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Japan Economics Analyst

Estimating Wage Growth Rates Consistent With 2% Inflation Path (Otani)

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Service prices are strongly influenced by wage growth, and are an essential driving factor when it comes to achieving sustainable 2% inflation. In the early 1990s, 2% inflation was achieved primarily because of growth in service prices, while goods inflation was much lower.

We assume this is why the Bank of Japan (BOJ) is emphasizing the importance of an increase in service prices along with wage growth in its monetary policy. However, while wage growth is currently approaching 3%, which the BOJ has described as a level consistent with 2% inflation, underlying inflation, which we define as service inflation caused by an increase in wage growth, remains some distance from the 2% target.

In this report, we analyze wage growth rates consistent with the path to 2% inflation, as we believe this could provide a useful perspective for assessing the pace of the BOJ's rate hikes by comparing these rates with actual wage growth.

The BOJ forecasts that underlying inflation will reach 2% by the end of March 2027, driven by stronger cost-push pressure from wage increases, similar to the early 1990s. We examine wage growth rates consistent with this inflation path from two perspectives: wage pass-through to service prices and ULC.

While the estimated result should be interpreted with a margin, our two methods suggest that if wage growth accelerates to around 3.0%-3.1% in 2025 and around 3.3-3.4% in 2026, the BOJ's envisioned 2% inflation path is achievable from the perspective of cost-push pressure accompanying wage increases.

We maintain our base case scenario of two rate hikes per year, with the next increase in July 2025, assuming underlying inflation would reach 2% as the BOJ projects. We believe the pace of the BOJ's rate hikes could accelerate if actual wage growth were to exceed levels consistent with a 2% inflation path by a large margin, or could be slower than we expect if wage growth were to fall well short of these levels.

Estimating Wage Growth Rates Consistent With 2% Inflation Path

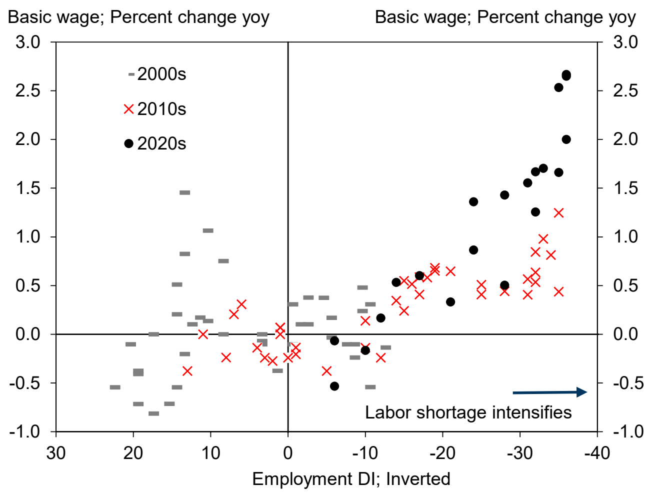
In the early 1990s, 2% inflation was achieved primarily because of growth in service prices, while the GDP deflator was also pushed up steadily by unit labor costs. However, while wage growth is currently approaching 3%, which the BOJ has described as a level consistent with 2% inflation, underlying inflation remains some distance from the 2% target.

The BOJ considers 2% inflation achievable within its projection period until March, 2027. It has stated that wage growth of 3% is consistent with its sustainable 2% inflation target. This is because a wage growth rate of 3% is expected to drive 2% inflation, assuming long-term growth in labor productivity is around 1%. Full-time workers' base pay growth is currently around 3% on a "same sample" basis (which is closely watched by the BOJ), and growth in total cash earnings (includes bonuses; hereinafter referred to as "wage growth") rose to 2.8% on average in 2024. Given Japan's labor shortage is expected to intensify, wage growth is expected to reach 3% soon (Exhibit 1). Despite this, underlying inflation (which we define as service price inflation driven by wage growth), which the BOJ considers the most important factor in monetary policy, continues to rise only moderately and remains below 2% (Exhibit 2). This suggests that a 3% wage increase may not necessarily be consistent with 2% inflation. With this in mind, we analyze a range of wage growth which appears consistent with the BOJ's envisioned path to 2% inflation.

