Board of Governors of the Federal Reserve System

International Finance Discussion Papers

ISSN 1073-2500 (Print)
ISSN 2767-4509 (Online)

Number 1420

September 2025

De-Dollarization? Diversification? Exploring Central Bank Gold Purchases and the Dollar's Role in International Reserves

Colin Weiss

Please cite this paper as:
Weiss, Colin (2025). "De-Dollarization? Diversification? Exploring Central Bank Gold Purchases and the Dollar's Role in International Reserves," International Finance Discussion Papers 1420. Washington: Board of Governors of the Federal Reserve System, https://doi.org/10.17016/IFDP.2025.1420.

De-Dollarization? Diversification? Exploring Central Bank Gold Purchases and the Dollar's Role in International Reserves

Colin Weiss*

Abstract

I examine how governments have managed their holdings of gold and dollar reserves in recent decades, a period when gold's share of aggregate international reserves rose and the dollar's share fell. Using data on central banks' reserve currency composition and official sector purchases of U.S. assets, I argue that gold reserve accumulation is generally not associated with de-dollarization of international reserves at the country level, except in a few prominent cases. Instead, gold purchases are more consistent with most countries pursuing a modest diversification of international reserves that does not solely target a reduced dollar share. My evidence suggests that this characterization also applies to gold reserve accumulation in 2022 and 2023. Finally, I show that, while gold's importance as a store of value for the official sector has grown since 2000, its use as a unit of account and a medium of exchange remains limited.

Keywords: International Reserves, Gold, Dollar
JEL Codes: F3, F31, F33

*Division of International Finance, Board of Governors of the Federal Reserve System, Washington D.C. 20551 USA. E-mail: colin.r.weiss@frb.gov. For helpful comments and conversations, I thank Daniel Beltran, Laurie DeMarco, Cody Kallen, Daniel McDowell, Andrew McCallum, Alexandra Tabova, and workshop participants at the Federal Reserve. Anna Rowbatham provided excellent research assistance. The views expressed in this paper are solely my own and do not reflect the views of the Board of Governors of the Federal Reserve or anyone else associated with the Federal Reserve system. All errors are my own.

1 Introduction

I use data on net purchases of U.S. assets by foreign official investors to study the relationship between central bank demand for gold and U.S. assets at the country level. In popular discussion, a central bank accumulating gold is often viewed as a sign that the central bank is de-dollarizing its international reserves–sharply reducing the share of reserves held in dollar assets to fairly low levels.[1] Indeed, the dollar's share of aggregate international reserves has declined while gold's share has increased (Arslanalp et al., 2022, 2023). Russia has also served as a prominent example of a central bank acquiring nearly 2000 metric tons of gold while selling off its dollar reserves. Yet, data limitations make it difficult to determine if gold reserve accumulation and diversification away from dollar reserves is a broad-based trend or if it reflects decisions by a few central banks. This study is the first to investigate these connections using data on net purchases of U.S. assets by foreign official investors at the country level.[2]

I show that, despite growing gold reserves and a declining dollar share in aggregate, most countries do not de-dollarize their reserves when they accumulate gold. Rather, for these countries, gold reserve purchases result in a modest diversification of international reserves away from all foreign currencies.[3] Examining countries that have accumulated gold since 2000 and publicly disclose the currency composition of their foreign exchange reserves, I find that the three countries with the largest purchases of gold reserves–China, Russia, and Türkiye–significantly reduced the dollar share of their reserves as they accumulated gold. Outside these three, however, there are few examples of countries that added to their gold reserves while meaningfully lowering the dollar share. Since most of the countries that

[1] Examples include "Central Banks Expect to Snap Up More Gold This Year Amid Dollar Pessimism" in the *Wall Street Journal* in 2024 and "Central Banks are Ditching the Dollar for Gold" in *Bloomberg* in 2019.

[2] McDowell (2023) shows that countries facing U.S. financial sanctions tend to accumulate gold reserves and also reduce their holdings of U.S. Treasuries. He does not establish any connection in unsanctioned countries.

[3] Throughout this paper, I use the term "international reserves" to refer to all reserves held in foreign currencies, gold, special drawing rights, and the reserve tranche held at the IMF. "Foreign exchange reserves" refers only to that portion held in foreign currencies.

have added to their gold reserves since 2008 did not disclose the currency composition of their foreign exchange reserves while they accumulated gold reserves, I turn to other data to further assess how important de-dollarization is for gold reserve purchases.

Specifically, I find that smaller official sector net purchases (or greater net sales) of U.S. assets are generally not associated with larger net purchases of gold reserves at the country level from 2012-2023. Smaller official sector net purchases of U.S. assets are also not associated with larger net purchases of gold reserves for just 2022 and 2023, after the G7 governments sanctioned the Russian government by blocking its access to its international reserves held in the sanctioning countries.[4] In fact, larger net official sector purchases of U.S. assets correlate with larger gold reserve accumulation in these years, and regression analysis also indicates that countries buying gold reserves in 2022 and 2023 were more likely to buy U.S. assets in these years compared to the years before 2022.[5] I argue that my findings are not driven by a few influential observations or a new set of central banks purchasing gold after 2021. Thus, while China, Russia, and Türkiye, who accumulated gold while diversifying away from the dollar, account for most of the gold reserve purchases since 2008, most of the countries that have purchased gold over this period do not appear to have done so while de-dollarizing. Moreover, gold reserve purchases in 2022 and 2023 did not occur alongside greater diversification away from the U.S. dollar.

The above analysis focuses on gold's role as a store of value for the official sector. In the last part of the paper I explore gold's ability to fulfill the unit of account and medium exchange functions of an international currency. For the official sector, this refers to whether gold serves as an exchange rate anchor and is used for exchange rate interventions. Zimbabwe appears to be the only country that anchors its exchange rate at least partially to gold.

[4]Arslanalp et al. (2023) and McDowell (2023) found that countries facing financial sanctions tend to hold larger gold reserves. I have found that this relationship likely depends on a few influential observations in a small number of countries. Greater details are available upon request.

[5]Other work has found that countries with weaker geopolitical ties to the U.S., measured by voting alignment with the U.S. in the United Nations, have accumulated more gold in recent years (Douglass et al., 2024; Brüggen et al., 2025). While a formal assessment is beyond the scope of this short paper, these previous results combined with mine suggest at least some geopolitically distant countries continued purchasing U.S. assets after 2021, consistent with Weiss (2023).

Gold's use in exchange rate interventions also appears limited, particularly for interventions involving international reserves sales. I show that countries only tend to sell their gold reserves when they have meager amounts of international reserves held in foreign currencies. Given the complementarities between the three functions of international currencies, these findings may suggest that gold's importance for international reserves faces a somewhat limited ceiling.

