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# Gold as International Reserves: A Barbarous Relic No More?

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## Gold as International Reserves: A Barbarous Relic No More?

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**2023**  
**JAN**



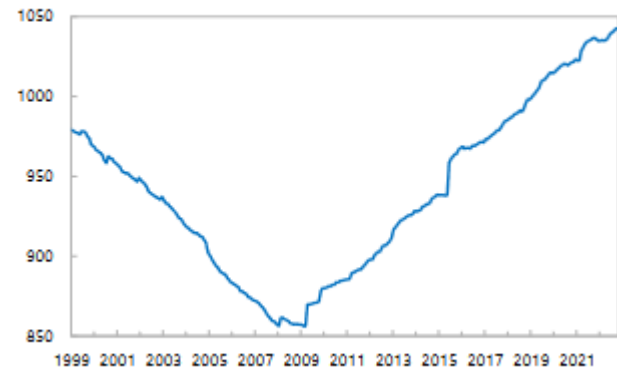
WORKING PAPER

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- In the third quarter of 2022, global central banks added US\$20 billion of gold to their international reserve portfolios.
  - This was the largest quarterly increase in official gold demand in fully 55 years according to the World Gold Council (2022).
  - This startling increase excited much commentary, taking place as it did against the backdrop of a secular decline in the share of global reserves held in the form of gold stretching over the better part of four decades.

# But this increase is not as unprecedented as sometimes portrayed

- After having fallen as a share of total reserve assets for some time prior to the GFC, the gold share has risen steadily thereafter, as you can see at right.

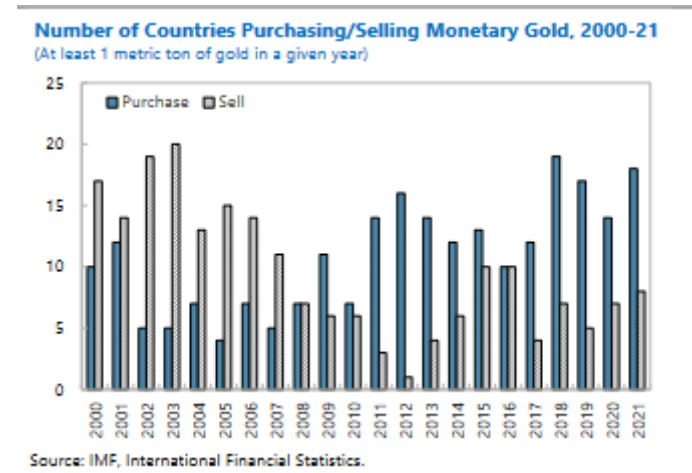
Gold Holdings in Official Reserve Assets, 1999-2022  
(Million fine troy ounces)



Source: IMF, International Financial Statistics.

# But this increase is not as unprecedented as sometimes portrayed

- Where prior to the GFC more countries/central banks were selling gold than were buying it, since then the situation has been reversed.



# In our paper, we explore two potential explanations

- First, gold is seen as a safe haven and desirable reserve asset in periods of high economic, financial and geopolitical uncertainty and when returns on reserves currencies are low, two conditions that have prevailed in recent years.
  - Gold is an inflation hedge.
  - It is a portfolio diversifier, and portfolio diversification is especially valuable in periods of volatility.
  - It is favored over other commodities on grounds of tradition.
  - There are well regulated markets in gold in London, NY and Shanghai.

# In our paper, we explore two potential explanations

- Second, gold is perceived as a safe and desirable reserve asset when countries are subject to financial sanctions, and when financial investments are potentially subject to asset freezes and seizure.
  - Decision of G7+ countries to freeze forex reserves of Bank of Russia was “unprecedented” (it was a wake-up call).
  - Gold vaulted at home, in contrast, is safe.
  - Bank of Russia had already accelerated its gold purchases just prior to Russia’s annexation of Crimea in 2014.

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# Equally, there are counterarguments

- As for the inflation and volatility hedge argument:
  - Financial securities more effectively provide protection against inflation and economic and financial volatility.
  - Gold prices move with inflation, but very erratically.
  - Gold doesn't bear interest.



