Decentralized Money Supply: A New Paradigm for Reserve Currencies

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Abstract

This paper proposes a decentralized currency, the Global Dollar (GD), designed as an alternative global reserve currency for international trade. From the perspective of banks and their customers, the GD functions like the US Dollar (USD). Bank customers can transact in GD using existing technologies used for USD transactions. However, no central bank or group of central banks has special governance powers over the GD. Users collectively govern the money supply through a unique bond auction mechanism. We compare the GD to the USD, highlighting its potential advantages, and explore strategies for implementation. The goal is an equitable alternative to centralized global reserve currencies.

1. Introduction

The US Dollar (USD) has dominated as the global reserve currency for decades, but its dominance carries significant costs. By tying the world's financial system to the monetary policy of a single country, the USD exacerbates economic instability in other nations and fuels persistent US trade deficits [9, 18]. Foreign demand for USD reserves distorts markets, while the US Federal Reserve's centralized control prioritizes domestic interests, often at the expense of global economic stability. These challenges underscore the urgent need for a decentralized alternative to serve as a robust global reserve currency.

Numerous attempts have been made to develop a decentralized alternative to the USD. This paper introduces the Global Dollar (GD), a novel decentralized reserve currency that differs significantly from previous proposals. The GD is a decentralized currency that requires minimal coordination between central banks. From the perspective of banks and their customers, the GD functions identically to the USD: banks issue GD deposits and loans, and customers conduct transactions using existing payment systems without requiring new technology or infrastructure. Unlike traditional fiat currencies or instruments backed by a basket of fiat currencies, no central bank or coalition of central banks has special governance powers in the GD system. Instead, its users—banks, central banks, and individuals—collectively govern the money supply through a transparent bond auction mechanism. Central banks conduct monetary policy by holding, trading, and lending GD bonds and GD reserves. The only coordination required among central banks is to respect the outcomes

of the auctions. This minimal coordination enables central banks with diverse economic priorities to adopt the GD.

The design of the GD is discussed in Section 2. Section 4 explores how central banks can use the GD to conduct monetary policy. Section 5 highlights the GD's advantages over alternative proposals, including Keynes's Bancor [13], Mundell's DEY [16], Carney's Synthetic Hegemonic Currency [5], the BRICS Unit [3] and various cryptocurrencies. Section 6 compares the features of the USD to those achievable by the GD. Some strategies for adopting the GD are outlined in Section 7. The mechanism at the heart of the GD builds on a similar mechanism described in our prior work [19]. We compare the two mechanisms in Section 8.

2. Global Dollars with a Decentralized Money Supply

The GD is designed to function like the USD for banks and their customers, while offering a decentralized money supply. This section outlines the rules governing the GD and its unique bond auction mechanism. These rules could be enforced by a new independent *Global Central Bank* (GCB) that administers a *global reserve*. Alternatively, the global reserve could be implemented on a blockchain with a cryptocurrency [17, 4] that enforces the rules of the reserve, effectively creating a distributed algorithmic GCB.

2.1. GD Bonds

GD bonds are central to the GD system:

Definition 1. *Let d be a date and $r \geq 0$ be a number.* $\mathsf{Bond}(r, d)$ *is a financial instrument that automatically generates r GD of yield daily while active. On date d,* $\mathsf{Bond}(r, d)$ *expires and converts to* 1 *GD.*

Unlike US Treasuries, GD bonds are not tied to the spending of any institution. Their purpose is to generate new GD through yields and serve as a safe-haven asset. The yields of GD bonds are created by the GCB and credited daily as new GD reserves to the holder's account. Users of the global reserve—such as central banks, banks, and individuals—hold accounts containing GD reserves and bonds. These can be freely exchanged among accounts within the reserve, but they remain within the reserve.

2.2. Bond Auction Mechanism

The GD money supply is controlled by users through auctions for GD bonds. New bonds are issued by the GCB according to the following rule:

- **Bond Rule:** If the number of bonds in the global reserve is less than the number of GD in the global reserve, a new bond is sold in an auction open to all users. Let d_0 be the current date, d a future date and $r \geq 0$ be a yield satisfying $r \cdot (d - d_0) \leq 1$, ensuring $\mathsf{Bond}(r, d)$ yields at most 1 GD over its lifetime. Users submit bids of the form:

  $$\text{user A bids for } \mathsf{Bond}(r, d),$$

  indicating that user A is willing to pay 1 GD to obtain a $\mathsf{Bond}(r, d)$, with r and d chosen by the user. The winning bid is the one with the smallest yield r. The corresponding bond is sold for 1 GD.

This concludes the rules enforced by the GCB on the global reserve. The rest of this section explains the consequences of these rules.

2.3. Intuition

Each GD bond costs 1 GD and converts to 1 GD when it expires, so new GD reserves emerge in the global reserve only in the form of GD bond yields. The GCB issues bonds of the lowest possible yield, while maintaining the invariant that half of the GD is invested in bonds at all times. The yields and durations of active bonds in the system are determined by users through their bids.

The auction's winning yield reflects the time value of money. High yields signal that GD reserves are more valuable now than in the future, while low yields signal the opposite. Consequently, the money supply expands when demand for GD reserves is high. Each GD can be invested in bonds or used elsewhere. When transaction demand for GD reserves is high, GD reserves gain value over bonds, as lending reserves for use in transactions generates returns. This drives higher bond yields, increasing the rate at which GD reserves are created. Conversely, when transaction demand is low, investing in bonds is more attractive, leading to near-zero yields and slower money supply growth.

Demand for GD reserves is highest when there are insufficient reserves to carry out transactions, namely, when there is a liquidity crisis. During times when such a crisis appears to be far into the future, yields will tend to be low. As such a crisis becomes more likely, reserves will become more valuable than bonds, and yields will rise. This rise in yields helps to address the shortage of reserves.

The condition $r(d-d_0) \leq 1$ ensures the robustness of the mechanism. It is equivalent to asserting that every GD bond can yield at most 1 GD during its lifetime. Without it, a small group of users might capture a significant fraction of the GD by winning just a few auctions.

