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Harold James – Marzenna James

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Role, Challenges and Network of International Financial Centres in a Changing World Order

János Müller – Réka Hámori

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Contents

Vol. 25 Issue 3, September 2026

STUDIES

Harold James – Marzenna James:

The Mermaid with the Sword: Poland's Search for Monetary Stability
and Military Security through Gold 5

C. M. Denny:

Fiscal Dominance, Structural Rigidities and the Political Economy
of Inflation in India: From Nehruvian Planning to the Monetary Policy
Framework 23

T. D. Aswani:

Environmentally Conscious Consumer Behaviour and Green Finance:
A Bibliometric Review of Emerging Trends 49

ESSAY

János Müller – Réka Hámori:

Role, Challenges and Network of International Financial Centres
in a Changing World Order 79

FEATURE ARTICLE

Challenges of the 21st century

Balázs Sárvári – Izabella Kuncz – Petra Németh:

Clarifying the Conceptual Framework of Sustainable Finance
and Periodising Research in the Field 107

BOOK REVIEW

István Kőrösi:

Achievements of Successful Women in Economics and Finance (Katalin Botos:
Jeles nők dícsérete [In Praise of Distinguished Women]) 126

The Mermaid with the Sword: Poland's Search for Monetary Stability and Military Security through Gold*

Harold James  – Marzenna James 

Poland's monetary history over the past century reveals an interdependence between monetary stability and national security. This paper argues that the two are not parallel policy problems but facets of a single predicament: sound money cannot be sustained in a state whose existence is in doubt, and no state can secure itself without the resources that monetary discipline makes available. Across regimes as different as the interwar Second Republic, German occupation, communist planning, and post-1989 democracy, financial fragility has repeatedly undermined strategic security, and strategic insecurity has destroyed monetary credibility. At the convergence of these twin crises, one asset recurs with striking regularity: gold. Its persistence in Polish public consciousness – from the name of the currency to the central bank's purchases in the 2020s – is not an atavism but a rational response to an enduring structural predicament. The Warsaw Mermaid, sword in hand, embodies this argument: the lure of monetary expansion on one side, the demand for defence on the other, and a currency perpetually caught between them.

Journal of Economic Literature (JEL) codes: E42, E58, F52, N14, N24

Keywords: monetary stability, international security, national security, gold reserves, central bank independence, Polish economic history, inflation, monetary sovereignty, interwar finance

* The papers in this issue contain the views of the authors which are not necessarily the same as the official views of the Magyar Nemzeti Bank.

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1. Introduction

To a remarkable – and remarkably underexplored – extent, Poland’s fate over the past century has been shaped by its monetary history. This paper argues that a single thread runs through Poland’s reversals of fortune: the interdependence of *monetary stability* (usually measured in terms of price stability) and *national security* (requiring commitments to higher defence expenditure). This paper draws on new archival material from repositories inside and outside Poland to identify a dilemma of Poland’s financial history, which we describe as “the Mermaid with the Sword”. It examines the interaction of economic and security factors and how they impact inflation, national power, and the credibility of commitments. As Poland’s modern history encompasses financial capitalism, socialism, a war economy, central planning, reform communism, the transition to a market economy, and emergence as a European “tiger economy”, it provides a range of empirical case studies that illuminate ongoing theoretical debates about institutional determinants of economic growth and development in economics and political science.

How broad should be our definition of institutional foundations? Scholars have typically treated monetary and security issues as distinct domains, examining the policy choices in separate analytical registers. Yet the story of modern Poland demonstrates that sound money cannot be sustained in a state whose very existence is in doubt, and that no state can secure itself without command over the resources that monetary discipline makes available. In the Polish case, monetary and national security problems are not parallel policy challenges but facets of a single predicament – what one might call the danger contained in the nexus between financial and military strength. This nexus can produce, in parallel in both domains, a negative chain reaction capable of stripping a country of its sovereignty (or its capacity to decide on the trade-offs between price stability and a defence ramp-up): even to the point of erasure from the map. When this occurs, the scope for independent political decision-making shrinks to whatever the opposing and arbitrary imperial powers permitted.

The dangers of this interdependence have surfaced repeatedly across political systems as different as the interwar Second Republic, the German occupation, communist central planning, and post-1989 democracy. Time and again, financial fragility in the face of crisis has undermined strategic security; and, conversely, strategic insecurity has destroyed creditworthiness and foreclosed the accumulation of necessary military strength.

The Warsaw Mermaid – symbol of the city – offers a fitting emblem of this recurring nexus between financial resilience and state sovereignty. Unlike the Homeric sirens, whose beguiling song lured sailors onto the rocks by distracting them from the work at hand, the Warsaw Mermaid brandishes a sword, an unmistakable reminder

that adequate means of self-defence are not optional. The siren figures of Greek mythology became, over time, a widely used metaphor for the seductive lure of dangerous and short-sighted (in technical terms non-time consistent) policy choices; the Polish Mermaid, and the leaders who embodied her vigilance in the domain of economic policy, have by contrast been largely forgotten. Tracing this hidden historical pattern sharpens attention to the inextricable link between monetary stability and national defence, and to the dangers that arise when weakness in either sphere compounds weakness in the other. There are vicious cycles of erosion of stability, but also some virtuous cycles of resistance, in this interaction. Poland's economic past can also offer lessons about the positive mutual reinforcement of price stability and national power – about how the destructive cycle can be broken.

Economists like to examine Central European experiences under the umbrella of “small open economies”. The CEE countries participate in international trade but are too small to influence global prices or world interest rates. In consequence, they are “price takers”, meaning they are highly dependent on global trade and sensitive to foreign economic policies. Bringing the security dimension is a source of more agency. In the Polish case, the country's experience was shaped by radically different institutional and economic visions and opportunities held out not just by the powerful neighbours – Russia or Germany – but also by other systemic actors, Britain, France, and the United States. The linkages often become embedded through capital flows on which a borrowing country becomes dependent to finance both economic development and security provision.

Two broad sets of policy choices have served as answers to the risk of mutual negative reinforcement between monetary and security weakness. The first consists of credible institutional commitments designed to forestall any destructive chain reaction before it can take hold (*North – Weingast 1989; Bordo – Kydland 1990; Neal 1990*). The second focuses on improving economic stability through a single asset that has returned with striking regularity at moments of national security worries: gold. Gold's persistence in Polish public consciousness – from the very name of the currency, *złoty*, meaning “golden”, to the central bank's large-scale purchases in the 2020s – is therefore not an atavism but a recurring, and largely rational, response to an enduring structural predicament.

This predicament of potentially utterly destructive chain reactions at the interdisciplinary nexus of financial and security policies is not uniquely Polish. Other countries have faced analogous pressures at the intersection of monetary disequilibrium and national security crisis.

Understanding the Polish response to the security/financial predicament requires traversing a full century of history and drawing on sources that were long unavailable, often suppressed, forbidden, or hidden from public view.

The theoretical synthesis required to perceive and understand the mutual reinforcement of price stability and national power is correspondingly broad. It runs from the siren calls of inflationary policy – and the leaders who yielded to or resisted them – through the institutions constructed to bind the state to its commitments, to the metal that kept reappearing whenever the two crises, of money and of survival, converged in what this paper calls the predicament of the Mermaid with the Sword.

2. The dream and the illusion of peace

The securitisation or militarisation of finance constitutes a constant threat, a danger. Philosophers who saw peace as an ultimate goal inevitably tried to pick apart the fantasies of war finance, but alas they created their own alternative dreams. Adam Smith and Immanuel Kant, along with other Enlightenment luminaries, saw perpetual peace as a desirable goal, to be obtained through peaceful commerce. They reasoned that by demonstrating the frequent folly, and the costliness, of military spending, they might convince their contemporaries to adopt a new political strategy. In his great essay of 1795, Kant made limiting credit to states a key part of his programme for securing perpetual peace. David Ricardo, the British economist, is often described in modern accounts as having established a theory of “Ricardian equivalence”, that is the principle that government borrowing in order to spend is no different in its impact than immediately taxing – because borrowing implies the need for elevated taxes in the future, which will be priced into markets immediately. In practice, Ricardo, writing with the experience of debt funding in the Napoleonic wars, like Kant warned about the dangers and temptations of government debt: *“Let us meet our difficulties as they arise, and keep our estates free from permanent encumbrances, of the weight of which we are never truly sensible till we are involved in them past remedy”* (Ricardo 1846: p. 421).

Kant reflected on what he termed “this ingenious invention of a commercial people in the present century”, the now very well-known financial revolution after Britain’s Glorious Revolution of 1688, which had brought a new coinage, the new Bank of England, and the adoption of the gold standard. The reforms carried out under William III followed the ideas of John Locke and Isaac Newton. Their implementation allowed governments to build up greater resources that they then believed could outcompete any rival. *“The ease, then, with which war may be waged, coupled with the inclination of rulers towards it – an inclination which seems to be implanted in human nature – is a great obstacle in the way of perpetual peace”* (Kant 1903: p. 112). However, Poland in the twentieth and twenty-first centuries, surrounded by frequently hostile and dangerous powers, had no choice except to see credit – with all its inherent dangers – as its path to securing national survival.

3. The siren and the sword

The Homeric story of Odysseus supplies the template for modern monetary commitment. Odysseus, the dynamic moderniser with a vision of the future, understood that he had to be bound to the mast lest he succumbs to the sirens, his sailors stopped their ears with wax. This image is routinely applied to central bankers. An “Odyssean contract” lets the technocrats steer through monetary turbulence, deaf to calls for generosity and to complaints of meanness, while the political master – Odysseus/the government/the people – agrees in advance to be bound. By committing credibly, the central bank can shift expectations and in this way alter market behaviour – a mechanism that the twenty-first century relabelled forward guidance, and that has often been illustrated by precisely this myth (Campbell et al. 2012). Peter Conti-Brown, historian of the world’s most powerful central bank, eloquently articulated the resulting expansion of the mythology: “We enjoy the ride while the technocratic central bankers guide the ship of the economy to the land of prosperity and low inflation” (Conti-Brown 2018: p. 2). But what happens when the ride gets bumpy, uncomfortable, dangerous, or even life-threatening?

Poland makes an unusually pure test case of how stability-inducing institutions emerge, and on what principles they may be designed. For long stretches of time, the nation existed only in underground opposition to foreign domination. In the two world wars, under Soviet-imposed communism, and during earlier long periods of forced subjugation by foreign powers, a new Polish state was conceived in resistance, and national institutions could survive only in a parallel world. In *Alfred Larry’s Ubu Roi* (1896), an uncanny premonition of the totalitarianisms to come, the action is set “in Poland, that is to say nowhere”. A state that must be created from nothing makes its monetary choices in the open: amid political contestation and a clash of visions. In Poland, the siren calls were especially strong, after all, *Syrenka Warszawska*, the mermaid herself, is the emblem of the country’s capital. And unlike the placid, forlorn figure of Andersen’s fable in Copenhagen harbour, Warsaw’s Syrenka stands proud and erect, carrying a shield and a sword. In other words, the Polish mermaid is concerned with security. This single image holds an argument about institutions and the threats they face: the lure of monetary expansion on one side, the demand for defence on the other, and a currency caught between them. Polish interwar politics was dominated by the military and polarised around rival soldiers; the military reached even into the central bank, and a colonel of the Piłsudski regime, Adam Koc, would briefly serve as president of the central bank and, in 1939, organise the dramatic evacuation of Poland’s gold to France via Romania, Turkey, and the Middle East.

4. Inflation as a fever indicator

The case for tying oneself to the mast was made, over and over, as a response to the disruptions caused by inflation. Poland's history for over the last hundred years since national independence was restored in 1918 is a chronicle of monetary distortion through wholly different political and economic regimes, with the surges clustering tellingly around national security crises. The zloty was introduced into circulation in 1924 by the central bank. Inflation at first looked like a regime inherited from the empires that had partitioned Poland, with high inflation a major cause of the disintegration of the tsarist empire in 1917, and spectacular postwar inflations in Austria, Hungary, and Germany. But freeing Poland from foreign tutelage and bad theory was hard.

