world exchange rate tends to converge on the equilibrium exchange rate over the long term. Even if the current exchange rate moves in ranges considerably stronger than in the past, if such movement takes place in tandem with that of the equilibrium rate, the levels may not necessarily be called “excessively strong.” However, if the current exchange rate is trading at levels far removed from the equilibrium exchange rate, it is highly possible that the currency is overvalued, and that the excessive premium will be resolved over time.

2. The prevailing market exchange rate in 2011 was about 30% higher than the industry average equilibrium rate

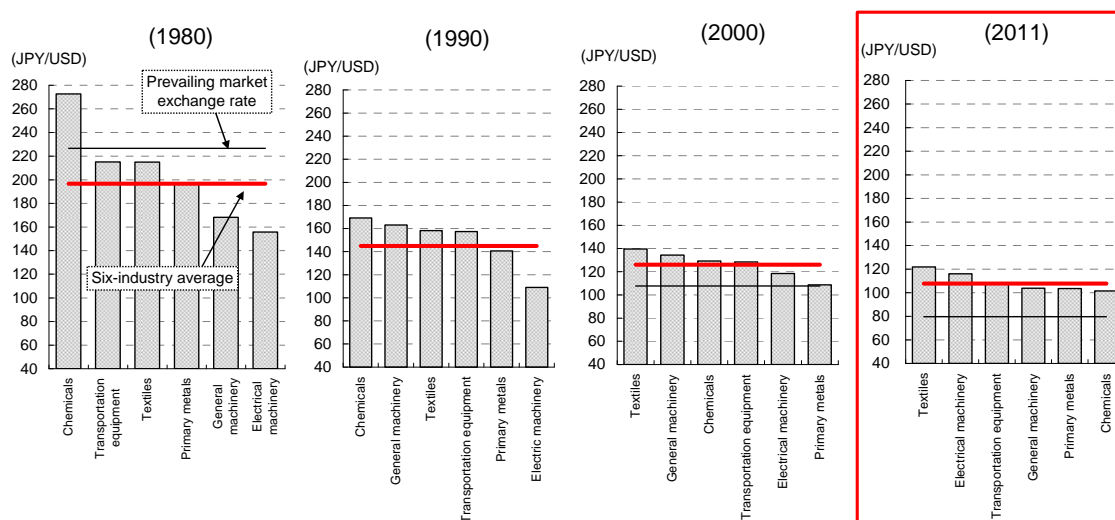
There are several ways to compute the equilibrium exchange rate, but the most popular one is the rate derived from purchasing power parity (PPP). PPP comes from the concept that the price of a product or service that presents the same quality will converge on one price (known as the law of one price), and an exchange rate is computed which will equalize the price levels between two countries. In this study, we define the equilibrium rate¹ as being the exchange rate that satisfies the law of one price between Japan and the U.S. based on the concept of PPP, while also factoring in the production costs of export goods (export-oriented manufacturing industries). To describe the method

¹ Based on the computation method applied in Cabinet Office (2009) *Annual Report on the Japanese Economy and Public Finance 2009*. The Cabinet Office based its computation on *Nihon keizai to makurokeizaigaku (The Japanese economy and macroeconomics)*, 1992, by Hiroshi Yoshikawa, and other materials. In his book, Yoshikawa defined the equilibrium exchange rate as being determined by factors including 1) nominal wages (price levels) in Japan and the U.S., 2) labor input coefficients and raw materials input coefficients in the two countries, and 3) terms of trade. Yoshikawa also states that, for an equilibrium exchange rate to be effective, it calls for two conditions: 1) profit rates of export-goods industries are at normal levels, and 2) global competitiveness of export goods is at normal levels.

in more detail, we establish a base period where the current-account payments between the two countries are balanced, and then ascribe the currency rate changes after that period to changes in the price per unit of export goods, i.e., the per-unit production costs (intermediate input plus labor cost) in the two countries. From this, we can deduce a relationship that the more production costs in Japan are reduced, the lower the price per unit of export goods becomes (thus satisfying the PPP principle), and the yen's equilibrium exchange rate against the dollar strengthens.

