Robert Triffin International

THE SYSTEMIC INSTABILITY OF BALLOONING GLOBAL LIQUIDITY AS A SYMPTOM OF THE WORSENING OF THE TRIFFIN DILEMMA

November 2021

CENTRO STUDI SUL FEDERALISMO

Robert Triffin International

A watch on the international financial and monetary system

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by **Christian Ghymers**

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Executive Summary

The impact of the Global financial cycle upon the global economic outlook has been increasing since the 1990s. This paper examines the systemic basis of this instability and develops the thesis that the "Minsky Moment" combined with a renewed form of the old "Triffin Dilemma" and its "built-in destabiliser" corollary could explain the unsustainability of the existing International Monetary System (IMS) based mainly on the dollar.

This explanation of the increasing pro-cyclicality of global liquidity (GL) focuses on changes in the sources of funding from banks to the "secured" wholesale monetary markets – the repo – which imply an enormous demand for safe assets as more collaterals are required in a growing share of the intermediation that provides the GL. The US economy – whose relative weight in the global economy is contracting -as – may be unable to provide sufficient "safe" liquid liabilities which are more and more demanded on the repo as collaterals for meeting the growing global refinancing needs. This why the highly profitable intermediation on the repo market creates "second best safe assets" required as substitutes for the missing "safe" dollar T-bills. The systemic flaw is that these substitutes are highly pro-cyclical, i.e. reversible, being also submitted to the general Minsky/Aglietta principle of financial instability. This internal endogeneity of part of the base of the inverted credit pyramid providing GL, introduces a repo-internal multiplier which is highly reversible due to the "dash-for-cash" in dollar assets, when a liquidity crunch is expected. This reversibility implies a rapidly shrinking portion of collateral that was fabricated to complement the official monetary base during the expansion phase of the cycle, generating an amplified contraction effect on private GL. This process works as a "Gresham Law" across collaterals, due to the dollar's international status, which guarantees a higher level of "moneyness" (safe haven effect). The dollar system implies therefore a structural narrowing of the effective base of the GL pyramid, leading to a systemic impossibility of guaranteeing a stabilising role to the base of repo-markets because it introduces a cyclical binary segregation favouring the dollar against other currencies when the downturn of the cycle increases the expectations of a liquidity crunch. The increased fluctuation in the availability of GL in turn destabilises the global economy at very high socio-political-economical costs.

Therefore, the use of the dollar as the main international reserve currency is the ultimate systemic cause of the instability of the base supporting the whole Global Liquidity (GL) because the provision of top quality safe assets is a debt of the US authorities that cannot be adequately adjusted to global needs. The resulting narrowing of the ultimate availability of safe assets in US dollars on which the inverted pyramid of GL is based creates a systemic destabilising effect on the global macroeconomic conditions. We call this unsustainable phenomenon the "Minsky-Triffin" endogenous mechanism of systemic instability of Global Liquidity. The current global monetary system does not yet have the tools to adequately respond to the structural scarcity of top quality safe assets, unless the issuer of the reserve currency agrees to create passively unsustainable national debts, destroying their internal quality of safe assets i.e. leading to a contradiction. This dilemma is none other than the Triffin Dilemma and its corollary, the "built-in destabiliser" of a monetary system based on the use of a national currency as the main international reserve currency.

The common feature to this recurring instability of GL and the IMS based on the dollar as the main reserve currency is the absence of a multilateral Lender-of-Last-Resort (LOLR) capable of regulating GL by issuing the optimal quantity of "safe assets", without either geopolitical policy conflicts or asymmetries increasing the external debt of a national economy. Indeed, a multilateral safe asset is not, by definition, a debt of any national economy but of the global system, therefore, restoring the missing systemic degree of freedom that a national currency cannot provide when it also plays the role of international currency.

However, the best solution of a multilateral reserve currency is technically simple: authorising the IMF to issue (withdraw) multilateral safe assets as its own liquid liability against buying (selling) eligible national assets to national central banks, according to the technically fixed, optimal creation (reduction) of GL volume. Its implementation is simpler, more neutral, more transparent and less utopian than any international coordination scheme.

Current objections view this solution as utopian, but these should soon fade under the pressures of necessity in view of the catastrophic events and mutations underway: (i) the panic of climate change and the need to re-balance the flow of savings from North to South for effecting global de-carbonisation, which is not possible with the current dollar system distorting net savings towards over-consumption of the North, (ii) the urgency to obtain a cheap and fast global safety net to face the next global financial crisis (iii) the emerging CBDC revolution which will make the creation of an e-SDR as the most efficient vehicle for Forex transactions at no cost, paving the way to a multilateral consensus for changing the status of the IMF and the SDR.

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The systemic instability of ballooning Global Liquidity as a symptom of the worsening of the Triffin Dilemma

by Christian Ghymers

1. Introduction

- The essential message that Robert Triffin tirelessly sent to economists and policymakers is that once a national currency is used as a foreign reserve by many other countries, asymmetries could result, creating distortions in the policy mix of the issuer of reserves, not only by exempting it from external monetary discipline, but also by causing significant repercussions on global liquidity conditions, which tend to become sub-optimal and unmanageable. He warned that this feature of the Triffin Dilemma[1] (TD) exposes the global economy to unnecessary and costly instability risks. More precisely, Triffin viewed these spillovers as symptoms of systemic incoherence, leading him to the conclusion that an International Monetary System based mainly on a key currency such as the dollar contains what he called a "built-in destabiliser", that is, an endogenous generation of global monetary waves that constitute a systemic cause of recurring global crisis.
- More than half a century later, despite the new development increasing the financial role of the dollar, this paper and the Robert Triffin International Association (RTI)[2] maintain that Triffin's warning is all the more valid and has become not only an analytical deduction but also a worrying empirical reality. The growing dominance of the dollar has been progressively more visible in the recurring instability of ballooning Global Liquidity (GL). Moreover, the impact of wild fluctuations of GL on macroeconomic development is significant and growing as financial markets have been increasing their domination on the business cycle and the real economy since the 1990s, the costs of which expose our societies to socio-political threats.
- The purpose of this paper is to draw attention to the link (still neglected by economists and policymakers) between the fragility of the liquidity situation and the Triffin Dilemma through the corollary of the "built-in destabiliser" [3]. Indeed, the changes in the financial markets that

[1] The Triffin dilemma expresses the logical impossibility to reach an optimal management of liquidity for simultaneously both the US domestic economy and global needs, when the dollar is used as the main international reserve; the reason is the simple fact that increasing international liquidity means increasing the external liabilities of the US economy, because the demand for the dollar as international reserve is an automatic cheap foreign loan to the US economy.

[2] RTI website : http://www.triffininternational.eu/global-liquidity

[3] The built-in destabiliser refers to the combination of the lack of external constraint upon the US policy-mix with the global monetary waves resulting from the asymmetric dominant role of the dollar in international gross flows of funds. See Triffin, R. "The IMS (International Monetary System…or Scandal?) and the EMS (European Monetary System…or Success?)", Jean Monnet lecture, European University Institute, Florence, *Banca Nazionale del Lavoro, Quarterly Review*, n°179, December 1991 and Ghymers, C. "Overcoming the Triffin dilemma today: A plan for a stable international financial architecture" in *10 Years After: The End of the Familiar... Reflections on the Great Financial Economic Crisis*, ed. The Reinventing Bretton Woods Committee & The Astana

explain most of the GL expansion have exacerbated the inner pro-cyclical character of financial markets by amplifying the endogenous reversibility of the creation of GL due to the narrowing of the ultimate availability of safe assets in US dollars, on which the inverted pyramid of GL is based, thus creating additional destabilising effects on the financial cycle. A common feature of this recurrent instability of GL and the IMS based on the dollar as the main reserve currency is the absence of a multilateral Lender-of-Last-Resort (LOLR) capable of regulating GL by issuing the optimal quantity of "safe assets" without causing geopolitical policy conflict or asymmetries, because a multilateral safe asset is not, by definition, a debt of any national economy but of the global system.

2. Deep structural changes in Financial Markets while theories still lag behind

- Over the past three decades, financial markets have fundamentally changed both in their structure and in the efficiency and use of policy instruments. These changes reflect deeper determinants of change in the real global economy (emerging economies with less developed domestic financial markets, decreasing marginal profitability of capital in advanced economies and decreasing growth of total factor productivity everywhere, over-indebtedness leading to growing recurring needs of liquidity for refinancing existing debts, ageing, etc.). These trends have been developed alongside financial deregulation and liberalisation of international capital movements, which reinforce the pro-cyclical nature of financial markets due to the cumulative link between demand for and supply of private liquidity (see M. Aglietta's explanation on section 8) impeding a stable equilibrium. In other words, financial market operators are not independent, being subject to mimetic competition and self-fulfilling liquidity conditions that move liquidity supply and demand curves together, preventing liquidity self-regulation through credit price adjustments, thus creating a destabilising financial cycle.
- Given the internal instability of financial markets, the huge increase in the balance sheets of central banks and the generalised increase in debt ratios have induced behavioural changes in the financial sectors, which have increased their inner pro-cyclicality.
- The most important change is the dramatic expansion of GL driven by private liquidity based on a shift in the sources of credit financing: wholesale financial markets oust traditional banking activities with the rapid development of the shadow banking system (or non-banking sector) which replaces traditional bank loans based on demand deposits with short-term loans secured by collateral. This greater reliance on collateral whose total value fluctuates with the economic cycle is pro-cyclical. It has amplified the financial cycle and its dependence on a shrinking of its safe asset base, which has itself become more unstable and partly endogenous, with a degree of pro-cyclical fluctuation within its components, according to the hierarchy between assets and currencies.
- Recurring liquidity crises reveal the differentiation between the quality of safe assets by applying some sort of "Gresham's law" to safe assets. High quality liquidity in US dollar

assets is more in demand due to the conversion of lower quality ones, which then chase dollar assets to hoard them. This currency hierarchy is the ultimate systemic cause of the underlying instability of the entire GL because the supply of high quality safe assets is a debt of the US authorities that cannot be determined by global needs. The current global monetary system does not yet have the tools to respond adequately to the growing scarcity of high-quality safe assets, unless the issuer of the reserve currency agrees to create passively unsustainable national debts, but this, in turn, would destroy their quality for remaining safe assets (Triffin Dilemma again).

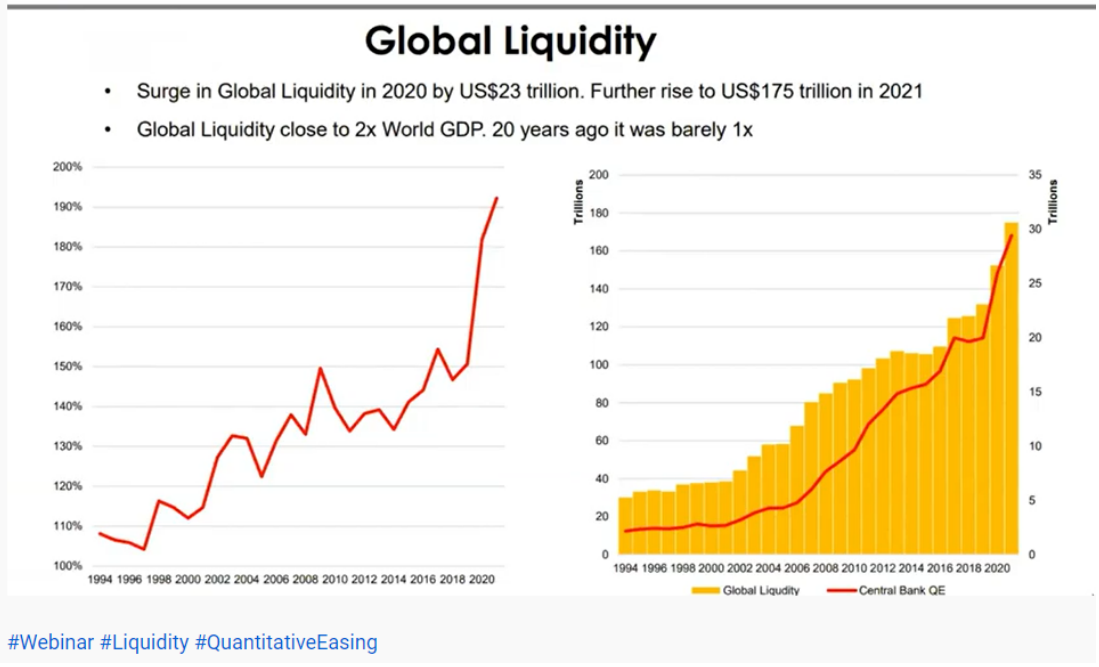
- A major feature of the current financial system is the rising scarcity of safe assets as a result of the growing importance of the non-banking sector as a main supplier of liquidity needs through the intensive use of safe assets as collaterals. Indeed, over the past two decades, the debt ratios of all agents (households, enterprises and governments) have risen significantly. This debt expansion implies an increasing need every year for refinancing part of the huge stock of debts reaching more than US $250 trillion. With the average duration estimated to be about 5 years, the refinancing needs amount to 50 trillion per year. Thus, rising debt ratios implies rising needs of liquidity, which in turn imply raising the appetite for safe assets, because the main source of funding is the non-banking sector. This explosive need for new safe assets is growing, which seems impossible to match only with accelerating treasury debt issued by economies whose currencies are used as reserve currencies without destroying the safe asset quality of these liquid debts (Triffin Dilemma once again).
- As a result, another major change is that Western financial systems have essentially become capital refinancing mechanisms dedicated to rolling over existing positions, rather than simple capital-raising mechanisms used to obtain new finance, while Emerging Economies (EE) strongly increase the demand for safe assets in dollars. These important changes have strong repercussions on central banks' room for manoeuvre, on the transmission channels of monetary policies and on the type of policy instruments to be used, with a decreasing role in interest rate management and an increasing importance of balance-sheet structure and volumes, which forces central banks to resort to unconventional quantitative easing (QE) in monetary policies. Financial innovation, deregulation and fast-moving cross-border capital flows have lately compromised official influence. As explained in this paper, new forms of high powered money have endogenously appeared to boost the effective size of the monetary base and have thus allowed credit providers to expand liquidity independently of central banks but at the cost of greater instability.
- Following the changes described, a crucial transformation in the global economy is the transition from economic cycles determined by the performance of the real economy to cycles determined by financial development and shocks, with an aggravation of macroeconomic instability and social costs. Although there is concrete recognition of this trend and its negative effects on growth and social performance, dominant macroeconomic theories, and particularly monetary theories, still seem to lag behind the facts and remain astonishingly slow in adapting their theoretical models to reality. It is amazing how the Minsky "financial-instability hypothesis[4]" and its more recent Aglietta's formulation[5] seem

[4] Minsky, Hyman P., 1982, "The Financial Instability Hypothesis, Capitalist Processes and the Behavior of the Economy", in C.P. Kindleberger et J.P. Laffargue (eds.), Financial crises, Theory, History and Policy, Cambridge

generally to remain ignored by mainstream economics and central banks. This is particularly clear with the use of the concepts of money supply and liquidity by conventional macroeconomics and policymakers who still seem to stick to the dogma of self-balancing financial markets and focus too much on net flows rather than on gross flows and balance sheet composition. It is only with the analysis of the global financial crisis (GFC) that attention has recently begun to focus on the mechanisms of pro-cyclical amplification, coined the "Minsky moment"[6]. This concept is, inherent in the modern financial structure, and on the analysis of global liquidity (GL) in terms of balance sheet and gross flows (which include the growing refinancing of existing positions, and not just new credit), pointing to the mismatch between risk-seeking flows and risk-averse movements.

- Global Liquidity (GL) has become the key determinant of macroeconomic cycles, financial (in)stability and crises. According to the ECB "*measures of global liquidity are one of the best performing leading indicators of asset price booms and busts*"[7]. The 2008/2009 Global Financial Crisis is generally attributed to GL fragilities - especially through the increase in "collateral funding" (Repo) and the growth of wholesale money - which have developed during the past two decades due to structural changes to the financial sector, induced in particular by excessively expansionary monetary policies (QE) and debt, combined with the lack of adequate financial regulations (excess leveraging and credit boom).

Chart 1: Global Liquidity indicators (from Michael Howell's Cross Border Capital Ltd[8])



Source: Howell, M. 2020 op. cit.

