Growth Lab

Global Imbalances in International Trade, Dynamics of Debt and Finance: Causes and Mitigation Measures

Tetiana Unkovska and Sergei Konoplyov

Growth Lab Working Paper Series
No. 252

August
2025

GROWTH LAB
HARVARD KENNEDY SCHOOL
79 JFK STREET
CAMBRIDGE, MA 02138

GROWTHLAB.HKS.HARVARD.EDU

This paper may be referenced as follows: Unkovska, T., Konoplyov, S. (2025). “Global Imbalances in International Trade, Dynamics of Debt and Finance: Causes and Mitigation Measures.” Growth Lab Working Paper, John F. Kennedy School of Government, Harvard University.

GLOBAL IMBALANCES IN INTERNATIONAL TRADE, DYNAMICS OF DEBT AND FINANCE: CAUSES AND MITIGATION MEASURES

Tetiana Unkovska[1], Sergei Konoplyov[2]

Abstract

Global imbalances have been building up in the world economy for decades and have reached critical levels, giving rise to tariff confrontations, trade wars and geopolitical tensions. This paper presents our systemic analysis of three global imbalances: international trade, debt dynamics, and finance. Based on our new systemic concept of global imbalances and analysis of a large body of historical and latest financial and economic data in various countries and the world economy, we have concluded that these three global imbalances are closely interconnected and mutually influence each other through different channels and nonlinear feedback mechanisms that we describe. These three global imbalances are interrelated symptoms of deep structural problems in the global economy that require correcting measures both at the level of individual countries, especially the US and China, and at the global coordinated efforts by key countries within the G7 and G20. We highlight the key structural problems in the global economy, suggest a modern interpretation of the Triffin dilemma through the prism of equilibrium levels of exchange rates, and suggest possible measures to mitigate the global imbalances.

Keywords: Global imbalances, international trade, global debt dynamics, fiscal sustainability, financialisation, international monetary system, Triffin dilemma

[1]Dr. Tetiana Unkovska – Associate Professor, Leading Researcher at the Institute for Economics and Forecasting of the National Academy of Sciences of Ukraine, Kyiv, Ukraine; Chief Advisor to the Council of the National Bank of Ukraine 2007-2015 unkovska@yahoo.com.ua

[2]Dr. Sergei Konoplyov – Visiting Professor at the Harvard Kennedy School, Cambridge, USA, Advisor to the Minister of Finance of Ukraine sergeiko@gmail.com

1 Introduction

Global imbalances have been building up in the world economy for decades and have reached critical levels, giving rise to geopolitical tensions and trade wars. If they are not mitigated, they could escalate into military confrontations in the future.

The extensive literature on this topic reflects heated debates and different, sometimes opposing, views on the nature and importance of global imbalances. There is also no academic consensus on the optimal macroeconomic, financial, and monetary policy instruments to mitigate them. In this research paper, we propose viewing the global economy as a complex network system in which fundamental structural misalignments generate different types of imbalances in international trade, debt dynamics and global financial flows. These imbalances are interconnected and have deep common roots.

This approach allows us to see specific imbalances as part of a broader complex system with structural misalignment that requires a whole range of instruments to solve.

Usually, the term global imbalances, including the IMF definition, refers to imbalances in international trade: the persistent increase in current account deficits of some countries and the rise in surpluses of others. These imbalances have reached critical levels and are causing serious concern in countries with the largest trade deficits, particularly the United States. This has led to tariff confrontations, trade wars and a new round of political and academic debate.

We propose considering global imbalances in a broader context as a whole system: imbalances in international trade should be analysed together with two other imbalances – in the dynamics of global debt and financial sector. From our view, these three global imbalances are closely interrelated symptoms of the same deeply

entrenched disease – structural distortions at the foundation of the global economy that led to the build-up of systemic risks. These structural distortions appear in multifaceted imbalances (in trade, debt and finance), which are closely interrelated and fuel each other through nonlinear feedback mechanisms. In the paper, we provide a wide, universal and systemic definition of global imbalances, which can help develop an effective analytical framework for their research based on complex network systems theory.

We provide a detailed analysis of the evolution and current state of each of the three imbalances, highlight the mechanisms of their interconnection and causes, and propose several systemic measures to mitigate them.

Our analysis has revealed that all three global imbalances are closely interrelated and highly persistent. They differ fundamentally from short-term volatility and random deviations from market equilibrium. These imbalances can't be mitigated by the mechanisms of the free market. At the same time, they reinforce each other through channels of non-linear feedback that are not obvious at first glance.

In the process of researching enormous growth of the global debt over the past decades and analysing its structure by type, country and sector, we divided countries with large private debt relative to GDP into three groups depending on the level of this indicator. These groups differ from the groups of countries by the level of government debt. In particular, Hong Kong SAR, Switzerland, Canada, China and Korea are the countries with largest private debt relative to GDP, which has grown most rapidly over the past 10 years. At the beginning of 2024, private debt in these countries reached more than 200%, 363%, 265%, 220%, 207% and 205% of GDP, respectively. In the group of countries ranked by government debt to GDP, Japan (235%), Greece (142.2%), Italy (137.3%), and the USA (122.5%) took the top places.

In several developed countries, including the US, there is a tendency to replace private debt with government debt. This tendency has intensified since the beginning of the 2008 financial crisis. Gradually declining as households and corporations deleveraged, private debt was offset by increasing government debt. This is especially clear in debt dynamics in the financial sector and government. This trend reflects the financing of anti-crisis measures and bailouts to rescue financial institutions during the crisis; however, it continues to the present day.

Imbalances in debt dynamics become problematic when they enter a zone of fiscal unsustainability. After reaching a critical threshold, they can escalate into a fiscal and debt crisis. The quantitative assessment of this threshold is the subject of academic debate and has its specifics for each country. However, even preliminary estimates based on classical Domar criteria can provide useful information. We investigated the critical threshold of government debt sustainability in the US based on the transversality condition and the calculation of the differential between economic growth rates and average interest rates on government debt.

Our analysis of the third type of global imbalances in financial flows revealed a rapid acceleration in the growth of the world financial sector to enormous proportions. This led to the crowding out of industrial production in the real sector and widened the gap between the growth in the real economy and the financial sector. This phenomenon has been termed financialization. From the 1940s to the 1950s, the financial industry was focused more on serving the real sector of the economy, financing economic growth and the optimal allocation of capital. However, over the past few decades, the financial sector has gradually moved away from these functions, shifting to a mode of self-sufficient growth detached from the real sector.

The financial sector has taken a dominant position compared to manufacturing in the developed countries' economies, especially in the US. This has shown up in a dramatic

increase in the size of financial flows, financial markets, an explosion in the turnover of financial trading, growth in the volume of financial assets in all sectors of the economy, an increase in private and public debt, and changes in the behaviour of market agents, including non-financial corporations. Our analysis of Bank of International Settlement data revealed that in 2024, the global foreign exchange trading daily turnover reached about $7.5 trillion; OTC interest rate derivatives $7.8 trillion; the notional value of all kinds of financial derivatives reached more than $600 trillion, and more than 60% of these transactions were executed by algorithmic and high-frequency trading. This has little to do with financing high-tech industrial production or manufacturing.

We researched the main drivers of these processes and found that the primary driver was the development of shadow banking. Its financial assets ($238.8 trillion) account for almost half of the total global financial assets of $486.4 trillion. Shadow banking is a broad and diverse sector of non-banking financial institutions (NBFIs), including money market funds, hedge funds, other investment funds, captive financial institutions, money lenders, central counterparties, broker-dealers, finance companies, trust companies, and structured finance vehicles. NBFI also includes different types of non-bank entities providing credit intermediation activities as real estate financial transactions, maturity and liquidity transformation, leverage or imperfect credit risk transfer, regulatory arbitrage, etc.

One of the consequences of financialisation has been fundamental changes in the traditional behaviour of non-financial corporations and their reorientation towards financial transactions and short-term profits. This has led to two tendencies that stimulated deindustrialisation in developed countries, including the US. On the one hand, non-financial corporations decreased financing of development industrial production and increased investment in short-term financial transactions, including shadow banking. A disproportionally large financial sector, instead of providing

finance to the real economy, displaces it and ‘successfully’ competes with it for human capital and financial resources. On the other hand, financialisation stimulated the development of outsourcing and manufacturing offshoring to lower-cost foreign jurisdictions. This contributed to the high-tech industrialisation of Asian countries, especially China, and a decreasing manufacturing share in GDP in developed countries, including the US.

As a result, the United States has already lost its global leadership in industrial production growth. However, China has upended the global manufacturing hierarchy. China currently holds the greatest share of global manufacturing value-added, with several sources estimating it controls between 26% and 30%.

In addition to the dynamics of quantitative indicators, we considered changes in qualitative indicators. Economic Complexity Index (ECI) is the most important indicator that characterises the country's qualitative level of industrial development. The ECI was developed by Ricardo Hausmann and Cesar A. Hidalgo (2009, 2012). ECI captures the diversity and sophistication of the productive capabilities of the country's exports. According to data from the Growth Lab of Harvard University and the Atlas of Economic Complexity, compared to a decade prior, China’s economy has become more complex, increasing its ECI by 3,5 times. For the same period, the US has become less complex according to ECI. Thus, the ECIs of the US and China are almost equal. This contributed to the expansion of trade imbalances and increased imbalances in global debt dynamics.

The countries with the highest Economic Complexity Index values in 2023 were Japan, Singapore, Korea, Taiwan, and Germany. For the US, a system of structural measures to develop its industrial production and Economic Complexity Index is very important. This would improve its economic growth prospects and mitigate trade and debt imbalances.

The next aspect in understanding the causes and mechanisms of global imbalances is the structural distortions in the international monetary system and the Triffin dilemma, which is currently the subject of widespread debates.

Bordo, M. D. and McCauley, R. (2019) analyse a large and long-term debate among many scholars about the relevance of Triffin's dilemma in its various forms for the present. They conclude that issues arising from one country's supplying most of the world's reserve currency have not gone away, and the certainly correct general form of Triffin's dilemma now is: "there is an irremediable contradiction between the issuing country's internal domestic requirements and the external requirements of the world using it".

We agree with this general form of the Triffin dilemma interpretation. However, for the specific form that corresponds to the current global situation, we suggest a modern Triffin dilemma interpretation through the lens of current structural contradictions between achieving a global equilibrium exchange rate for the international reserve currency (the US dollar) and the local equilibrium exchange rate for the dollar from the perspective of the US economy.

A persistently and long-term overvalued US dollar exchange rate depresses the US export and domestic industrial sectors and simultaneously stimulates imports. Through a system of feedback loops and network effects, the increasing volume of cheap imports displaces domestic production. Therefore, it depresses exports and increases trade imbalances from both sides (further decreasing exports and increasing imports). Thus, the persistently overvalued dollar exchange rate triggers a chain reaction and a self-enforcing spiral of worsening US trade imbalances.

A powerful additional driver of this process is the huge increase in financialisation of the economy. Global financialisation, on the one hand, stimulates the persistent growth of global demand for US dollar assets, and on the other hand, within the US,

depresses the industrial production sector and replaces it with the financial sector. This, in turn, stimulates the next round of worsening trade imbalances, growth of financialisation and appreciation of the US dollar.

Therefore, the structural problem of the modern international monetary system exists in the sense that the persistently increasing demand of the world economy for the US dollar leads to its long-term and persistent appreciation. This demand for the dollar is not limited to the needs of international trade and necessary settlements. The abnormally huge development of financialisation (see the analysis in section 3.4) constantly increases the demand for the US dollar. The overvalued US dollar real effective exchange rate and other factors described in the paper lead to the persistent widening of the US current account deficit and other negative consequences for the US economy and the global economy as a complex network system with the US economy as a financial and economic hub.

We propose the following form of a modern modification of the Triffin dilemma:

There is a systemic long-term and persistent contradiction between achieving the global equilibrium value of the US dollar exchange rate (determined by the balance between the global demand for US dollars and the supply of dollars) and the equilibrium dollar exchange rate within the US economy (determined by the goals of achieving a US trade balance and industrial growth).

This modification allows for a deeper understanding of the contemporary factors behind the long-term sustainable strengthening of the US dollar and its impact on the three global imbalances examined in the article.

Based on the results of our integrated analysis, we suggest a system of possible measures to mitigate global imbalances in international trade, debt and financial dynamics.

Political and economic debates on global imbalances will continue to intensify. The approach we propose, which views the global economy from the perspective of complex network systems theory, may help find solutions at the national and world scales. This article contributes to the search for an optimal approach in this area. We plan to continue developing a quantitative model of global imbalances as symptoms of structural distortions in a complex network system of the global economy. We are researching to reveal the interrelationships between the Economic Complexity Index dynamics of key countries and global imbalances.

The contribution of our paper over the existing literature are following: we have suggested a precise definition of the term "global imbalances" and systemic approach to research on global imbalances; we analysed historical evolution and current state of three global imbalances (in international trade, the global debt and finance) in their interrelationships and revealed nonlinear feedback loops between them; we have proposed a new interpretation of Triffin's dilemma for the current global conditions as specific structural contradictions between achieving the global equilibrium level of international reserve currency (US dollar) exchange rate and the local equilibrium level of US dollar exchange rate from the perspectives of the US economy; we suggested directions for mitigation of the global imbalances both at the level of the US and China economies and at the level of global coordination in the framework of G7 and G20.

Outline of the Paper. Section 2 outlines the related literature and its connection with our research. Section 3 describes our approach to a new definition of global imbalances and a systemic analytical framework for their research. It presents the results of our analysis on evolution and the current state of three global imbalances – in the dynamics of the international trade, world debt and finance. Section 4 describes structural distortions in the foundation of the global economy, our suggestions for the

modern interpretation of Triffin's dilemma, and possible measures for mitigating the global imbalances. Section 5 concludes the paper.

2 Related literatures

A massive literature related to research of global imbalances, dynamics of global debt and financialisation.

Global imbalances are generally understood in the literature, including research and policy papers of IMF, as imbalances in international trade, referring to the large current account deficit in the one group of countries, especially United States, and the matching surpluses in other countries such as Japan, emerging Asia, including China, oil-exporter countries and some industrial countries as German, Canada, etc. In the reports of IMF staff, including Reto (2005)[3], IMF Report "Global Imbalances" (2019)[4], and IMF Report (2024)[5] "External Sector Report: Imbalances Receding", the authors provided detailed analysis of international trade imbalances and the factors affecting them.

In the CFR Global Imbalances Tracker[6], which is used to gauge the vulnerability of individual countries and the global economy to the buildup of imbalances in the current account, the *Global Imbalances Index (GII)* is defined as the total size of global current account deficits and surpluses as a percentage of world output.

[3] Global Imbalances and Poverty - Challenges for the World Economy, Remarks by Rodrigo de Rato y Figaredo, Managing Director of the IMF, 2005 https://www.imf.org/en/News/Articles/2015/09/28/04/53/sp062005

[4] IMF Staff report, Group of Twenty "Global Imbalances", 2019 Global Imbalances, IMF Staff Note, G-20 Finance Ministers and Central Bank Governors' Meetings, June 8-9, 2019, Fukuoka, Japan

[5] International Monetary Fund. 2024. External Sector Report: Imbalances Receding. Washington, DC, July https://www.imf.org/en/Publications/ESR/Issues/2024/07/12/external-sector-report-2024

[6] Benn Stail (2025) The CFR Global Imbalances Tracker https://www.cfr.org/tracker/global-imbalances-tracker

In the seminal papers of Maurice Obstfeld and Kenneth Rogoff (2009)[7], Maurice Obstfeld (2012[8], 2017[9], 2018[10]), Blanchard, Olivier J. et al (2010)[11], Richard Portes[12] (2009), the authors discuss the questions why did global imbalances, which defined as imbalances in countries' current accounts expand after the mid-1990s, what transmission channels were between global imbalances of the 2000s and the global financial crisis 2008, and what policy implications follow. Many findings of these research papers broadened the understanding of the interrelationship between global imbalances in international trade and financial sector crises. They shaped directions for further research in a broader context.

The authors of the BIS Annual Report (2011)[13] consider global imbalances wider than countries' current account. They substantiated the view that the dangers posed by imbalances in current accounts and net capital flows are important, but the financial crisis also highlighted the need to look beyond them. The authors mean that we must also look to gross financial flows that are substantially larger than the net flows associated with the current account and are often large even where current account balances are negligible.

In the ECB research paper Thierry Bracke et al (2008)[14], the authors define global imbalances in a broad sense as "external positions of systemically important economies that reflect distortions or entail risks for the global economy". This

[7] Maurice Obstfeld & Kenneth S. Rogoff (2009), Global imbalances and the financial crisis: products of common causes, Federal Reserve Bank of San Francisco, issue Oct, pages 131-172.
[8] Maurice Obstfeld, Financial flows, financial crises, and global imbalances, Journal of International Money and Finance, Volume 31, Issue 3, 2012, Pages 469-480, ISSN 0261-5606, https://doi.org/10.1016/j.jimonfin.2011.10.003.
[9] Does the Current Account Still Matter? Maurice Obstfeld NBER Working Paper No. 17877 March 2012 JEL No. F32,F34,F3
[10] Obstfeld, M (2018), 'DP13066 Twenty Five Years of Global Imbalances', CEPR Discussion Paper No. 13066. CEPR Press, Paris & London. https://cepr.org/publications/dp13066
[11] Blanchard, Olivier J. and Milesi-Ferretti, Gian Maria and Milesi-Ferretti, Gian Maria, Global Imbalances: In Midstream? (February 1, 2010). Available at SSRN: https://ssrn.com/abstract=1525542 or http://dx.doi.org/10.2139/ssrn.1525542
[12] Richard Portes (2009) Global Imbalances, Chapter in Macroeconomic Stability and Financial Regulation: Key Issues for the G20, Edited by Mathias Dewatripont, Xavier Freixas and Richard Portes, Centre for Economic Policy Research
[13] BIS Annual Report (2011) The risks of international imbalances: beyond current accounts https://www.bis.org/publ/arpdf/ar2011e3.pdf
[14] Thierry Bracke, Matthieu Bussière, Michael Fidora and Roland Straub (2008) A framework for assessing global imbalances, ECB Occasional Paper Series No 78, January 2008

definition is very close to our view on global imbalances. However, we think that global imbalances can be defined even more universally and systematically and provide our definition of global imbalances and a rationale for this. This definition allows developing a more universal structure of operational research and monitoring of global imbalances as possible sources of systemic risks for the global economy.

Based on our view, an important element in analysing global imbalances is to monitor and assess global debt dynamics. We relied on the fundamental results in debt research of well-known authors including Carmen M. Reinhart and Kenneth S. Rogoff (2008[15], 2010[16], 2012[17]) Hausmann, R., and Panizza, U., (2002)[18], Eichengreen, B., Hausmann, R., and Panizza, U., (2002[19], 2007[20], 2023[21]), Borio, Claudio E.V. et al. (2017)[22], Joseph Stiglitz (2003)[23], Cecchetti, Stephen G. et al. (2011)[24] as on basis for understanding the core principles of debt dynamics, its critical thresholds and mechanisms of systemic risks accumulation on the debt side.

Specifically, the research paper by Cecchetti, Stephen G., et al. (2011) reveals that beyond a certain level, debt is a drag on growth. The authors assessed that *for government debt, the threshold is around 85% of GDP*. The authors conclude that

---

[15] Carmen M. Reinhart and Kenneth S. Rogoff (2008) This Time is Different: A Panoramic View of Eight Centuries of Financial Crises, NBER Working Paper No. 13882 March 2008 JEL No. E6,F3,N0

[16] Reinhart, Carmen M., and Kenneth S. Rogoff (2010), Growth in a Time of Debt. *American Economic Review* 100 (2): 573–78.DOI: 10.1257/aer.100.2.573

[17] Reinhart, Carmen M and Reinhart, Vincent R and Rogoff, Kenneth S (2012) Debt Overhangs: Past and Present, National Bureau of Economic Research, Working Paper, Working Paper Series, 18015, April 2012, doi = 10.3386/w18015, URL = http://www.nber.org/papers/w18015

[18] Hausmann, R., and Panizza, U., (2002). `"The Mystery of Original Sin: The Case of the Missing Apple", Harvard University, Kennedy School of Government. Mimeographed

[19] Eichengreen, B., Hausmann, R., and Panizza, U., (2002). "Original Sin: The Pain, the Mystery and the Road to Redemption", paper presented at a conference on Currency and Maturity Matchmaking: Redeeming Debt from Original Sin, Inter-American Development Bank

[20] Eichengreen, B.; Hausmann, R.; Panizza, U. (2007). "Currency Mismatches, Debt Intolerance and Original Sin: Why They Are Not the Same and Why it Matters". Capital Controls and Capital Flows in Emerging Economies: Policies, Practices and Consequences. University of Chicago Press. pp. 121–170. ISBN 978-0-226-18497-5.

[21] Eichengreen, Barry; Hausmann, Ricardo; Panizza, Ugo (2023). "Yet it Endures: The Persistence of Original Sin". *Open Economies Review*. **34** (1): 1–42. doi:10.1007/s11079-022-09704-3. ISSN 1573-708X. PMC 9768781.

[22] Borio, Claudio E.V. and McCauley, Robert N. and McCauley, Robert N. and McGuire, Patrick M., FX Swaps and Forwards: Missing Global Debt? (September 17, 2017). BIS Quarterly Review September 2017, Available at SSRN: https://ssrn.com/abstract=3041870

[23] Joseph Stiglitz (2003) Dealing with debt. How to reform the Global Financial System, Harvard International Review; Spring 2003

[24] Cecchetti, Stephen G. and Mohanty, Madhusudan S. and Zampolli, Fabrizio, The Real Effects of Debt (September 1, 2011). BIS Working Paper No. 352, Available at SSRN: https://ssrn.com/abstract=1946170

countries with high debt must act quickly and decisively to address their fiscal problems. The longer-term lesson is that, to build the fiscal buffer required to address extraordinary events, governments should keep debt well below the estimated thresholds. Authors' examination of other types of debt yields similar conclusions: when corporate debt goes beyond 90% of GDP, it becomes a drag on growth, and for household debt, a threshold is around 85% of GDP.

Also, these works deepen the understanding of interconnectedness between debt and the processes of financialisation and risks. Borio, Claudio E.V. et al. (2017) reveal that non-banks outside the United States owe large sums of dollars off-balance sheet through these FX swaps and forwards. Authors assess that the total on-balance sheet dollar debt exceeds $10.7 trillion. Even when this debt is used to hedge FX risk, it can still involve significant maturity mismatches.

In a research paper by Antoniades, A., & Griffith-Jones, S. (2018)[25], the authors investigate the broken link between what global debt was supposed to do and what it does. They point to three interrelated dynamics: the accumulation of unproductive debt, growing inequalities of income and wealth and the increase in privately created interest-bearing money.

We utilised certain data OECD Global Debt Report (2025)[26] to test our hypothesis about the unproductivity of non-financial corporations' debt and their shift to financial transactions besides investment in industrial production development. The authors of the report provide evidence that since 2008, corporate bond issuance has grown significantly above trend, while corporate investment has not. Cumulative bond issuance by non-financial companies in 2009-23 was USD 12.9 trillion, higher than the pre-2008 trend, while corporate investment was USD 8.4 trillion lower. The

[25] Antoniades, A., & Griffith-Jones, S. (2018). Global debt dynamics: The elephant in the room. *The World Economy*, *41*(12), 3256-3268. https://doi.org/10.1111/twec.12623

[26] OECD Global Debt Report (2025), Financing growth in a challenging debt market https://www.oecd.org/en/publications/2025/03/global-debt-report-2025_bab6b51e.html

authors conclude, that rather than productive investment, a lot of debt in recent years has been used to fund financial operations like refinancings and shareholder payouts. This suggests existing debt is unlikely to pay itself off through returns on productive investment.

In our view, all these arguments and facts support the need to consider global trade and debt imbalances together with the processes of global financialisation, which generate imbalances between financial development and the real sector of the economy.

As the problems of financialisation have attracted increasing attention from researchers, a large body of literature has been devoted to them. The influential research papers on these issues by Stephen G Cecchetti and Enisse Kharroubi (2015)[27], Lorenzo Ductor and Daryna Grechyna (2013)[28], and Alberto Bucci et al. (2023)[29], provide econometric evidence that disproportional financial growth harms financially dependent and R&D-intensive industries. After increasing beyond the critical threshold, the financial sector has a negative influence on the real economy and economic growth. Lorenzo Ductor and Daryna Grechyna (2013), based on a panel data set of 33 OECD economies, show that for smooth economic development, the equilibrated growth of both the real and the financial sectors is required. *Whenever financial development exceeds the development of the productive industries by more than 4.5%* (when measured in terms of growth rates of the two sectors' output), there is a threat of reaching the productive capacity bound of the economy, with *consequent financial crisis.*

[27] Stephen G Cecchetti and Enisse Kharroubi (2015) Why does financial sector growth crowd out real economic growth? BIS Working Papers No 490 by Monetary and Economic Department, February 2015

[28] Lorenzo Ductor, Daryna Grechyna (2013) Excess Financial Development and Economic Growth

[29] Bucci, Alberto and Diallo, Boubacar and Marsiglio, Simone, On The Nonlinearity of the Finance and Growth Relation: the Role of Human Capital (November 20, 2023). CEIS Working Paper No. 567, Available at SSRN: https://ssrn.com/abstract=4638928 or http://dx.doi.org/10.2139/ssrn.4638928

Harvard Business Review in 2009 publicised an article by Harvard professors Gary Pisano and Willy Shih (2009)[30] that provided evidence of the disaster consequences of U.S. companies' outsourcing manufacturing for decades. As the authors wrote, today's low-value manufacturing operations hold the seeds of tomorrow's innovative new products. What those companies have been ceding is the country's *industrial commons* - that is, the collective operational capabilities that underpin new product and process development in the U.S. industrial sector. They think that restoring the ability of enterprises to develop and manufacture high-tech products in America is the only way the country can pay down enormous trade deficits.

Our analysis of countries' current data from the databases of IMF, World Bank, OECD, US Federal Reserve System, and Growth Lab of Harvard University confirmed these conclusions.

The Growth Lab of Harvard University, under the leadership of Ricardo Hausmann[31], provides calculations and monitoring of the Economic Complexity Index for countries on a global scale, which captures the diversity and sophistication of the productive capabilities embedded in the exports of each country. The ECI was developed by Ricardo Hausman and Cesar A. Hidalgo (2009[32], 2012[33]). The dynamics of ECI can be a good indicator of a country's future economic development and the perspectives of its trade balance. We analysed ECI dynamics of China, the US, Japan, Germany, Singapore and Korea based on the Growth Lab of Harvard University data for assessing structural problems deepening global imbalances.

---

[30] Gary Pisano and Willy Shih, (2009) "Restoring American Competitiveness," *Harvard Business Review,* July/August 2009, http://hbr.org/2009/07/restoring-american-competitiveness/ar/1/.

[31] Ricardo Hausmann, director of the Growth Lab, professor at the Harvard Kennedy School (HKS), and the leading researcher of The Atlas of Economic Complexity

[32] Cesar A. Hidalgo, Ricardo Hausmann (2009). "The Building Blocks of Economic Complexity". *Proceedings of the National Academy of Sciences*. **106** (26). PNAS: 10570–10575. arXiv:0909.3890. Bibcode:2009PNAS..10610570H. doi:10.1073/pnas.0900943106. PMC 2705545. PMID 19549871.