Here, we took the January-March quarter of 1979 as the base period in accordance with the 2009 report published by the Cabinet Office, and computed the equilibrium yen-to-dollar exchange rate by industry in the years 1989, 1990, 2000 and 2011 (**Chart 1**). We based the industry classification to that drawn up by the Cabinet Office, taking six major industries (textiles, chemicals, primary metals, general machinery, electric machinery and transportation equipment). The first observation we can make is that

Chart 1: Changes in the equilibrium yen/dollar exchange rates by industry (1980, 1990, 2000, 2011)



Note: The computation of the equilibrium exchange rates is based on the method adopted in the *Annual Report on the Japanese Economy and Public Finance 2009* published by the Cabinet Office. Setting the Jan-Mar Qtr 1979 as the base period, we took the unit intermediate input cost and the unit labor cost of six manufacturing industries (textiles, primary metals, chemicals, general machinery, electric machinery and transportation equipment) and arrived at an exchange rate that would satisfy the law of one price. The six-industry average is computed by weighting the export value of each industry. It should be noted that the results can vary greatly depending on the assumptions made, including which point in time to base the computation on.

Sources: Compiled by Mizuho Research Institute Ltd. (MHRl) from official documents published by the Cabinet Office, the Ministry of Finance, the U.S. Department of Commerce and other public offices

the six-industry average (industry average hereinafter) equilibrium rate² is seen shifting toward a higher valuation of the yen throughout the period. Looking at the prevailing market rate and the industry equilibrium rate in each year, in 1980 the market rate (226.5 yen to the dollar) undervalued the yen compared to the equilibrium rate (196.6 yen). However, from 1990 on, while both the market rate and the equilibrium rate showed an increasingly higher valuation of the yen, the market rate put the yen at stronger levels than the equilibrium rate. The discrepancy is particularly remarkable in 2011, when the market rate (79.7 yen) valued the Japanese currency stronger than the industry average equilibrium rate (107.7 yen) by as much as 35%.

Also, looking at what is known as the comparative advantage (i.e., price competitiveness) of each industry,³ we can see that the relative strengths of the six industries have changed over time. In 1980 and 1990, the most advantageous industry was electric machinery, but in 2000 primary metals such as the iron & steel industry was placed first, and in 2011 chemicals was the most cost competitive industry. Comparing 2000 and 2011, we can also observe that the equilibrium rates for general machinery, chemicals and transportation equipment shifted more toward stronger yen levels to the dollar than for the other industries. It can be said that these industries were more successful in maintaining and boosting price competitiveness through efforts to reduce production costs than the other industries. However, the prevailing market rate in 2011 still put the yen at much stronger levels than the equilibrium rates of these relatively competitive industries.

3. The discrepancy between the two equilibrium exchange rates suggests squeezed margins for Japanese companies

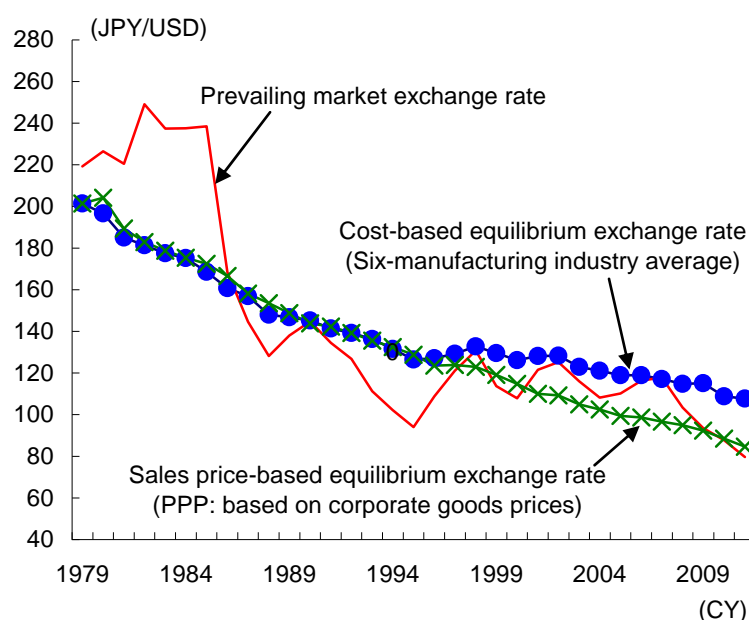
Next, we compared two different equilibrium exchange rates (**Chart 2**). One is the industry average equilibrium rate that we computed above, and the other is the more

² The six-industry average equilibrium exchange rate takes the average of the individual industries' equilibrium exchange rates weighted by the respective export volumes.