# Equally, there are counterarguments

- As for the sanctions hedge argument:
  - Gold vaulted at home can't be used in currency swaps or as collateral in other financial transactions, unlike vaulted at say the Bank of England or the London Metals Exchange.
    - Such gold is safe but sterile.
  - Gold vaulted at home is clumsy for use in transactions.
    - There are counterexamples, as when Venezuela chartered Iranian aircraft to transfer gold to Iran in payment for oilfield equipment and services, but this makes the point.

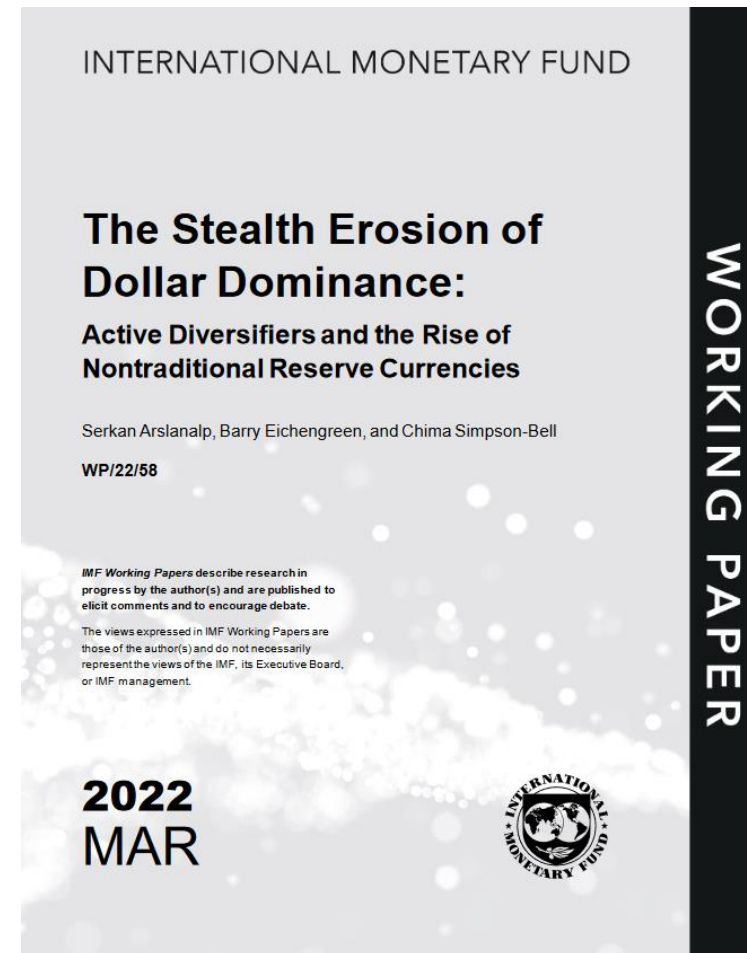
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# In this paper we seek to do the following

- First, establish which central banks have been diversifying toward gold.
- Second, recover their motives.
  - More generally, we ask how the place of gold in central bank reserves is affected by transactions costs, relative returns, economic and financial uncertainties, geopolitical events, and sanctions risk.

# Findings

- We identify 14 “active diversifiers,” 14 countries – all emerging markets – that have increased their gold reserve shares by at least 5 percentage points of total reserves since the turn of the century.
- This contrasts with our own earlier work, where we identified 46 countries, both EMs and DCs, that increased the share of their reserves in “nontraditional reserve currencies” over the period.
- Our 14 “active gold diversifiers” are all subject to exceptional economic, financial or geopolitical uncertainty of one sort or another.



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# Findings

- We confirm that gold shares display considerable inertia. History matters for reserve management, in other words.
- But relative returns also matter. The gold share is positively affected by the futures/spot price differential, and negatively affected by the U.S. federal funds rate.
  - This last pattern is most evident for EMs, consistent with the idea that EMs manage their reserve portfolios relatively actively.
- In addition, the share of gold is positively associated with global economic policy uncertainty and US dollar uncertainty.
- There is some, albeit more limited, evidence that the gold share responds positively to global geopolitical risk as captured by an index of interstate conflict and terrorist attacks.
  - Whereas advanced countries respond more to geopolitical risk, EMs respond more to economic policy uncertainty.

