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Gold Revaluation and External Payment Liquidity under Geoeconomic Fragmentation

Prof. Dr. Tuğhan Turan and Article Advisor: Prof. Dr. Osman Doruk¹

ABSTRACT

Rising gold reserve values can coincide with a deterioration in an economy's ability to meet external payments when they fall due. This article examines that apparent contradiction through a framework connecting reserve composition, asset mobilisation times, and the financing of essential imports. A critical synthesis of research on reserve management, trade finance, dominant currency pricing, and maritime disruption informs a deterministic cash flow model. The model measures the minimum bridge facility required to cover every payment date, rather than judging liquidity from a terminal reserve ratio. Reproducible numerical experiments compare two portfolios of equal value under alternative access conditions. Following a hypothetical 20 percent gold price increase, their values rise to 107 and 112 units. Both cover cumulative payments by day 30, yet require bridge capacities of 8.79 and 23.16 units at earlier checkpoints. Their ranking reverses when access to foreign currency assets is more impaired than access to gold. Improving gold mobilisation and restoring supplier credit reduce funding needs through partly overlapping channels. A portfolio that minimises the worst funding gap across two scenarios changes substantially when a third scenario delays gold conversion beyond the payment horizon. The findings establish conditional relationships, not estimates of an actual crisis or an optimal reserve allocation for Türkiye. The article develops an empirical implementation for Türkiye and other energy importing economies, separating valuation gains, contractual liquidity, private financing needs, and contingent public support. Its central implication is that external resilience requires matching executable funding to payment dates, alongside conventional reserve adequacy assessment.

Keywords: geoeconomic fragmentation; gold reserves; external liquidity; trade finance; energy security

Keywords: *Revaluation; External; Payment; Liquidity; Under*

Introduction

An energy cargo can be affordable on a national balance sheet and still be difficult to pay for on its contractual settlement date. The distinction becomes consequential when several arrangements change together: suppliers shorten payment terms, banks reduce confirmation limits, shipping disruptions postpone receipts, and reserve assets take longer to mobilise. A higher gold price can improve the reported value of official reserves during the same episode. These developments are compatible because the value of an asset and the time at which it can deliver an accepted payment are different economic quantities. For an energy importing economy, the resulting mismatch can affect production before any conventional measure signals that its total external resources have been exhausted.

Existing research provides substantial foundations for understanding this problem. Gold accumulation and reserve composition respond to geopolitical considerations, while reserve management guidance explicitly recognises liquidity and operational risks (Arslanalp et al., 2023; International Monetary Fund [IMF], 2013b). Recent work goes further: Mak and Vaccaro-Grange (2026) distinguish gold's contribution to balance sheet resilience from its suitability for immediate liquidity needs, and Weiss (2026) cautions against interpreting changes in market value as equivalent changes in reserve preferences. The present article builds on these distinctions. Its research question is how the timing of reserve mobilisation interacts with import financing needs to determine the external funding capacity required before an adverse episode has run its course.

Türkiye provides an institutionally relevant setting for this question. The OECD's 2025 survey reports that roughly two thirds of energy consumption depends on imports, predominantly fossil fuels (Organisation for Economic Co-operation and Development [OECD], 2025). The Central Bank of the Republic of Türkiye (CBRT) describes reserve management objectives that include maintaining foreign currency liquidity against external shocks and supporting external debt service (CBRT, 2025). These features motivate an application without implying that all energy imports are publicly financed or that all reported reserves are available for private transactions. The necessary link runs through banks, eligible counterparties, contractual payment obligations, and an explicitly defined public liquidity policy.

The contribution is a joint analytical treatment of three quantities usually discussed in different settings: the market value of a reserve portfolio, the amount that can be converted and delivered by each payment date, and the residual financing demand created by changes in trade terms. I derive a minimum bridge requirement, identify conditions under which reserve rankings reverse, and examine how an adverse set of access conditions changes a liquidity-oriented portfolio choice. These are accounting and optimisation results under stated assumptions. They do not identify the causal macroeconomic effects of a particular conflict, and they do not establish that the broader distinction between wealth and liquidity is new.

The study combines a focused literature review with transparent numerical experiments and an empirical implementation proposal. Its illustrative economies have no country-specific calibration. Every numerical input is disclosed, so the results can be reproduced without inferring unavailable information about official reserve custody or private credit lines. Methodology precedes the literature review to make the object being explained precise. Findings then report the analytical propositions and scenario calculations. The extended arguments consider monetary transmission, global reserve diversification, Türkiye's measurement requirements, and the conditions under which improved access would support external adjustment without concealing credit losses or postponing an unsustainable commitment.

Methodology

Research design and the scope of the literature search

The article is an analytical study supported by a purposive review of academic research and primary institutional publications. Searches completed on 29 September 2026 combined terms covering gold reserves, sanctions, reserve liquidity, settlement horizons, trade finance, working capital, and shipping delays. Publisher records, author or university repositories, and publications from the IMF, BIS, CBRT, OECD, Federal Reserve, UNCTAD, and Financial Stability Board were used to check bibliographic details and the claims attached to them. The search included recent reserve studies as well as foundational work. It was not a preregistered systematic review, and its coverage cannot establish that no unpublished or differently indexed treatment exists. The originality claim is therefore confined to the particular integration and explicit propositions developed here.

confidential reserve data are imputed, and no scenario is assigned an empirical probability. The interpretation of each finding follows that division. A simulated payment failure is a property of a hypothetical cash flow schedule, whereas a statement about reserve reporting is tied to a cited institutional source.