Prices can be broadly categorized into goods and service prices. Goods prices tend to fluctuate to a greater extent, because they are significantly affected by exchange rate changes and international factors. Therefore, we believe service prices, which are strongly influenced by wage growth, would need to be the driving force in order to achieve sustainable 2% inflation. Japan's achievement of 2% inflation in the early 1990s was driven primarily by growth in service prices accompanying wage increases. In addition, the GDP deflator was pushed up steadily by unit labor costs (ULC; Exhibit 3)[1]. We assume this is why the Bank of Japan (BOJ) is emphasizing the importance of an increase in service prices along with wage growth in its monetary policy.

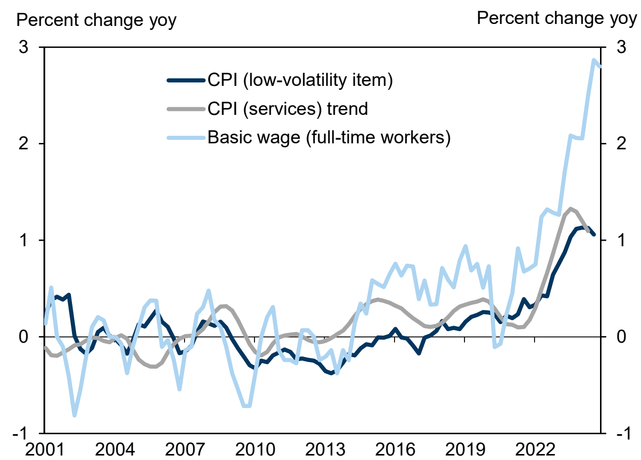
[1] Unit labor costs represent the labor cost required to produce one unit of added value.

Exhibit 1: Wage Phillips Curve Has Steepened Amid Intensifying Labor Shortage
Wage Phillips Curve



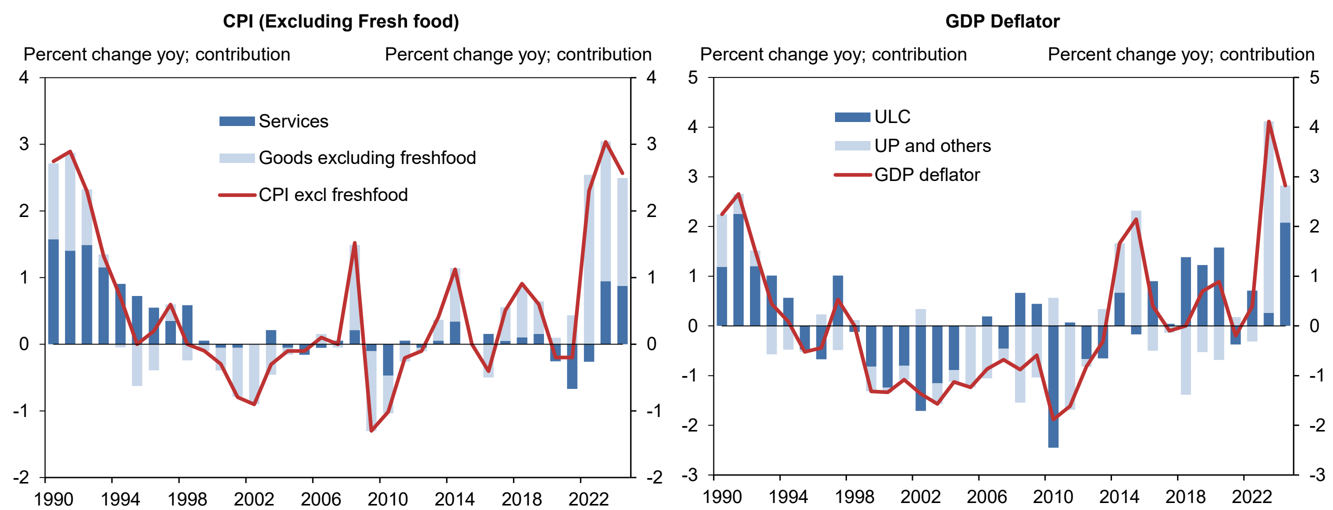
Source: Ministry of Health, Labour and Welfare, BoJ, Data compiled by Goldman Sachs Global Investment Research