³ The differences in the equilibrium exchange rates by industry indicate the comparative advantage (price competitiveness) of the respective industries. It is thought that an individual industry's trade balance (the distinction between an export-specializing industry and an import-specializing industry) is determined by the actual currency exchange rate and by where the industry stands in terms of comparative advantage. According to the calculation of industry-by-industry equilibrium exchange rates in Cabinet Office (2009), the most competitive sector as of 2007 was electric machinery (equilibrium rate at 95 yen to the dollar) and the least competitive industry was textiles (133 yen to the dollar).

commonly used equilibrium exchange rate derived from PPP (based on corporate goods prices). We can understand the difference as the former being based on costs,⁴ and the latter based on sales prices which also reflect markups (where a certain level of profit is added to costs). The two equilibrium rates moved more or less in tandem toward stronger yen-to-dollar levels beginning in 1979, but diverged in a significant way in the late 1990s, when the Japanese economy plunged into deflation. This situation where the exchange rate based on sales prices places the yen stronger than the cost-based exchange rate indicates that the margins for Japanese companies are being suppressed compared to their U.S. counterparts.

Chart 2: Historical changes in the yen/dollar market rate and the two equilibrium exchange rates



Note: The equilibrium exchange rates were computed in the way described in the note to Chart 1.

Sources: Compiled by MHRI from official documents published by the Cabinet Office, the Ministry of Finance, the U.S. Department of Commerce and other public offices

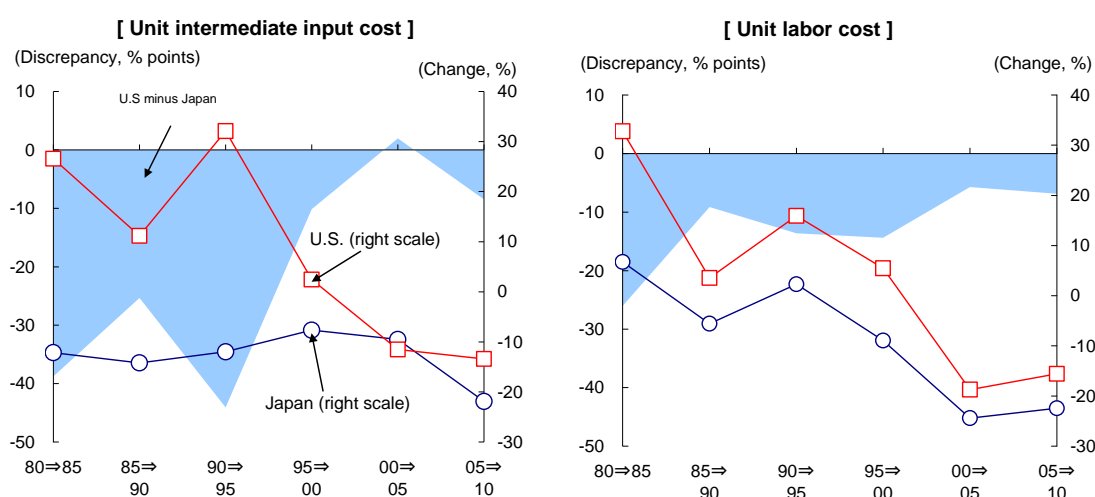
The suppressed levels of Japanese business profits can be attributed to either insufficient cost-cutting efforts or to inadequate price-setting for companies to secure reasonable margins. From the aspect of costs, the very fact that the cost-based

⁴ If we assume that the profit rate is zero, then the equation “price = cost” will hold. It can be added to right-hand side if we assume a certain level of profit rate, but it will not affect the computation of equilibrium rates after the base point so long as the profit rate is held constant.

equilibrium rate has shifted to stronger yen levels means that Japanese companies have made greater efforts to cut costs than their U.S. counterparts. In fact, as far as we can observe from changes in the unit intermediate input cost and the unit labor cost in the two countries, we can conclude that Japanese businesses have made more efforts to slash costs than U.S. firms (**Chart 3**). The difference in the pace of cost reduction (the pace in Japan minus that in the U.S.) is narrowing as U.S. companies catch up in their cost-cutting efforts. However, even in the recent period between 2005 and 2010, the pace of cost reduction by Japanese companies remained faster than that by U.S. companies.⁵

From this point of view, we can say that Japanese company profits have been suppressed not by cost but by inadequate price setting. In fact, due to the severe price competition amid deflation which has gripped Japan since the late 1990s, Japanese businesses have had no choice but to lower sales prices and live with narrower margins.

Chart 3: Comparison of production costs between Japan and the U.S



Note: Percentage changes were computed in the unit intermediate input cost and the unit labor cost in Japan and the U.S. respectively, and the differences between the two countries were calculated.