University Press. See also "The Financial Instability Hypothesis", *Levy Economics Institute Working Paper* No. 74, Bard College, New York, 1992

[5] Aglietta, Michel, Finance and Macroeconomics: The Preponderance of the Financial Cycle, OFCE « Revue de l'OFCE » 2018/3 N° 157 | pages 197 à 22

[6] Cassidy, John," The Minsky Moment", comment in *The New Yorker*, 4 February 2008

[7] ECB, Global Liquidity: Concepts, Measurement and Implications from a Monetary Policy Perspective. ECB Monthly Bulletin, October 2012

[8] Howell, Michael J. *Capital Wars: The Rise of Global Liquidity*, Palgrave Macmillan, 2020

Chart 2: Global Liquidity determines Global cycle despite active policies of central banks

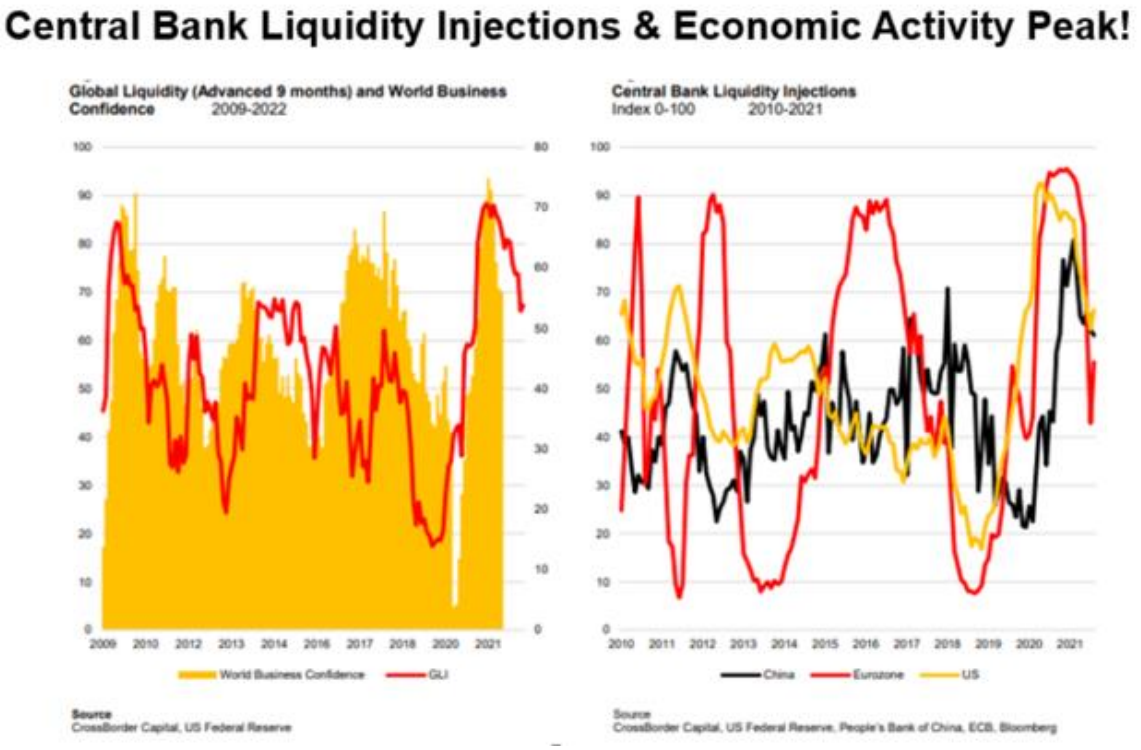
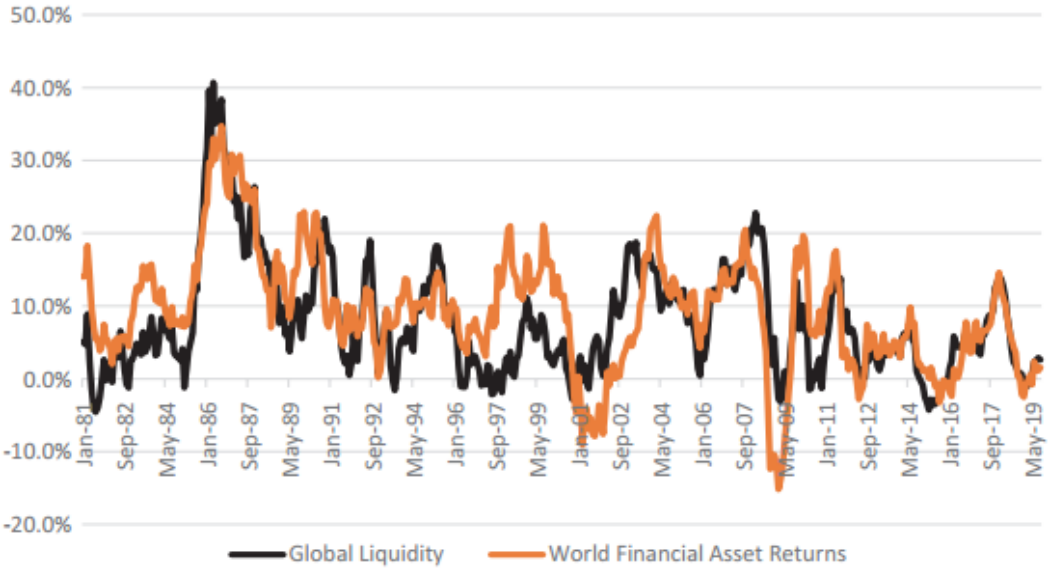


Chart 3: Global Liquidity as a determinant of financial asset returns



Source: Howell, M. 2020

3. What is Global Liquidity (GL) and what are its main drivers?

In this paper, GL is defined as the world average measure of the endogenous ability of financial assets to be converted into cash at any time, which could be coined as the degree of "moneyness"[9]. This definition is inspired by the (old - 1959) Radcliffe Committee's view[10] that: "…[Although] *we do not regard the supply of money as an unimportant quantity, we view it as only part of a wider structure of liquidity in the economy … it is the whole liquidity position that is relevant to spending decisions …*". Liquid assets cover *"… all such assets which can be exchanged for money (or for other liquid assets, normally through the intermediation of money), at any time, at short notice, and at a relatively small transaction cost… decisions to spend on goods and services — the decisions that determine the level of total demand — are influenced by the liquidity of the spenders … The spending is not limited by the amount of money in existence, but it is related to the amount of money people think they can get hold of whether by disposal of capital assets or by borrowing*".

Finding out the statistical content of such a dynamic concept is certainly a difficult task that several institutions have worked on and are still working on. In our view, the most comprehensive measure is the index calculated by Michael Howell at Cross Border Capital Ltd[11]. He built an operational and analytical index of GL that examines the private sector's sources of funding to access cash through saving, national and international banking and non-banking credits. Howell's index covers all the liquid sources of funding: retail and wholesale liquid assets from banks and shadow-banks, adding up the cash and reserve issued by national central banks plus all the credits issued by the financial sector, including international capital movements. "*Global Liquidity is the collective term we use to describe the gross flows of credit, savings and international capital feeding through the world's banking systems and wholesale money markets and used in and between World financial markets to facilitate debt, investment and cross-border capital flows*"[12]

Concretely, Howell's index of the source of financing of Global Liquidity is defined by the flow of savings and credit and analysed through a flow of funds framework. It can be measured by adding up the money flowing through its three main conduits: (1) central bank provision; (2) private sector supply from corporations, traditional banks and shadow banks; and (3) cross-border capital inflows. According to Howell, "*the major sources of Global Liquidity are the US, China and offshore pools, such as the Eurodollar markets. Policy-makers and academics put more emphasis on interest rates, i.e. the cost of capital, than balance sheet size and the quantity of liquidity, i.e. the capacity of capital. The cost of capital matters in an economy actively driven by capital spending, but in a World featuring huge debt refinancings, the capacity of capital and, hence, liquidity matter more*".

Thus, GL covers cash sources that overflow from the national context and controls; it is much more than adding up national liquidity because credit markets have become highly interconnected internationally through complex and less transparent intermediation chains, which require an

[9] We use this term in its broad sense*: the degree to which an asset approximates cash in its ready liquidity and the low transactions costs in realizing that liquidity*, not as the technical application of the same concept to derivatives instrument (options).

[10] Cited by Howell, Michael J., p. 24-25 in Capital Wars: The Rise of Global Liquidity, Palgrave Macmillan, 2020

[11] Howell, Michael J., http://www.liquidity.com/docs/Global_liquidity_indexes_(GLI)_2012_data.pdf

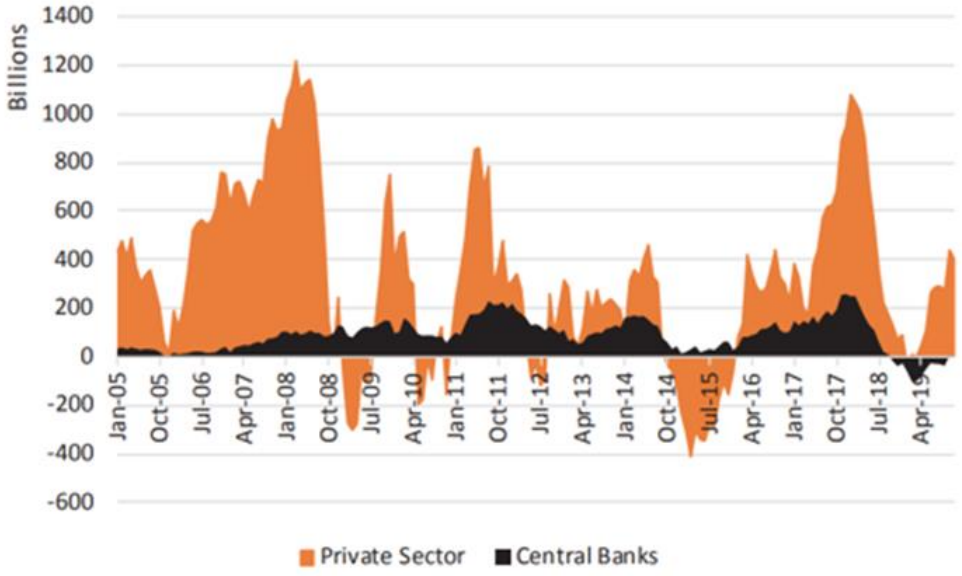
[12] Howell, Michael J., ibid p.23

analysis of gross flows and their composition mismatch. GL reflects a variable combination of both the availability of funds at a national level – issued by central banks and their national financial sectors - as well as the extent of international financial intermediation and integration which interconnects national liquidity with foreign sources of funding.

- Generally, GL is approached as a conceptual aggregate of two main categories: official liquidity (central bank reserves) which is a policy tool, and private liquidity (international loans, bonds, deposits), showing that in quantitative terms, private liquidities statistically dominate official ones.
- It is obvious that major spillovers impact GL through international capital flows, exchange rate fluctuations and differences in national regulations, however, the fact that official liquidity management is in the hands of national independent authorities, indicates a logical flaw of both economists and policymakers who pretend to have a rational approach to monetary policies. Under these conditions, basic rationality is not respected; unsurprisingly, GL is difficult to manage and creates global costs.
- Although central banks' management of their national liquidities is important and has increased their active role and proportion in total GL, the wild fluctuations of the private component of GL indicate their internal endogenous character, making them highly pro-cyclical; however, as Chart 4 illustrates, changes in official liquidity by central banks still influence most of the orientations of private liquidity fluctuations.
- This private component is itself made up of two categories that reflect different behaviours and liquidity risks:

- "core liquidity" brought about by deposits from residents to banks without inter-bank deposits; this segment is close to the traditional monetary aggregates. The characteristic of these liabilities is that banks have the ability to create more liabilities through their loans, thus benefitting from more stable sources of funds through deposits which enjoy some public guarantee;
- "non-core liquidity" generated by financial markets, i.e. liabilities to financial institutions such as cross-border deposits and other deposit corporations, as well as loans and securities (other than shares) of commercial banks, non-banks and other financial intermediaries. These liabilities are typically not included in traditional monetary aggregates and correspond to the "shadow banking" activities of non-bank financial agents.

Chart 4: Variations in the components of Global Liquidity:
private liquidity compared to central banks' liquidity provisions
(2005-2019 in US$ bn)



Source: Howell, M. 2020

- GL is very volatile, with sharp fluctuations showing a pro-cyclical cumulative behaviour that worsens macroeconomic instability and costs. This instability comes essentially from the "non-core" part of private liquidity. These liabilities are created by wholesale markets that are typically more leveraged, collateral-based and dependent upon cross border flows. This important component of GL is more fragile than the core liabilities of traditional banks because they are based on collaterals that co-vary more with the financial cycle and external spillovers, causing the funding to expand or contract depending on the market value of the underlying collaterals. In particular, international interconnections are highly unstable and a cause of spillovers on national financial markets because national assets and currencies are not perfect substitutes: they express differences in the variability and qualities of liquidity, which make substitution across them often unstable and variable during the cycle, some of them being at risk of vanishing quickly, setting in motion self-fulfilling and adverse dynamic effects leading to financial crisis. These qualities can be described as the degree of "moneyness", the differences of which generate a hierarchy of quality across national currencies and assets based on their ease and guarantee of time to be transformed into cash balances.

- Non-core liquidity created by shadow banking has thus become the key driver of GL fluctuations, which means that financial institutions tend to increasingly rely on endogenous and unstable "money" creation.

- Therefore, GL is a composite and moving concept, difficult to capture and even more to manage, which combines both volumes of funds and the variable quality of their endogenous degree of "moneyness", as well as policy components (monetary and regulation policies) and a financial market component (depending on behavioural and structural features).

4. The three main actors of Global Liquidity

Surprisingly, the distribution and relative importance of the pool of GL show big changes geographically: the US financial market is no longer the most important by volume, China has already taken over with 27% of the world balance sheets representing the available funding, against 23% for the US markets and 22% for the Euro-area (Chart 5). China's surge is a recent phenomenon that started with the GFC as the US stalled at the nominal 2007 level (chart 6). These changes reflect both the real economy and the GL structure, but not in the uses of currency, as the dollar remains anyway dominant.

Chart 5: The pool of Global Liquidity by geographical areas

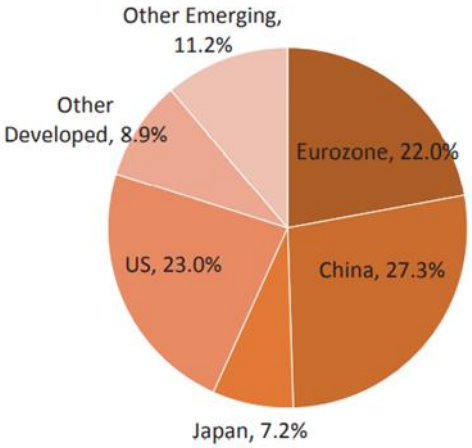
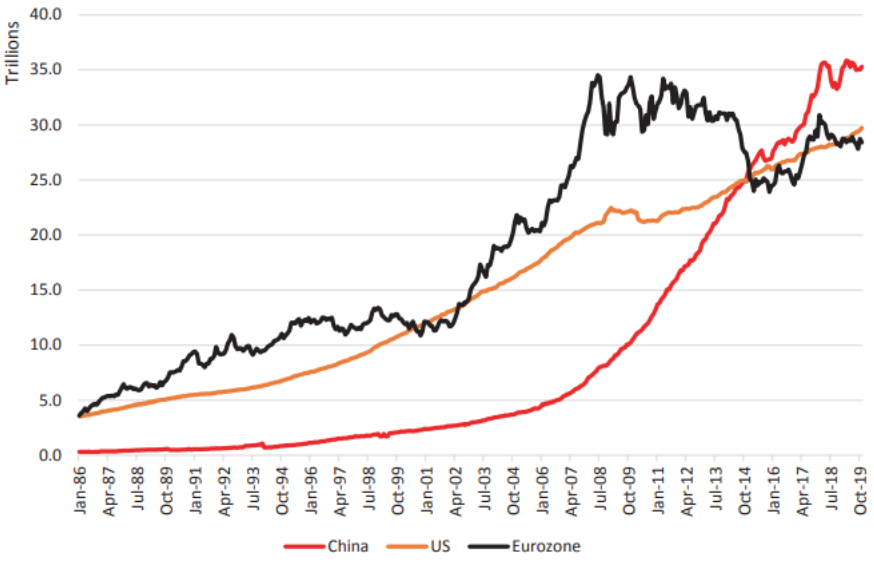


Chart 6: The 3 main actors of Global Liquidity



Sources for Charts 5 & 6: Howell (2020)

5. The Shadow-banking expansion: explanatory factors, mechanisms and actors

The "shadow-banking" system (or non-banking financial sector) accounts for two-thirds of the growth in the increase in available global funding. However, this dramatic increase in credit supply is substantially affected by the refinancing of existing debts, providing very few new credits. The reason is that shadow banks transform traditional bank assets and liabilities and refinance them into more secured and long-term positions using collateralised loans. This type of borrowing has grown to eclipse in size the pre-2008 uncollateralised interbank loan market and, in fact, incorporates the latter because participants now prefer secured lending, even between banks. Thus, it repackages and recycles existing savings by offering asset-backed securities to institutional investors who wish to keep their liquid assets as insured assets and not as (uninsured) bank deposits. Shadow banks expand the elasticity of the banking system by escaping the capital requirement of banks and thereby increasing or decreasing the credit multiplier, therefore raising systemic risks since this elasticity works both ways, it is reversible as it is highly pro-cyclical. It manufactures liquidity by creating (fragile) liquid claims from the less liquid assets it holds.