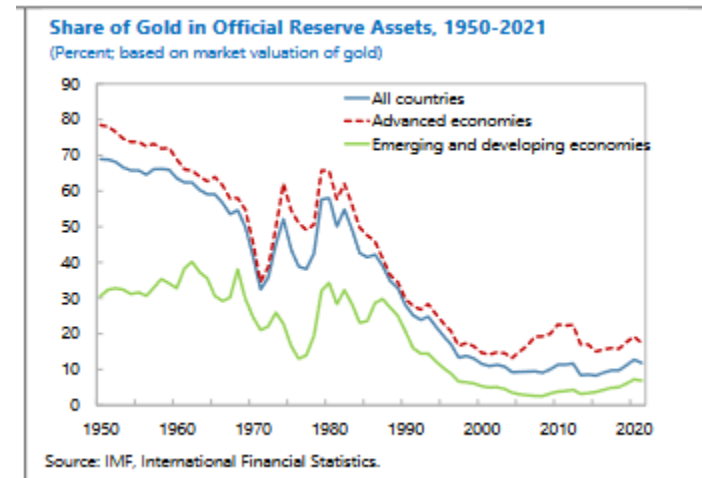
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# Our most novel findings look at the impact of sanctions risk

- Fully half of the largest year-over-year increases in central bank holds of gold since the turn of the century were associated with sanctions risk.
- For a large sample of countries, we show that sanctions have a positive impact on the share of reserves held in gold.
- Multilateral sanctions have a larger effect than unilateral sanctions, which makes sense.
- But while that impact is positive and significant, it is on average relatively small. It explains only a small fraction of observed increases in the gold share of central bank portfolios.

# Now in more detail...

- Gold's share has long been trending downward.
- Most obviously since 1980s.
- Most obviously in DCs, which inherited substantial gold holdings from the past and have been seeking to trim their holdings without destabilizing prices.
- Although this has stabilized and turned around more recently.



- Who holds large amounts of gold (in absolute amount) depends on economic size, but it also appears to depend on a variety of other circumstances.
  - This is nothing if not a diverse collection of countries.
- Prominence here of Russia, China, Taiwan suggests a role for geopolitical circumstances.

Table 1. Top 20 Reported Official Gold Holdings, end-2021

	million troy ounces	percent of total	percent of reserve assets	reserve assets as percent of GDP
United States	261.5	23%	66%	3%
Germany	108.0	9%	66%	7%
Italy	78.8	7%	63%	11%
France	78.3	7%	58%	8%
Russia	74.0	6%	21%	36%
China	62.6	5%	3%	20%
Switzerland	33.4	3%	5%	137%
Japan	27.2	2%	4%	28%
India	24.2	2%	7%	21%
Türkiye	21.1	2%	35%	14%
Netherlands	19.7	2%	56%	6%
ECB	16.2	1%	33%	1%
Taiwan, Province of China	13.6	1%	4%	73%
Kazakhstan	12.9	1%	68%	18%
Portugal	12.3	1%	69%	13%
Uzbekistan	11.6	1%	60%	51%
Saudi Arabia	10.4	1%	4%	57%
United Kingdom	10.0	1%	9%	6%
Lebanon	9.2	1%	48%	...
Spain	9.1	1%	18%	6%
Memo items:				
Euro Area	346.4	30%	53%	8%
IMF	90.5	8%	...	...
BIS	16.4	1%	...	...

Sources: IMF, International Financial Statistics and World Economic Outlook.

# Probably more revealing is who holds large *shares* of reserves in gold

- Some surprises here.
- Who knew that Portugal was at the top of this list.
  - Not me...
- Or that only one Latin American country, Bolivia, would feature on the top 20?
  - We find that CBs of countries for which gold mining is important hold more gold (they support the local industry as a buyer). Thus, gold is Bolivia's #1 export.