[33] Ricardo Hausmann, Cesar Hidalgo; et al. (2012) "The Atlas of Economic Complexity". Puritan Press, Cambridge MA.

An interesting approach to understanding the downward trend in the share of manufacturing production in the US is presented in the book of Lawrence, Robert Z. (2024)[34] "Behind the Curve: Can Manufacturing Still Provide Inclusive Growth?". The author emphasised that the trend of manufacturing declining as a share of GDP has also impacted exports from China, Germany, Japan, Singapore, and South Korea. The author demonstrates that deeply rooted structural forces common to all countries – technological change, shifting consumer spending patterns, and trade – account for lagging manufacturing employment. He suggests strengthening government efforts in the promotion of new policies to help people, places, and countries cope with inevitable changes in the composition of employment.

The next important structural drivers of global imbalances – disproportions in savings and consumption in different countries' economies – are the subject of intensive discussions in the literature. The seminal fundamental books by John Keynes (1936)[35] and Joan Robinson (1947)[36] are classical economic literature that has confirmed its predictive power and acute relevance today. They provided evidence that the core of the current global imbalances is the violation of fundamental proportions in the global economy – excessive saving in some countries with a lack of consumption, versus excessive consumption in others, with a lack of savings. Government's maintenance of excess savings in a country's economy, underpayment of labour costs in the export sectors, and currency interventions to keep the exchange rate undervalued to support their exports are the components of what Joan Robinson called the "Beggar-to-Neighbours" policy.

[34] Lawrence, Robert Z. (2024) Behind the Curve: Can Manufacturing Still Provide Inclusive Growth? Peterson Institute for International Economics

[35] Keynes J.M. (1936) General Theory of Employment, Interest and Money

[36] Robinson, Joan (1947), Essays in the theory of employment, Oxford, Basil Blackwell, 201 pages

In the well-known papers by Bernanke, Ben S. (2005[37], 2006[38]), Corneli, Flavia (2009)[39], Caballero, Ricardo J. et al. (2006)[40], Altuzarra, A. et al (2010)[41] discuss these issues in the pre-crisis and post-crisis periods of global turbulence in 2008.

The next big structural issues driving global imbalances in international trade, debt and financial flows are the structural distortions in the foundation of the current international monetary system. A new impetus to the heated academic debate on this topic was an article by Stephen Miran (2024)[42], which described the current systemic problems of US trade imbalances using the arguments of the Triffin dilemma. In Robert Triffin's book (1960) "Gold and the Dollar Crisis: The Future of Convertibility"[43], the author discovered a structural problem in the Bretton Woods system and correctly predicted the "Nixon gold shock" and collapse of this system. Keynes J.M. (1944)[44] also wrote about this structural problem back in the forties when he proposed an alternative project of the Bretton Woods system.

In-depth academic articles by authors who question the relevance of Triffin's arguments or support them with the modifications as applied to the modern world,

[37] Bernanke, Ben S. (2005). "The Global Saving Glut and the U.S. Current Account Deficit," speech delivered for the Sandridge Lecture at the Virginia Association of Economists, Richmond, March 10, www.federalreserve.gov/boarddocs/speeches/2005/200503102/default.htm

[38] Bernanke, Ben S. (2006), Reflections on the Yield Curve and Monetary Policy," speech delivered at the Economic Club of New York, New York, March 20, www.federalreserve.gov/newsevents/speech/bernanke20060320a.htm.

[39] Corneli, Flavia (2009)[39], *The Saving Glut Explanation of Global Imbalances. The Role of Underinvestment*, EUI ECO, 2009/41 - https://hdl.handle.net/1814/12893

[40] Caballero, Ricardo J., Emmanuel Farhi, and Pierre-Olivier Gourinchas (2006). "An Equilibrium Model of 'Global Imbalances' and Low Interest Rates ," NBER Working Paper Series 11996. Cambridge, Mass.: National Bureau of Economic Research, January, www.nber.org/papers/w11996.pdf.

[41] Altuzarra, A., Ferreiro, J., Serrano, F. and Serrano, F. (2010). The Role of Global Imbalances as a Cause of the Current Crisis. *Journal of Innovation Economics & Management,* 6(2), 25-48. https://doi.org/10.3917/jie.006.0025.

[42] Stephen Miran (2024) A user's guide to restructuring the global trading system https://www.hudsonbaycapital.com/documents/FG/hudsonbay/research/638199_A_Users_Guide_to_Restructuring_the_Global_Trading_System.pdf

[43] Robert Triffin. Gold and the Dollar Crisis: Future of Convertibility" – Yale University Press, 1960 https://www.amazon.com/Gold-Dollar-Crisis-Future-Convertibility/dp/B0000CKPLE

[44] Keynes, J.M. (1944). Note by Lord Keynes. *The economic journal*, 54 (215/216), 429–30. In: E. Johnson and D. Moggridge, eds. 2013. *The collected writings of John Maynard Keynes*. Vol. XXVI, Activities 1941–1946: shaping the post-war world: Bretton Woods and reparations. Cambridge: Cambridge University Press on behalf of the Royal Economic Society, 39–40.

include Bordo M. D. (2019)[45], Bordo, M. D. and R McCauley (2019[46], 2025[47]), Bénassy-Quéré, A (2025)[48], Fahri, E and M Maggiori (2017)[49], Gourinchas, P-O, H Rey and E. Farhi (2011)[50], Kimura, T. and T. Nagano (2017)[51], Obstfeld M. (2025)[52], Schnabel I. (2025)[53], Biagio Bossone (2025)[54], and many others.

Bordo, M. D. and R. McCauley (2019) analyse a large and long-term debate among many scholars about the relevance of the Triffin dilemma in its various forms for the present global situation. They conclude that issues arising from one country's supplying most of the world's reserve currency have not gone away, and this problem again is at the centre of concerns about global imbalances. The authors confirm that the certainly correct form of the Triffin dilemma now is: "there is an irremediable contradiction between the issuing country's internal domestic requirements and the external requirements of the world using it".

We agree with this interpretation of the Triffin dilemma in a general form and suggest its specification for the current global situation through the prism of systemic structural contradictions in the process of achieving the global equilibrium value of the international reserve currency (US dollar) exchange rate (paragraph 4.2).

[45] Bordo, M D (2019), "The imbalances of the Bretton Woods System between 1965 and 1973: US inflation, the elephant in the room", VoxEU.org, 7 June.
[46] Bordo, M D and R McCauley (2019), "Triffin: Dilemma or Myth?", *IMF Economic Review* 67: 824–851.
[47] Bordo, M and R N McCauley (2025), "Miran, we're not in Triffin land anymore", VoxEU.org, 7 April.
[48] Bénassy-Quéré, A (2025), "Is the international monetary system 'unfair'?", 19 March.
[49] Fahri, E and M Maggiori (2017), "The new Triffin Dilemma: The concerning fiscal and external trajectories of the US", VoxEU.org, 20 December.
[50] Gourinchas, P-O, H Rey and E Farhi (2011), *Reforming the International Monetary System*, CEPR Press.
[51] Kimura, T and T Nagano (2017), "Exorbitant privilege and the Triffin dilemma through FX swaps", VoxEU.org, 30 May
[52] Obstfeld M (2025), "The U.S. Trade Deficit: Myths and Realities", BPEA Conference Draft, 27-28 March.
[53] Schnabel, I (2025), "No longer convenient? Safe asset abundance and r*", Keynote speech at the Bank of England's 2025 BEAR Conference, London, 25 February.
[54] Biagio Bossone (2025) Not Triffin, not Miran: Rethinking US external imbalances in a new monetary order Not Triffin, not Miran: Rethinking US external imbalances in a new monetary order | CEPR

3 Evolution and current state of global imbalances in international trade, global debt dynamics and finance

3.1. Definition of global imbalances.

Usually, the concept of global imbalances is used, including its use in the IMF's reports[55], without a precise definition and implies imbalances in international trade: the persistent widening current account deficits in certain countries and an increase in current account surpluses in others. A global imbalance in international trade is usually used as a synonym for a global imbalance in a general sense. Recently, global trade imbalances reached critical levels that gave rise to serious concerns in countries with the largest trade deficits, especially in the United States. This led to tariff confrontations with transition to the trade war and gave rise to a new round of political and academic debate on this issue.

We believe that a precise definition of the global imbalances concept is highly important for correct research on these problems because it can help to provide a clearer and systemic understanding of its nature, dynamics and causes.

In the ECB research paper by Thierry Bracke et al (2008)[56], the authors define of global imbalances in a broad sense as "external positions of systemically important economies that reflect distortions or entail risks for the global economy". The definition has three components. It refers to external positions, encompassing current account positions as well as fi nancial positions; it refers to systemically important economies, including both the deficit side (e.g. the United States) and the surplus side (e.g. Asia, oil exporters); and it refers to distortions and risks, so as to distinguish imbalanced from balanced positions. Risks refer to the macroeconomic and financial

[55] IMF Report Global Imbalances (2019) https://www.imf.org/external/np/g20/pdf/2019/060519b.pdf

[56] Thierry Bracke, Matthieu Bussière, Michael Fidora and Roland Straub (2008) A framework for assessing global imbalances, ECB Occasional Paper Series No 78, January 2008

implications, both under a scenario of unwinding and under a scenario of further increasing imbalances.

This definition is very close to our view on global imbalances. However, we think that global imbalances can be defined even more universally and systematically to give an effective analytical framework for research on them and the monitoring of their dynamics.

Our analysis shows that three types of global imbalances – in international trade, global debt dynamics and financial flows – demonstrate tight interconnectedness and reinforce each other through nonlinear feedback mechanisms and network effects. These three imbalances interrelatedly react on deep and long-term structural distortions in the foundation of the global economy. We consider these imbalances as three interconnected symptoms of deep-rooted structural distortions in the foundation of the global economy.

Our view is based on the vision of the global economy as a complex network system that unites nodes (countries) by multilevel connections. This view can help to understand more deeply nonlinear network effects in the global economy and the the dynamics of global imbalances.

Our definition of global imbalances is "G*lobal imbalances are the long-term persistent disproportions between and within the countries' economies, the exacerbation of which could lead to the build-up and realisation of systemic risks to the global economy".*

This definition includes three essential concepts:

- the concept of "long-term persistent disproportions" that separates global imbalances from short-term fluctuations or random deviations from equilibrium,

- "*between and within countries' economies"* means that global imbalances can manifest themselves as disproportions within individual systemically important economies (e.g. the US, China or other economies that influence the entire global system) or as disproportions between countries, a group of which can influence the entire global economy (e.g. China-USA interconnections, oil-exporting countries or others).

- the concept of "*systemic risk*" that has already been well studied in economic science and differs fundamentally from the individual risks of economic entities.

This definition allows developing an analytical framework for research and monitoring of different global imbalances as possible indicators of systemic risks to the stability of the global economy. Figure 1 presents a diagram that combines the logical elements of our approach into a coherent picture. This diagram presents our suggestion of a systemic approach to a definition of global imbalances, considering three types of them – in international trade, in the dynamics of global debt, and global finance – as a whole system of three interrelated symptoms of structural disease in the foundation of the global economy. We present a vision that combines the logical elements of our approach into a coherent picture. Three global imbalances fuel each other through nonlinear feedback mechanisms and have some common roots that we describe in the paper: modern form of the Triffin Dilemma, Asymmetric Trade Conditions and "Beggar-to-Neighbours" policies; global structural disproportions between "Saving Glut" countries vs countries with overindebted consumption; overvalued Real Effective Exchange Rate of the US Dollar; global financial sector excessive growth, and widening gap between financial and real sectors.

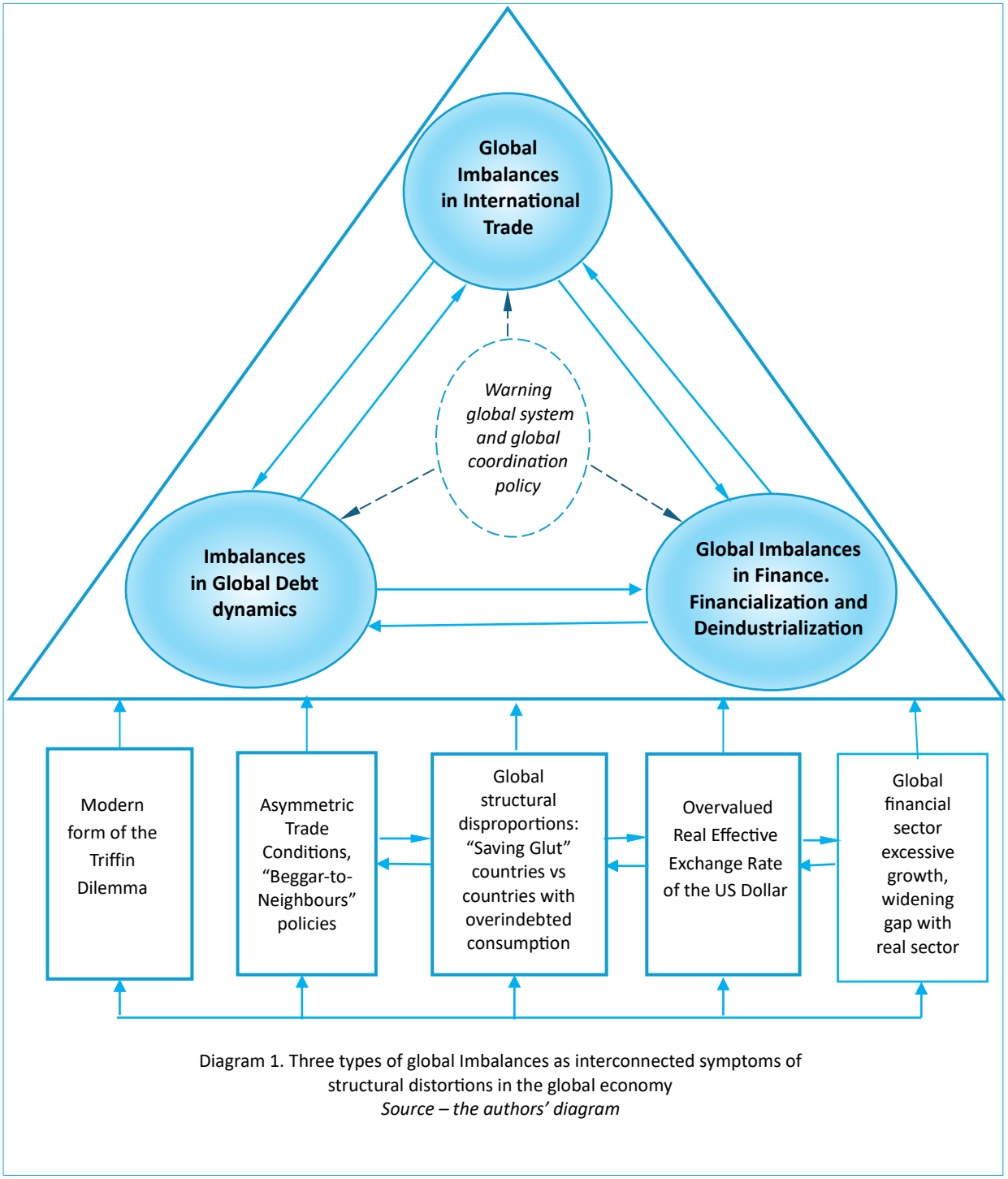


Diagram 1. Three types of global Imbalances as interconnected symptoms of structural distortions in the global economy
Source – the authors' diagram

These global imbalances demonstrate their long-term persistence and can't be overcome by free market adjustment mechanisms. To gain a broader understanding of the measures that should be taken, we analyse in detail the evolution and current state of each of the three imbalances and mechanisms of their interconnectedness.

The following paragraph is focused on the analysis of global imbalances in international trade.

3.2. Global imbalances in international trade

The worsening global imbalances in international trade, manifested in the persistent widening of current account deficits in some countries and the increase in current account surpluses in others, are generating heated economic and political debates. These imbalances are a source of serious concern for countries with the largest deficits, especially the US, giving rise to waves of protectionism and trade wars.

How significant are these imbalances at present, and how have they evolved historically?

An analysis of existing historical and current data reveals that the trend toward widening current account deficits in some countries and surpluses in others is surprisingly persistent (Graph 1). These global imbalances are fundamentally different from short-term volatility and random deviations from equilibrium in international trade, which could be overcome by free market mechanisms.

The polarisation of the global economy into countries with large persistent current account deficits and massive current account surpluses is a long-term tendency that has been intensifying for several decades. It became more acute after the East Asian crisis of 1997–98. The second, more powerful impulse for the widening of the US current account deficit came after China's acceded to the WTO in 2001, and the so-called China Shock.

China Shock refers to the 12-year huge increase in Chinese imports into the US and Europe and the decline US and European manufacturing jobs. This phenomenon is well documented in many research papers, particularly in Callendo, Lorenzo; Dvorkin,

Maximilliano; Parro, Fernando (2019)[57], D. Autor et al. (2013[58], 2016[59]) and others. In the work of D. Autor et al. (2013) authors concluded that the growth of Chinese exports was largely the result of reform-induced changes within China: rising productivity growth, greater investment in labour-intensive export sectors, and a lowering of trade barriers. This research paper provides evidence that US exposure to Chinese import competition affected local labour markets through a decrease in manufacturing employment and wages. Reductions in both employment and wage levels led to a steep drop in the average earnings of households, growth of government spending for the households' social support and an increase in the US trade deficit.

At present, the US current account deficit continues to widen. For decades, the current account deficit in the US economy has remained the largest among all countries and continues to widen. It widened by 25.2% in 2024 and reached its highest historical volume of $1.13 trillion or 3.9% of GDP. The core of this deficit is the US trade deficit on goods, which stands at $1.21 trillion. Surplus of balance on services was $295,2 billion, deficit of primary income balance was $8,89 billion, and deficit of balance on secondary income was $206,87 billion[60].

[57] Callendo, Lorenzo; Dvorkin, Maximilliano; Parro, Fernando (2019) Trade and Labor Market Dynamics: General Equilibrium Analysis of the China Trade Shock, Econometrica. 87 (3): 741-835 **https://doi.org/10.3982/ECTA13758**

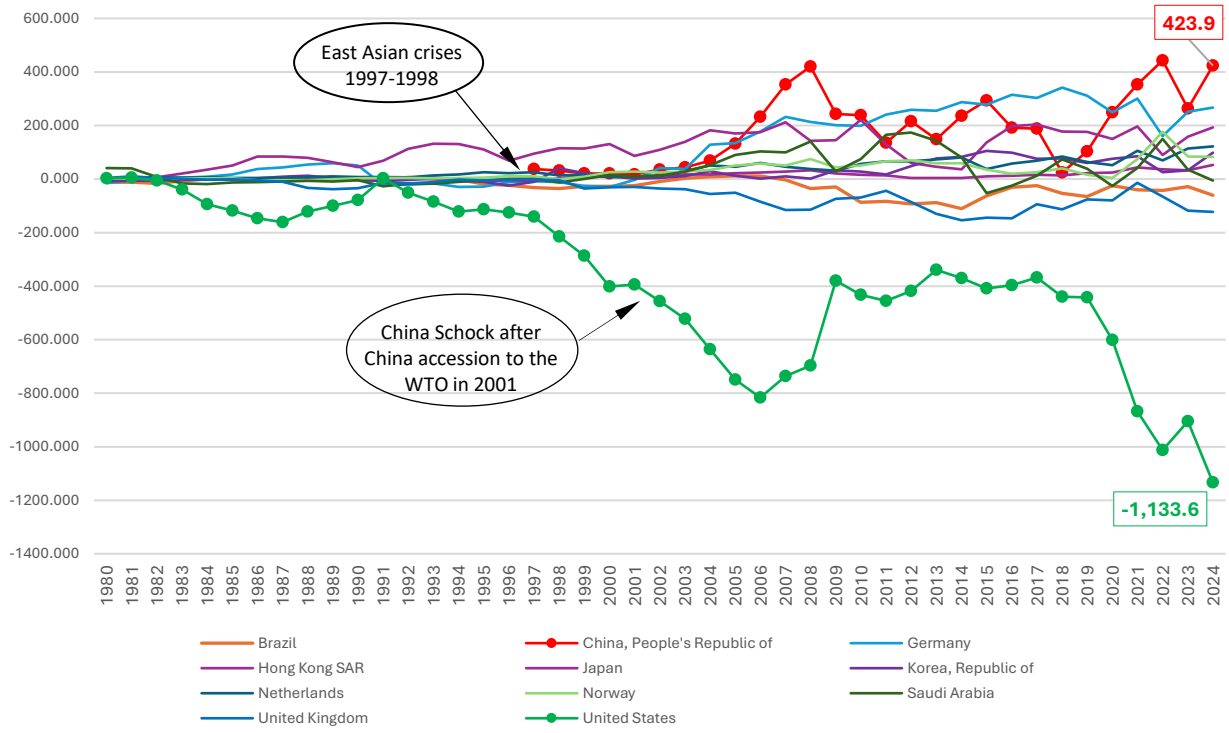
[58] Autor, David H., David Dorn, and Gordon H. Hanson. 2013. "The China Syndrome: Local Labor Market Effects of Import Competition in the United States." *American Economic Review* 103 (6): 2121–68.DOI: 10.1257/aer.103.6.2121

[59] David H. Autor & David Dorn & Gordon H. Hanson (2016)[59]. "**The China Shock: Learning from Labor Market Adjustment to Large Changes in Trade,**" Annual Review of Economics, vol 8(1).

[60] The U.S. Bureau of Economic Analysis https://www.bea.gov

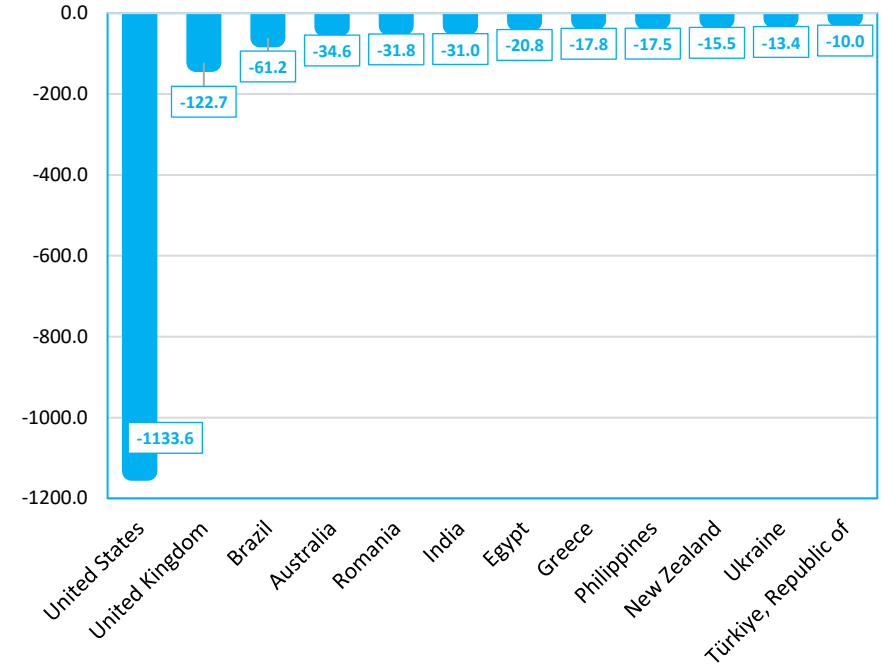
Graph 1. Current account by countries 1980-2024 (Bilions of US Dollars)

Chart: compiled by the authors, data source - IMF database



Other countries also had significant current account deficits in 2024, although much smaller than the US. The countries in this category with the largest deficits include the United Kingdom ($122,7 billion), Brazil ($61,2 billion), Australia ($34,6 billion), Romania, India, Egypt, Greece and others (Graph 2).

Graph 2. Current account balances of deficit countries in 2024
(Billions of US Dollars)
Chart: compiled by the authors, data source - IMF database



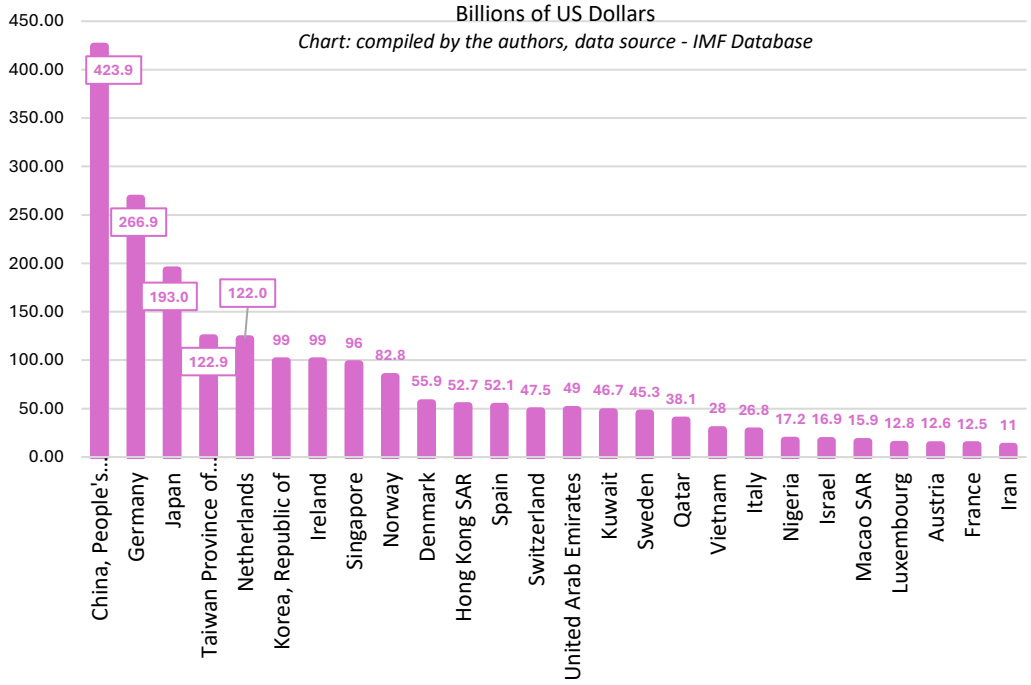
At the same time, China continues to be the country with the world's largest current account surplus. Since 2020, it has surpassed Germany in this indicator, and in 2024, China's current account surplus reached a historic maximum of $423.92 billion, or 1.7% of GDP. The core of this surplus was China's excess of goods exports over imports. The trade surplus in goods in 2024 amounted to $767.9 billion. Trade in services remained in deficit, amounting to $228.8 billion[61].

The group of countries with the most significant and persistent current account surpluses in 2024 also includes Germany ($266,9 billions), Japan ($193 billions), Taiwan ($122,9 billions), Netherland ($122 billions), Republic of Korea ($99 billions), Ireland ($99 billions), Singapore ($96 billions) and others (Graph 3).

