

Index Insights | Fixed Income

A yen to carry or time to hedge?

November 2026

AUTHOR

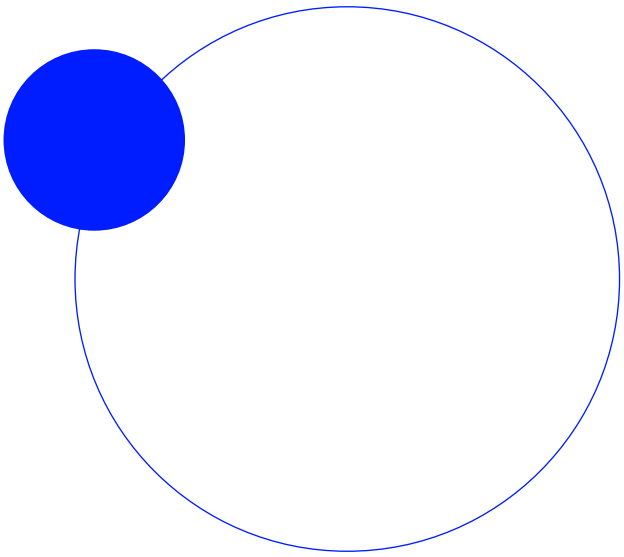
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Overview

Recent foreign exchange (FX) intervention to support the Japanese yen, and the yen exchange rate at 40 year lows versus the US dollar, raise key issues around dollar/yen valuation, FX hedging ratios for US Treasury holdings and the yen carry trade. US support for the yen signals broader G7 concern about dollar/yen valuation, which was voiced by Treasury Secretary Bessent.

In this paper, we first assess the key drivers of the yen as a low yielding funding currency in recent decades, and the extent of the yen's undervaluation versus fundamental measures, like purchasing power parity (PPP). We then address the implications of yen weakness for WGBI-ex Japan returns, for Japanese investors both FX hedged and unhedged, and the optimal FX hedging ratio. For the period 1986 to 2026, we find the optimal FX hedging ratio was not 100% for yen-based investors, even if the objective was to minimise variance of index returns only. This may have been due to the underlying correlation of asset returns in fixed income and foreign exchange, which conferred portfolio diversification benefits on investors. Indeed, the 100% FX hedged WGBI index underperformed both the 50% FX hedged index on variance, and the FX unhedged index, measured by the mean/variance of returns.



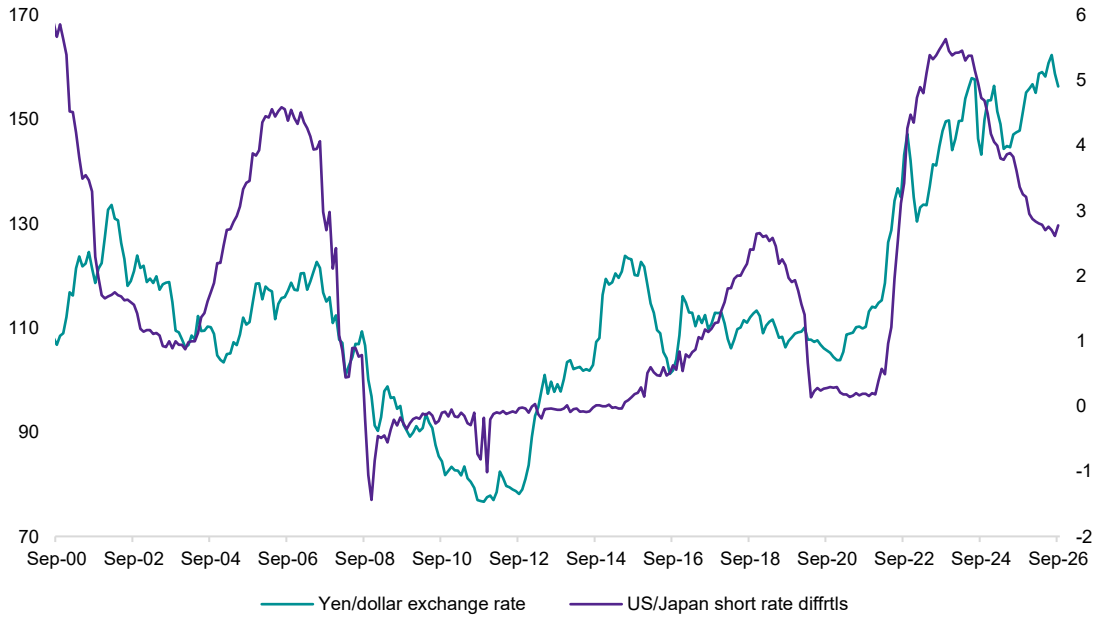
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Yen undervaluation and the carry trade

The advent of the yen as a very low yielding funding currency in recent decades, suitable for carry trades, may well be linked to yen undervaluation. US-Japan interest rate differentials since 2000 tend to confirm this, as Chart 1 shows.

