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Financial sanctions and the share of US dollar in global reserve currencies: evidence from the Least Absolute Shrinkage and Selection Operator (LASSO) model

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ABSTRACT

The decline in the dollar's share in global reserve currencies has generated debate on the effect of the United States' financial sanctions. This study examines the effect of US financial sanctions on the dollar's share in global reserve currencies by employing the Least Absolute Shrinkage and Selection Operator (LASSO) model. The estimates suggest that the imposition of financial sanctions by the US reduces the dollar's share in global reserve currencies. This implies that although the US dollar remains the foremost global reserve currency, the imposition of financial sanctions may weaken its dominance.

KEYWORDS

US dollar; financial sanctions; central banks; global reserve currency

JEL CLASSIFICATION

E42; E58; F51

I. Introduction



Since the end of World War II, the US dollar has remained the dominant global reserve currency. The significance of the US dollar in global foreign exchange reserves stems from its use for global trade and finance (ECB 2022). However, Arslanalp, Eichengreen, and Simpson-Bell (2022) noted that the share of US dollars in foreign exchange reserves of central banks was 59% in 2021 compared to 71% in 1999. This decline is argued to be, at least in part, a result of the continued imposition of financial sanctions by the US (ECB 2022; Yellen 2023).¹ These sanctions risks create a political incentive for central banks to diversify their reserves into commodities such as gold (Arslanalp, Eichengreen, and Simpson-Bell 2023) and other non-traditional reserve currencies such as the renminbi.

In light of the paucity of empirical studies (Bergeijk (2021) & McDowell (2023) are notable exceptions), this study examines the effect of US financial sanctions on the dollar's share in global reserve currencies. This study finds that, although the dollar has exhibited significant resilience as the dominant reserve currency, the overuse of financial sanctions by the

US may undermine its global status. Thus, this study lends empirical support to the argument of the ECB (2022) and Yellen (2023) that financial sanctions may have contributed to the recent decrease in the dollar's share in global reserve currency thereby undermining its dominance.

II. Materials and method

This study relies on Markowitz's (1952) modern portfolio theory (MPT) which demonstrates that risk-averse investors construct portfolios to maximize expected return for a given degree of risk (Kempthorne 2013). One implication of the MPT is that risk-averse investors would pick the less risky asset when faced with two portfolios with equal projected returns. Financial sanctions, in theory, freeze the central bank's foreign exchange reserves of the sanctioned country. Sanctions, therefore, raise the political risks associated with holding dollar assets (McDowell 2023), reduce their financial returns and offset their liquidity value (Bianchi and Sosa-Padilla 2023). In this regard, central banks of countries prone to

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¹US sanctions may in themselves be endogenous to the reduction of dollar reserves in countries with hostile relation with it (see; McDowell 2023) which may give potential endogeneity problem. The Sargan test demonstrates that sanctions are endogenous. However, the Granger causality test reveals that the US's capacity to apply sanctions is dependent on the dollar's global reserve currency position.

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sanctions may have an incentive to diversify their foreign exchange reserve portfolios away from the US dollar and into other currencies with lesser sanction risks.² Thus, this study employs the inferential Least Absolute Shrinkage and Selector Operation (LASSO) model which Drukker (2019) shows is a high-dimensional machine-learning model used for prediction and statistical inference. The choice of the LASSO model is because the problem under investigation involves confirming the suspected influence of financial sanction on the share of the dollar in official forex reserves, but with potentially so many control variables that make the model prone to the *curse of dimensionality*. This makes the LASSO a better model than its OLS or kernel alternatives due to its effectiveness regardless of the number of covariates, model specification, nonlinearity, and multicollinearity (Chan-Lau 2017). Following the lead of Ofori *et al.* (2021), the partialing-out inferential lasso linear regression (POLR) model is as follows:

$$E[Y_t/d, .x] = d_t\alpha' + x_t\beta' \quad (1)$$

where y_t is the share of the US dollar in global currency reserves, d is a vector containing the J predictors of interest (i.e. the non-zero selected

covariates of share of the US dollar, namely lagged share of the US dollar, financial sanctions, broad money supply, exchange rate, US GDP, and US inflation), and X contains the p controls (i.e. the weak predictors of the share of US dollar, namely economic policy, monetary policy, fiscal policy, financial regulation, national security, trade policy uncertainties, sovereign debt, currency crises, and equity market volatility, and federal funds rate). However, the POLR produces inferential statistics only on the J covariates while relaxing that of the p controls. This study estimates the LASSO model using quarterly series from 1999Q1 to 2022Q4 (the data was accessed in June 2023), Table 1 describes the sources and nature of the data.³

III. Results and discussion

Table 2 reports the results from the estimation of Equation (1). Table 2 shows that the coefficient of lagged dollar share is 0.68 and statistically significant at a 1% level. One implication of this resilience is that the medium-term evolution of the dollar's share will continue to be important in understanding its position among global reserve currencies.