Exhibit 2: Modest Increase in Underlying Inflation but Still Falls Short of 2%
Wage and Underlying Inflation Trends



Source: Ministry of Health, Labour and Welfare, BoJ

Exhibit 3: Japan's Achievement of 2% Inflation in Early 1990s was Driven Primarily by Growth in Service Prices; ULC Also Pushed Up GDP Deflator Steadily



UP (unit profit) and others in the right-hand chart is calculated as the residual excluding ULC.

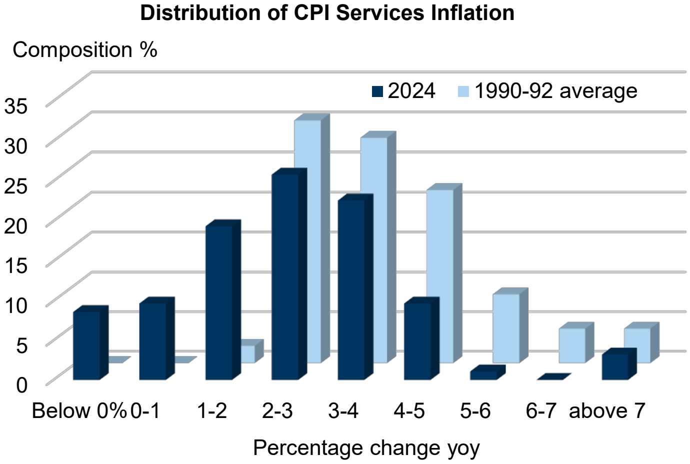
Source: Ministry of Internal Affairs and Communications, Cabinet Office, Goldman Sachs Global Investment Research

However, recent trends show that while service prices have increased since 2023, their contribution to inflation has not reached the same level as in the early 1990s. On the other hand, the positive contribution from ULC in 2023 exceeded that from the early 1990s, but this was due to the catch-up effect from the prior year, when wages did not rise as much as prices, and it appears there is still some way to go before ULC can help achieve a sustained increase in the GDP deflator. Furthermore, the distribution of CPI services inflation indicates that both the weighted median and mode are lower than in the early 1990s, and inflation is below +2% for a considerable number of items (Exhibit 4).

Exhibit 4: Compared to Early 1990s, Service Prices Have Lower Weighted Median and Mode, and Inflation is Below +2% for Considerable Number of Items

Weighted Mean and Mode of CPI Services

	Weighted Mean	Mode
1990-1992	3.6%	2.8%
2024	2.5%	2.3%



We use single item data for general services (excluding imputed rent and private rent).

Source: Ministry of Internal Affairs and Communications, Goldman Sachs Global Investment Research

The BOJ expects underlying inflation to reach 2% by the end of March 2027, driven by stronger cost-push pressure from wage increases, similar to the early 1990s. We believe that showing the specific range of wage growth consistent with this path could provide a useful perspective for assessing the pace of BOJ rate increases. We consider wage growth rates consistent with this inflation path in terms of wage pass-through to service prices and ULC.

The BOJ expects underlying inflation to reach 2% in the latter half of its forecast horizon through to the end of March 2027, driven by stronger cost-push pressure from wage increases, similar to the early 1990s. We believe that showing the specific range of wage growth consistent with this path could provide a useful threshold for assessing the pace of the BOJ's rate increases, a topic of considerable interest to market participants.

In this report, we assume the BOJ expects cost-push pressure from wage increases to gradually strengthen, reaching a level comparable to the early 1990s (when +2% inflation was achieved) by 2026. In analyzing wage growth rates consistent with this path, we use two measures for cost-push pressure from wage increases. The first is wage pass-through to service prices (wage growth rate multiplied by pass-through rate), and the second is the impact of ULC on the GDP deflator.