There was hyperinflation after the First World War and the re-establishment of the Polish state; renewed inflation after the only half-successful stabilisation of 1924, which helped produce Piłsudski's coup of 1926 (*Zimmerman 2022*); a deliberate turn to reflation in the later 1930s, after the misery of depression and deflation, as the foreign-policy and military threats to Polish existence escalated, and policy-makers worried how to finance higher defence expenditures; the inflation forced on Poland after the German invasion of 1939; the suppressed and then erupting inflation of a planned economy whose theorists denied that inflation was even possible under socialism; and the stubbornly high inflation of the post-1989 transition. The twenty-first-century episodes were milder – an undershooting of targets after the Great Recession, which in Poland alone among European countries was not a recession, then an unexpected surge after Covid and the Russian invasion of Ukraine – yet even these provoked political reactions of a ferocity intelligible only against the backdrop of older traumas.

What is striking is less any single episode, most of which had counterparts abroad, than their *concatenation*, which was in Europe almost uniquely Polish. The post-1918 hyperinflation swept through Central Europe, sparing only Czechoslovakia; Poland stabilised relatively late because it wished to avoid the heavy controls that earlier stabilisations had required. Nazi wartime occupation generally produced inflation, as military spending was financed by local monetary issue, but Poland was uniquely exposed as the staging ground for the assault on the Soviet Union in 1941. Inflation in the communist era ran higher than in most planned economies – while the Soviet Union enjoyed price stability from the early 1950s to the mid-1980s, Poland and Hungary did not – because a stronger tradition of political protest forced governments to accommodate demands with spending, and the price increases, imposed to absorb the resulting shortages, fed further protest. Inflation thus turned into a remarkably enduring and relatively precise diagnostic instrument: a damning numerical measure of the gap between socialism's promises and its performance. The political logic that always threatened monetary stability

had already been described in the 1920s by the liberal economist Edward Taylor, who saw political groups fight “furiously for the material interests of particular social groups”, silently pressing for more banknotes and more inflation, so that political disorder bred inflation and, in turn, inflation deepened the disorder, making the new state “difficult to settle down” (Taylor 1926: p. 287).

5. Sovereignty, credit, and the substitution of tanks for trust

Inflation was so sensitive a subject because it immediately raised the question of Poland’s relationship with the outside world. Money, in a small or medium-sized country, is usually defined by its relation to some other currency, so monetary affairs perpetually generate the fear of lost sovereignty. Even substantial and very rich West European countries felt the effects of exchange rate movements on economic activity very directly, and the calculation provided a rationale for imitating the United States in developing a large internal market transacting through a single currency. And for poorer countries, with less developed capital markets, there was always an attraction in apparently cheaper (but also inherently risky) foreign currency borrowing.

The internal divisions and institutional failures that produce inflation might in principle be patched with external resources, but borrowed money helps only if it is channelled into investment and new growth rather than mere short-term relief. In the interwar years the standard remedy was outside supervision – the League of Nations had pioneered the method in Austria and Hungary in the early 1920s – but Polish politicians judged such tutelage politically poisonous, associated with an unacceptable degree of foreign control. Finance Minister Władysław Grabski insisted instead on salvation *O własnych siłach*, “on one’s own”. He lamented that, amid crisis, “*more and more people give in to the thought that we cannot cope on our own and we need not only money from abroad, but also people who will take care of us*”, and warned, it was “*unacceptable that, under the influence of the current crisis, we should try to obtain a loan on terms that would limit our state sovereignty*” (Grabski, quoted in Jeż 2022).

Borrowing from abroad was nonetheless central to stabilising a relatively poor economy after a great shock. In the 1920s the decisive blow was the near-total loss of the old Russian market that had driven Polish industrialisation, and then came a costly trade war with Germany; in the 1990s an analogous shock came with the disappearance of the Soviet market. Both times the response required turning to the United States and its financial markets. But the deeper lesson of the interwar period is that the gravest threats to sovereignty came not from creditors but from armies. As American financial power evaporated after the stock market panic of 1929, and France was forced into austerity in the 1930s and incapable of providing

large defence loans, Poland – wedged between two unstable, aggressive revisionist powers, and abandoned by an isolationist United States – found that its sovereignty was compromised not by pressure from financial institutions and credit chains, but most directly and destructively from German and then Soviet tanks. After 1945 this pattern became inverted. Western, mostly American, financial power became omnipresent; dollars could reach beyond the carapace provided by tanks. The debt crisis that broke in 1981, amid an unprecedented protest movement and a general international debt crisis, tightened the communist regime's room for manoeuvre, pushed it toward experiments with reform, and left the country to begin its market transition under a heavy debt overhang. The two eras thus illustrate a substitution: where credit is scarce and contested, security must be bought with hard assets; where credit is abundant and trusted, money itself can do the work that tanks once did.

6. The persistence of gold

Through all these regimes and political climates, one alternative appeared to offer a glittering way out, and it is here that the interdependence of money and security becomes most concrete. Gold has intrinsic value; it depends on no state's authorisation. For that reason, gold offers security in a specifically military sense: in war, it can pay for the procurement of urgently required goods and services that cannot be obtained on credit, or on the mere word of a state. Small wonder that gold became the focus, even the obsession, of Polish policymakers, who wrote it into the very name of the currency – *złoty* means "gold". Poland introduced a virtual gold currency in the early 1920s, before it could take serious steps to retire the inflation-prone mark inherited from the war, and the gold promise lay at the core of the stabilisation that established Bank Polski in 1924. In 1926, when the finance minister and the bank's vice-president travelled to complete the second and final stabilisation in the company of a French and an American central banker, visiting the ailing Governor of the Federal Reserve Bank of New York, they called themselves the "Four Golden Złotys". The gold cover ratio became the headline measure of success, reaching 38.7 per cent at the end of 1929.

That very success bred a toxic illusion that the gold stock could rise forever. Reversing its earlier policy of holding only the legal minimum, the bank declared in its 1929 annual report that, "for psychological reasons", a central bank was strong in proportion to the gold it held. The illusion concealed a structural vulnerability, for credit flows were at the core of the international system, and Poland's prosperity – together with its gold – ultimately rested on foreign borrowing. The most acute contemporary analyst, Feliks Młynarski, who had taught himself monetary theory from the work of the great American monetarist Irving Fisher, saw it clearly: *"Instead of a fluctuation of gold we have an ebb and flow of short-term credit"*

(Młynarski 1929: p. 79). He wrote these words in 1929, just as the ebb turned into a catastrophic outflow. Gold, it emerged, was not the autonomous anchor it appeared to be; it floated on the same tide of international credit on which security also depended.

There was also a darker resonance. Gold stood at the centre of the national mythologies of the two powers that menaced Poland east and west. Russian thought had long treated gold (rather than institutional arrangement) as the ultimate guarantor of stability. Gold in Russian culture commanded a quasi-religious aura borrowed from the icons that embodied God's power. In Germany the Nibelungen saga, as reworked by Wagner, turned on the seizing and hoarding of gold as a demonstration of power. To reach for gold was thus to reach for the very symbol through which Poland's predators understood domination – a reminder that the asset which promised security was also entangled with the sources of the threat.

7. Gold's odyssey and the coming of the dollar

As Poland's credit ebbed through the 1930s its gold stock waned, but the obsession only intensified as the security threat grew. Fearing that creditor states might seize it, Bank Polski repatriated as much gold as it could from New York and Paris – whereupon gold at home suddenly looked like a fresh vulnerability. Colonel Adam Koc, the former head of the bank, drew out the underlying logic of this decision, *"The purpose of gold during war is to serve the defence of the state. It does not play the role that it played during peace, when it was the foundation of the Polish currency"* (Koc 2005: p. 267). In September 1939 he coordinated the spectacular evacuation by which the reserves travelled by bus and truck to Romania, by rail to the Black Sea coast, by an ageing oil tanker to Istanbul, by rail again to Beirut, and by French warship to Toulon. The gold was rescued, but France was not safe either; after the German invasion of May 1940 the Vichy authorities removed it to West Africa, under the control of the Banque de France and subject to German pressure (Rojek 2000).

Then a new kind of power asserted itself. When Germany demanded – with menacing notes – that the gold be returned to occupied Warsaw, where Bank Polski still nominally existed, the Polish government in exile in London obtained an injunction in a New York court holding French gold there as collateral for the Polish claim. The question of who owned Poland's gold was decided, in the end, not by armies or by the metal's own "intrinsic" value but by American courts – an early sign that financial and legal infrastructure, centred on the United States, was becoming the real arbiter. The point was confirmed after the war. The reserves rescued through an odyssey across three continents proved useful, in practice,

only as a means of buying the dollars needed for strategic imports. The dollar was unmistakably the world's new key currency, and gold had become its servant.

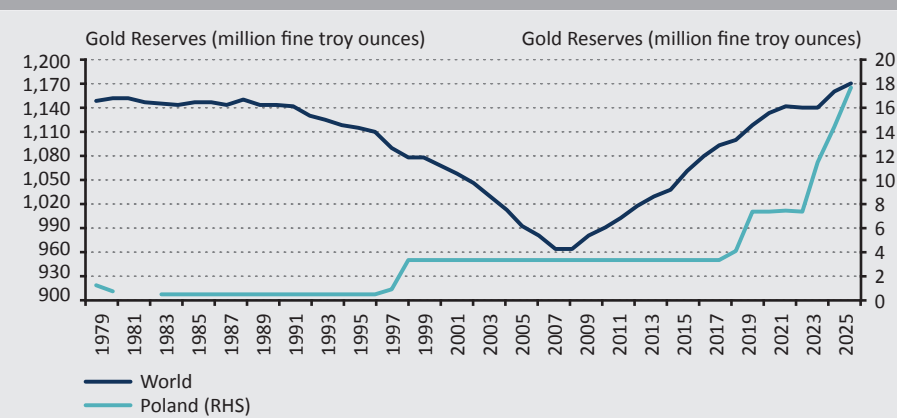
Communist Poland nonetheless clung to the gold idea, even as it forbade its citizens to hold the metal. In the currency conversion of 1950, when old notes were exchanged at 100 to 1, the złoty was placed on a gold basis at 0.222168 grams of fine gold – precisely the value the Soviet Union had just set for the rouble. The finance minister told the Sejm that the reform would strip “the capitalist element” of some of its cash, create conditions for economic saving, and equalise the złoty “to the world's strongest currency – the Soviet rouble” (*Dąbrowski 1950: pp. 1, 4*). The claim was unreal even as it was uttered: everyone in Poland already knew the strongest currency was the dollar, and the supply of dollars only grew as émigrés sent their hard-earned savings to relatives at home. The gold link survived as ideology long after it had ceased to describe anything real.

8. The return of gold

By the late twentieth century only the dollar seemed to matter. Yet as the new century unfolded, gold returned – and it returned, significantly, at moments of geopolitical tension. Central bank purchases surged after 2011 and far more dramatically after 2020 (*World Gold Council 2023*). Emerging economies – China, India, Türkiye, Russia – bought gold as a way to loosen the dollar's grip, and Europeans joined in; having announced a plan in 2013 to bring half its reserves home, the Bundesbank shipped some 300 tons from New York and 374 from Paris (*Deutsche Bundesbank 2017*). Poland followed the trend with conviction, but the Polish move cannot easily be explained in terms of a politicised emerging market preference for escaping a dependence on dollar or euro reserves, or on the SWIFT payments platform, as Poland is heavily and firmly embedded in the European Union, and is also one of the least US-phobic European countries.

The Polish move to reserve diversification thus is not a matter of a political reorientation, but rather a rethinking of what constitutes a secure asset in monetary terms. In 2018, Narodowy Bank Polski took a strategic decision to expand its gold reserves, buying 125.7 tons in 2018–2019 and more than doubling its stock to 228.7 tons. Its president, Adam Glapiński, mused that “*perhaps Shakespeare was right... that all that glitters is not gold... gilded tombs do worms enfold*”, before adding that, in managing reserves, the bank “*certainly didn't mind some glitter in our portfolio*” (*Glapiński 2021*).