2.4. Banking and Transactions

Banking with the GD is nearly identical to banking with the USD. Banks can issue GD deposits held in customer accounts. Just as banks issue USD deposits that exceed available USD reserves, they may issue GD deposits that exceed the supply of GD reserves held in the global reserve. Banks can issue GD loans to customers using the same mechanisms as for USD loans. GD bank deposits are regulated locally by central banks or governments, not by the GCB. The GCB imposes no restrictions on GD bank deposits.

Transactions involving GD deposits are conducted using existing banking infrastructure, without GCB oversight. Bank customers need not interact with the global reserve at all. If a cryptocurrency is used to implement the GCB, bank customers need not interact with the blockchain. This means that a blockchain-based implementation of the GCB need not be particularly efficient, because it is mostly needed to settle transactions between banks and central banks.

Net flows between banks or countries must be settled by transferring GD in the global reserve from one account to another. This limits the ability of countries or banks to issue excessive GD deposits, as doing so risks a liquidity crisis and threatens the financial stability of the local banking system.

2.5. Money Supply Dynamics

The rules enforced by the GCB on the global reserve have the following consequences:

1. **Bonds vs GD**: The number of bonds and GD in the global reserve will typically be very close to each other. Every bond eventually converts to a GD, so if bonds exceed GD, bonds are replaced by GD until GD exceed bonds. The bond rule ensures that when bonds fall below GD, new bonds are issued. These new bonds are purchased at some yield, consuming GD until the two quantities reach equilibrium.

2. **Churn**: The daily volume of bonds sold via the bond rule, namely the *churn*, is determined by the durations of active bonds held by users in the system. If most bonds are of long duration, the churn will be small. If the bonds are of short duration, the churn will be large. If the churn is large, the system will reserve the capacity to allow users to quickly increase the money supply by bidding for high yielding bonds. The churn of the system is determined by users of the system.

3. **Secondary Markets and Arbitrage for Bonds and Liquidity**: Because users are allowed to exchange both bonds and GD within the reserve, secondary markets for these instruments will emerge. Arbitrage between secondary markets and the auctions on the reserve will ensure that bond yields in the auctions are consistent with the prices in the secondary markets. Similarly, there will be arbitrage between GD yields and interest rates for inter central bank GD loans and inter bank loans. Arbitrage ensures that large interest rates for loans to relatively safe financial institutions will lead to large GD bond yields.

4. **Liquidity and Central Banks**: Secondary markets will allow the GD money supply to grow based on information available throughout the financial system. When liquidity is in great demand, new GD reserves will emerge at a high rate. Users that anticipate the increased demand for GD reserves will sell GD bonds in favor of GD reserves, knowing that they can later obtain GD bonds of higher yield. In periods where the financial system is very stable and ample GD reserves are available to carry out all transactions, GD bonds will be in high demand, and consequently yields will fall.

   Central banks like the Federal Reserve are crucial to providing USD liquidity during financial crises and maintaining the stability of the financial system. The same role can be played by central banks in the GD system. Although the GCB is not allowed to deviate from the rules above, central banks can choose to lend GD to each other, and central banks can lend to banks in their jurisdiction to provide liquidity when it is needed. As a liquidity crisis begins to emerge, arbitrage between the interest rates of GD loans and GD bond yields will lead to the GCB generating new GD, which can be routed where it is needed. Because the rules of the GCB are known to the market ahead of time, a panic in the financial system is likely to end before it gets started, and channels to route liquidity are likely to be created by central banks and banks without any change to the rules followed by the GCB. We explore how central banks might adapt to the GD in Section 4.

2.6. Fairness, Incentives and Security

The rules of the GCB have the following consequences for the fairness, security and incentives for users of the global reserve:

1. **Fairness**: The system is fair in two ways: all users can participate to determine the rate of growth of the money supply, and all users have fair access to the newly generated money. A coalition of users that controls a large fraction of the bonds and GD can cause the money

supply to grow at a high rate, but the generated money will accrue to all users: every user that takes part in the auctions should expect to maintain their share of the GD and bonds in the system over time.

2. **Hoarding vs Spending**: Currencies backed by a fixed supply, like gold or Bitcoin, favor hoarding rather than spending. As the number of transactions increase, the supply of the currency per transaction decreases. This steady increase in demand for the currency incentivizes users to hoard it and spend something else. In contrast, the incentives for the Global Dollar are similar to those for the USD. The favored strategy is to hoard GD bonds and spend GD. It is the bonds that help to preserve value, while the GD lose value as the money supply increases. Each bond eventually becomes a GD, so users cannot simply buy and hold bonds forever; users are incentivized to buy new bonds and contribute to the churn of the system.

3. **Bond durations**: Yields on US Treasuries are typically larger for bonds of longer duration. It is unclear if the same dynamic will hold for GD bonds. Because exactly 50% of all GD will stay invested in bonds, investing in GD bonds of short duration carries the risk that the GD cannot be reinvested for some time after the bond expires.

   The predominant use case for GD bonds is for central banks to hold them in order to govern the money supply. We suspect that bonds of short duration are the most useful instruments for this purpose. However, bonds of long duration would help the functioning of secondary markets, and investors may prefer such bonds for reasons that may be hard to understand before such a market is implemented.

4. **Security**: The GD is designed to be secure against attackers that aim to disrupt the functioning of the currency. For exmple, a cartel of users that controls more than 50% of the GD could bid for bonds of tiny yield r and duration $1/r$ and capture all of the bonds in the system. In this way, the cartel can lock up the bonds for a long time and disrupt the functioning of the GD. However, a group that comes to control such a large fraction of the GD will not be incentivized to disrupt the system in this way, and groups that control a small fraction of the GD cannot disrupt the system. A small group of users that is somehow able to lock out all other users from bidding in the auctions can win auctions for a short period of time. However, because each bond is limited to yielding at most 1 GD over its lifetime, such an attack can increase the size of the GD holdings of the attacker by a small amount. If such attacks are a concern, the system can be adjusted to limit lifetime yields of bonds to an even smaller constant.