Chart 1: US/Japan interest rate differentials and dollar/yen



Source: LSEG, FTSE Russell. Data to September 2026.

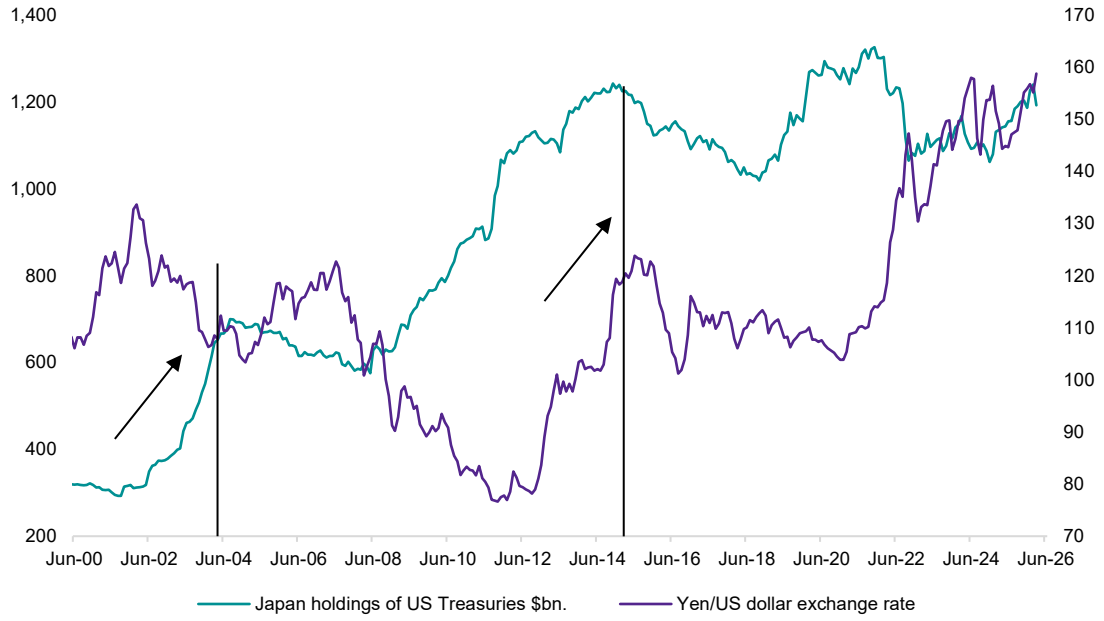
Because these rate differentials have persisted, the yen carry trade (YCT) has been a feature of financial markets for a considerable time, and the scale of the YCT is now substantial. Most estimates suggest a total size of at least $1 trillion[1]. but this covers a range of yen exposures from derivatives as well as FX forwards, swaps, debt portfolios, and institutional balance sheets. These are not simply speculative hedge fund positions. The fact that cheap, and stable, yen funding has been available for so long has driven the growth in these exposures, and also increases the risks of a disorderly unwind, when funding conditions change.

Empirical support for the YCT comes from the fact low yielding currencies, like the yen, have tended to under-perform relative to their forward rates, or uncovered interest parity (please see our earlier note[2]). Indeed, the YCT relies on uncovered interest parity not working reliably, so that low yielding currencies, like the yen, fail to appreciate sufficiently to offset the yield disadvantage they have versus higher yielding currencies[3].

[1] BIS estimate.
[2] See A currency hedge that didn't need to be trimmed | LSEG, 2023.
[3] See Charles Engel, Ekaterina Kazakova,Mengqi Wang and Nan Xiang, 2021. "**A Reconsideration of the Failure of Uncovered Interest Parity for the US Dollar**," NBER Chapters, in: NBER International Seminar on Macroeconomics 2021, National Bureau of Economic Research, Inc.