[61] China's State Administration of Foreign Exchange https://www.safe.gov.cn/en/2025/0214/2282.html

Graph 3. Current account balances of surpluse countries in 2024, Billions of US Dollars

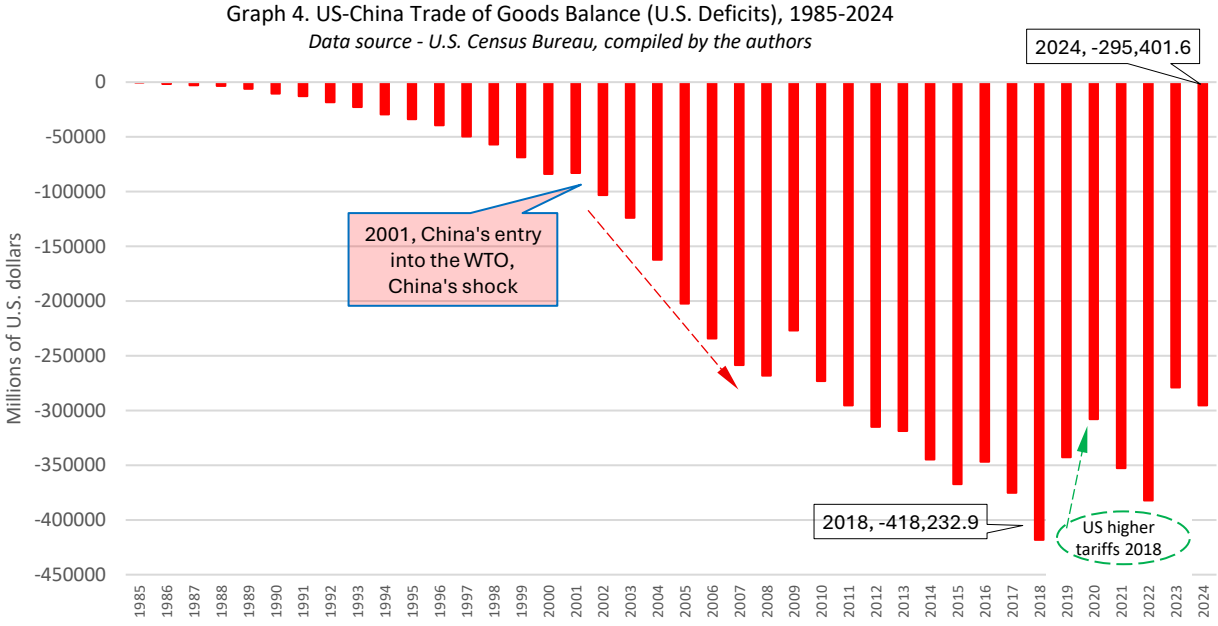
Chart: compiled by the authors, data source - IMF Database



One of the most heavily disputable problems is the bilateral trade imbalance between the US and China. The US trade deficit with China rose substantially after China's Accession to the World Trade Organisation in 2001 and reached its historical maximum $418,2 billion in 2018.

Graph 4. US-China Trade of Goods Balance (U.S. Deficits), 1985-2024

Data source - U.S. Census Bureau, compiled by the authors



After the US introduced higher tariffs on imports from China in 2018, the US-China trade balance deficit began to decline, eventually reaching $295.4 billion in 2024 (Graph 4). This deficit accounts for 24.4% of the total US trade deficit, which reached a record high of $1.21 trillion in 2024.

Overall, the largest trading partners of the US with which it had a trade deficit[62] in 2024 were:

- China ($295,4 billion, 24,4%);

- the EU ($235,6 billion, 19,5%), в котором дефицит с Германией имеет наибольший вес ($85 billion);

- Mexico ($172,8 billion, 14,3%);

- Vietnam ($123,5 billion, 10,2%);

- Ireland ($87 billion, 7,2%);

- Canada ($63,3 billion, 5,2%).

The US trade deficit with these countries accounted for about 81% of the total US trade deficit.

A more widen historical analysis of the US current account for the period 1960 – 2024 years shows two other important periods (Graph 5):

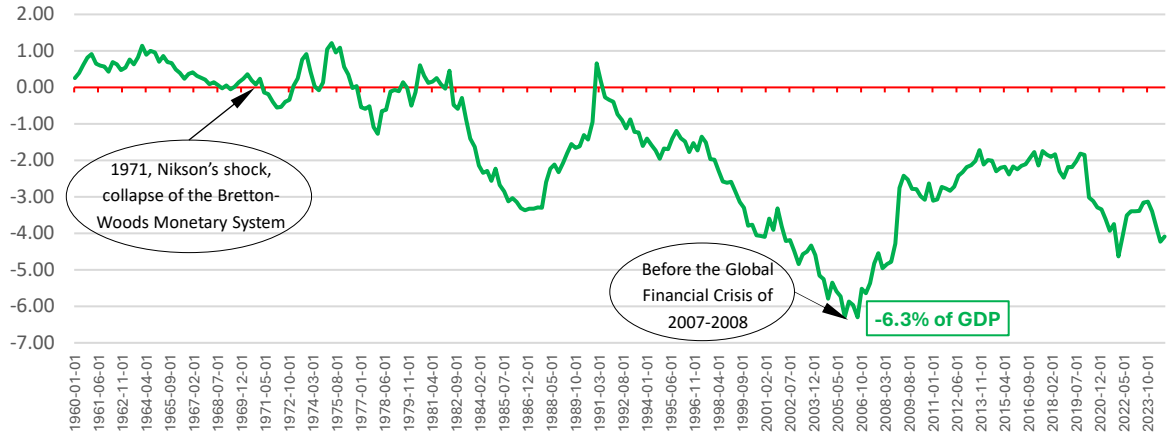
- 1971, the year of the Nikson's shock and collapse of the Bretton-Woods international monetary system, when Nikson announced changes in the fixed exchange rate of the US dollar related to gold and then the entire disconnection US dollar from gold. Starting from this period, the dynamics of the US current

[62] U.S. Census Bureau and U.S. Bureau of Economic Analysis, Trade Balance: Goods, Balance of Payments Basis [BOPGTB], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/BOPGTB, April 28, 2025. The U.S. Bureau of Economic Analysis https://www.bea.gov

account became more volatile, remained in deficit for a significant period, and then, starting from 1991, fell into a persistent and deep deficit;

- the period before the Global Financial Crisis (GFC) of 2008-2009, when the deficit of the US current account widened sharply and reached in 2006 its historical maximum in percent of GDP (-6,3%).

Graph 5. Current account in US economy for the period 1960-2024 (% of GDP)
Chart: compiled by the authors, data source - Board of Governors of the Federal Reserve System (US), U.S. Bereau of Economic Analysis via FRED



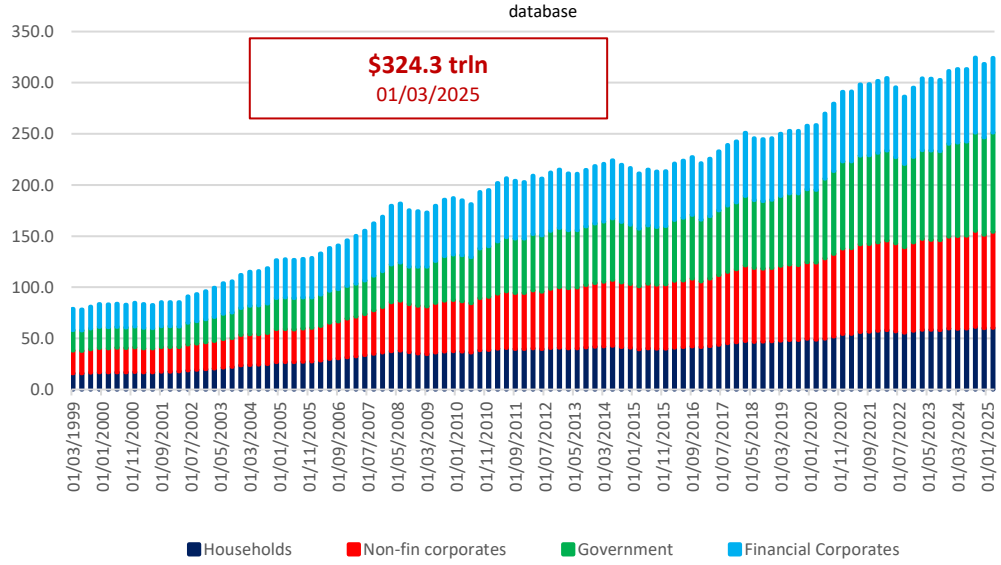
After the dollar was unpegged from gold and the Bretton Woods international monetary system collapsed, the world shifted to the new Jamaican monetary system, which remains in place today, and a process of more liberal US dollar issuance began. In the same period, the US government debt began to grow at quite a high speed (Graph 12 p. 3.2), a trend that accelerated for the next decades and at present. A more detailed analysis of the imbalances in debt dynamics is presented in the following paragraph.

3.3. Imbalances in the global debt dynamics

The enormous growth of global debt over the past decades and the high level of costs of servicing it, which require new borrowing to pay for, is the second type of global imbalance. It increases the vulnerability of the world economy and global finance to shocks and systemic risk.

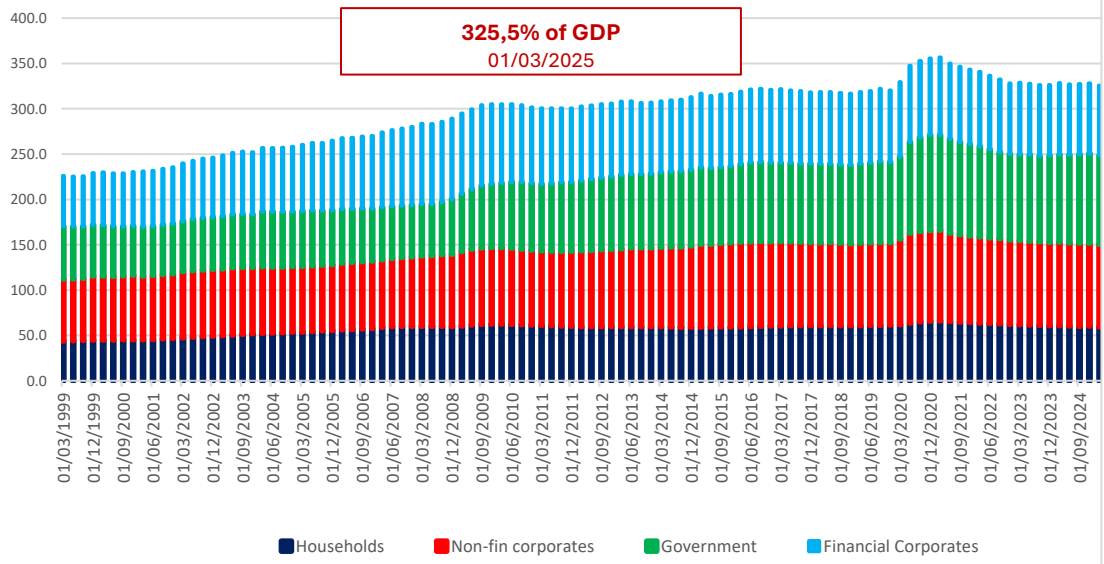
By the Global Debt Monitor database of the Institute of International Finance[63], the total global debt rose by $7.5 trillion to a new record high of over $324 trillion in Q1 2025. Это составило 325,5% of global GDP (Graph 6, 7).

Graph 6. Global Debt total and by sectors
(trillion of US dollars)
Chart: compiled by the authors, data source - Institute of International Finance, Global Debt Monitor database



[63] https://www.iif.com/Products/Global-Debt-Monitor#:~:text=Global%20debt%20rose%20by%20some,%24324%20trillion%20in%20Q1%202025.

Graph 7. Global Debt total and by sectors,
(Percent of GDP)
Chart: compiled by the authors, data sources - Institute of International Finance, Global Debt Monitor database

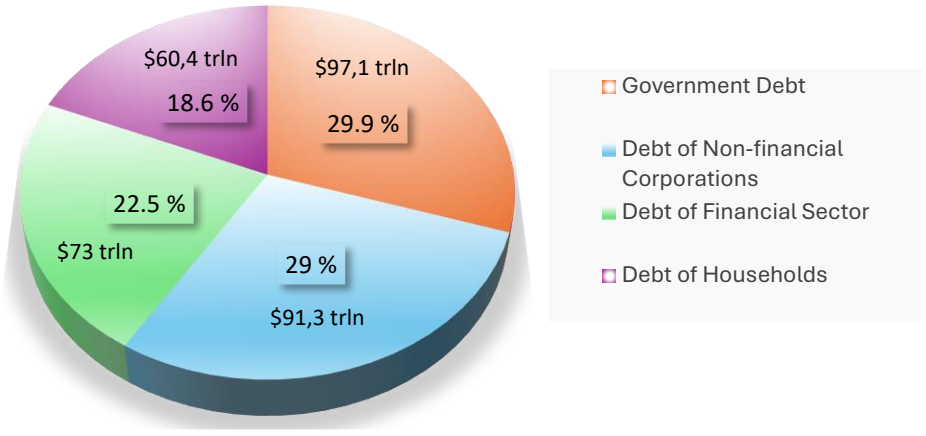


The structure of global debt by sector is as follows: households' debt reached $60,4 trillion (59,2% of GDP), debt of non-financial corporations was $94 trillion (91,3% of GDP), debt of financial corporations was $73 trillion (77% of GDP), and global government debt was $97,1 trillion (98% of GDP).

Government debt accounts for almost 30% of total global debt. Private debt, which includes the debts of non-financial corporations, the financial sector, and households, accounts for 70%: the debts of the non-financial corporate sector and the financial sector account for 29% and 22.5%, respectively, while global household debt accounts for 18.6% (Graph 8).

Graph 8. Structure of Global Debt in 2024

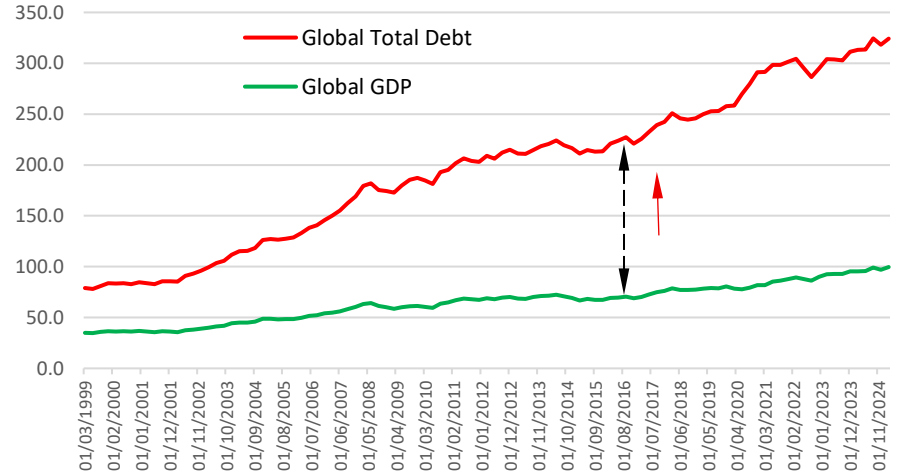
Chart: complied by the authors, data source - IMF, IIF Global Debt Monitor



The total global debt has grown by $245 trillion in 26 years and reached $324,3 trillion, while the global GDP has grown only by $64,7 trillion in the same period and reached $99,6 trillion (Graph 9).

Graph 9. Global Total Debt and Global GDP, Trillion of Dollars

Chart: compiled by the authors, Data source - IMF, IIF Global Debt Monitor database



That is, on average, global debt rose almost four times faster than GDP and now exceeds the total GDP by three times. Such dynamics undermine the basic principle of debt and fiscal sustainability. It assumes that a healthy and sustainable source for debt repayment should be the growth of the economy's evenues (i.e., part of GDP

growth), rather than new borrowed funds, which would be a Ponzi scheme. With the current dynamics of global debt, the classic rule of debt sustainability

$$g_t > r_t$$

g_t – GDP growth rate at period t, r_t – rate of the debt service costs at the period t

has been broken.

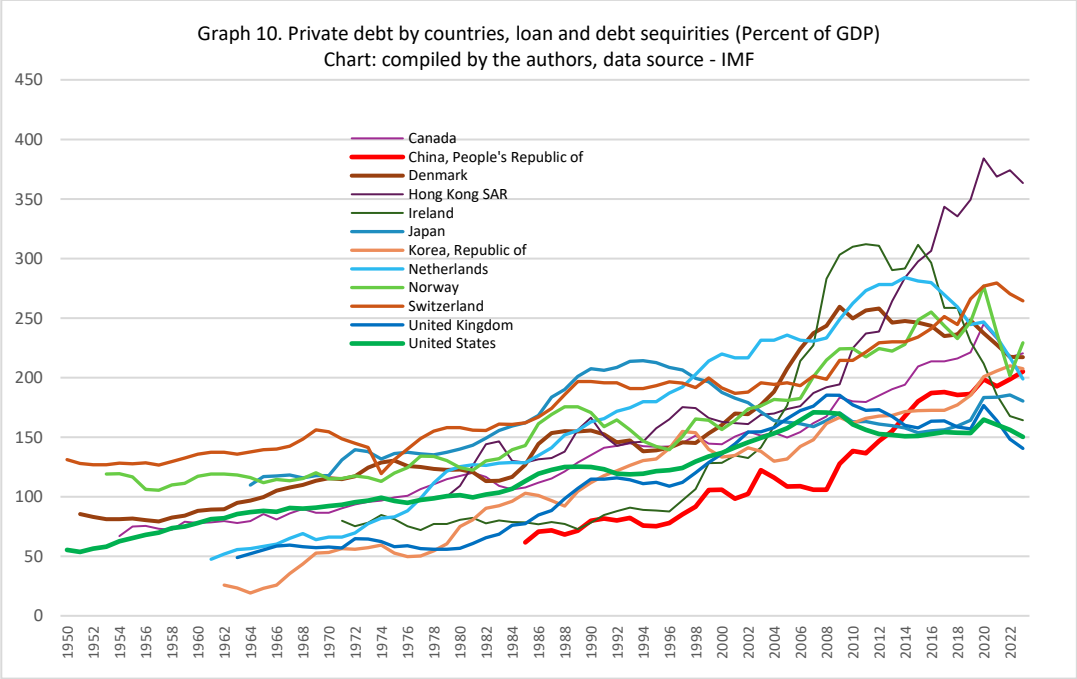
Accelerating debt growth leads to a debt trap, global imbalance, and high vulnerability to risks. In the OECD "Global Debt Report 2025", authors warn: "Our world has already shifted to a new paradigm in terms of debt levels, with governments and companies borrowing approximately USD 10 trillion more from markets every year compared to the pre-COVID period (2015-19)"[64]. From our point of view, this statement about a new debt paradigm deserves close attention and coordinated efforts by the most indebted countries to reduce it. This is especially true given that interest payments continue to rise, as record levels of Treasury bonds issued at low rates need to be refinanced. Long-term rates also reached their highest levels in nearly 20 years in several major markets in 2024[65].

An analysis of countries in terms of their private and public debt as a percentage of GDP revealed that private debt has grown most rapidly over the past 10 years in Hong Kong SAR, Switzerland, Canada, China, and Korea. According to IMF data, at the beginning of 2024, private debt in these countries reached 363%, 265%, 220%, 207%, and 205% of GDP, respectively (Graph 10). Other countries with large private debt exceeding 200% of GDP are Norway, Denmark, and Sweden, at 229%, 217%, and 211%, respectively, but the dynamics in these countries show a downward trend.

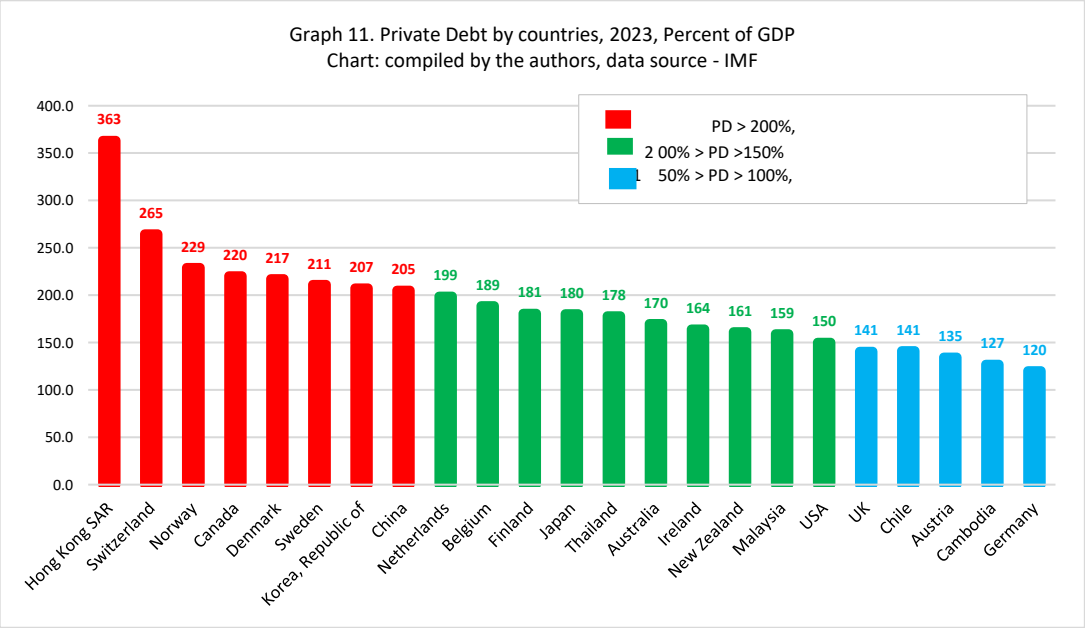
[64] OECD Global Debt Report 2025. Financing Growth in a Challenging Debt Market Environment https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/03/global-debt-report-2025_bab6b51e/8ee42b13-en.pdf

[65] OECD Global Debt Report 2025. Financing Growth in a Challenging Debt Market Environment https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/03/global-debt-report-2025_bab6b51e/8ee42b13-en.pdf

Private debt in the US was 150% of GDP in 2024, which is less than in many other countries.



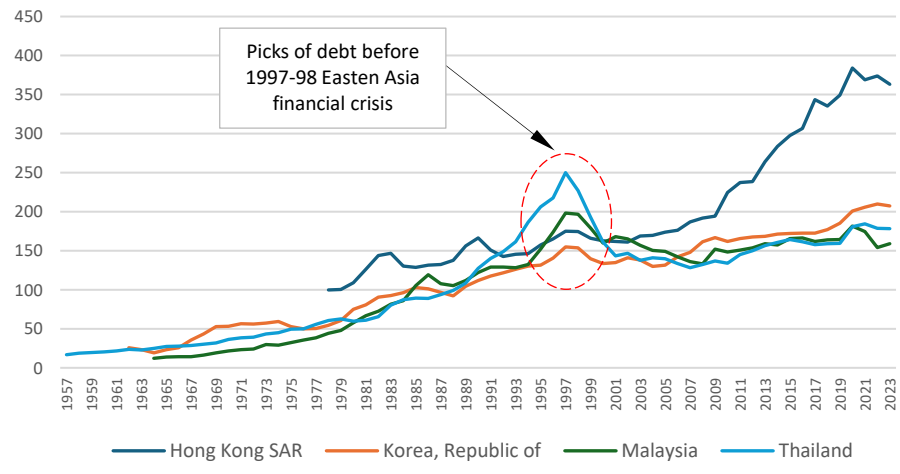
We divided countries with high private debt relative to GDP into three groups based on the value of this indicator (Graph 11).



Based on IMF data for the beginning of 2024, the group of countries with private debt exceeding 200% of GDP includes Hong Kong SAR, Switzerland, Canada, Denmark, Sweden, Korea, and China. Countries with private debt less than 200% of GDP but greater than or equal to 150% include the Netherlands, Belgium, Finland, Japan, Thailand, Australia, Ireland, New Zealand, Malaysia, and the USA. The third group, with private debt less than 150% of GDP but greater than 100% of GDP, includes the UK, Chile, Austria, Cambodia, and Germany.

As for East Asian countries such as Thailand, South Korea, Malaysia, and Hong Kong, the massive inflow of foreign speculative short-term capital into portfolio investments, which began in 1992, led to a rapid increase in private debt in these countries. By 1997, Thailand's private debt had soared to 250% of GDP, Malaysia's to 198% of GDP, Hong Kong's to 176% of GDP, and South Korea's to 155% of GDP (Graph 12).

Graph 12. Private debt, loan and debr sequirities in Easten Asia countries
(Percent of GDP)
Chart: compiled by the authors, data source - IMF



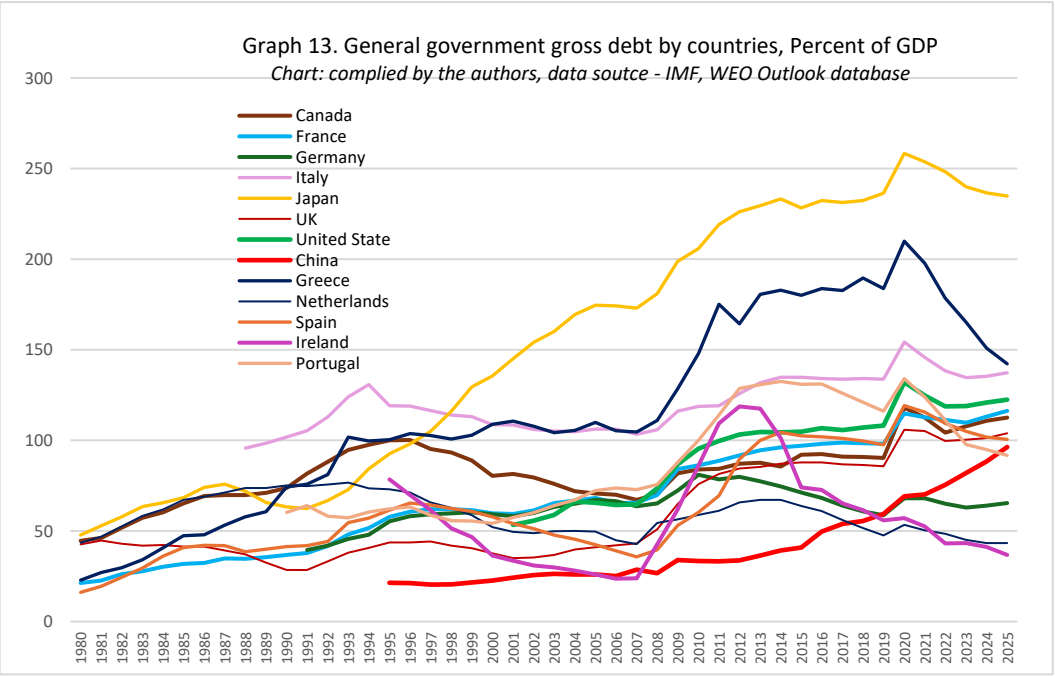
This led to an increase in systemic risks, an abrupt “sudden stop” in cash inflows, capital outflows, and a large-scale East Asian crisis that devastated the economies of these countries and hurt other countries.

Government debt is a crucial element in the assessment of debt imbalances, as it accounts for nearly 30% of global debt and is one of the primary indicators of country risk.