The accounting perimeter and the unit of observation

The model represents an authorised reserve management entity meeting a specified schedule of external currency needs. The schedule may include a defined liquidity facility for domestic banks, but it does not automatically consolidate every private obligation into a public liability. All amounts are expressed in a common settlement currency, labelled dollar units. Initial reserve value is normalised to 100. The model contains an unencumbered foreign currency asset pool F and gold valued initially at G. Other reserve instruments can be added as separate pools with their own availability profiles; omitting them keeps the mechanism inspectable.

Four payment checkpoints occur on days 7, 14, 21, and 30. In the numerical experiment, these are the only dates on which net payments are due. This assumption is essential: coverage at four dates would not establish coverage between them if actual invoices settled daily. An operational implementation would use the complete relevant calendar. The dollar price of gold changes by a proportion g before payments begin and is then held fixed within each scenario. Equation 1 defines the marked reserve value R. It is an opening asset valuation after the price change, not the unspent reserve stock at the end of the month.

$$R = F + (1 + g)G, F + G = 100(1)$$

From asset value to executable funding

Let α_k denote the cumulative proportion of F that can deliver the settlement currency by checkpoint k, and let β_k denote the corresponding proportion of the gold pool that can be mobilised. Both profiles are nondecreasing and lie between zero and one. They describe hypothetical stressed access after the opening balance sheet is measured. A haircut h captures the assumed reduction between marked gold value and funding proceeds. Equation 2 gives cumulative resources U_k that can have been raised by each checkpoint. Previously raised amounts are included once; U_k is not a fresh cash balance that can be spent repeatedly.

$$U_k = \alpha_k F + (1 - h)\beta_k(1 + g)G(2)$$

Operational readiness and market depth can impose different restrictions. A supplementary case replaces gold proceeds with the smaller of the value-based amount and a cumulative counterparty limit C_k . The access share then controls how much eligible gold reaches the transaction process, while the limit controls how much settlement currency counterparties will provide. The cap is independent of the gold price in that experiment. No direct payment in bullion is assumed. Actual sales, swaps, and secured borrowing have different legal and balance sheet consequences; the baseline treats proceeds as arising from asset realisation and introduces borrowing only through the separate bridge facility.

External payments and temporary import financing needs

Cumulative net payments D_k are decomposed into a reference schedule D^0_k , an additional persistent payment component P_k , and a temporary residual financing component W_k . The last term represents the liquidity call admitted by the specified public support rule after private cash, supplier credit, and committed bank finance have been taken into account. It can fall when delayed receipts arrive or advances are recovered. Accordingly, a temporary financing need can increase peak funding demand without increasing the terminal net drain. The decomposition is shown in Equation 3.

$$D_k = D^0_k + P_k + W_k(3)$$

For an importer with a constant daily cash purchase rate m, an additional financed interval of δ days ties up approximately $m\delta$ units during the transition, if payment precedes the offsetting receipt. This expression is a stock of additional financing, not a daily loss and not an amount to add repeatedly to cumulative imports. It also depends on contractual incidence. A seller offering open account terms may finance much of the interval, whereas advance payment places it on the buyer. The numerical W profile is stipulated rather than mechanically derived from shipping time alone. This respects the distinction between transport duration and the financing terms studied by Antràs and Foley (2015).

Minimum bridge capacity and portfolio choice

the economic cost or actual availability of such a facility. Existing committed receipts are already netted into D and cannot be counted again as part of B. Under a common fungible settlement currency and the stated payment calendar, the required capacity is the maximum positive cumulative deficit in Equation 4.

$$B^* = \max \{0, \max_k (D_k - U_k)\}(4)$$

A separate experiment asks which initial gold allocation minimises the largest required bridge across a finite set of stress states. Initial total value remains 100, so F equals 100 minus G. Each state's access profiles and haircut are fixed, and the gold allocation must be chosen before the state is known. Equation 5 is a linear programme when proceeds have no independent cap. Its objective values payment continuity across the stipulated states. It contains neither an expected return target nor probabilities, so its solution is not an estimate of a welfare-maximising or investment-optimal reserve share.

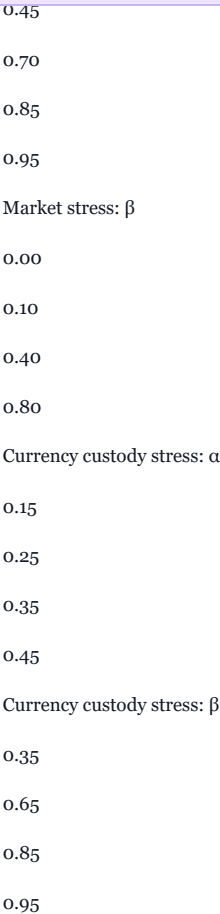
$$\min G, B \text{ s.t. } BB + 100\alpha_k + [\beta_k(1 - h)(1 + g) - \alpha_k]G \geq D_k \text{ for all } k, 0 \leq G \leq 100, B \geq 0(5)$$

Experimental inputs and computational checks

Portfolio A holds 65 units of foreign currency assets and 35 of gold; portfolio B holds 40 and 60. Under normal access, all F is available before the first checkpoint, 80 percent of gold can be mobilised by day 7, and all gold by day 14, with a 2 percent haircut and no price change. The reference payment profile is 26, 45, 62, and 82. In the main stress, gold rises by 20 percent, the haircut becomes 5 percent, and both access profiles deteriorate. Additional payments are 3, 5, 7, and 8; temporary financing needs are 5, 8, 11, and zero. Thus stressed net payments are 34, 58, 80, and 90. All values are illustrative dollar units, not billions or estimates for Türkiye.