In addition to the YCT, there are also ongoing direct Japanese institutional flows into foreign assets, from life insurers, pension funds and regional banks, and other Japanese savings outflows. Japan's sizeable and persistent current account surplus means the country's net creditor status is substantial. For example, Japan holds approximately $1 trillion in US Treasuries, as Chart 2 shows. But the Chart also shows correlation between Japanese US Treasury holdings and the dollar/yen exchange rate is low. Somewhat counter-intuitively, Japan's US Treasury holdings have increased, both during periods of yen strength (2002-04) and yen weakness (2012-14).

Chart 2: Japan holdings of US Treasuries and yen/dollar exchange rate



Source: LSEG Datastream, US Treasury. Monthly data to end-June 2026.

So what are the key drivers of Japanese overseas holdings ?....

This suggests other variables are key drivers of Japanese holdings in US Treasuries, and the YCT, rather than the yen/dollar exchange rate. In fact, we find the correlation of US dollar/yen hedging costs and Japanese holdings of US Treasuries is notably higher than the yen/dollar exchange rate, as Table 1 shows. This seems intuitive, since hedging ratios for the FX exposure in overseas assets are highly relevant for Japanese institutional investors, even if a hedge fund pursuing a YCT may prefer to run the FX exposure in the hope of boosting returns, rather than hedging it.

Treasury holdings show higher correlations with short rate differentials …

Table 1 shows a negative correlation between holdings of US Treasuries and yield differentials in favour of Treasuries, which may reflect the dominant role of hedging costs in driving Japanese holdings of Treasuries, since hedging costs generally increase as US short rates and Treasury yields increase. The -0.77 negative correlation between hedging costs and Treasury holdings since March 2022, when the Fed first raised rates post-Covid, confirms this, and this is also shown in the higher negative correlation of 3rd differences, at -0.47 (where the change in Treasury holdings has been lagged 3 months to allow more time for decisions to change institutional portfolio allocations). The fact that the cross-currency basis cost of hedging has also increased in recent years may also have contributed.

….and so does the yen/dollar exchange rate

The correlation of the dollar/yen exchange rate is notably higher with short rate differentials, than 10 year yield differentials. This is explained by the FX forward market being built around short term funding, uncovered interest parity and arbitrage between spot and forward rates. Similarly carry trades are generally funded in short-term money. 10 year yields also reflect factors like the term premium, LDI flows and government debt issuance, which have little bearing on FX rates.

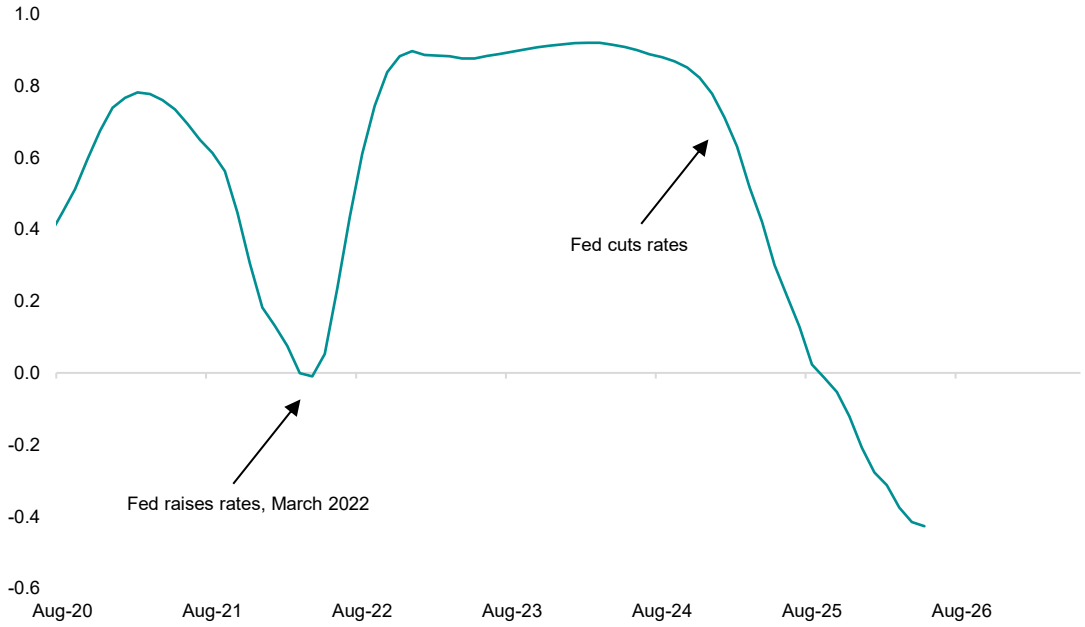
Table 1: Correlations of US Treasury holdings and dollar/yen with selected variables