The main contribution of this paper is to study the importance of diversification away from the dollar for the build-up in gold reserves in recent years. As such, I build on existing work studying central bank gold reserves, most recently Arslanalp et al. (2023) and McDowell (2023) but also earlier papers by Ghosh (2016), Gopalakrishnan and Mohapatra (2018), and Oztunc and Orhan (2021). Arslanalp et al. (2023) identify a set of 14 "active diversifiers", countries that substantially increased their volume of gold reserves and gold's share of their international reserves. My results suggest that the set of countries accumulating gold and de-dollarizing is likely even smaller. Since I consider the link between demand for gold and dollar reserves, I also relate to several recent papers studying the currency composition of international reserves (Arslanalp et al., 2022; Chinn et al., 2024; Goldberg and Hannaoui, 2024; Iancu et al., 2022; Ito and McCauley, 2020). In particular, by exploring how widespread gold accumulation and dollar diversification is across central banks I connect to papers that have studied whether diversification of foreign currency reserves away from the dollar is broad-based (Arslanalp et al., 2022; Goldberg and Hannaoui, 2024). Finally, there is a large related literature that studies the safe haven and hedging properties of gold relative to other assets (Abid et al., 2020; Baur and McDermott, 2010; Baur and Smales, 2020; Burdekin and Tao, 2021 are among the examples.) I contribute by examining how central banks, an important piece of the market for gold, allocate between gold and U.S. assets.

2 The Return of Gold Reserve Accumulation

Central bank gold holdings peaked in absolute terms at the height of the Bretton Woods system in the mid-1960s, as shown in the top left of Figure 1, and then generally declined over the next 40 years.[6] After the Bretton Woods system collapsed in 1971, advanced economy central banks gradually reduced their gold reserves, while emerging and developing economy central banks added only a small amount to their gold reserves before 2008. In the midst of the Global Financial Crisis, this longstanding trend changed, and emerging market central banks began accumulating larger amounts of gold while the decline in aggregate advanced economy gold reserves ceased. Arslanalp et al. (2023) suggest that increases in the volatility of dollar exchange rates and in the level of global economic policy uncertainty in the aftermath of the Global Financial Crisis contributed to increased demand for gold reserves. Additionally, the growing use of financial sanctions by the U.S. government appears to have pushed governments to diversify some of their international reserves into gold (McDowell, 2023). Finally, as shown in the top right of Figure 1, not only did aggregate gold reserves increase after 2008, but the number of countries purchasing gold each year also increased, averaging roughly 26 per year from 2002-2008 and 34 per year 2009-2024.

Gold's share in international reserves has also risen since the end of 2008 from 9 percent at that time to 16 percent in 2024, as shown in the bottom of Figure 1. This remains far below the dollar's share of international reserves (around 42 percent in 2024 and 58 percent of foreign exchange reserves) and is at least in part driven by recent increases in the nominal price of gold rather than just increased gold accumulation (Bertaut et al., 2025).[7] Nevertheless, in aggregate, gold's share of international reserves has trended up over the past decade while the dollar's share has moved down, suggesting that at least some of

[6]The Bretton Woods system was established towards the end of World War II and required participating governments to peg the value of their currencies to the U.S. dollar, while the dollar was pegged to a certain value of gold ($35 per troy ounce). The system effectively ended in 1971 when the U.S. government ended the convertibility of the dollar into gold. For more information, see Bordo and McCauley (2019) and Monnet and Puy (2020).

[7]Central bank purchases may be responsible for some of the rise in gold prices since 2022 (World Gold Council, 2024a).

this gold accumulation reflects diversification away from the dollar. Whether this trend is broad-based or reflects decisions by a few central banks is the subject of the next section.

3 Assessing the Relationship between Dollar and Gold Reserves

Gold Accumulation and the Dollar Share of Reserves

Ideally, country-level data on the composition of central banks' international reserves would be used to understand how those accumulating gold reserves have managed their dollar reserves at the same time. Such data are not consistently available to undertake econometric analysis even with recent datasets compiled by Ito and McCauley (2020) and expanded by Arslanalp et al. (2022). For example, 62 countries have a larger volume of gold reserves at the end of 2023 compared to the end of 2008, but less than 30 of these countries disclose the currency composition of their foreign exchange reserves in the years they accumulate gold.

At the same time, a general theme is suggested by the available data. Namely, while a few countries clearly accumulated gold as they diversified their foreign exchange reserves away from the dollar, most of the countries with currency composition data available did not. At the same time, these few central banks that did diversify away from the dollar account for most of the gold reserves accumulation. In particular, Russia and Türkiye built up their gold reserves at the same time that the dollar share of their foreign exchange reserves fell dramatically to levels below 50 percent, consistent with de-dollarization.[8] While less clear due to data limitations, China also stands as an example of a country that accumulated gold reserves at the same time it made a major reduction in the dollar share of its foreign exchange reserves.[9] Since most of China's foreign exchange reserves continued to be held in

[8]McDowell (2021, 2023) provides greater details on these cases. Although not included in the Ito and McCauley (2020) data, Johnson (2008) provides evidence that Russia also reduced the dollar share of their foreign exchange reserves significantly in 2006.

[9]The 2019 annual report by China's State Administration of Foreign Exchange (SAFE) states that China

dollar assets, this is more a case of substantial diversification away from the dollar without de-dollarizing.[10] Together, these three countries are responsible for 64 percent of gold reserve accumulation after 2008.

Besides these three countries, it hard to find examples of gold reserve accumulation and clear diversification away from dollar reserves. Poland, the fourth-largest buyer of gold since 2009, began building its gold reserves in 2017. In the five years before 2017, the dollar share of its foreign exchange reserves averaged 38 percent, but its dollar share rose to 41 percent in 2023 during this period of gold accumulation. The dollar share of South Korea's foreign exchange reserves only temporarily declined from 64 percent to 58 percent when it accumulated gold reserves from 2011-2013, as it rebounded in 2015 and has remained above 65 percent since. Mexico also accumulated gold reserves in the early 2010s; although they did not disclose the currency composition of their international reserves at that time, they currently hold just over 90 percent of their foreign exchange reserve in dollars. Thus, it seems implausible that their gold accumulation resulted in a large diversification away from the dollar. Other examples include Brazil accumulating gold in various years from 2011-2021 and maintaining a dollar share of foreign exchange reserves above 80 percent throughout and Bangladesh buying gold from the IMF in the immediate aftermath of the Global Financial Crisis and also increasing the dollar share of foreign exchange reserves substantially after 2012 (from 50 percent in 2011 to over 80 percent in every year after 2013). For a more complete list of countries, see Table A1 in the Online Appendix.

reduced the dollar share of its foreign exchange reserves from 79 percent in 1995 to 58 percent in 2015. Over the same period, China's gold reserves increased from 395 metric tons to 1762 metric tons.

[10] Alternative reserve currency composition data compiled by Laser et al. (2024) (covering a smaller set of countries than Arslanalp et al, 2022), suggests that the dollar share of Türkiye's foreign exchange reserves rebounded somewhat after 2018 and is now above 50 percent. This would make Türkiye's case more like China's heavy diversification rather than Russia's de-dollarization.

Regression Analysis: Official Sector Purchases of Gold and U.S. Assets

To study the relationship between gold and dollar reserves more formally, I analyze a panel of country-level net purchases of gold reserves alongside net official sector purchases of U.S. assets. In particular, I seek to understand whether there is a negative correlation between a government's net purchases of gold reserves and its net purchases of U.S. assets in a given year, which would be consistent with diversification away from dollar reserves being a primary motivation for gold reserve accumulation.[11] To that end, I estimate the following specification:

$$GoldPur_{i,t} = \alpha_i + \delta_t + \beta USPur_{i,t} + \gamma' \mathbf{x}_{i,t} + \varepsilon_{i,t} \tag{1}$$

A negative estimate of β implies that a government selling U.S. assets in a given year would be expected to purchase gold reserves, consistent with diversification away from dollar reserves being a primary motive for gold reserve accumulation.