Table 1 Cumulative payments and stressed asset access at each checkpoint

Quantity	
Day 7	
Day 14	
Day 21	
Day 30	
Reference payments D^0	
26	
45	
62	
82	
Persistent addition P	
3	
5	
7	
8	
Temporary financing W	
5	
8	
11	
0	
Stressed payments D	
34	
58	
80	



All inputs are synthetic. Payments are dollar units; α and β are fractions of the relevant opening asset pool. Gold rises 20% in both stress states; haircuts are 5% in market stress and 10% in currency custody stress. The added gold-delay state retains market-stress α and sets every β to zero.

Calculations use the disclosed arithmetic and SciPy's HiGHS linear programming method. Each bridge calculation is checked against an independently specified one-variable linear programme. The portfolio solutions are also checked by solving the equations for their binding constraints. Sensitivity exercises change gold prices, mobilisation profiles, counterparty limits, and the set of admissible stress states. No Monte Carlo sample is required because the model has finitely many deterministic dates and states. Precision in the resulting numbers concerns calculation alone; uncertainty about real access conditions and behavioural responses is addressed through the empirical design and limitations.

Literature Review

Reserve adequacy and the timing of external adjustment

Reserve adequacy research explains why authorities hold costly liquid assets against external disruption. Jeanne and Rancière (2011) model reserves as insurance against sudden stops in capital flows and relate the desirable buffer to the losses it can prevent. Obstfeld et al. (2010) place financial openness and domestic financial stability at the centre of reserve demand. Together these approaches show why reserve needs cannot be inferred from trade flows alone. A payment calendar adds a narrower question within that broader problem: whether resources become usable before the adjustment mechanism has had time to operate.

The distinction between reserves and foreign currency liquidity is already embedded in official statistical guidance. The IMF's reserves data template includes relevant foreign currency resources and drains, including specified off-balance-sheet exposures (IMF, 2013a). Its reserve management guidelines also emphasise control of settlement, custody, legal, and operational risks alongside investment risks (IMF, 2013b). The present model operationalises a stressed maturity comparison within that established conceptual space. It does not suggest that recognised reserve assets are generally illiquid or propose to replace the official statistical definition. Its additional question concerns access under a particular adverse state and over a particularly short payment horizon.

Gold as protection and as a source of settlement currency

volatility, and financial sanctions. Zulaica (2020) shows that the portfolio case for gold depends on the reserve manager's numeraire and the risk criterion being considered. None of these relationships alone determines the date on which a particular gold holding will deliver the currency needed for an import invoice.

Recent publications make the boundary more explicit. Mak and Vaccaro-Grange (2026) assess gold's strategic role alongside its market risk and liquidity limitations, including the need to distinguish investment reserves from immediately deployable liquidity. Weiss (2026) separately shows why valuation effects and the composition of major holders matter when comparing gold with Treasury securities in aggregate reserve statistics. These findings make a simple claim that gold value differs from usable liquidity insufficient as a new contribution. The extension developed here is the interaction of a dated mobilisation schedule with a residual trade financing call, including cases in which the portfolio ordering changes across access regimes.

Political fragmentation and the currency of obligations

Geopolitical fragmentation can affect the attractiveness of an asset and the infrastructure needed to use it. Chinn et al. (2025) examine reserve currency composition in relation to political and economic variables, financial sanctions, and trade policy uncertainty. Their analysis concerns portfolio holdings; it does not establish that the currency of outstanding private payment contracts changes at the same speed. A reserve diversification decision and an importer's invoice denomination therefore need to be measured separately. The model retains a common settlement currency to isolate the consequences when those two choices do not coincide.

Gopinath et al. (2020) explain how dominant currency pricing shapes international price and quantity adjustment. The Committee on the Global Financial System (CGFS, 2020) documents the international importance of dollar funding and the vulnerabilities associated with its intermediation. These contributions motivate treating access to settlement currency as an economically meaningful constraint. They do not imply that every external contract uses dollars or that a common currency assumption is appropriate everywhere. A multicurrency application would require separate dated needs, executable conversion arrangements, and limits on cross-currency substitution.

Transport delays and the allocation of financing responsibility

Time in transit is an economic cost, not merely a logistical inconvenience. Hummels and Schaur (2013) estimate the value of shipping time in trade, while UNCTAD (2024) documents how pressure on maritime chokepoints lengthens routes and affects transport costs. The financing consequence depends on when payment is due relative to the return of cash from the transaction. Antràs and Foley (2015) analyse the choice of financing terms supporting international trade. Their work makes clear why a longer voyage cannot be translated into a fixed public reserve loss without knowing who supplies credit during it.