Variable	Correlation coefficient with US/Japan 10 year yield differentials.			Correlation coefficient with short rate differentials/ hedging costs		
	Since January 2000	Since June 2008	Since March 2022	Since January 2000	Since June 2008	Since March 2022
Japan holdings of US Treasuries	-0.612 (3rd differences = -0.34)	-0.124 (3rd differences = -0.39)	-0.74 (3rd differences = -0.54)	-0.28 (3rd differences = -0.20)	0.20 (3rd differences = -0.40)	-0.77 (3rd differences = -0.47)
US dollar/yen	0.48	0.63	-0.11	0.64	0.82	0.16

Source: LSEG, US Treasury, monthly data to June 2026.

However, note that the correlation of the yen/dollar exchange rate with short rate differentials has been much lower since March 2022, falling to only 0.16 since March 2022. This is confirmed in the 36 month rolling correlation of the exchange rate with short rate differentials, shown in Chart 3. This increases sharply as the Fed raises rates from March 2022 onwards and peaks in 2024, before the Fed began easing rates in September 2024, and has collapsed since, turning negative in August 2025. This suggests other variables, like extent of yen undervaluation relative to PPP, FX intervention in support of the yen, expectations of higher Japanese rates and potential unwind of the carry trade may be becoming key drivers.

Chart 3: 36 Month rolling correlation of yen/dollar with short rate differentials



Source: LSEG Datastream, monthly data to Aug.2026.

Since FX hedging costs directly impact the relative value of investing in Treasuries, the correlation between Japan's US Treasury holdings and hedging costs is unsurprising. Indeed, some bond investors are obliged to hedge FX risk entirely by regulators. Theoretically, the higher volatility of FX returns, relative to government bonds, gives an optimal FX hedging ratio (HR) of 100% for overseas bond holdings, if the objective is purely to minimise the variance of returns, regardless of currency valuation. This can also be justified on the assumption exchange rates are stationary, and expected FX returns are zero in the longer run.

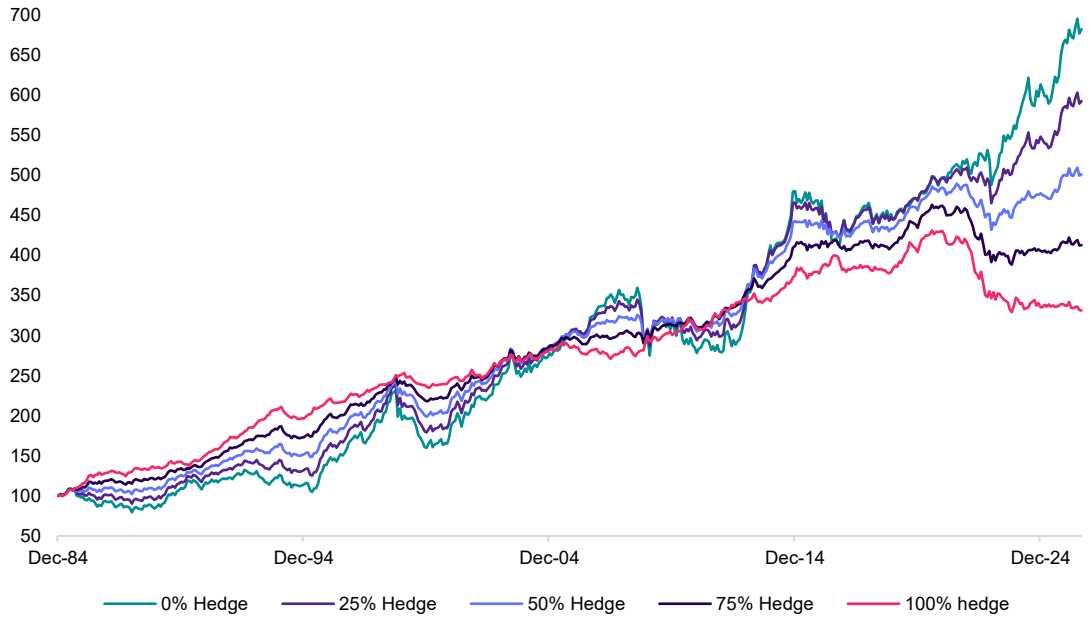
Importantly, optimal hedging ratio to minimise variance of WGBI ex Jpn returns since 1986 was not 100%...