The vector $\mathbf{x}$ is a set of controls for other factors that may influence a country's gold reserve allocation and may be correlated with its reserve purchases of U.S. assets. Specifically, I include annual real GDP growth, annual inflation, annual appreciation of the local currency against the dollar, and the ratio of total international reserves to nominal GDP.[12] Real GDP growth is meant to capture income or wealth shocks that may prompt greater overall reserve accumulation.[13] I include inflation since gold is commonly viewed as a hedge against inflation, so higher inflation may prompt reserve demand for gold. I also use appreciation of a country's local currency against the dollar as another control since countries may lean against currency appreciation with purchases of international reserves, including gold. Finally, I include foreign exchange reserves (excluding gold) as a share of GDP to control for some measure of reserve adequacy, like McDowell (2023). This is meant

[11] Countries may also repatriate gold reserves to domestic vaults alongside de-dollarization, but country-level data on where gold reserves are vaulted is sparse.

[12] Lagging the controls by one year does not change the estimated relationship between gold reserve accumulation and U.S. asset purchases.

[13] It may also capture large negative shocks that prompt safe have demand for gold from reserve managers.

to capture when countries have enough liquid foreign exchange reserves and can instead invest in gold.[14] All control variables are sourced from the IMF's World Economic Outlook or International Financial Statistics (IFS). The regressions also include country and year fixed effects.

The outcome variable, $GoldPur$, is annual net reserve purchases of gold. I measure this in millions of dollars in order to compare the magnitude of gold reserve accumulation to official sector purchases of U.S. assets directly. For each month in a given year, I compute net purchases by taking the change in gold reserve holdings (measured in fine troy ounces) and multiplying by the average gold price in that month; I then sum across months to get annual net purchases. Changes in gold reserves generally come from the IMF's IFS with a few exceptions that are adjusted based on data from the World Gold Council's estimates for individual countries.[15] Specifically, the World Gold Council data try to capture only changes in gold holdings that come from active purchases or sales rather than other methods. Most notably, the World Gold Council estimates differ for Türkiye, whose reported reserves also change due to changes in gold deposited at the central bank by commercial banks to meet reserve requirements, though there are smaller differences for Australia as well.[16]

Official sector purchases of U.S. assets are taken from the monthly Treasury International Capital (TIC) data that inform the balance of payments statistics for the U.S. At the country level, official sector flows are confidential. I specifically consider net flows into short-

[14]Some central banks include gold holdings as part of the "liquidity tranche" of their reserves while others do not. Evidence included in Banco Central do Brasil (2024) suggests gold has a risk-return profile similar to advanced economy stock indexes.

[15]There may have been a surge in unreported gold-buying by the official sector after 2021, as estimates by the World Gold Council for *aggregate* gold reserve accumulation are more than twice as large as those shown in the IFS, potentially reflecting purchases by sovereign wealth funds or other parts of the government outside the central bank. Capturing these unreported purchases would likely not change the reported results. The three countries suspected of accounting for most of these purchases are China, Russia, and Saudi Arabia (Dempsey, 2023). As discussed below, China and Russia are excluded from the regression sample. Investors in Saudi Arabia bought significant amounts of U.S. assets at least in 2022 (Weiss, 2023), and this likely includes the official sector, since the official sector dominates emerging market holdings in aggregate (Department of the Treasury et al., 2025).

[16]The conclusions below are generally robust to using changes in Türkiye's gold reserves from the IFS rather than the World Gold Council. Based on information provided in the World Gold Council data, I also set Japan's 2021 gold purchases to zero, as this gold was purchased from another part of the Japanese government.

term liabilities of U.S. financial institutions, U.S. Treasuries, agency securities, and equities. For the latter three asset classes in particular, I use estimates of net purchases following the methodology of Bertaut and Tryon (2007) and Bertaut and Judson (2014, 2022) that measures flows using valuation-adjusted changes in positions given the potential issues with the transactions data prior to 2023. For 2023, I use reported transactions in the TIC data given changes to reporting methodology (Bertaut and Judson, 2023; McCallum et al., 2024). The sample begins in 2012, corresponding the to the introduction of monthly holdings data.[17] Finally, while central banks hold dollar reserves in assets issued by entities outside the U.S., most dollar reserves appear to be held in U.S. assets (McCauley, 2019).

Two additional notes about data and sample construction are also worth mentioning. First, I measure net official sector purchases of gold and U.S. assets in several different ways to mitigate the effect of extreme values. Besides using net purchases in millions of dollars in the regressions, I also report results for regressions that use the inverse hyperbolic sine of net purchases in millions of dollars as well as standardized net purchases.[18] Second, I drop four countries from the regressions. I exclude Russia because its official sector was banned from transacting in U.S. assets as part of the sanctions package in 2022. I drop China because their gold reserves were only reported infrequently before 2015, with large jumps in their gold holdings in the IFS data reflecting gold accumulation spread over an unknown earlier span of time. Finally, I exclude Latvia and Croatia because their only gold reserve transactions are for transfer activity related to adopting the euro. While dropping the two largest buyers of gold reserves, Russia and China, may seem problematic, this paper studies how widespread gold accumulation for diversification away from dollar reserves is, so dropping China and Russia is less consequential for this analysis.

Turning to the results for estimating equation 1, Table 1 shows that there is generally

[17] Bertaut and Tryon (2007) and Bertaut and Judson (2014) construct country-level flows in a similar way for the pre-2012 period, but for a more limited set of countries. Given that my sample covers all but three years of the period of elevated central bank gold demand, I choose to focus on a balanced panel that covers the 2012-2023 period.

[18] Alternative approaches to dealing with extreme values including scaling official sector flows by GDP or lagged international reserves yield qualitatively similar findings as those discussed below.

no significant relationship between official sector demand for gold and U.S. assets, except in one specification. Note that the main samples include Türkiye, the largest buyer of gold reserves in the sample that also visibly de-dollarized its reserves. Dropping Türkiye's observations leads to less negative (or more positive) estimates of β than shown in Table 1, with the estimate for the specification shown in column (4) no longer statistically significant. Thus, while some central banks clearly purchased gold at the same time they reduced their dollar reserves, many did not, aligning with available reserve currency composition data. These results examine the relationship over the entire 2012-2023 period, but the relationship may have changed over time due to certain events, especially the sanctions that blocked Russia's access to its international reserves in 2022.

To see whether the sanctions on Russian reserves changed how central banks managed their gold and dollar reserves, I modify equation 1 by interacting $USPur$ with a dummy for the years 2022 and 2023:

$$GoldPur_{i,t} = \alpha_i + \delta_t + \beta USPur_{i,t} + \theta USPur_{i,t} \times Post2021_t + \gamma' \mathbf{x}_{i,t} + \varepsilon_{i,t} \tag{2}$$

The results reported in Table 2 show an unexpected change in the relationship after 2021, given the sanctions on Russia's reserves. Most importantly, the estimates of θ are positive and statistically significant in all specifications, meaning that greater official sector purchases of U.S. assets were associated with more gold reserve accumulation after 2021. This is the opposite of what would be expected if gold reserve purchases for de-dollarization increased following the sanctions on Russia's reserves. Additionally, given that the estimates of β are relatively small and sometimes statistically insignificant, $\beta + \theta$ is estimated to be positive, with the sum of these coefficients statistically significant in many specifications.[19] Thus, countries with larger official net purchases of U.S. assets tend to accumulate more gold reserves in 2022 and 2023.