2.7. Omitted Details

Any implementation of the Global Dollar system will need to make decisions about details that have been omitted here. The auctions in the bond rule will have to be implemented efficiently, allowing for many bonds to be sold at once. Transaction costs will have to be taken into account. Care must be taken to ensure that the bids of the users are sealed so that one user cannot win the auction by looking at the bids of others.

3. Model Validating the Mechanism

Suppose a banking system consists of banks that hold R reserves and D deposits. Each bank is required to maintain a reserve ratio of κ, so $R/D \geq \kappa$: each dollar of reserve can be used to generate $1/\kappa$ dollars of deposits that can be lent to borrowers. Each dollar lent out to borrowers defaults with probability δ, and is repaid with interest ρ with probability $1 - \delta$. In this model, the money distributed in defaulted loans is assumed to eventually return to banks as repaid loans with interest.

Thus, each dollar of reserve can be used to generate

$$(1/\kappa)(-\delta + (1-\delta)(1+\rho)) - 1/\kappa = (\rho - 2\delta - \delta\rho)/\kappa$$

dollars of reserves for the bank that is making the loan after one time step. To maintain stability in such a system, an idealized central bank must generate reserves at the rate of $(\rho - 2\delta - \delta\rho)/\kappa$.

Now, imagine that the GCB is adopted, so the banks hold R GD reserves and B GD bonds, with $B = R$ in steady state. The bonds earn a yield of r that is determined by auctions. For each GD reserve, a bank can choose to either invest it in GD bonds or use it to lend to borrowers and earn a return. Arbitrage will ensure that the yield of GD bonds r is the same as the return that can be earned using each unit of reserve: $r = (\rho - 2\delta - \delta\rho)/\kappa$. This means that in steady state, each bond yields $(\rho - 2\delta - \delta\rho)/\kappa$, and the rate of growth of R is identical to the rate of growth determined by the ideal central bank.

Of course, this model is overly simplified. Banks would certainly prefer the safe return guaranteed by GD bonds to the volatile returns given by borrowers, unless the borrowers offer better returns. Moreover, the parameters ρ and δ are determined by the market based on the level of risk that banks are willing to take. In a real system incorporating the GD, all of these parameters, including the yield r of the bond rule, would be determined by the market.

4. Central Banking with Global Dollars

Many central banks would prefer the GD system over a fiat currency because it mitigates the risk of financial contagion from a single country's mismanagement. In the GD system, central banks can collectively shape money supply growth, ensuring no single entity disproportionately influences global liquidity. The minimalist framework of the GD makes it easy for most central banks to commit to the GD system, because they still retain significant flexibility to conduct monetary policy. A bank that depletes its GD reserves risks insolvency. Governments and centrals banks will adapt to this hard constraint by planning to prevent such failures and so maintain the stability of their banking systems.

Just as non-US central banks today amass USD reserves in order to handle liquidity crises or attacks on their local currencies, central banks and banks would need to amass GD reserves and GD bonds. If a bank is in danger of running out of reserves, the central bank could step in to provide a loan of reserves, or orchestrate such loans from other banks in the country. The banks and central banks can sell their amassed bonds on the secondary market, where they will be purchased by central banks and banks in other countries. If the crisis escalates to affect many countries, the yield r of the winning bid in the bond rule will rise, and the GCB will generate a flood of liquidity that can be routed to the affected countries.

4.1. General Principles

Central banks can implement monetary policy [2] by:

- **Adjusting local reserve ratios**: Increasing ratios restricts lending; decreasing ratios promotes lending.
- **Setting interest rates for loans to banks**: Higher rates discourage lending activity; lower rates stimulate it.
- **Trading GD bonds**: Buying bonds on secondary markets reduces yields, tightening conditions; selling bonds increases yields, easing conditions.
- **Directly bidding in bond auctions**: Bidding for low-yield bonds slows money supply growth; high-yield bids accelerate it.
- **Negotiating with other central banks**: The above levers can be applied simultaneously by a group of central banks that reach an agreement.

4.2. Case study: a single central bank

In order to understand how central banks can use the GD to maintain stability in their banking systems, we start with a toy example: a financial system where there is only one central bank.

Normal times

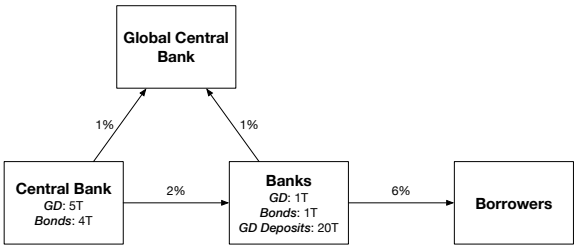

Figure 1: Interest rates during normal times.

Figure 1 shows how the system might behave in normal times. The central bank currently holds 5T in GD, and 4T in GD bonds which yield 1% annually. The central bank offers overnight loans to its banks at an annual interest rate of 2%. The banks offer loans to borrowers at the rate of 6%, and also invest in GD bonds yielding 1%. Some fraction of the borrowers do default on their loans, but the defaults do not lead to a panic and the system is stable. In anticipation of potential future crises, the central bank maintains a large holding of GD bonds of short duration. This ensures that the system has high churn if/when a crisis does arrive.

Monetary policy

The central bank conducts monetary policy by changing the interest rates it charges banks, trading bonds, and participating in the auctions of the bond rule. To tighten financial conditions, the central bank takes the following actions:

- Raises the interest rates for loans to banks.
- Buys GD bonds on secondary markets.
- Bids for low yielding bonds at the auctions of the bond rule.
- Imposes a higher reserve ratio requirement, forcing banks to increase their ratio of reserves to deposits.

These actions reduce GD bond yields, and make it harder for banks to issue new loans. If the central bank wants to ease financial conditions, it takes the opposite actions:

- Lowers the interest rates for loans to banks.
- Sells GD bonds on secondary markets.
- Bids for high yielding bonds at the auctions of the bond rule.
- Lowers the reserve ratio requirement, allowing banks to decrease their ratio of reserves to deposits.

These actions increase GD bond yields and encourage banks to issue new loans.