To capture returns in other global bond markets, and extend the analysis of FX hedging, we assess the impact of different FX hedging ratios on WGBI ex Japan returns for yen-based investors, since 1986. We also look at the more recent sub-periods since 2016, and 2022-26, to see if the optimal hedge ratio (OHR) has changed, as FX and fixed income regimes changed. We look first at a risk-based approach, based on minimising variance, and maximising risk-adjusted returns.

This can be seen in Charts 4 and 5. The most striking feature is firstly the divergence and outperformance by the unhedged WGBI ex Japan index since 2022, when overseas hedging costs increased sharply, as rates went up, led by the US, and the dollar appreciated versus the yen. So hedged WGBI indexes underperformed as returns were

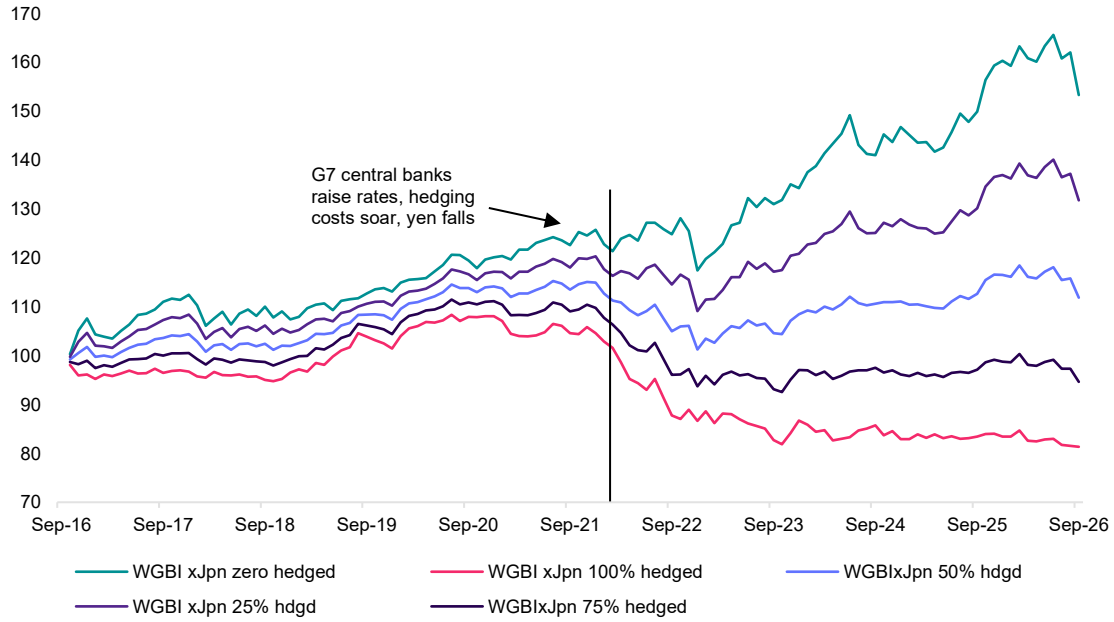
squeezed by the combination of higher hedging costs, and the lower exposure of these indexes to FX gains from the yen's weakness in the post-2022 period.

Chart 4: WGBI ex Jpn cumulative returns in yen, by hedge ratio, since 1986



Source: LSEG Yield Book, data to end-August 2026.

Chart 5: WGBI ex Jpn cumulative returns in yen, by FX hedge ratio, since 2016



Source: LSEG Yield Book, data to end-August 2026.

Table 2: WGBI ex Jpn returns and volatility for selected FX hedging ratios

If we drill down further into the results, Table 2 shows that the standard deviation (SD) of returns is not even minimised by 100% FX hedging the WGBI index in the period 2016-26, even if it is since 1986, marginally. In fact, volatility of returns does not have a monotonic relationship with the degree of hedging since 2016, and the SD of returns is minimised with a hedge ratio between 50 and 75%. Even then, the reduction in SD is not much over 2%, compared with a zero hedged portfolio.

However because of the higher costs of FX hedging, and yen weakness, particularly in the sub-period since 2022, the reduction in hedged returns is significant and the highest returns per unit of risk are still evident in the zero-hedged portfolio. These results show that the OHR to minimise the variance of returns – in this case, a ratio of 50-75% – may well differ from the OHR for risk-adjusted returns (in this case, a zero hedge ratio). Finally, the results show that different sub-periods over the 40 years have driven different OHRs, reflecting variations in the cross-correlations between bond and FX returns and the degree of FX volatility and performance.