[19]I can reject the hypothesis that $(\beta + \theta) \leq 0$ at conventional levels of significance in all specifications. The estimates for β and θ are unchanged if I also interact the control variables with the post-2021 dummy.

Notably, the positive estimate of θ that results in larger official sector net purchases of U.S. assets being associated with larger purchases of gold reserves in 2022 and 2023 withstands several challenges. First, because central bank gold flows have a skewed distribution with fat tails, the results could be highly sensitive to outliers or extreme observations. I drop the countries with the observations with the most influential observations for the estimates of θ (based on calculated DFBETA statistics); the estimates of θ remain positive and statistically significant, with the p-values on $\beta + \theta$ shrinking in all specifications.[20] Second, the shifting relationship may be due to composition changes: different countries may have accumulated gold reserves after 2021 and these countries may manage their reserves differently from the countries active in gold markets prior to 2022. However, of the 43 central banks that bought gold in 2022 or 2023, only 2 of these central banks were not active in gold markets from 2017-2021. After dropping these two central banks, estimates of θ again remain positive and statistically significant. Moreover, I cannot reject the hypothesis that the estimates of θ using the modified samples are the same as those reported in columns (1)-(3) for all specifications.

In contrast, the small but negative estimates of β that can be interpreted as suggesting that central banks de-dollarized when they purchased gold reserves from 2013-2021 are not as robust. For example, as noted above, the country in the sample with the largest gold purchases, Türkiye, is one that visibly de-dollarized its reserves. After dropping its observations and those for one other country, the estimate for β reported in column (1) of Table 2 is no longer statistically significant. Thus, a few countries could drive the negative relationship between gold and U.S. asset purchases at an annual frequency from 2013-2021.

Additionally, the lack of robustness in the de-dollarization interpretation of the 2013-2021 period is evident another way as well. Central banks may have sold U.S. assets while accumulating gold reserves in a specific year, but this behavior may not carry over to other years and for the entire period on net. I thus calculate the correlation of cumulative net

[20]DFBETA measures the difference in an estimated coefficient between the full sample and the sample with that observation excluded.

purchases of gold reserves and U.S. assets for the 2013-2021 period. I find the correlation between cumulative net purchases of gold reserves and U.S. assets over 2013-2021 is positive both when purchases are measured in millions of dollars (coefficient of 0.158) and using the inverse hyperbolic sine transformation (coefficient of 0.105).[21] This suggests de-dollarization was not a primary motivation for gold reserve accumulation for most countries from 2013-2021, though countries certainly bought gold reserves and sold U.S. assets in some years. Instead, an alternative motivation for gold accumulation is suggested by the positive (and often statistically significant) coefficient on the ratio of foreign exchange reserves to GDP. Namely, countries with larger levels of liquid foreign exchange reserves may look to acquire other assets without necessarily reducing reliance on the dollar.

An alternative approach to assessing the relationship between gold reserve accumulation and de-dollarization yields similar conclusions. Specifically, I investigate how the probability of a government buying U.S. assets in the same year it purchases gold may have changed after 2021. I regress an indicator variable equal to one when a government purchases U.S. assets in a given year on an indicator variable equal to one for the years 2022 and 2023, an indicator equal to one when a central bank buys gold, and the interaction of these two indicators. The advantage of this approach is each observation has the same influence on the estimated coefficient since all observations take either zero or one as a value. Figure 2 shows two important results about the estimated probability of a government buying U.S. assets conditional on buying gold in that year: first, that estimated probability is above one half for both sub-samples, and this probability meaningfully increases after 2021.[22] Most central banks thus do not appear to de-dollarize their reserves as they accumulate gold throughout the entire period.

While this collection of results indicates the relationship between central bank pur-

[21] I find similar correlations using only purchases after the central bank first purchased gold. The correlations for cumulative purchases from 2022-2023 are also positive.

[22] The sum of the estimated coefficients on the post-2021 indicator variable and the interaction of the post-2021 indicator and gold-buying indicator variables is statistically significant. Including the same controls as above as well as country fixed effects does not change the results.

chases of gold and U.S. assets changed in 2022 and 2023, it cannot rule out that sanctions on Russia's international reserves in 2022 caused central banks to accumulate more gold and fewer U.S. assets than they otherwise would have after 2021. Nevertheless, the examples of two of the most prominent buyers of gold, India, and Poland, suggest gold reserve purchases in 2022 and 2023 were often the continuation of existing trends rather than the response to a new shock. India's gold reserves increased by more in 2020 and 2021 (119.2 metric tons) than in 2022 and 2023 (49.5 metric tons).[23] Similarly, Poland expanded its gold reserves for the first time in many years in 2018, accumulating 125.7 metric tons of gold from 2018-2019. The Board of the National Bank of Poland assumed further gold reserve accumulation in its 2020 foreign exchange reserve management strategy, and in 2022 and 2023 gold reserve accumulation totaled 127.8 metric tons, nearly identical to the earlier additions (Glapiński, 2021).

Gold and the other roles of international money

International currencies for the official sector must be widely used for exchange rate interventions (the medium of exchange function), as an exchange rate anchor (the unit of account function), and as the currency of denomination for assets held as official reserves (the store of value function) (Cohen, 1971). The ongoing accumulation of gold by many governments shows that gold fulfills the role of a store of value, and its importance in this role is on the rise in some countries, but its use for fulfilling the other two functions of an international currency seems more limited. The complementarities between these three functions mean that further gold reserve accumulation could be constrained by its fulfillment of the other functions. For the unit of account function, almost no country anchors its exchange rate to gold, with the exception of Zimbabwe, which partially pegs to gold alongside other currencies.

[23]The most recent period of gold reserve accumulation by India began in late 2017, and the Reserve Bank of India's annual report for 2017-18 notes that the "diversification of India's foreign currency assets (FCA) continued during the year" (Reserve Bank of India, 2018).

Assessing gold's use as a medium of exchange by the official sector is more difficult because of data limitations, but the available evidence suggests its use remains well short of the dollar's. As noted above, gold would need to be widely used for exchange rate interventions–active transactions undertaken by the central bank to change its foreign currency position that alter the exchange rate–to fulfill the medium of exchange role for the official sector.[24] Despite limitations, available data suggest that countries that have accumulated gold over the past 15 years have primarily done so through active purchases and the net foreign currency position of the central bank has generally increased due to these purchases. Thus, it would seem much of the recent gold accumulation would be considered exchange rate interventions under the definition proposed by Adler et al. (2024) that abstracts from intent.

At the same time, gold's use for interventions broadly defined likely remains well below that of the dollar. A key issue is that large sales of gold are uncommon. For example, Adler et al. (2024) show that about 30 percent of their observations involve quarterly foreign exchange interventions less than -0.25 percent of GDP.[25] From 2012-2023, less than 2 percent of the observations in my sample have annual gold flows less than -0.25 percent of GDP, and many of these observations likely involve portfolio rebalancing rather intervention. Rebalancing is especially common in countries with programs where the central bank buys gold from domestic miners, for example Kazakhstan, Mongolia, and Tajikistan.