Financial conditions can also change the quantity of trade. Amiti and Weinstein (2011) connect the health of trade-financing banks to firms' export performance. Alessandria et al. (2010) demonstrate the role of inventories in the sharp adjustment of trade during the global financial crisis. These mechanisms suggest that the relevant external financing requirement can move through bank credit, inventories, and receipts before appearing in final expenditure. The temporary W component is designed to represent that timing problem after available private finance has been considered. It should be estimated from contractual exposures, not inferred from a headline freight index.

Liquidity transmission and macroeconomic interpretation

Brunnermeier and Pedersen (2009) model the interaction between funding conditions and market liquidity. Their distinction is relevant to the independent counterparty cap: an asset may retain substantial market value while the intermediary that normally provides cash against it restricts funding. The Financial Stability Board (FSB, 2024) adds an operational perspective through recommendations on preparedness for margin and collateral calls. Both strands support examining contingent cash needs alongside asset values. In the present framework, such calls would enter the dated payment schedule; they would not automatically reduce the price of the gold holding itself.

The macroeconomic consequences of a payment interruption depend on the underlying shock and production structure. Kilian (2009) distinguishes oil supply, aggregate demand, and oil-specific demand shocks rather than treating every oil price increase alike. Carrière-Swallow et al. (2023) provide evidence of

by the hypothetical funding gaps below to produce an estimated inflation or output effect for Türkiye.

The resulting research gap is specific. Reserve studies identify reasons to hold gold and currencies; trade research explains how financing and transport shape transactions; liquidity analysis distinguishes funding capacity from asset valuation. Bringing their timing restrictions into one auditable calculation allows a more precise comparison of interventions. The minimum bridge, the binding payment date, and the state in which a portfolio performs poorly become separate measurable objects. The next section derives those objects before interpreting their possible macroeconomic significance.

Aim

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Findings

The maximum cumulative deficit determines the bridge

Proposition 1 is that Equation 4 gives the necessary and sufficient bridge capacity under the stated assumptions. Necessity follows directly: at any checkpoint, cumulative payments cannot exceed cumulative reserve proceeds plus accessible bridge funds. A facility below the largest deficit must therefore fail at the corresponding date. For sufficiency, begin with that capacity, retain unused proceeds, and draw only when cumulative payments exceed proceeds raised to date. Every specified balance remains nonnegative because the maximum deficit has already been covered. This argument relies on fungibility, reliable access to the bridge, and the absence of additional payment dates or financing costs.

A terminal coverage ratio can consequently exceed one while the bridge remains positive. Such a ratio compares two totals and cannot determine their intermediate ordering. Under normal access, both illustrative portfolios meet every reference payment date with no bridge. In the main stress, opening marked values rise to 107 for A and 112 for B. At day 30 their cumulative realisable resources are 93.67 and 92.72 against payments of 90, giving terminal coverage ratios of approximately 1.041 and 1.030. Nevertheless, the minimum facilities are 8.79 and 23.16. A's binding date is day 21; B's is day 14.

Table 2 Higher marked reserve values coexist with earlier payment deficits

Day
Payments D
A: resources U
A: deficit D – U
B: resources U
B: deficit D – U
7
34.00
29.25
4.75
18.00
16.00
14
58.00
49.49
8.51

21
80.00
71.21
8.79
61.36
18.64
30
90.00
93.67
-3.67
92.72
-2.72

A initially holds $F = 65$ and $G = 35$; B holds $F = 40$ and $G = 60$. Marked values after the price rise are 107 and 112. A positive deficit requires bridge funding; a negative value denotes cumulative surplus. Values are synthetic dollar units.

Figure 1 Payment needs and resources at the four model checkpoints. Lines connect the specified dates for readability; no intervening payment dates are assumed. Source: calculations from Equations 2–4 and Table 1.

The difference is not caused by an accounting loss on gold: its marked price has risen. It follows from the joint change in access and the timing of financing needs. The larger gold holding raises B's opening marked value by more, yet only one tenth of that pool is mobilisable by day 14. Its accessible foreign currency assets are also smaller because the initial portfolio totals are equal. By day 30, additional gold proceeds close the cumulative gap. Funds arriving then cannot retroactively settle an invoice due two weeks earlier. The bridge measures the capacity required to carry the commitment across that interval.

More gold can improve one access regime and worsen another

Proposition 2 follows by holding initial reserve value fixed and differentiating U_k with respect to G . An additional initial unit of gold replaces one unit of F . Its effect at a checkpoint equals its after-haircut conversion factor minus the accessible proportion of the displaced foreign currency asset, as shown in Equation 6. The sign depends on the state and date. A larger gold share has no universal implication for short-horizon funding adequacy.

$$\partial U_k \partial G = (1 - h)\beta k(1 + g) - \alpha k(6)$$

The restricted currency custody scenario illustrates the reversal. Its foreign currency access profile is 0.15, 0.25, 0.35, and 0.45; gold access is 0.35, 0.65, 0.85, and 0.95, with a 10 percent haircut. The gold price change and payment schedule remain the same as in the main stress. A then requires 25.12 units of bridge capacity, while B requires 10.92, both binding on day 21. These are hypothetical restrictions, not a description of a sanction regime applied to Türkiye. They establish that the asset allocation cannot be evaluated independently of which transaction channels remain usable.