The Financial Stability Board (FSB) formally defines shadow banking as "… *credit intermediation involving entities and activities (fully or partially) outside of the regular banking system*". Howell (2020) estimates that in the broadest sense, the size of shadow banking would be as high as 2.5 times the world GDP or US $210 trillion in 2019. Using the narrower definition of high-risk, shadow banking would currently total around US $60 trillion.

The rapid development of this non-core source of funding is explained by the conjunction of several structural factors. On the demand side: the growing demand for liquidity which increases with the need to refinance rising debt ratios in the world economy, with the increasing constraints imposed on the banking sector, namely after the GFC (leverage & liquidity coverage ratios), the demand for more alternative short-term liquid investment vehicles secured by collaterals, offering thus more guarantee than bank deposits; on the supply-side: the rapid expansion of "wholesale money", led by financial innovations applied to growing corporate and institutional cash pools, represents another key structural change in financial markets as a result of changes in the global economy (emerging market economies' surplus building up competition in forex reserves, thus resulting in inflows of cash to Western financial centres, combined with lower marginal profitability on new investment in advanced economies). These new supplies of cash come from un-invested corporate treasury funds, liquid asset holdings of forex reserve managers, the cash holdings of Sovereign Wealth Funds (SWFs), of institutional money managers, and the cash collateral business of derivative markets. These are estimated to be over US$30 trillion.

These changes on both the demand and supply side of financial markets explain why former lenders (banks) have become borrowers from wholesale markets, and many previous borrowers (corporations) have become lenders.

Among this "non-core" component of GL, the markets for **repurchase agreement ("repo")** [13] - a form of borrowing that has to be backed by "collateral" in the form of "safe assets"[14] such as high quality government bonds, provides cash against collateral assets, reaching an estimated global amount of daily transactions of $14 trillion[15] in mid-2021. The US repo is estimated to be around $5 trillion and the European repo slightly lower[16]. However, the US dollar denomination prevails with more than 60%[17].

The Repo market fulfil three functions:

1) It allows to match without almost no risk, demand and supply of short-term liquidity between financial institutions (e.g. banks, broker-dealers, hedge funds) that own lots of securities but need to borrow cheaply and other parties (e.g. money market mutual funds) that need to earn a small return on their temporary excess of cash, because high quality securities (most often government bonds) serve as collateral.

2) Most central banks rely on the repo market as the main channel for the transmission of monetary policy to the wider financial market and to provide emergency assistance to the banking system and, since the GFC, to the non-banks, due to the disruption of the repo during the GL crisis. As banks lend their excess reserves – or borrow the reserves they need – using collaterals in the repo market, it is both a vital source of information for central banks about the state of liquidity and of the economy, and the way in which central banks carry out monetary policy.

3) The repo market funds long positions in securities and covers short trades, all of which is vital to those hedging and pricing derivative instruments. A liquid repo market is therefore technically essential for the whole financial system.

Repo markets are a key component of the financial system and play a key role in liquidity development and management. Because the repo market is not restricted to traditional banks, it has become the primary monetary policy channel for central banks. It is the largest segment of the shadow banking system and is termed the "plumbing of the financial system". It consists of two simultaneous short term operations: a repurchase agreement (named "*a repo*") for providing immediate cash to a borrower who sells a security to an investor with the commitment to repurchase his security at a higher price (the "*reverse repo*") which depends on the quality of "safe asset" used as collateral. It plays a strategic place in GL dynamics and monetary policies. When central banks apply QE, they inject liquidity with a "reverse repo", buying securities on this market against the commitment to sell them later.

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[13] For more information on the US repo-markets, see the SIFMA Research databases and reports on: www.sifma.org/research. For the European repo-markets, see ICMA-European-repo-market-survey-number-40-conducted-December-2020_23032 on www.icmagroup.org

[14] The definition of a safe asset is common sense: an asset which is risk-free, no liquidity risk, no debtor risk

[15] According to Finadium (Concord, MA, USA), https://finadium.com/updated-we-size-the-global-repo-markets-at-us13-4-trillion-premium/

[16] According to the ICMA survey for 2020, the daily amount for the EU28 was €3.5 trillion for a partial sample. Data are difficult to compare due to surveys covering only part of the markets, to double-counting issues, and to differences between data measuring daily turnover and stock at one date, for which the share of shorter-term repos is understated compared with turnover data, given that more shorter-term than longer-term repos will run off between surveys (for more statistics see ICMA and SIFMA reports mentioned above)

[17] For the international Debt Capital Market (DCM) issuances, ICMA market data (3d quarterly report 2020), https://www.icmagroup.org/resources/market-data/

To protect themselves against a fall in the value of the assets subject to repurchase, cash lenders typically require over-collateralisation, and thus, the value of the assets pledged as collateral is discounted, which is typically referred to as a haircut. Additionally, repo transactions specify the terms, including the securities that are acceptable as collateral, and the associated haircuts or initial margin requirements. Most repo contracts last overnight only, but different types of repo agreements can be created with longer or indefinite duration (the contract rolls over into the next day with one party notifying the other). On the Euro-repo, the ECB has estimated that, in euros, overnight repos were over 75% of turnover but only between 15% and 25% of the outstanding value. Those of less than one-month duration have fluctuated widely between about 60% and 70% of the outstanding value of repos. On the US repo, the overnight share is higher, close to 90%.

Although similar to any collateralised loan, a repo is an actual purchase of securities, with fiscal, legal and monetary implications. In the event of bankruptcy, investors can sell their collateral securities, unlike in the case of collateralised loans. Nevertheless, the seller of the collateral retains the risk on this collateral, as he has committed to buy it back in the future for its original value plus repo interest. Thus, if the price falls between the sale and the purchase, the seller will suffer the loss. Therefore, the seller retains a right to the coupons that could be paid during the repo time despite not being the legal owner. Furthermore, acquiring ownership means the buyer can re-use the asset, and agents can intermediate on the repo creating more capacity to borrow at a lower price for a less trustworthy borrower. For example, a hedge fund would typically borrow from a dealer through a repo[18]. This dealer-lender being more trustworthy than the hedge fund, would then borrow from the cash pool of the wholesale money market through his or her own repo to finance on better terms the transaction with the hedge fund, thus ensuring a profit commission. Intermediation would then make it possible to combine the risky hedge fund asset with the greater reliability of the dealer, obtaining more liquidity at lower costs. This profitable intermediation underpins GL's unstable dynamics through repo markets (see below).

Paradoxically, the QE policies that increase GL have also resulted in a secondary effect that could limit GL, as the counterpart of the injected reserves means a reduction in the available stock of securities used as "safe assets", given that they are "frozen" on the asset side of central banks, that is, these safe assets are withdrawn from the market for banks and non-banks. Indeed, a huge amount of central bank reserves created as a by-product of asset purchases increases the scarcity of these collaterals, thus pushing repo rates below the deposit facility rate. This would be reminiscent of the US experience, where money market rates have been below the rate of interest on excess reserves (IOER) since 2008.

Prudential regulations implemented after the GFC have increased the need for banks to obtain excess reserves from central banks, which increases the amount of safe assets delivered to them in exchange for these cash reserves.

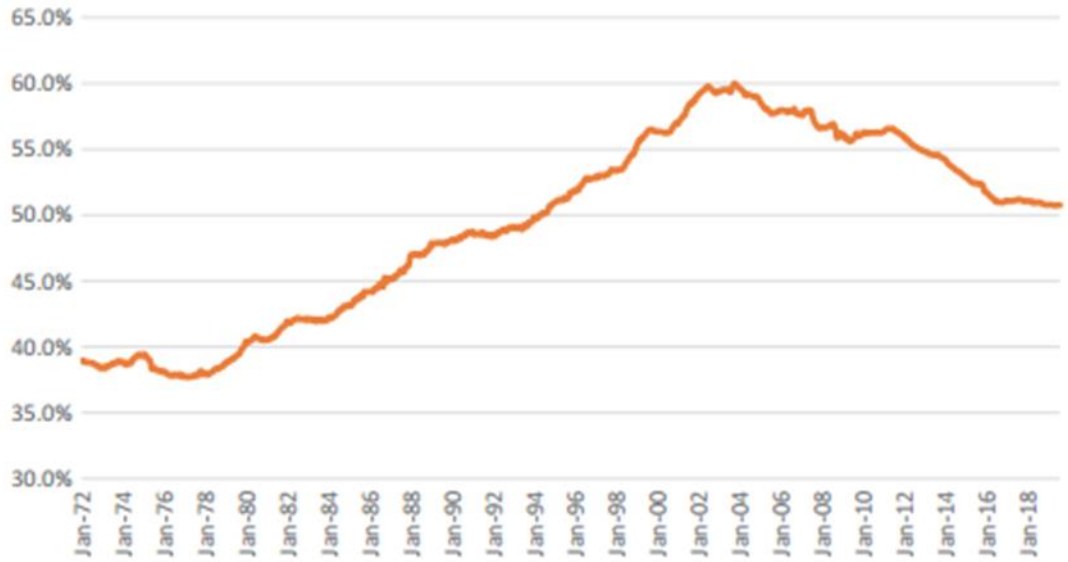
Surprisingly, the US repo market which provides more than $4 trillion to financial firms every day only started to receive more attention with the 2008 GFC. This belated concern has risen again since the autumn of 2019, when an unforeseen stress appeared. Although the system had enough reserves, unusual frictions prevented liquidity from being distributed effectively to smoothen out the cash demand-supply imbalance, resulting in the overnight repo rate jumping as high as 10%

[18] This is the dominant case, named a "tri-party repo"

when the interbank Fed-rates were around 2%. The Fed was forced to intervene heavily to bring money directly into the repo. This example shows that the problem was not the total amount of official reserves in the system, but rather the lack of mobility of those reserves to provide private liquidities, something that cannot be seized with traditional net flows or monetary stocks (like M0, M1, M2 or M3). The same problem occurred in March 2020 with the pandemic, forcing the Fed into an emergency injection of $1.5 trillion on the repo.

However, unlike the Fed funds market, repos are highly leveraged, which makes the task of policymakers much harder, requiring frequent interventions and, when the banks accumulate cash as a precaution, they often need 'large' liquidity injections to backstop the market. The repo market transacts funds between all types of financial institutions, such as banks, broker-dealers, insurance companies, pension funds, hedge funds and mutual funds, as well as major corporations and government agencies. Traditional banks may no longer be the main source of lending, but they continue to act as intermediaries for most of these transactions, thus being closely interlinked with the repo. The increasing use of repos, carry trades and currency swaps underscores the importance of the balance sheet capacity of the financial sector. In the US, treasury securities may account for about two-thirds of that repo market. Much of the rest of the US market is government guaranteed Agency debt and Agency Mortgage-Backed Securities (MBS). In Europe, the ECB[19] estimates government bond collateral to account for 85% of Euro-originated repo collateral. Other safe assets are not as high quality as government bonds but are still eligible as collateral for their sufficient liquidity (AAA corporate bonds, equity ETF, covered bonds and other liquid assets like some bank loans).

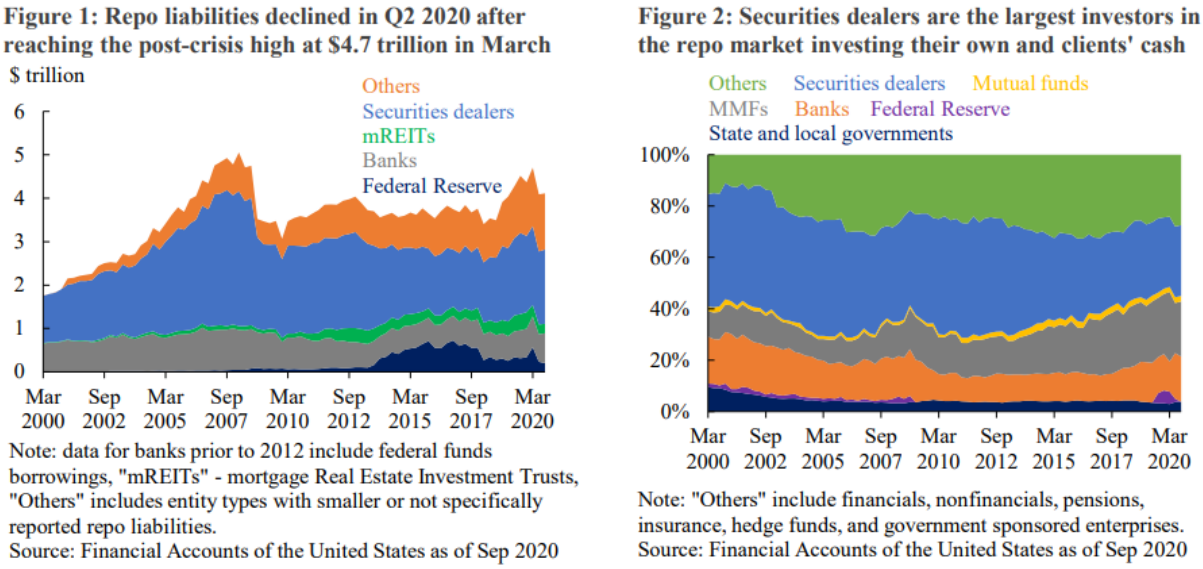
Chart 7: US shadow banking, 1972–2019 (percentage of total private sector liquidity)



(Source: Howell, M. 2020)

[19] ECB, *Euro money market study 2020*, April 2021

Chart 8: The US Repo size and composition of lenders



Source: U.S. Securities and Exchange Commission, Viktoria Baklanova, Isaac Kuznits, Trevor Tatum *Money Market Funds and the Repo Market*, Public Information, February 2021

6. What are the main effects of the surge and mechanism of collateral-based shadow banking activities?

- On the one hand, shadow banks could be seen as providing the necessary liquidity that was too constrained by the scarcity of official safe assets with a high degree of moneyness. On the other hand, their response to market needs has increased the pro-cyclical nature of private liquidity with the reversibility of the "fabricated" safe assets, creating greater GL instability, which eventually leads to a counterproductive higher degree of scarcity and dependence on high quality safe assets. Therefore, this degree of flexibility permitted by the dynamism of shadow banks has not solved the systemic problems of the irregular scarcity of safe assets and ways to make GL more stable. Shadow banks have made GL liquidity more endogenous and unstable, being more pro-cyclical than traditional bank loans, as they increasingly depend on less reliable and more reversible or variable wholesale sources (with respect to retail sources). In particular, shadow banks tend to increase the scarcity of safe assets in US dollars, thus resulting in more financial fragilities, less power for central banks, and an amplification of the financial cycle, with higher probability of reverse liquidity contraction provoking a rush towards US dollar safe assets and deeper recession.
- The detailed mechanism of this dynamic over-expansion of shadow bank credits shows a peculiar process of cumulative circular causality of GL instability in four successive steps:

- first, a strong increase in the relative needs for safe assets creates a scarcity of the "safe assets" base of this reverse pyramid of credits, each expansion of which means also an increase in the future need for refinancing with more safe assets.

- second, this cumulative causality from excessive demand for collaterals explains two mutually supportive effects: (i) the higher price of safe assets, i.e. their lowering yields, and (ii) the greater incentive for shadow banks to activate their intermediation by fabricating additional safe assets with a lower degree of moneyness (riskier) but with high profitability for the dealers: the repo mechanism bundles together 'safe' assets as collateral, e.g. government bonds, foreign exchange and top-grade corporate debt, and uses these as security against which to borrow. This combination leads to a progressive differentiation between the initial "external" collateral (for example a US T-bill) underpinning the induced securitisation that creates "internal" second-best collaterals.