Our two methods suggest that if wage growth accelerates to around 3.0%-3.1% in 2025 and around 3.3%-3.4% in 2026, the BOJ's envisioned 2% inflation path is achievable from the perspective of cost-push pressure accompanying wage increases. If actual wage growth were to accelerate beyond this level, we think the pace of the BOJ's rate hikes could also accelerate. Conversely, if wage growth falls short of this level, the pace of rate hikes could be slower than we expect.

We first estimate wage growth rates consistent with a 2% inflation path based on the impact of wage pass-through to service prices. In this case, we need to take into account the pass-through rate of wages to service prices. Our estimation shows that the pass-through rate has declined from around 0.5 in the first half of the 1990s to around 0.3 recently (Exhibit 5).

Exhibit 5: Wage Pass-Through to Service Prices Has Declined Significantly
Pass-through Rate

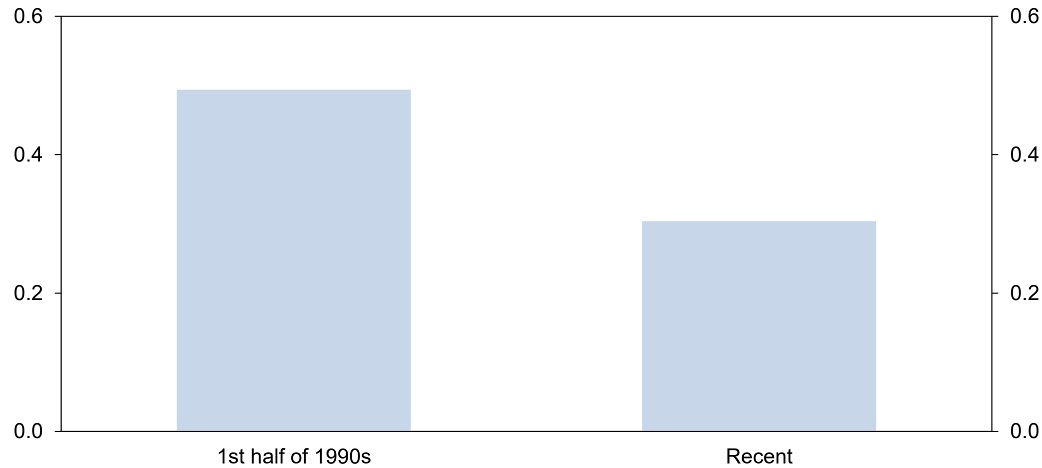


Chart shows the impact of a 1% wage increase on the level of service prices (%, cumulative over four quarters) based on VAR analysis using output gap, wages (total cash earnings), and CPI (general services excluding private rent/imputed rent and adjusted for the effects of consumption tax and special facors such as free education, mobile phone price reductions, and nationwide travel support) as endogenous variables and yen-denominated import prices as exogenous variables. Data from 1987 to 1994 are used for the first half of the 1990s, and data from 2020 to 2024 are used for the recent period. The accumulated impulses are 90% significant for the first half of the 1990s and 80% significant for the recent period. For the recent pass-through estimation, the deviation between the actual value and the trend calculated using the HP filter for a new index (coincident index, services index) that captures economic activity is used instead of the output gap.

Source: Ministry of Health, Labour and Welfare, Ministry of Internal Affairs and Communications, Cabinet Office, BoJ, Goldman Sachs Global Investment Research