Revaluation has limited power when conversion is delayed or capped

Proposition 3 is that a gold price increase cannot relieve a binding checkpoint at which no gold can be mobilised. In the main stress β is zero on day 7. With fixed access conditions, arbitrarily high gold prices therefore leave lower bounds of 4.75 for A and 16 for B, provided other dates cease to be more restrictive. This is a bound on the bridge, not a prediction about gold prices. At the other dates, price increases help until another constraint becomes binding. For A, moving g from zero to 20 percent reduces the bridge from 11.45 to 8.79; a 50 percent increase reduces it to 7.5125.

A separate cap on cumulative gold proceeds makes the distinction sharper. With caps of zero, 4, 18, and 45, A's main-stress bridge stays at 8.79, but B's rises to 28 on day 21. At that checkpoint, B's eligible gold is worth more than the amount counterparties are assumed to advance. Raising its price while the cap remains binding changes the balance sheet valuation without changing those proceeds. The calculation does not imply that gold markets normally impose such caps. It shows



Improved gold readiness replaces β with 0.15, 0.40, 0.70, and 0.90 while retaining the main-stress haircut and foreign currency access. A separate intervention halves the temporary financing profile W without changing permanent payments. These are assumed improvements, with no implementation cost assigned. They are compared as mechanisms rather than ranked as investments. Gold readiness eliminates A's bridge and reduces B's to 5.74. Restoring part of supplier credit reduces the corresponding needs to 4.51 and 19.16. Combining the changes leaves A at zero and B at 3.24.

Table 3 Bridge requirements respond to access and financing terms

Specification

A: bridge

A: binding day

B: bridge

B: binding day

Main stress

8.79

21

23.16

14

Improved gold readiness

0.00

—

5.74

7

Half of temporary financing need

4.51

14

19.16

14

Both improvements

0.00

—

3.24

7

Independent gold funding cap

8.79

21

28.00

21

Improved β = (0.15, 0.40, 0.70, 0.90). Supplier credit halves W. The independent cap is C = (0, 4, 18, 45). Other parameters retain their main-stress values. A dash indicates no positive deficit. Intervention costs are excluded.

The effects need not add. A facility is determined by the worst date, and an intervention can move that date. A's trade-finance intervention shifts the binding checkpoint from day 21 to day 14. Once gold readiness has eliminated its deficit, another timing improvement cannot make the required facility negative. For B, the combined intervention still leaves an early gap because day 7 remains restrictive. Evaluating interventions by total monthly proceeds alone would miss

Across the main market-access state and the restricted currency custody state, the minimax programme selects an initial gold allocation of 49.3934 and a bridge of 16.9445. The binding constraints are the market-access deficit on day 14 and the custody deficit on day 21. Their expressions are $-12 + 0.586G$ and $45 - 0.568G$. Equating them gives $G = 57/1.154$, with every other constraint satisfied. This supplies a direct check on the numerical optimiser and explains the balance being struck.

Adding a state in which no gold is convertible within 30 days moves the solution to $G = 32.9381$ and raises the minimum worst-state bridge to 26.2912. The new binding comparison is $-5 + 0.95G$ against $45 - 0.568G$, giving $G = 50/1.518$. Figure 2 shows how the envelope changes. These values are sensitive consequences of the chosen stress set. They establish the need to disclose that set; they do not establish a recommended gold percentage for any central bank.

Figure 2 Required bridge capacity as the initial gold allocation changes. The upper envelope of included states determines the minimax allocation. Values and states are synthetic; the result is not a recommended reserve share. Source: Equation 5.

The numerical findings are exact within the finite model. A larger gold share can coincide with both higher marked wealth and a larger early funding requirement; the ordering can reverse under another access pattern; and a month-end adequacy test can miss both cases. The magnitudes are illustrative. Their empirical relevance depends on measuring the access profiles and residual payment needs, which public aggregate reserve totals alone cannot identify.

Arguments

Reserve gains should be interpreted alongside the payment calendar

The most consequential result concerns the information contained in an apparently reassuring balance sheet. In the main experiment, B gains more marked wealth than A, yet needs a much larger facility before the month ends. A policymaker observing only total reserves could rank the portfolios in the opposite order from a manager responsible for day 14 settlement. Neither observation is arithmetically wrong. They answer different questions. Reporting both the opening valuation and the largest dated shortfall would reveal which improvement is available to support an immediate commitment and which remains a source of protection over a longer horizon.

This distinction matters for interpreting reserve accumulation. Changes in the reported dollar value of gold should first be separated into quantity changes, dollar price changes, and any classification changes. A local currency report adds another valuation component when the exchange rate moves. A revaluation gain can improve a balance sheet without producing a new contractual cash inflow. Weiss (2026) demonstrates why such valuation effects matter in interpreting aggregate reserve comparisons. In an operational application, the further step is to identify whether the gain changes the amount deliverable before a relevant liability matures. That step requires transaction information absent from an aggregate price series.

The appropriate response is a supplementary liquidity assessment rather than an informal discount applied indiscriminately to reported reserves. The model's α and β are conditional access parameters, not evidence that an authority has misclassified its assets. A reserve asset that is readily available under normal arrangements may be slower to use under a deliberately severe disruption. Conversely, a holding that appears operationally inconvenient may be highly usable through a tested transaction arrangement. A stress report should disclose the assumed state, the horizon, and the contractual mechanism represented by any reduction in access. Without those details, a haircut can be as misleading as an indiscriminating gross total.