Table 2. Top 20 Gold Holdings as a Share of Official Reserves, end-2021

	percent of reserve assets	million troy ounces
Portugal	69%	12.3
Kazakhstan	68%	12.9
Germany	66%	108.0
United States	66%	261.5
Italy	63%	78.8
Uzbekistan	60%	11.6
France	58%	78.3
Netherlands	56%	19.7
Bolivia	53%	1.4
Cyprus	51%	0.4
Austria	48%	9.0
Lebanon	48%	9.2
Greece	46%	3.7
Belarus	37%	1.7
Türkiye	35%	21.1
ECB	33%	16.2
Belgium	32%	7.3
Curacao & St Maarten	30%	0.4
Russia	21%	74.0
Kyrgyz Rep	20%	0.3
Memo items:		
Euro Area	53%	346.4

Source: IMF, International Financial Statistics.



# Top 10 buyers and top 10 sellers of gold

- You can see here the contrast between EMs, which have been the largest buyers since the turn of the century, and DCs, which have been the largest sellers.

Table 3. Top 10 Buyers and Sellers of Gold in the Official Sector from end-1999 to end-2021

	million troy ounces	percent of all buying/selling	change in gold share in official reserves
<b>Largest buyers</b>			
Russia	60.7	28%	-10%
China	49.9	23%	1%
Türkiye	17.4	8%	31%
India	12.7	6%	-2%
Kazakhstan	11.1	5%	42%
Uzbekistan	10.0	5%	21%
Saudi Arabia	5.8	3%	-3%
Thailand	5.4	2%	4%
Poland	4.1	2%	5%
Mexico	3.7	2%	3%
<b>Largest sellers:</b>			
Switzerland	-49.8	34%	-34%
France	-18.9	13%	17%
IMF	-13.0	9%	...
Netherlands	-11.9	8%	7%
United Kingdom	-10.6	7%	-4%
ECB	-7.8	5%	19%
Spain	-7.8	5%	5%
Portugal	-7.2	5%	29%
Austria	-4.1	3%	28%
Germany	-3.5	2%	32%
<b>Memo items:</b>			
Euro Area	-56.4	38%	21%

Source: IMF, International Financial Statistics.

# And here finally is our list of “active diversifiers

- All EMs.
- A number with “distinctive” international economic or geopolitical concerns:
  - Kazakhstan, Belarus, Turkey, Uzbekistan, Hungary, Iraq, Argentina, Qatar.

Table 4. Active Diversifiers into Gold in Reserve Assets, 1999-2021

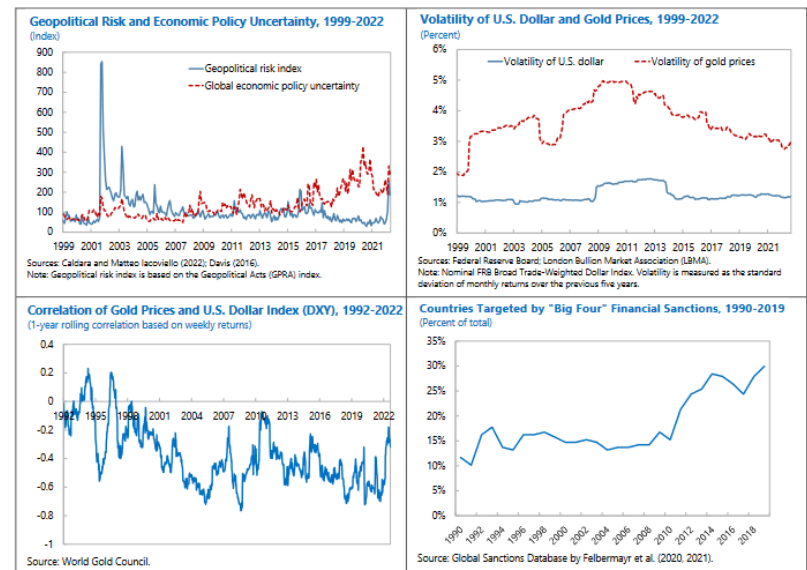
	end-1999		end-2021		change in gold share in official reserves
	gold (bil US\$)	gold share in official reserves	gold (bil US\$)	gold share in official reserves	
<b>Large buyers of gold (&gt; 1 million troy ounces)</b>					
Kazakhstan	0.5	26%	23.5	68%	42%
Belarus	0.0	3%	3.1	37%	34%
Türkiye	1.1	4%	38.5	35%	31%
Uzbekistan	0.5	39%	21.2	60%	21%
Hungary	0.0	0%	5.5	13%	12%
Iraq	0.0	0%	5.6	9%	9%
Argentina	0.1	0%	3.2	8%	8%
Qatar	0.0	0%	3.3	8%	7%
<b>Other buyers of gold (&lt; 1 million troy ounces)</b>					
Bolivia	0.3	22%	2.5	53%	31%
Mongolia	0.0	0%	0.6	13%	13%
Kyrgyz Rep	0.0	10%	0.6	20%	10%
Egypt	0.7	5%	4.7	12%	7%
Serbia 1/	0.1	5%	2.2	12%	7%
Mauritius	0.0	2%	0.7	8%	6%

