Gold as international reserves

SUERF BAFFI Bocconi e-lecture

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Key questions

Can gold diversify foreign exchange reserve portfolios?

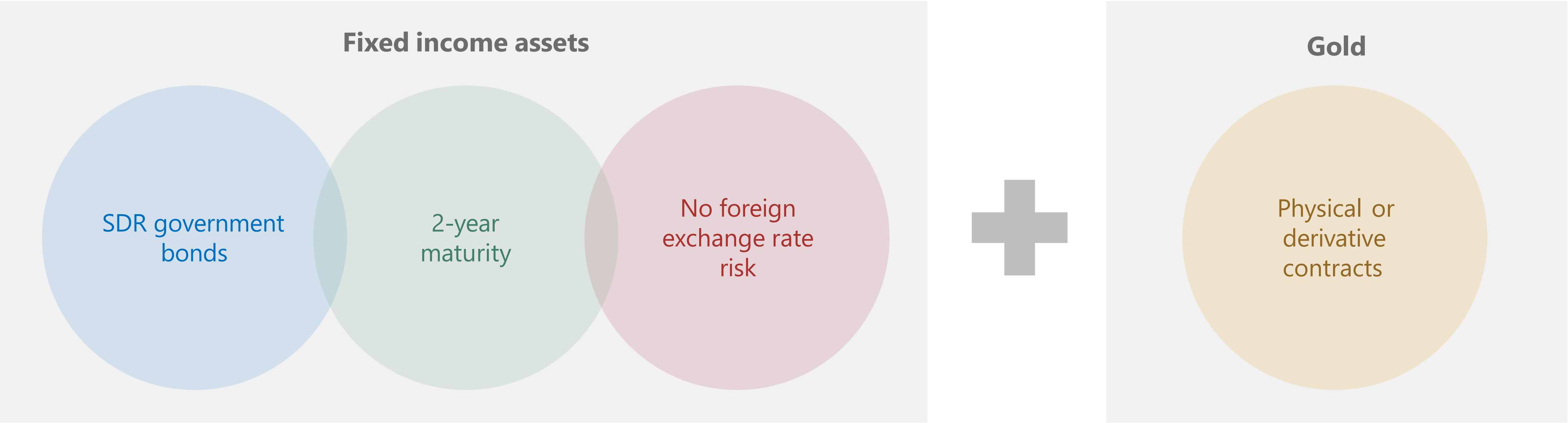
What's the *right* amount of gold to hold?

How does this contrast with the amount central banks hold in reality?

Our experiment

- Gold is well known to have high return volatility – however, its low correlation with some fixed income instruments make it an interesting case study.
- Our methodology consists of sampling the returns of gold and a fixed income portfolio, synthesising thousands of different combinations of the two, and analysing the statistical properties of each of them.
- We know we reach an appropriate or *optimal* combination of gold when we find that the risk-return profile of an otherwise gold-less portfolio is improved.

Graphical illustration: combining FX reserve assets and gold



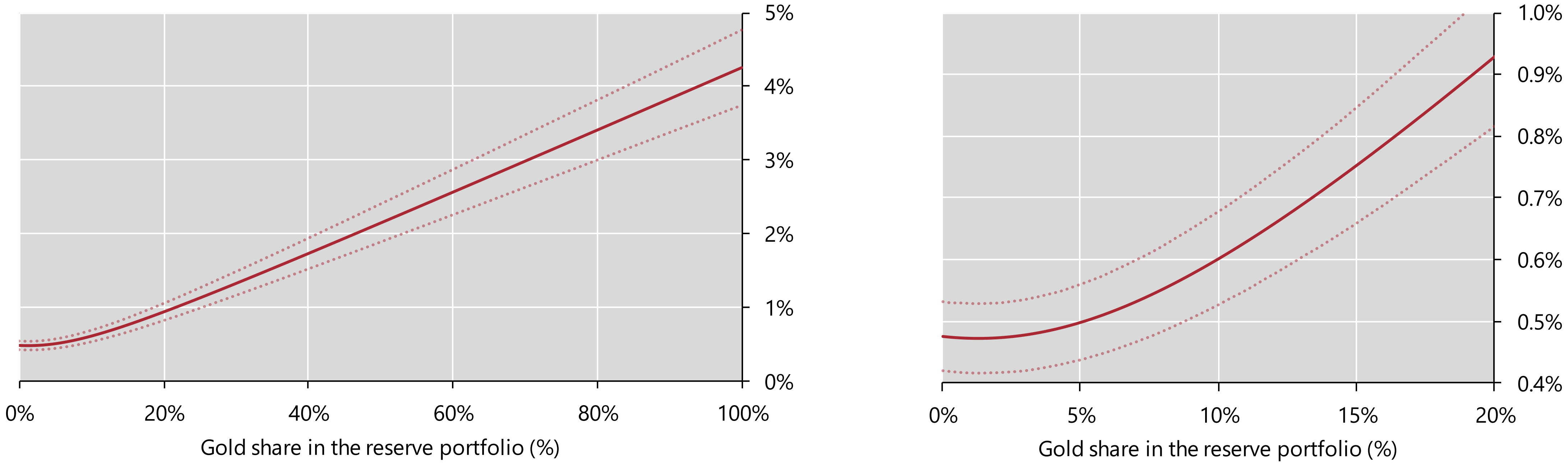
Source: Author's elaboration.
Note: Diagrammes are used for illustrative purposes.