- third, this differentiation in moneyness across safe assets reflects the difference in sensitivity to information between external and internal collaterals, the value of the latter co-varies more over the cycle. Market expectations then produce an instability inside the GL base, which itself becomes an inverted credit pyramid supporting the GL reversed pyramid. This differentiation therefore produces an amplified fluctuation in private liquidity. Within the base, a sort of "Gresham law" could occur to chase the best external collaterals by selling some internal ones with a multiplied effect on private liquidity volume.

- fourth, in case of a sharp cyclical downturn leading to a GL crisis, the differentiation worsens moving into a deeper split between dollar safe assets versus non-dollar ones, as a result of the safe-haven superior status of the dollar arising from its dominant reserve currency advantage: the scarcity of safe assets moves into an even scarcer dollar safe asset for supporting larger fluctuations of private liquidity, with damaging impact on real activity

This four-step dynamic intensifies the role of the dollar by creating a structural narrowing of the GL base which leads to increasing systemic instability.

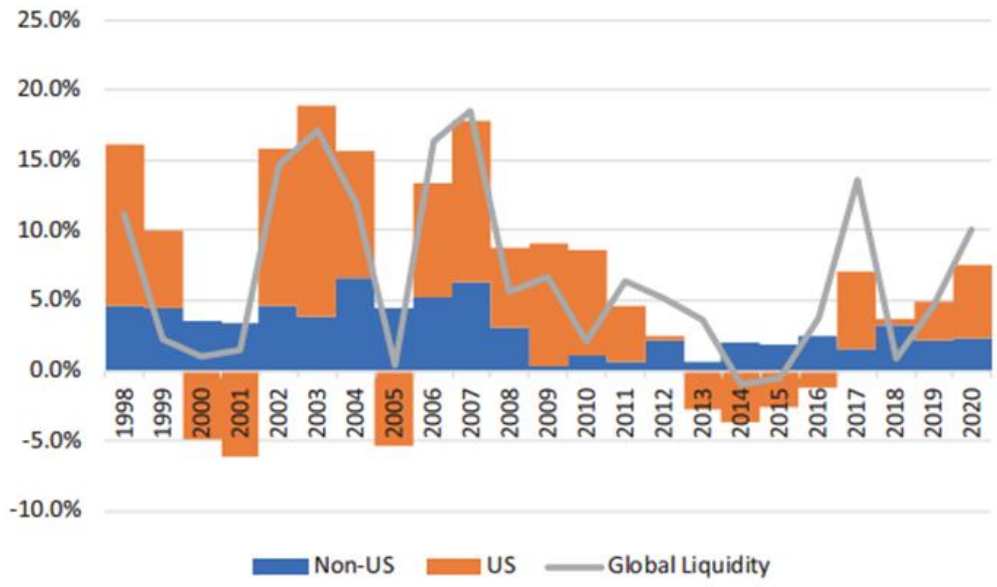
- The driving factor behind this instability seems similar to the easy securitisation which led to the GFC. Indeed, the short-term profitability of the monetary intermediation on the repo by the private sector (dealers on the repo) leads to issuing lower quality debt as an inferior collateral substitute , thereby mismatching liabilities and requiring more frequent refinancing: the dealers have been able to produce (temporarily) a second-best alternative by activating the velocity of circulation of "safe assets" in a collateral chain on the repo by successive lending in which the initial "external" collateral (for example a US T-bill) underpinning the transaction may be re-used (re-hypothecated) for generating "privately created collateral" i.e. "internal" collaterals, particularly through the securitisation of riskier assets. This monetary intermediation creates an endogenous multiplication of collateral used as second-class "safe assets". This behaviour, which was already a major driver of the GFC, resulted in many financial institutions becoming more dependent on short-term debt markets to refinance themselves continually, creating an inverted credit pyramid inside the repo in which scarce external safe assets create many internal ones but with a decreasing quality of moneyness up to the point where liquidity risks appear.

- Thus the base of the GL reversed pyramid is itself a two-tier inverted pyramid which amplifies the reversibility of private liquidity: this base comprises two intertwined categories of functional safe assets, the quality of which differs in terms of sensitivity to information, particularly in case of liquidity tensions: the "external collaterals", in the sense that they are created by institutions outside the financial intermediaries – central bank or government debts (US T-bills and bonds being the main ones) - which are the "super-safe assets" as these are highly liquid and information-insensitive, permitting investors to liquidate positions easily, and therefore being in high demand, namely for use as reserves to issue the second category of safe assets: the endogenous "internal collaterals", created as private forms of monetary instrument through the repo-market on the basis of the first category, the high quality assets or external collaterals; the liquidity degree of the internal ones, although significant, are information-sensitive and therefore, subject to fluctuations in valuation and liquidity due to new events affecting the asset value or the business cycle.
- Thus the repo-market manufactures the "second-best monetary basis" boosting the size of the official monetary base and allowing credit providers to supplement liquidity independently of central banks, at least during the expansion phase of the financial cycle. The result is a temporary larger quantity of "high-powered-money" made with market-based wholesale funding which is both pro-cyclical and often very short-term: they have a lower degree of moneyness which co-varies with the business cycle and risk assessments (haircuts). This augmented "high-powered money" also includes offshore pools of US dollar deposits, such as the Eurodollar Markets, that can be borrowed easily.
- Therefore, the repo is an important factor of the financial cycle that amplifies macroeconomic fluctuations. The process is that intermediation on the repo increases the basis for expansion of GL by allowing for more loans driving up stock markets, real estate values and other risk asset prices, which tend to further increase the value of collaterals, underpinning new liquidity creation. This, in turn, pushes the private sector to borrow ever more credit until a typical Minsky Moment is created, reversing the financial cycle with a consequent shock for the real economy.
- This means that the liquidity created by the repo is never sufficiently fungible when a high degree of moneyness becomes crucial, i.e. in times of higher risk or crises. With the recession, fire-sales of securities, deleveraging and the run to safe assets destroy part of GL.
- In this cyclical amplification, the development of "rehypothecation agreements" allows for lucrative successive re-use in other transactions. Re-using pledged collateral allows credit to be created in a way that is analogous to the textbook money-creation process (involving the deposit-loan multiplier and governed by central bank reserves). On the repo, the collateral represents the high-powered money component; the collateral "haircut" is the risk adjustment to the market value of collateral translating the assessment of the risks with respect to a collateral comprised of pure external safe asset; this loss of value corresponds to the banks' reserve ratio, and the length of the collateral chain, i.e. the number of times collateral is re-pledged, is equivalent to the traditional money multiplier.
- Rehypothecation stretches existing collateral, making funding liquidity more elastic but in both senses, then amplifying the cycle. Indeed, the continual re-pledging of collateral has limits because haircuts (due to the lower moneyness of these second-best safe assets)

progressively reduce the credit-raising potential of the underlying asset. These collateral 'haircuts' inversely determine the maximum leverage, with a 2% haircut allowing leverage up to 50 times in the best part of the cyclical expansion, but exposing GL to a rising risk of cyclical contraction.

- But as several agents count on this same collateral as backup in case things go wrong, rehypothecation also risks excessive leverage and, given the interlocking nature of intermediaries' balance sheets, it heightens systemic risk.

Chart 9: The shortage of safe asset supply.
Supply of global 'safe' assets (percent of world GDP)
and growth of Global Liquidity (%yoy), 1998–2020



(Source: Howell, M. 2020)

- Holding of collaterals helps in mitigating credit risk, but the risk of maturity transformation remains, e.g. the gap between the duration of assets and the duration of liabilities, and is highly dependent on being able to roll over or refinance positions, meaning that significant macroeconomic spillovers make the collateral less secure than what they appear at the microeconomic level, leading to "black swan" cases. Paradoxically, the demand for safety through the intensive use of collaterals creates a feeling of safety at the microeconomic level for agents, which develops systemic risks at the macroeconomic level.
- The importance of repo activities by agents without direct access to the national LOLR also changes the transmission channels of monetary policy. On this aspect too, monetary theories lag behind the facts[20], in considering that conventional tools – increasing the money supply to banks and accepting broader collateral – could reduce systemic liquidity risk. This is true as far as the intermediation of bank liquidity to non-banks relies on well-functioning repo,

[20] d'Avernas, A, Q Vandeweyer and M Darracq-Pariès (2020), "Unconventional Monetary Policy and Funding Liquidity Risk," *ECB Working Paper* No 2350

which would not be the case in a GL crisis which causes an excessive scarcity of good collaterals (high-quality safe assets). With a disruption on the wholesale money market due to the scarcity of safe assets, conventional monetary policy would not work. This is shown also by Howell, who draws attention to the fact that interest rates have become less important than before, and less important than balance sheets for acting upon GL; this is due to the large global outstanding debt that needs to be permanently refinanced, together with the huge overhang of derivative instruments. Both factors explain why the quantity of available credit becomes more important than the costs of these credits. As a result, the relationship between interest rates and the supply of liquidity is weaker than before. The main transmission channel operates by altering the composition of private sector balance sheets by the types of assets that a central bank buys or sells, which changes the relative yields across assets; in addition, as already mentioned before, market rates will differ from central bank rates either because the excess scarcity of safe assets pushes up the value of collaterals (i.e. pushes down their yields below the policy rates), or because of potentially large fluctuations in risk premia due to the heavier role played by the assessment of risk by the suppliers on the wholesale market (corporates and brokers).

- Transparency is lower and banks are closely connected to non-banks, who also operate on the wholesale market. Fragilities emerge from the higher reversible leverage that results from intermediation by shadow banks: traditional banks use to benefit from more stable short-term liabilities, with household (warranted) deposits and their loans creating new deposits. Also the mismatch on duration is difficult to identify.

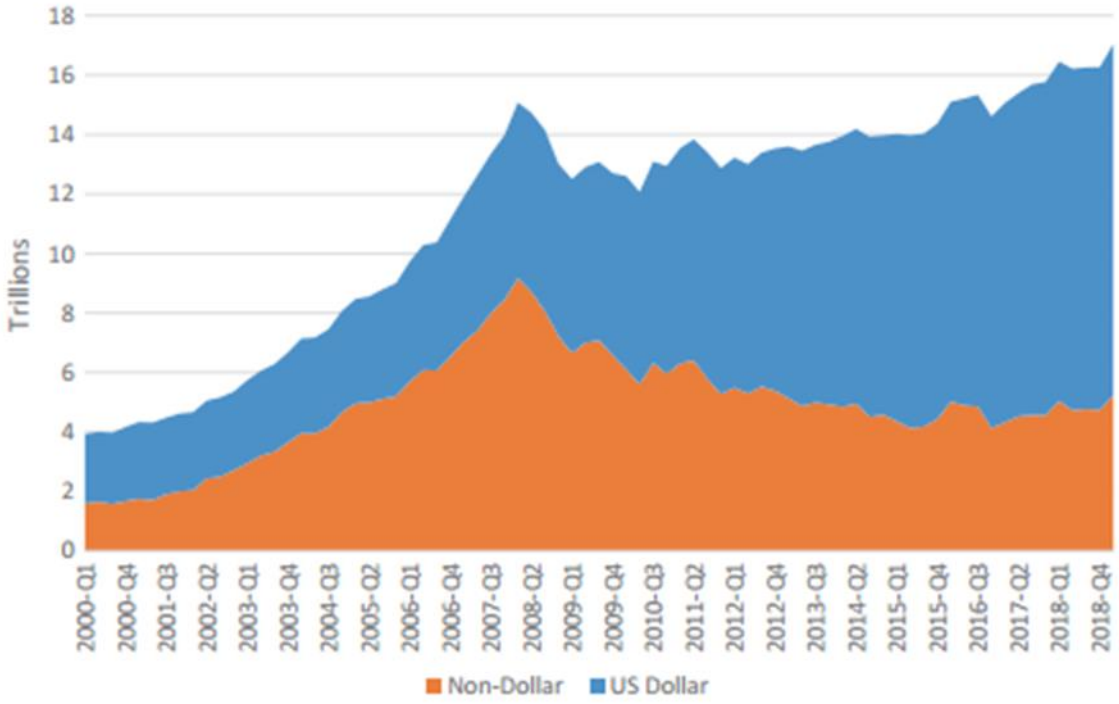
- This accumulation of risks could lead to the fourth stage of the vicious circle by which too much liquidity destroys market confidence and so cuts part of the private monetary basis, causing a GL crisis that reinforces the supremacy of the dollar as a safe haven. This dynamic process in four stages also explains why the US dollar remains so dominant, even increasing its importance (see chart 10) both as a financial vehicle and as playing the *de facto* and imperfect role of LOLR, despite the rising level of external indebtedness of the US economy. Despite the falling share of US GDP, the dominance of the dollar has increased with the key role played by the US dollar in the booming emerging economies, both for trade and financial transactions (global value chains, cross-border capital markets, Forex and global bank activities), and with the resulting growing importance and power of the US Federal Reserve, which was almost institutionalised with the discretionary swap network in dollars created in an emergency (bringing a total of US $4,45 trillion mostly to EU banks). Only the US Fed had this power because the liquidity in US dollar was the priority need to face the rush to US dollar assets in the GFC. Furthermore, the Euro-area crisis made it clear that the ECB was not a genuine LOLR, with the result of increasing the fragmentation of the Euro-security market: only a slim volume of German T-bonds could play the role of safe assets in euros. There exists also a shadow dollar monetary system, with collateral and cross-border pools of offshore currency, such as Eurodollars, which are an increasingly important source of GL, contributing to the shift in the denomination of Global Liquidity towards the dollar, much of it being used outside the US. The widespread use of the US dollar in trade invoicing and its dominance in international banking and finance are self-reinforcing. A result of the dollar's international role in transactions is that the global banking system also runs on dollars, implying a demand for large US dollar reserve holdings. This natural first mover

advantage is backed by an even more important advantage: the access to the US LOLR which gives a quasi-monopoly to US dollar assets, making US assets the preferred 'safe haven'. Indeed, by working in dollars, non-US banks could get access to the Fed through their subsidiaries in the US. Besides, in cross-border and Forex flows, the dollar is needed as the dominant counterpart to any exchange-rate transactions. With the repo being mainly short term, operators can work efficiently only with a single operational vehicle for fast intra-day and other short-term transactions. This technical practice of the dealers gives a decisive advantage to the use and the maintain of the dollar as the dominant vehicle in financial markets.

- Lending in dollars tends to grow faster when the US dollar is weak. The cycles in world trade and global finance are in large part dollar cycles, as demonstrated by Rey[21] and Shin[22]. With global banks working in dollars, coupled with the two-sided fact that borrowing appetite is bigger with a weaker US dollar and the corresponding improvement in the dollar value of local currency collateral, which increases both funding opportunities and leverage. As shown by H.S. Shin, current account imbalances do not reflect the influence of gross capital flows on global liquidity, which is "*a banking sector phenomenon and that the financial stability implications of global liquidity are intimately tied to the leveraging/deleveraging cycle of the global banks*"[23]. Gross cross-border banking and the fluctuating leverage of global banks are the channels through which lax financial conditions are transmitted globally. H. Rey[24] demonstrated that liquidity conditions in the rest of the world are directly influenced by the Fed's monetary stance through the pre-eminent role of the dollar in global banks. The Fed policy amplifies the pro-cyclical movement in cross-border bank flows, in leverages and in spreads (depreciation of the dollar increases leverage outside and the reverse for appreciation).
- Complementary data from the BIS global liquidity indicators[25] show that this expansion of the relative importance of the US dollar since 2008 corresponds mostly to the faster development of dollar denominated securities to non-banks outside the US (left graph of Chart 12B), essentially reflecting the reduction of the euro denominated share (left graph of Chart 11). However, as a proportion of the world GDP, the dollar peak of 30% reached in 2007 is not yet restored (middle graph of Chart 11), although the US dollar has returned to the dominant position of 50% of the global outstanding debt it held around the turn of the century (right graph of Chart 11).