The bridge measure also needs a clear economic interpretation. A capacity of 23.16 is the largest temporary deficit in a specified schedule, not a loss of 23.16, a required fiscal transfer of that amount, or an estimate of the decline in output. In the main experiment, later reserve proceeds permit repayment of the bridge by the final checkpoint before financing costs. A country might nevertheless find the facility expensive or unavailable. Those consequences depend on the contract offered by the lender and the credibility of repayment. The accounting result identifies what must be financed; it does not decide whether the underlying production commitment should be maintained at any cost.

Custody and market access require separate contingency tests

The relevant comparison is between executable routes in a defined state. A general statement that domestic custody is safer, or that an international financial centre is always more liquid, leaves that comparison incomplete. Storage arrangements and transaction access solve related but distinct problems, and the portfolio needs to be tested against both.

An executable contingency plan would specify who can authorise a transaction, what asset documentation is required, which counterparties can receive the asset, and when usable currency can arrive. Its funding estimate should reflect the complete sequence. Counting an agreement as available before its conditions have been satisfied would inflate β ; ignoring an already operational arrangement would understate it. Testing these stages can be useful without disclosing sensitive account-level information publicly. The model requires an internally verifiable access profile. It does not require publication of vault addresses, counterparties' confidential limits, or other details that could themselves impair operational resilience.

The independent cap illustrates why a transaction relationship cannot be reduced to an asset price. An intermediary may recognise the asset's value but limit funding because of its own balance sheet, concentration limits, or settlement capacity. An uncommitted facility may also disappear in precisely the state for which it was intended. The perfectly reliable bridge in the numerical experiment should therefore be read as a benchmark requirement. In an implemented stress test, the bridge lender's willingness and ability to deliver must be stressed alongside the reserve assets, especially when both depend on the same intermediaries or currencies.

The minimax exercise makes another governance issue visible. Adding one plausible adverse state changes the preferred allocation materially. Optimisation cannot settle a disagreement about which states deserve protection; it translates the chosen set into a decision. A useful portfolio review would therefore challenge the state definitions before debating the last decimal place of the allocation. It would also consider opportunity costs, investment returns, and any restriction on changing holdings. The reported 49.39 and 32.94 allocations omit those considerations intentionally. Their purpose is to demonstrate sensitivity to the protection requirement, not to furnish a universal target range for gold.

Trade finance can tighten monetary transmission through working capital

A shipping disruption and a change in payment terms need not have the same effect on an importer's cash requirement. If the seller continues to finance a delayed cargo, the buyer's immediate funding need may change little. If the seller simultaneously demands prepayment, a substantial interval can move onto the buyer's balance sheet. The public sector becomes exposed only through an existing guarantee, an agreed liquidity facility, or a new policy choice. Thus the path from logistics to reserve demand contains contractual decisions. Treating every additional day at sea as an automatic official financing obligation would overstate the public exposure and obscure the party that bears the initial risk.

For a credit-constrained importer, that interval affects the transmission of domestic monetary policy. A longer financing period increases the stock on which interest must be paid, while a higher lending rate increases its carrying cost. If the credit limit also binds, the importer may reduce purchases even when the shipment remains profitable at unchanged financing terms. An interruption in an essential input can then constrain production downstream. These are deductions from the financing mechanism, not estimates of Türkiye's monetary multiplier. The magnitude would depend on bank pricing, borrower liquidity, inventories, and the availability of substitute inputs.

The distinction creates a policy choice that an aggregate reserve ratio cannot resolve. A narrowly defined facility could maintain eligible foreign currency payments while domestic policy continues to address inflationary demand. Its design would have to identify viable borrowers, collateral requirements, repayment sources, and a clear end date. Domestic liquidity effects would also need to be managed consistently with the monetary stance. Calling such support temporary does not make it neutral: below-market pricing, weak collateral, or repeated extensions can transfer losses to the public balance sheet. The question is whether a genuine timing mismatch is being bridged under acceptable terms, rather than whether more credit can always preserve current output.

The experiment helps distinguish mechanisms before that policy judgement. Reducing W addresses the financed interval; improving β addresses the reserve conversion interval. They produce different changes in the binding date, and their benefits overlap after a deficit is eliminated. An empirical evaluation should

payment schedule fixed so that the consequences of access and contract timing remain identifiable.

Settlement currency and purchasing power need different measures

The gold price relevant to a dollar invoice is the dollar price at which the reserve manager can execute a transaction. A rise in the domestic currency price may instead result partly or entirely from depreciation. Counting that rise as additional external purchasing power would mix numeraire. The numerical experiment fixes the settlement currency and changes only the dollar gold price. This prevents exchange rate translation from generating an artificial improvement in funding capacity. A Türkiye application should preserve that discipline even when its public discussion and fiscal accounts are expressed in Turkish lira.

Real purchasing power adds a further distinction. If gold and imported energy both rise in dollar price, the quantity of energy that a unit of gold can purchase depends on their relative movement. Even an improved gold-to-energy price ratio cannot finance a payment date before gold proceeds arrive. Conversely, a reserve manager might have timely currency access while facing a lasting deterioration in the terms of trade. One problem concerns financing time; the other concerns the real cost of the commitment. A temporary bridge is suited to the former only when there is a credible adjustment or repayment path for the latter.