Figure 1
Polish and World Gold Reserves



Note: One troy ounce is equivalent to 31.1035 grams.

Source: Authors' compilation based on World Gold Council (WGC) and IMF International Financial Statistics data

After Russia's full-scale attack on Ukraine in 2022 directly threatened Polish security, the rhetoric became explicitly strategic. Gold, Glapiński argued, made Poland "a more credible country... a very serious partner", and he set the goal of holding 20 per cent of reserves in the metal, "The dream is to reach 20 per cent" (Glapiński 2023). In February 2024, he announced a plan to realise that dream and released a video displaying the stacks of gold in the vaults of NBP (Glapiński 2024). By the end of 2025, a year in which the NBP had been the greatest central bank purchasers of the yellow metal, the reserve had reached some 550 tons, a substantial part of it once again held in New York rather than in a Europe more exposed to the Russian threat. The parallel with the late 1930s is exact in form: as the security threat mounted, Poland reached for gold and weighed where in the world it could safely keep the gold. In the Polish official thinking, once more, in the setting of an unstable international order, gold had become the country's best friend once more not in spite of the security crisis but because of it.

9. Heroes, nemeses, and the politics of stabilisation

Transformative moments require remarkable personalities, and Poland's two great rebirths – after 1918 and after 1989 – threw up charismatic, flawed, polarising leaders who gave voice to a humiliated nation yet had little grasp of the monetary questions on which their projects would stand or fall. Marshal Piłsudski, in the economist Ferdynand Zweig's words, "may be said to have centred in himself all Polish dreams and ambitions, social as well as national", succeeding "in creating a genuine myth about his personality" (Zweig 1944: p. 44). Lech Wałęsa consciously

took Piłsudski as his model, complaining of the first reformers that *“they haven’t been able to translate the great work they’ve done into everyday language. The nation can be persuaded to put up with unpopular things if it’s treated seriously”* (*Financial Times* 1990).

Both leaders were frank about their economic ignorance. Piłsudski admitted that he did not understand the “economic-financial game” (Zweig 1944: p. 70), and Wałęsa habitually opened discussions by disclaiming any expertise in economics. The liberal economist Edward Taylor judged the political class harshly in the 1920s, writing that the leaders *“exhibit a striking ignorance of monetary affairs, to the extent difficult to find elsewhere”*, while sharing the society’s *“extraordinary restlessness that hugely worsens every economic plight”* (Taylor 1926: p. 371). Stanisław Karpiński, the first president of Bank Polski, fumed in his diary that *“the self-praise of the various ‘saviours’”* had wrecked the tenth-anniversary celebrations of independence: *“with the champions of independence having multiplied so copiously one is left to wonder why Poland had not been liberated earlier”* (Karpiński 2021: p. 149).

The institution-builders who redesigned monetary affairs were equally larger than life, and equally polarising. In the 1920s, the far-sighted figure who saw that financial ingenuity could beat the speculators profiting from instability was Feliks Młynarski; he never cared for the colonels around Piłsudski, who in the end removed him from Bank Polski. His antithesis was the more bureaucratic Zygmunt Karpiński, the bank’s chief of foreign relations between the wars, its guide in wartime exile in London, and later the architect of its reintegration into the People’s Republic and of the transfer of the gold to the new Narodowy Bank Polski. In 1989, the heroic and polarising figure was the reforming finance minister Leszek Balcerowicz, seen by many as a reincarnation of Grabski; his nemesis was the brilliant, critical Grzegorz Kołodko, theorist of a “New Pragmatism” opposed to what he saw as market fundamentalism, who fought Balcerowicz repeatedly across the finance ministry and the central bank.

Beneath the clash of personalities lay a clash of parties unlike the western European pattern. Where western Europe built its long postwar stability on a productive tension between a centre-right that resisted redistribution and a social-democratic left that sought more of it, Polish cleavages formed much less around alternative views of market order. The interwar axis ran between Piłsudski and his rival soldier, General Władysław Sikorski; in the new millennium, the polarisation returned as an epic contest between the socially conservative Prawo i Sprawiedliwość (PiS) of the Kaczyński brothers and the economically centre-right liberalism of Donald Tusk’s Civic Platform, its bitterness rooted in the accusations of national and social betrayal that surrounded the Round Table pact of 1989. In both eras, the surest way for parties to build support was to spend more and tax less – the political logic, described above, that perpetually threatened the cause of monetary stability.

10. Institutions: independence, resistance, and its limits

In both eras, an independent central bank appeared as part of the necessary infrastructure of reform. One of the key modifications of the original 1919 schemes for Bank Polski was its private ownership structure, designed to mark a separation from government in the spirit of Montagu Norman, the influential Governor of the Bank of England, who preached central bank independence as a precondition for effective stabilisation. Central bankers often seemed to win their conflicts with governments. In November 1925, central bank president Stanisław Karpiński helped bring down the very Grabski government responsible for the bold stabilisation of 1924, in a dispute over the use of the bank's reserves; after 1989, Balcerowicz as central bank president effectively removed Finance Minister Kołodko in a quarrel over lax fiscal policy, and a decade later Marek Belka brushed against Finance Minister Jacek Rostowski. In the 1980s, NBP president Władysław Baka had already argued for independence as a way of making policy consistent over time – the time-consistency that would become central to late-century thinking on the careful delegation of a delimited mandate to an autonomous central bank (*Tucker 2018*).

Poland after the constitution and banking law of 1997 became a quite extreme case of independence, with no obligation to report to government or parliament – unlike the Federal Reserve, the Bank of England, or even the very independent European Central Bank – so that the bank is sometimes said to be accountable “only to God and to history”. Yet there has always been a crucial objection, never put better than by the British expert Hilton Young in a report to the Polish government in the mid-1920s: *“No law, however rigorous, and no bank, however independent, can be strong enough to stand up against a Government that must have funds to cover a deficit. The life of the State may depend on the deficit being met, and it is not a currency law that will be allowed to stand in its way”* (Young 1924: p. 9). When survival is at stake, the security imperative overrides the monetary rule – which is exactly why states facing existential threats reach for an asset that needs no rule to enforce it.

Institutions also serve as guarantors of technical competence and as channels to the outside world, and here Poland's wartime experience is dramatic. Both Bank Polski in exile in London and the German-controlled Bank Emisyjny in occupied Kraków reached across the Atlantic to the American judicial system and the US Treasury. Its interventions kept the Vichy and Nazi regimes from collaborating to appropriate the Polish official gold holdings, and Młynarski prepared memoranda for Treasury Secretary Morgenthau aimed at setting out the basis for postwar restitution claims against Germany. The resistance of a Polish central bank in an occupation regime proved an unlikely school of monetary statecraft. The postwar Narodowy Bank

Polski, created by the communist authorities in 1945, drew its leadership not chiefly from the communist underground but from the Home Army, the *Armia Krajowa* demonised by the regime – among them the first president, Edward Drożniak, and the head of foreign exchange, Tadeusz Mierzyński, who had held a similar post in the interwar and then the wartime bank of issue, and who in that role engineered the largest bank robbery in Polish history, seizing some 106 million złoty in August 1943 (a high estimate for monthly pay at the time was 500 złoty) without ever being traced by the German police. That such men – trained in the wartime underground state much as an earlier generation had been trained in the Polish Legions in First World War – became the builders of the postwar bank is a vivid reminder that monetary institutions and the struggle for national survival were never far apart.

The contrast between Poland's post-1918 and post-1989 eras of rebirth, like the analysis presented so far, confirms the argument about the interdependence between the monetary and national security spheres. The two eras differed in five relevant and meaningfully connected ways. First, the international environment: the interwar republic was a victim of trade protectionism and of the closing of its Russian and German markets, with Britain, France, and the United States all turning inward, whereas the transformation of 1989 unfolded amid accelerating globalisation and European integration, with the Single Market set to launch in 1992. Second, the international architecture: where interwar Poland struggled to keep the League of Nations at arm's length, fearing its sympathy for German claims, postwar reformers worked toward the IMF membership that came in 1986 and that proved central to the transition and to renegotiating the debt. Third, the search for stability took longer in the 1990s but, once achieved in the early 2000s, proved far more durable, helped by a global return to price stability. Fourth, security: the constant interwar threat was, for a time, decisively answered by NATO membership in 1999 – though the heightened risk after Russia's attacks on Ukraine in 2014 and 2022 revived the oldest of responses, raising the share of reserves held in gold. Fifth, the fragility of interwar democracy made for greater economic and financial insecurity, whereas the memory of dictatorship has since underwritten a deeper commitment to democracy.

11. Conclusion: the interdependence of money and security

The Polish century analysed here yields a general lesson that echoes well beyond one country. Monetary stability is a vital social good because it allows economic agents to make the long-horizon judgements on which rational investment depends: in an inflation, almost any investment seems worthwhile and decisions are made too early on too little information; in a deflation, refraining is always rational and, as a result, economic activity is placed on hold. But stability is not produced by monetary institutions alone. It rests on a foundation of military security, and, in turn,

it supplies the resources without which national security cannot be financed. The two stand or fall together. This is why gold – the asset that answers the monetary question and the military security question at the same time – kept returning to the centre of Polish thinking under the monarchs, under dictators, under communists, and under democrats alike. Gold mattered most precisely at the moments when the monetary and national security crises coincided.

The gold obsession of the 1930s and the 2020s was in many ways a second-best option. In the 1930s, as the military situation deteriorated, the question of where the gold could safely be located became increasingly pressing. In the 2020s, the gold price surged but the spectacular highs raised questions about whether this was an asset bubble that might burst; and Poland confronted the same problem of a secure physical location. Today the institutional security and economic and monetary framework look much stronger and capable of protecting a prosperous but potentially vulnerable medium-sized state like Poland (as well as its smaller Central European partners). There is NATO, but the President of the United States repeatedly makes threats about withdrawing the vital US support. There is the European Union, but it lacks an effective common fiscal mechanism and has no debt instruments that could rival US Treasuries. And there is the common currency, which Polish governments so far were hesitant about, as exchange rate flexibility was a major economic asset for Poland in the purely financial crisis of 2007–2008. But in a world in which financial and political crises will be much more intertwined, the question will certainly be raised of whether the Euro might be a preferable institutional mechanism to dependence on the yellow metal.

This analysis of the similarities and the differences between Poland's post-1918 and post-1989 eras of rebirth of political independence draws the main threads of this argument together. Ultimately, it is when democracy is weak, fragile, and threatened that the suspicion created by delegating authority to an independent central bank – authority needed for the maintenance of monetary stability – becomes most politically potent, and it is then, too, that a state reaches past its institutions for the metal that needs none. Poland's transformation from one of Europe's poorest performers into a continental growth champion (*Piętkowski 2018*) was possible because, for a generation, sound institutions and a credible security system allowed the country to trust its money and to do without gold. However, it has been Poland's historic experience that when either faltered, the mermaid lifted her sword, and the gold came home. The interdependence and the fragility of monetary stability and national security is the constant of which Poland's gold, in all its journeys, has always been the visible sign.

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Data Availability

The data used in this study were obtained from World Gold Council (WGC) and IMF International Financial Statistics.

Ethical Approval

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Fiscal Dominance, Structural Rigidities and the Political Economy of Inflation in India: From Nehruvian Planning to the Monetary Policy Framework*

C. M. Denny 

India's persistent inflation reflects fiscal dominance, structurally distorted agricultural markets and the primacy of distributional politics over price stability. Using ARDL bounds testing, Toda–Yamamoto Granger precedence, Bai-Perron structural break analysis (unconditional and conditional) and GARCH(1,1) with break dummies on both the conditional mean and variance, applied to quarterly data spanning 1955 Q1–2024 Q4, the paper identifies three structural determinants of inflation persistence: fiscal deficits operating through channels distinct from monetisation; minimum support price policies transmitting cost-push shocks via the high food share in the CPI; and inertial expectations. The 2014 Q3 transition coinciding with inflation-targeting adoption constitutes a statistically identifiable regime shift in both the level and conditional volatility of inflation. Framework durability depends on continued fiscal consolidation and agricultural reform.