Portfolio volatility: how much gold?

- Gold's market risk profile is palpable in our first exercise. An addition of the metal (ie, a positive per cent share in gold) quickly increases the variability of overall portfolio returns).
- However, upon closer visual examination (Graph 3, right-hand panel), it turns out that there are some (small) allocations where, on average, diversification benefits can be reaped. To be precise: the global minimum is reached for a gold weight of 1.35%.

FX reserve portfolio volatility combining gold and 2-year SDR government bonds

In per cent return (and zoomed on the right-hand panel)

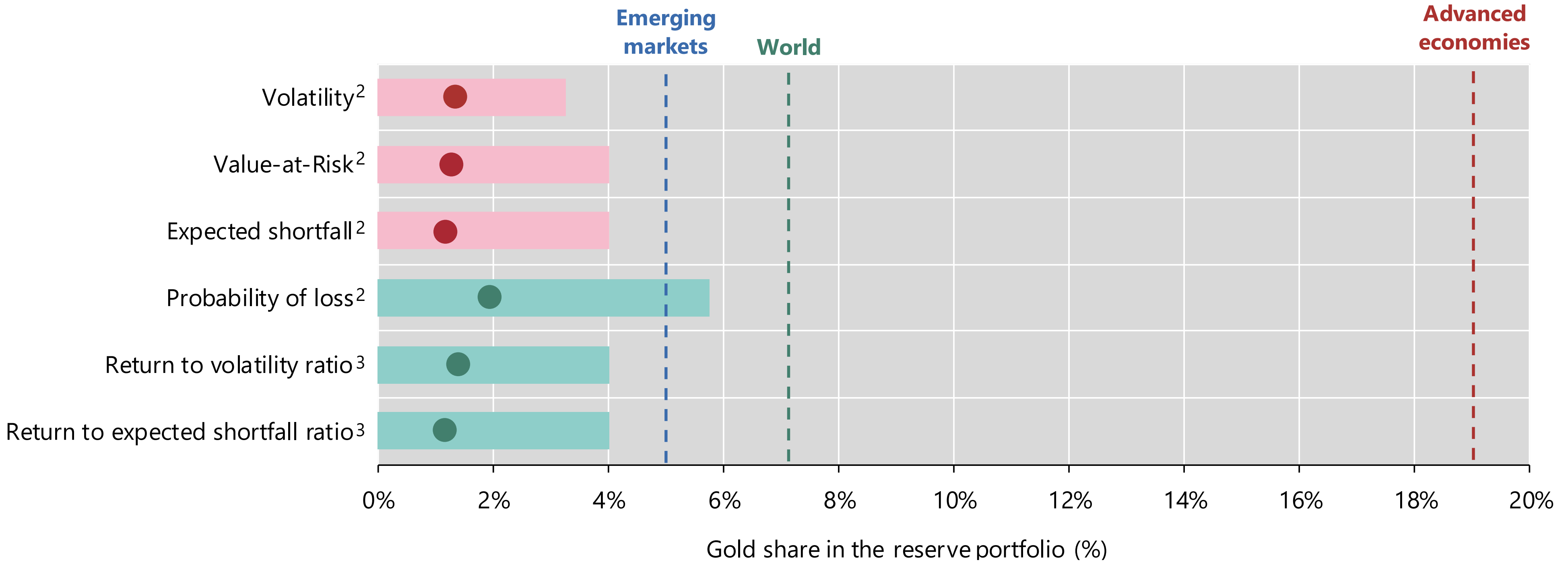


These calculations are based on 5,000 simulations with 10 years of monthly data each. The dotted lines denote a 95% confidence band around the mean estimate.
Sources: BIS calculations; Board of Governors of the Federal Reserve System; Deutsche Bundesbank; Bank of Japan; Bloomberg.

Six measures later: how much gold?

- We can run these exercises for other risk and return metrics, as well as ratios of return to risk.