[21] Rey, Hélène, "International Channels of Transmission of Monetary Policy and the Mundellian Trilemma", Mundell Fleming Lecture 2014, IMF Economic Review 2015.
[22] Shin Hyun Song, "Global Banking Glut and Loan Risk Premium", IMF Economic Review, Vol. 60, No. 2, 2012.
[23] Shin, Hyun Song, "Global Banking Glut and Loan Risk Premium", 12th Polak Annual Research Conference, 2011
[24] Rey, Hélène, Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy Independence, Federal Reserve Bank of Kansas City Economic Policy Symposium (2013).
[25] BIS global liquidity indicators, at www.bis.org/statistics/about_gli_stats.htm

Chart 10: Cross-border and foreign currency borrowing – banks and non-banks, 2000–2019 (quarterly, US$ in trillions)



(Source: Howell, M. 2020)

Chart 11: BIS data on US $ shares in cross-border credits

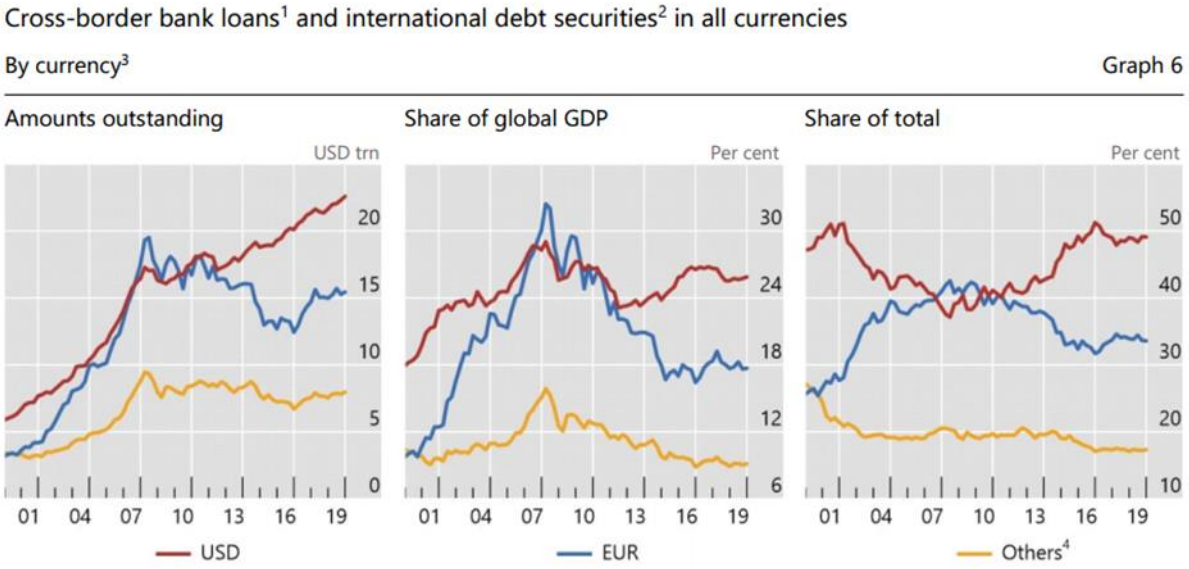
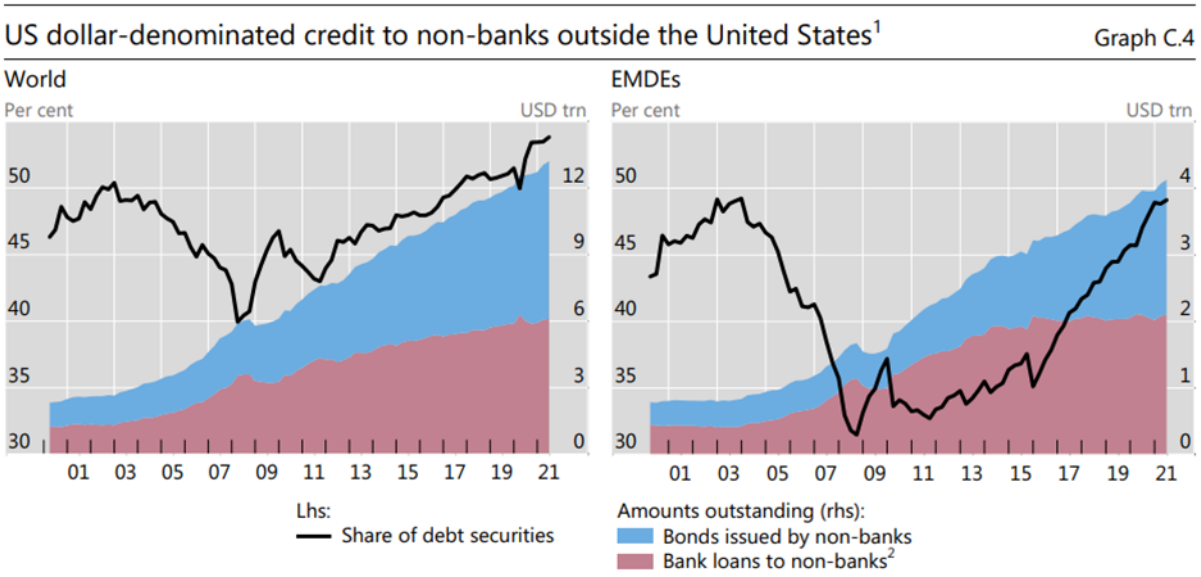


Chart 12A: BIS data on US$ credits to Foreign non-banks



Source: BIS global liquidity indicators

Chart 12B: BIS data on the dollar shares on global markets

Source: US dollar funding: an international perspective, BIS CGFS Papers, n°65, June 2020

7. The shortage of safe assets is the present form of the Triffin Dilemma (TD)

As explained, the change in the main source of liquidity funding has resulted in a greater need for safe assets such as top government bonds. Although the general rise in debt levels provides many sovereign bonds, the growing need for refinancing has led to rising roll-overs that absorb proportionally more high-quality collaterals with a moving differentiation based on the cyclical impact on the moneyness degree of the currency in which they are issued.

This new feature is a major element for understanding the working of the global financial system, its weaknesses and the monetary policies. Before further analysis, in the next section, of its role in the instability of GL, it is helpful to clarify some aspects of this shortage of high-quality, mostly dollar-denominated safe assets.

This shortage seems to contradict the Triffin Dilemma (TD) which declares that if the dollar continues to feed GL, its credibility would eventually be called into question. This logical conclusion remains fully valid in the sense that this national currency is no longer in a position to support an optimal expansion of GL in stability: the demand for purely liquid dollar liabilities exceeds the technical capacity of this relatively shrinking economy (Fed and Treasury) to issue sufficient debts without destroying its internal and external balances. Thus, financial operators and markets were able to cope with the official lack of dollar supply and role, by creating the missing collaterals on shadow markets to provide profitable substitutes for the high-quality safe assets required. As explained, these "internal" collaterals expose the whole system to new fragilities, which force the Fed, in the event of a crisis, to intervene heavily to feed the repo markets and to open bilateral swaps to some other central banks, not as a systemic change, but as emergency and discretionary actions.

Therefore, what remains fully valid is only a change in the terms of the dilemma, due to a set of structural changes, but not an objection to the TD. More precisely, these fundamental changes are the product of the operational modality of the demand for liquidity and huge transformations in the world economy (emerging economies, Global Value Chains) and in the structure of GL (shadow banking), which together explain the shortage of safe assets in dollars. This shortage eventually leads to the same results as the initial TD:

- either the US could not respond by supplying official liabilities (by the Fed and by the Treasury) to preserve their statutory domestic mission of stability for the US economy, and this corresponds to the current situation in which the deregulated shadow banks continue to issue riskier substitutes of safe assets, adding to the risks of GL instability, and eventually global crisis and recession
- or by responding to global needs by becoming a *de facto* global LOLR, sacrificing illegally the goal of domestic stability by massively issuing more liabilities of the Treasury and the Fed

In both scenarios, there is no stable solution with a dollar system.

The key issue is that all these stocks of GL are based on a hierarchy of safe assets according to their degree of moneyness, which gives a quasi-monopoly to the dollar to remain as the most used in all the markets for a set of mutually supporting reasons: the weight of the institutional standard of the dollar (initial Bretton Woods system) which favours the only currency that enjoyed at that time the full technical qualities (depth, breath and resilience of US financial markets) necessary to be used as the main international currency. From this position, networks, practices, and irreversible economies of scale have developed for technical reasons: the need for dealers and banks to work with a single homogenous instrument, particularly on the very short-term markets (like the intraday and the overnight) of capital flows and wholesale markets. Therefore, the emergence of other reserve currencies like first the DM and Yen, and then the Euro, were unable to take on the role of the dollar except, at some time in the past, for longer-term issuance of bonds. Furthermore, the dollar system allowed emerging economies, most notably China, to become main users of the dollar in their (mercantilist) export-driven model of growth to export their net savings, thus accumulating liquid

assets in dollars. The (voluntary) absence of mature domestic financial markets, and the lack of financial internationalisation of these fast-growing economies, reinforced the demand for dollars and allowed the dollar system to be useful for the interests of both sides, although with different time horizons. In the short-term political dominance of the United States, China allows the US to maintain its over-consumption and indebtedness but accelerates her own strategic development. The US economy is used to transform (cheap risk-averse) short-term liabilities into (more profitable, risk-taking) longer-term assets, but provides to emerging economies the necessary technologies and entry into the Global Value Chains, while China acquires a geopolitical lever upon the US Treasury by being its main official creditor. This change in the real economy has resulted in additional imbalances to the financial mechanism, especially by narrowing the relative share of the ultimate layer of the monetary base of the inverted GL pyramid.

A paradoxical effect is that the QE policy contributes to the scarcity of safe assets in two ways: QE begins by increasing the supply of liquidity to the private sector, but this generates additional loans that imply additional need for safe assets (either for liquidity and capital bank regulation, or for additional collateral uses), while the securities used as a counterpart to the reverse-repo of the QE policy are withdrawn from the market and locked in the assets of the central banks. However, this reduction in some supplies of safe assets could be compensated by a moderation in the demand for safe assets, in as much as the effect of additional liquidity reduces systemic risks and threat of default, by raising the risk-taking mood and the hunt for longer duration assets by selling safe assets for buying others, such as equities.

Another important aspect of the excess demand for safe assets is its relation to the perception of systemic risks which depends on the GL conditions: additional liquidity tends to reduce the excess demand for safe assets as agents shift towards longer-term riskier assets, driving up the risk-premia (steeper yields curve). Conversely, the perception of liquidity restriction tends to increase the risk-averse behaviour that leads to more demand for safe assets and pushes down the risk-premia (flatter yields curve). These variations in the demand for safe assets explain the paradox that the yield curves move contrary to the textbook view which associate more (less) liquidity to steeper (flatter) yields curve.

Thus, the technical determinant of using the dollar as a vehicle, coupled with the structural trends in financial markets that require the highest degree of moneyness for premium security collaterals, explain the surprising shortage of high-quality safe assets in dollars. This reveals the growing disproportion between the global safe assets needed and the limited expansion of their supply from a relatively shrinking economy. This process has accelerated during the past two decades and makes more evident that the rising costs for a national currency to play the role of the main international currency become impossibly high for both the US economy and the whole world that deserves a true stability mechanisms. The core of the problem is the endogenous fluctuation in the perceived advantage in the degree of moneyness of the dollar, which is able to reverse the GL created on the shadow markets, with spillovers on the whole GL inverted pyramid (see Chart 14, section 8). Therefore, the shortage of dollar safe assets is nothing other than the new version of the standard TD which confirms fully Triffin's warning of the dollar "built-in destabiliser", with its high costs and the eventual unsustainability of the dollar system for providing a stable monetary base for the world system.

BOX: The process of narrowing the relative share of safe assets in dollars

1) The relative expansion of shadow banks as the main source of private funding tends to increase the the risks of a liquidity crisis since they transform short-term liabilities into longer-term assets without having any direct access to their lender-of-last-resort.

2) At the microeconomic level this higher risk implies the intensive use of collaterals, thus generating a higher proportional increase in the global demand for collaterals.

3) However, at the macroeconomic level collaterals cannot prevent systemic liquidity risks because the value of these collaterals tends to co-vary more with the financial cycle; in case of a liquidity crisis, the fall in asset values prevents the repo markets from channelling a conventional liquidity injection from central banks through banks toward non-banks.

4) Therefore, central banks responded to this inefficiency of their conventional monetary policies by moving to quantitative easing (QE), but the net impact on the supply of safe assets remains unclear as QE freezes safe assets in the balance sheets of central banks.

5) The appetite for collaterals is mainly driven by the size of the global outstanding debt, the roll-over of which implies a growing share for refinancing liquidity needs (about US $50 trillion per year).

6) In this huge flow of recurring refinancing needs, the use of the dollar is rising for external financial transactions, with the relative increase of offshore (Eurodollar) markets (for example US $17 trillion for dollar debt, as high as US $16,7 trillion for the volume of the US interbank), the reason is the Fed's access to the network advantages of the dollar in global banking activities and the technical need to work in a single vehicle for intra-day and short-term operations.

7) But this trend implies a growing gap between the increase in the international use of the dollar and the relative contraction of the economic, financial and geopolitical weight of the US (much faster growth of emerging economies which use dollar in the Global Value Chains and keep main reserves in dollar while the US financial markets are now inferior in size to the Chinese and Japanese ones); this increasing gap reveals the conflict between domestic objectives and global needs to ensure global stability with a dollar-based system.

8) This growing shortage of dollar safe assets offers further profitable opportunities to shadow banks to respond by creating additional safe assets through successive repos with decreasing degrees of moneyness, but with increasing liquidity risks across financial cycles.

9) Banks and non-banks have linked activities that make them more interdependent; the additional liquidity of QE also feeds offshore and non-bank markets; these additional operations imply further need for collaterals supporting their profitable repoed business.

10) The Euro-crisis highlighted effective absence of a genuine LOLR for the Euro financial markets (securities). Only German Bonds are able to complement the dollar safe assets, but to a limited extent, as the available volume of German debts is excessively thin and does not warrant the same degree of access to a Euro-LOLR.

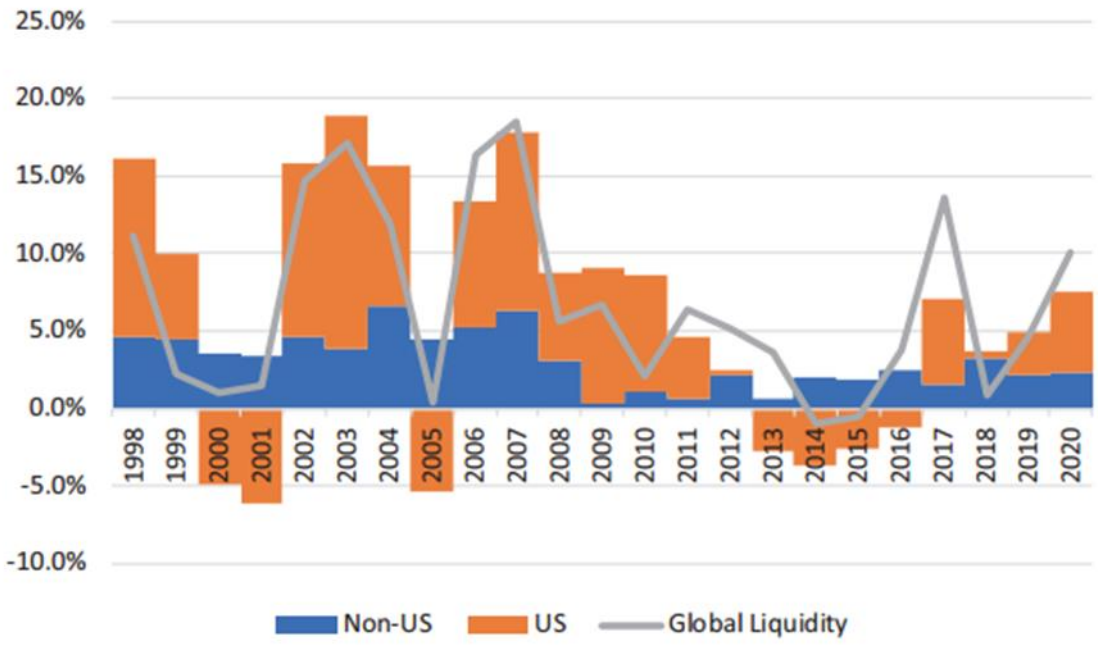
(box follows on page 31)

11) An increase in the perception of financial risks stimulates the demand for collaterals in dollars for prudent reasons, thus increasing the differentiation between safe assets in dollars and other currencies, in a form of Gresham's law on the repo that causes a sharp contraction of additional collaterals created on the repo by successive chains of repos.

12) The monetary base of GL relies on a proportionally shrinking volume of dollar safe assets whose stability is highly dependent on cyclical risk perception, creating amplified effects on global private liquidity, with the credit crunch spreading fire-sales with value fluctuations in assets, affecting both banks and non-banks, and therefore inducing strong recession in real activity.