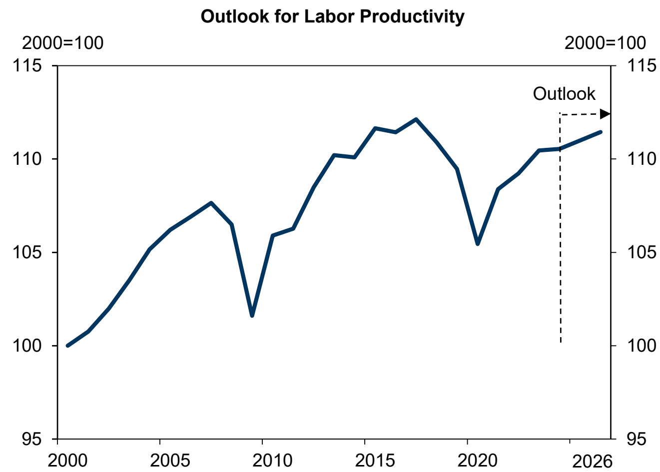
In its Outlook Report and research papers, the BOJ evaluates the current distribution of service inflation and wage pass-through to service prices by comparing them to the situation in the early 1990s, implicitly suggesting the BOJ believes the early 1990s was when 2% inflation was realized and is aiming for the situation then. In addition, the BOJ forecasts that long-term inflation expectations will rise further from the current level of around 1.5%. Rising inflation expectations mean that households are more accepting of higher prices as wages increase, and that companies find it easier to pass on costs. We believe the BOJ is projecting the pass-through rate will rise as well. Therefore, we assume it expects: (1) the same cost-push pressure from wages seen in the early 1990s to occur in 2026 as wage growth and pass-through rates reach similar levels to those seen during that period; and (2) cost-push pressure from wages and the pass-through rate to increase in 2025 by half the increase from 2024 through 2026. Based on this assumption, wage growth rates consistent with this path would be around 3.1% in 2025 and around 3.3% in 2026, the same as in the early 1990s.

Next, we analyze wage growth rates consistent with a 2% inflation path in terms of ULC. The GDP deflator can be decomposed into ULC and UP and unit taxes. Based on this relationship, the contribution of ULC to the change in the GDP deflator is labor share multiplied by [wage growth rate - change in labor productivity][2]. We therefore

[2] The GDP deflator = nominal GDP / real GDP = employee compensation / real GDP + (nominal GDP - employee compensation) / real GDP, where the first term represents ULC and the second term represents UP and other terms. ULC is also wages / labor productivity. Based on these relationships, the contribution of ULC to the change yoy in the GDP deflator is labor share multiplied by [wage growth rate - change in labor

need to project future trends in labor productivity and labor share in order to calculate wage growth rates consistent with a 2% inflation path. Labor productivity and labor share are likely to rise due to the strengthening of a high-pressure economy through intensifying labor shortages as the population declines. Based on the correlations outlined in our report, both factors are expected to increase gradually going forward (Exhibit 6). We also assume the BOJ expects: (1) the same contribution from ULC to the GDP deflator to emerge in 2026 as in the early 1990s, and (2) the contribution from ULC to the GDP deflator to rise in 2025 by half the increase from 2024 through 2026[3]. Using our projections for labor productivity and labor share, we estimate that wage growth rates consistent with the BOJ's envisioned path are around +3.0% in 2025 and around +3.4% in 2026.

Exhibit 6: Labor Productivity and Labor Share Could Increase Gradually Amid Intensifying Labor Shortage



For labor productivity, we calculate the impact of software capital stock on labor productivity and project future trends assuming that the average growth rate of software stock for addressing labor shortages since 2020 will continue in the future. For labor share, we analyze the effect of labor shortage and project it by extraporating the future trend in labor shortage based on the unemployment rate outlook published by the Japan Institute for Labour Policy and Training.

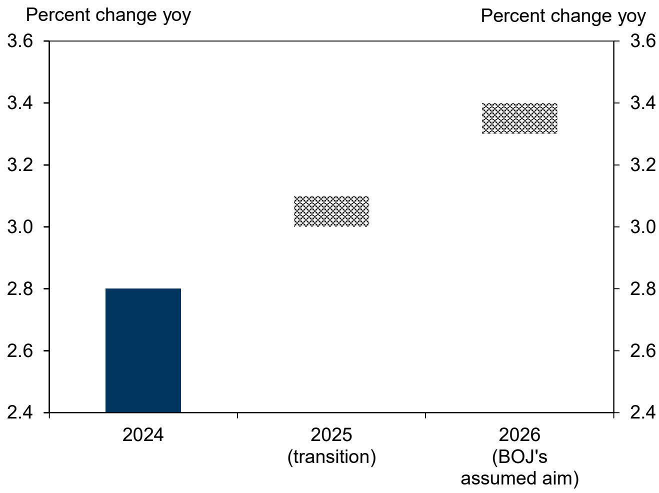
Source: Cabinet Office, BoJ, Japan Institute for Labour Policy and Training, RIETI, Goldman Sachs Global Investment Research