From Table 2, the financial sanction coefficient was found to be -0.04 and is statistically significant.

Table 1. Description of data.

Label	Description	Source
Share of dollar	Quarterly US share of global reserve currency	IMF IFS
Financial sanction	Quarterly changes (year-on-year) in US financial sanctions.	Global Sanctions Database
Uncertainties indices	Log of US policy uncertainty indices	Economic Policy Uncertainty Database
Money supply	Log of the nominal monetary base (M2) of the US	Federal Reserve Bank of St. Louis Economic Data (FRED)
Inflation	US quarterly (year-on-year) inflation	FRED
GDP	Log of US nominal GDP	IMF IFS
Federal funds rate	Level of federal funds rate	FRED
Exchange rate	Log of quarterly US nominal effective exchange rate.	FRED

Table 2. Effect of United States financial sanctions on dollar's share in global reserve currency.

Partialing-out linear model using adaptive method (without inflation)			Partialing-out IV linear model using adaptive method (without GDP)	
Dependent Variable: dollar share	Coef.	P-value	Coef.	P-value
Lagged dollar share (resilience)	0.68	0.00	0.28	0.00
Financial sanction	-0.04	0.05	-0.07	0.01
Money supply	-1.64	0.03	-4.32	0.00
Exchange rate	5.37	0.01	13.15	0.00
US GDP	-0.19	0.91	-	-
US inflation	-	-	-0.14	0.36

²However, Folkets-Landau, Garber and Dooley (2023) argue, to the contrary, that seizures of foreign reserves will not weaken the dollar's reserve currency dominant but will rather reinforce it by raising the 'collateral demand' for reserves especially in developing countries.

³The sanction data is detailed in Felbermayr *et al.* (2020), Kirilakha *et al.* (2021), and Syropoulos *et al.* (2022).

This means that for every 1-unit rise in US financial sanctions, the dollar's share in global reserves may decline by 4% points. This finding aligns with McDowell (2023) and appears to justify the claims of ECB (2022) and Yellen (2023) that US financial sanctions may be leading central banks to diversify their foreign exchange reserve portfolios away from the dollar. This is possible because, as Bianchi and Sosa-Padilla (2023) and McDowell (2023) show, actual and anticipated sanctions raise the political risk associated with holding dollar assets and provide the political motivation for central banks to shift their foreign exchange reserve portfolios away from the dollar, resulting in a decline in its share of global reserve currencies. The significance of the Wald Chi-squared test shows the overall significance of the model, while the Bayesian Information Criterion (BIC) signifies that the estimates of the POLR model are efficient. The Generalized Method of Moments (GMM) and Two-Stage Least Squares (2SLS) suggest that the findings in Table 2 are robust to alternative estimation strategies.⁴

However, because the currency composition of the central bank's foreign reserves is not made public, we did not analyse a panel of countries in which each country's usage of dollars depended on whether it had been sanctioned. Also, this study acknowledges that dollar holdings are adjusted not only as a result of the past (i.e. sanctions imposed and threatened) but also as a result of planned actions by potential sanction targets who may change dollar holdings in anticipation (as Russia did between 2014 and 2022). Therefore, the findings of this study should be interpreted in light of these limitations.

IV. Conclusion

This study examines the effect of United States financial sanctions on the US dollar's share in global foreign reserves for the period 1999Q1-2022Q4. To achieve this objective, this study employs the inferential LASSO model for analysis. The LASSO model reveals that the inertial effect is a significant determinant of the dollar's share in global reserve currencies. Specifically, the results show that

increased imposition of financial sanctions by the US reduces the dollar's share in global reserve currencies. This finding supports the recent claim that US financial sanctions could be the reason central banks shift their foreign exchange reserve portfolios away from the dollar, resulting in its decline as a global reserve currency.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

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⁴Due to paucity of space, this was not included in the paper. However, the results are available on request.

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