These distinctions help explain why a rising gold share in reserves need not immediately remove demand for dollar liquidity. Contracts, banking relationships, and margin requirements can remain denominated in dollars after an official portfolio has diversified. Within the model, shifting assets changes F and G but leaves the payment denomination fixed. It can therefore increase the need for an intermediate conversion even while reducing a particular custody exposure. Gopinath et al. (2020) and CGFS (2020) motivate attention to the persistence of pricing and funding arrangements. The inference here is conditional: reserve diversification changes payment resilience only through the channels that connect those holdings to obligations.

At a global level, simultaneous funding demands could exceed what an isolated-country exercise assumes. Several reserve managers may seek currency from the same intermediaries while importers draw facilities and lenders preserve their own liquidity. Transaction prices, haircuts, and limits could then move together. The present model treats those variables as scenario inputs, so it cannot quantify that feedback. Its results instead identify where a broader model would need additional behaviour. In particular, a nationally credible conversion plan should not be assumed to scale unchanged when many holders attempt to execute it at once.

Türkiye requires a contract based measurement strategy

An application to Türkiye should begin with the CBRT's international reserves and foreign currency liquidity statistics, which provide an official reporting framework for assets and relevant currency drains (CBRT, n.d.). Those aggregates establish a balance sheet context. They cannot, by themselves, identify the stressed access profile of each asset or the conditions attached to an individual import credit line. Assigning β from the gold share in reported reserves would therefore confuse a portfolio weight with a transaction capability. The missing information must come from authorised operational records or be retained explicitly as a range of stress assumptions.

The perimeter must also reconcile assets and liabilities. Gold already committed to a transaction cannot simultaneously be treated as a fully unencumbered pool for another payment. Conversely, a related cash obligation should not be deducted twice, once through the asset measure and again through the payment schedule. Private household gold is outside the official portfolio unless a specified transaction transfers control to the reserve manager. Mobilising it through a deposit or borrowing arrangement creates a corresponding claim that must be recorded. These distinctions prevent a national wealth estimate, a gross reserve total, and a public liquidity buffer from being treated as interchangeable.

On the demand side, a useful observation links an importer, its financing bank, an invoice, and the expected return of cash. Required fields include the settlement currency, due date, advance payment share, shipment milestones, available credit, and the conditions for drawing it. An export receipt is an offset only if its amount, currency, and timing are sufficiently committed for the chosen stress test. A credit line that can be cancelled should be distinguished from an irrevocable commitment. Table 4 sets out the minimum measurement objects; most require information beyond public monthly statistics.



Required observation

Source and interpretation

Opening asset pool

Instrument, currency, valuation, ownership and encumbrance

Official reporting reconciled with authorised internal records; excludes assets unavailable for a second use

Access profiles α and β

Transaction stages, approvals, counterparties and settlement dates

Operational records and transaction tests; public portfolio weights do not identify stressed access

Counterparty capacity C

Committed amount, expiry, conditions and currency

Executed agreements; uncommitted offers require separate stress assumptions

Reference payments D^0 and P

Invoice due dates, currency, additional prices and committed receipts

Contract and treasury records; each inflow or drain enters the calendar once

Residual financing W

Advance terms, bank lines, cash recovery and eligibility for support

Linked importer–bank records; private need becomes a public call only under a stated rule

Validation outcomes

Actual proceeds, draws, fees, refusals and payment delays

Transaction records from reserved episodes; compare both peak amount and date

Proposed data design, not a description of a dataset assembled for this study. CBRT (n.d.) supplies the public reporting starting point; asset and contract level implementation requires additional authorised information.

The policy experiment can then compare a clearly defined eligible sector with its actual support arrangements. Essential energy imports may be a useful starting point because their interruption can affect other activities, but strategic importance does not determine creditworthiness. The researcher must report which private needs become eligible public calls and why. Results should remain disaggregated long enough to distinguish banks, currencies, and settlement dates that cannot freely substitute for one another. Aggregation is justified only after those restrictions are applied. Otherwise, a national surplus can conceal a local payment failure just as a month-end surplus conceals an earlier deficit.

An empirical test must identify timing rather than infer it from prices

The model generates testable predictions. Holding payment needs and currency access fixed, a gold price increase should not ease a deadline that precedes all feasible gold mobilisation. Improved mobilisation should matter most for deadlines it newly reaches, and it may move the date of the largest shortfall. A reversal in the relative accessibility of gold and currency assets can reverse portfolio rankings. These predictions are more discriminating than a positive association between geopolitical risk and gold prices. Observing the latter would provide no direct evidence that settlement capacity improved or that a trade financing interruption was avoided.

One feasible research design would use a panel of importer–bank relationships with exposures measured before a disruption. The outcomes could include invoice payment delays, facility utilisation, financing spreads, and quantities of critical inputs received. Predetermined route dependence and payment terms would define exposure groups. Comparisons would still require careful identification: routing choices, bank relationships, and inventories may reflect the same unobserved resilience that determines outcomes. A shipping interruption can coincide with commodity price changes, sanctions, and shifts in demand. An event date is not, by itself, an exogenous treatment, and unaffected routes are not automatically valid controls.

contract composition, and concurrent sectoral shocks would require attention. The geopolitical risk measure developed by Caldara and Iacoviello (2022) could describe the environment or enter a specified exposure design; its availability does not make it an instrument with an established exclusion restriction. Similarly, gold prices respond to several forces and cannot be treated as an independent reserve windfall without a defensible identification argument.