The countries that sell gold for reasons other than strict portfolio rebalancing often do so when they have limited international reserves aside from gold available to liquidate. Stark examples include Bolivia selling gold reserves equal to 2.5 percent of GDP in 2023 when its international reserves excluding gold were below 1 percent of GDP and Venezuela selling gold reserves worth 3 percent of its GDP in 2016 when its reserves excluded gold totaled just under 3 percent. The pattern holds more broadly: countries that sell relatively large amounts of gold reserves do so when their other international reserves are relatively

[24]This definition largely conforms with that proposed by Adler et al. (2024), although they abstract from intent in order to construct a dataset.

[25]These interventions may involve gold reserves, but the bulk of transaction likely use foreign currency-denominated securities and deposits.

low. Figure 3 shows that countries selling more than five metric tons (a minimum sale amount of roughly $200 in the sample) of gold in a year have a median ratio of international reserves (excluding gold) to GDP ratio that is about half the level of the overall sample.[26] By comparison, the median international reserves excluding gold for countries selling at least $200 million in U.S. assets is slightly above the full-sample median, again shown in Figure 3, suggesting that U.S. assets are a preferred source of foreign currency liquidity compared to gold.

4 Conclusion

I explore the role de-dollarization has played in central banks' recent accumulation of gold reserves. Public data on the currency composition of foreign exchange reserves shows that the three countries responsible for most of the gold reserve purchases since 2009–Russia, China, and Türkiye–did indeed diversify away from dollars as they accumulated gold. At the same time, most other countries purchasing gold that have public data on the currency composition of their reserves did not. Moreover, regression analysis of gold reserve purchases and official sector flows into U.S. assets covering a larger group of countries suggests that most countries outside of Russia and China have not sold U.S. assets as they purchase gold reserves, and this is especially true after 2021 even as Russia was blocked from using its international reserves held in the G7. These regression results are also inconsistent with widespread de-dollarization by countries accumulating gold reserves. Additionally, gold's use as an exchange rate anchor is almost nonexistent, and governments often sell their gold reserves only after having nearly depleted their foreign exchange reserves.

This evidence suggest gold clearly has value as a substitute for the dollar as a reserve asset for some central banks, but many countries accumulate gold alongside dollar reserves. Such a pattern is consistent with recent survey results showing only a small minority of

[26] A basic quantile regression confirms a statistically significant difference in medians.

international reserve managers hold gold as part of a de-dollarization policy (World Gold Council, 2024b). Countries may also have pursued modest diversification of their international reserves without seeking a large reduction in the dollar share. Th limited use of gold for fulfilling the other functions of an international currency by the official sector has likely contributed to relatively small diversification into gold reserves by most countries. Thus, any challenge to the dollar's position as the dominant reserve currency by gold likely requires a broader shift in its use by both the official sector and likely the private sector.

References

Abid, Ilyes, Abderrazak Dhaoui, Stéphane Goutte, and Khaled Guesmi. (2020). "Hedging and Diversification Across Commodity Assets," *Applied Economics* 52(23): 2472-2492.

Arslanalp, Serkan, Barry Eichengreen, and Chima Simpson-Bell. (2022). "The Stealth Erosion of Dollar Dominance and the Rise of Nontraditional Reserve Currencies," *Journal of International Economics* 138(2022): 103656.

Arslanalp, Serkan, Barry Eichengreen, Chima Simpson-Bell. (2023). "Gold as International Reserves: A Barbarous Relic No More?" *Journal of International Economics* 145(2023): 103822.

Banco Central do Brasil. (2024). *International Reserves Management Report*, Volume 16, July.

Baur, Dirk G. and Thomas K. McDermott. (2010). "Is Gold a Safe Haven? International Evidence," *Journal of Banking and Finance* 34(8): 1886-1898.

Baur, Dirk G. and Lee A. Smales. (2020). "Hedging Geopolitical Risk with Precious Metals," *Journal of Banking and Finance* 117(2020): 105823.

Bertaut, Carol C. and Ralph W. Tryon. (2007). "Monthly Estimates of U.S. Cross-border Securities Positions," International Finance Discussion Papers 910. Washington: Board of Governors of the Federal Reserve System.

Bertaut, Carol C. and Ruth A. Judson. (2014). "Estimating U.S. Cross-border Securities Positions: New Data and New Evidence," International Finance Discussion papers 1113. Washington: Board of Governors of the Federal Reserve System.

Bertaut, Carol C. and Ruth A. Judson. (2023). "Measuring U.S. Cross-border Securities Flows: New Data and a Guide for Researchers," FEDS Notes. Washington: Board of Governors of the Federal Reserve System.

Bertaut, Carol C., Bastian von Beschwitz, and Stephanie Curcuru. (2025) "The International Role of the Dollar–2025 Edition," FEDS Notes. Washington: Board of Governors of the Federal Reserve System.

Bordo, Michael D. and Robert N. McCauley. (2019). "Triffin: Dilemma or Myth," *IMF Economic Review* 67(4): 824-851.

Brüggen, Anja, Maurizio Michael Habib, Roger Gomis, and Alessandro Vallin. (2025). "Gold Demand: The Role of the Official Sector and Geopolitics," in *The International Role of the Euro*. European Central Bank, Frankfurt am Main, June 2025.

Burdekin, Richard C.K. and Ran Tao. (2021). "The Golden Hedge: From Global Financial Crisis to Global Pandemic," *Economic Modelling* 95(2021): 170-180.

Chinn, Menzie D., Jeffrey A. Frankel, and Hiro Ito. (2024). "The Dollar Versus the Euro as International Reserve Currencies," *Journal of International Money and Finance* 146(2024): 103123.

Cohen, Benjamin J. (1971). *The Future of Sterling as an International Currency*. London: Macmillan.

Dempsey, Harry. (2023). "'Colossal' Central Bank Buying Drives Gold Demand to Decade High," *Financial Times*, January 31.

Department of the Treasury, Federal Reserve Bank of New York, and Board of Governors of the Federal Reserve System. (2025). "Foreign Portfolio Holdings of U.S. Securities as of June 28, 2024," Washington: Department of the Treasury.

Douglass, Patrick, Linda S. Goldberg, and Oliver Z. Hannaoui. (2024). "Taking Stock: Dollar Assets, Gold, and Official Foreign Exchange Reserves," Federal Reserve Bank of New York *Liberty Street Economics*, May 29, 2024.

Ghosh, Amit. (2016). "What Drives Gold Demand in Central Bank's Foreign Exchange Reserve Portfolio?", *Finance Research Letters* 17(C): 146-150.

Glapiński, Adam. (2021). "Investing for the Long-Term: Gold as a Pillar of NBP's Reserve Management Strategy," CFI.co.

Goldberg, Linda S. and Oliver Z. Hannaoui. (2024). "Drivers of Dollar Share in Foreign Exchange Reserves," Federal Reserve Bank of New York *Staff Reports*, no. 1087.

Gopalakrishnan, Balagopal and Sanket Mohapatra. (2018). "Global Risk and Demand for Gold by Central Banks," *Applied Economics Letters* 25(12): 835-839.

Iancu, Alina, Gareth Anderson, Sakai Ando, Ethan Boswell, Andrea Gamba, Shushanik Hakobyan, Lusine Lusinyan, Neil Meads, and Yiqun Wu. (2022). "Reserve Currencies in an Evolving International Monetary System," *Open Economies Review* 33: 879-915.