Sources: Compiled by MHRI from official documents published by the Cabinet Office and the U.S. Department of Commerce

⁵ By breaking down changes in the unit labor cost in Japan into changes in the unit wage and labor productivity, we can see that the reduction in the unit labor cost from the late 1990s is the result of both suppressed wage levels and labor productivity improvements.

Needless to say, corporate profits increase if businesses can buy cheap and sell dear. However, as can be seen in the continued decline in terms of trade (expressed as the sales price diffusion index minus the purchasing price diffusion index) reported in the Bank of Japan's *Short-term Economic Survey of Enterprises in Japan (Tankan)*, we can say that Japanese companies continue to face a severely unprofitable environment where sales prices remain under constant pressure.

We can summarize our findings by saying that companies in Japan have been subjected to harsh price competition amid continuing deflation, resulting in a situation where the PPP equilibrium exchange rate, which is based on sales prices, has moved to stronger yen levels than the industry average equilibrium rate based on cost. It can be said that the oft-mentioned currency level of the mid-80 yen to the mid-90 yen to the dollar, which is derived from PPP, is a level resulting from the fact that Japanese companies have forsaken reasonable margins in response to severe price competition—or the fact that the domestic economy has been so sluggish that companies have had no other choice.

4. From the perspective of the industry average equilibrium rate, the yen has more room to decline if Japan escapes deflation

Without doubt, the decline of the yen which started at the end of 2012 will help improve the country's exports and production as well as the profitability and sentiment of export companies. Given that the average break-even exchange rate among export companies is 83.9 yen to the dollar (according to the *FY2012 Annual Survey on Corporate Behavior* by the Cabinet Office), the current level in the mid-90 yen range allows export companies to secure a profit. Also, from the perspective of PPP, the current yen-to-dollar exchange rate has already fallen to a level where there is little room for further decline.

On the other hand, compared to the industry average equilibrium rate (107.7 yen to the dollar in 2011), the yen remains overvalued. Then, is it realistic to assume that the yen will continue to weaken beyond 100 yen to the dollar? The key to this question lies in whether the domestic economy will see a full-fledged recovery, and whether Japan can really pull itself out of deflation. It can be assumed that in an economy where deflation has become a thing of the past, companies are freed from the spell of endless price competition and are able to secure sufficient profits. The discrepancy between the industry average equilibrium rate and the PPP-based equilibrium rate that we saw earlier will likely shrink and ultimately disappear altogether. The market exchange rate will also gradually converge on the equilibrium rate, making it likely that the yen will eventually

weaken beyond 100 yen to the dollar. Needless to say, the increase in import prices resulting from a weakening yen will push up costs for domestic-demand companies and small and medium enterprises. Still, in an economy that has successfully put deflation behind it, companies are more likely able to pass cost increases on to sales prices, making it easier to offset the negative impact on profitability. It is also more likely that the benefits of a weaker yen will be felt across a wide range of sectors through wage increases and other positive movements.

Furthermore, at exchange rate levels over 100 yen to the dollar, it is possible that domestic capital spending by export companies may pick up. The Osaka Chamber of Commerce asked its member companies at what currency levels they are likely to make major business decisions. (*“Cho-endaka no zesei e no ugoki ga kigyo keiei ni oyobosu eikyo ni kansuru chosa”* (Survey regarding the impact of a reversal of the excessive strength of the Yen on corporate activities)⁶) According to the survey, to make a decision on “expansion of exports or cultivation of export markets,” more respondents (20.1%) said they would look for a rate of “95 yen or higher to less than 100 yen,” while to make a decision on “expansion of domestic capital spending,” the highest percentage of respondents (11.6%) looked for a rate of “110 yen or higher.” The rate of 110 yen to the dollar is a level close to the industry average equilibrium rate that we looked at earlier. This means that, if the actual exchange rate shifts and stays close to that level, corporate spending can be expected to increase and boost domestic demand.

Finally, many export companies have built resistance to the effects of the yen’s appreciation by such efforts as cost cutting and productivity improvement, and have adjusted themselves to break even at stronger yen levels. If Japanese companies continue to make every effort to improve efficiency, even if the yen weakens and stays at levels above 100 yen to the dollar, it is likely that they will greatly improve their competitiveness in global markets. And if this actually occurs, it will be an opportunity for Japanese export companies and manufacturing to regain their strength.

⁶ Based on the results of the survey of the 1,476 member manufacturing companies belonging to the Osaka Chamber of Commerce, conducted between January 28 and February 5, 2013. The number of companies providing effective responses was 164 (for a response rate of 11.1%).