Validation of the cash flow model is a distinct exercise from estimation of macroeconomic responses. It would compare forecasts of executable proceeds and due payments with subsequent transactions, including fees, rejected draws, and settlement delays. Entire episodes should be reserved for validation so that assumptions are not tuned to the same disruption they are judged against. A useful benchmark is whether the model predicts the largest facility draw and its date more accurately than an endpoint reserve ratio. Only after that accounting performance is established should estimated production or price responses be connected to it. No such regression or validation result is claimed in this article.

Policy use depends on limits that the model leaves visible

A short horizon can make an enduring imbalance appear temporary. A facility that is repaid in one month may be drawn again in the next, while a sale of reserves permanently reduces the remaining asset pool. Extending the model therefore requires carrying forward assets, debts, interest, and commitments rather than restarting each period with 100 units. It must also allow import compression, price adjustment, and changes in private financing. Without those elements, the model can establish a within-period funding requirement but cannot establish external solvency or the sustainability of repeated support.

The comparison of operational improvements also requires costs. Maintaining counterparties, testing mobilisation procedures, holding readily usable currency, and arranging committed credit all consume resources. A smaller bridge requirement is a benefit to be valued against those costs and against losses in states outside the chosen set. Sensitivity ranges should reflect coherent combinations of prices, access conditions, and financing demand. Mechanically combining every worst input can produce a state with no plausible economic interpretation, while excluding adverse dependencies can understate need. The finite scenarios used here expose that judgement rather than concealing it in an unexplained probability distribution.

The binding date also determines the marginal usefulness of an operational improvement. Equation 4 is a maximum of dated deficits, so reducing one deficit ceases to lower required capacity once another becomes larger. This feature matters when staff, counterparties, or collateral arrangements can accelerate only a limited set of transactions. Increasing total mobilisable resources is insufficient as a decision rule: the manager needs to know which payment dates the additional resources can reach and which deficits would remain after the change.

For example, bringing one unit of A's day 30 proceeds forward to day 21 lowers its day 21 deficit from 8.79 to 7.79. The required facility falls only to 8.51 because day 14 then binds. Bringing the same unit forward to day 14 instead reduces both intermediate deficits and lowers capacity to 7.79. The terminal resource total is identical in the two cases. The difference arises entirely from when an already owned resource becomes executable, under the model's assumption that unused funds can be retained.

This comparison supplies a practical criterion for evaluating readiness expenditure. Its benefit should be the reduction in the complete schedule's peak financing need, valued at the relevant cost of committed capacity, rather than the amount accelerated in isolation. Transaction costs and the earlier sacrifice of investment income must also enter. Once the binding date changes, the next unit should be reassessed against the revised schedule.

An operational report could therefore present four quantities together: marked asset value, executable proceeds by date, the largest residual deficit, and the assumptions governing private support. Its review cycle should respond to changed contracts and access conditions, not only to large market price movements. A supplier's move to prepayment may warrant an update even when reserves and exchange rates barely change. A successful transaction test may warrant another update even when gold prices are unchanged. This use of the model would make liquidity management more responsive to the actual commitments being financed.

The analytical contribution is consequently narrow but useful. It explains how improved asset valuation can coexist with a greater requirement for immediate financing, why competing reserve portfolios change rank, and why interventions



commitment. That distinction is the basis for credible policy evaluation, not an inconvenience to be removed by an optimistic reserve total.

Argument

This section should be reviewed during editorial preparation. If the original manuscript does not provide this section separately, the editorial office should decide whether the existing article content already covers it or whether author-approved expansion is required.

Conclusion

Gold revaluation can strengthen a reserve balance sheet while leaving an earlier external payment unfunded. The article has derived this result from the joint timing of reserve mobilisation and residual import financing needs. Its principal measure is the maximum cumulative deficit across the relevant settlement calendar. Under the specified assumptions, that deficit is both necessary and sufficient to determine bridge capacity. A terminal coverage ratio cannot recover the same information because it discards the order in which resources and obligations become available.

Author Contribution

The author is responsible for the conceptual preparation, manuscript content, academic interpretation, and final approval of the submitted work unless otherwise stated.

Conflict of Interest

The author declares no conflict of interest unless otherwise stated in the manuscript or correspondence.

Data Availability

Data availability information was not separately provided unless stated by the author.

become less accessible relative to gold. Faster gold mobilisation and improved supplier credit reduce needs through different channels, while an independent counterparty cap can prevent additional gold value from becoming additional funding. The minimax allocation changes when the set of adverse access states changes, demonstrating the dependence of any portfolio result on its protection objective.

These findings support supplementing reserve adequacy analysis with dated, contractually grounded stress tests. For Türkiye, implementation would require reconciling official assets and currency drains with eligible private financing calls, while keeping household wealth and unsupported private obligations outside the public reserve pool. Payment currencies, commitment conditions, and real transaction times matter as much as aggregate values. A credible empirical study would test forecast funding needs against actual draws before using them to explain production or inflation.

The model leaves several questions open, including the cost of readiness, endogenous market access, repeated reserve depletion, and welfare effects. Those extensions require evidence and behavioural assumptions beyond the present experiment. What the analysis establishes is a precise condition for resilience: accepted settlement currency must reach the authorised payer before the commitment falls due. Gold can contribute substantially to that capacity, but its contribution is determined jointly by value, access, and time.

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