Sources: IMF, International Financial Statistics; National Bank of Belarus; National Bank of Serbia  
 1/ The figures for Serbia are as of end-2002 (rather than end-1999) due to data availability.

# Some potential determinants of the share of gold in reserves

- Economic uncertainty (in red) and more recently geopolitical risk (in blue).
- US dollar volatility (in blue).
- Hedge against dollar depreciation (third panel).
- Increased use of financial sanctions (fourth panel).

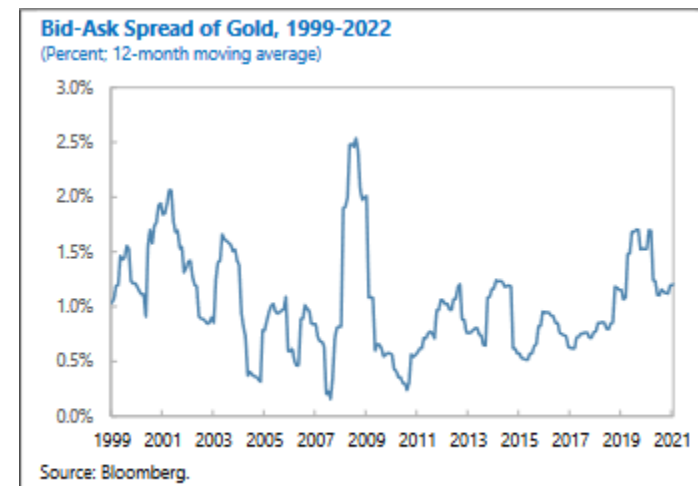
Figure 4. Potential Determinants of the Share of Gold in Official Reserves, 1999-2022



Note: Global geopolitical risk is measured by the Caldara-Iacoviello (2022) subindex for geopolitical acts (conflicts, terrorist attacks). This provides a news-based measure of adverse geopolitical events and associated risks. Global economic uncertainty is measured by Davis (2016) as a nominal GDP-weighted average of national economic policy uncertainty indices.

# Finally, gold-market specific conditions vary

- I must admit that I'm not sure why bid/ask spreads vary so enormously.
  - Maybe Shaoki can speak to this.
- That they spike during the GCF and COVID makes sense.
- But more generally?



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# We then turn to aggregate time series regressions

- Data on gold reserves come from IFS.
- Global geopolitical risk is the Caldara-Iocoviello (2022) subindex for geopolitical conflicts and terrorist attacks.
- Global economic uncertainty is the relevant subindex from the Davis et al. (2016) measure of economic policy uncertainty (aggregated and weighted across countries).
- Data on other variables come from the usual sources.
  - I refer you to the paper.
- Observations are monthly, cover 1980-2021.
  - Monthly fixed effects included throughout.
  - Griliches adjustment is used to estimate coefficient on LDV.