Liquidity crisis

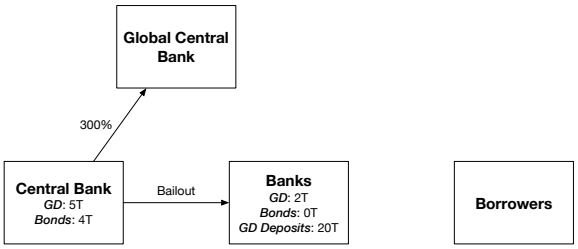

Figure 2: A liquidity crisis

Figure 2 shows what happens when the system experiences a liquidity crisis. Many borrowers have unexpectedly defaulted, and the result is that many banks are about to run out of GD reserves. Here is how the crisis may play out. As the crisis worsens, the banks sell their GD bonds to obtain GD reserves on the secondary market. Suppose that fails to end the problem. The banks are no longer willing to lend to each other because of the panic, and all institutions hoard GD reserves. The central bank decides to implement a bailout. It takes control of the banks and enforces a freeze, preventing customers from withdrawing significant bank reserves from the banking system. During the period of the freeze, the central bank is the most significant bidder in the bond rule, so it is able to obtain high yielding bonds from the GCB. The central bank wins these auctions and reassures the market that the obtained GD reserves will be used to bailout the banks by providing the banks with loans on favorable terms. After the panic settles, access to bank deposits is restored. So, bank failures are ultimately prevented by generating new GD using the bond rule.

This single central bank example resembles the current system, where the Fed has sole control of the money supply and is able to generate liquidity and settle a crisis in whatever fashion it deems

necessary. However, there is an important difference: in the GD system, investors that predict a liquidity crisis ahead of time can sell GD bonds and acquire GD on the reserve to prepare for the crisis. This reserve GD can be used during the peak of the crisis to take part in the auctions and obtain the same returns that the central bank obtains from the bond auctions. In this way, investors can profit from predicting the crisis. Consequently, the central bank also gets an important market-based signal of an impending crisis: escalating GD bond yields in the secondary market indicate trouble ahead.

In fact, because all parties in the system can make predictions about the behavior of the central bank and banks ahead of time, it is quite likely that a liquidity crisis will simply fail to emerge because of action in the GD bond market. Anticipating that a crisis will emerge, market participants are incentivized to sell their GD bonds to acquire GD reserves before the central bank takes any actions. This activity will naturally lead to rising GD bond yields and a flood of new liquidity generated by the GCB, which may well resolve the liquidity crisis before it takes hold.

4.3. Case study: 2 central banks

The main use case of the Global Dollar is as a global reserve currency. Let us explore an example involving two countries with separate financial systems that both interface with the Global Dollar.

Normal times

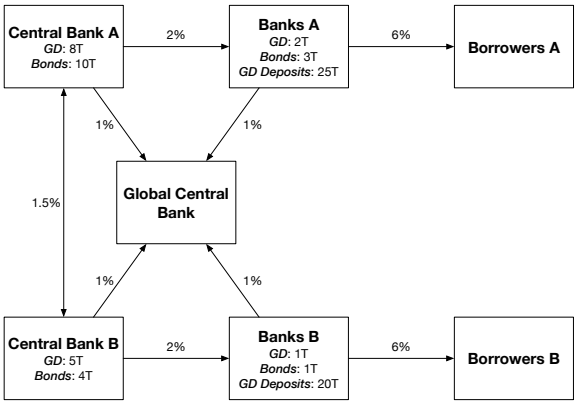

Figure 3: Interest rates in normal times

Figure 3 shows an example with 2 countries that use the GD. These central banks each manage the banks of their own countries, but they are also willing to lend to each other at a certain interest rate to manage short term issues. The central banks maintain large holdings of GD bonds of short duration to ensure that the system has the churn available to deal with a future crisis.

Monetary policy

It is difficult for any one central bank to unilaterally ease or tighten financial conditions in the GD system. This is a feature of the system, not a bug. However, central banks do have some

influence in their local system. If a central bank wants to tighten financial conditions in its local economy, it can take the following actions:

- Raise reserve ratio requirements for banks in its jurisdiction.
- Raise interest rates for loans to banks in its jurisdiction.

These two actions encourage banks to reduce lending activity. A single central bank has limited ability to move GD bond yields without the cooperation of the second central bank, and an attempt to buy bonds at above market rates could backfire and result in a loss in relative holdings of reserves. Similarly, the central bank can loosen conditions in its local economy by taking the following actions:

- Lower reserve ratio requirements for banks in its jurisdiction.
- Lower interest rates for loans to banks in its jurisdiction.

Again, it is not very easy for a single central bank to unilaterally influence bond yields to increase the supply of GD reserves.

Liquidity Crisis

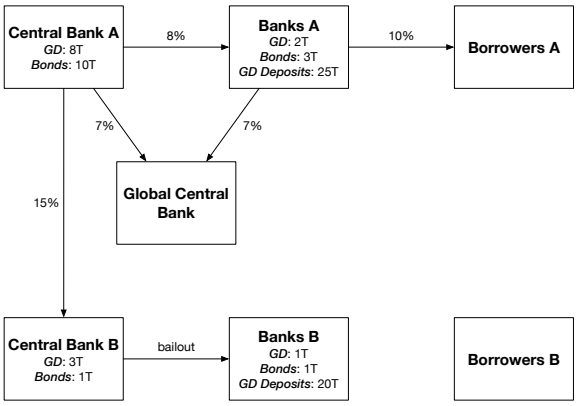

Figure 4: A liquidity crisis in B

Imagine that an unexpected GD liquidity crisis in country B emerges because of large scale defaults. Figure 4 shows what might happen. Central bank B and the banks in B first attempt to stop the crisis from taking place by selling their bonds on secondary markets to obtain reserves. If that fails to end the panic, and central bank B still does not have enough GD reserves to save its banking system, central bank B can appeal to central bank A for help. Central bank B restricts withdrawals of GD reserves from banks in B for a short time. Central bank A negotiates with central bank B, offering B loans at a high rate of interest and demands that austerity measures are implemented at banks in B. It raises interest rates in its local system to recover GD reserves and obtains high yield short-term bonds from the GCB. After sufficient GD reserves have been secured and channeled to central bank B, and confidence has been restored in the banks of B, customers in B are allowed full access to their deposits. However, country B is now in debt to country A. If an

agreement between the central banks is not secured, the GD banking system in B fails, but banks in A continue to function.