In this report, we estimated wage growth rates consistent with a 2% inflation path from the perspectives of wage pass-through and ULC. Our findings suggest that these are around 3.0%-3.1% for 2025 and around 3.3%-3.4% for 2026 (Exhibit 7). Wages did not rise under long-lasting deflation, but are now rising under a high-pressure economy and need to accelerate more gradually to achieve stable 2% inflation going forward (Exhibit 8). While the results should be interpreted with a margin, we think the BOJ is likely to continue raising policy rates gradually, as it has indicated to date, if future wage growth rates are broadly in line with these figures. We maintain our base case scenario of two rate hikes per year, with the next increase in July 2025. However, we believe the pace of the BOJ's rate hikes could accelerate or rate increases could be front-loaded if actual wage growth were to exceed levels consistent with a 2% inflation path by a large margin, or could be slower than we expect if wage growth were to fall well short of these levels.

productivity].

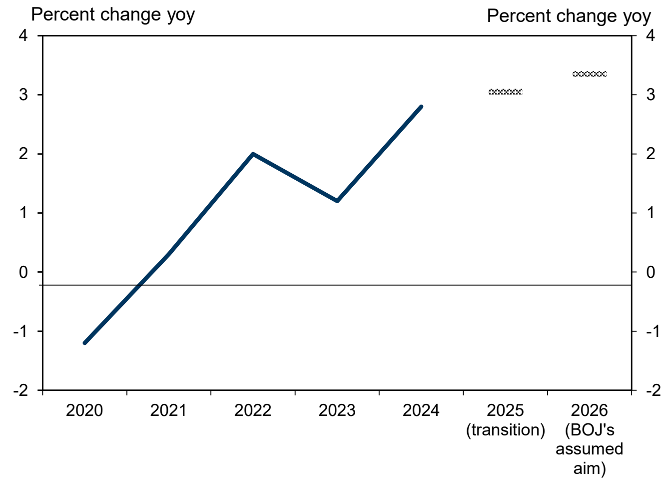
[3] As mentioned above, the contribution from ULC in 2024 increased significantly due to a catch-up effect from 2023, when wages did not rise as much as prices. In order to smooth out these temporary movements when calculating the wage path, we use the average ULC contribution from 2023 and 2024 as the ULC contribution for 2024.

Exhibit 7: We Estimate Wage Growth Rate Consistent with +2% Inflation Path at Around 3.0-3.1% in 2025 and 3.3-3.4% in 2026 from two methods



Source: Ministry of Health, Labour and Welfare, Goldman Sachs Global Investment Research

Exhibit 8: Wages are Now Rising Under a High-pressure Economy
Actual and Estimated Wage Growth Path



Source: Ministry of Health, Labour and Welfare, Goldman Sachs Global Investment Research