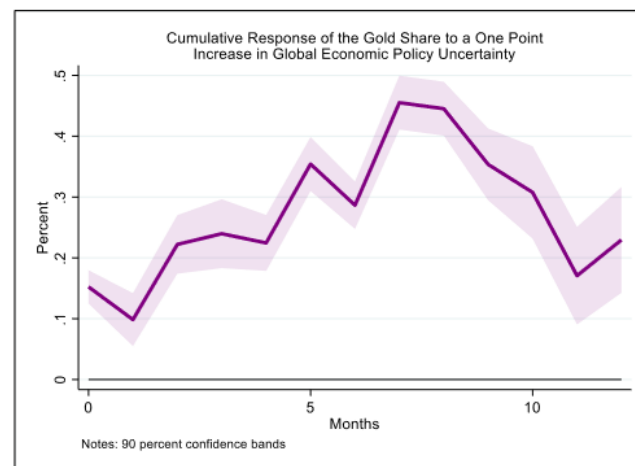
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# Rather than showing you a battery of tables, let me summarize the results

- LDV consistently has a coefficient of 0.95, confirming existence of considerable inertia.
- Gold basis (future/spot price ratio) has positive effect.
- US inflation is positively associated with gold holdings, as is US dollar volatility.
- In addition, the share of gold is positively associated with global economic policy uncertainty and US dollar uncertainty.
- There is some, albeit more limited, evidence that the gold share responds positively to global geopolitical risk as captured by an index of interstate conflict and terrorist attacks.
  - Whereas advanced countries respond more to geopolitical risk, EMs respond more to economic policy uncertainty.

- Figure 6 shows the cumulative response of the gold share to a 1-point shock to the Global Economic Policy index.
- This is positive on impact and then rises progressively, peaking after eight months.
- Observe that the GEPU index rose by 140 points between February and March of 2022 following the outbreak of war in Ukraine.
- On impact (in the first month), this means a  $140 \times 0.15 = 0.21$  percent (about a fifth of one percent) increase in the share of gold in central bank portfolios, a relatively small effect.
- The cumulative impact tops out in 7 months at about three times that initial increase.

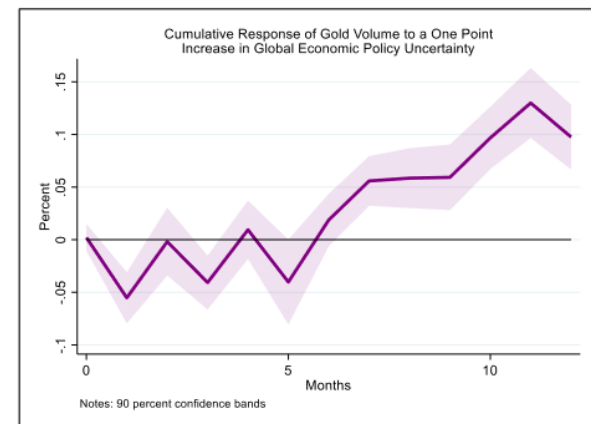
Figure 6. Cumulative Response of Gold Share to a 1-point Shock to the Global Economic Policy Uncertainty (GEPU) Index



# Here volume instead of value

- Part of the explanation is that the gold prices rise in periods of heightened uncertainty, increasing the gold share in global reserves. Figure 7 therefore replicates the previous exercise for fine troy ounces, excluding price effects.
- The figure confirms that gold holdings (in volume terms) do not change on impact, unsurprisingly given that changes in the strategic asset allocation of reserve managers usually require a decision by the board of the central bank, which takes time.
- But there is evidence of buying subsequently, starting about 5 months after the uncertainty shock.

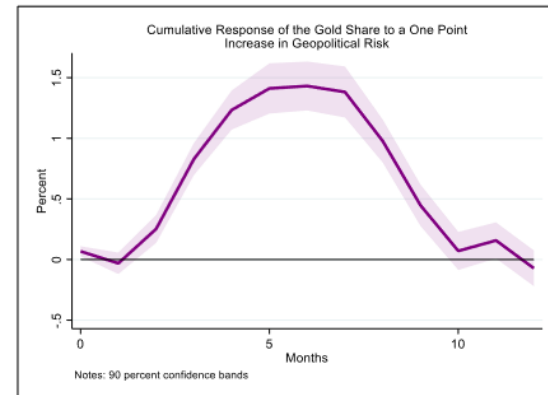
Figure 7. Cumulative Response of Gold Volume to a 1-point Shock to the Global Economic Policy Uncertainty (GEPU) Index





- For geopolitical risk, the response peaks after 5-6 months and dissipates after a year (Figure 8).
- This is in contrast to the response to one-time increase in economic policy uncertainty, where the demand for gold remains elevated after a year.