In fact, the crisis may well be resolved by the market before it occurs. Knowing that the central banks are likely to intervene, holders of GD bonds, including banks, will be incentivized to sell their bonds in secondary markets and acquire GD reserves ahead of time. This will raise bond yields, including the yields in the auction for new bonds issued via the bond rule. This could raise GD bond yields and help restore confidence in the banking system before any serious intervention by central banks is required.

4.4. Case study: a coalition of aligned central banks

Let us discuss the kinds of structures that might emerge in a world uses the GD as the global reserve currency and has many central banks. Because no single central bank has the ability to unilaterally influence the money supply, it is beneficial for coalitions of central banks to band together and create agreements to help facilitate coordinated action. Suppose the central banks of the countries of NATO form such a coalition to coordinate their actions. Assume that these countries together hold 60% of GD reserves and bonds. The members decide that they will make decisions using votes that are proportional to GD reserve holdings. They meet biannually to decide on their joint financial strategy.

Normal times

During normal times, the coalition requires that the ratio between reserves and deposits in their local economies should be at least 10%. They agree that each central bank will hold an equal number of GD and GD bonds on the reserve. The central banks of the coalition establish a common market for central banks to lend GD to each other and trade GD bonds.

Monetary policy

Each central bank may have its own monetary policy agenda, which it can implement by changing reserve ratios or interest rates in its local system as discussed in the examples above. During a period of high inflation, the central banks decide to try to decrease the growth of the GD money supply by changing the composition of their reserve holdings so they hold 45% GD and 55% GD bonds on the reserve. This net purchase of bonds on the secondary market leads to a decrease in yields in the bond rule.

Liquidity crisis

A single country A experiences a liquidity crisis in the GD. The other members of the coalition negotiate an agreement to help by:

- Providing loans to A using government bonds and GD bonds as collateral.
- Buying GD bonds from A at above market prices.
- Deciding on austerity measures for banks in A.

Sanctions

In the current system, the US has sole power to deny countries access to the USD. In a world that has adopted the GD, such power does not disappear entirely, though it does get diluted. If the countries of NATO decide to place sanctions on country X, they can take the following actions:

- Stop all transfers of GD reserves between banks in NATO and institutions in X.
- Exclude institutions in X from interacting with secondary markets administered by NATO.
- Prevent institutions in X from using all banking infrastructure, like payment systems, that are controlled by NATO.

However, if NATO attempts to prevent X from taking part in the auctions of the bond rule, this would dismantle the credibility of the GCB and hurt the GD.

4.5. Case study: Great Financial Crisis (GFC) of 2008

Let us explore how the GFC might have played out in a world where the global financial system has adopted the GD but the US is by far the richest and most powerful country.

Recap of actual events [20, 14]

Triggered by U.S. subprime mortgage defaults in 2007, the crisis escalated with the collapse of major financial institutions, such as Lehman Brothers in September 2008. The Fed responded by slashing the federal funds rate from 5.25% in September 2007 to 0–0.25% by December 2008 and launching Quantitative Easing (QE) in November 2008, purchasing $600 billion in mortgage-backed securities and Treasuries to inject USD liquidity. The crisis spread globally as banks worldwide, holding U.S. mortgage-backed securities, faced losses, and interbank USD funding markets froze, disrupting credit flows.

Investors fled to safe-haven U.S. assets, particularly Treasuries, due to the USD's status as the global reserve currency, amplifying capital outflows from other regions. Global equity markets plummeted, losing $29 trillion in value in 2008, with developed markets like the Eurozone and Japan seeing declines of 40–50%. Emerging markets (EMs) faced severe capital outflows, with equity markets losing $1.4 trillion and portfolio investments collapsing (e.g., India's net flows dropped from $17.3 billion in 2007 to -$13.2 billion in 2008). EM currencies depreciated sharply (e.g., Brazilian real fell 32%, Indian rupee 20% against USD), raising USD-denominated debt costs, while exports contracted (e.g., India's exports fell 33% in October 2008) due to trade finance shortages. Global trade collapsed by 10% in 2009, hitting export-driven economies like Germany and China. Commodity prices, such as oil, dropped from $147 to $34 per barrel, impacting exporters like Russia and Venezuela. The Fed's swap lines with 14 central banks, mainly in developed economies (e.g., ECB, Bank of Japan), provided USD liquidity, but most EMs (e.g., India, Brazil) were excluded, exacerbating liquidity crises. QE later drove capital surges in 2009–2010, sparking asset bubbles and currency appreciation worldwide (e.g., Brazil's real appreciated 35%, prompting capital controls). These events underscore the global contagion and EM vulnerabilities in a USD-centric system.

Alternate history

We consider a scenario where the Global Dollar (GD) is the global reserve currency, U.S. mortgages are still denominated in USD, and the Federal Reserve (Fed) holds 50% of all GD reserves and bonds. The crisis begins with USD-denominated subprime mortgage defaults in 2007, escalating with a major bank collapse in 2008. The Fed injects USD liquidity through Quantitative Easing and rate cuts, stabilizing U.S. banks. Banks worldwide face losses on their holdings of U.S. mortgaged-backed securities, and sell these instruments and buy GD bonds and reserves. These events lead to depreciation of the USD against the GD. To prevent further USD depreciation, the Fed begins to sell a large portion of its GD reserves to buy USD, flooding markets with GD reserves and bonds. Global investors rush to buy GD bonds, the standard safe-haven asset.

EM capital outflows do still occur as investors seek safety, but the flood of GD reserves and bonds sold by the Fed reduces the pressure on EMs. The Fed prioritizes US recovery, but benefits EMs indirectly by reducing their loss of capital. The Fed's USD injection and GD-to-USD conversions stabilize the US financial system. Fear of a GD liquidity crisis leads to rising GD bond yields, because investors value GD now instead of in the future. This leads to an uptick in the GD money supply. The flood of USD from the QE program leads to volatility in exchange rates for the USD, but has limited impact on the stability of other economies. The Fed's GD reserves are reduced, and all other countries have a net gain of GD reserves.