Akira Otani

Japan Main Economic Forecasts

	Calendar Year						Fiscal Year					
	2023	2024	2025E	2026E	2027E	2028E	2023	2024E	2025E	2026E	2027E	2028E
Real GDP (YOY %)	**1.5**	**0.1**	**1.3**	**1.1**	**1.1**	**1.0**	**0.7**	**0.8**	**1.1**	**1.1**	**1.1**	**1.0**
Consumption	0.8	0.0	1.0	0.8	0.6	0.6	-0.4	0.8	0.8	0.8	0.6	0.6
Capex	1.5	1.4	1.6	2.2	2.8	2.9	-0.1	2.0	1.6	2.4	2.8	3.0
Housing Investment	1.5	-2.4	0.7	0.0	-0.5	-0.5	0.8	-1.3	0.3	-0.2	-0.5	-0.5
Private Inventories (contribution)	-0.3	-0.1	-0.1	0.0	0.0	0.0	-0.3	0.0	-0.1	0.0	0.0	0.0
Export	3.0	1.0	3.1	2.9	3.5	3.4	2.9	1.8	2.5	3.2	3.5	3.3
Import	-1.5	1.3	2.1	3.7	4.2	4.3	-3.3	3.2	2.0	3.9	4.2	4.4
Government Spending	-0.3	0.9	1.1	0.8	0.7	0.7	-0.8	1.6	0.9	0.7	0.7	0.7
Public Fixed Investment	1.5	-1.0	2.9	5.3	5.8	4.2	-0.3	1.5	3.0	5.5	5.5	3.7
Net Exports (cont.)	0.9	0.0	0.2	-0.1	-0.1	-0.2	1.2	-0.2	0.1	-0.1	-0.1	-0.2
Private Domestic Demand (cont.)	0.4	0.0	0.7	0.8	0.8	0.8	-0.5	0.7	0.6	0.8	0.8	0.8
Public Demand (cont.)	0.0	0.1	0.4	0.4	0.4	0.4	-0.2	0.4	0.3	0.4	0.4	0.3
Nominal GDP (YOY %)	**5.6**	**3.0**	**3.6**	**2.6**	**2.3**	**2.2**	**4.9**	**3.5**	**3.2**	**2.5**	**2.3**	**2.2**
Industrial Production (YOY %)	**-1.2**	**-2.4**	**2.8**	**3.2**	**3.8**	**4.6**	**-1.9**	**-0.4**	**2.6**	**3.4**	**4.0**	**4.7**
Core CPI (YOY %)	**3.1**	**2.6**	**2.6**	**2.0**	**1.7**	**1.7**	**2.8**	**2.7**	**2.5**	**1.9**	**1.7**	**1.7**
New Core CPI (YOY %)	**4.0**	**2.5**	**2.4**	**2.0**	**1.9**	**1.7**	**3.9**	**2.3**	**2.2**	**2.0**	**1.8**	**1.7**
Global Core CPI (YOY %)	**2.6**	**1.9**	**1.9**	**2.1**	**1.8**	**1.7**	**2.6**	**1.7**	**2.0**	**2.0**	**1.8**	**1.7**
Unemployment Rate (%)	2.6	2.5	2.3	2.3	2.3	2.3	2.6	2.5	2.3	2.3	2.3	2.3
Current Account (¥ tn)	22.6	29.3	30.5	28.7	27.1	25.1	26.6	30.2	30.5	28.3	26.6	24.6
BOJ Policy Rate (End of Period; %)	**-0.05**	**0.25**	**0.75**	**1.25**	**1.50**	**1.50**	**0.05**	**0.50**	**1.00**	**1.50**	**1.50**	**1.50**
2-year JGB yield	0.04	0.60	1.20	1.45	1.45	1.45	0.18	0.80	1.30	1.45	1.45	1.45
10-year JGB yield	0.61	1.10	1.60	2.00	2.00	2.00	0.72	1.30	1.70	2.00	2.00	2.00
USD/JPY (End of Period)	142.0	157.4	152.0	145.0	132.0	119.0	151.2	150.0	152.0	145.0	132.0	119.0
EUR/JPY (End of Period)	157.1	162.9	155.0	153.7	145.2	134.5	163.2	160.5	155.0	153.7	145.2	134.5