- A summary of our results are below. It seems that a reserve manager with a 2-year government bond portfolio of SDR bonds would find it hard to argue in favor of gold holdings above 6%. This contrasts markedly with the amount of gold held by advanced economies and the world altogether.

Optimal allocation to gold according to multiple quantitative criteria[1]
In per cent of the market value of the reserve portfolio

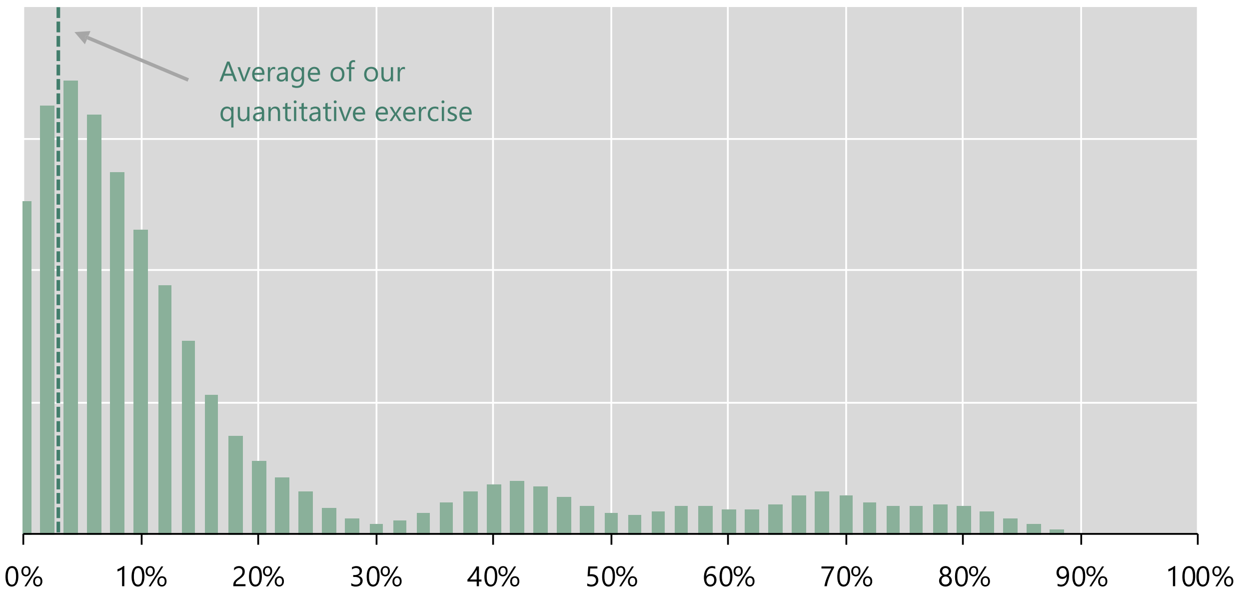


1/ Bubbles denote the average optimal weight across 5,000 simulations. 2/ Allocation to gold that minimises the measure. 3/ Allocation to gold that maximises the measure. 4/ Allocation to gold that minimises the variance explained by the first principal component of a PCA analysis. 5/ Bank of Ghana data obtained from the International Financial Statistics, as of December 2021. Sources: BIS calculations; Board of Governors of the Federal Reserve System; Deutsche Bundesbank; Bank of Japan; Bloomberg. To read more, visit bis.org. Zulaica (2020), "What share for gold? On the interaction of gold and foreign exchange reserve returns" Working Paper No. 906.