Ito, Hiro and Robert N. McCauley. (2020). "Currency Composition of Foreign Exchange Reserves," *Journal of International Money and Finance* 102(2022): 102104.

Johnson, Juliet. (2008). "Forbidden Fruit: Russia's Uneasy Relationship with the U.S. Dollar," *Review of International Political Economy* 15(3): 379-398.

Laser, Falk, Jan Mihailov, and Jan Weidner. (2024). "Currency Compositions of International Reserves–Recent Developments," BOFIT Policy Briefs 2024 No. 6.

McCallum, Andrew H., Laura DeMane, Nyssa Kim, Emily Liu, and Andrew Loucky. (2024). "Introducing New Valuation Change Data for U.S. Cross-Border Portfolio Holdings," FEDS Notes. Washington: Board of Governors of the Federal Reserve System.

McCauley, Robert N. (2019). "Safe Assets: Made, Not Just Born," BIS Working Papers, no. 769.

McDowell, Daniel. (2021). "Financial Sanctions and Political Risk in the International Currency System," *Review of International Political Economy* 28(3): 635-661.

McDowell, Daniel. (2023). *Bucking the Buck: U.S. Financial Sanctions and the International Backlash against the Dollar*. New York: Oxford University Press.

Monnet, Eric and Damien Puy. (2020). "Do Old Habits Die Hard? Central Banks and the Bretton Woods Gold Puzzle," *Journal of International Economics* 127(2020): 103394.

Oztunc, Hakan and Mehmet Orhan. (2021). "Gold Demand by Central Banks: A Comparative Study of Emerging Market and Advanced Economies," *Emerging Markets Finance and Trade* 57(9): 2687-2698.

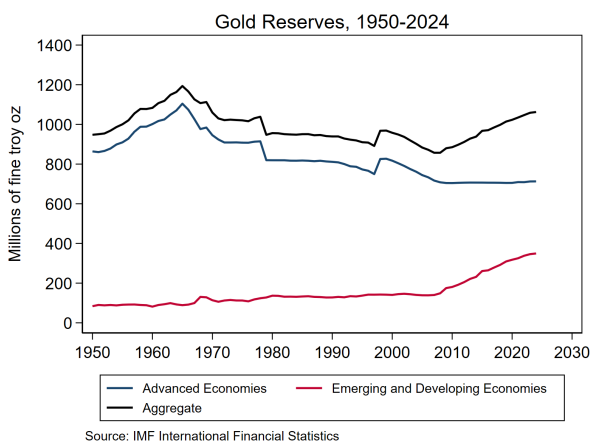
Reserve Bank of India. (2018). *Annual Report 2017-18*.

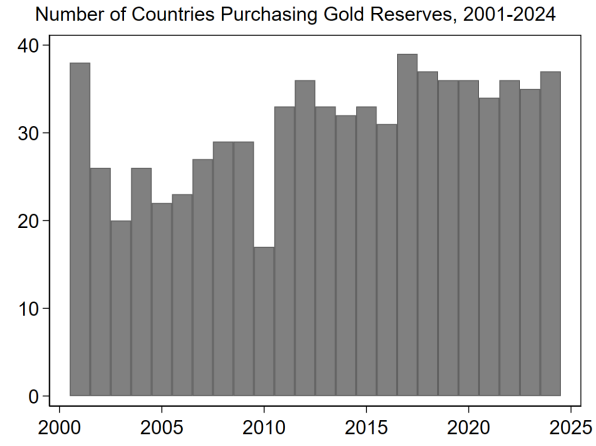
Weiss, Colin R. (2023). "Financial Flows to the United States in 2022: Was There Fragmentation?", FEDS Notes. Washington: Board of Governors of the Federal Reserve System.

World Gold Council. (2024a). "Gold Market Commentary: Gold Hit New Highs in 2023," *World Gold Council*, January.

World Gold Council. (2024b). "Central Bank Gold Reserves Survey 2024," *World Gold Council*, June.