Journal of Economic Literature (JEL) codes: E31, E52, E62, O11, Q18

Keywords: Inflation targeting, fiscal dominance, minimum support price, ARDL, GARCH, structural breaks, India, food inflation, Phillips curve, Central and Eastern Europe

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1. Introduction

India's inflation record since independence presents a paradox. The country has never experienced hyperinflation of the Argentine variety; *Blejer (2025)* documents how Argentina's peso lost thirteen zeros between 1945 and 1992. Yet India has struggled to sustain price stability below 5 per cent for any prolonged period. From the chronic single-digit inflation of the planned-economy era, through the double-digit food-price surges of 2009–2014, to the more recent disinflation under inflation targeting (IT), India's relationship with price stability has been one of managed coexistence rather than decisive resolution.

This pattern is not primarily the product of monetary incompetence, as the Reserve Bank of India (RBI) has been a technically sophisticated institution throughout most of its history. Instead, inflation persistence reflects structural and political-economic conditions that repeatedly constrain monetary effectiveness: the primacy of fiscal over monetary objectives; the political entrenchment of agricultural price-support policies that transmit cost-push pressures into the consumer price index; and the asymmetric federal structure that distributes inflationary spending across twenty-eight states, while concentrating anti-inflationary responsibility in the Union government and the RBI.

Two further structural features merit explicit recognition. First, the banking system is dominated by Public Sector Banks (PSBs), which hold roughly two-thirds of system assets and operate under non-commercial mandates that attenuate the interest-rate channel. *Mishra and Montiel (2013)* find that policy-rate-to-lending-rate pass-through in India is among the weakest in Asia, attributable in substantial part to balance-sheet stress, directed-lending obligations and administered deposit pricing in the PSB-dominated market. Second, the share of food and beverages in the all-India CPI basket is approximately 45.86 per cent, far higher than in advanced economies (typically 10–15 per cent) and most emerging market peers. This large food weight magnifies the MSP (Minimum Support Price) -driven cost-push channel identified below and constrains the central bank's ability to deliver target-consistent outcomes without disproportionate output costs. The interaction between weak banking-channel transmission and high pass-through from administered agricultural prices constitutes the operational environment within which inflation targeting must function.

The comparative literature on emerging market inflation persistence identifies two broad classes of explanation: the fiscal theory of the price level, in which persistent deficits ultimately require monetary accommodation regardless of central bank preferences (*Sargent – Wallace 1981; Cochrane 2023*); and structural theories emphasising supply-side rigidities, backward-looking price setting and the political economy of reform resistance (*Akerlof et al. 2000; Blejer 2025*). The Indian case

requires both: the fiscal and supply-side channels are empirically distinguishable, statistically significant and politically reinforcing.

This paper makes five contributions. First, it applies a multi-method time-series framework to quarterly data spanning 1955 Q1–2024 Q4: ARDL bounds testing, VAR-based Granger precedence, Bai-Perron structural break analysis (unconditional and conditional) and GARCH modelling with break dummies on both conditional mean and variance. This complements recent work by *Rastogi and Kanoujiya (2024)*, who model post-IT inflation volatility with attention to commodity and exchange-rate spillovers. The present paper differs in its joint integration of long-run cointegration, multivariate Granger precedence, endogenous break dating and conditional volatility within a unified empirical strategy. Second, it identifies the MSP index as a statistically significant long-run determinant of CPI inflation that remains significant when monetary aggregates are controlled for, giving direct empirical content to the structural food-price channel argued thus far on institutional grounds (*Gokarn 2011; Rangarajan – Mishra 2013*). Third, it documents that inflation targeting is associated with a statistically identifiable shift in both the level and conditional volatility of inflation, consistent with *Rastogi and Kanoujiya (2024)* and *Bhalla et al. (2026)*, while interpreting this cautiously in light of *Eichengreen and Gupta (2024)*, who find the post-2016 reaction function not demonstrably more hawkish. Fourth, it situates these findings within a comparative political-economy framework drawing on the Argentine experience (*Blejer 2025*) to illuminate the shared structural logic of inflation persistence where distributional politics constrain reform. Fifth, it draws concise institutional lessons from the Indian transition for other emerging market inflation-targeting frameworks, including those of Central and Eastern Europe.

A methodological caveat applies throughout. Following central bank practitioners with extensive operational experience, we treat statistical precedence relationships (whether from Granger-type tests or cointegration) as evidence compatible with hypothesised economic mechanisms rather than proof of fundamental causality, since in-sample co-movements need not correspond to exploitable causal mechanisms. Where the paper reports that one variable ‘Granger-causes’ another, the claim is one of statistical predictive content, not fundamental causal exploitability for policy.

The paper is organised as follows. *Section 2* reviews the historical record. *Section 3* presents data and methodology. *Section 4* reports the econometric results, including a robustness subsection (4.6) on unit-root robustness, intra-quarter endogeneity and regime-specific estimation. *Sections 5* through *7* provide the structural and political-economy interpretation, with *Section 7* incorporating the March 2026 framework renewal. *Section 8* draws concise comparative institutional lessons. *Section 9* concludes.

2. Inflation in India: the historical record

In the Indian context, inflation is not merely a monetary phenomenon; it is also influenced by agricultural conditions, Centre–State fiscal relations, and political factors. The evolution of Indian inflation since 1950 divides into four phases (*Table 1*). The first (1950s–1960s) saw modest inflation below 3 per cent on the WPI basis, suppressed by administered prices but structurally fragile.

The second (1970s–1980s) saw acceleration driven by oil shocks, droughts and fiscal expansion, with M3 growth above sixteen per cent per annum. The third (1991–2016) encompasses both the 1991–1993 crisis-stabilisation inflection and the resurgence of elevated food-price inflation under the United Progressive Alliance. The fourth (2017–2024) is the inflation-targeting era: lower average inflation but persistent structural pressures.

Table 1 Inflation, monetary growth and fiscal balances by decade (quarterly averages) in India					
Period	Avg. WPI (%)	Avg. CPI (%)	Avg. M3 Growth (%)	Fiscal deficit (% GDP)	Key structural context
1951–1960	1.7	2.1	6.8	~2.0	Nehruvian ISI; FYP allocation
1961–1970	6.4	7.0	9.2	~3.0	Green Revolution transition; droughts
1971–1980	9.6	8.3	16.4	~4.5	Oil shocks; bank nationalisation
1981–1990	7.1	8.9	17.3	~8.0	Fiscal expansion; SLR peaks at 38.5 per cent
1991–2000	7.6	9.4	15.1	~5.8	BOP crisis; partial liberalisation
2001–2010	5.5	5.9	17.0	~4.8	High-growth decade; MSP acceleration
2011–2016	6.2	9.5	13.1	~4.9	Elevated food inflation; UPA II
2017–2024	4.1	5.4	10.2	~5.8	IT era; COVID shock; 2024–2025 disinflation
<i>Note: WPI = Wholesale Price Index; CPI = Consumer Price Index; M3 growth refers to broad money growth. Fiscal deficit figures are approximate central government deficits as a percentage of GDP. ISI: Import Substituting Industrialisation; FYP: Five-Year Plan, SLR; Statutory Liquidity Ratio; BOP: Balance of Payments; MSP: Minimum Support Price; UPA: United Progressive Alliance.</i>					
<i>Source: RBI Handbook of Statistics (2024), Ministry of Finance Annual Reports, World Bank World Development Indicators</i>					

As *Table 1* shows, a persistent positive association between fiscal deficits and inflation is visible across most sub-periods, interrupted only by the post-1991 reform episode and partially by the early IT period. The M3-inflation association is similarly visible in the pre-IT era, consistent with (though not itself proof of) the quantity theory at longer horizons. Such bivariate co-movements may reflect common drivers or accommodative monetary responses rather than monetary growth as an independent causal force; we therefore treat the association as compatible with monetary-theoretic interpretations without claiming an exploitable mechanism. The distinctiveness of 2011–2016 (high CPI inflation despite declining WPI and moderate money growth) points to the structural food-price channel that *Section 4* confirms formally.

3. Data and methodology

3.1. Data

The analysis uses quarterly data spanning 1955 Q1–2024 Q4, yielding 280 observations. The primary variable is all-India CPI inflation, the annualised quarterly log-difference of the price level. For the pre-2011 period, when the new all-India CPI was unavailable, we use the CPI (Industrial Workers) series spliced to the new series using standard index-linking consistent with RBI practice.¹

The explanatory variables span five categories: (i) *fiscal*: the central government fiscal deficit as a share of GDP (*fd*) and its components; (ii) *monetary*: broad money growth M3 (*m*) and the real interest rate (*r*); (iii) *agricultural price policy*: the all-commodity MSP index (*m**sp*), a weighted average of MSP levels for the twenty-three CACP commodities;² (iv) *demand and external*: the output gap (*gap*) from Hodrick-Prescott filtering, the nominal effective exchange rate (*er*), and the rupee crude-oil price index (*oil*);³ and (v) *expectations*: the RBI's quarterly household inflation-expectations survey (*pe*), available from 2006 Q3 and extended backwards using model-based fitted values. Consistent quarterly unemployment data are unavailable for the full sample; the output gap serves as the demand-side proxy. *Kapur (2013)* provides a complementary unemployment-based Phillips-curve analysis for the post-2010 period.

¹ CPI data for the pre-2011 period are based on the CPI-IW (Industrial Workers) series, re-based and spliced to the new all-India CPI series at 2011 Q4 using standard index-linking methodology consistent with RBI practice. Sensitivity analysis using alternative splicing approaches (CPI-AL series for the agricultural-labour weight; chain-linked weighted average across CPI-IW, CPI-AL and CPI-RL) yields qualitatively similar coefficients on the main variables and identical structural break dates; results are available from the author on request.

² The MSP index is constructed as a geometric weighted average of the CACP-announced MSP levels for twenty-three commodities, using procurement volume weights updated at five-year intervals. Full construction details are available from the author.

³ The output gap is estimated via one-sided Hodrick-Prescott filtering with smoothing parameter $\lambda = 1,600$ for quarterly data, applied to real GDP at constant 2011–2012 prices. The filter boundary problem is addressed using the RBI endpoint-constraint method.

All series are drawn from the *RBI Handbook of Statistics (2024)*, the DGCIS (Directorate General of Commercial Intelligence and Statistics), the CACP (Commission for Agricultural Costs and Prices) Annual Reports and the IMF International Financial Statistics (IFS). Models including expectations are estimated on 2006 Q3–2024 Q4 (73 observations, 68 after lags); for comparability, all four ARDL models in *Table 5* use this sample, and full-sample robustness checks (excluding *pe*) yield qualitatively similar coefficients on *fd*, M3, MSP and the output gap. Monetary and fiscal variables are in log-differences where required by the stationarity analysis.

One caveat concerns consistency across methodological revisions. The CPI basket and the IFS series underwent definitional changes in the period 1955–2024 (the 2011 CPI transition, periodic fiscal-deficit redefinitions, and IMF methodological updates) that may bias break estimates toward transition dates. Recomputing the principal Bai-Perron procedure on the RBI Handbook series alone and on the IFS series independently yields break dates differing by no more than two quarters, with the principal dates (1991 Q3, 2007 Q4, 2014 Q3) coinciding in both. A residual concern is that breakpoint tests may attribute significance to dates reflecting statistical revisions; we therefore treat the smaller breaks (notably 1997 Q2, near the 1999 fiscal-accounting reform) with caution and assign them no causal weight in the interpretation.

3.2. Econometric framework

The strategy proceeds in five stages, following time-series precedents on long-horizon regime-shift identification, cointegration under structural change and conditional-volatility modelling (*Hamilton 1994; Stock – Watson 2003; Lütkepohl 2005*).