Do our results align with reality?

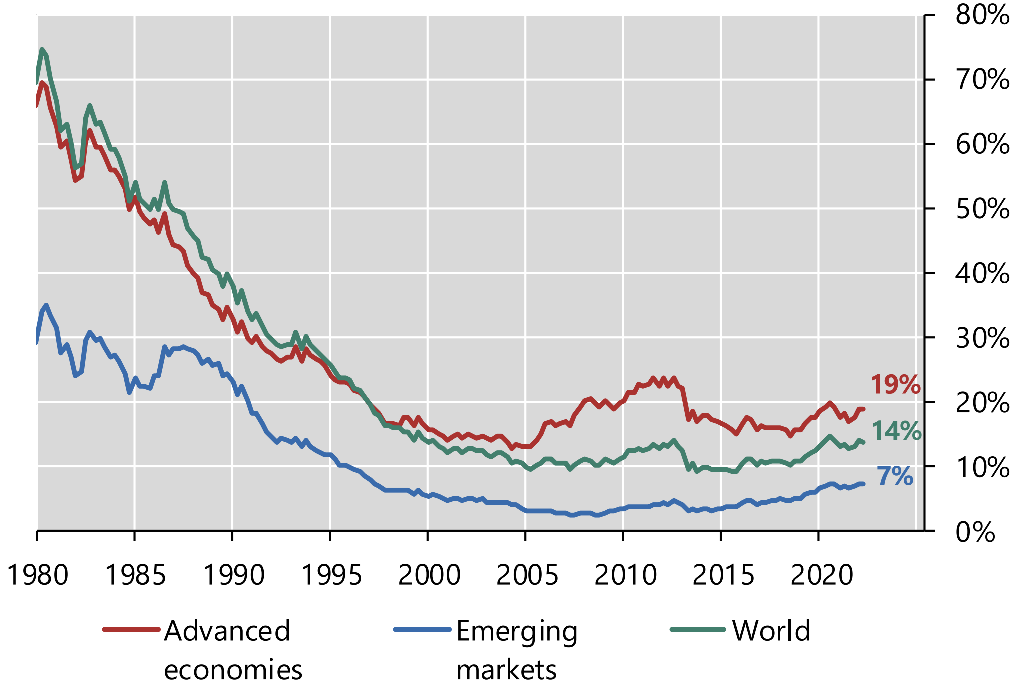
- To answer this question, we look at the fraction of FX reserves invested in gold by each official institution.
- Looking at the individual shares of gold, we find that holdings (in per cent) typically exceed the figures coming out of our previous analysis (green bars).
- Splitting it by type of economy we also see that emerging markets (blue line) tend to hold a lower proportion of gold than advanced economies.

Distribution of the fraction of reserves invested in gold[1]
Probability density, as per cent of FX reserves



Sources: BIS calculations; International Monetary Fund (IMF); World Gold Council. Emerging markets includes countries classified as emerging and developing economies by the IMF. Data as of H2-2022.

Gold as a fraction of total reserve assets by grouping
In per cent of total FX reserves



Why not?

- Seeing the previous figures, it is difficult to explain real world choices of gold reserve shares using purely a market risk perspective. Further consideration of other qualitative standpoints (accounting rules; the status of gold as durable, imperishable and absent of counterpart liability, etc.) may help.
- Various such additional arguments favouring gold holdings have been advanced in the literature. The Arslanalp, Eichengreen & Simpson-Bell (2023) paper contributes in this front.

Reasons to hold gold beyond diversification benefits[1]

Gold is an asset viewed as durable and largely imperishable.

Gold kept at home is not subject to political manipulation.

Gold may function as an inflation hedge, though only over longer periods of time.

Gold is believed to have value in highly adverse scenarios ("war chest", "tail risk hedge").

Source: Author's elaboration.

1/ The annual central bank survey by the World Gold Council (2022) shows that the top five most relevant factors for holding gold for central banks are: (1) its historical position, (2) its performance during times of crisis, (3) its long term store of value, (4) its lack of default risk and (5) its value as a portfolio diversifier.