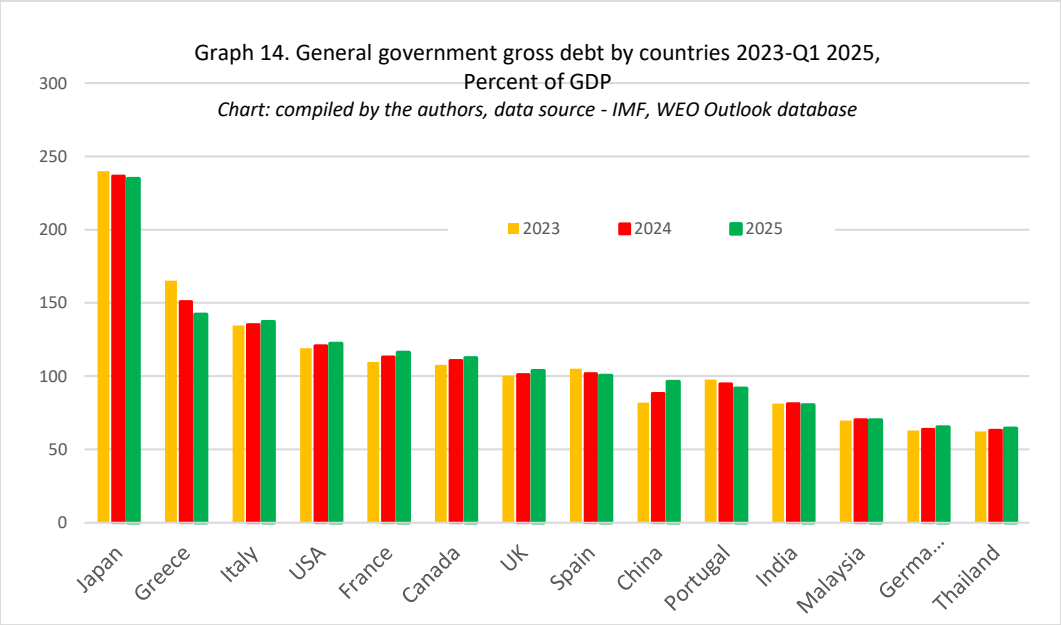
At the end of the first quarter of 2025, the countries with the highest government debt-to-GDP ratios were Japan (235%), Greece (142,2%), Italy (137,3%), USA (122,5%), France (116,3%), Canada (112,5%), UK (104%), Spain (101%), China (92%) and Portugal (92%) (Graph 13, 14).

Graph 13. General government gross debt by countries, Percent of GDP

Chart: complied by the authors, data soutce - IMF, WEO Outlook database



In countries such as Japan, Greece, Spain, and Portugal, government debt-to-GDP ratios have been trending downward since 2021. Meanwhile, in the USA, France, the UK, and China, this indicator continues to grow. It is growing particularly rapidly in China. Its growth rate has increased since 2015, and over the past 10 years, this indicator has increased from 41% of GDP in 2015 to 92% of GDP at the end of the first quarter of 2025.



The global picture by region in terms of debt dynamics as a percentage of GDP in 2024 compared to 2023 is as follows:

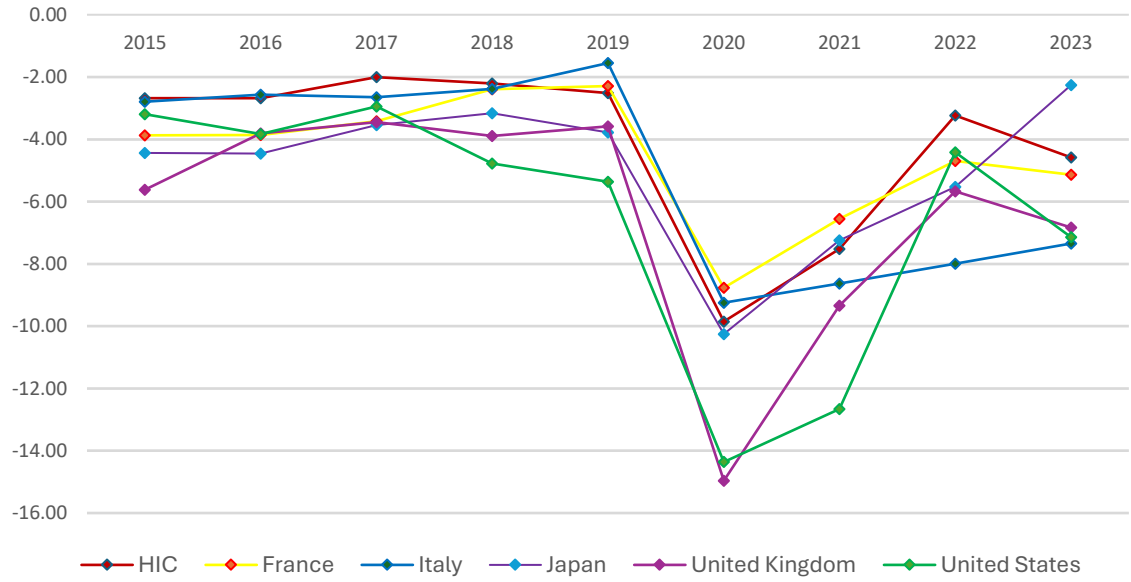
- in advanced economies (excluding the US), it was declining dynamics: total debt was 268%, private debt declined by 6% to 165%, public debt declined by 3% to 103%;
- in the US, it was mixed dynamics: total debt was 273%, private debt declined by 6% to 150%, but public debt increased by 3% to 123%;
- in China, it was rising dynamics: total debt was 289%, private debt rose by 7% to 205%, public debt rose by 7% to 84%;
- in Emerging Markets (excluding China), it was rising dynamics: total debt was 126%, private debt was stable and remained 69%, public debt rose by 2% to 57%.

However, despite mixed trends in certain regions, global debt has increased by $74 trillion over the past 15 months: from $250 trillion in 2023, which is 237% of GDP, to $324 trillion in Q1 2025, which is 325.5% of GDP. These figures are striking and indicate

growing imbalances in global debt dynamics and the accumulation of systemic risks associated with excessive debt service costs.

In particular, the government net lending (+)/net borrowing (–) indicator for high-income countries (HIC) as a whole and for key countries in this group has been in a position of persistent deficit over the past ten years (Graph 15).

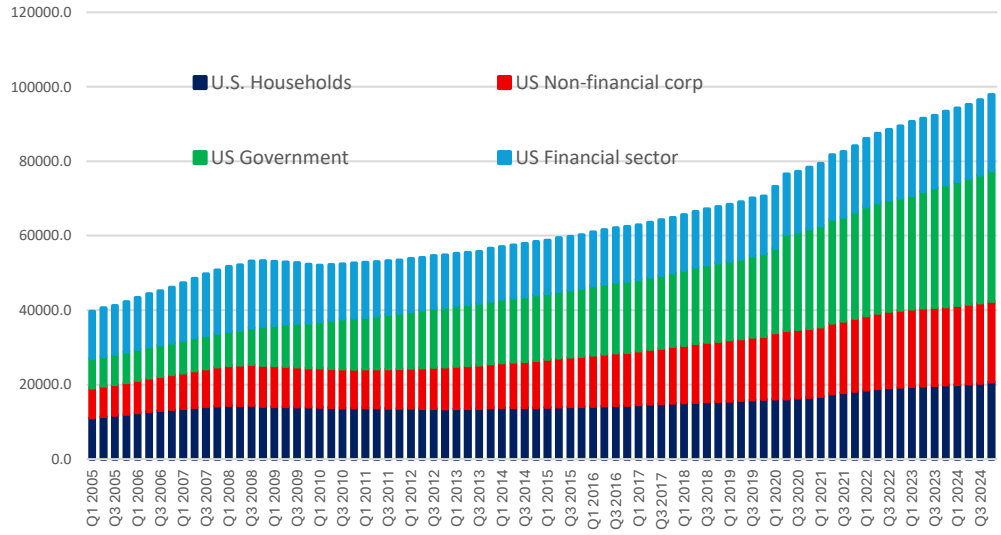
Fig. 15. General government net lending/borrowing
(Persent of DGP)
Chart: compiled by the authors, data source - World Bank, World Development Indicators database



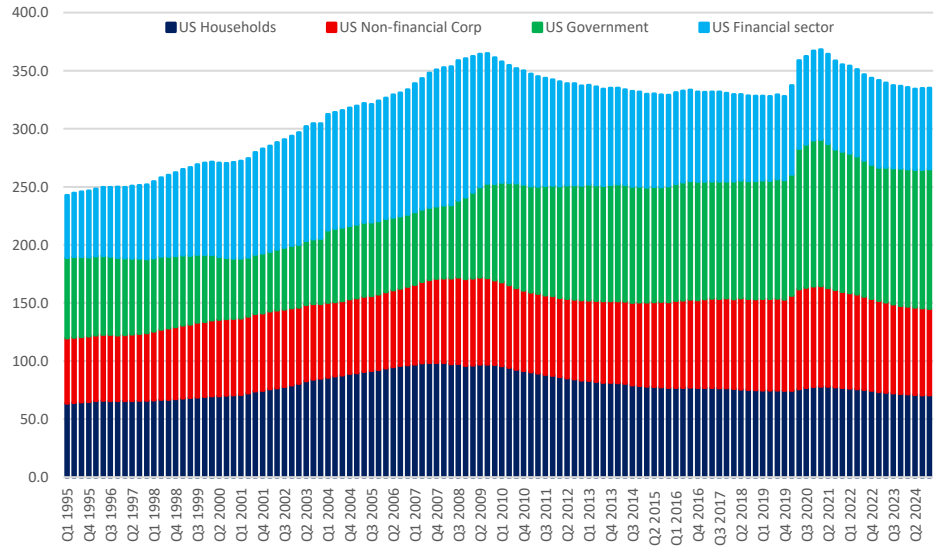
Let us examine the dynamics of the total and government debt in the United States in more detail. Since the US dollar is the world's reserve currency, providing international liquidity through channels of payment for imports, external debt repayment and financial markets, the dynamics of US debt flows are of systemic importance for many countries and the global economy as a whole.

US total debt in 2024 reached $97,8 trillion, with private debt at $62,7 trillion and government debt at $35,07 trillion. It was in percent of GDP, respectively 337,2% with private debt at 216,2% and government debt at 121% (Graph 16, 17).

Graph 16. US debt total and by sectors
Billion of dollars
Chart: compiled by the authors, data source - IMF, IIF Finance, Global Debt Monitor database

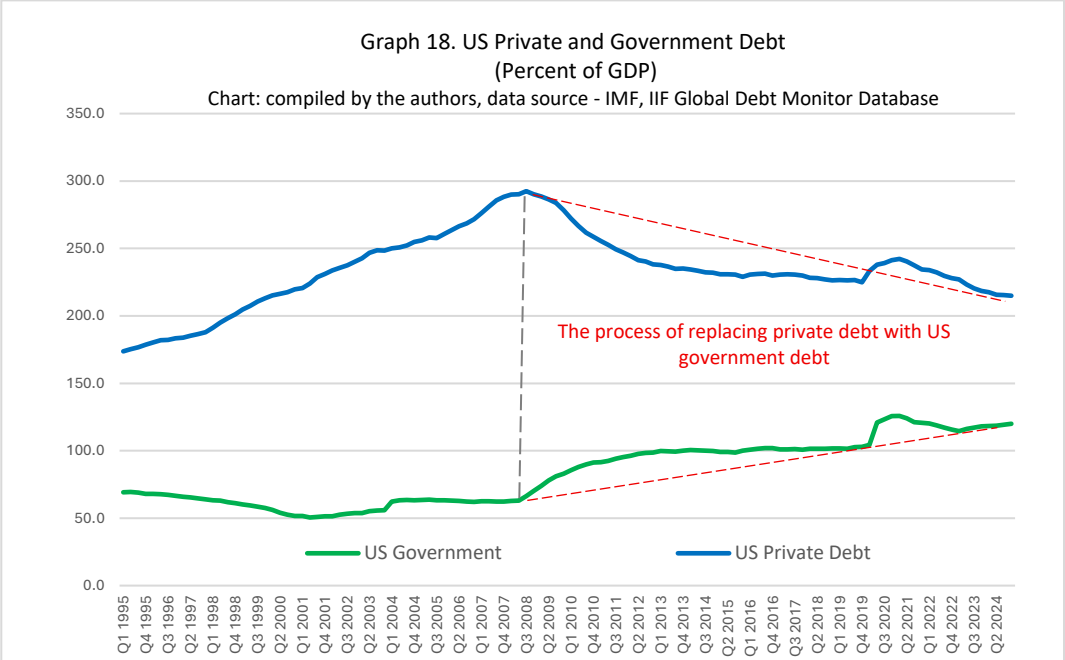


Graph 17. US debt total and by sectors
Percent of GDP
Data source - IMF, IIF Global Debt Monitor database



US private debt peaked during the 2008–2009 financial crisis, reaching 290.3% of GDP in the second quarter of 2008. Household debt reached 98.6% of GDP in the third quarter of 2007, non-financial corporate debt was 75% of GDP in the first quarter of 2009, and financial sector debt reached 120.4% of GDP at the middle of the crisis in the third quarter of 2008.

Gradually declining in the process of households and corporations deleveraging, private debt was partially substituted by growth in government debt (Graph 18).

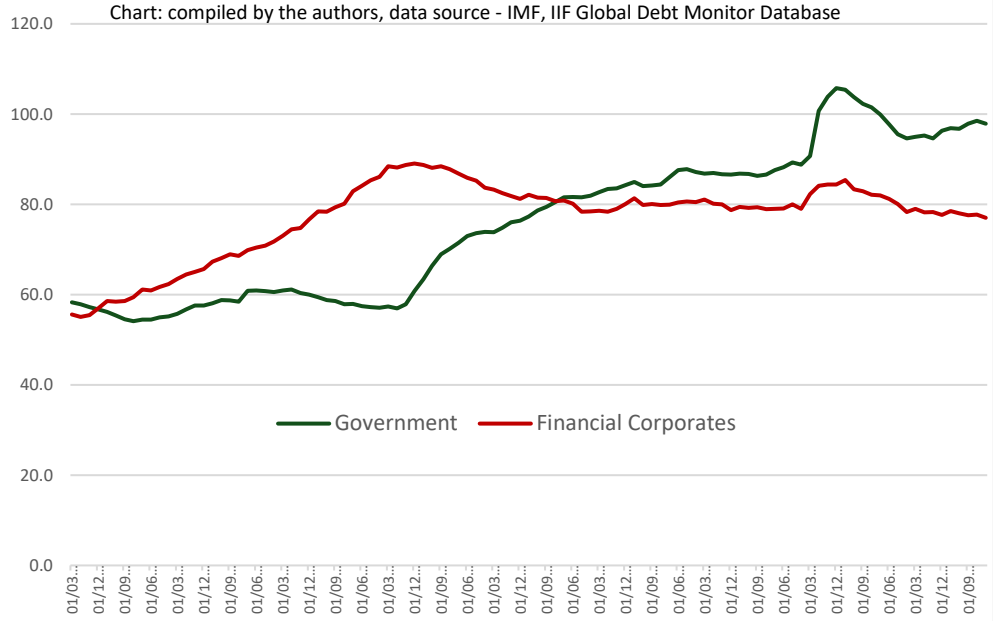


This is especially clear when analysing the dynamics of private debt in the financial sector and the growth of government debt in the US and the global economy during this period. This substitution characterises the process of government financing of anti-crisis measures and bail-out operations to rescue financial organisations. (Graph 19, 20)

Another spike in US government debt occurred during the Covid-2019 crisis. In the first quarter of 2021, US government debt reached its historic maximum as a percentage of GDP (125.8%), while private debt increased to 242.2%. This was followed by a slight decline in government debt to 114.6% by the first quarter of 2023, after which it began to rise again. As a result, by 20/05/2025, US government debt rose to its historical maximum in dollar terms of $36.2 trillion (122.5% of GDP).

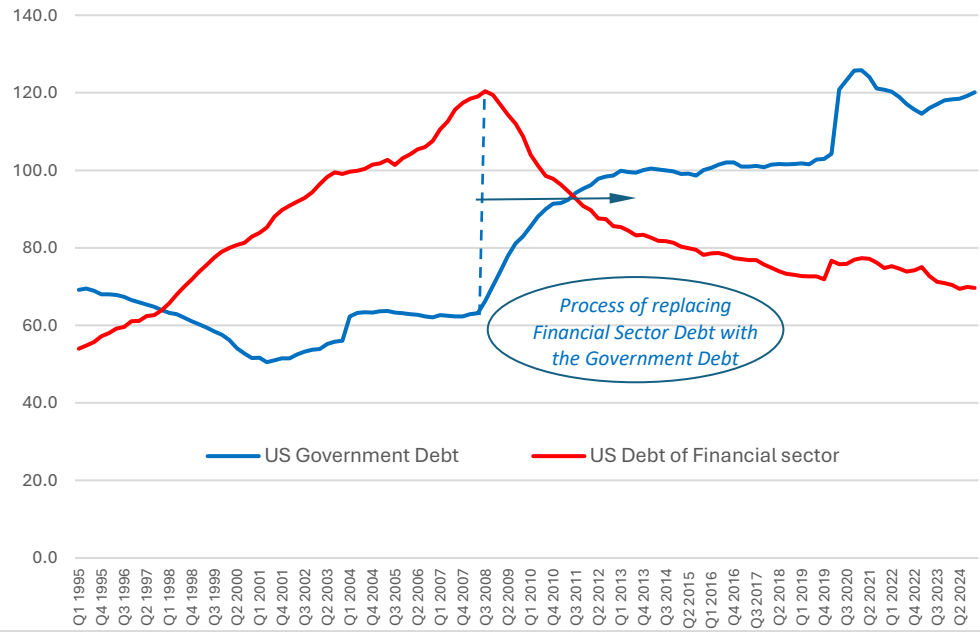
Graph 19. Replacing Global Debt of Financial Corporations with Global Government Debt, Percent of GDP

Chart: compiled by the authors, data source - IMF, IIF Global Debt Monitor Database



Graph 20. US Debt of Government and Financial Sector Percent of GDP

Chart: compiled by the authors, data source - IMF, IIF Global Debt Monitor Database



US Government Debt includes intragovernmental holdings and debt held by the public, including securities issued by the US Treasury. US government debt is held domestically for $27.2 trillion (75%) and by foreign investors for $9.05 trillion (25%).

US domestic government debt includes:

- $15,2 trillion (42%) that is held by private investors mostly in the form of savings bonds, mutual funds and pension funds;

- $7,36 trillion (20%) is held by intra-government US agencies and trusts;

- $4,36 trillion (13%) is held by the Federal Reserve System.

Foreign investors in Japan hold $1.13 trillion of US government debt, in the United Kingdom - $779.3 billion, China holds $765.4 billion, the Cayman Islands holds $455.3 billion as a tax haven, and Canada holds $426.2 billion.

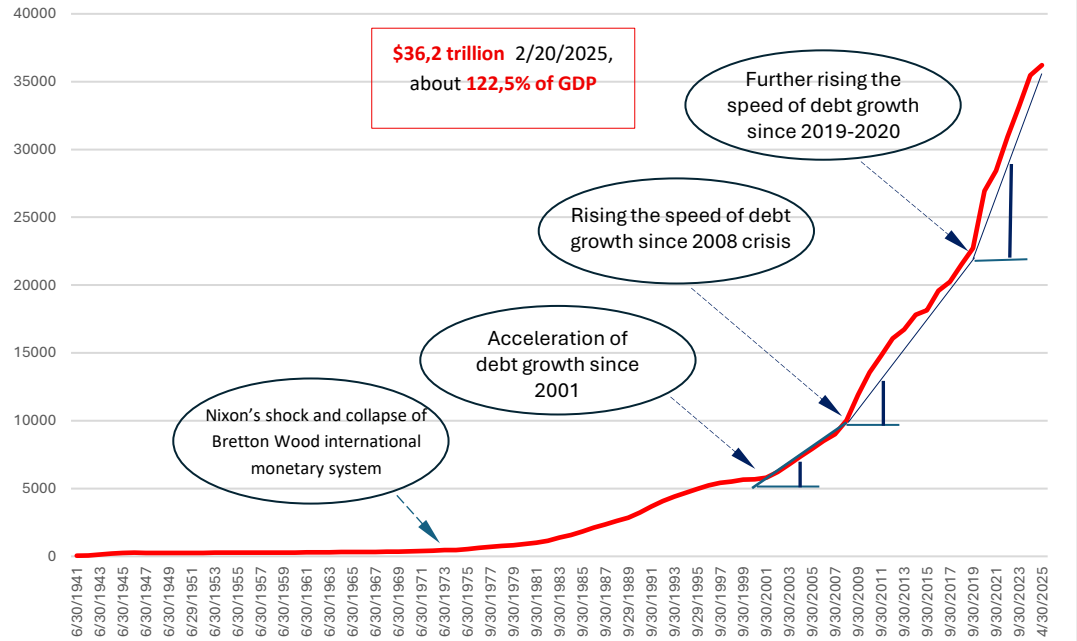
A retrospective historical analysis of the dynamics of US government debt since 1941 shows three points of significant increase in its growth rate (Graph 21): since 2001, 2008 and since 2019-2020.

- In 2000-2001, the US experienced the dot-com crisis, and since 2001, China's shock;
- 2008 was the peak of the global financial crisis, which began with the subprime mortgage crisis in the US;
- and 2019-2020 was the period of the Covid-19 crisis.

Each time, the US government responded to the crisis by accelerating the rate of growth of government debt. This rate did not slow down after the crisis but became the new normality and a starting point for the next round of debt growth. Such type of a debt policy, even despite the status of the US dollar as the world's reserve currency, poses risks for fiscal and debt sustainability.

Grapph 21. US Government Debt, Bilion of Dollars,

Chart: compiled by the authors, data source - The US Department of the Treasury and the Bureau of the Fiscal Service

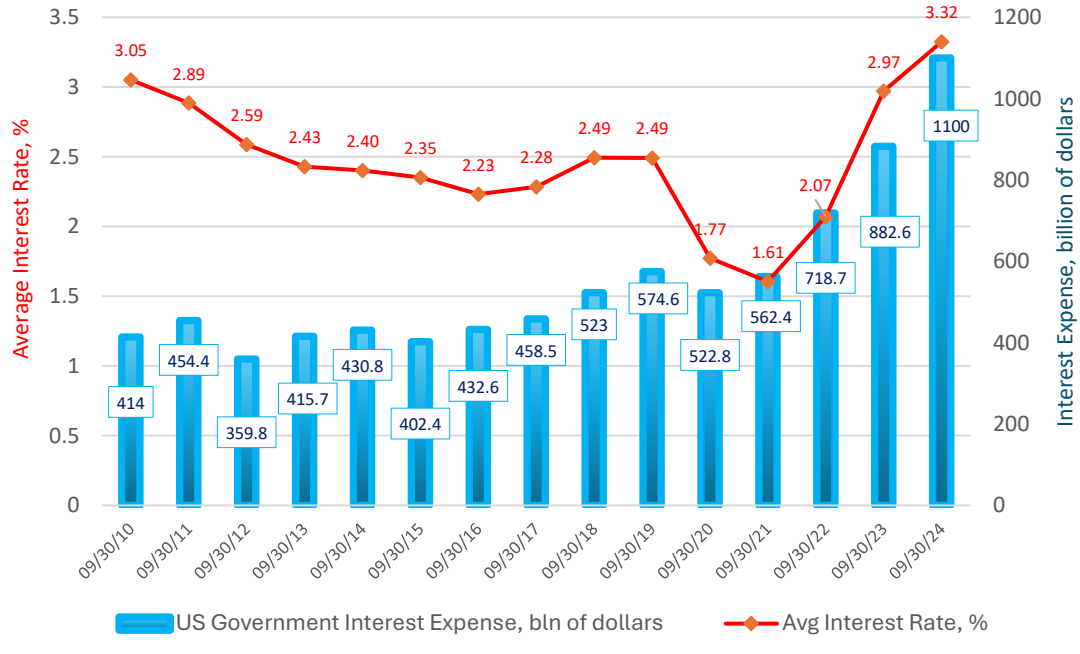


Reinhart Carmen M. and Kenneth S. Rogoff (2008)[66] studied the effects of government debt on economic growth using a massive corpus of empirical data covering more than 100 countries and 800 financial crises. They found empirical evidence that countries with government debt levels exceeding 90% of GDP had significantly lower economic growth. Countries with excessive government debt are caught in a vicious circle. On the one hand, rising debt and debt servicing costs increase government interest payments and budget deficits. On the other hand, economic growth slows down, which negatively affects budget revenues and the budget deficit.

[66] Reinhart Carmen M. and Kenneth S. Rogoff (2008) This Time is Different: A Panoramic View of Eight Centuries of Financial Crises, NBER Working Paper No. 13882 March 2008 JEL No. E6,F3,N0

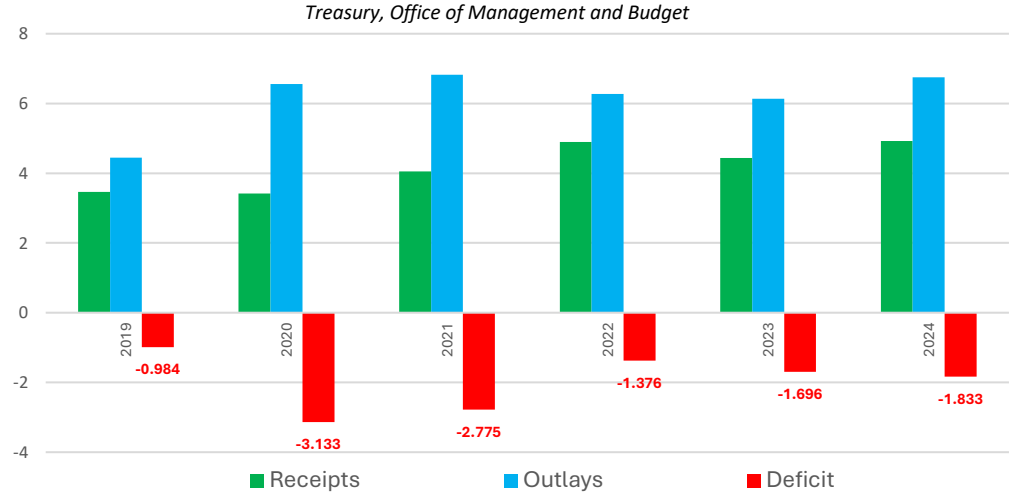
The deficit of the US federal budget totalled $1,8 trillion in fiscal year 2024 (as of 9/30/2024)[67] or -6,4% of GDP. Net outlays for interest on the government debt rose to a total of $949 billion. Those outlays rose substantially – increasing by $239 billion (or 34%) – primarily because interest rates were significantly higher in fiscal year 2024 in comparison with those in the previous years. Thus, in 2024, interest payments outlay exceeded the spending of the Department of Defence – Military, which was $826 billion. It is a quite dangerous dynamic, which is a serious challenge for the new US Administration and requires a systematic strategy for monitoring and reducing the risks of fiscal unsustainability. The US federal government's gross interest payments dynamics and average interest rates are presented on Graph 22, and the evolution of budget deficits for last five years presented on Graphs 23, 24.