4.6. Case study: Asian Financial Crisis (AFC) of 1997

Let us explore how the AFC might have played out in a world where the GD is the reserve currency, and western countries hold most GD reserves.

Recap of actual events [20, 14]

In the mid-1990s, Asian "Tiger" economies—Thailand, Indonesia, South Korea, Malaysia, and the Philippines—pegged their currencies to the USD to draw foreign investment. These nations accumulated high USD debt—Thailand's hit $90 billion (50% of GDP)—to fund speculative local currency investments in real estate and corporate ventures, often with lax oversight. By 1997, these investments began to falter, with non-performing loans soaring. Thailand's reached 15% of bank assets.

As investments unraveled, the USD strengthened after the Federal Reserve raised interest rates to 5.5% in 1997 to control domestic U.S. inflation, increasing the local Asian currency cost of USD debt repayment. Investor confidence collapsed, sparking capital flight. Central banks depleted USD reserves to defend pegs; Thailand's reserves fell from $38 billion to $1.1 billion by mid-1997. On July 2, 1997, Thailand abandoned the baht's peg, triggering a 40% devaluation. Contagion spread, with the Indonesian rupiah falling 80% and South Korea's won 30% as pegs collapsed.

Needing USD to stabilize currencies and service debts, affected nations sought aid. The IMF, backed by the G7, provided $118 billion in bailouts—$17.2 billion for Thailand, $43 billion for Indonesia, $57 billion for South Korea—with stringent austerity measures, including high interest rates (Indonesia's hit 70%) and budget cuts. These deepened recessions, with GDP contracting 10.5% in Thailand, 13.1% in Indonesia, and 6.9% in South Korea in 1998.

Alternate history

Imagine a world where the Global Dollar (GD) is the global reserve currency. Asian economies—Thailand, South Korea, Malaysia, and the Philippines—hold GD reserves and substantial GD-denominated debt, pegging their currencies to the GD to attract investment. They used this debt to fuel speculative local currency investments in real estate and corporate ventures. In 1997, as these investments falter, a crisis emerges, but the GD's decentralized system softens its impact.

As the crisis unfolds, investor confidence wanes due to rising non-performing loans, triggering a flight of GD reserves from Asian markets. Interest rates for lending to Asia in GD spike, reflecting heightened risk, which raises rates for all GD lending between central banks and pushes up GD bond yields. Asian central banks, exhausting their GD reserves, sell GD bonds on secondary markets to gain liquidity and demand GD loans from other countries to defend their pegs. This sparks a general bond sell-off, increasing yields in the bond auction mechanism and generating new GD liquidity system-wide. Though this fails to stop the crisis, the additional GD liquidity cushions the blow, enabling a softer landing. Pegs collapse, starting with Thailand's baht, followed by other regional currencies. The U.S. raises interest rates in 1997 to control domestic inflation, but this does not have a significant effect on GD lending, insulating Asian economies from U.S. monetary policy shocks. The IMF, backed by the G7, provides large GD loans to affected Asian nations, conditioned on austerity measures like high interest rates and budget cuts. G7 countries commit GD to these loans instead of buying bonds, prompting further bond sell-offs and raising GD bond yields, which generates additional GD liquidity. So, the bursting of Asia's credit bubble drives GD creation through the bond rule, even as the U.S. battles domestic inflation.

5. Comparison with Alternatives

The Global Dollar (GD) is designed to address the limitations of centralized reserve currencies like the US Dollar (USD). Numerous alternatives have been proposed to replace or supplement the USD's role in global trade, ranging from fiat currencies to supranational units of account. This section compares the GD to four categories of alternatives: existing fiat currencies, currencies backed by baskets of fiat currencies, Keynes's Bancor, and currencies backed by fixed-supply assets. The GD's decentralized bond auction mechanism, minimal governance, and integration with existing banking systems distinguish it from these proposals, offering a more resilient and equitable framework for global finance.

- **Existing Fiat Currencies**: The Euro is the most plausible rival to the USD due to the Eurozone's economic size and transparent institutions. However, its adoption as a global reserve currency is constrained by the Maastricht Treaty and Stability and Growth Pact, which cap annual budget deficits at 3% of GDP and public debt at 60% of GDP [**?**]. These limits restrict the issuance of safe-haven assets like government bonds, critical for absorbing global reserves. For instance, German debt, the Eurozone's primary safe asset, totals only $2.9T compared to $36T in US debt, insufficient to meet global demand for reserve assets [12]. In contrast, the GD provides GD bonds as a scalable, decentralized safe-haven asset not tied to any nation's fiscal constraints. As outlined in Section 7, the GD's bond mechanism could even be adapted to enhance the Euro's reserve potential without increasing sovereign debt, offering a hybrid solution for Eurozone countries.

- **Currencies Backed by a Basket of Fiat Currencies**: Proposals like Mundell's DEY

[16], the IMF's Special Drawing Rights (SDRs) [11], Carney's Synthetic Hegemonic Currency [5], and the BRICS Unit [3] aim to distribute control of the reserve currency across multiple nations. These currencies are backed by a basket of fiat currencies. They require centralized coordination to determine the composition of the basket and maintain pegs, a process vulnerable to geopolitical tensions and divergent economic priorities. These proposals risk instability if consensus on the composition of the basket falters. In contrast, the GD requires no agreement on currency weights, relying instead on a simple, transparent bond auction rule that treats all users equally. The users only have to agree to respect the outcomes of the auctions. This minimalist approach reduces coordination costs and enhances stability.