Source: ゴールドマン・サックス・グローバル投資調査部

	2024				2025				2026			
	1Q	2Q	3Q	4Q	1QE	2QE	3QE	4QE	1QE	2QE	3QE	4QE
Real GDP (QOQ Annualized %)	**-2.1**	**3.2**	**1.4**	**2.2**	**0.6**	**1.0**	**1.1**	**1.1**	**1.0**	**1.1**	**1.1**	**1.2**
Consumption	-1.8	3.1	3.0	0.1	0.1	1.0	1.0	1.0	0.8	0.7	0.7	0.7
Capex	-1.4	4.4	-0.3	2.3	1.2	1.5	2.0	2.0	2.0	2.5	2.5	2.8
Housing Investment	-10.5	5.5	1.8	-0.8	0.5	0.5	0.5	0.0	0.0	0.0	-0.5	-0.5
Private Inventories (contribution)	0.9	0.0	0.4	-1.1	0.4	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
Export	-15.5	6.8	6.1	4.1	2.0	1.5	2.0	2.5	3.0	3.5	3.5	3.5
Import	-10.6	12.6	8.1	-8.3	4.0	2.5	3.0	3.5	3.8	4.0	4.2	4.2
Government Spending	0.9	3.9	0.6	1.6	0.5	1.2	0.8	0.8	0.8	0.7	0.7	0.7
Public Fixed Investment	-8.0	24.6	-4.7	-2.7	3.0	5.0	5.0	5.0	5.0	5.0	6.5	6.5
Net Exports (cont.)	-1.2	-1.0	-0.4	2.6	-0.4	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1
Private Domestic Demand (cont.)	-0.8	2.6	2.0	-0.7	0.7	0.7	0.9	0.9	0.8	0.8	0.8	0.8
Public Demand (cont.)	-0.2	1.8	-0.1	0.1	0.2	0.5	0.4	0.4	0.4	0.4	0.5	0.5
Real GDP (YOY %)	**-0.7**	**-0.7**	**0.7**	**1.1**	**1.9**	**1.3**	**1.2**	**0.9**	**1.0**	**1.1**	**1.1**	**1.1**
Consumption	-1.6	-0.5	1.0	1.1	1.6	1.0	0.6	0.8	0.9	0.9	0.8	0.7
Capex	-0.7	2.4	2.5	1.2	1.9	1.2	1.7	1.7	1.9	2.1	2.3	2.5
Housing Investment	-3.3	-3.3	-2.1	-1.1	1.7	0.5	0.2	0.4	0.2	0.1	-0.1	-0.3
Export	1.4	1.1	1.9	-0.2	4.7	3.4	2.4	2.0	2.2	2.7	3.1	3.4
Import	-3.4	3.8	5.3	-0.1	3.8	1.4	0.2	3.2	3.2	3.6	3.9	4.0
Government Spending	-0.8	1.6	1.3	1.7	1.6	1.0	1.0	0.8	0.9	0.8	0.7	0.7
Public Fixed Investment	-6.2	0.5	0.9	1.4	4.5	0.1	2.5	4.5	5.0	5.0	5.4	5.7
Nominal GDP (YOY %)	**2.3**	**2.3**	**3.1**	**4.0**	**4.5**	**3.7**	**3.3**	**2.9**	**2.7**	**2.6**	**2.5**	**2.6**
Industrial Production (YOY %)	**-4.0**	**-3.0**	**-1.4**	**-1.0**	**4.0**	**1.8**	**2.9**	**2.6**	**2.9**	**3.2**	**3.3**	**3.4**
Core CPI (YOY %)	**2.5**	**2.5**	**2.7**	**2.6**	**2.9**	**2.7**	**2.4**	**2.5**	**2.3**	**2.0**	**2.0**	**1.8**
New Core CPI (YOY %)	**3.2**	**2.2**	**2.0**	**2.4**	**2.5**	**2.5**	**2.3**	**2.1**	**2.0**	**2.0**	**2.1**	**2.0**
Global Core CPI (YOY %)	**2.4**	**1.8**	**1.6**	**1.6**	**1.6**	**1.9**	**1.9**	**2.1**	**2.1**	**2.1**	**2.1**	**2.0**
Unemployment Rate (%)	2.6	2.6	2.5	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Current Account (¥ tn)	6.6	6.9	8.9	6.9	7.6	7.9	9.4	5.6	7.5	7.2	8.6	5.3
BOJ Policy Rate (End of Period; %)	**0.05**	**0.05**	**0.25**	**0.25**	**0.50**	**0.50**	**0.75**	**0.75**	**1.00**	**1.00**	**1.25**	**1.25**
2-year JGB yield (End of Period)	0.18	0.36	0.38	0.60	0.80	1.00	1.10	1.20	1.30	1.40	1.45	1.45
10-year JGB yield (End of Period)	0.72	1.05	0.85	1.10	1.30	1.40	1.50	1.60	1.70	1.80	1.90	2.00
USD/JPY (End of Period)	151.2	160.9	143.3	157.4	150.0	150.0	151.0	152.0	152.0	150.0	147.0	145.0
EUR/JPY (End of Period)	163.2	172.3	159.7	162.9	160.5	160.5	158.6	155.0	155.0	154.5	154.4	153.7

Source: Goldman Sachs Global Investment Research

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