Graph 22. US Government Interest Expense (Billion of Dollars) and Average Interest Rates (%)
Chart: compiled by the authors, data source - US Government Fiscal Data

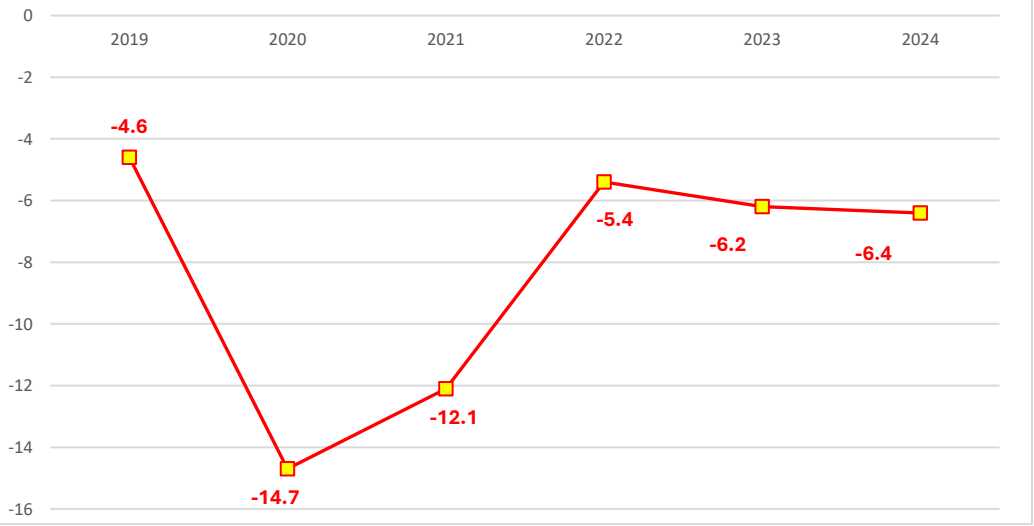


[67] US Congressional Budget Office, Department of the Treasury https://www.cbo.gov/publication/60843/html#total-outlays-up-by-10-percent-in-fiscal-year-2024

Graph 23. US Federal Budget revenues, outlets and deficits,
Fiscal Years 2019-2024 (trillion of US dollars)
Chart: compiled by the authors, data sources - Congressional Budget Office, Department of the Treasury, Office of Management and Budget



Graph 24. US Fedral Budget Deficit (Persent of GDP),
Fiscal Years 2019-2024
Data sources - Congressional Budget Office, Department of the Treasury, Office of Managment and Budget



Imbalances in debt dynamics become dangerous when fiscal unsustainability reaches a critical threshold, beyond which it turns into a fiscal crisis. The quantitative assessment of this threshold is the subject of academic debates and has its characteristics for each country. However, even preliminary assessments based on classical criteria can provide helpful information in the process of government decision-making. These standard criteria for fiscal sustainability assessment include

the transversality condition and the convergence of the government debt-to-GDP ratio to a constant level.

1) The essence of the transversality condition is:

$$\lim_{S\to\infty} \frac{1}{(1+r)^S}\, b_{t+S} = 0,$$

where b_t is the outstanding government debt at the end of period t, and r is the average interest rate for government debt measured in real terms.

The term $\frac{1}{(1+r)^S}\, b_{t+S}$ is the present value of outstanding government debt (value in period t) existing at the end of period $t+S$.

The transversality condition is a common measure of fiscal sustainability based on dynamic macroeconomics[68]

2) As many authors wrote[69], in practice, fiscal sustainability is often defined as the convergence of the government debt-to-GDP ratio to a constant value. The process of convergence depends on a differential $dif(t)$ between GDP growth ratio $g(t)$ and average interest rate on government debt $r\ (t)$:

$$dif\ (t) = g(t) - r(t)$$

Following Domar's rule, a necessary condition for fiscal sustainability is that the dynamics of the factors affecting the differential ensure that it remains in positive territory:

$$dif\ (t) = g(t) - r(t) > 0$$

[68] Eguchi Masataka and Hatano Toshiya (2023), What is fiscal sustainability? —Transversality condition, Domar condition, the fiscal theory of the price level - Policy Research Institute, Ministry of Finance, Japan, Public Policy Review, Vol.19, No.3, September 2023 https://www.mof.go.jp/english/pri/publication/pp_review/ppr19_3_1.pdf

[69] Yasuhito Tanaka (2024) Condition for convergence of debt to GDP ratio under full employment with consumption from assets and impossibility of fiscal collapse, Faculty of Economics, Doshisha University, Kyoto, Japan https://www.qeios.com/read/5DHSCH.2/pdf

This is a necessary precondition for fulfilling the two criteria of fiscal sustainability mentioned above: transversality and convergence of the government debt-to-GDP ratio to a constant value.

Conversely, if the differential is in the negative range

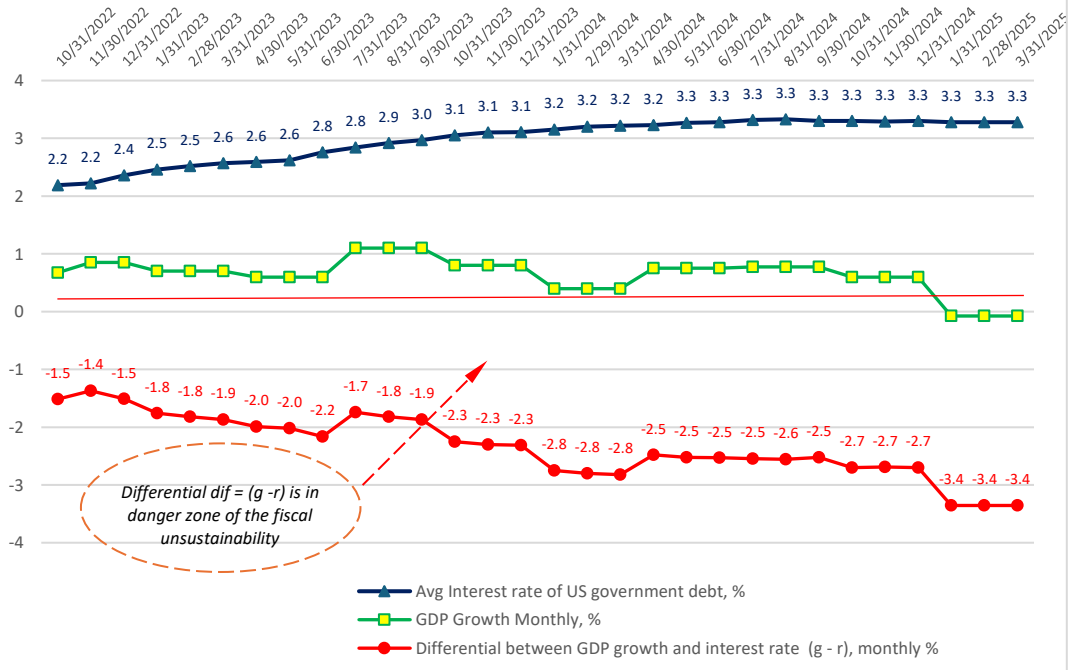
$$dif\ (t) = g(t) - r(t) < 0,$$

then the debt dynamics fall into the zone of fiscal unsustainability.

Analysis of the current state of US public debt and calculation of the differential trajectory for the last three years (Graph 25) revealed that already in 2022, the differential was in the negative zone. It means the area of fiscal unsustainability. In January 2025, the situation deteriorated, and the differential value reached its lowest value since then:

$$dif\ (t) = g(t) - r(t) = -3{,}4\%\,.$$

Graph 25. Average Interest Rates of US Government Debt, GDP Growth, Differential between GDP Growth and AIR (g-r), %
Chart: calculations of the authors, data source - US BEA, Treasury Fiscal data



The considered imbalances in international trade and global debt dynamics are important types of global imbalances, but this is not the whole picture. The described processes of widening imbalances in international trade and debt dynamics are taking place in the global financial environment, which is known as financialisation. It not only affects the outlined global imbalances, but also creates new ones, feeding the economic ground for the aggravation of geopolitical tension.

3.4. Global imbalances between financial and real sectors development.

Financialisation and deindustrialisation.

The global financial and economic crisis of 2008 brought the attention of the economic establishment to the excessive financialisation of the world economy and the exacerbation of its vulnerability. The financial crisis demonstrated that the enormously expanded financial sector brings not only fast, massive profits for its participants but also enormous risks that fall on the shoulders of the entire society.

What is the essence of financialisation?

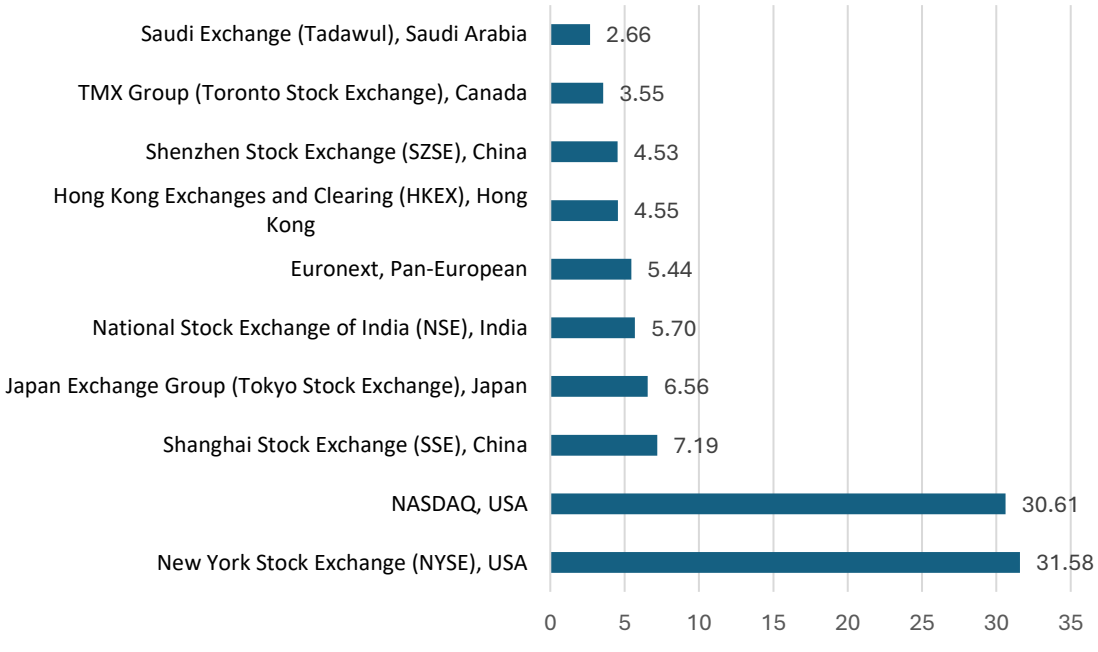
The financial industry was created to serve the real sector of the economy, to finance its economic growth and optimal capital allocation. However, over the past decades, the excessively grown financial sector in several developed countries has gradually detached itself from these functions, moved into a mode of self-sufficient self-growth in detachment from the real sector, and has come to dominate the economies of the financialising countries. This was demonstrated in the dramatic increase in the volume of financial markets, the explosion in the volume of financial trading, the growth of financial assets in all sectors of the economy, the rise in private and public debt, the fundamental changes in the behaviour of market agents, even non-financial

corporations and their orientation towards short-term financial profits through financial transactions. These processes continue to develop at present.

According to the Bank of International Settlements data, in 2024, the global foreign exchange trading daily volume was about $7.5 trillion per day; the turnover of OTC interest rate derivatives daily average reached $7.8 trillion; the notional value of all kinds of financial derivatives reached more than $600 trillion. Then, 60% of these transactions have been executed by algorithmic and high-frequency trading. These financial transactions are hardly related to the purpose of attracting financial resources for industrial production development.

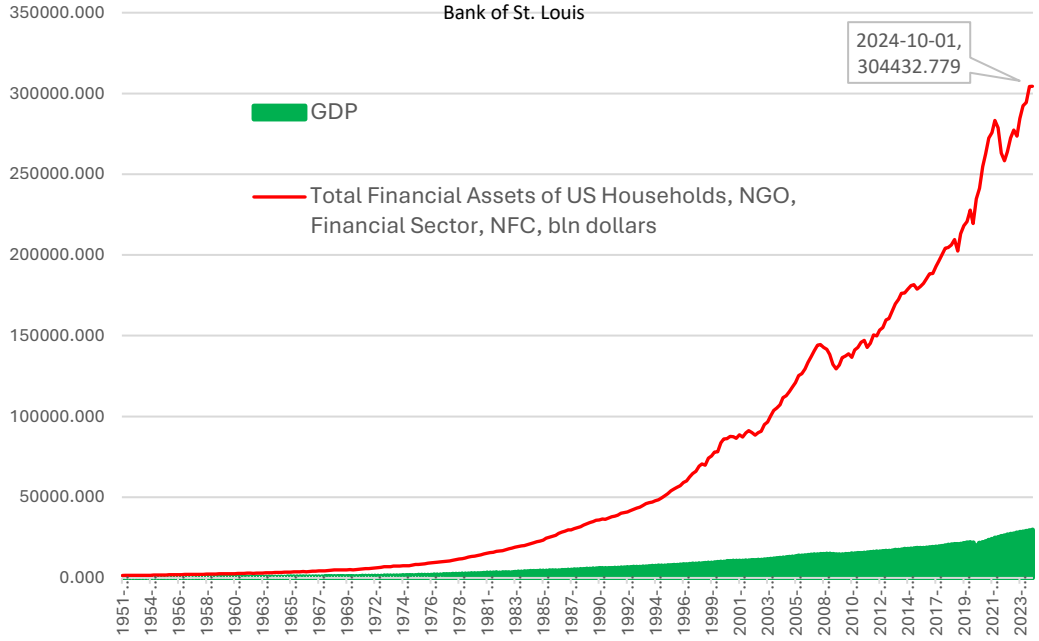
The US has the biggest financial markets in the world; particularly, the US stock markets in 2024 accounted for about 61% of world stocks (Graph 26), therefore, the processes of financialisation are most intensively expressed in the USA.

Graph 26. Stock Market Capitalization (Trillions of US Dollars), December 2024
Chart: compiled by the authors, data source: World Federation of Exchange (WTE)

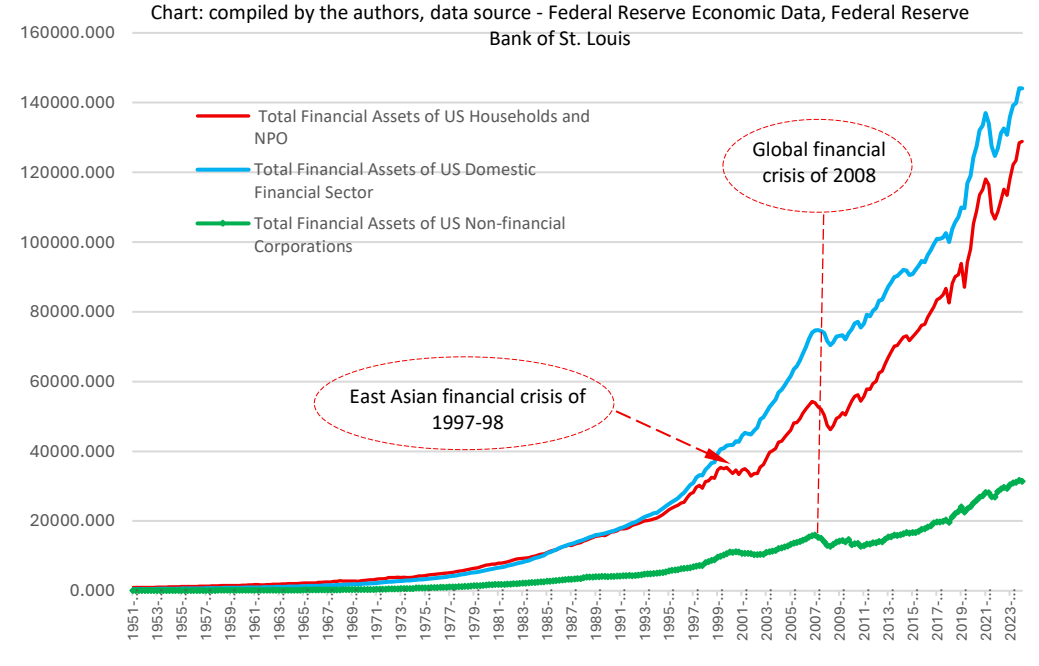


Total value of financial assets of the US domestic financial sector in October 2024 was more than $144 trillion, households and non-profit organisations – $129 trillion, nonfinancial corporations – $31,5 trillion. Thus, the US private sector holds financial assets totalling in more than $304 trillion. It is 10,5 times more than the US GDP (Graph 27, 28).

Graph 27. Total Financial Assets of US HH, FS, NFC, NGO, and US GDP
Billion of Dollars
Chart: compiled by the authors, data source - Federal Reserve Economic Data, Federal Reserve Bank of St. Louis



Graph 28. Total Financial Assets by US Private Sectors, Billion of Dollars
Chart: compiled by the authors, data source - Federal Reserve Economic Data, Federal Reserve Bank of St. Louis



Another consequence of the financialisation of the global economy is the emergence of huge amounts of volatile international short-term capital flows, which move instantaneously around the planet in search of high financial profits.

The rapid liberalisation of East Asian financial markets in the 1990s attracted hot short-term capital flows from developed countries to South Korea, Thailand, Indonesia, Malaysia and the Philippines (Graph 28). These took the form of portfolio investments, bank loans, and in some cases, speculative attacks on local currencies (particularly on the Thai baht). Foreign currency debts and dependence on further financing increased sharply in East Asian countries. The liberalisation of the financial accounts of these countries, combined with the fixed exchange rate regime and low level of foreign exchange reserves of central banks, was a high-risk mix that triggered the currency crisis that began in Thailand with the devaluation of the baht. The effect of "sudden-stop" of capital inflows in 1997, and then the massive outflows, led to a large-scale financial crisis in the listed five countries, a sharp collapse of their currencies, banking panics, massive bankruptcies and the collapse of their economies (Graph 29, 30).

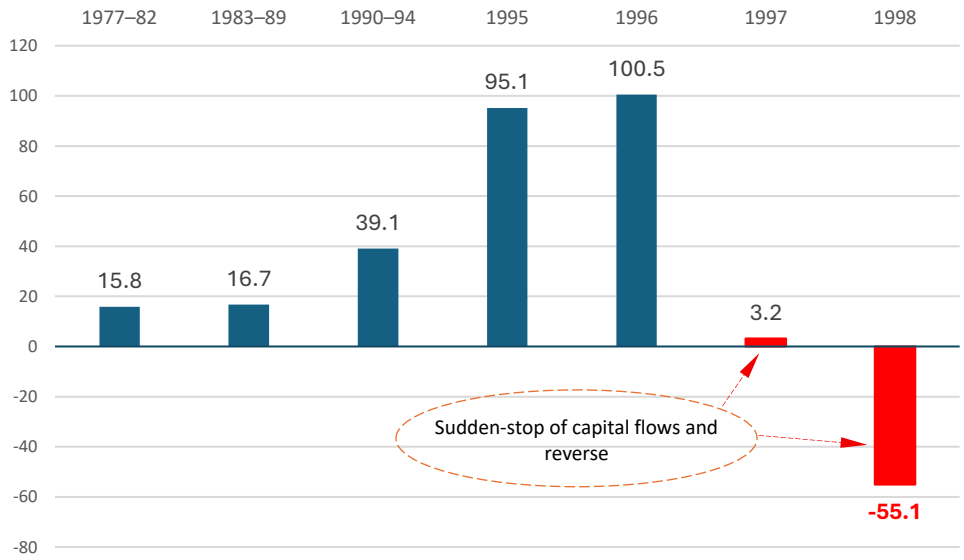
The crisis also had an impact on other countries. The most tragic consequences of the crisis, such as the sharp rise in suicides in these countries (documented in academic articles[70]), raise questions about the devastating social consequences of the global imbalances connected with financialisation. Particularly, the authors of Sinyor, M. et al. (2024)[71] wrote: "One study estimated that there were an additional 10,4 thousands suicides in 1998 (compared with 1997) in Japan, Hong Kong, and South Korea, where the economic crisis severely affected GDP and unemployment rates".

[70] Talamonti, D. *et al.* (2023) 'The impact of national and international financial crises on mental health and well-being: a systematic review', *Journal of Mental Health*, 33(4), pp. 522–559. doi: 10.1080/09638237.2023.2278104; 'Was the economic crisis 1997–1998 responsible for rising suicide rates in East/Southeast Asia? A time-trend analysis for Japan, Hong Kong, South Korea, Taiwan, Singapore and Thailand' by Shu-Sen Chang, David Gunnell, Jonathan A. C. Sterne, Tsung-Hsueh Lu , Andrew T. A. Cheng Social Science & Medicine (2009), doi:10.1016/j.socscimed.2009.01.010 .

[71] Sinyor, M. et al. (2024) 'The effect of economic downturn, financial hardship, unemployment, and relevant government responses on suicide', The Lancet Public Health, 9(10). doi:10.1016/S2468-2667(24)00152-X.

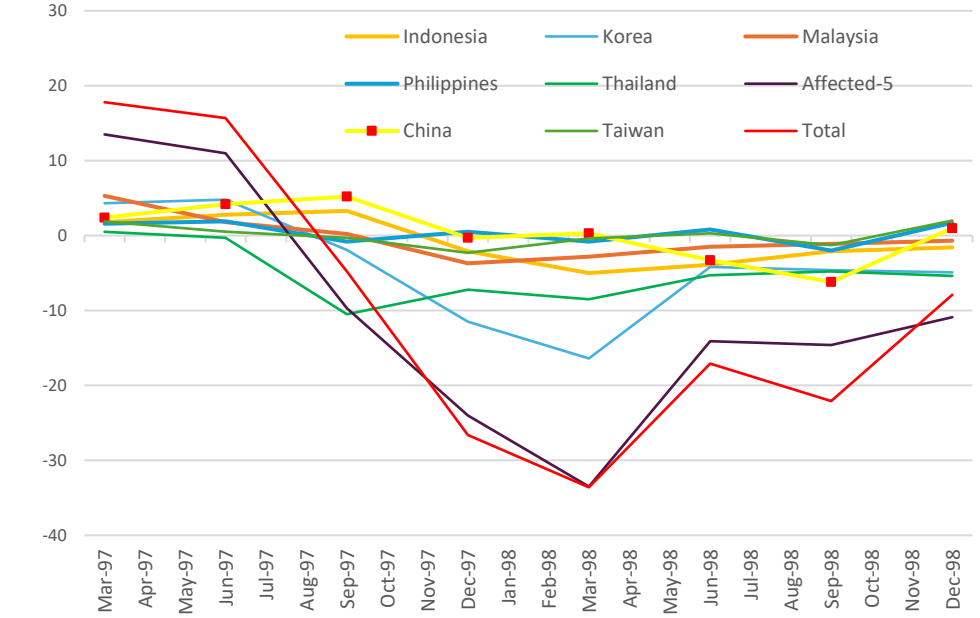
Graph 29. Net Private Capital Flows to East Asia, Annual Averages, Billions of US Dollars

Chart: compiled by the authors, data source - IMF



Graph 30. East Asian financial crisis 1997-98: changes in Banks' Unconsolidated Assets in Asia, Billions of US Dollars

Chart: compiled by the authors, data source - BIS, International Banking and Financial Market Development

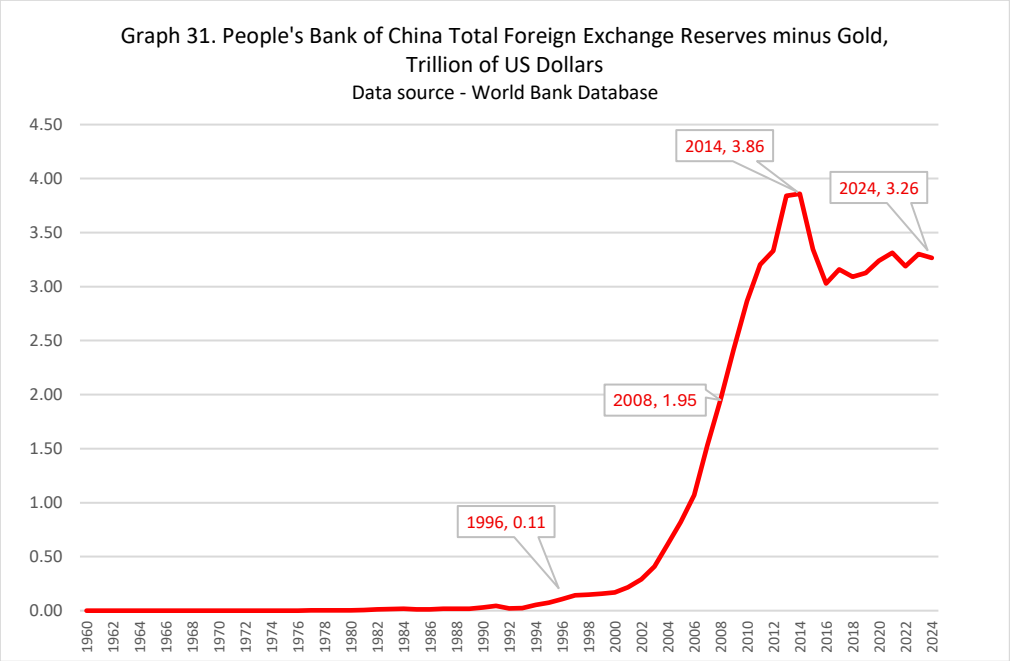


A large strand of literature has been devoted to the study of this crisis, with detailed analyses of its causes, including Jason Furman, Joseph E. Stiglitz (1998), Zhuang, Juzhong et al. (2000)[72] and others. One of the major consequences of the crisis was that it became a turning point for countries in this region in the monetary policies of their central banks and the build-up of foreign exchange reserves.

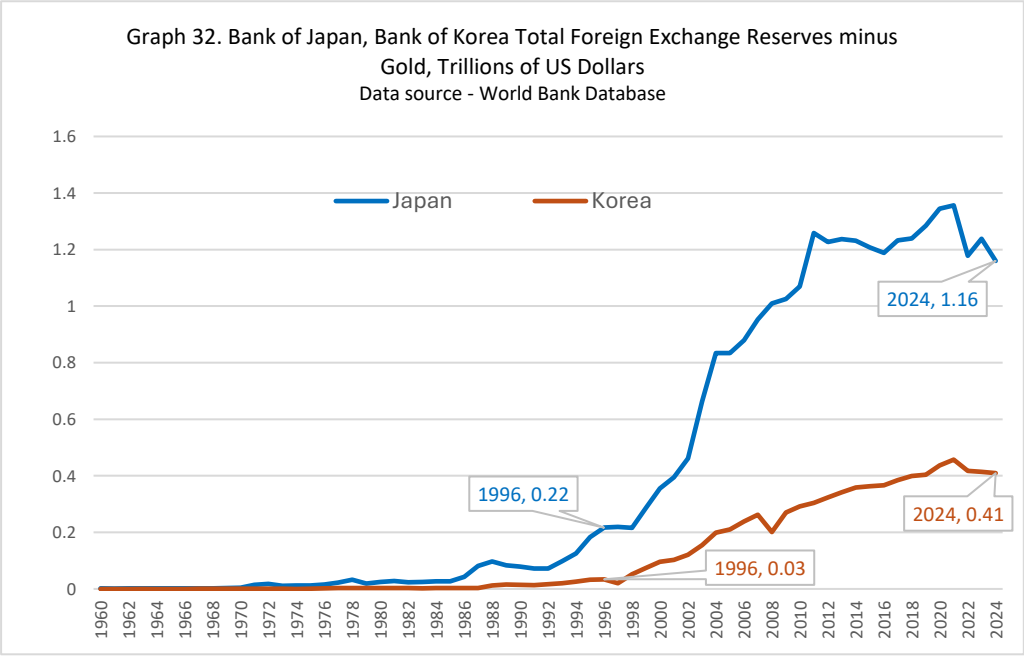
China was not a victim of this crisis because the first line of its defence was a nonconvertible capital account and foreign exchange control. But China nevertheless monitored at close distance as foreign speculative capital inflows brought down the economies of its neighbours - South Korea, Thailand, Indonesia and Malaysia.

East Asian countries, gradually recovering, began to introduce regulations to protect their economies from the volatility of speculative capital inflows. The second measure was to build up international foreign exchange reserves in US dollars, US Treasuries, gold and other assets. The People's Bank of China в 1996 foreign exchange reserves were $110 billion; however, they reached more than $1,95 trillion in 2008 and $3,24 trillion in 2024 (Graph 31), which is the highest FX reserves in the world. The management of China's foreign exchange reserves is governed by the State Administration of Foreign Exchange (SAFE) and the People's Bank of China.