Figure 8. Cumulative Response of Gold Share to a 1-point Shock to the Geopolitical Risk Index



# Alternatively, country-level regressions

- 144 countries, annual data.
- Results are broadly consistent with those from the aggregate time series analysis.
- In addition, they document the tendency for central banks to buy and hold more gold if the economy is a major gold producer and exporter.
- They show that EMs more open to trade hold less gold (they need forex instead for trade finance?).
- Countries in a stronger fiscal position hold less gold (less need for signaling?).

# Main event: association with sanctions (in five of ten cases)

Table 13. Top 10 Annual Increases in the Share of Gold in Reserves, 2000-21

Country	Year	Increase in gold share (in ppt of reserves)	Increase in gold volume (in percent)	Concurrent events (current or two preceding years)
Türkiye	2020	21%	29%	Sanctions by the US (2018) and EU (2019); COVID-19 pandemic (2020)
Belarus	2010	17%	57%	Sanctions by Russia in 2010
Lao PDR	2001	10%	328%	A series of bomb blasts in 2000 before presidential elections in 2001
Turkey	2017	9%	50%	Coup attempt in 2016; Constitutional referendum in 2017
Sri Lanka	2009	8%	299%	Purchase of gold from IMF following the global financial crisis
Paraguay	2012	8%	1141%	Sanctions by Mercosur and Unasur in 2012
Hungary	2021	8%	200%	COVID-19 pandemic in 2020
Belarus	2006	8%	25%	Sanctions by the EU and US in 2006
Sri Lanka	2000	7%	437%	1997-98 Asian crisis; Assassination attempts before elections in 2000
Belarus	2008	7%	33%	Sanctions by the EU and US in 2006

Sources: IMF, International Financial Statistics; Global Sanctions Database (GSDB).  
Note: Excludes countries with central bank gold purchase programs from domestic producers.

# Effect of sanctions in current or two preceding years (here reserve shares)

- The table reports Tobit model estimates of our financial sanctions specifications for country level gold reserve shares.
- A lower limit at 0 and an upper limit at 1 for the dependent variable is imposed on all specifications.
- All specifications include year dummies, for which the coefficients are omitted.
- The regressions also include inflation, fiscal balance, GDP growth, trade openness, currency appreciation, public debt, gold production and FX regime as covariates, but the coefficient for these are omitted for clarity.
- Standard errors are robust to heteroscedasticity.

Table 15. Effect of Sanctions on Country-Level Gold Reserve Shares, All Economies

Variable	(1)	(2)	(3)
<i>Gold reserve shares</i>			
Big 4 Sanctions	0.02**		
US Sanctions		0.01	
EU Sanctions		0.04***	
Japan Sanctions		-0.04**	
UK Sanctions		0.26***	
Big 4 Sanctions (Unilateral)			0.01
Big 4 Sanctions (Multilateral)			0.04***
Constant	0.04**	0.04**	0.04**
Statistics			
N	1293	1293	1293
Pseudo $R^2$	-0.31	-0.27	-0.31

# Effect of sanctions in current or two preceding years (here volume held)

- The table reports Tobit model estimates of our financial sanctions specifications for country level gold reserve shares.
- A lower limit at 0 and an upper limit at 1 for the dependent variable is imposed on all specifications.
- All specifications include year dummies, for which the coefficients are omitted.
- The regressions also include inflation, fiscal balance, GDP growth, trade openness, currency appreciation, public debt, gold production and FX regime as covariates, but the coefficient for these are omitted for clarity.
- Standard errors are robust to heteroscedasticity.