- **Keynes's Bancor**: Proposed in the 1940s, the Bancor was envisioned as a unit of account managed by an International Clearing Union (ICU) to address trade imbalances [13]. Governed by a board with voting power proportional to trade quotas, the ICU would charge interest on deficit countries' negative balances to incentivize balanced trade. Bancor's rejection at Bretton Woods in favor of the USD-centric system highlights the difficulty of achieving global consensus on complex rules [21]. The GD diverges sharply from the Bancor: it is a fully transactable currency, not a unit of account, and its money supply is managed through auctions rather than a governing board. No voting is required to implement the GD. The GD's rules are codified and transparent, requiring minimal negotiation and reducing the risk of political deadlock.

- **Currencies Backed by a Fixed Supply**: Currencies backed by a scarce resource like gold or Bitcoin [17] are incompatible with modern banking systems that rely on the creation of new money to bridge the gap between risky loans and safe deposits. Fixed-supply currencies incentivize hoarding over spending, as their value rises with transaction demand, and they lack the elasticity needed to handle a liquidity crisis, as seen during the gold standard's collapse in the 1930s [8]. In contrast, the GD would seamlessly integrate with the existing banking system, allowing existing technologies to be used for transactions. The GD is elastic and can handle liquidity crises as described in Section 4.

- **Stablecoins**: Stablecoins like Tether (USDT), USD Coin (USDC), Dai (DAI), Binance USD (BUSD), and Frax (FRAX) are cryptocurrencies designed to maintain a stable value by pegging to the US Dollar (USD) [6, 15, 10]. The peg to the USD is achieved through reserves (e.g., USDT, USDC, BUSD), algorithmic mechanisms (e.g., DAI), or a hybrid collateralized-algorithmic model (e.g., FRAX). The peg means that thsese objects are subject to centralized control: the Federal Reserve retains the power to issue the coins because it can issue USD and convert that USD via the peg. In contrast, the GD's decentralized bond auction mechanism eliminates the power of any single entity to make unilateral decisions about the money supply.

6. Comparison with the USD

Let us compare the key features of the USD to the corresponding features of the GD. We start by discussing some key attributes of the USD that have helped to protect its entrenched position as the dominant global reserve currency for so many decades.

Advantages of the USD

1. **First-mover advantage**: The USD is the common language of international finance. Systems, protocols and regulations have been built around the USD over a period of many decades. The USD's dominance in global trade, especially in commodities like oil, creates a self-reinforcing cycle.

2. **Liquidity**: The USD is supported by robust mechanisms developed by the Fed to address liquidity crises and ensure stability. The infrastructure to deliver the USD wherever it is demanded is provided by an established network of international banks that are able to issue USD deposits (called Eurodollars) and trust each other's deposits.

3. **Safety**: Foreign holders of USD can invest in a deep and liquid market for US Treasuries, the defacto safe-haven asset. These assets preserve the value of reserves, yet can be efficiently and reliably sold to defend local currencies when needed. Countries around the world have used these safe assets to hold their rapidly expanding reserves. Although the US has recently shown it is willing to seize the reserves of countries it has conflicts with, the USD remains the safest available option for holding reserves.

4. **Transparency**: The USD is overseen by relatively independent and transparent institutions like the Federal Reserve. While these institutions prioritize US interests, they are perceived as insulated from short-term political pressures.

USD vs GD

The primary advantage of the GD over the USD is that the money supply is decentralized. The primary advantage of the USD over the GD is the first-mover advantage. Assuming that the GD is adopted at scale, here is a comparison between the two on some other dimensions:

1. **Liquidity**: If adopted, the GD can simply use the same mechanisms for delivering liquidity currently used by the USD. Existing relationships between banks and existing infrastructure for issuing credit can easily be ported to the GD. Central banks and governments will have to come up with new protocols and regulations to prevent liquidity crises and conduct monetary policy, but there is no reason why the GD would not attain the same level of liquidity that is currently enjoyed by the USD.

2. **Safety**: Instead of holding US Treasuries as a safe-haven asset, central banks would hold GD bonds on the global reserve. Because the number of bonds is about the same as the number of GD on the reserve, there will always be a significant number of bonds available. These bonds are safer than US Treasuries, because they are not tied to the spending of any government, and the rules of the GCB guarantee that the bonds never default. In addition, the issuance of bonds follows predictable rules that ensure that new bonds will be available and every user has fair access to new bonds. For these reasons, the GD is safer.

3. **Transparency**: The rules for the GCB are so transparent that they can be implemented by an algorithm. This extreme transparency is a key advantage of the GD over the USD.

4. **Financial Contagion**: The world economy is entangled with the USD, and so mismanagement by financial institutions in the US has serious consequences for all countries. This was

on display during the Great Financial Crisis. In a world where the GD is the dominant reserve currency, what happens in one country will surely affect another, but no country has a special role. If a single country has a liquidity crisis, that crisis has limited ability to spread to other countries. In fact, countries that have secure finances will be able to help the country that is in distress, for an appropriate price.

5. **Volatility**: The USD maintains relatively stable exchange rates with major global currencies. It is hard to predict how volatile the GD would be as a financial instrument if it was only partially adopted. A collection of central banks that commit to adopting the GD could put into place protocols that help to manage its initial volatility, as discussed below.

7. Strategies for Implementation

Adopting a new global reserve currency like the Global Dollar (GD) faces formidable barriers. This section explores four distinct routes for adoption: a US-led transition, a partial adoption that converts the Euro into a semi-decentralized currency, a coalition-driven effort by BRICS or similar groups, and an organic emergence through cryptocurrency. These strategies could compete or coexist. Each certainly requires further research to assess feasibility and refine execution.

1. **Led by the US**: The US benefits enormously from the use of the USD as the global reserve currency, but this status has drawbacks. Foreign countries demand USD reserves, creating trade imbalances. Tariffs on US exports are attractive because a trade surplus with the US gives countries access to more USD. In essence, the USD acts as a major US export, competing with other exports.

   To align US interests with a transition to the GD, the following steps could be considered:

   (a) The US agrees to support the transition to the GD, and creates the GCB.

   (b) The Fed agrees to redeem each GD for a USD during a defined transition period. This ensures that the GD immediately has value. All financial systems that use the USD and Eurodollars are adapted to use the GD during this transition period.