In the first stage, we test for unit roots using the Augmented Dickey-Fuller (ADF) test with lag length selected by AIC:

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \sum_{j=1}^p \delta_j \Delta y_{t-j} + \varepsilon_t \quad (1)$$

where $H_0: \gamma = 0$ (unit root) is tested against $H_1: \gamma < 0$ (stationarity), for specifications with intercept only and with intercept and trend.

In the second stage, we employ the ARDL bounds test of *Pesaran et al. (2001)*. The unrestricted error-correction model is:

$$\Delta \pi_t = \alpha_0 + \sum_{i=1}^p \alpha_i \Delta \pi_{t-i} + \sum_{j=0}^q \beta_j' \Delta X_{t-j} + \lambda_1 \pi_{t-1} + \lambda_2' X_{t-1} + \varepsilon_t \quad (2)$$

where X is the vector of explanatory variables. Lag orders p and q are selected by AIC with a maximum of four quarters; the optimal structure is ARDL(2,1,1,1,0,1,1,0). The bounds test evaluates $H_0: \lambda_1 = \lambda_2 = 0$ against the F-statistic critical values of Pesaran *et al.* (2001). Long-run coefficients (Table 5) are recovered by the normalisation $\vartheta = -\lambda_2/\lambda_1$.

In the third stage, we estimate a reduced-form VAR with lag order selected by the Schwarz criterion and apply the Toda – Yamamoto (1995) procedure for Granger precedence tests valid regardless of integration order, avoiding pre-testing distortions.⁴ Precedence is interpreted as statistical predictive content, not exploitable causality. The framework establishes lag-based content, but cannot rule out intra-quarter endogeneity among inflation, fiscal and monetary variables within a quarter; Section 4.6. addresses this by re-estimating the ARDL model with lagged or instrumented contemporaneous regressors.

In the fourth stage, we apply the Bai and Perron (1998, 2003) multiple-break test in two specifications: an unconditional one regressing inflation on a constant only, and a conditional one that additionally includes the contemporaneous fiscal deficit, M3 growth and the MSP index. The conditional specification tests whether these structural channels jointly account for the observed regime shifts. The test allows for m breaks in:

$$\pi_t = x'_t \beta_j + \varepsilon_{jt} \text{ for } t = T_{j-1} + 1, \dots, T_j, j = 1, \dots, m+1 \quad (3)$$

with break dates $\{T_1, \dots, T_m\}$ estimated jointly with regime-specific parameters by minimising the global sum of squared residuals. The supF and double-maximum tests (UDmax, WDmax) evaluate the presence and number of breaks.

In the fifth stage, we model both the conditional mean and variance of inflation using GARCH(1,1) (Bollerslev 1986) augmented with structural-break dummies in both equations:

$$\pi_t = \mu + \varphi D_{IT} + \rho \pi_{t-1} + \varepsilon_{jt} \mid \Omega_{t-1} \sim N(0, h_t) \quad (4)$$

$$h_t = \omega + \alpha \varepsilon_{t-1}^2 + \beta h_{t-1} + \gamma D_{IT} \quad (5)$$

⁴ We follow the convention adopted in Toda and Yamamoto (1995) of estimating the VAR in levels with $k + d_{max}$ lags, where k is the optimal lag length and d_{max} is the maximum order of integration of the variables, then applying the modified Wald test on the first k lag coefficients only. This approach yields χ^2 test statistics with standard asymptotic distributions regardless of the integration order of the variables.

where D_{IT} equals one from 2016 Q1, φ captures the IT-associated mean shift, and γ the variance shift. Including φ is consistent with the Bai-Perron evidence (Section 4.4.) that IT adoption was associated with a level shift, not merely a volatility shift. The sum $\alpha + \beta$ measures volatility persistence. Equations (4)–(5) are estimated jointly by quasi-maximum likelihood with Bollerslev-Wooldridge robust standard errors.

4. Empirical results

4.1. Unit root tests

Table 2 reports ADF results for all variables in levels and first differences. With the exception of the output gap, which is stationary in levels by construction, all variables are integrated of order one, $I(1)$, failing to reject the unit-root null in levels but strongly rejecting it in first differences (MacKinnon 1996), consistently across both specifications. This motivates the ARDL bounds approach, valid for any mixture of $I(0)$ and $I(1)$ regressors. As shown in Section 4.6., re-estimating with procedures allowing endogenous breaks (Zivot – Andrews 1992; Lee – Strazicich 2003) preserves the integration-order classification.

Table 2
Augmented Dickey-Fuller unit root test results

Variable	Levels– Intercept	Levels– Trend	Lags	Δ –Intercept	Δ –Trend	Lags	Integration order
CPI inflation (π)	–1.42	–1.61	3	–6.83***	–6.79***	2	$I(1)$
WPI inflation (π_w)	–1.67	–1.88	2	–7.12***	–7.08***	1	$I(1)$
Fiscal deficit (fd)	–1.29	–1.47	4	–5.94***	–5.90***	3	$I(1)$
M3 money growth (m)	–2.01	–2.14	2	–6.41***	–6.38***	1	$I(1)$
MSP index (m_{sp})	–1.55	–1.72	3	–5.78***	–5.74***	2	$I(1)$
Output gap (gap)	–3.12**	–3.34**	2	–7.91***	–7.85***	1	$I(0)$
Exchange rate (er)	–1.83	–1.99	3	–6.02***	–5.97***	2	$I(1)$
Global oil price (oil)	–1.47	–1.63	2	–6.25***	–6.21***	1	$I(1)$
Real interest rate (r)	–2.88*	–3.05**	3	–6.78***	–6.74***	2	$I(1)$
Inflation expectations (pe)	–1.96	–2.12	4	–5.55***	–5.51***	3	$I(1)$

Note: ADF t-statistics for the null of a unit root. Lag length selected by AIC with maximum lag of 8. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$ relative to MacKinnon (1996) critical values. Sample: 1955 Q1–2024 Q4 ($N = 280$).

As a preliminary multicollinearity check, the pairwise correlation matrix (*Appendix Table 10*) shows all absolute pairwise correlations below 0.50 and variance inflation factors well below the conventional threshold of five, indicating that multicollinearity does not substantively distort the ARDL estimates.

4.2. ARDL bounds testing

Table 3 presents ARDL bounds test F-statistics for seven specifications. The full model yields an F-statistic of 6.84, well above the upper $I(1)$ bound of 4.35 at 5 per cent, confirming cointegration; five of seven specifications exceed the upper bound. The isolated fiscal-dominance model ($\pi = f(fd)$ alone) is inconclusive, suggesting that fiscal deficits operate through multiple channels rather than purely through monetisation (*Pesaran et al. 2001*).

Model specification	F-statistic	Lower bound $I(0)$ (5%)	Upper bound $I(1)$ (5%)	Cointegration decision
$\pi = f(fd, m, msp, gap, er, oil)$	6.84***	3.23	4.35	Cointegrated
$\pi = f(fd, m, msp)$	5.91***	3.23	4.35	Cointegrated
$\pi = f(m, gap, er, oil, pe)$	7.12***	3.23	4.35	Cointegrated
$\pi = f(msp, fd, r, gap)$	5.47***	3.23	4.35	Cointegrated
$\pi w = f(fd, m, msp, er, oil)$	4.88**	3.23	4.35	Cointegrated
$\pi = f(fd)$ – fiscal dominance baseline	3.01	3.23	4.35	Inconclusive
$\pi = f(m)$ – monetary baseline	5.22***	3.23	4.35	Cointegrated

Note: F-statistics test H_0 : no long-run relationship. Critical values from Pesaran et al. (2001), Case III (unrestricted intercept, no trend). *** $p < 0.01$; ** $p < 0.05$. All models include a structural break dummy for 1991 Q3. Lag length selected by AIC (maximum four quarters).

Long-run coefficients are reported in *Table 4*: *Model 1* (full), *Model 2* (fiscal and MSP), *Model 3* (monetary and demand) and *Model 4* (food-price emphasis). All four use the common 2006 Q3–2024 Q4 sample (68 observations after lags) for comparability with the expectations variable; full-sample checks excluding pe yield qualitatively similar coefficients (available on request). Across all specifications the coefficients are signed consistently with theory and significant at conventional levels.

Table 4**ARDL long-run coefficient estimates: dependent variable is CPI inflation (π)**

Regressor	Model 1 (full)	Model 2 (fiscal)	Model 3 (monetary)	Model 4 (food-price)	Expected sign
<i>Fiscal deficit (fd)</i>	0.312*** (0.081)	0.387*** (0.094)	—	0.241** (0.097)	+
<i>M3 money growth (m)</i>	0.418*** (0.073)	—	0.511*** (0.088)	0.329*** (0.076)	+
<i>MSP index (msp)</i>	0.287*** (0.068)	0.341*** (0.079)	—	0.348*** (0.072)	+
<i>Output gap (gap)</i>	0.196** (0.084)	—	0.241*** (0.079)	—	+
<i>Exchange rate (er)</i>	0.143** (0.062)	—	0.167** (0.071)	—	+
<i>Global oil price (oil)</i>	0.098* (0.053)	—	0.112** (0.057)	—	+
<i>Inflation expectations (pe)</i>	0.221*** (0.066)	—	0.198*** (0.071)	0.244*** (0.069)	+
<i>Constant</i>	-1.204** (0.491)	-0.874* (0.508)	-1.567*** (0.472)	-0.991** (0.467)	—
<i>R²</i>	0.847	0.721	0.803	0.776	
<i>Adjusted R²</i>	0.821	0.701	0.783	0.754	
<i>AIC</i>	-2.341	-1.978	-2.219	-2.108	
<i>Durbin-Watson</i>	1.943	1.871	1.988	1.924	
<i>Breusch-Godfrey LM p</i>	0.312	0.271	0.394	0.341	
<i>RESET test p</i>	0.481	0.398	0.512	0.443	
<i>Observations</i>	68	68	68	68	

Note: Long-run coefficients recovered from the UECM normalisation $\vartheta = -\lambda_2/\lambda_1$. Newey-West HAC-robust standard errors in parentheses. ‘—’ indicates variable excluded in columns of models. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$. All four models estimated on the common 2006 Q3–2024 Q4 sample ($N = 73$, reducing to 68 after lags).

The *Model 1* fiscal-deficit coefficient of 0.312 ($p < 0.01$) implies that a one-point rise in the deficit-to-GDP ratio is associated with a 0.31-point rise in steady-state CPI inflation, holding other conditions constant, robust across *Models 2* and *4*. The significance of *fd* conditional on *m* indicates that the fiscal effect operates beyond simple monetisation, consistent with the fiscal theory of the price level.

The *MSP* coefficient of 0.287 ($p < 0.01$, largest in *Model 4* at 0.348) is the paper’s most policy-consequential finding, confirming that agricultural price-support policies are an independent structural driver of CPI inflation through a cost-push channel orthogonal to monetary conditions. A 10-per cent MSP increase (roughly the annual hike in 2011–2014) is associated with a 2.87-point rise in steady-state inflation, an effect amplified by the high food share in the CPI. The expectations

coefficient (0.221 in *Model 1*) captures inertia: a one-point rise in prior-period household expectations is associated with a 0.22-point rise in realised inflation, consistent with backward-looking price setting that sustains inflation independently of contemporaneous demand or monetary conditions.

4.3. VAR Granger precedence analysis

Table 5 reports *Toda – Yamamoto (1995)* precedence tests from a VAR(4) in levels; we use ‘precedence’ rather than ‘causality’ to underscore that these evaluate predictive content, not fundamental causality. The pattern is clear and asymmetric: fiscal deficits, money growth, MSP prices, exchange-rate movements and global oil prices all statistically precede CPI inflation, while the reverse is generally not supported. The strongest signal comes from M3 ($\chi^2 = 21.54$, $p = 0.000$), followed by MSP (18.92, $p = 0.001$), inflation expectations (16.74, $p = 0.002$) and the fiscal deficit (14.32, $p = 0.006$). The bidirectional link between expectations and realised inflation is consistent with a self-reinforcing mechanism. The magnitude ranking does not by itself establish a hierarchy of causation: a stronger signal for money growth than for the deficit may reflect either greater predictive content or lower measurement noise in monetary aggregates.