13) In conclusion, accepting such a dysfunctional financial system looks contrary to the economist rationality and mission which would ensure a more efficient and less costly system. It is both irrational and politically dangerous to oppose the simple and logical systemic change of moving to a multilateral LOLR which would make possible an effective management of global liquidity as a public good bringing significant benefits to all.

Chart 13: The shortage of safe-asset supply
Supply of global 'safe' assets (percent of world GDP) and growth of Global Liquidity (%yoy), 1998–2020



Source: Howell (2020)

8. The reasons for the intrinsic instability of Global Liquidity: an integrated explanation of the Minsky Moment with the Triffin Dilemma or the two major flaws in mainstream economics and policymaking

The previous explanations indicate that the mechanism of uncontrolled intermediation on repo-markets continues to play a key role in the ballooning of GL and in its volatility. The reasons for this instability are the combination of two main flaws in the global financial system which rely on two theoretical paradigms:

- The first one is the unfounded dogma that free financial markets would necessarily be as efficient as any product market that fixes competitive asset prices and yields based on their fundamental value.
- The second is the implicit assumption that global stability could be ensured by domestic stability with national instruments, ideally coordinated, but without the need for a global Lender-of-Last-Resort (LOLR) to stabilise GL.

The analysis of the working of repo-markets illustrates that the inner volatility of GL comes from the association of these two mistaken views. Indeed, the pro-cyclical behaviour of the repo is an application of the Minsky/Aglietta instability principle to any financial market which denies the possibility for free financial markets to be efficient, together with the Triffin/RTI principle that the absence of multilateral LOLR prevents the creation of a multilateral currency for the shortage of high-quality safe assets resulting from currency substitution among national currencies.

8.1. Free financial markets cannot be spontaneously stable for systemic reasons

The prevailing dogma considers liberalised financial markets to be as efficient as any product market that sets competitive asset prices and yields based on their fundamental value. This assumption is unfounded because financial market operators are not independent, being subject to mimetic competition and self-fulfilling assessment of liquidity conditions that move demand and supply curves together for liquidity, impeding self-regulation of liquidity by credit price adjustments, thus creating a destabilising financial cycle.

As Michel Aglietta explains, the reason is merely that financial markets do not operate in the same way as product and service markets because the behaviours of financial operators are linked through mimetic competition to their assessment of liquidity conditions which tends to be self-fulfilling. This lack of independence of the operators hinders the efficiency of financial markets and explains their intrinsic instability. Contrary to other markets, demand for and supply of credit move along with liquidity conditions, thus preventing yields and interest rates from playing the equilibrating role of "objective" market prices. As shown by Aglietta in Minsky's interpretation of Keynes, financial market behaviours are not governed in the same way as other markets by the objective fundamental value of assets with a symmetry of information, but by liquidity, which is mainly self-fulfilling and makes financial operators mutually dependent: liquidity intrinsically reflects this interdependence because financial markets form common expectations of asset values

and debt sustainability across the cycle: credit providers tend to expect the same type of change in asset price valuation as borrowers expect. This link alters the credit market indicators in a one-way bet. Therefore, demand for and supply of credit cannot ensure a stable equilibrium through yield changes as in the case of other markets, because demand and supply move together.

The repo-markets operate through exactly the same interdependence between supply and demand. Unlike non-financial markets, where the two sides of the market have opposing interests with regard to prices, as demand is subject to saturation condition (i.e. demand slope is negative), financial markets are inherently unstable and inevitably generate a succession of euphoria and panic based on their similar subjective perceptions of liquidity, which link demand and supply of credit: credit demand slope could be positive when the expected change in asset value is higher than the costs of borrowing, but since this expectation is shared by both borrowers and credit suppliers, the expected yields cannot have the stabilisation role of normal competitive market prices. Free financial markets inevitably trigger pro-cyclical mechanisms through the common assessment of asset price changes by both sides of the market, which makes liquidity self-fulfilling: in the cyclical upwards phase, optimistic expectations increase the demand for credit even with interest rate increases, while lenders also increase their supply of credit as they perceive less business risks and as their collaterals take more value. Paradoxically, indebtedness tends to contract risk premium.

When the cyclical bubble bursts, the same cumulative process is in motion on the negative side: asset values decrease while debt values remain (or even increase in real terms) moving back supply and demand for credits. The deterioration of debtors directly affects those of creditors and lenders, triggering a deleverage adjustment process which has macroeconomic depressing effects (balance-sheet recession). The engine of this inevitably unstable financial cycle that amplifies the macroeconomic cycle and costs is the differential between the market assessment (on both sides) of debt value and asset value, as mimetic competition necessarily favours a pro-cyclical behaviour by preventing a self-regulation of liquidity through credit price adjustments.

8.2. The additional source of instability in global liquidity comes from the systemic impossibility for safe assets in US dollar to solve the shortage of stable monetary base of the reversed pyramid of global credit

In addition to being submitted to the (Minsky/Aglietta's) general principle of instability of financial markets, repo-markets are peculiarly based on a two-tier hierarchical monetary structure: external collaterals and internal ones, and since the US dollar enjoys the best degree of moneyness for being the major vehicle in international transactions, the best safe assets remain dollar assets which make up most of the external assets. An analysis of the financial crisis shows that safe assets in US dollar play the role of safe-haven with respect to other major currencies. This higher degree of moneyness of the US dollar assets reflects the fact that this currency has most of the attributes of an international currency: no other national currency plays the same role as the dollar in trade, in capital markets, in global banking operations, in international reserves, and on the Forex. These dominant functions are mutually supporting and give the dollar a quasi-monopoly at times of crisis.

Therefore, the "Minsky Moment" (when the financial cycle turns downward) is exacerbated by the differentiation in the degree of moneyness between the dollar and other reserve currencies, which is suddenly amplified by the lack of liquidity, a form of Gresham's law applied to the two categories of safe assets: the best one being in high demand and hoarded against the others which are sold. The repo intermediation within the high-powered-money (through successive pledges in repo-chains) tends to be reversed by the jump in the haircut of non-dollar collaterals, destroying part of the internal collaterals with an amplified impact on GL and on the shortage of high-quality safe assets which are subject to an oversupply of demand. The reason for a greater reversibility is the worsening of the "Minsky Moment" due to the differentiation in favour of the dollar. Contrary to the simple case of a national credit pyramid where the Minsky Moment occurs with an exogenous monetary base manageable by the national central bank, at the global level, the Minsky Moment occurs with a global "extended" monetary base which contracts by an internal deleveraging, since part of the global monetary base is also pro-cyclical, as the repo creates internal collaterals in the ascending part of the financial cycle. Furthermore, while the national monetary base is manageable by the national central bank, it is not the case at the global level where there is no LOLR. Neither the Treasury nor the Fed would be able to suddenly supply safe assets in adequate volumes. The only response after the GFC, but this was too late, was the agreement of a series of bilateral swaps between the Fed and some central banks, under the pressure of risk for the US system, and on a discretionary (political) basis. This useful ad-hoc response is neither a systemic solution to the TD nor the missing tool to regulate the global basis of GL. Therefore, at the global level there is a Minsky Moment compounded by the Triffin's Dilemma or "built-in destabiliser".

In the event of a global crisis, the rush to dollar liquidity and some T-bills as safe-assets issued by US and German Treasuries, suggests a strong disequilibrium as the supply of safe assets is structurally insufficient with respect to the flows from private liquidity in a "dash for cash", thus exacerbating the hoarding of dollar liquidities.

A clear example is the recent tension appeared at the beginning of the COVID Pandemic in March 2020. The Bank of England has just recognized that, after a deep analysis[26] of the yield spike occurred in mid-March 2020 (10-year gilt yields increased by more than 50 basis points) this huge yield spike was accompanied by the heavy selling of gilts by mutual funds and insurance companies and pension funds (ICPFs). Focusing on the latter group, the Bank argues that ICPFs' abnormal trading behaviour in this period was a result of the dollar's global dominance: ICPFs invest a large portion of their capital in dollar assets and hedge these exposures through foreign exchange (FX) derivatives. As the dollar safe-haven status makes this reserve currency to appreciate in March 2020, ICPFs sold large quantities of gilts to meet margin calls on their short-dollar derivative positions, contributing to the yield spike in the gilt market. Its conclusion: … *"In crisis periods, because of the global reserve currency status, the dollar appreciates against other major currencies…* [this status] *may exacerbate crises in domestic markets through a currency hedging channel".*

The sudden shortage of high-quality safe assets in case of liquidity crunch, is similar to the 19th century banking crisis, which saw a rush for cash collective panics putting traditional banks in crisis when national central banks did not yet exist to issue their liabilities as safe assets. The

[26] "An unintended consequence of holding dollar assets" by Robert Czech, Shiyang Huang, Dong Lou and Tianyu Wang, Bank of England working N° 953, December 2021.

similarity between the 19th century national liquidity crisis and the present instability of GL based on the international role of the dollar, illustrates precisely the major flaw in the dollar system: the absence of a genuine LOLR at the multilateral level to regulate the volume of high-quality safe assets. Given the growing gap between the effective supply of high-quality safe assets by the US economy whose relative economic weight is decreasing, and the huge global demand for US safe assets (for the structural reasons explained earlier), there is an urgent need for a systemic solution to issue and regulate the base of the GL pyramid. This systemic need was met at the national level through the central bank issuing a "neutral" monetary base that is not a liability of any commercial bank. At the global level, there is a similar need for creating a multilateral LOLR which is not the debt of any economy, unlike the present dollar system.

Thus, the volatility of GL reflects the systemic unsustainability of an international monetary system based on a national currency. This is unsustainable because the monetary base of the GL tends to narrow with a cyclical downturn due to the difference in moneyness between the dollar and other currencies, which is suddenly perceived as increasing when internal haircuts on collaterals over-react to the markets' perception of emerging risks. The repo-markets are unable to provide stable substitutes. Clearly then, safe assets issued in dollar, the dominant international reserve currency, necessarily benefit from a higher degree of moneyness than any other safe assets. This differentiation, which varies over the cycle with market expectations, makes it impossible for a national currency used as a main international vehicle to provide a stable volume of safe assets when needed, making a liquidity crisis inescapable. Dollar assets suddenly become equivalent to the cash reserves in the 19th century, when competition among commercial banks in the absence of a national Lender-of-Last-Resort led to a costly financial-liquidity-banking- crisis affecting severely the real economy.

This logical flaw cannot be solved by a polycentrism of multiple reserve currencies at the same time because the competition of these currencies would create wild substitutions between them, with even more instability in GL than with a hegemonic currency. This too is comparable to the 19th century competition between commercial banks issuing their own paper money.

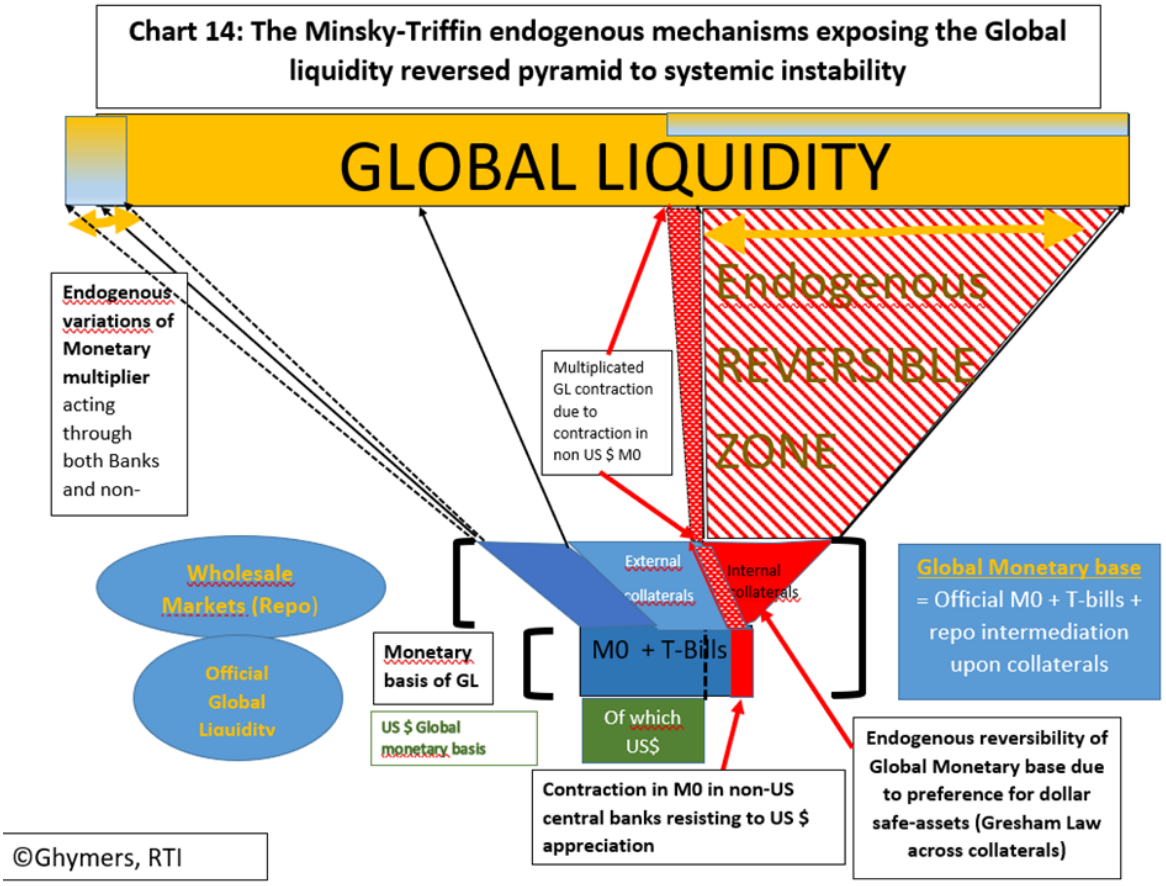


Chart 14 attempts to depict the endogeneity of GL by making explicit the role of the shadow bank multiplier within the base of GL. This internal multiplier is highly reversible due to the preference for the dollar in case of a liquidity crunch. But contrary to the traditional banking system, this reversibility generates an amplified contraction effect on the global monetary base through the contraction of the internal collaterals that were created to complement the too-narrow official monetary base in the expansion phase of the cycle. These substitutes for the lack of sufficient safe assets suddenly vanish because of the rush for dollars. This rush is due to the higher degree of moneyness guaranteed to safe assets in the dollar for its dominant role and technical use in international transactions.

The monetary basis of the whole inverted GL pyramid has two main categories of liquid assets:

- The conventional monetary bases of central bank liabilities
- The shadow monetary base (as coined by M. Howell[27]) which groups the offshore wholesale markets and the available pool of private sector collaterals

These two additional sources of "high-powered money" (in the Howell sense) lie beyond the traditional definition of the monetary base. They gain feedback from the traditional monetary base and vice-versa because banks short of reserves can borrow from shadow markets and extend more loans, which will create more deposits. Furthermore, when a central bank injects funds in the repo (as is usually the case for QE), it "*enables the dealer to purchase more bonds in the open market, and potentially to repo them again. This, in turn, should encourage more risk-taking elsewhere in financial*

[27] Howell, M. op. cit. Capital war… 2020, p. 94-95

markets, including greater demand for loans. Loan supply could be further stimulated by second-round effects as the value of collateral itself climbs higher[28]". Thus, central banks lose some of their control over the monetary base and on the GL multiplier, which is more than the money multiplier of the strict monetary base, but results from a complex interaction between the traditional base and the shadow base.

Another consequence of this mechanism that is not visible in this chart, is the possible impact of the hunt for dollars on the appreciation of the dollar exchange rate. This can also cause additional contraction of the non-dollar monetary base of some central banks which resist the depreciation of their exchange rate against the dollar.

Therefore, the global monetary base cannot be managed from the simultaneous adjustment of several reserve currencies but only through a single, superior asset, which cannot be subject to the limitation of being the liquid debt of a single economy like a national currency or national T-bill. On the contrary, with the creation of a multilateral safe-asset the instability of the GL could be significantly reduced and managed. In this case, although the instability due to the Minsky Moment persists, this fundamental endogeneity of the financial markets would have less impact on the inverted pyramid of GL, and this effect could be countered by adjusting the volume of global safe assets as is the case in any national economy adjusting its monetary base.