Figure 1: Gold Reserve Trends





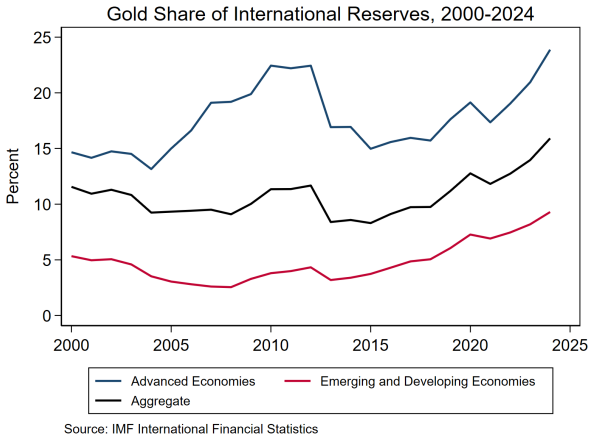


Figure 2

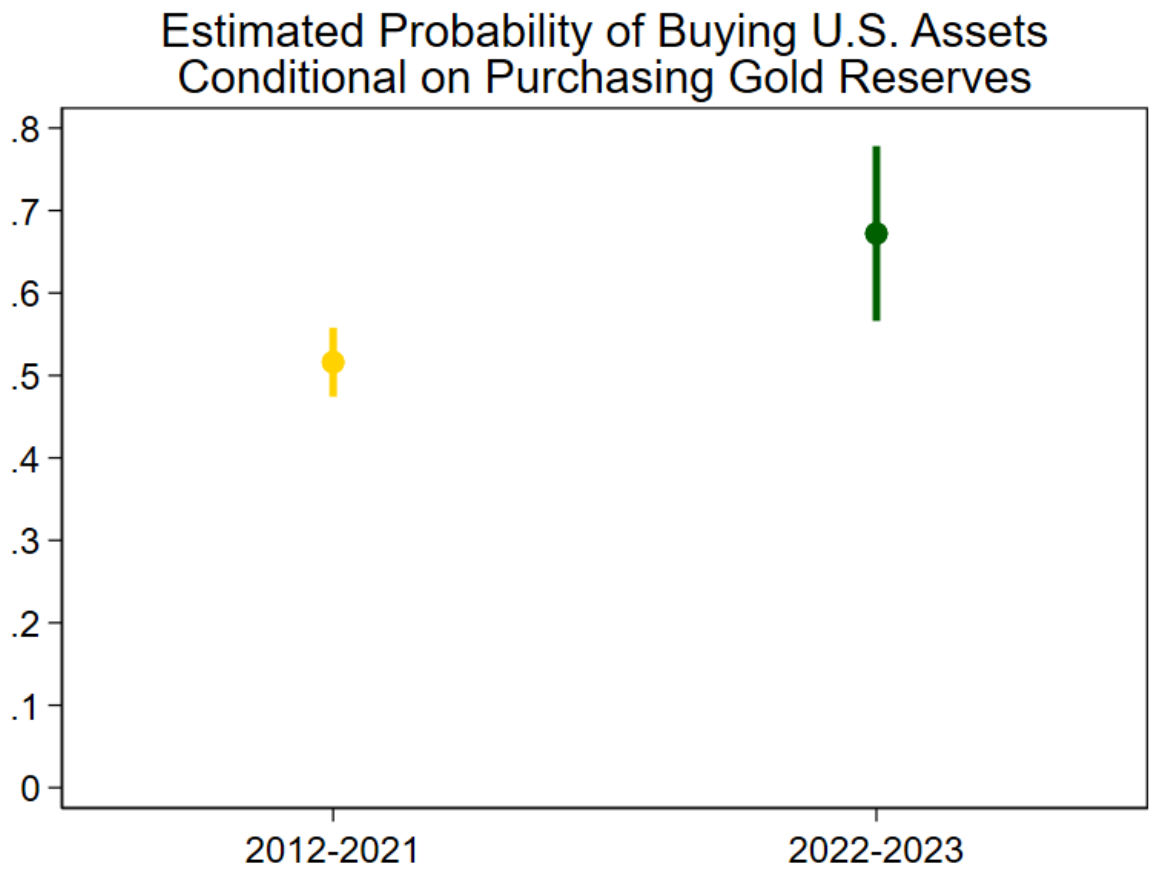
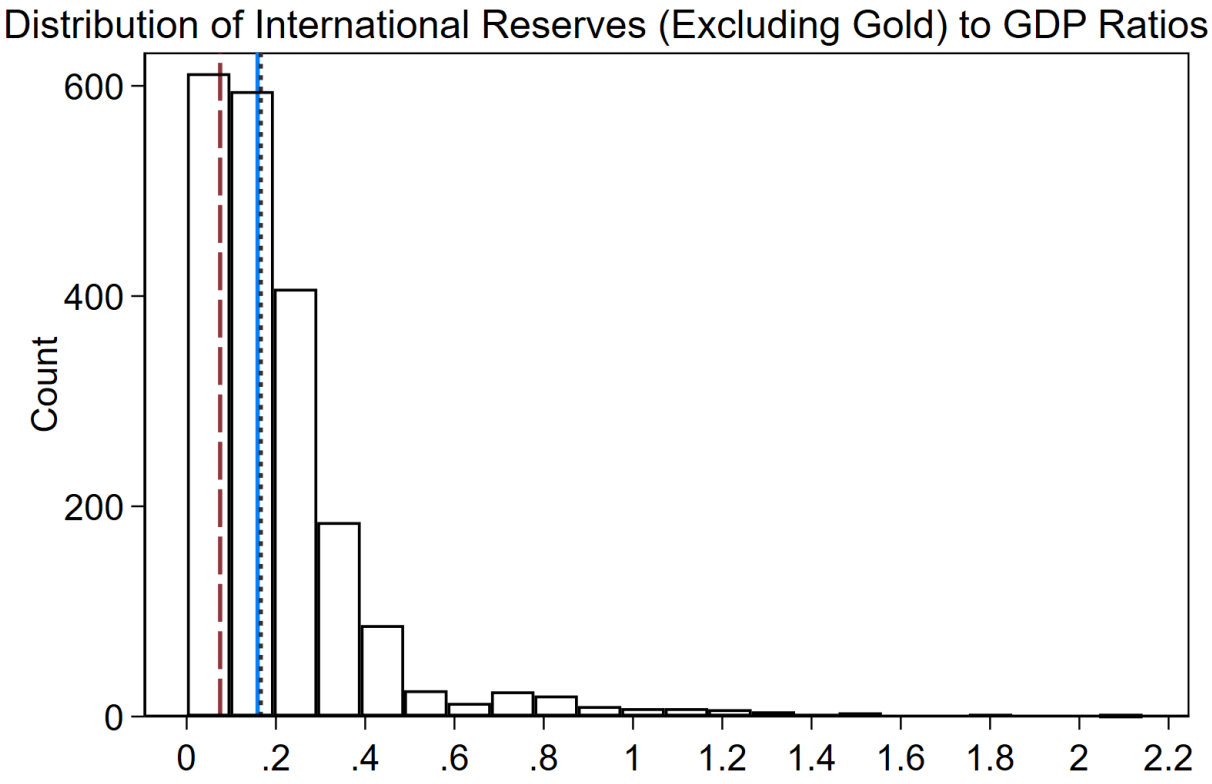


Figure shows estimated probabilities a sovereign buys U.S. assets in a given year conditional on that sovereign purchasing gold reserves in the same year for the 2012-2021 and 2022-2023 periods alongside 90 percent confidence intervals constructed using standard errors clustered at the country level. Estimates are based on a regression of an indicator variable equal to one if the official sector in a country purchases U.S. assets on net in a given year on a constant, an indicator equal to one if a central bank buys gold in a given year, an indicator variable for 2022 and 2023, and the interaction of the the gold-buying and post-2021 indicator variable. The plotted probability for 2012-2021 is the estimate of the constant term plus the coefficient on the gold reserve-buying indicator. The plotted probability for 2022-2023 is the sum of the estimated constant,the coefficient on the gold-buying dummy, the coefficient on the post-2021 indicator variable, and the coefficient on the interaction of these two indicator variables.

Figure 3



Solid blue vertical line is median for entire sample. Dashed red vertical line is median for countries selling >5 metric tons of gold. Short-dashed black vertical line is median for countries selling >$200 million of U.S. assets.

Table 1: Drivers of Official Sector Gold Purchases

	Millions of USD		Inverse Hyperbolic Sine		Standardized	
	(1)	(2)	(3)	(4)	(5)	(6)
U.S. Asset Purchases	−0.002	−0.002	−0.013	−0.016*	0.005	0.000
	(0.003)	(0.003)	(0.009)	(0.009)	(0.024)	(0.024)
Real GDP Growth		−0.262		0.011		0.003
		(1.443)		(0.007)		(0.003)
Inflation		−0.326		−0.004		0.001
		(0.388)		(0.004)		(0.001)
Reserves-GDP Ratio		117.882		1.629**		0.526**
		(122.386)		(0.797)		(0.264)
Ex. Rate Change		39.040		1.281		0.486*
		(145.382)		(0.820)		(0.267)
N	1586	1586	1586	1586	1586	1586

Table shows results from estimating equation 1 for three different measures of financial flows. "Millions of USD" columns measure net purchases of gold reserves and official sector purchases of U.S. assets in millions of U.S. dollars. "Inverse Hyperbolic Sine" columns measure these as the inverse hyperbolic sine of the net purchases in millions of dollars. "Standardized" columns rescale net purchases of gold reserves and U.S. assets to each have mean zero and unit standard deviations for every country. All regressions include country and year fixed effects. Standard errors clustered at the country level. ***p<0.01, **p<0.05, *p<0.1.

Table 2: Drivers of Official Sector Gold Purchases–Dollar Diversification after 2021

	Millions of USD (1)	Inverse Hyperbolic Sine (2)	Standardized (3))
U.S. Asset Purchases	-0.006^{**}	-0.030^{***}	-0.026
	(0.003)	(0.010)	(0.026)
U.S. Asset×Post-21	0.017^{**}	0.093^{**}	0.161^{**}
	(0.007)	(0.038)	(0.071)
Real GDP Growth	-0.233	0.012	0.003
	(1.444)	(0.007)	(0.003)
Inflation	-0.291	-0.004	0.001
	(0.398)	(0.004)	(0.001)
Reserves-GDP Ratio	122.141	1.531^{*}	0.502^{*}
	(123.316)	(0.785)	(0.264)
Ex. Rate Change	45.611	1.117	0.445
	(147.941)	(0.845)	(0.270)
$\beta + \theta$ p-value	0.12	0.07	0.04
N	1586	1586	1586

Table shows results from estimating equation 2 for three different measures of financial flows. "Millions of USD" column measures net purchases of gold reserves and official sector purchases of U.S. assets in millions of U.S. dollars. "Inverse Hyperbolic Sine" column measures these as the inverse hyperbolic sine of the net purchases in millions of dollars. "Standardized" column rescales net purchases of gold reserves and U.S. assets to each have mean zero and unit standard deviations for every country. $\beta + \theta$ p-value reports the p-value on the test that the sum of the estimated coefficients on the $USPur$ and $USPur \times Post2021$ variables in equation 2 is equal to zero. All regressions include country and year fixed effects. Standard errors clustered at the country level. ***p<0.01, **p<0.05, *p<0.1.