FX hedging ratios for WGBI ex Jpn index	Annualised returns 1986-2026 %	St.dev of ann.returns 1986-2026 %	Returns/ st.dev.of returns 1986-2026	Annualised returns 2016-26 %	St.dev of ann. Returns 2016-26 %	Returns/ st.dev. of returns%	Annualised returns 2022-26 %	St.dev. of ann.returns 2022-26 %	Returns/ st.dev. of returns 2022-26
Zero-hedged	4.71	9.74	0.50	5.16	5.97	0.86	7.06	7.02	1.01
25% hedged	4.36	7.52	0.58	3.44	4.6	0.75	4.17	5.48	0.76
50% hedged	3.94	5.56	0.71	1.8	3.82	0.47	1.3	4.54	0.29
75% hedged	3.47	4.22	0.82	-0.08	3.81	-0.21	-1.5	4.56	-0.33
100% hedged	2.91	4.14	0.70	-1.68	4.85	-0.35	-4.68	5.7	-0.82

Source: LSEG Yield Book. Data to end-August 2026. Please see the end for important legal disclosures.

FX valuations can be used as inputs in FX hedging ratios

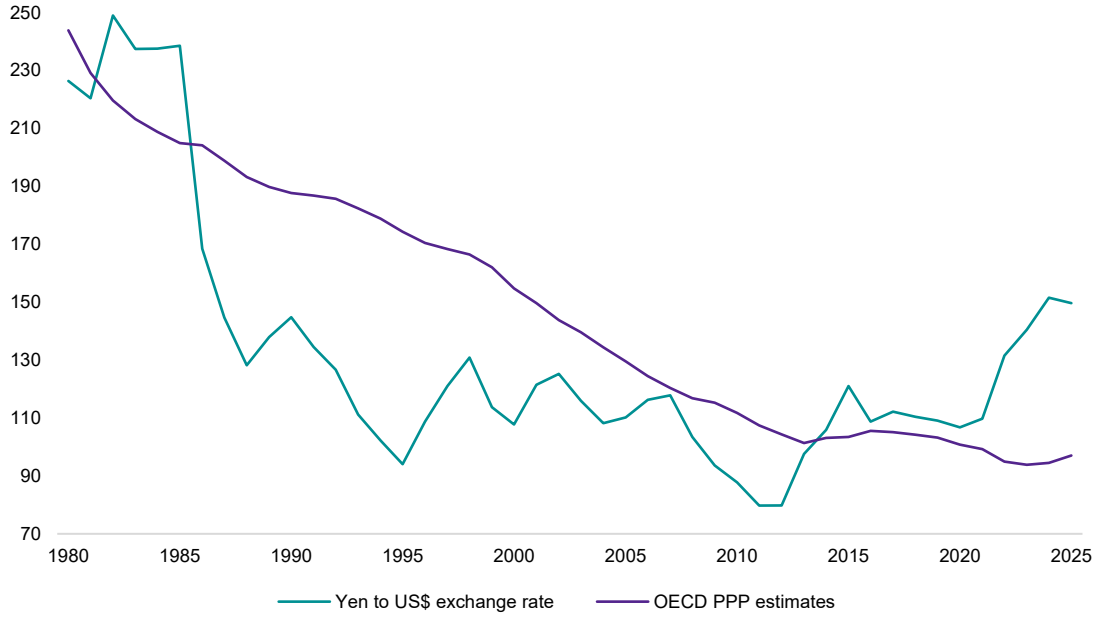
The risk-based approach to FX hedging ratios assumes expected FX returns are zero, regardless of currency valuation. This enables a unique solution to be found for the optimal degree of FX hedging, which minimises variance, or maximises risk adjusted returns of the overall index, or investor portfolio, as Table 2 shows. But to make FX hedging ratios more flexible, and allow tactical variation around strategic objectives, the underlying valuation of currencies can be integrated, even if currencies can diverge from metrics like purchasing power parity (PPP) for some years[4].

[4] Exchange Rate Risk and Deviations From Purchasing Power Parity - Michael G. Arghyrou, Wenna Lu, Panayiotis M. Pourpourides, International Journal of Economics and Finance, April 2025.

Case study – yen valuation and US/Japan hedging costs

For example, the yen's current extreme undervaluation against PPP strengthens the case for incorporating yen valuation into hedging ratio calculations. Chart 6 shows the current yen under-valuation contrasts starkly with the years of yen over-valuation versus PPP estimates in the 1990s and early 2000s.