9. Official responses to intrinsic liquidity instability

The quasi-Ponzi game of the repo that shaped GL led to the 2008 GFC. The authorities were able to draw lessons from this historical disaster, and to coordinate new regulatory measures within the G-20 Financial Stability Board (FSB). The FSB identified a number of financial stability risks with the use of securities financing transactions (SFTs) for both banking and non-banking activities, but the operational measures fell mostly on the banks, creating new distortions with respect to the freer shadow banks. In July 2021, the G30 also issued similar recommendations.

For banks, extreme risks have been addressed through extensive reforms of the Basel international banking supervision regime. The Leverage Ratio (LR) has been introduced and its measurement improved, and a Liquidity Coverage Ratio (LCR) has been implemented to tackle the liquidity risk of the market --- the possibility of the whole market drying up --- ensuring that each firm maintains a stock of high-quality liquid assets (HQLA) as a sufficient reserve to cover projected net cash outflows in case of a 30-day market crisis. The Net Stable Funding Ratio (NSFR) has been introduced to address the funding liquidity risk arising from mismatches between long-term assets and short-term liabilities such as the wholesale funding of leveraged non-banks by banks. The aim is to ensure that companies can obtain stable funding for their assets in faced with a year-long crisis.

For non-banks, however, the regulatory decisions are more difficult. Shadow banking activities are more dependent on wholesale sources of financing than traditional banks, which rely on retail deposits. The FSB has recognised that the risk of excessive leverage was too high on the repo, where

[28] Howell, 2020 op. cit.

repo-chains allow for repetitive use of repos to obtain cash to buy assets that are "repoed out" for more cash and so on. This intermediation is clearly understood as a pro-cyclical driver. The FSB decided that regulatory authorities need more information to help detect and monitor systemic risks as they build up. It intends to improve transparency in reporting, in corporate disclosure, and in practices for collateral management and evaluation (mandatory minimum haircuts for risky collateral assets, and minimum standard for haircut and valuation, extending the benchmark to a whole cycle), and to reinforce the repo market structure (central clearing, applying bankruptcy law to repo collateral). These proposals are indeed important, and the debates continue.

The US authorities have taken steps to regain control of the US monetary base by bringing non-bank credit flows under regulation and by adapting their tax code to try to moderate the amount of liquidity available on the still growing offshore Eurodollar markets.

However, these measures and intense debates uphold the traditional view that financial markets and liquidity are ruled by the same principles of demand-supply equilibrium. According to this view, information and some regulations could solve the instability of financial markets. This mainstream outlook continues to ignore the systemic flaws, and considers that the problems arise from "market imperfections" that can be addressed. A systemic flaw in the spillover of dollars has never been mentioned in official circles, with the exception of Governor Mark Carney29 in Jackson Hole 2019, and not a single official in posts has dared to make a link with the Triffin Dilemma. The G20 Group of Eminent Persons, established by the German presidency of the G20 for dealing with systemic reforms in global financial governance30 has been particularly disappointing.

The analysis presented above on the internal dynamics of any repo market leads to the conclusion that liquidity is subject to a vicious circle and that the regulations (at least those actually decided) seem unable to address sufficiently at the root:

1. The dynamics of liquidity depend on the repo, whose internal logic is pro-cyclical. In normal times, the repo serves to increase liquidity by stretching sources of funding, thereby effectively lubricating the financial system. However, this expansion of permissive liquidity conditions tends to accumulate forces of further disequilibrium conducive to a cyclical downturn. In the event of a crisis, repo-markets act as a transmission channel to destroy GL through price shocks in securities markets that amplify deleveraging and affect the wider financial and economic system. This is a systemic flaw: excess private liquidity leads to the self-destruction of liquidity, but the disastrous consequences of this financial cycle usually force the authorities to intervene by injecting official liquidity to compensate for the liquidity crunch. Nevertheless, this cycle cannot be considered as a satisfactory balancing mechanism since it creates a perverse amplification of macroeconomic instability with increasing costs in terms of activity, jobs and total productivity.
2. The regulations needed to prevent crises by limiting leverage require constraints on banks, which mean additional costs and frictions in interest rate markets that prevent capital from flowing freely to smooth out temporary demand-supply imbalances. This in turn means

[29] Carney, M. "The Growing Challenges for Monetary Policy in the current International Monetary and Financial System", speech given by Mark Carney as Governor of the Bank of England at Jackson Hole Symposium 2019

[30] https://www.globalfinancialgovernance.org/assets/pdf/G20EPG-Full%20Report.pdf

greater pricing inefficiencies available to those with the specialised expertise and experience to profit from, while attracting business towards less regulated shadow banks.

3. These recent banking regulations, combined with the need to apply accommodative monetary policies, have had perverse consequences such as creating an additional demand for high-quality liquid assets, to which the private sector has responded through the shadow banking market with operations that are complex, less transparent, difficult to regulate and subject to more pro-cyclical market evaluation.

Therefore, it seems that official thinking as well as economic theories are slow in confronting the reality of a loss of control over a troubling "Dracula" that is driving GL.

The rational way to attack the monster is to focus primarily on trying to tackle the growing but volatile scarcity of global safe assets. As we know that neither the US Treasury and Fed, nor the very few other reliable debtors would be able or willing to provide the necessary liquid liabilities without running into domestic stability conflicts or credibility constraints, this Triffin dilemma can only be solved through two alternative ways: a strong coordination at the G20 level (or even broader), or the creation of the necessary liabilities at the multilateral level against eligible national T-bonds, because these liabilities on the world system would not create any new national liabilities but would allow for a genuine LOLR that could manages the global monetary base and the induced GL. The first option has still the preference of the authorities despite subsequently demonstrating its utopian character that is in contradiction with the principle of national sovereignty. The second one has been systematically rejected by the authorities as à-priori utopian, although, contrary to the coordination option, it fully preserves national sovereignty and the autonomy of central banks. Of course, if being utopian refers to not sufficiently recognizing that US vested interests would stick to the status quo, it is even more true to understand why coordination has failed and will continue to fail for exactly the same reason, but extended also to the vested interests of other countries, thus making the coordination option even more naïve. In the meantime, systemic risks continue to accumulate, and the costs of instability pose a serious threat not only to the dollar system but to global interests including those of US citizens in case of currency wars.

10. The inescapable rational solution of a multilateral currency issued by a multilateral LORL

Economics is based upon rationality, therefore all economists could agree that it is easier, much simpler and more rational to first focus on correcting the main flaw of the IMS (relying on a national currency, one among the "n" national currencies, used as reserve currency) creating the missing "(n+1)th" reserve currency used as a safe asset as was the case with gold in the 19th century (i.e. an exogenous asset that is not a national debt), but with the main difference and advantage of obtaining a "(n+1)th" safe asset not issued by geological factors (gold) but by a collective mechanism that flexibly regulates the degree of GL required according to multilateral technical rules.

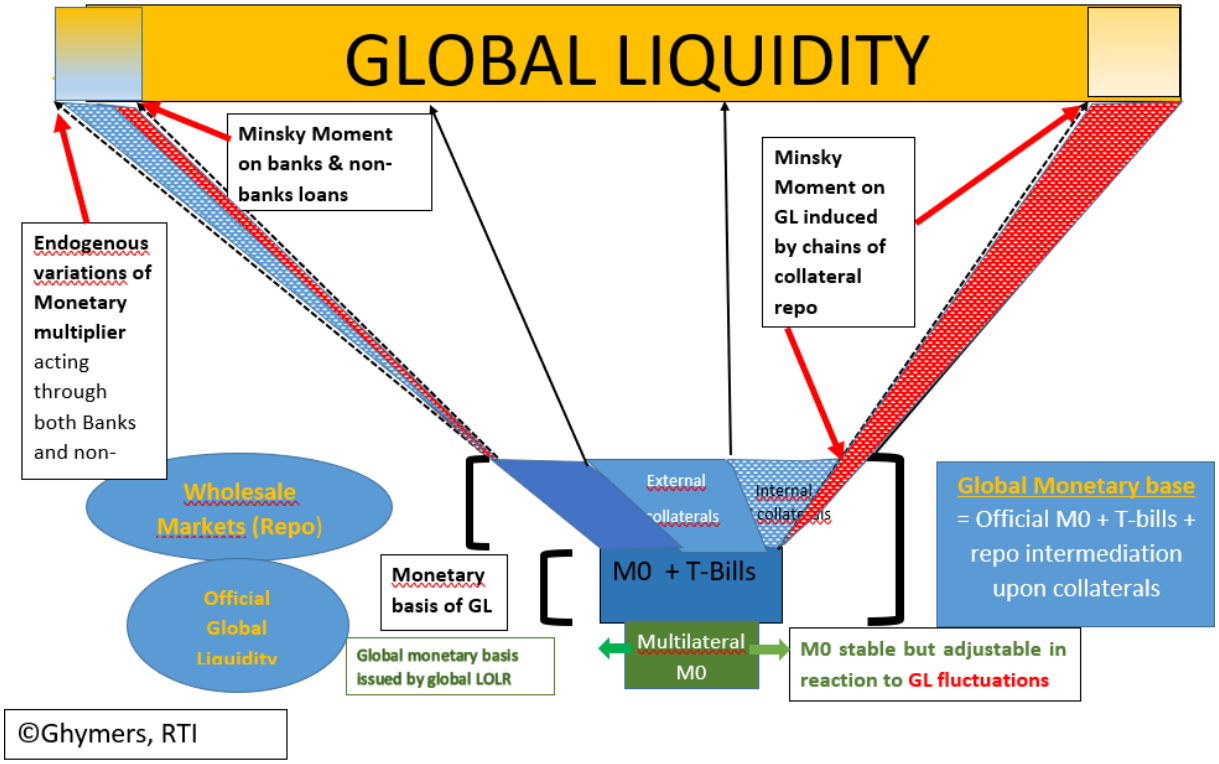
It is essential to remember the elementary principle that as money is first of all a liquid debt of an agent it must be issued by a specific agent that is neutral (the central bank, LOLR) with respect to the "n" other agents (banks) and not by one of the "n" competitors, the debts of which would increase with the need for safe assets, creating an inner asymmetry between this "nth" agent and the "n-1" others. This is true both at national and international levels where the “n” agents are “n” economies. If one of the “n” economy becomes the issuer of international safe assets, this system reproduces the instability conditions that prevailed in national economies before the creation of the Fed as the national central bank playing the role of the “(n+1)th” agent. These past recurring financial crises are similar to the global ones of the present time. It is an elementary deduction that monetary stability requires a “(n+1)th” currency with a superior status to issue the single safe asset for the global economy according to the objectives of technical stability. This is the basic principle that allows the monetary creation process to be managed as a public good: only a currency external to the “n” existing economies could offer an efficient tool without spillover, exactly as the argument founding the existence of national central bank. Surprisingly, this universally acknowledged principle when talking about national levels does not seem to be fully understood when dealing with the international level or is perceived as an unattainable dream by rational economists (we discuss this paradox in section 11).

A multilateral reserve currency is the ultimate, pure “safe asset” issued by a specific adjustment agent, external to the economies but managed collectively by them, the "n+1th" one. This produces three essential advantages that make a systemic difference to the present dollar system:

1. This multilateral agent issues its debt-at-sight as the multilateral international currency which is not a debt of any national economy but of the global system. There is no net liability or net asset worldwide, as liabilities are accumulated not against an individual economy but against the global system itself and with an equivalent counterpart on its asset side. The liability side would be the created global safe assets and the equivalent asset side would be the eligible national bonds, purchased to national central banks to issue the multilateral safe assets of this global system.
2. The degree of moneyness of a multilateral LOLR is necessarily superior to any national currency not only for being guaranteed by the whole system, which cannot automatically incur net debt, but above all because its value is necessarily more stable than any national safe asset whose fluctuations depend on national sovereign policies and exchange rates against other national currencies. Furthermore, when one currency appreciates, the other depreciate against it, but the value of a global currency made up with national currencies cannot change. Thus a multilateral safe asset is necessarily more stable because its supply aims only at global stability, monitored collectively by multilateral technicians in order to anchor the global economy. This feature means that the global monetary base of the GL pyramid would no longer be endogenous but would become exogenous, i.e. technically fixed to be a tool to smoothen out the global cycle. In case of a cyclical downturn or shortage of GL, the global LOLR would create more safe assets by buying bonds or increasing its overdraft facility to national central banks. The national banks would then get more multilateral reserves deposited in their account with the multilateral LOLR. With these reserves they could intervene on their interbank and shadow bank markets, preventing any rush to dollar safe assets (that is highly destabilising in the present system through the pro-

cyclical shortage of global safe assets). Currency substitutions could still occur but would not create spillover effects on the global monetary base (for example the increase in dollar monetary base – US M0 – would – be offset by the decrease in non-US M0). The national central banks would intervene and regulate with full autonomy their banks and shadow banks, which would continue to give flexibility by activating collaterals (both in multilateral and national safe assets) on the repo. The Minsky Moment would still persist on bank lending and non-bank activities, acting both on credit multipliers and repo-markets (through some instability on collateral activation), but without the same degree of impact multiplied on GL and – overall – with efficient leverage that allows for a global monetary policy to counter any excessive fluctuations by injecting/withdrawing multilateral safe assets, in the same way that any national central bank uses to manage its own monetary base. The systemic difference is that without such a multilateral tool, national monetary policies are unable to incorporate the cross spillover effects on GL, particularly the asymmetric effects of the dollar on capital flows and other monetary policies. The most significant lasting impact stems from the endogeneity of the repo, but existing (national or multilateral) regulations and recommendations from the FSB, the G30 and the BIS could limit its leverage.

Chart 14B: The more stable mechanisms of Global liquidity reversed pyramid with a Multilateral reserve currency



Note: This chart has to be seen in comparison with Chart 14 on page 36

Chart 14B visually represents, compared to Chart 14, the systemic progress in limiting reversibility in the GL inverted pyramid, thanks to the elimination of the structural shortage of safe assets due to the TD:

The multilateral safe assets would play the role of the dollar safe assets. This means that the global monetary base would be perfectly homogenous (no differentiation any longer in moneyness degrees across collaterals), therefore it would become exogenous and manageable in a flexible way to react to any contraction or excessive expansion of GL, without creating either spillover on other currencies, or on wholesale markets. As depicted in chart 15, this means that the monetary multiplier would remain variable and endogenous, but some components of the global monetary base would not, as these would be adaptable according to technical criteria, fixed collectively at the multilateral level (this appears in Chart 14B with green arrows on the basis).

3. With a multilateral safe asset, international financial governance is much easier and simpler, less need for coordination. The "n" participants to the system all face the same liquidity constraint and are free to choose their national policies. It seems tautology but it is an attractive principle of a clearing union that underpins the initial Keynes/Triffin proposals for creating a symmetric IMS, which most economists do not seem to fully realise. Such a neutral agent issuing an "(n+1)th" currency restores symmetric decentralised forces capable of automatically constraining the set of "n" monetary policy stances in their own national interest, through a technical (apolitical) constraint that hardly needs a supranational power (only international technical discussions and exchanges of best practices), without the need for policy coordination, each country being responsible only for its own result with no spillover on the rest of the world.

Of all the existing alternatives for reforming the IMS, this option is the most economically coherent, and also the least intrusive in national sovereignties, therefore it should also have a pragmatic advantage in dealing with the current populist mood against international cooperation and a return to economic nationalism. It consists in entrusting this "(n+1)th" agent to validate the net result of "n" sovereign policies on demand for GL from the "n" autonomous choices under the sole constraint of acting as the global nominal anchor to collectively manage GL conditions compatible with international price stability and stable macroeconomic growth. This is the best option for managing GL as a public good. Such a public good is not political but purely technical, and at the highest global level: to manage multilaterally the degree of GL by supplying adequate safe assets without spillovers and according to objective parameters in the interest of all.

11. Is the optimal solution realistic?

Since Keynes' proposal at Bretton Woods and Triffin's many plans for multilateral management of global liquidity through a multilateral reserve currency, the status quo has prevailed immutably in both academic and official circles, despite the succession of financial crises with increasing magnitude and rising costs, and despite major changes in the world economy and in geopolitical powers. Such astonishing resistance to change and to what we consider the basic logical principle of money is due to two categories of policymakers and economists: those who see no systemic problem and therefore deny the Triffin Dilemma, and those who agree that the multilateral option would be the most coherent but that it is still not feasible as it is the most unrealistic.