[72] Jason Furman, Joseph E. Stiglitz. Crises: Evidence and Insights from East Asia. - Brookings Papers on Economic Activity, 2:1998, Zhuang, Juzhong; Edwards, David; Webb, David C.; Capulong, Ma Virginita (2000). Corporate governance and finance in East Asia: a study of Indonesia, Republic of Korea, Malaysia, Philippines, and Thailand. Vol. 1. Manila, Philippines: Asian Development Bank. ISBN 978-971-561-295-1; "The Capital Surge to Developing Countries". IMF. September 1999. Retrieved 18 May 2025; FRBSF Economic Letter: What Caused East Asia's Financial Crisis? Archived 14 May 2013 at the Wayback Machine 7 August 1998; The Three Routes to Financial Crises: The Need for Capital Controls Archived 17 November 2015 at the Wayback Machine. Gabriel Palma (Cambridge University). Center for Economic Policy Analysis. November 2000.



Japan and South Korea followed its example in their policy of increasing reserves. In 2024. foreign exchange reserves in Japan were $1,16 trillion, in South Korea 2024 they were $0,41 trillion. (Graph 32).



The primary objective of maintaining high foreign exchange reserves by the central banks of these countries is to provide external resilience in terms of the stability of the exchange rate and capital flows. Central banks use FX interventions as the first line of

defence against excessive volatility in exchange rates. As a report[73] of the Asian Consultative Council and the Bank of International Settlements (2023) noted, Japan used intensive FX intervention first time since 2011 to deal with unprecedentedly sharp one-sided movements in the Japanese yen. According to the report, FX interventions were primarily intended to deal with volatility driven by factors such as speculative and herd behaviour or market dysfunction, such as due to a lack of FX liquidity. A key component of these countries' toolkit was capital flows management measures that focused on macroprudential purposes to reduce the systemic risk posed by capital inflows and FX volatility.

We don't know the exact current structure of China's foreign exchange reserves, as this is classified information. However, by U.S. Treasury data[74], China had been the largest foreign holder of U.S. Treasury securities since 2008, accounting for about 22% of all U.S. Treasury securities held by non-Americans. However, as of March 2025, China reduced its holdings of U.S. Treasury Securities to $765,4 billion, which made it the second largest foreign U.S. Treasury holder behind Japan that held them to $1,131 trillion.

Thus, China and Japan are the largest creditors of the U.S. economy through the channels of central banks purchasing U.S. Treasury Securities for their international foreign exchange reserves. This is directly related to the size of U.S. debt through which trade deficits in the U.S. economy are financed, particularly with China and Japan. Through these mechanisms, global imbalances related to the financialisation of economies, debt growth, and trade deficits interact closely and fuel each other.

Central banks in developed countries are involved in the process of financialisation of economies not only through foreign exchange reserves, but more broadly through their

[73] Report of a Working Group established by Asian Consultative Council of the Bank of International Settlement (2023) Inflation, external financial conditions and macro-financial stability frameworks in Asia Pacific. – 10 October 2023, BIS https://www.bis.org/publ/othp78.pdf
[74] https://ticdata.treasury.gov/resource-center/data-chart-center/tic/Documents/slt_table3.html

monetary policy channels. The 2008 crisis forced central banks to inject additional liquidity into their economies through quantitative easing policies. The crisis associated with Covid-19 also influenced additional injections. As a result, in the end of 2024, total assets of the Federal Reserve System reached $6,8 trillion (24% of GDP), Bank of England $1,046 trillion (29% of GDP), European Central bank $6,65 trillion (43% of GDP), Bank of Japan $5,06 trillion (123% of GDP)[75].

Another powerful driver of the financialisation of the global economy is the development of the shadow banking or non-bank financial intermediation institutions (NBFI) over the past decade. According to reports of the Financial Stability Board (2024, 2025)[76], total global financial assets grew to $486,4 trillion by the start of 2024, and NBFIs' financial assets reached $238,8 trillion. It is almost half of the total amount of global financial assets. NBFI is a diverse sector of all non-bank financial entities, composed of all financial institutions that are not central banks, banks, or public financial institutions. This sector includes insurance corporations, pension funds, and the OFIs (other financial intermediaries) sector, including money market funds, hedge funds, other investment funds, captive financial institutions and money lenders, central counterparties, broker-dealers, finance companies, trust companies, and structured finance vehicles. NBFI also includes different types of non-bank entities providing credit intermediation activities that involve real estate financial transactions, maturity and liquidity transformation, leverage or imperfect credit risk transfer, regulatory arbitrage, and others.

In other words, these entities and OFIs are a so-called *shadow banking system* that fulfils its functions without strict regulation, in contrast with a traditional banking system. That is why their activity may pose systemic risk for financial stability (as it was

[75] Data source – Bank of International Settlement
[76] Financial Stability Board (2024) Enhancing the Resilience of Non-Bank Financial Intermediation. Progress report, 20 July, 2024 https://www.fsb.org/uploads/P220724-2.pdf

in 2008), so they have been monitored by the Financial Stability Board after the 2008 crisis.

NBFIs are the main drivers of the global financial assets and financialisation of the global economy. Their financial assets grow faster than assets of commercial banks and central banks. As the Financial Stability Board's report estimates, while the March 2023 turmoil was generally limited to banks (Silicon Valley Bank, Signature, First Republic and Silvergate in the USA, and big systemic bank Credit Suisse in Switzerland), it contributed to capital inflows into the NBFI sector, alongside other factors, particularly the higher interest rate environment.

The size and structure of the global financial assets and NBFIs' impact on them are presented in Graph 33. The size and structure of the global financial assets and NBFI impact on them are clear from these amounts: at the end of 2023, total global financial assets were $486,4 trillion and NBFI were $238,8 trillion, which is almost 50% of them. Financial assets of banks were much less, namely $188,7 trillion. Financial assets of central banks were $37,5 trillion, and financial assets of PFI were $21,4 trillion.

NBFIs' financial assets expanded faster than financial assets of all other sectors of the global economy and became the most powerful driver of financialisation in 2023 (Graph 34).

PFI and banks continued to be the second and third largest financial subsectors in most jurisdictions. However, the OFI sector was the largest sector in the Cayman Islands, Luxembourg, Ireland, the Netherlands, Canada, and the United States. OFI grew fast (above 10%) in Japan and Germany as well as in Mexico, Brazil, and South Africa. Financial Stability Board revealed that NBFI operations:

- dramatically increasing the volume of financial assets in the global economy,
- highly intertwined with the transactions of banks, households, and non-financial corporations,

Graph 33. Size and composition of Global Financial Assets at the end of 2023
(trillions of US dollars)
Chart: compiled by the authors, data source - Financial Stability Board Reports 2024, 2025

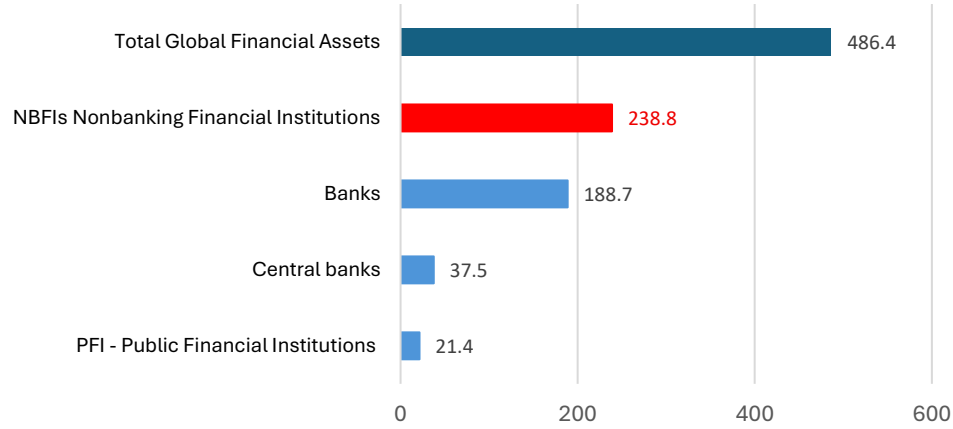
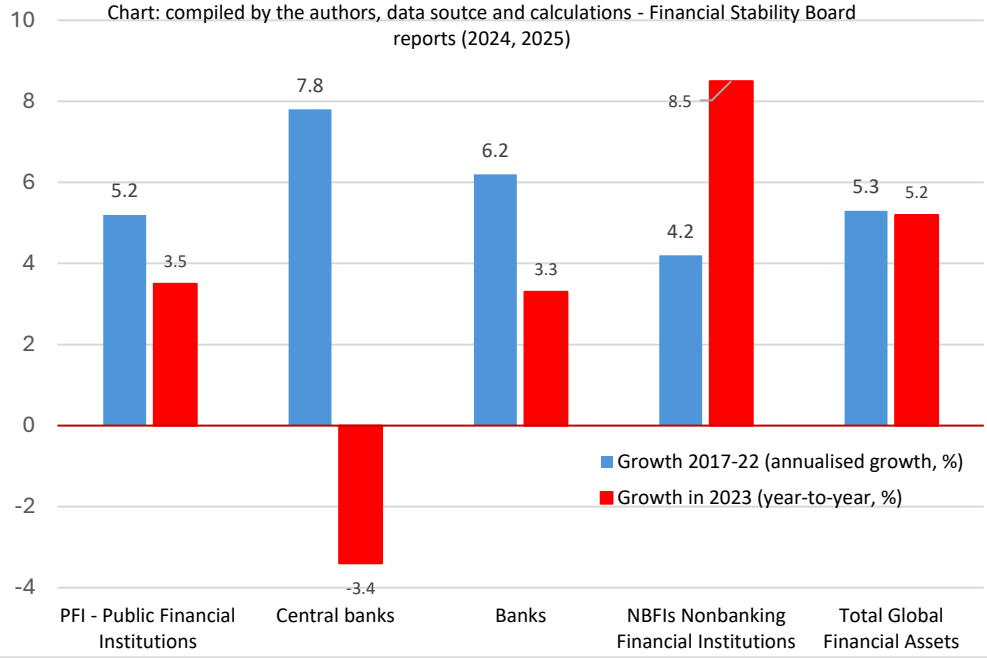


Chart 34. Dynamics of the global financial assets by sectors (%)
Chart: compiled by the authors, data soutce and calculations - Financial Stability Board reports (2024, 2025)



- financial transactions take place in many jurisdictions, including the United States, China, Japan, the Cayman Islands, and many other countries, i.e. globally,
- through the structured derivatives and other financial innovations, are driving rapid growth in debt and leverage across all sectors of the global economy, with a significant portion of transactions based on short-term wholesale funding,

- NBFIs can generally promote diversification and risk insurance, but high leverage, increased volume and speed of financial transactions, and the interconnectedness of all counterparties increase systemic vulnerability to shocks and the likelihood of risk transmission across the global network.

Thus, despite the reforms following the 2008 financial crisis, the financialisation and leverage of the global economy continue to grow, the size and interconnectedness of the financial sector increase, and hence global financial imbalances deepen.

One of the consequences of the growth of financialisation, increasing short-term profitability of transactions with financial assets and the ease of conducting such transactions has been a change in the classical behaviour of real sector entities. Owners and managers of non-financial corporations shifted their interests to short-term financial profit and share price maximisation. This led to the following consequences.

On the one side, non-financial corporations began to use their financial resources not for the development of industrial production but for investing in short-term financial transactions, including in the shadow banking system. Thus, instead of providing the real economy with financing, the growing financial sector 'successfully' competes with it for resources. On the other side, intense pressure from investors to rapidly reduce costs and boost profits stimulated US production offshoring to lower-cost foreign jurisdictions as the effective response of corporate management. As Weiss, L and Thurbon, E (2018) showed, by the 2000s, even the smallest, newest US high-tech firms came under pressure from venture capital companies to pursue offshoring as a key strategy for development.

A trend of US advanced manufacturing migration abroad is well documented in many research papers, including Berger (2013), Bonvillian (2018), Bonvillian and Weiss (2015), Locke and Wellhausen (2014), Manyika, Pacthod, and Park (2011), PCAST

(2011, 2012), Pisano and Shih (2009, 2011), Sturgeon (2002), Weiss, L and Thurbon, E (2018), and others. As summarised in Weiss, L and Thurbon, E (2018)[77] , it began with the exit of labour-intensive industries in the 1970s, but gained real momentum in the following decades, extending into increasingly advanced and high-tech manufacturing activities. As result, by 2002, for the first time on record, the United States began running trade deficits in advanced technology products.

We can summarise a great body of research papers on causes of intensive USA production offshoring in the following list:

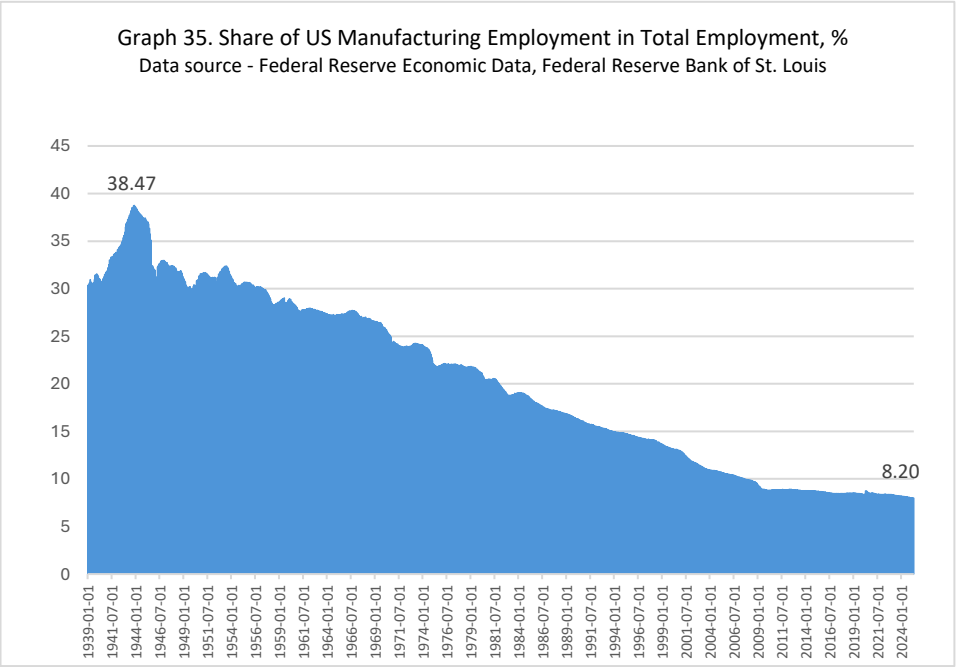
- growing competitive pressures since 1970s in consumer electronics, autos, and semiconductors markets from East Asia that faced US firms pushed them to fragment their production processes and distribute part of them to lower-cost foreign destinations;
- the rise of US offshoring since the 1980s to the value chain development with more advanced manufacturing activities, integrated with high-skilled services, such as IT support and industrial design services;
- intensive financialisation in the US economy and shift of non-financial corporations' business models to rapidly reducing costs and getting short-term financial profit by production offshoring to lower-cost countries;
- unfavourable persistent changes in US dollar real effective exchange rate, which suppressed exports and boosted imports.

As a result, the US manufacturing sector's share of GDP has steadily declined from over 27% in the early 1950s to 10% in 2024. Accordingly, employment in manufacturing as a share of total employment in the US has steadily declined from its maximum of 38.5% in 1944 to its historical minimum of 8% in April 2025. (Graph 35).

[77] Weiss, L., & Thurbon, E. (2018). Power paradox: how the extension of US infrastructural power abroad diminishes state capacity at home. Review of International Political Economy, 25(6), 779–810. https://doi.org/10.1080/09692290.2018.1486875

In the scale of OECD countries, we also see changes in non-financial corporate behaviour towards financialisation. According to the OECD Global Debt Report (2025)[78], non-financial corporations' debt was unproductive, and they shifted to financial transactions beside of investment in industrial production development. The authors of the report provide evidence that since 2008, corporate bond issuance has grown significantly above trend, while corporate investment has not. Cumulative bond issuance by non-financial companies in 2009-2023 was $12.9 trillion higher than the pre-2008 trend, while corporate investment was $8.4 trillion lower. The OESD report concludes that, rather than productive investment, a lot of debt in recent years has been used to fund financial operations like refinancings and shareholder payouts. This suggests existing debt is unlikely to pay itself off through returns on productive investment.

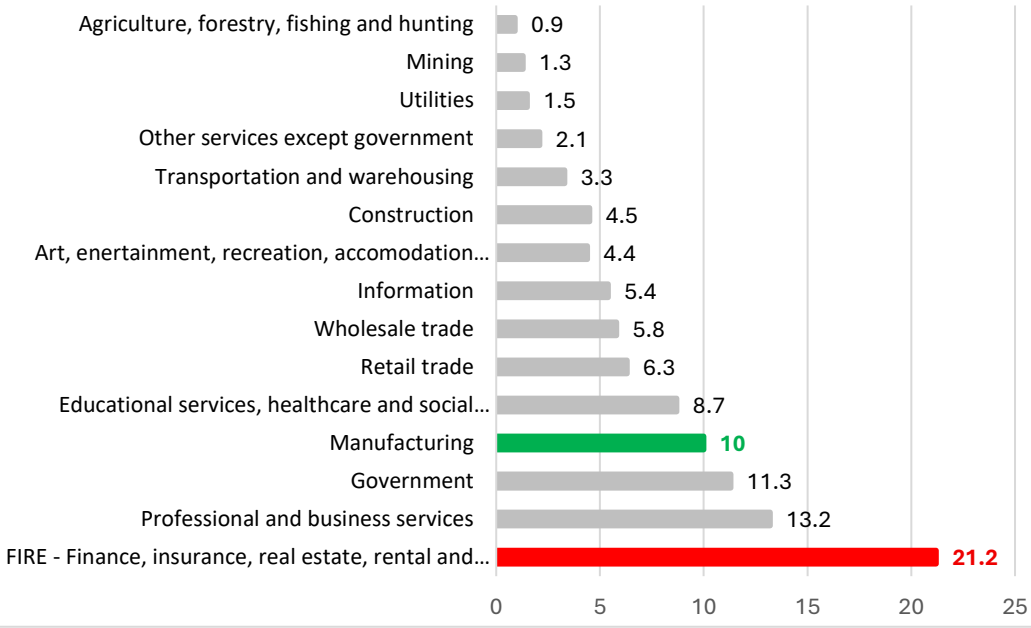
Graph 35. Share of US Manufacturing Employment in Total Employment, %
Data source - Federal Reserve Economic Data, Federal Reserve Bank of St. Louis



[78] OECD Global Debt Report (2025), Financing growth in a challenging debt market
https://www.oecd.org/en/publications/2025/03/global-debt-report-2025_bab6b51e.html

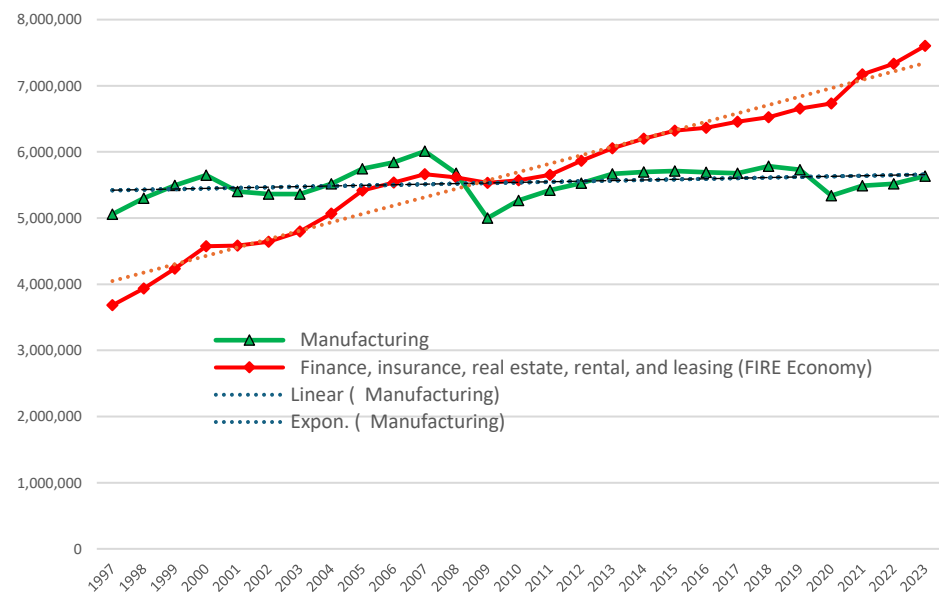
At the same time, the share of the financial sector in GDP, which also includes insurance, real estate, rental, and leasing (FIRE economy), has gradually increased from 10.3% of GDP in 1947 to 21.2% of GDP in 2024 (Graph 36). That is, the financial sector, instead of supporting the growth and development of the manufacturing sector, gradually replaced it.

Graph 36. Share of Value Added to GDP by sectors in USA 2024, %
Chart: compiled by the authors, data source - U.S. Bereau of Economic Analysis

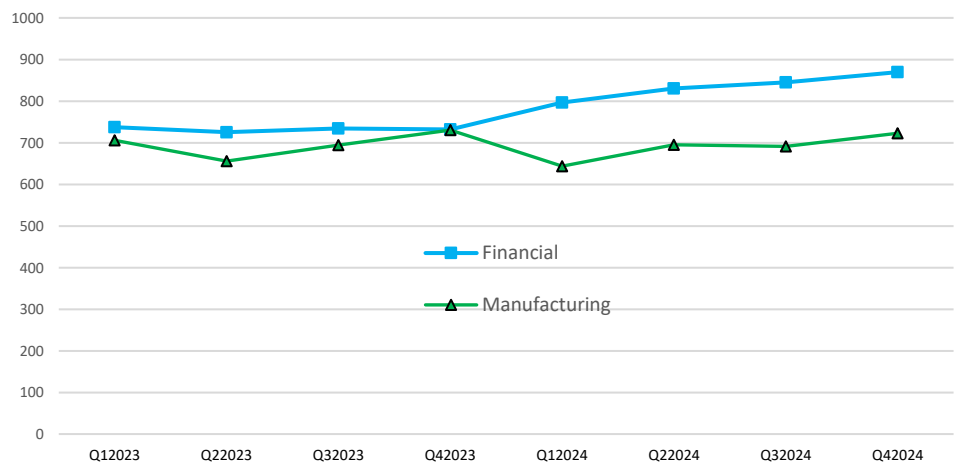


We can see an analogical tendency when analysing the real gross output of manufacturing and FIRE sectors in absolute volume. While manufacturing stagnated around $5 trillion, the FIRE sector increased from $3,7 trillion in 1997 to $7,6 trillion in 2024 and continues to grow (Graph 37). One of the powerful drivers of the deindustrialisation process of the US economy was the financialization and dominance of financial companies' profits over the real sector profits of non-financial industrial corporations. In Q4 2024, the difference between profits in the financial sector and manufacturing was about $150 billion (Graph 38).

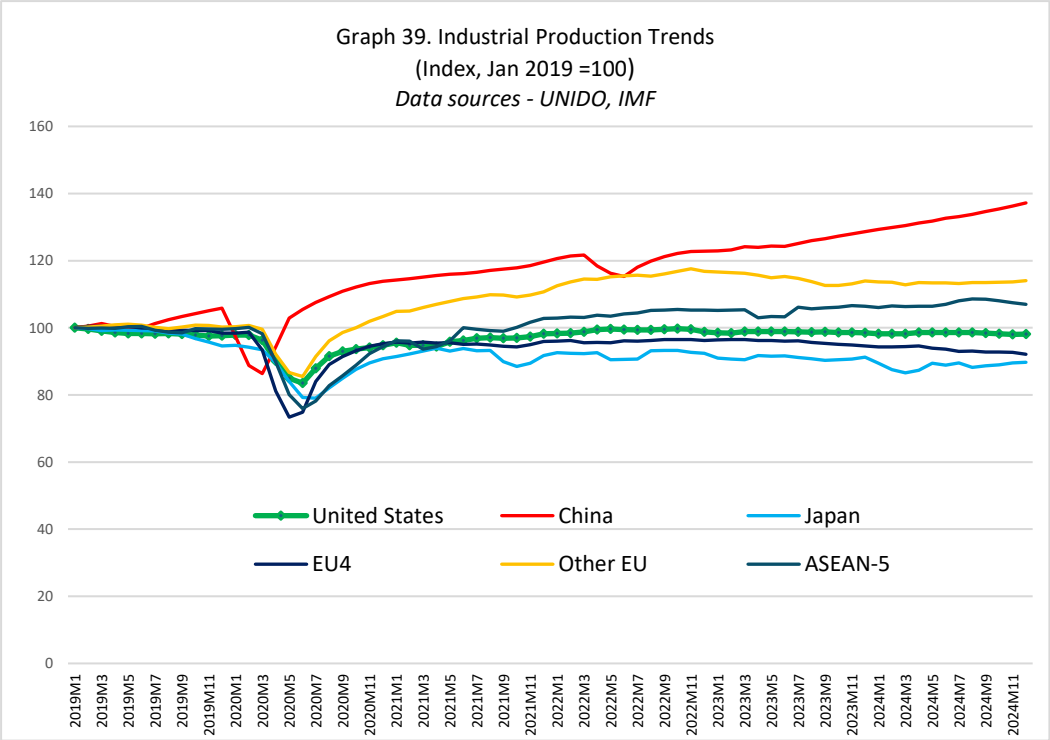
Graph 37. U.S. Real Gross Output in Manufacturing and FIRE, Millions of dollars
Chart: compiled by the authors, data source - U.S. Bureau of Economic Analysis



Graph 38. U.S. Corporate profits by Industry (with inventory valuation adj.), Billion of US Dollars
Chart: compiled by the authors, data source - U.S. Bureau of Economic Analysis (BEA)



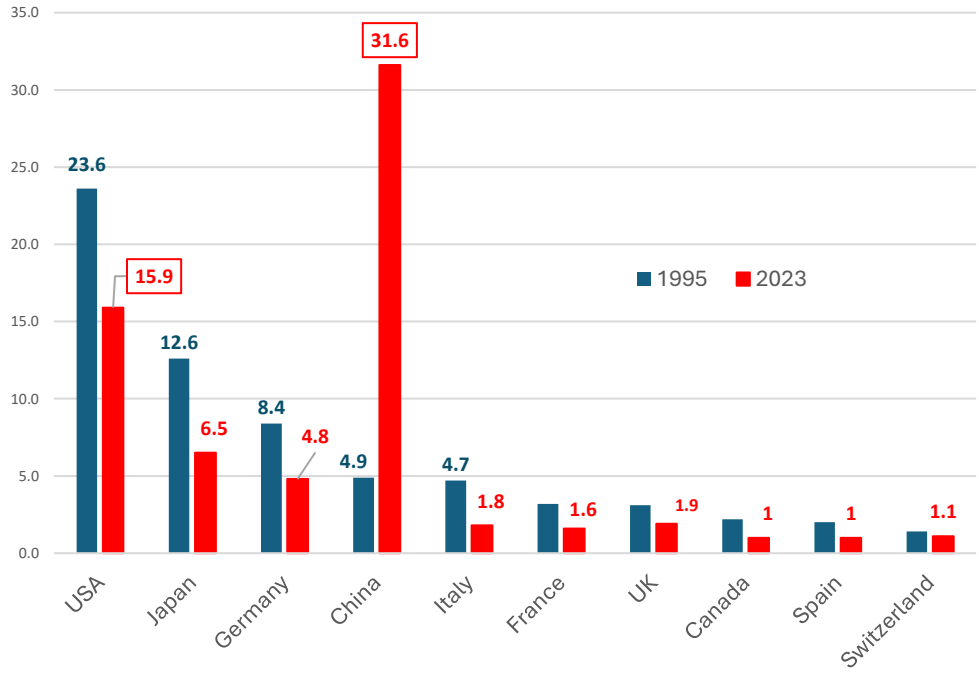
The data demonstrates that the United States has already lost its global leadership in industrial production growth (Graph 39).