Chart 6: Yen/US dollar exchange rate vs OECD PPP estimates

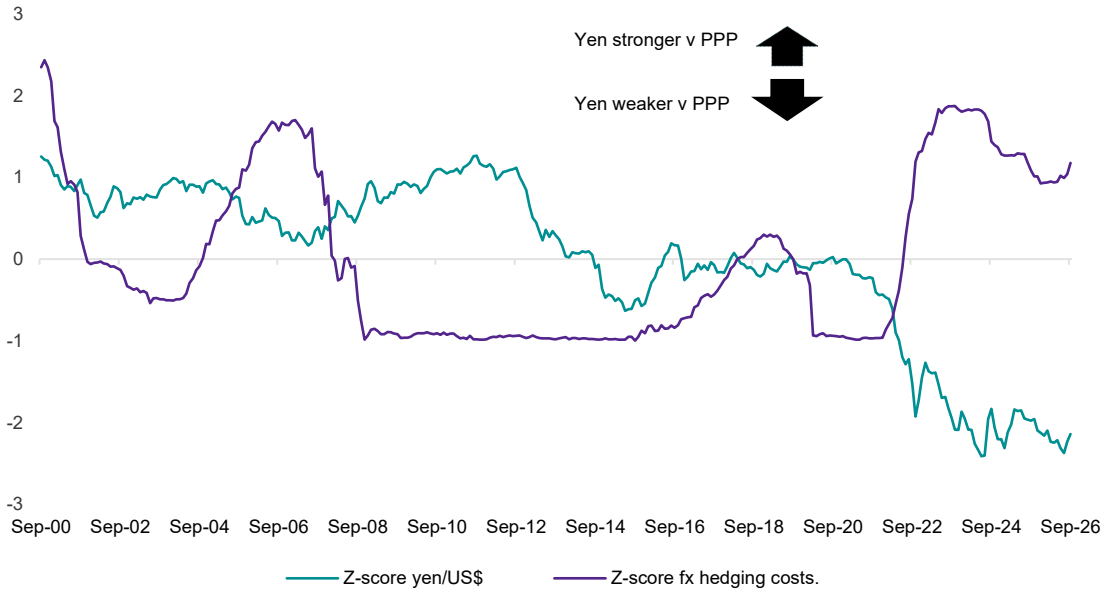


Source: OECD (latest PPP estimate – 2025), LSEG Datastream.

Z-scores[5], versus OECD PPP estimates, are shown in Chart 7, as well as hedging costs for a yen based investor in US Treasuries, using 3 month rate differentials, since 2000. (A Z-score of zero means the exchange rate is equal to PPP). The scale of the undershoot in the yen/dollar rate from PPP valuations has recently been as high as 30-40% and is about 2 standard deviations from the historical mean, making it hard to justify by economic factors alone. Since global daily FX volumes of $9.5 trillion[6][7] exceed daily trade flows by a multiple of about 100 times, it seems likely financial flows and the yen's use as a low-yield funding currency has driven some of the undervaluation.

[5] Z-scores, or standard scores, are based on the full sample and are a dimensionless statistical measurement that quantifies the signed number of standard deviations a raw data point is above or below the mean of its distribution.
[6] BIS April 2025 triennial FX survey.
[7] WTO estimate of $90-100 bn for trade flows.

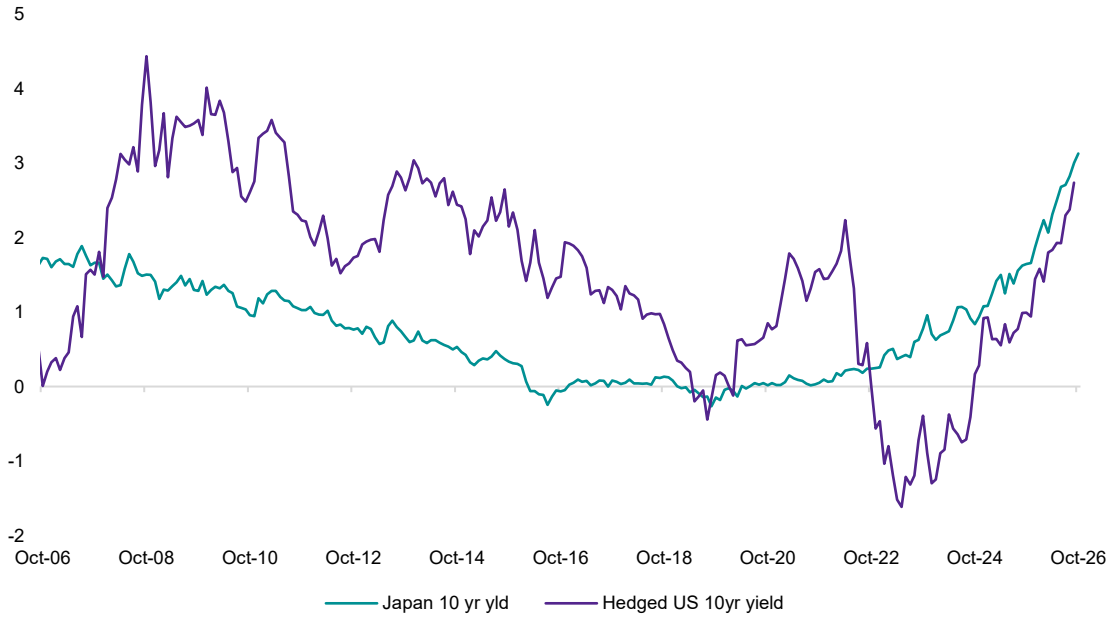
Chart 7: US$/yen hedging costs and US$/yen versus PPP (Z-scores since 2000)