Table 5				
Toda–Yamamoto Granger precedence test results (VAR system, 4 lags)				
Null hypothesis	χ^2 statistic	df	p-value	Decision
$fd \rightarrow \pi$	14.32***	4	0.006	Reject
$\pi \rightarrow fd$	3.41	4	0.492	Fail to reject
$m \rightarrow \pi$	21.54***	4	0.000	Reject
$\pi \rightarrow m$	5.87	4	0.209	Fail to reject
$mSP \rightarrow \pi$	18.92***	4	0.001	Reject
$\pi \rightarrow mSP$	2.14	4	0.710	Fail to reject
$er \rightarrow \pi$	9.67**	4	0.046	Reject
$\pi \rightarrow er$	6.43	4	0.169	Fail to reject
$oil \rightarrow \pi$	11.28**	4	0.024	Reject
$\pi \rightarrow oil$	1.98	4	0.740	Fail to reject
$pe \rightarrow \pi$	16.74***	4	0.002	Reject
$\pi \rightarrow pe$	8.41*	4	0.077	Reject at 10%
$gap \rightarrow \pi$	7.82*	4	0.098	Reject at 10%
$\pi \rightarrow gap$	4.11	4	0.391	Fail to reject

Note: $X \rightarrow Y$: X does not statistically precede Y . *Toda – Yamamoto (1995)* modified Wald test statistics, valid for $I(1)$ or cointegrated variables. VAR lag order = 4 selected by Schwarz BIC. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$. Sample: 1955Q1–2024Q4 ($N = 280$ for base variables; 2006 Q3–2024 Q4 for pe). The tests evaluate statistical predictive precedence rather than fundamental economic causality.

4.4. Bai-Perron structural break analysis

We implement the Bai-Perron procedure in two specifications. The unconditional one regresses inflation on a constant only, identifying breaks in the unconditional mean; the conditional one adds the fiscal deficit, M3 growth and the MSP index.

Table 6 reports the unconditional results: seven significant breaks over the sample. The supF test strongly rejects no breaks ($p < 0.001$), and the double-maximum tests (UDmax = 31.4, WDmax = 38.2, both $p < 0.001$) confirm multiple breaks.

Table 6 Bai-Perron multiple structural break test results: unconditional specification, CPI inflation series, 1955 Q1–2024 Q4				
Break no.	Break date	95% CI	Regime avg. CPI (%)	Economic narrative
1	1973 Q3	[1972 Q4 – 1974 Q2]	9.81	First oil shock; drought confluence
2	1984 Q1	[1983 Q2 – 1984 Q4]	9.14	Peak fiscal expansion; pre-crisis buildup
3	1991 Q3	[1991 Q1 – 1992 Q1]	13.24	BOP crisis; stabilisation inflection
4	1997 Q2	[1996 Q4 – 1997 Q4]	5.22	Post-reform disinflation consolidates
5	2007 Q4	[2007 Q2 – 2008 Q2]	9.87	Global food and fuel shock; UPA II expansion
6	2014 Q3	[2014 Q1 – 2015 Q1]	4.41	IT credibility gains; supply-side favourable
7	2020 Q2	[2019 Q4 – 2020 Q4]	6.93	COVID-19 pandemic supply disruption
<i>Note: Bai and Perron (1998, 2003) sequential procedure with maximum of 8 breaks and trimming parameter $\epsilon = 0.10$. Break dates estimated by minimising the global sum of squared residuals. 95% confidence intervals from the asymptotic distribution. Regime average CPI is the mean annualised quarterly inflation within each regime.</i>				

Table 7 reports the conditional results, replacing the constant with a regression on lagged inflation, the fiscal deficit, M3 growth and the MSP index. Only three breaks now survive: 1991 Q3 (BOP crisis), 2007 Q4 (global food and fuel shock), and 2014 Q3 (IT credibility transition). The four unconditional breaks absorbed by the structural regressors provide direct evidence that the fiscal, monetary and food-price channels jointly account for the medium-frequency level shifts in Indian inflation. The three surviving breaks correspond to events operating through channels orthogonal to the regressors: external crisis, global commodity shock and institutional regime change.

Table 7**Bai-Perron multiple structural break test results: conditional specification (regressors: π_{-1} , fd, m, msp), CPI inflation series, 1955 Q1–2024 Q4**

Break no.	Break date	95% CI	Sup F-stat	Interpretation
1	1991 Q3	[1991 Q1 – 1992 Q2]	27.4***	BOP crisis: external break orthogonal to regressors
2	2007 Q4	[2007 Q2 – 2008 Q2]	19.8***	Global commodity shock: cost-push break
3	2014 Q3	[2014 Q1 – 2015 Q1]	23.1***	IT credibility transition: institutional break

Note: Conditional Bai-Perron procedure with maximum of 8 breaks and trimming parameter $\epsilon = 0.10$. Regressors: one lag of CPI inflation, fiscal deficit, M3 growth and MSP index. UDmax = 24.7, WDmax = 31.3 (both $p < 0.001$).

The most policy-relevant break is the 2014 Q3 conditional break, coinciding with the disinflationary transition preceding formal IT adoption. The shift from the elevated UPA-era regime (9.87 per cent unconditional average, *Table 6*) to the IT-era regime (4.41 per cent) is the largest single reduction across all transitions, suggesting that the RBI credibility commitment from 2013, the Urjit Patel Committee report of January 2014 (*RBI 2014*) and the February 2015 framework constituted a genuine regime change rather than cyclical moderation. That this break survives conditioning (when the BOP-crisis and commodity-shock breaks would not, absent the regressors) is direct evidence that the IT transition operates through a credibility channel empirically distinct from the structural drivers.

4.5. GARCH conditional mean and volatility analysis

Table 8 presents GARCH(1,1) estimates with break dummies on both the conditional mean (ϕ) and variance (γ). Across all periods, the sum $\alpha + \beta$ is near unity (0.910–0.942), indicating near-integrated, highly persistent inflation volatility (*Bollerslev 1986*). In the full sample, the IT dummy enters significantly negative in both the mean ($\phi = -1.823$, $p < 0.01$) and variance ($\gamma = -0.641$, $p < 0.01$) equations, confirming that IT adoption is associated with a statistically significant downward shift in both the conditional level and volatility of inflation, consistent with *Section 4.4.* and with international evidence (*Bernanke et al. 1999; Lin – Ye 2009; Bhalla et al. 2026*).

Table 8
GARCH(1,1) conditional mean and volatility estimates: CPI inflation, 1955 Q1–2024 Q4

Parameter	Full (1955–2024)	Pre-IT (1955–2015)	IT era (2016–2024)	Interpretation
<i>Mean equation</i>				
Constant (μ)	6.523*** (0.467)	7.214*** (0.538)	4.882*** (0.321)	Long-run mean inflation
IT mean dummy (φ)	–1.823*** (0.541)	–	–	IT lowers conditional mean
AR(1) persistence (ρ)	0.628*** (0.069)	0.712*** (0.088)	0.488*** (0.064)	Inertial component
<i>Variance equation</i>				
Constant (ω)	0.412*** (0.118)	0.487*** (0.137)	0.318** (0.142)	Baseline variance
ARCH term (α)	0.287*** (0.074)	0.341*** (0.091)	0.198** (0.082)	Shock impact on volatility
GARCH term (β)	0.654*** (0.088)	0.601*** (0.104)	0.712*** (0.097)	Volatility persistence
$\alpha + \beta$ (persistence sum)	0.941	0.942	0.910	Near unit-root volatility
IT variance dummy (γ)	–0.641*** (0.198)	–	–	IT reduces conditional variance
Log-likelihood	–139.4	–118.4	–31.2	
AIC	3.221	3.494	2.817	
Ljung-Box Q(10) p	0.408	0.388	0.521	
ARCH-LM test p	0.341	0.291	0.477	
Observations	276	243	33	

Note: GARCH(1,1) estimates by quasi-maximum likelihood with Bollerslev-Wooldridge robust standard errors (in parentheses). $D_{IT} = 1$ from 2016Q1; both mean (φ) and variance (γ) dummies are included in the full-sample specification. The pre-IT and IT-era columns are sub-sample estimates without dummies, reported for comparison. *** $p < 0.01$; ** $p < 0.05$. Diagnostics: Ljung-Box Q(10) on standardised residuals; ARCH-LM on squared standardised residuals. The IT-era sub-sample ($N = 33$) is illustrative; the full-sample dummy specification provides the primary inference.

Comparing sub-samples, the ARCH coefficient (α) falls from 0.341 (pre-IT) to 0.198 (IT era), indicating a smaller immediate impact of shocks on conditional variance. The GARCH coefficient (β) remains high, so shocks remain persistent but strike with lower initial force, consistent with the credibility gains of a rules-based framework. These findings align with *Rastogi and Kanoujiya (2024)*, who document a post-IT volatility reduction; our framework additionally identifies a statistically significant downward level shift through the mean-equation dummy, which their specification does not estimate. Their documented volatility spillovers from crude oil, gold and exchange rates correspond to the level effects captured by our exchange rate and oil coefficients in *Table 4*.

4.6. Robustness: break-robust unit roots, intra-quarter endogeneity and regime-specific estimation

Three additional exercises test the robustness of the principal inferences.⁵

Break-robust unit-root inference. The ADF test loses power under structural breaks, potentially yielding spurious non-rejection for series stationary around a broken trend. Re-estimating with *Zivot – Andrews (1992)*, permitting one endogenous break, and *Lee – Strazicich (2003)*, allowing two, yields t-statistics for CPI inflation, the fiscal deficit, M3 growth and the MSP index of -4.18 , -4.02 , -4.51 and -3.98 , respectively, all failing to reject the unit-root null at 5 per cent (critical value -5.08). Endogenous break dates cluster at 1991 Q3 and 2014 Q3. The $I(1)$ classification is therefore robust; the ADF non-rejection in *Table 2* does not reflect break-induced distortion.

Intra-quarter endogeneity. To assess whether the contemporaneous fiscal and monetary coefficients reflect within-quarter simultaneity, we re-estimate *Model 1* (i) replacing contemporaneous regressors with first lags and (ii) instrumenting them with second and third lags in an IV-ARDL framework. The long-run coefficients on the fiscal deficit (0.291 and 0.305, both $p < 0.01$) and the MSP index (0.262 and 0.279, both $p < 0.01$) remain significant and close to the baseline estimates of 0.312 and 0.287, while the M3 coefficient declines slightly (to 0.382 and 0.395), but stays highly significant. The principal long-run associations are therefore not driven by intra-quarter simultaneity, though the precise contemporaneous magnitudes cannot be pinned down without external instruments that are unavailable in this setting.

Regime-specific estimation. Re-estimating the full ARDL model separately on the four regimes defined by the conditional breaks (pre-liberalisation, 1955 Q1–1991 Q2; post-reform pre-2007, 1991 Q3–2007 Q3; UPA-era food inflation, 2007 Q4–2014 Q2; and IT era, 2014 Q3–2024 Q4) shows the MSP coefficient positive and significant in all four, rising from 0.21 to 0.34, consistent with the growing political-economic salience of MSP. The fiscal coefficient is significant in the pre-liberalisation and IT regimes but weaker in the intervening periods, consistent with the fiscal channel operating differently under financial repression and credible commitment than under partial liberalisation. The expectations coefficient is significant only in the IT regime, consistent with expectations becoming anchored to the official target only after the 2015 framework. These estimates, though based on shorter samples, confirm that the structural channels operate across configurations with interpretable variation. Full tables are available on request.