To the first category, in addition to the arguments presented above, we refer here to the most radical and global change taking place that threatens the future of humankind and, therefore, will require responsible authorities to adapt to the international financial architecture: the need to rebalance the distorted international flows of savings from North to South in order to make possible the huge financial flows required to introduce profitable changes towards a low-carbon system in emerging economies and other LDCs. It is a more pragmatic way to make it clear to policymakers that the Triffin Dilemma generates perverse effects by maintaining cheap financial inflows needed to fuel the US's over-consumption, i.e. the unsustainable global macroeconomic imbalances that prevent the financing of global decarbonisation[31].

The second category correctly raises the key issue of the operational feasibility of the best solution. Their main arguments are:

1. The first and most powerful argument is geopolitical: there are obvious geopolitical reasons that explain the US hegemon's resistance to understanding the long-term benefits by sticking to apparent short-term advantages. Although this argument seems normal for the US authorities, it is highly questionable for the authorities of the rest of the world for two reasons: the dynamic one, when they abstain or refuse to promote a win-win game by passively agreeing to expose the whole world to costly and dangerous instability which is a threat to their citizens, and the static one when they implicitly support the exorbitant US privilege in the zero-sum game of seigneurage and the intermediation role of the US by transforming low-yield short-term liabilities into high yield real assets with the rest of the world.

   Our response to this geopolitical argument is to recommend separating political choices from technical analysis. This latter points to the enormous costs of the current system for both the US and the rest of the world, by exposing the world to increasing risks (including climate change) which could in turn very likely backfire on the US, including the likelihood of a sudden shift to another rising hegemon without improving the systemic issue. On this basis, the political choices of the US must be based on an assessment of the advantages and costs of the present system, and a comparison of the results with the same exercise for alternative options, without any political taboo (cost/benefit analysis, including the financial aspects of the urgent need for global decarbonisation which requires making possible net flows of savings from North to South due to the need for decarbonisation). Before getting rid of the dollar system, the same exercise must be carried out by the rest of the world, drawing attention to the need to conceive an operational way to substitute the hegemonic role of the US as "consumer-of-last-resort" for a better instrument to prevent a deflationary vacuum.

2. The second argument of the authorities who defend the status quo would be the technical impossibility of making a multilateral safe asset other than the dollar attractive and effectively usable. The competitive advantages gained by the dollar are based on economies

[31] On these aspects see Ghymers, Christian "The Systemic Nature of the Global Crisis and Some Principles for Tackling It", Chapter 3 in de Souza Guilherme, Bettina & Ghymers, Christian and others, *Financial Crisis Management and Democracy*, Springer, 2021, e-book available on https://doi.org/10.1007/978-3-030-54895-7 See also Aglietta, Michel & Coudert, Virginie, The dollar and the Transition to Sustainable Development : from Key Currency to Multilateralism, CEPII Policy Brief, N°26, Paris, May 2019.

of scale and network that seem irreversible, at least over the foreseeable future. The experience of the Euro demonstrates indeed the quasi-impossibility of moving from a single standard to a bi-polar one despite the trend towards a multi-polar economic world. Furthermore, competition (between two or three currencies) does not in itself lead to stability and would expose the world economy to additional risks, and maybe to a worse scenario. Therefore, the responsible authorities opt for the status-quo, the defects of which are known but could be progressively remedied with a prudent step-by-step strategy. As for the SDR option, which is currently not a currency but only a basket of five reserve currencies, its present statutory limitations prevent it from becoming a competitive vehicle, not only because its use is limited to official transactions but also because its present status regulates its composition and the interest rate, which discourages its use as a private asset.

Our response would be to make the SDR a truly multilateral currency by allowing the IMF to issue/destroy it directly as its liability by buying/selling eligible national assets to national central banks, based on a technical assessment of GL needs. This "Multilateral Drawing Right" would obviously be more competitive than the dollar as a stable reserve currency and a safe asset with the best degree of liquidity. However, such an upgrade of the SDR requires a change in the status of the IMF, which is only possible with an approval vote of at least 85% of the IMF shares. As the share of the US is 17%, a clear political support from the US would be needed for this systemic change, which is totally unrealistic at the moment.

This apparently sends us back to the first argument. In fact, there are new elements which could radically change the attractiveness of SDRs for private use: the emerging digital currency revolution and the consequent need for Central Banks to maintain control by issuing their own (harmonised) Central Bank Digital Currencies (CBDC). The compelling benefits of the CBDC pave an operational way to shift official thinking away from the status quo of the dollar system. As discussed in an earlier paper[32], the process would briefly be as follows:

- CBDC will generate a catalytic transformation of Forex operations by giving direct access to any central bank liabilities to any holder.
- In this situation it would quickly become advantageous to organise at no cost (thanks to the DLT blockchain technology) an automatic conversion of all international payments into a private "e-SDR", whose stability is arithmetically better than any other standard, ensuring the attractiveness of the use of this private e-SDR.
- The result is a huge market in competitive private e-SDRs, which would automatically become a sort of spontaneous clearing payment union between national currencies, on which central banks opting for interventions would be involved, blurring the operational distinction between private and official e-SDRs.
- Logically, these new modalities would create attractive conditions by making possible a multilateral agreement that allows the IMF to directly issue e-SDRs as a short-term overdraft facility available to each central bank to smoothen out Forex trading settlements.

[32] Ghymers, Christian, The emerging revolution of digital currencies: a technological opportunity for the international monetary system, RTI Paper n° 13, Centro Studi sul Federalismo, Torino, July 2020

- Institutionally, this step would justify the merging of private and official e-SDRs, for allowing central banks to take up with the market dynamics, but overall for IMF and Central Banks to be ready, when the next financial crisis occurs, to instantly provide the missing safety-net to deal with the crisis at lower costs than before. Anyway, the necessity should create an easy consensus for an adjustment in the Articles of the IMF; this step will be proof of the cost-free availability of the missing leverage to enable the IMF to manage global liquidity through the direct issuance of e-SDR safe assets against eligible national safe assets.

12. Conclusion: the process of relative shortage of dollar safe assets is the new form of the Triffin Dilemma

The instability of Global Liquidity (GL) is far from under control, despite the official responses that have already addressed the many flaws in the financial markets. However, hardly any official authority and only very few economists think that there is a systemic flaw in the international financial architecture that would make it unsustainable. This paper shows that GL's instability is systemic and due to a narrowing of the ultimate liquidity base of repo-markets, that is, collaterals in dollar assets. This structural scarcity is nothing other than a current manifestation of the Triffin Dilemma, as the US economy is now too small to provide and regulate the liquid liabilities that the world needs, at the required speed, without disastrous consequences for the credibility of the dollar. This dilemma is inevitable when a national currency enjoys the highest degree of liquidity because, once liquidity risks are expected, this differentiation between safe assets dries up the availability of dollar safe assets, which prevents the repo-market from efficiently intermediating bank liquidity to non-banks when a credit crunch occurs.

The Triffin Dilemma takes on several forms depending on the evolution of financial markets and the phenomenon to be addressed. A traditional aspect focuses on the net dissaving of the US and the consequent growth of its liquid foreign debt. The second version, the "built-in destabiliser" draws attention to the global liquidity waves created by the use of the dollar in international capital flows and by global banks. Without prejudice to these two important aspects, the growing importance of non-bank intermediation in global liquidity development through an intensive use of "safe assets" as collaterals, leads to the formulation of a third aspect of the dilemma, which allows us to better understand that it is impossible for the dollar to provide the safe assets needed to stabilise global liquidity. At the same time, this aspect explains why the Triffin Dilemma has not led to a loss of credibility of the dollar and a weakening of its international role. On the contrary, not only does the dollar remain dominant but – in absence of institutional progress – it is also granted an increased international role despite the worsening of the "built-in destabiliser" and systemic financial risks.

The Triffin Dilemma is often interpreted as announcing that the growing indebtedness of the US economy would lead to the end of the dollar's dominant role. In fact, the credibility of and the demand for the dollar do not depend so much on net international flows that measure the growing net indebtedness of the US, but essentially on two factors: (i) the qualitative advantage conferred on the dollar by its role as the main reserve currency that introduces a clear differentiation between safe assets in the event of global liquidity risks, suddenly drying up the availability of dollar collaterals and thus causing a multiplied contraction of global private liquidity (ii) the dominant quantitative weight of the refinancing needs of the gross stock of international dollar debts which generates a much faster demand for dollar safe assets to support the roll-over of this huge pile of international debts. The appetite for dollar collaterals is mainly driven in volume by the growing share of refinancing liquidity needs (about US $50 trillion per year!). In comparison, the net dissaving of the US economy is unable to provide the necessary safe assets required for a smooth functioning of the international financial system.

Moreover, the relative weight of the US economy and its financial markets is rapidly decreasing with the rapid development of emerging economies whose international transactions still remain based on the dollar. Thus, this growing gap between the need for dollar safe assets and the debt capacity of the US explains the apparent paradox of a structural shortage of dollar safe assets. Furthermore, in the event of a liquidity crisis, the fall in asset values prevents repo-markets from channelling conventional liquidity injection by central banks through banks feeding non-banks on wholesale markets. Central banks have responded to this limitation in their conventional monetary policies by moving to quantitative easing (QE), but the net impact on the supply of safe assets remains unclear in as much as QE freezes safe assets in central banks' balance sheets. This means that the inverted pyramid of global liquidity relies essentially on the pro-cyclical nature of safe assets, of which the proportion of safe assets in dollars is shrinking. This combination increases systemic risks and global liquidity instability.

The technical determinant that favours the use of the dollar as a vehicle, combined with the structural trends of financial markets that require the highest degree of moneyness for the best security collaterals, explain the astonishing shortage of high-quality safe assets in dollars, which clearly demonstrates the growing disproportion between the global safe assets needed and the limited expansion of their supply by a relatively shrinking economy. This process has been accelerating during the last two decades and makes more evident the logical rising costs and the impossibility for a national currency to effectively play the role of the main international currency. The heart of the problem is the endogenous fluctuation in the perceived advantage in the degree of moneyness of the dollar, which is able to suddenly reverse the creation of global liquidity in the shadow markets, with spillovers on the entire inverted GL pyramid.

This feature is the new form of the Triffin Dilemma or its "built-in destabiliser". The solution seems obvious: issuing safe assets in a multilateral reserve currency would automatically and immediately eliminate the destabilising multiplier within the liquidity base, one of the two main causes of private liquidity boom-bust cycles. Indeed, multilateral safe assets are necessarily less discretionary, safer, arithmetically more stable and collectively manageable according to technical criteria without policy conflicts, once they are issued consensually as the liquid debt of the whole system rather than by a discretionary policy of a single shrinking economy. The best solution is simply to apply globally exactly what the national central banks are doing to manage their respective monetary bases.

Current objections to this best solution are expected to fade under public pressure that will soon develop three major structural changes already underway: (i) the panic of climate change and the need to ensure a re-balanced flow of funds from North to South to make global decarbonisation possible, which is not possible with the current dollar system that skews net savings towards over-consumption in the North, (ii) the next global financial crisis that will make explicit the disastrous absence of a global lender-of-last-resort and the need to make available the cheapest safety-net financing that is the creation of a multilateral reserve currency that objectively issues the necessary safe assets which are not the debt of a single economy, (iii) the emerging CBDC revolution that will make the creation of an e-SDR cost-free as the most efficient vehicle for Forex transactions, paving the way to a multilateral consensus for changing the status of the IMF and the SDR.

The responsibility to clarify at the multilateral level this urgent need for an objective cost/benefit assessment of the present system rests more on European policymakers than on any other. In addition, European authorities could suggest to the other regions to join these cost/benefit assessments for putting a genuine reform of the financial governance on the G20/IMF agenda.

Annex: Operational feasibility of issuing a multilateral safe-asset in e-SDR

The purpose of this annex is to illustrate the concrete working of a multilateral currency in terms of balance-sheet of the IMF+ (i.e. the present IMF authorized to issue a genuine multilateral safe-asset equivalent to the present SDR). This issuance does not require neither a multilateral Treasury nor complex institutional changes. Technical criteria for issuing or withdrawing this new safe-asset would be defined by central banks of the IMF members and the IMF staff, and the decision to modify the issued amount could only be made under proposal addressed to the IMF Board, by a qualified majority of these central banks, with the agreement of IMF staff.

Overall, the key step is to adapt IMF status for allowing IMF to issue directly an e-SDR against eligible domestic earning assets from the "n" economies, transforming IMF into a "Multilateral Central Bank"-MCB and e-SDR into a genuine "Multilateral Reserve Currency"- MRC (at par with SDR value). This will allow for creating or withdrawing global monetary base by managing the quantity of safe-assets in e-SDR under strict technical criteria and collegial decision approved by IMF Board, making possible a rational management of global liquidities, meeting cyclical and crisis liquidity adjustment playing the role of a global safety-net (conditional counter-cyclical or emergency LOLR actions).

Making the IMF the Multilateral LOLR simplifies radically the problem of the safety-net, the IMF resources issue and the associated burden-sharing debate. As an automatic consequence, the distinction between the official SDR and the private e-SDR would disappear. Private banks could hold e-SDRs on IMF accounts while Central Banks could use their official SDRs on private markets, allowing interventions directly in SDR. In particular, Central Banks could operate on the interbank Clearing House with both official and private e-SDRs and swap operations could ensure liquidity and yield curve, making the e-SDR a competitive and fully-fledged reserve currency, enjoying the natural advantage of an inner stability, arithmetically due to the automatic cancellation of exchange-rate fluctuations among the 5 international reserve currencies, but also for not being a liquid debt of any national economy, as well as resulting from multilateral decisions taken collegially upon technical and transparent criteria for ensuring global stability.

The dollar could of course remain the main operational vehicle on money/financial markets, but the instantaneous possible conversion in or out the e-SDR gives an implicit anchor and tool for cushioning any liquidity crisis by freeing the issuance of safe-assets from the domestic US criteria. The volume of safe-assets does not anymore correspond to a national liquid debt of the US, but to the whole monetary system, restoring the missing degree of freedom in the global economy, and eradicating the endogenous fluctuations/disruptions in private liquidity due to the "run-for-dash" in dollar assets which is the direct consequence of a two-tier system across national currencies when the dollar is endowed with a quasi-monopoly of liquidity safe-haven.

Analytic Scheme: Balance-sheet of the Multilateral Central Bank (MCB = IMF+) in MRC (=SDR+)

ASSETS A1 + A2 =total claims upon "n" economies:	LIABILITIES = Global Monetary Base P1+P2 = total liquid liabilities
A1. National Bonds in "n" national currencies converted in MRC (= SDR+) (=valorized at daily market-rates against the MRC ("Multilateral Reserve Currency") basket **A1.1 Swapped Bonds** **A1.2 Bought Bonds**	**L1. Deposits in MRC from « n » Central Banks as counterparts for « n » national Bonds sold to MCB** (countervalue changing all days but assets = liabilities, no exchange-rate risks) **P1.1 = counterpart of swapped Bonds** **P1.2 = net issuance of MRC** (= exogenous variation in Global Monetary Base according to global needs)
+ A2. Overdraft Facility in MRC (SDR+) to National CB from deficit economies (according to objective criteria and with Board veto)	**+L2. Reserve Deposits in MRC (SDR+) from National CB** (countervalue of overdraft loan) = endogenous net variation in Global Monetary Base according to deficit adjustment needs

Comments to the analytic scheme of the issuance of MRC (SDR+) in the MCB (IMF+) Balance-sheet

A1.1 Swap between MCB and « n » national CB for 20% (for example) of their national assets backing their national monetary base (registered at current exchange-rate in MRC: such a **swap does not create any new liquidity (substitution inside global monetary base)**	**L1.1 In counterpart of 20% of assets swapped by the « n » CB the MCB issues MRC (SDR+) on the respective accounts of these CB usable between CB.** If exhausted, possibility to borrow with the overdraft facility below (L2)
A1.2 The MCB buys national Bonds for increasing Global Monetary Base (and sells for cutting it)	**L1.2 Exogenous net issuance of MRC** making IMF a genuine Global Central Bank able to change Global Monetary Base and SDR becoming a full international currency
A2 The MCB opens an Overdraft Facility to national CB of deficit economies, usable according to objective rules (% of quotas) and after approval by Board qualified majority **: Global Monetary Base increases**	**L2 MRC issued as counterpart of overdraft uses:** deficit economies pay to surplus economies by shifting MRC from their accounts to the surplus economies accounts: **deficit ones support exchange risk** since they borrow in MRC but their MRC deposits move to surplus economies (symmetrical constraint)
A2 =P2 no net debt for MCB	

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