   (c) US government debt to foreign nations is restructured: all US Treasuries and USD currently held in foreign government reserves are replaced by GD bonds and GD on the new global reserve. This compensates the US and strengthens the Global Dollar.

   (d) The Fed's account at the new global reserve is initialized with a significant allocation of bonds and GD, incentivizing US commitment and ensuring US influence within the GD system.

   The US sacrifices the USD's reserve status but gains debt relief and reduced pressure on US exports. Foreign nations gain a decentralized reserve currency, reducing their need to hoard USD and mitigating market distortions.

2. **Semi-decentralized Euro**: As noted in Section 5, the Euro is a strong contender to the USD, but its scarcity of safe-haven assets limits its reserve currency potential. The European Central Bank (ECB) could adopt a GD-inspired bond auction mechanism to create a semi-decentralized Euro:

(a) The ECB implements the GCB's bond auction protocol to manage a global reserve of Euros and Euro bonds, analogous to GD bonds. Only Eurozone central banks are permitted to participate in bond auctions, preserving Eurozone dominance over Euro monetary policy.

(b) The system is initialized with zero Euro bonds, prompting rapid issuance until Euro bonds constitute roughly 50% of the reserve, as per the bond rule.

(c) Secondary markets, open to all, trade Euro bonds, enhancing liquidity and global access.

(d) The ECB maintains control of the Euro, although foreign markets do gain an influence. The ECB conducts monetary policy by negotiating agreements among Eurozone members to coordinate bond trading. During crises, the ECB could temporarily restrict non-Eurozone access to liquidity by controlling Eurozone nations' Euro bond trading on secondary markets and coordinating their bidding in the bond rule, prioritizing regional stability.

(e) Foreign governments and institutions hold Euro bonds as a reserve asset.

This approach equips the Euro with a scalable safe-haven asset (Euro bonds) without increasing Eurozone sovereign debt, strengthening its competitiveness as a reserve currency. The definition of the mechanism ensures that the number of Euro bonds will always be about the same as the number of Euros in reserve, so if adoption of the Euro increases, the number of bonds available will grow as well. This strategy appeals to Eurozone countries seeking greater global financial influence without relinquishing fiscal discipline or regional autonomy.

3. **Led by BRICS or similar coalition of countries**: The BRICS coalition (Brazil, Russia, India, China, South Africa, and new members) has sought alternatives to the USD to reduce exposure to US monetary policy and sanctions. A GD-based approach could align with their goals:

   (a) BRICS countries establish the GCB and commit to adopting the GD as a reserve currency.

   (b) During a transition period, BRICS central banks redeem each GD for a basket of their currencies, anchoring the GD's value and encouraging early adoption.

   (c) All trade among BRICS countries is conducted in GD, creating a critical mass of transactions to build network effects.

   (d) After the transition, the GD floats freely, its value determined by market dynamics and reserve demand.

4. **Organically using a Cryptocurrency**: Bitcoin has shown that it is possible for an organically emergent cryptocurrency to acquire value [17]. A similar chain of events could allow the GD to emerge.

   (a) A carefully designed cryptocurrency that implements the GCB is released.

   (b) Users adopt the GD and trade bonds on the global reserve, driven by speculation that the GD will become a global standard.

   (c) Unlike Bitcoin, the GD's design incentivizes spending over hoarding, reducing volatility over time. Without central bank backing, initial volatility may be high.

(d) The GD gains traction in global transactions, particularly in regions with unstable currencies or limited access to USD.

(e) Banks begin holding GD bonds and reserves, issuing GD-denominated deposits and loans. Central banks join to mitigate liquidity risks, formalizing the GD's role.

This strategy relies on grassroots adoption and market-driven growth, bypassing the need for immediate state support. It faces challenges in achieving scale and regulatory acceptance but could thrive in a digital economy seeking decentralized alternatives.

8. Comparison with Elastic Cash

The Global Dollar (GD) builds on a mechanism introduced in the prior work *Elastic Cash* (EC) [19]. While both systems aim to decentralize governance of money, the GD employs a distinct bond auction mechanism that offers several advantages. This section outlines the key differences between the GD and EC, emphasizing the GD's suitability as a global reserve currency.

1. **Different Invariants**: In EC, the money supply is also governed by users, but the mechanism fixes bond yields for a given duration, limiting flexibility. In contrast, the GD maintains that the number of bonds is close to the number of GD in the system as an invariant. The GD ensures that many bonds are always available to use as a safe haven asset. This is not guaranteed in EC.

2. **Control of Bond Yields and Durations**: In EC, the mechanism predetermines the duration of outstanding bonds, reducing user control. The GD empowers users to choose both yields and durations in auctions, providing greater flexibility for central banks and other participants to tailor bonds to their monetary policy needs. This user-driven approach enhances the GD's adaptability in diverse economic environments.

3. **Suitability as a Reserve Currency**: The GD is explicitly designed as a global reserve currency, compatible with existing banking systems and central bank operations, as detailed in Section 4. While the EC mechanism could theoretically be adapted for reserve currency purposes, its limited flexibility makes it less attractive for central banks. The GD's bond auction mechanism allows users to influence the system's churn (the rate of bond issuance and expiration) by selecting bond durations. High churn, driven by short-duration bonds, enables rapid money supply expansion during crises. In EC, churn is less directly controlled by users potentially slowing responses to liquidity shortages.

9. Conclusions

This paper proposes the Global Dollar (GD), a decentralized global reserve currency governed by user-driven bond auctions. The GD requires minimal cooperation between central banks, making it viable as solution for global trade. By enabling all users to participate equally in money creation, the GD ensures fairness and resilience, distinguishing it from centralized currencies like the USD. It provides a safe-haven asset, GD bonds, that are not tied to the deficits or spending of any government. Its design allows seamless integration with existing banking systems, making it a practical alternative for global trade. If adopted, the GD could enhance financial stability by

reducing reliance on any single nation's monetary policy, mitigating the risk of global contagion from localized crises.

Future research should explore auction implementation, strategies for adoption and partial implementations. The GD represents a bold step toward a decentralized financial future, with the potential to reshape global economics if stakeholders embrace its vision.

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