⁵ The structural-break-allowing unit-root and cointegration procedures in *Section 4.6*. (*Zivot – Andrews 1992*; *Lee – Strazicich 2003*; *Gregory – Hansen 1996*) are estimated using the standard implementations in R packages ‘urca’ and ‘tseries’. Full output is available from the author on request.

5. The Nehruvian legacy and the architecture of fiscal dominance

The institutional roots of India's fiscal dominance (evidenced empirically in *Tables 4* through *7*) lie in the model of economic governance established under Jawaharlal Nehru. The nationalisation of fourteen commercial banks in 1969 deepened financial repression through SLR and CRR requirements. As *McKinnon (1973)* showed, financial repression of this type is inherently inflationary: it suppresses saving and necessitates higher monetary growth to finance investment. Import-substitution industrialisation created a high-cost industrial sector generating cost-push pressures; as *Bhagwati and Desai (1970)* documented, the licensing system ('licence raj') created rents for incumbents, discouraged productivity improvement, and generated persistent inflationary pressure.

5.1. The political economy of fiscal dominance

The analogy with Peronist Argentina is instructive but imperfect. *Blejer (2025)* identifies three core inflationary mechanisms of Peronist policy: structural wage-price dynamics sustained by politicised union bargaining; fiscal populism financed by monetary expansion; and backward-looking indexation embedding expectations into contracts. India's Nehruvian framework exhibits all three, with the wage-price mechanism operating through the MSP-agricultural labour nexus rather than urban trade union bargaining, and indexation through the dearness allowance system for government employees, a formal mechanism transmitting past inflation into current wage costs.

What India shares with Argentina is the 'inflationary trap': a political-institutional configuration in which the structural sources of inflation are sufficiently politically embedded that no government has been able or willing to address them comprehensively. Monetary policy can moderate inflationary episodes but cannot resolve the underlying distortions without complementary fiscal and supply-side reforms that the political economy constrains.

5.2. Labour market structure and the flat Phillips curve

Although wage-price dynamics operate primarily through the agricultural-MSP nexus, the broader labour market warrants discussion. *Behera et al. (2018)* documents a substantial flattening of the unemployment-inflation trade-off over the post-2010 period, with the unemployment-gap coefficient rendered insignificant in most specifications once supply-side controls enter. This is consistent with our finding that the *Model 1* output-gap coefficient (0.196, *Table 4*), while positive and significant, is substantially smaller than those on the fiscal deficit (0.312),

M3 growth (0.418) and the MSP index (0.287). In an economy where cost-push channels operate through administered agricultural prices and the formal-sector labour market is a small minority of employment, the demand-side Phillips curve operates with reduced potency relative to the supply-side and fiscal channels. Consistent full-sample quarterly unemployment data are unavailable; we view this as a limitation for future research building on the post-2010 sample.

6. The political economy of food inflation: India's MSP trap

The ARDL result that the MSP index carries a long-run coefficient of 0.287–0.348 on CPI inflation (significant and robust across specifications) is the paper's most policy-consequential finding. It confirms empirically what institutional analysis suggests: the Minimum Support Price system is a structural generator of inflation qualitatively distinct from, and empirically separable from, the fiscal and monetary channels. The effect is amplified by the high food-and-beverages share (≈ 45.86 per cent) in the CPI, so that even moderate MSP increases translate into substantial headline movements.

The MSP system was established in 1966 as a response to food security vulnerabilities. Between 2007 and 2014, paddy MSP increases averaged 14.3 per cent per annum, far above general inflation. As *Rangarajan and Mishra (2013)* documented, these increases substantially exceeded non-food inflation, creating a secular upward trend in food prices that monetary policy could not address without excessive output and employment losses.

The precedence result (*Table 5*) that *msp* precedes π ($\chi^2 = 18.92$, $p = 0.001$), while π does not precede *msp* ($\chi^2 = 2.14$, $p = 0.710$) establishes MSP's asymmetric predictive content for inflation, consistent with a political-economy interpretation: MSP levels are set by electoral considerations rather than inflationary conditions, generating an exogenous driver of headline inflation unresponsive to monetary instruments. We re-emphasise that statistical precedence is not fundamental causal exploitability; nonetheless the institutional evidence on MSP determination is consistent with the asymmetric pattern in the data.

The Farm Laws episode of 2020–2021 provides a natural experiment for the political-economy constraint. The three laws were withdrawn in November 2021 following sustained protests, the most explicit recent illustration of the trap: a reform with strong long-run macroeconomic benefits overridden by concentrated political costs, structurally analogous to *Blejer's (2025)* account of successive Argentine governments unable to dismantle the legacies of Peronist labour policy.

7. The inflation-targeting framework: credibility, recent disinflation and the 2026 renewal

The 2014 Q3 break in both Bai-Perron specifications (*Tables 6 and 7*) and the significant negative IT dummies in the GARCH mean ($\phi = -1.823$, $p < 0.01$) and variance ($\gamma = -0.641$, $p < 0.01$) equations together confirm that flexible inflation targeting represents a genuine institutional regime change. *Table 9* contextualises India's IT performance in comparative perspective.

Table 9 Inflation targeting performance: India in comparative perspective, 2017–2024					
Country	IT adopted	CPI target (%)	Avg. inflation	Fiscal deficit avg. (% GDP)	Assessment
India	2016	4±2	5.4	~5.8	Partial; structural constraints persist
Indonesia	2005	3±1	3.4	~2.6	Successful; fiscal complement
South Korea	1998	2±0.5	1.5	~1.4	Strong; institutional credibility
Brazil	1999	3.5±1.5	5.1	~7.1	Mixed; fiscal-monetary tensions
Philippines	2002	3±1	3.9	~3.1	Successful; commodity exposure
Turkey	2006	5±2	42.7	~3.5	Failed; political interference
Argentina	2016*	N/A	51.4	~5.4	Abandoned; institutional collapse
<i>Note: Averages for 2017–2024. * Argentina adopted IT in 2016, but effectively abandoned the framework by 2019. Fiscal deficit figures are approximate general-government balances. The seven economies span three Asian emerging market peers (Indonesia, South Korea, the Philippines), one Latin American comparator with a comparable fiscal challenge (Brazil), and two cases of IT failure or abandonment (Turkey, Argentina). Advanced economy adopters are excluded as less informative for evaluating the institutional preconditions of sustained target adherence in an emerging market context.</i> <i>Sources: IMF (2024), national central bank publications, World Bank World Development Indicators (https://databank.worldbank.org)</i>					

India's average CPI inflation under IT (5.4 per cent) is well below its pre-IT average and below comparable economies with weaker frameworks, but exceeds the 4-per cent target midpoint by 1.4 points and remains above Asian peers such as Indonesia (3.4 per cent) and the Philippines (3.9 per cent). The gap reflects precisely the structural constraints identified econometrically: MSP-driven food inflation and persistent fiscal deficits.

An important qualification comes from *Eichengreen and Gupta (2024)*, who find the RBI's post-2016 reaction function not demonstrably more hawkish than before, raising the question of how much observed disinflation reflects a genuine policy-stance shift versus favourable supply-side and global conditions. Our findings are not in conflict with theirs: the break and volatility-reduction results (*Tables 6–8*) capture outcomes (the conditional level and variance of inflation), while their analysis examines policy inputs. The two reconcile if the framework operated primarily through the expectations channel and institutional commitment rather than systematically more aggressive rate movements, consistent with the post-IT decline in expectations captured by our ARDL coefficient on *pe*.

7.1. Recent disinflation and the March 2026 framework renewal

Headline CPI inflation moderated through 2024 and fell within the 4 ± 2 per cent band by early 2026, despite a central-government deficit above 5 per cent of GDP and an unreformed MSP regime. In March 2026, the Government and the RBI renewed the framework (retaining the 4-per cent target and ± 2 -point band) for a further 5-year cycle, a decision *Gupta (2026)* reports commanded wide professional support.

This disinflation is consistent with the structural framework rather than evidence against it. The structural channels operate in the long-run cointegrating sense: cyclical disinflation from favourable food supply conditions, base effects and global commodity moderation can coexist with structural pressures that re-emerge under less favourable circumstances, as in the 1997–2003 disinflation followed by the 2007–2014 food price acceleration. The GARCH evidence that conditional volatility fell substantially in the IT era is itself a partial answer to the structural critique: even where the conditional mean remains susceptible to structural drivers, a tighter conditional distribution implies fewer extreme episodes, and the institutional commitment provides an anchor absent in the pre-IT regime.

On the appropriateness of the 4-per cent target, our estimates imply that a 3-per cent deficit (the FRBM⁶ target) and MSP indexation aligned with general inflation would together reduce steady-state inflation by roughly 1.4–1.9 points relative to the IT-era average of 5.4 per cent, bringing it to about 3.5–4.0 per cent. A lower target (e.g. 3 per cent, as in Indonesia and the Philippines) would be consistent with the evidence only if accompanied by these structural reforms; it cannot be achieved through monetary policy alone without excessive output and employment losses given weak transmission. The retention of the 4-per cent target in March 2026 thus represents a reasonable institutional choice, given the unresolved structural constraints; any reduction should be coordinated with, and conditional on, measurable fiscal and agricultural market reform.

⁶ Fiscal Responsibility and Budget Management.

7.2. Residual vulnerabilities of the Indian IT framework

The fiscal-monetary coordination problem of *Sargent and Wallace (1981)* remains the central vulnerability. The central government's budget deficit has averaged approximately 5.8 per cent of GDP during the IT period, against the FRBM target of 3.0 per cent. At 2.8 points above target, the implied inflationary pressure from the fiscal stance alone is approximately 0.87 points of steady-state inflation on the *Model 1* coefficient of 0.312, a substantial fraction of the 1.4-point gap between average IT-era inflation and the 4-per cent midpoint. The durability of the framework thus remains contingent on fiscal consolidation that political-economy constraints have so far prevented.

8. Institutional lessons for other inflation-targeting economies

The Indian experience (a multi-decade transition from fiscal dominance under Nehruvian institutions to a credible inflation-targeting framework adopted in 2016 and renewed in 2026) offers institutional lessons of comparative interest, including for the Central and Eastern European (CEE) economies whose own disinflationary trajectories were anchored by the European Union accession process and the Maastricht criteria. We draw three high-level structural takeaways, while emphasising that the macroeconomic structures, openness and policy instruments of India and the CEE economies differ fundamentally, so that the comparison is illustrative rather than a template for direct policy transfer.

First, the source of disinflationary credibility differs. The CEE transition to inflation targeting in the late 1990s and early 2000s was underwritten by an external commitment device (the prospective EU accession process and the fiscal discipline embedded in the Maastricht criteria) and proceeded comparatively rapidly. India, lacking an equivalent regional anchor, built credibility entirely through domestic institutional innovation over a substantially longer horizon. The high-level lesson is that domestically-anchored credibility-building takes longer and is more exposed to political-economic shocks during the transition, but can prove durable once established, as the 2014 Q3 break and the framework's continued survival suggest. Economies whose external anchors are weakening may find the Indian case of domestic institutional commitment instructive.

Second, structural cost-push channels operating independently of the monetary stance can drive headline inflation through periods of disinflation, and their political economy differs across contexts. In India, the channel is agricultural and domestic-political in origin, the MSP system administered by an institution responsive to electoral constituencies. In CEE economies, the analogous channel is principally

energy-related and largely externally determined, as the 2022–2023 episode illustrated. The shared high-level lesson is that a framework operating only through the demand channel, without addressing cost-push channels in an institutionally-appropriate way, will exhibit persistent target deviations during cost-push stress; the appropriate institutional response must be calibrated to the political economy of the relevant channel rather than a single template.

Third, fiscal-monetary coordination conditions durability everywhere. The Indian evidence that a 5.8-per cent deficit contributes roughly 0.87 points of inflationary pressure relative to a 3-per cent benchmark generalises directly: frameworks operating without fiscal consolidation should expect persistent target overshoots even where expectations are nominally anchored. The broader implication is that the institutional architecture of inflation targeting cannot be specified independently of the structural-political-economy configuration in which it operates.