Source: OECD PPP data and LSEG calculations, data to August 2026.

Chart 7 also shows US Treasury hedging costs and yen valuations versus PPP may pull in different directions. For example, the yen gained strongly versus the dollar after the GFC in 2008-09, but hedging costs fell sharply as US short rates were reduced to near zero. Similarly, since the Fed began raising rates in March 2022, hedging costs in Treasuries increased sharply, but the yen has fallen to about 2.5 standard deviations below the longer term mean, making US dollar assets more expensive. So yen undervaluation alone may not be sufficient to increase FX hedging, if hedging costs are high, and we note FX valuation is a supplementary input to the FX hedging decision. Investor choice of a specific hedging ratio will hinge on risk preferences, objectives and constraints. The impact of higher hedging costs is shown in Chart 8. This shows hedged US 10 year yields are below 10 year JGB yields, and have been since 2022, when the Fed raised rates, increasing hedging costs sharply for overseas investors.

Chart 8: JGB 10 year yield and hedged US Treasury yield



Source: LSEG Datastream, FTSE Russell calculations, data to October 2026.

Summary and conclusions

Japan's substantial net creditor status, and extended period of near zero rates, have driven sizeable use of the yen as a funding currency in recent decades, and holdings of overseas securities. Thus US Treasury holdings of Japanese residents still exceed $1 trillion (US Treasury data). These flows combine both Japanese institutional investment in overseas markets, and leveraged yen carry trades, facilitated by the positive carry in overseas bond markets, and low hedging costs. This combination has helped drive the yen to undervaluation extremes, versus PPP estimates, and recently prompted US support for FX intervention to support the yen.

Since 2000, we find both Japan's US Treasury holdings and the dollar/yen exchange rate are strongly correlated with short US/Japan interest rate differentials, indicating the importance of FX hedging costs. Indeed, if Treasury yields are adjusted for hedging costs, hedged US yields for a yen-based investor are now below JGB 10 year yields, and have been since 2022, when the Fed began to raise rates.

With the US Fed raising rates again in September and signalling further rate increases may transpire, unless the BoJ raises rates at a faster pace, a reduction in hedging costs is unlikely in Q4. So although JGB yield spreads versus other G7 members have narrowed sharply in 2025-26, these relative monetary policy settings complicate the process of exchange rate adjustment, and recovery of the yen to nearer PPP, despite recent FX intervention. This increases the embedded risk of a more disorderly unwind of leveraged yen carry trades in 2026-27.

Higher costs reduce the incentive to hedge US dollar FX exposure for existing Treasury holdings, for a yen-based investor, even if the yen is at undervaluation extremes versus the yen. This is reinforced by more speculative yen carry trades, which rely on uncovered

interest parity not working, and the lower yielding yen not appreciating sufficiently to compensate for its lower yield.

We also find empirical evidence of the importance of hedging costs in WGBI xJpn returns. Thus although a 100% FX hedging ratio for a yen-based investor since 1986 minimised the variance of returns, hedging ratios between 50% and 75% delivered stronger mean/variance returns over the period. In fact, a zero hedged WGBI xJpn delivered the strongest mean/variance returns since 2016, and 50-75% hedging ratios minimised variance, rather than 100% hedged returns. This may be explained by higher overseas interest rates relative to Japan raising FX returns in the period, and some negative correlation of FX returns with govt bond returns, conferring portfolio diversification benefits on partially FX-hedged portfolios, relative to 100% hedged.

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