According to the report of UNIDO,[79] for much of the 20th century and into the early 2000s, the United States was responsible for 25% of global manufacturing value-added, while Japan and Germany followed with 11% and 8%, respectively. In total, high-income countries accounted for 75% of global industrial output, while China was responsible for just 6%. However, China has upended the global manufacturing hierarchy. China currently holds the greatest share of global manufacturing value-added, with several sources estimating it controls between 26% and 30%. UNIDO estimates that by 2030, China will continue to gain ground in manufacturing industries, most worryingly in advanced technologies, increasing its share to 45%. UNIDO estimated that the United States will hold 11% of the global share.

[79] United Nations Industrial Development Organization (UNIDO), "The Future of Industrialization: Building Future-Ready Industries to Turn Challenges into Sustainable Solutions," (Riyadh, Saudi Arabia: UNIDO, October 2024).

Graph 40. Countries' manufacturing share in the World manufacturing
Chart: compiled by the authors, data source - World Bank database

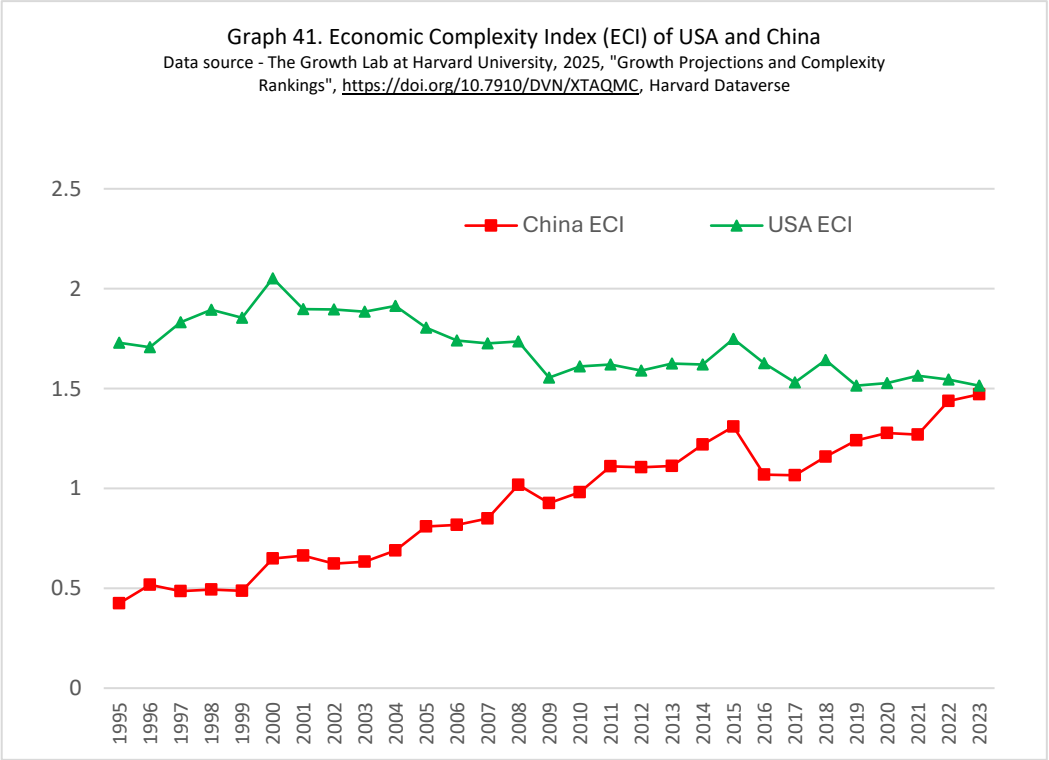


From our view, the general picture is worrying, especially in the aspects of military defence and national security, for which the high-technological industrial production is the core instrument. However, the US economy has great potential for reindustrialisation on a new level of quality and addressing the challenges that we described before.

In addition to the dynamics of quantitative rates, it is also important to consider changes in qualitative indicators. One of the most important indicators characterising the qualitative level of industrial development of a country is the Economic Complexity Index (ECI).

The ECI was developed by Ricardo Hausmann and Cesar A. Hidalgo (2009[80], 2012[81]). By Ricardo Hausmann, director of the Growth Lab, Professor at the Harvard Kennedy School (HKS), and the leading researcher of The Atlas of Economic Complexity, the Economic Complexity Index (ECI) captures the diversity and sophistication of the productive capabilities embedded in the exports of each country. ECI can profoundly explain differences in country incomes and predict future growth. According to the data of the Growth Lab[82] of Harvard University, compared to a decade prior, China's economy has become more complex, increasing its ECI by 3,5 times: from 0,424 in 1995 to 1,471 in 2023. For the same period the US has become less complex by ECI, decreasing its ECI from 1,729 in 1995 to 1,514 in 2023. Thus, the ECIs of USA and China are almost equal (Graph 41).

Graph 41. Economic Complexity Index (ECI) of USA and China
Data source - The Growth Lab at Harvard University, 2025, "Growth Projections and Complexity Rankings", https://doi.org/10.7910/DVN/XTAQMC, Harvard Dataverse

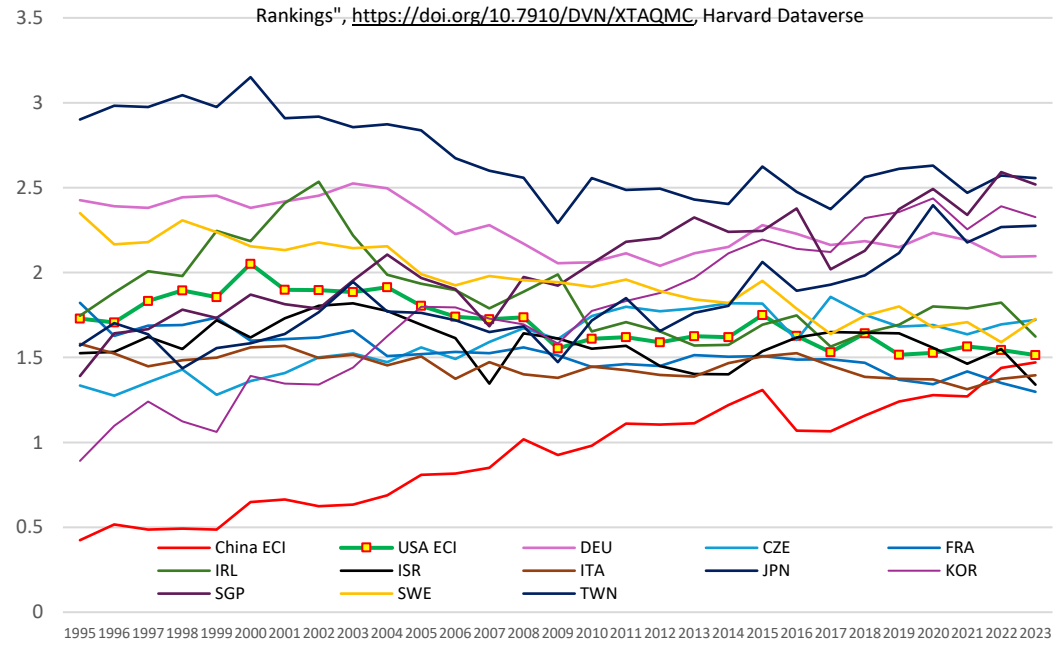


[80] Cesar A. Hidalgo, Ricardo Hausmann (2009). "The Building Blocks of Economic Complexity". *Proceedings of the National Academy of Sciences*. **106** (26). PNAS: 10570–10575. arXiv:0909.3890. Bibcode:2009PNAS..10610570H. doi:10.1073/pnas.0900943106. PMC 2705545. PMID 19549871.
[81] Ricardo Hausmann, Cesar Hidalgo; et al. (2012) "The Atlas of Economic Complexity". Puritan Press, Cambridge MA.
[82] The Growth Lab at Harvard University, 2025, "Growth Projections and Complexity Rankings", https://doi.org/10.7910/DVN/XTAQMC, Harvard Dataverse

For the US, a system of structural measures to develop its industrial production and Economic Complexity Index is highly important. This will improve its economic growth prospects and mitigate trade and debt imbalances.

The top 5 countries with the highest Economic Complexity Index values in 2023 were Japan, Singapore, Korea, Taiwan, and Germany (Graph 42).

Graph 42. Economic Complexity Index (ECI) of contries with its high value
(ECI > 1,3 in 2023)
Data source - The Growth Lab at Harvard University, 2025, "Growth Projections and Complexity Rankings", https://doi.org/10.7910/DVN/XTAQMC, Harvard Dataverse



Along with structural factors as technological changes, international trade asymmetry, and overvaluation of the US dollar, deindustrialisation and decreasing ECI contributed to the widening of the US trade deficit with the Rest of the World. In turn, the widening of this deficit due to the massive influx of cheap imports into the US economy deepens the deindustrialisation of the economy. Thus, through the mechanisms of non-linear feedback, a self-reinforcing spiral has been unfolding for several decades, leading to further aggravation of trade imbalances.

The following paragraph focuses on structural problems that give rise to the global imbalances.

4 Structural distortions and mechanisms causing the global imbalances. What mitigation measures should be done?

4.1. Disproportional network structure of the global economy with indebted consumption-led growth vs export-led growth countries

The global economy is a complex multilevel network system that demonstrates nonlinear behaviour and, in some periods, explosive network effects. They can't be comprehended and modelled by standard macroeconomic tools. To gain a deeper understanding of the mechanisms underlying global imbalances and their mutual influence, thinking in a complex network paradigm will be helpful. We consider the global economy as a complex network system that unites different nodes (countries) through multilevel connections and behaves as a whole organism. Borrowing a metaphor from the complex systems theory, "the flapping of a butterfly's wings at one end of the globe can lead to a hurricane at the other". The behaviour and dynamics of complex network systems are largely determined by their topology. In other words, the structure of the network, the characteristics of the nodes and the architecture of their multilevel interconnections are of paramount importance.

To understand the causes and mechanisms behind global imbalances, we must identify the nodes (countries) in the network with specific properties. There are major hubs that influence the entire network's dynamics. In complex network theory, hubs are nodes that are maximally interconnected with other parts of the network. Hubs play a unique role in a network's structure and function, acting as central nodes for resource, information, and influence flows. Hubs impact the dynamics, resilience, fragility, and speed of dissemination processes within the network.

With its largest financial markets and its unique role as the global reserve currency provider — the U.S. dollar — the U.S. economy is the most influential and highly interconnected global hub in the complex network of the world economy.

From the previous analysis on p. 2.1 – 2.3, it is clear that the second big global hub with a huge impact on the entire network is the economy of China. Further, in building our future nonlinear dynamic network model of the global economy, we will highlight other clusters and big hubs in the global network that includes 195 countries with considering three wide groups: high-income (developed) countries, newly emerging economies (emerging) and low-income countries (developing). For now, for purposes of this research paper, we consider two main big hubs – the US economy and the economy of China.

The main structural characteristics of the US economy as the major hub in the complex network of the global economy as follows.

- The US economy is not only an economic influencer in the network of global economy but also it is a powerful financial hub with the biggest financial markets and sophisticated financial infrastructure. It provides depth and liquidity of the financial market, speed, ease and accessibility for market agents to conduct investment and financial transactions with minimal transaction costs. See paragraph 2.3 for details on the size and features of the US financial markets.
- As an issuer the US dollar, it provides the global reserve currency to the Rest of World (RoW) as international liquidity for trade, financial and investment operations in the global market. Channels that facilitate the supply of the US dollar to the RoW: payment for USA imports from the RoW; repayment of the amounts of principal debt and costs of debt services to the US debt holders; gross capital

flows through leveraged financial institutions, including banks and shadow banking entities (NBFI)[83].

At present, the rates of large-scale financialization as excessive liquidity, inflation of financial assets, and credit misallocation, indicate global financial imbalances and financial vulnerability.

- The US provides to the Rest of World with the safe assets - Treasury securities. At the same time, US government debt, government budget outlays for interest payments, and federal budget deficit grow enormously (paragraph 2.2)
- The growth model of the US economy is based on debt-led demand and consumption-led growth. In other words, the US economic model is based on hugely indebted consumption. Declining manufacturing share of GDP and persistent wide deficit of the current account make the US economy a "consumer-of-last-resort" for the RoW based on the high debt level. Many other countries with current account surpluses benefited from this, but such a structure is inherently unsustainable for them as well.

This global structure is highly vulnerable and fragile, and in the event of serious shocks, the Federal Reserve System and US government no longer have as much room for manoeuvre as they did before.

- This structural economic model of the US economy, along with an overvalued US dollar, constantly fuels the wider US trade deficit. Unfavourable dynamics of the US dollar Real Effective Exchange Rate depresses exports and reindustrialisation but stimulates imports and offshoring of industrial production to lower-cost foreign jurisdictions.

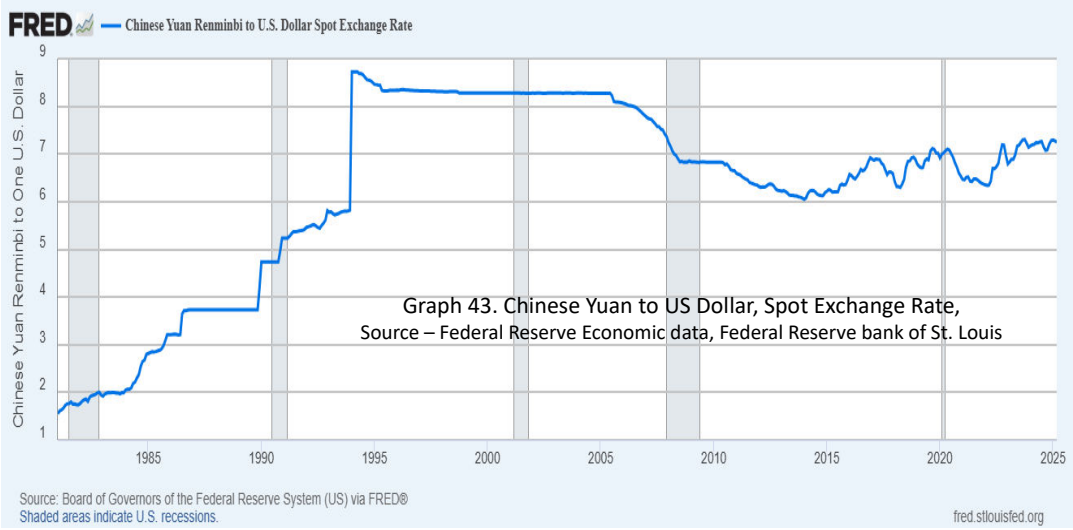
[83] See analysis at the paragraph 2.3. of this paper

These structural problems are unfavourable not only for the US economy. As the US economy is a systemically important major hub in the whole complex network of the global economy, this fragile structure is quite risky for other key countries and for the world. Therefore, correcting these structural problems is not a task for the United States alone; it should become the goal of coordinated action by all key countries in the framework of the G7 and G20.

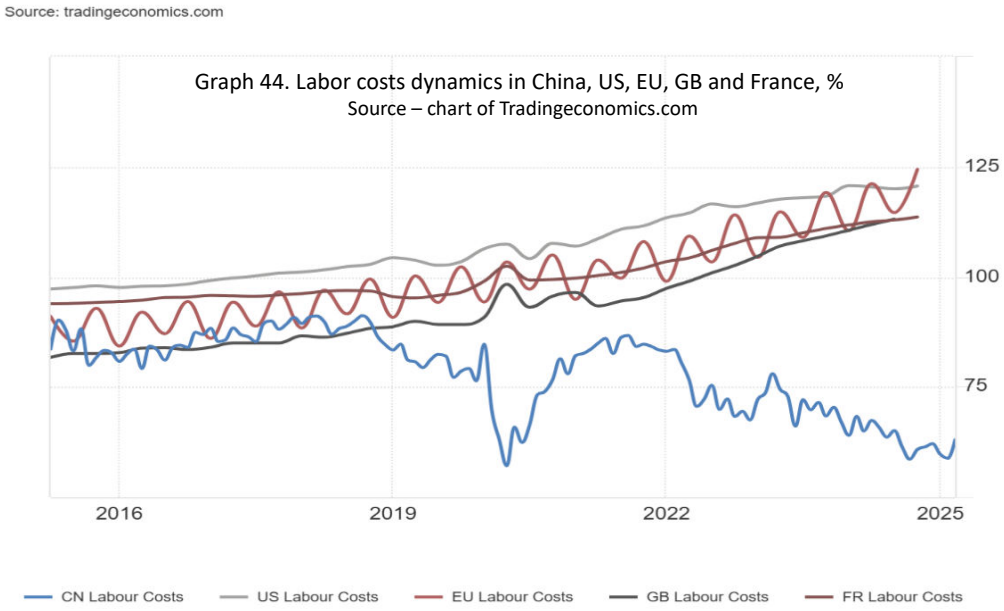
China's economy is the second-largest economy on which global financial stability significantly depends. Based on our analysis, we can highlight the main structural characteristics of China's economy as the second major hub in the complex network of the global economy.

- Expanded industrialisation with intensive government support and an export-led growth model of Chinese economy.
- Structural problems in the Chinese economy are related to imbalances and systemic risks in the real estate market and the sector of development companies. In particular, the crisis in the large systemic development company Evergrande was associated with this. We researched it in detail in our previous paper[84].
- Exchange rate policy on yuan depreciation for export support (Graph 43). People's Bank of China intervenes to buy foreign currency to prevent the yuan from appreciating and replenish foreign exchange reserves (paragraph 2.3).
- Keeping employees' wages low to preserve low labour costs to gain an export price advantage in global markets (Graph 44). This entails the following point.
- Low level of domestic consumption and excess of the saving rate ("saving glut") in the economy (Graph 45).

[84] Unkovska T, Taruta S, Grydzhuk D. (2022) Systemic risks in China's economy from the real estate sector. Self-enforcing cycles Financial and credit activity: problems of theory and practice ISSN: 2306-4994 (print), 2310-8770 (online) https://journals.indexcopernicus.com/search/article?articleId=3486370



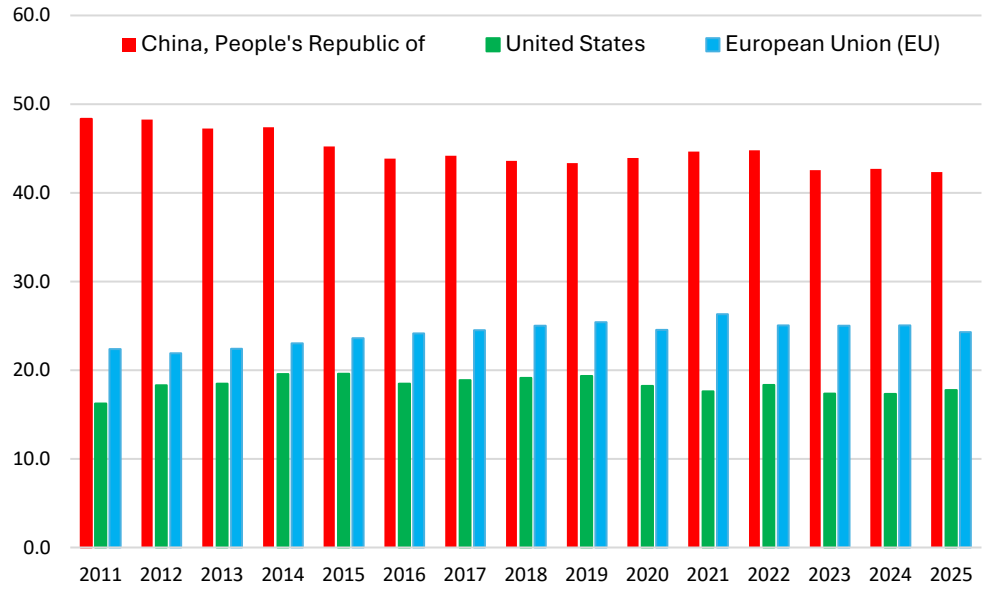
Graph 43. Chinese Yuan to US Dollar, Spot Exchange Rate,
Source – Federal Reserve Economic data, Federal Reserve bank of St. Louis



Graph 44. Labor costs dynamics in China, US, EU, GB and France, %
Source – chart of Tradingeconomics.com

This leads to underdevelopment of the domestic market and high dependence of the Chinese economy on external global demand for export goods. China's high current account surplus with the RoW, especially with the US, on the one hand, indicates structural imbalances within the Chinese economy, and on the other hand, causes international tensions and trade wars.

Graph 45. Gross National Saving in China, US and EU (% to GDP)
Chart: compiled by the authors, data source - IMF Database



In macroeconomic and international trade theory, the country's policy of supporting its own exports by artificially restraining the cost of labour (in essence, it is export subsidies), depressing the share of consumption in the economy, and overstating the share of savings, as well as foreign exchange interventions to reduce the value of its currency, is called "Beggar-to-Neighbour Policy"[85,86] Therefore, China should reorient its economic policy towards increasing China's population consumption, developing the domestic market and reducing dependence on exports.

Thus, the global economy's two big systemically important hubs – the US and Chinese economies – have accumulated over decades of persistent structural large-scale imbalances that are inextricably linked to each other and affect the entire world.

[85] Joan Robinson (1947), Essays in the theory of employment, Oxford, Basil Blackwell, 201 pages
[86] J.M. Keynes (1936) General Theory of Employment, Interest and Money

The responsible position consists of a comprehensive study of all sides of the existing structural problems and coordinated actions by key countries to resolve the problems peacefully and optimally.

4.2. Structural distortions in the International Monetary System and the modern form of the Triffin Dilemma.

One of the biggest structural issues driving global imbalances in trade, debt and financial flows is the structural distortions in the foundation of the current international monetary system. A new impetus to the heated academic debate on this topic was an article by Stephen Miran (2024), which described the current problems of US trade imbalances using the arguments of the Triffin dilemma.

In Robert Triffin's (1960) "Gold and the Dollar Crisis: The Future of Convertibility"[87], the author discovered a structural problem in the Bretton Woods system and correctly predicted the "Nixon gold shock" and collapse of this system. Keynes J.M. (1944)[88] also wrote about this problem back in the forties when he proposed an alternative structure to the Bretton Woods system.

What is the essence of the Triffin dilemma, and is it relevant for the current global situation?

In 1960, Robert Triffin's book "Gold and the Dollar Crisis: The Future of Convertibility"[89] was published by Yale University. Robert Triffin, researching the Bretton Woods system of the gold and currency standard, had already in 1957 discovered a structural problem in it, which was bound to lead to its collapse. He

[87] Robert Triffin. Gold and the Dollar Crisis: Future of Convertibility" – Yale University Press, 1960 https://www.amazon.com/Gold-Dollar-Crisis-Future-Convertibility/dp/B0000CKPLE

[88] Keynes, J.M. (1944). Note by Lord Keynes. *The economic journal*, 54 (215/216), 429–30. In: E. Johnson and D. Moggridge, eds. 2013. *The collected writings of John Maynard Keynes*. Vol. XXVI, Activities 1941–1946: shaping the post-war world: Bretton Woods and reparations. Cambridge: Cambridge University Press on behalf of the Royal Economic Society, 39–40.

[89] Robert Triffin. Gold and the Dollar Crisis: Future of Convertibility" – Yale University Press, 1960 https://www.amazon.com/Gold-Dollar-Crisis-Future-Convertibility/dp/B0000CKPLE

correctly predicted the "Nixon gold shock" and the collapse of the Bretton Woods monetary system in 1971. Keynes also wrote about this problem back in the forties when he proposed an alternative structure to the Bretton Woods system. From our point of view, it still deserves deep research today.

There were two alternative projects of the international monetary system discussed at Bretton Woods in 1944: the US project, represented by US Treasury Chief Henry Morgenthau and a group of experts led by Harry White, and the UK project, represented by John Keynes.

1. Keynes' project was based on the creation of an International Clearing Union (ICU)[90] in which each member country would be represented by its central bank. The ICU would issue its reserve currency, *the bancor*, whose exchange rate is linked to a basket of exchange-traded commodities, including gold. The bancor was to be accepted by all countries as the world's reserve currency to settle international balances of payments. States with temporary current account deficits could cover them with ICU credits in bancor within established quotas. The USA and Great Britain were supposed to be the founders with a privileged position: they were to establish the initial parity of their national currencies denominated in bancors and the exchange rate of the bancor to a basket of exchange-traded commodities. The plan envisaged the preservation of currency areas, primarily sterling.

2. The US project was to create the International Monetary Fund and the International Bank for Reconstruction and Development. It was proposed to use the US national currency, the dollar, as the world reserve currency. The USA undertook to fix the gold value of the dollar at the level of 35 dollars per ounce of gold and freely sell gold for dollars to central banks of other countries. The currencies of other

[90] International Clearing Union http://hansard.millbanksystems.com/lords/1943/may/18/international-clearing-union

countries were proposed to be pegged to the dollar at a fixed exchange rate. They were to be freely exchangeable for gold at a fixed parity through the US dollar. Article 4 of the IMF Charter stipulated the obligation of member countries to maintain the price of gold at a fixed level, not allowing deviations in one direction or another by more than 1 per cent. If there was a need to go beyond these limits, it was necessary to obtain IMF approval by proving that such a measure was caused by "fundamental changes in the balance of trade" (negative or positive balance)[91]

On 22 July 1944, discussions at the conference resulted in the signing of the Final Agreement, based on the second version proposed by the US, which became the Bretton Woods world monetary system. It was based on the gold and currency standard and the US dollar as the world reserve currency.

Keynes's ideas on the international monetary system remained unrealised. His idea of an International Clearing Union and a world reserve currency, the bancor, didn't have the structural problems later raised by Triffin. The bancor, equidistant from all national paper money and linked to a basket of exchange-traded commodities and gold, would probably have protected the global economy from the structural problem that was later, in 1960, called the Triffin dilemma. The issue of this dilemma is in the next contradictions:

1) if the U.S. were to limit its current account deficit, the world economy would experience a liquidity shortage – a shortage of the world's reserve currency. This deficit could lead to a self-reinforcing spiral of contraction of the world economy, i.e. a global economic recession and financial instability;

2) if, conversely, the US were to meet the global economy's growing demand for liquidity by increasing the supply of reserve currency to support global economic growth, then the growing US current account balance deficit would undermine the

[91] Dormael A.V. Bretton Woods: birth of a monetary system. New York: Holmes & Meier Publishers, 1978.

dollar's purchasing power and credibility. Other countries will run balance of payments surpluses and accumulate excessive international reserves. If the central banks of these countries exchange dollars from their reserves for gold, the US gold reserve will be rapidly depleted. Reduced confidence in the dollar will undermine its function as the world's reserve currency, countries will want to exchange their accumulated foreign exchange reserves for gold, and there will be a collapse of the fixed gold content of the dollar. And in this case, the world economy will face financial instability.