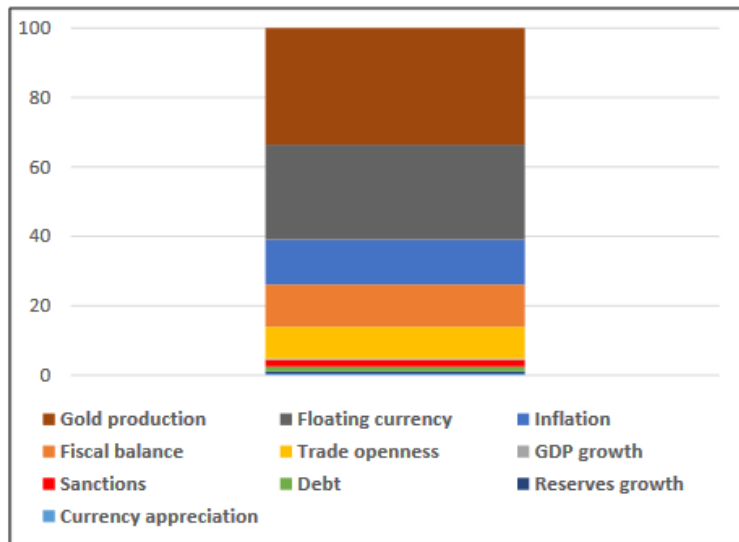
Table 17. Effect of Sanctions on Country-Level Gold Reserve Volume, All Economies

Variable	(1)	(2)	(3)
<i>Gold reserve volumes (mm troy ounces)</i>			
Big 4 Sanctions	4.17***		
US Sanctions		2.36	
EU Sanctions		2.27	
Japan Sanctions		2.33	
UK Sanctions		-2.11	
Big 4 Sanctions (Unilateral)			4.83***
Big 4 Sanctions (Multilateral)			3.25*
Constant	-10.89***	-10.55***	-10.97**
Statistics			
N	1291	1291	1291
Pseudo R <sup>2</sup>	0.04	0.04	0.04

# Huttner/Sunder decomposition

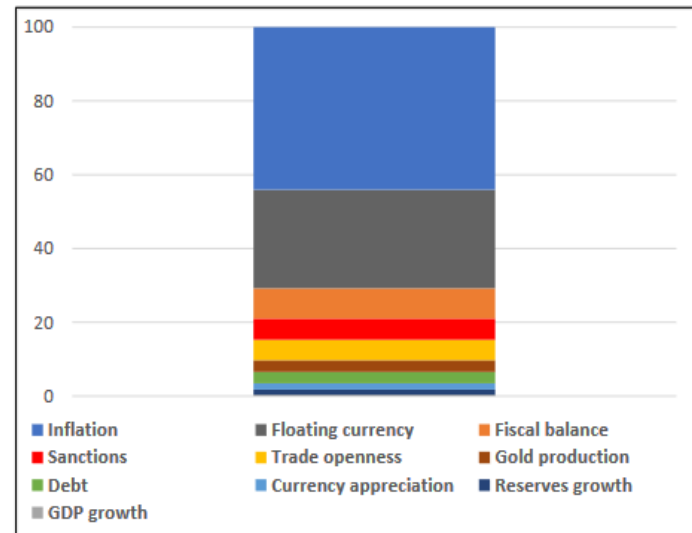
(Sanctions not among the most important determinants, but matter more for EMs)

Figure 10. Determinants of Gold Shares: All Economies



Note:  $R^2$  decomposition using the method from Hüttner and Sunder (2011).

Figure 11. Determinants of Gold Shares: Emerging Market and Developing Economies



Note:  $R^2$  decomposition using the method from Hüttner and Sunder (2011).

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# Questions about the future

- Will even more aggressive use of sanctions imply more CB holdings of gold?
- Will this effect be offset by the return of positive interest rates on traditional forms of forex reserves?
- Will the development of currency alternatives not subject to sanctions risk (RMBI and CIPS) create more attractive financial alternatives?
- And if this last scenario comes to pass, what will it imply for the global monetary and financial system?

- 
- Thank you.
  - I look forward to your comments.