A Online Appendix: Details for gold reserve buyers that disclose currency composition of reserves

Table A1: Gold Reserve Accumulation and Currency Composition since 2000

Country	Gold Accumulation (Millions of troy oz)	Details
Russia	62.64	**De-dollarization**. Begins adding gold in 2006 at the same time it first reduces dollar share of reserves from 70% to 50% (Johnson, 2008). Pace of gold accumulation increases in 2014 and dollar share decreases from 46% then to less than 20% in early 2022.
China	59.17	Substantial diversification but not de-dollarization since dollar share drops from 79% in 1995 to 55% in 2019.
Türkiye	13.64	**De-dollarization**. True gold accumulation begins in 2017 (prior increases appear to be from deposits of gold by commercial banks). Dollar share of reserves plummets from 77% in 2016 to 30% in 2018.
Poland	8.22	Begins accumulating gold in 2017. Average dollar share of reserves in 5 years before 2017 is 38%, most recent is 41%.
Kazakhstan	7.62	Small purchases 2003-2008 before accelerating after launch of domestic gold purchase program in 2011. Dollar share is very volatile throughout, but 2002 share is 70.3% and 2022 share is 65%.
Mexico	3.63	Purchases in 2011 and 2012. No dollar share reported in those years, but current share is above 90%.
South Korea	2.92	Gold purchases from 2011-2013. Dollar share declined during period of gold accumulation from 63.7% to 58.3% but was 71.9% at the end of 2024.

Brazil	2.05	Gold purchases primarily in 2011 and 2021. Dollar share was 82.2% in 2010 and 82.1% in 2023.
Serbia	0.83	Steady accumulation after 2010. Dollar share was 21.1% in 2010 and 22.5% in 2022 and 20-25% from 2006-2009.
Kyrgyzstan	0.61	Begins gold purchases in 2011, has domestic gold purchase program. Dollar share was 32% in 2010 and 69% in 2023.
Czech Republic	0.54	After reducing gold stock through 2019, has added gold every year since. Dollar share was 24% in 2019 and 30% in 2022.
Ukraine	0.42	Gold holdings fluctuate 2000-2023, but end the period higher on net. Dollar share was 73.2% in 2001 (earliest available) and 88% in 2025.
Bangladesh	0.34	One of the main buyers of IMF gold 2009-2010. Dollar share was below 50% in three years prior to first gold purchases in 2009 and has been above 80% every year after 2013, including 81% in 2023.
Paraguay	0.23	Gold accumulation mainly in 2012. Dollar share of reserves is currently almost 100%.
Ireland	0.21	Small purchases of gold in 2008, larger accumulation in 2021 and 2022. Dollar share has been steadily increasing since 2018, above 50% in 2024.
Brunei	0.15	Gold purchases 2011-2014. Dollar share first disclosed in 2011 is 86%, though it declines in 2012 and 2013, it is 88% in 2023.
Slovenia	0.10	Buys gold in 2001. Transfers some to ECB when it joins eurozone in 2007. Dollar share is nearly 100% in 2019.

Mozambique	0.06	Gold holdings volatile from 2000-2023, but up on net. Main years of accumulation are 2005, 2012, 2013. Dollar share is disclosed from 2007-2016 and ranges from 50-60% from 2008-2012. Below 50% 2014-2016, might reflect dollar liquidations to support economy amid debt crisis rather than de-dollarization.
Bosnia and Herzegovina	0.05	Gold purchases 2009, 2011, 2013. Pegs to the euro and holds over 95% of reserves in euro throughout.
Bulgaria	0.03	After gold reserves decline 2000-2006, accumulation from 2007-2023. Pegs to euro and holds almost no dollar reserves throughout.
Peru	0.01	Gold purchases in 2001. No currency composition data that year, but dollar share above 90% in 2024.
Moldova	0.001	Very small gold purchases in 2011 and 2012. Dollar share is 42% in 2011 (first year disclosed) and 66% in 2022.

Table reports total gold purchases 2001-2023 for countries that accumulated gold on net from end-2000 to end-2023 and disclose the currency composition of FX reserves to allow for assessment of de-dollarization. Sources: IMF International Financial Statistics and International Reserves and Foreign Currency Liquidity, World Gold Council, Arslanalp et al. (2022), central bank publications.

In addition to these cases, six additional countries warrant discussion. Each of these six countries has a period with notable gold accumulation but wasn't reported in the table for various reasons.

- **Tajikistan** acquires gold reserves in all but one year from 2003-2020, but data on gold reserves end in 2022. The first year where the dollar share is disclosed is 2008 when it is 85 percent. From 2009 to 2013, the dollar share is always below 60 percent and often below 50 percent. In 2022, the dollar share is above 70 percent. With the dollar still comprising the bulk of foreign exchange reserves, this is not a case of de-dollarization.

- **Philippines** gold reserves increase from 2011-2023, but earlier sales leave gold reserves

lower on net in 2023 than in 2000. The dollar share of reserves was 77.5 percent in 2010 and 93.7 percent in 2022.

- **France** reduces its gold holdings significantly from 2000-2009 as part of the Central Bank Gold Agreements that governed how advanced economy central banks that signed the agreement could sell their gold reserves. It then begins a period of very small but consistent accumulation from 2015-2023. The dollar share of reserves is disclosed starting in 2018 and is between 81 and 82 percent in all years through 2022. This would be inconsistent with de-dollarization.

- **South Africa** experienced a large decline in its gold reserves in 2003 due to the repayment of a loan denominated in gold, but accumulates gold in every year from 2004-2012 with further purchases in 2014 and 2017. Despite this accumulation, gold reserves are still lower in 2023 compared to 2000. The dollar share was first disclosed in 2004 and stood at 81.3 percent then. The most recent dollar share was 67%. Thus gold accumulation appears to have come alongside diversification but not de-dollarization.

- **Bolivia** purchased gold reserves in 2010 and 2011 following a reduction in the dollar share of its reserves from 100 percent to 80.3 percent by end-2009. Thus, the gold accumulation came as part of an intentional diversification of Bolivia's international reserves, but the dollar share remained significant. Bolivia most heavily relied on its dollar reserves to meet substantial foreign exchange liquidity needs beginning in 2015. By 2023, with foreign exchange reserves almost depleted, Bolivia liquidated a large part of its gold reserves, leaving them below their 2000 level.

- **Sri Lanka** accumulated gold on net from 2008-2014 but liquidated most of its gold reserves facing a shortage of hard currency beginning in 2020. The dollar share of reserves fluctuated quite a bit from 2008-2020, but it appears to have ended this period above its 2008 level.