Robert Triffin addressed the US Congress in 1960 to explain this paradox and proposed his solution to the problem, which was published by the IMF as an analytical paper.[92] He proposed the creation of an international reserve currency independent of any national economy, which would not be rigidly tied to either gold or national currencies. This would allow the US to optimise the amount of dollar mass from the standpoint of efficiency of domestic monetary policy, and at the same time provide sufficient international liquidity. However, these proposals were not considered in practical terms at that time and were forgotten for a while.

Triffin's predictions came true in full. Events began with Charles de Gaulle's demand that France's foreign exchange reserves be exchanged for gold. Since the late 60s, the United States, together with the IMF and several other countries made a series of attempts to jointly prevent the collapse of the dollar and the Bretton Woods monetary system. From 13 to 15 August 1971, Richard Nixon, along with a group of fifteen advisors, developed an urgent crisis plan they called the New Economic Policy. The group of advisors included, among others, Fed Chairman Arthur Burns, Treasury Secretary John Connally, and Foreign Relations Adviser Paul Volcker (who later

[92] https://www.imf.org/external/np/exr/center/mm/eng/mm_sc_03.htm; https://www.federalreservehistory.org/essays/gold-convertibility-ends;

headed the Fed). On 15 August, Richard Nixon made a televised address to the nation[93]. He announced a radical change in the international monetary system - the cessation of the exchange of US dollars for gold. In essence, this was the end of the Bretton Woods system.

The measures he proposed were called the "Nixon shock". All attempts to prevent dollar depreciation and stabilise exchange rates failed. Therefore, in 1973, the IMF officially announced the end of the Bretton Woods monetary system[94]. The structural distortion in its architecture, as John Keynes and later Robert Triffin were convinced in their time, led to the fact that a crack under its foundation turned into a huge chasm.

After the collapse of the Bretton Woods system, the world abandoned any variation of gold standards and pegging currencies to gold and moved to the system that exists today. It is called the Jamaican system, and it is based on the circulation of paper money without being tied to any real asset, using the US dollar as the world currency, based on trust in the strength of the US economy and the obligations of the US government.

Today, the Triffin dilemma and questions about the structure of the International Monetary System are once again at the centre of heated debate. In-depth academic articles by authors who question the relevance of Triffin's arguments or support them with changes in accordance with the modern global economy, include Bordo M. D. (2019)[95], Bordo, M. D. and McCauley R. (2019[96], 2025[97]), Bénassy-Quéré, A (2025)[98],

[93] https://www.youtube.com/watch?v=iRzr1QU6K1o&ab_channel=danieljbmitchell
[94] International Monetary Fund. *Annual Report of the Executive Directors for the Fiscal Year Ended April 30, 1973*. Washington, DC: International Monetary Fund, 1973
[95] Bordo, M D (2019), "The imbalances of the Bretton Woods System between 1965 and 1973: US inflation, the elephant in the room", VoxEU.org, 7 June.
[96] Bordo, M D and R McCauley (2019), "Triffin: Dilemma or Myth?", *IMF Economic Review* 67: 824–851.
[97] Bordo, M and R N McCauley (2025), "Miran, we're not in Triffin land anymore", VoxEU.org, 7 April.
[98] Bénassy-Quéré, A (2025), "Is the international monetary system 'unfair'?", 19 March.

Fahri, E and M Maggiori (2017)[99], Gourinchas, P-O, H Rey and E Farhi (2011)[100], Kimura T, and Nagano T. (2017)[101], Obstfeld M. (2025)[102], Schnabel, I. (2025)[103], Biagio Bossone (2025)[104], and many others.

Bordo, M. D. and McCauley R. (2019) analysed a large and long-term debate among many scholars about the relevance of the Triffin dilemma in its various forms for the present. They conclude that issues arising from one country's supplying most of the world's reserve currency have not gone away, and correct general form of the Triffin dilemma now is: "there is an irremediable contradiction between the issuing country's internal domestic requirements and the external requirements of the world using it".

We agree with this general interpretation of the Triffin dilemma and propose its specification for the current global situation through the prism of systemic structural contradictions between achieving the global equilibrium value of the world reserve currency exchange rate and the local equilibrium value of the US dollar from the perspectives of the US economy.

A persistently and long-term overvalued US dollar exchange rate depresses the US export and domestic industrial sectors and simultaneously stimulates imports. Through a system of feedback loops and network effects, the increasing volume of cheap imports displaces domestic production and therefore further depresses exports and increases trade imbalances on both sides (further decreasing exports and increasing imports). Thus, the persistently overvalued dollar exchange rate triggers a chain reaction and a self-enforcing spiral of worsening US trade imbalances.

---

[99] Fahri, E and M Maggiori (2017), "The new Triffin Dilemma: The concerning fiscal and external trajectories of the US", VoxEU.org, 20 December.
[100] Gourinchas, P-O, H Rey and E Farhi (2011), *Reforming the International Monetary System*, CEPR Press.
[101] Kimura, T and T Nagano (2017), "Exorbitant privilege and the Triffin dilemma through FX swaps", VoxEU.org, 30 May
[102] Obstfeld M (2025), "The U.S. Trade Deficit: Myths and Realities", BPEA Conference Draft, 27-28 March.
[103] Schnabel, I (2025), "No longer convenient? Safe asset abundance and r*", Keynote speech at the Bank of England's 2025 BEAR Conference, London, 25 February.
[104] Biagio Bossone (2025) Not Triffin, not Miran: Rethinking US external imbalances in a new monetary order Not Triffin, not Miran: Rethinking US external imbalances in a new monetary order | CEPR

A powerful additional driver of this process is the huge growth of financialisation of the economy. Global financialisation, on the one hand, stimulates the persistent growth of global demand for US dollar assets, and on the other hand, within the US, depresses the industrial production sector and replaces it with the financial sector. This in turn stimulates the next round of worsening trade imbalances, growth of financialisation and appreciation of the US dollar.

Therefore, the structural problem of the modern international monetary system exists in the sense that the huge demand of the world economy for the US dollar leads to its long-term persistent appreciation.

This demand for the dollar is not limited to the needs of international trade and necessary settlements. The abnormally huge development of financialisation (see the analysis in section 2.3) constantly increases the demand for the US dollar, which is a persistent factor for its appreciation. The overvalued US dollar real effective exchange rate and other factors that we have described above lead to the persistent widening of the US current account deficit and other negative consequences for the US economy and the global economy as a complex network system.

We suggest the following form of the Triffin Dilemma modern modification:

There is a systemic long-term and persistent contradiction between achieving the global equilibrium value of the US dollar exchange rate (determined by the balance between the global demand for US dollars and supply of dollars) and the equilibrium dollar exchange rate within the US economy (determined by the goals of achieving a minimal deficit of US trade balance and a maximal industrial growth).

Mitigating the described structural problems requires both national structural measures in the US and Chinese economies and coordinated efforts of key countries and the global community to adopt a system of optimal measures. In our opinion, it is advisable to consider the following directions.

1. What should be done in the US national economic structural reforms:

- a system of measures aimed at consolidating the federal budget and optimising public debt management;
- creation of favourable conditions for the reshoring of industrial and high-tech US companies from foreign jurisdictions and their return to the US economy;
- diplomatically resolving trade balance issues with countries that allow asymmetric trade terms and subsidise exports to the US based on a "Beggar-your-Neighbour" policy;
- coordinated measures with other countries to overcome persistent overvaluation of US dollar Real Effective Exchange Rate (REER);
- optimisation of financial sector regulation to reduce the pressure of financialisation on the real sector and the financial sector's "crowding-out effect" for real sector; reducing competition between the financial sector and the real economy for human capital and financial resources (see p. 2.1, 2.2, 2.3, 3); consideration of possibility for a Tobin tax on speculative financial transactions;
- development of proposals for the global community to reduce the burden of the US as the issuer of the world reserve currency, and consideration of an alternative monetary system based on a basket including the US dollar and the euro.

2. What should be done in Chinese national economic structural reforms:

- measures to increase the disposable income of China's population, increase domestic consumption to smooth the trade balance and reduce the Chinese economy's dependence on global export;
- measures to optimise the consumption-savings ratio in the economy – decreasing the saving ratio and increasing the consumption ratio to an optimal balance;
- strengthening of the RMB exchange rate to its equilibrium value;

- measures to reduce the leverage of China's private sector and imbalances in the real estate market;
- slowing down the growth rate of public debt and optimising debt management.

3. Structural measures that should be done at the global level:

- considering optimisation of financial sector regulation to ease the pressure of financialisation on the real sector and the "effect of crowding-out the real sector", reducing competition between the financial sector and the real economy for human capital and financial resources (see p. 2.1, 2.2, 2.3, 3); considering introducing a Tobin tax on speculative financial transactions;
- development and consideration of possible US proposals for the global community to reduce the burden of the US as the issuer of the world reserve currency and overcome the problems of the persistent overvaluation of the Us dollar real effective exchange rate; consideration of the International monetary system modification based on a basket of currencies including the US dollar and the euro.

5 Conclusion

Based on systemic analysis of three global imbalances - in international trade, debt dynamics and global finance - we conclude that these imbalances are closely interlinked and mutually influence each other through different channels. They are interconnected symptoms of deep structural problems in the global economy that require action both at the level of individual countries, in particular the US and China, and at the level of the global coordinated efforts by other key countries within the G7 and G20.

As a result of our research and analysis of a large body of historical and latest reporting financial and economic data in various countries and the global economy until the first

quarter of 2025, we have concluded that there is a sharp increase in the level of global imbalances in international trade, global debt dynamics and financialisation processes.

The global imbalances in international trade - widening current account deficits of certain countries, including the USA, and surpluses of others, including China are worsening and persistent. These global imbalances are fundamentally different from random deviations from equilibrium in international trade, which could be overcome by free market mechanisms. Targeted structural measures are therefore needed to address these problems. A particularly deep current account deficit was reached in the USA $1.2 trillion, which demonstrates the global position of the US economy as a "Consumer-of-Last-Resort". It is quite a risky global structure that impacts on high vulnerability to shocks.

The total global debt in Q1 2025 reached a new record high of over $324 trillion or 325.5% of global GDP. In its structure, private debt dominates and accounts for 70%, while public debt accounts for 30%. Private debt has grown fastest in Hong Kong SAR, Switzerland, Canada, China and Korea over the last 10 years. At the beginning of 2024 in these countries, it exceeded 200% and reached 363%, 265%, 220%, 207%, and 205% of GDP, respectively. Private debt of the US was 150% of GDP, which is less than in many other countries.

In the US, from the beginning of 2008 until now, there has been a tendency of private debt offsetting by government debt, which in Q1 2025 reached its historical maximum of $36 trillion or 122.5% of GDP. According to our calculations of debt and fiscal sustainability indicator, the US government debt is in the zone of fiscal unsustainability. Since January 2025, the situation has worsened, with the negative value of the indicator reaching in the first quarter of 2025 its worst (minimum) value over the last three years (- 3.4%).

Trade and debt imbalances are closely interconnected with the rapidly expanding global processes of financialisation and the widening gap between the growth of the financial sector and the real economy. One of the core drivers of this process is the intensive expansion of the shadow banking sector (non-banking financial institutions). The volume of its financial assets already accounts for almost half of the total global financial assets, exceeding $438 trillion. The global imbalances of financialisation in developed countries, especially in the USA, lead to the effects of displacement of industrial production by the financial sector and pulling financial resources and human capital from the real economy into its orbit. This contributes to the decline in the share of industrial production in the economy in favour of the financial sector and worsens the US trade balance.

In addition, financialisation and the paradigm of short-term profit orientation through financial transactions have influenced changes in the behaviour of non-financial corporations in the real economy. These processes have influenced the diversion of financial resources from the development of real business, as well as stimulated the development of industrial production offshoring to low-cost jurisdictions, including China. This exacerbated global trade imbalances and the unsustainability of debt dynamics.

One of the core drivers of exacerbating global imbalances is structural distortions in the international monetary system. Together with the other factors analysed, they lead to the persistent long-term appreciation of the US dollar. It widens the US trade deficit and debt problems.

Considering the three types of global imbalances - in international trade, global debt dynamics, and global finance - as three interconnected symptoms of deep structural distortions of the global economy, we conclude that both national structural reforms in the U.S. and Chinese economies and coordinated action by all key countries in the

global community are needed. On the basis of our analysis, we suggest possible directions of reform on the national and global levels to mitigate the imbalances.

References

Agnès Bénassy-Quéré (2023), Second Deputy Governor of the Banque de France, Global imbalances: what's new? Bank of France, Published on the 8th of December 2023

Altuzarra, A., Ferreiro, J., Serrano, F. and Serrano, F. (2010). The Role of Global Imbalances as a Cause of the Current Crisis. *Journal of Innovation Economics & Management,* 6(2), 25-48. https://doi.org/10.3917/jie.006.0025.

Antoniades, A., & Griffith-Jones, S. (2018). Global debt dynamics: The elephant in the room. *The World Economy*, *41*(12), 3256-3268. https://doi.org/10.1111/twec.12623

Autor, David H., David Dorn, and Gordon H. Hanson. (2013) "The China Syndrome: Local Labor Market Effects of Import Competition in the United States." *American Economic Review* 103 (6): 2121–68.DOI: 10.1257/aer.103.6.2121

Autor David H. & David Dorn & Gordon H. Hanson (2016). "The China Shock: Learning from Labor Market Adjustment to Large Changes in Trade," Annual Review of Economics, vol 8(1).

Bénassy-Quéré, A (2025), "Is the international monetary system 'unfair'?", 19 March.

Bernanke, Ben S. (2005). "The Global Saving Glut and the U.S. Current Account Deficit," speech delivered for the Sandridge Lecture at the Virginia Association of Economists, Richmond, March 10, www.federalreserve.gov/boarddocs/speeches/2005/200503102/default.htm

Bernanke, Ben S. (2006), Reflections on the Yield Curve and Monetary Policy," speech delivered at the Economic Club of New York, New York, March 20, www.federalreserve.gov/newsevents/speech/bernanke20060320a.htm.

Biagio Bossone (2025) Not Triffin, not Miran: Rethinking US external imbalances in a new monetary order Not Triffin, not Miran: Rethinking US external imbalances in a new monetary order | CEPR

BIS Annual Report (2011) The risks of international imbalances: beyond current accounts https://www.bis.org/publ/arpdf/ar2011e3.pdf

Blanchard, Olivier J. and Milesi-Ferretti, Gian Maria and Milesi-Ferretti, Gian Maria (2010), Global Imbalances: In Midstream? Available at SSRN: https://ssrn.com/abstract=1525542 or http://dx.doi.org/10.2139/ssrn.1525542

Bordo, M. D. (2019), "The imbalances of the Bretton Woods System between 1965 and 1973: US inflation, the elephant in the room", VoxEU.org, 7 June.

Bordo, M. D. and R McCauley (2019), "Triffin: Dilemma or Myth?", *IMF Economic Review* 67: 824–851.

Bordo, M and R N McCauley (2025), "Miran, we're not in Triffin land anymore", VoxEU.org, 7 April.

Borio, Claudio E.V. and McCauley, Robert N. and McCauley, Robert N. and McGuire, Patrick M., FX Swaps and Forwards: Missing Global Debt? (September 17, 2017). BIS Quarterly Review September 2017, Available at SSRN: https://ssrn.com/abstract=3041870

Bracke Thierry, Matthieu Bussière, Michael Fidora and Roland Straub (2008) A framework for assessing global imbalances, ECB Occasional Paper Series No 78, January 2008

Bucci, Alberto and Diallo, Boubacar and Marsiglio, Simone, On the Nonlinearity of the Finance and Growth Relation: the Role of Human Capital (November 20, 2023). CEIS Working Paper No. 567, Available at SSRN: https://ssrn.com/abstract=4638928 or http://dx.doi.org/10.2139/ssrn.4638928

Caballero, Ricardo J., Emmanuel Farhi, and Pierre-Olivier Gourinchas (2006). "An Equilibrium Model of 'Global Imbalances' and Low Interest Rates," NBER Working Paper Series 11996. Cambridge, Mass.: National Bureau of Economic Research, January, www.nber.org/papers/w11996.pdf

Callendo, Lorenzo; Dvorkin, Maximilliano; Parro, Fernando (2019) Trade and Labor Market Dynamics: General Equilibrium Analysis of the China Trade Shock, Econometrica. 87 (3): 741-835 https://doi.org/10.3982/ECTA13758

Cecchetti, Stephen G. and Mohanty, Madhusudan S. and Zampolli, Fabrizio, The Real Effects of Debt (September 1, 2011). BIS Working Paper No. 352, Available at SSRN: https://ssrn.com/abstract=1946170

Cecchetti, Stephen G and Enisse Kharroubi (2015) Why does financial sector growth crowd out real economic growth? BIS Working Papers No 490 by Monetary and Economic Department

China's State Administration of Foreign Exchange https://www.safe.gov.cn/en/2025/0214/2282.html

Corneli, Flavia (2009), The Saving Glut Explanation of Global Imbalances. The Role of Underinvestment, EUI ECO, 2009/41 - https://hdl.handle.net/1814/12893

Dormael A.V. Bretton Woods: birth of a monetary system. New York: Holmes & Meier Publishers, 1978.

Ductor Lorenzo, Grechyna Daryna (2013) Excess Financial Development and Economic Growth

Eichengreen, B., Hausmann, R., and Panizza, U., (2002). "Original Sin: The Pain, the Mystery and the Road to Redemption", paper presented at a conference on Currency and Maturity Matchmaking: Redeeming Debt from Original Sin, Inter-American Development Bank

Eichengreen, B.; Hausmann, R.; Panizza, U. (2007). "Currency Mismatches, Debt Intolerance and Original Sin: Why They Are Not the Same and Why it Matters". Capital Controls and Capital Flows in Emerging Economies: Policies, Practices and Consequences. University of Chicago Press. pp. 121–170. ISBN 978-0-226-18497-5.

Eichengreen, Barry; Hausmann, Ricardo; Panizza, Ugo (2023). "Yet it Endures: The Persistence of Original Sin". *Open Economies Review*. **34** (1): 1–42. doi:10.1007/s11079-022-09704-3. ISSN 1573-708X. PMC 9768781.

Financial Stability Board (2024) Enhancing the Resilience of Non-Bank Financial Intermediation. Progress report, 20 July, 2024 https://www.fsb.org/uploads/P220724-2.pdf

Fahri, E and M Maggiori (2017), "The new Triffin Dilemma: The concerning fiscal and external trajectories of the US", VoxEU.org, 20 December.

Furman J., Stiglitz J.E. (1998) Crises: Evidence and Insights from East Asia. - Brookings Papers on Economic Activity, 2

Gourinchas, P-O, H Rey and E Farhi (2011), *Reforming the International Monetary System*, CEPR Press.

Hausmann, R., and Panizza, U., (2002). `"The Mystery of Original Sin: The Case of the Missing Apple", Harvard University, Kennedy School of Government. Mimeographed

Hidalgo C. A., Hausmann R. (2009). "The Building Blocks of Economic Complexity". Proceedings of the National Academy of Sciences. 106 (26). PNAS: 10570–10575. arXiv:0909.3890. Bibcode:2009PNAS..10610570H. doi:10.1073/pnas.0900943106. PMC 2705545. PMID 19549871.

Hausmann R., Hidalgo C. et al. (2012) "The Atlas of Economic Complexity". Puritan Press, Cambridge MA.

IMF Report Global Imbalances (2019) https://www.imf.org/external/np/g20/pdf/2019/060519b.pdf

IMF Staff report (2019), Group of Twenty "Global Imbalances", Global Imbalances, IMF Staff Note, G-20 Finance Ministers and Central Bank Governors' Meetings, June 8-9, 2019, Fukuoka, Japan

IMF Report (2024) External Sector Report: Imbalances Receding. Washington, DC, July https://www.imf.org/en/Publications/ESR/Issues/2024/07/12/external-sector-report-2024

IMF, Rodrigo de Reto (2005) Global Imbalances and Poverty - Challenges for the World Economy, Remarks by Rodrigo de Reto, Managing Director of the IMF, 2005 https://www.imf.org/en/News/Articles/2015/09/28/04/53/sp062005

IMF (1973) *Annual Report of the Executive Directors for the Fiscal Year Ended April 30, 1973*. Washington, DC: International Monetary Fund, 1973

Keynes, J.M. (1944). Note by Lord Keynes. *The economic journal*, 54 (215/216), 429–30. In: E. Johnson and D. Moggridge, eds. 2013. *The collected writings of John Maynard Keynes*. Vol. XXVI, Activities 1941–1946: shaping the post-war world: Bretton Woods and reparations. Cambridge: Cambridge University Press on behalf of the Royal Economic Society, 39–40.

Keynes J.M. (1936) General Theory of Employment, Interest and Money

Kimura, T and T Nagano (2017), "Exorbitant privilege and the Triffin dilemma through FX swaps", VoxEU.org, 30 May

Lawrence, Robert Z. (2024) Behind the Curve: Can Manufacturing Still Provide Inclusive Growth? Peterson Institute for International Economics

Masataka Eguchi and Toshiya Hatano (2023), What is fiscal sustainability? —Transversality condition, Domar condition, the fiscal theory of the price level - Policy Research Institute, Ministry of Finance, Japan, Public Policy Review, Vol.19, No.3, September 2023 https://www.mof.go.jp/english/pri/publication/pp_review/ppr19_3_1.pdf

Miran, Stephen (2024) A user's guide to restructuring the global trading system https://www.hudsonbaycapital.com/documents/FG/hudsonbay/research/638199_A_Users_Guide_to_Restructuring_the_Global_Trading_System.pdf

OECD Global Debt Report 2025. Financing Growth in a Challenging Debt Market Environment https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/03/global-debt-report-2025_bab6b51e/8ee42b13-en.pdf

Obstfeld Maurice & Kenneth S. Rogoff (2009), Global imbalances and the financial crisis: products of common causes, Federal Reserve Bank of San Francisco, issue Oct, pages 131-172.

Obstfeld Maurice (2012) Financial flows, financial crises, and global imbalances, Journal of International Money and Finance, Volume 31, Issue 3, 2012, Pages 469-480, ISSN 0261-5606, https://doi.org/10.1016/j.jimonfin.2011.10.003.

Obstfeld Maurice (2012) Does the Current Account Still Matter? NBER Working Paper No. 17877 March 2012 JEL No. F32,F34,F3

Obstfeld, M (2018), 'DP13066 Twenty Five Years of Global Imbalances', CEPR Discussion Paper No. 13066. CEPR Press, Paris & London. https://cepr.org/publications/dp13066

Obstfeld M (2025), "The U.S. Trade Deficit: Myths and Realities", BPEA Conference Draft, 27-28 March.

Obstfeld M (2025), "The U.S. Trade Deficit: Myths and Realities", BPEA Conference Draft, 27-28 March.

OECD Global Debt Report (2025), Financing growth in a challenging debt market https://www.oecd.org/en/publications/2025/03/global-debt-report-2025_bab6b51e.html

Pisano Gary and Shih Willy, (2009) "Restoring American Competitiveness," *Harvard Business Review,* July/August 2009, http://hbr.org/2009/07/restoring-american-competitiveness/ar/1/.

Portes Richard (2009) Global Imbalances, Chapter in Macroeconomic Stability and Financial Regulation: Key Issues for the G20, Edited by Mathias Dewatripont, Xavier Freixas and Richard Portes, Centre for Economic Policy Research

Reinhart Carmen M. and Kenneth S. Rogoff (2008) This Time is Different: A Panoramic View of Eight Centuries of Financial Crises, NBER Working Paper No. 13882 March 2008 JEL No. E6,F3,N0

Reinhart, Carmen M., and Kenneth S. Rogoff (2010), Growth in a Time of Debt. *American Economic Review* 100 (2): 573–78.DOI: 10.1257/aer.100.2.573

Reinhart, Carmen M and Reinhart, Vincent R and Rogoff, Kenneth S (2012) Debt Overhangs: Past and Present, National Bureau of Economic Research, Working Paper, Working Paper Series, 18015, April 2012, doi = 10.3386/w18015, URL = http://www.nber.org/papers/w18015

Robinson, Joan (1947), Essays in the theory of employment, Oxford, Basil Blackwell, 201 pages

Report of a Working Group established by Asian Consultative Council of the Bank of International Settlement (2023) Inflation, external financial conditions and macro-financial stability frameworks in Asia Pacific. – 10 October 2023, BIS https://www.bis.org/publ/othp78.pdf

Schnabel, I (2025), "No longer convenient? Safe asset abundance and r*", Keynote speech at the Bank of England's 2025 BEAR Conference, London, 25 February.

Shu-Sen Chang, David Gunnell, Jonathan A. C. Sterne, Tsung-Hsueh Lu , Andrew T. A. Cheng (2009) Was the economic crisis 1997–1998 responsible for rising suicide rates in East/Southeast Asia? A time-trend analysis for Japan, Hong Kong, South Korea, Taiwan, Singapore and Thailand' by Social Science & Medicine , doi:10.1016/j.socscimed.2009.01.010 .

Sinyor, M. et al. (2024) 'The effect of economic downturn, financial hardship, unemployment, and relevant government responses on suicide', The Lancet Public Health, 9(10). doi:10.1016/S2468-2667(24)00152-X.

Stall Benn (2025) The CFR Global Imbalances Tracker https://www.cfr.org/tracker/global-imbalances-trackerStiglitz, Joseph (2003) Dealing with debt. How to reform the Global Financial System, Harvard International Review; Spring 2003

Tanaka Yasuhito (2024) Condition for convergence of debt to GDP ratio under full employment with consumption from assets and impossibility of fiscal collapse, Faculty of Economics, Doshisha University, Kyoto, Japan https://www.qeios.com/read/5DHSCH.2/pdf

Triffin, Robert (1960) Gold and the Dollar Crisis: Future of Convertibility" – Yale University Press, 1960 https://www.amazon.com/Gold-Dollar-Crisis-Future-Convertibility/dp/B0000CKPLE

The U.S. Bureau of Economic Analysis https://www.bea.gov

The U.S. Census Bureau and U.S. Bureau of Economic Analysis, Trade Balance: Goods, Balance of Payments Basis [BOPGTB], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/BOPGTB, April 28, 2025. The U.S. Bureau of Economic Analysis https://www.bea.gov

The US Congressional Budget Office, Department of the Treasury https://www.cbo.gov/publication/60843/html#total-outlays-up-by-10-percent-in-fiscal-year-2024

The Growth Lab at Harvard University, 2025, "Growth Projections and Complexity Rankings", https://doi.org/10.7910/DVN/XTAQMC, Harvard Dataverse

United Nations Industrial Development Organization (UNIDO), "The Future of Industrialization: Building Future-Ready Industries to Turn Challenges into Sustainable Solutions," (Riyadh, Saudi Arabia: UNIDO, October 2024).

Unkovska T, Taruta S, Grydzhuk D. (2022) Systemic risks in China's economy from real estate sector. Self-enforcing cycles Financial and credit activity: problems of theory and practice ISSN: 2306-4994 (print), 2310-8770 (online) https://journals.indexcopernicus.com/search/article?articleId=3486370

Weiss, L., & Thurbon, E. (2018). Power paradox: how the extension of US infrastructural power abroad diminishes state capacity at home. Review of International Political Economy, 25(6), 779–810. https://doi.org/10.1080/09692290.2018.1486875

Declarations Ethical Approval This article complies with the ethical responsibilities of authors. Specifically, this is original work which has not been submitted to any other journal.