9. Conclusions and policy implications

This paper has applied a comprehensive time-series framework to establish four empirical propositions about India's inflation persistence. First, CPI inflation, the fiscal deficit, M3 growth, the MSP index and most external variables are $I(1)$ and cointegrated, a classification robust to break-allowing unit-root procedures (*Section 4.6.*). Second, the ARDL estimates indicate significant positive long-run effects of fiscal deficits ($\beta \approx 0.31\text{--}0.39$), the MSP index ($\beta \approx 0.29\text{--}0.35$) and M3 growth ($\beta \approx 0.33\text{--}0.51$) on CPI inflation, robust to replacing contemporaneous regressors with lagged or instrumented counterparts and operating with interpretable variation across regimes. Third, Granger precedence runs from fiscal, monetary and agricultural price variables to inflation but not in reverse, with the strongest signal from M3 growth and the MSP index. Fourth, IT adoption constitutes a statistically identifiable break in both the level ($\phi = -1.823$) and conditional volatility ($\gamma = -0.641$) of inflation, with the 2014 Q3 break surviving the inclusion of structural regressors, consistent with a credibility interpretation.

These results support the central argument: India's inflation persistence reflects a structural political-economy configuration in which monetary policy operates in an environment shaped by fiscal dominance and agricultural price politics. The analogy with *Blejer's* (2025) characterisation of Argentine inflation as institutional rather than purely monetary is empirically grounded, though the magnitudes differ by orders of magnitude: both exhibit an 'inflationary trap' in which the structural drivers are sufficiently embedded that successive governments have been unable or unwilling to address them. The 2024–2025 disinflation and the March 2026 renewal demonstrate

the partial success of reform since 2014; the structural channels nonetheless remain operative and would re-emerge under less favourable conditions.

The comparative discussion in *Section 8* places the Indian transition in the broader context of emerging market disinflationary reform. The principal lesson is that the institutional architecture of inflation targeting cannot be specified independently of the structural-political-economy configuration in which it operates: the Indian MSP-driven and CEE energy-driven cost-push channels are different manifestations of the same underlying problem, each requiring responses calibrated to its own political economy.

The policy implications are demanding. A durable solution requires three complementary reforms. First, genuine fiscal consolidation to a deficit of 3 per cent or below, which on the *Model 1* coefficient could alone reduce steady-state inflation by approximately 0.87 points, bringing average IT-era inflation to about 4.5 per cent and within striking distance of the target midpoint. Second, a politically sequenced reform of the MSP–FCI⁷ complex: on the coefficient of 0.287–0.348, moderating annual MSP increases to align with general inflation could contribute a further 0.5–1.0-point reduction in steady-state food-price inflation. Third, a strengthening of Monetary Policy Committee (MPC) institutional independence to protect the GARCH-confirmed volatility reduction from reversal, and continued work on the transmission channel to address the PSB-related rigidities documented by *Mishra and Montiel (2013)*.

Whether India can achieve this combination is the defining question for its macroeconomic future. The evidence documents both the genuine progress of the IT era and the structural constraints that remain. The institutional architecture of price stability has been erected; the foundations in the real and political economy remain contested. The interpretation advanced here (that statistical evidence is compatible with the structural-political-economy framework rather than proof of fundamental causality) is consistent with the empirical record and with the operational experience of central banks in similar contexts.

⁷ Food Corporation of India (FCI).

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Competing interests

The author has no competing interests to declare that are relevant to the content of this article.

Author contributions

The sole author was responsible for all aspects of this manuscript. The author has read and agreed to the published version of the manuscript.

Data Availability

The data and code that support the findings of this study are available from the author upon reasonable request.

Ethical Approval

Not applicable. This study did not involve human participants or sensitive personal data requiring institutional ethical approval.

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The author did not use any generative AI tools in the creation of this manuscript.

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Appendix

Table 10

Pairwise correlation matrix of explanatory variables, 1955 Q1–2024 Q4

	Δfd	Δm	Δmsp	gap	Δer	Δoil	Δpe
Δfd	1.00						
Δm	0.42	1.00					
Δmsp	0.38	0.31	1.00				
gap	0.15	0.18	0.12	1.00			
Δer	–0.21	–0.18	–0.14	–0.09	1.00		
Δoil	0.19	0.22	0.27	0.11	–0.32	1.00	
Δpe	0.34	0.41	0.47	0.18	–0.22	0.29	1.00

Note: Pearson correlation coefficients across the estimation sample, computed in first differences for I(1) variables and in levels for the I(0) output gap. All absolute pairwise correlations are below 0.50, and variance inflation factors (untabulated) range from 1.18 (gap) to 2.31 (Δpe), well below the conventional threshold of 5, indicating that multicollinearity does not substantively distort the ARDL coefficient estimates. The highest correlation is between Δmsp and Δpe (0.47), consistent with the role of food-price dynamics in shaping household expectations.

Environmentally Conscious Consumer Behaviour and Green Finance: A Bibliometric Review of Emerging Trends*

T. D. Aswani 

This bibliometric review analyses 173 Scopus-indexed articles (1997 to April 2025) on environmentally conscious consumer behaviour (ECCB) and its links with green finance, using Bibliometrix and VOSviewer for performance analysis and science mapping. It distinguishes everyday consumption choices (eco-friendly goods, energy, food, mobility) from financial decisions (green deposits, loans, ESG products), positioning green finance, including central banks and the ESG strand, as the institutional supply side meeting ECCB demand. Willingness to pay, attitude-behaviour gaps and climate-finance literacy emerge as key pressure points. Output has accelerated since 2019; China leads in volume, the United Kingdom in citation impact, and Hungary ranks in the top eight. Bibliographic coupling reveals four streams: consumer decision factors, industry applications, pro-environmental technology adoption and product lifecycle. The review offers implications for financial institutions, central banks, regulators and marketers, plus a research agenda at the ECCB and green-finance interface.

Journal of Economic Literature (JEL) codes: D12, G11, M31, Q56

Keywords: environmentally conscious consumer behaviour, sustainable consumption, green finance, green financial products, bibliometric analysis, VOSviewer

1. Introduction

Environmental awareness has become a key determinant of consumer choice over the past three decades. Concerns about climate change, resource depletion and pollution have prompted households to revise consumption patterns toward more sustainable practices (Kumar – Ghodeswar 2015; Nekmahmud – Fekete-Farkas 2020). An environmentally conscious consumer is one whose purchase

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and use decisions deliberately seek to minimise environmental harm (*Amberg – Fogarassy 2019; Joshi – Rahman 2015*). These decisions are not, however, a purely psychological or marketing phenomenon. They are economic decisions taken under price signals, information frictions and budget constraints, and they have an explicitly financial counterpart: the household's choice of where and how to save, borrow and invest.

It is useful from the outset to distinguish two analytically separate layers of “green” consumer choice. The first is the layer of everyday consumption decisions (what to buy, how to use energy, what to eat, how to travel) where willingness to pay (WTP) a green premium, response to eco-labels and the well-known attitude–behaviour gap are the dominant questions (*Carrington et al. 2010; Vecchio – Annunziata 2015; White et al. 2019*). The second is the layer of household financial product choices (whether to hold green deposits, take up green mortgages, invest in ESG¹-tilted funds or participate in sustainability-linked savings schemes) where information asymmetries about underlying environmental performance, the credibility of ESG ratings and risk–return perceptions become central (*Goodell et al. 2021; Kiss et al. 2025*). Both layers are part of “environmentally conscious consumer behaviour” in the broad sense used here, but they call on different theoretical frameworks and different policy levers, and have so far been studied in largely separate literatures.

The supply side of this picture is green finance: the system of financial flows, instruments and intermediaries that channel funding toward environmentally beneficial activities. Green finance is not only a market response, it is also actively shaped by central banks and prudential authorities. *Dikau – Volz (2021)* document that more than 130 central banks now incorporate sustainability objectives in some form, with channels ranging from disclosure regimes through to climate-adjusted prudential tools. The Magyar Nemzeti Bank's Green Preferential Capital Requirement Programme (*Kim et al. 2024*), the analytical work on monetary policy and the green transition (*Kolozsi et al. 2022*) and evidence on the price-impact of green central bank communication (*Neszveda – Siket 2025*) illustrate that the supply side of household green finance is conditioned on the actions of monetary authorities to a degree that consumer-behaviour research has only recently begun to acknowledge. At the corporate–investor interface, the rapidly growing ESG literature (*Kiss et al. 2025; Mukhtar et al. 2025; Csillag et al. 2022; Kovacs et al. 2024; Mishra – Pandey 2025*) provides the rating and disclosure infrastructure that allows household green preferences to be translated into capital allocation decisions, while also generating its own equilibrium pathology, in the form of greenwashing (*Bhullar et al. 2025*).

¹ Environmental, Social and Governance

Despite a fast-growing literature, no comprehensive bibliometric assessment maps the intellectual development, publication trends and thematic structure of ECCB while connecting it to the green-finance agenda in this two-layered sense. Existing reviews tend to be topical or narrative (*Kushwah et al. 2019; Peattie 2010; White et al. 2019*) and treat consumer behaviour and green finance as adjacent but separate fields. Bibliometric methods provide a transparent, reproducible way to evaluate scientific output, intellectual influence and thematic trajectories (*Donthu et al. 2021; Zupic – Čater 2015*), and are particularly suited to ECCB because the field straddles marketing, environmental psychology, sustainability studies, behavioural economics and (as this paper foregrounds) green finance (*Kilbourne – Beckmann 1998; Papadas et al. 2017*).

Accordingly, this study addresses four research questions:

- RQ1: What are the publication patterns and trends in ECCB research from 1997 to 2025?
- RQ2: Who are the most influential authors, countries and journals?
- RQ3: What is the intellectual structure and thematic composition of the field?
- RQ4: What emerging themes (particularly those that link ECCB to green financial products, ESG and the actions of central banks) can be identified for future research?

The paper is organised as follows. *Section 2* reviews the literature on ECCB and green finance and develops a simple conceptual framework that links the two. *Section 3* details the data, search procedure and analytical techniques, including robustness checks and a clarification of journal-quality choices. *Section 4* presents the results. *Section 5* discusses theoretical and practical implications (for financial institutions, central banks, regulators and policymakers) and features a dedicated subsection on Hungarian contributions, given the readership of this journal and Hungary's prominence in the citation-impact rankings. *Section 6* concludes.

2. Literature review

2.1. Environmentally conscious consumer behaviour

ECCB refers to consumption choices and activities aimed at minimising environmental damage (*Axsen et al. 2013; Leonidou et al. 2010*). It encompasses purchasing eco-friendly products, reducing energy use, recycling, proper waste disposal and participation in conservation efforts (*Hansen – Schrader 1997; Steg – Vlek 2009*). Early scholarship in the 1990s focused on conceptualising environmentally responsible consumption (*Hansen – Schrader 1997; Kilbourne – Beckmann 1998; Shrum et al. 1995*). The 2000s shifted toward the antecedents of

green purchase decisions (knowledge, attitudes and personal values) and toward explanations of the persistent attitude–behaviour gap (*Carrington et al. 2010; Follows – Jobber 2000; Kollmuss – Agyeman 2002; Thøgersen 2006*).

Since the 2010s, the field has broadened to cultural difference, social influence on green purchase and the effectiveness of marketing strategies (*Ambert – Fogarassy 2019; Kumar – Ghodeswar 2015; Nguyen et al. 2017*). Recent strands address sustainable food, the circular economy and digital technologies for sustainable behaviour (*De-Magistris – Gracia 2016; Kirchherr et al. 2017; Nekmahmud – Fekete-Farkas 2020; Schanes et al. 2018*). The attitude–behaviour gap remains a central problem, alongside an unresolved debate about the relative merits of individual responsibility versus structural reform (*Carrington et al. 2014; Girod et al. 2014; Lorek – Spangenberg 2014; Spaargaren 2011*). From the standpoint of consumer economics, the gap is the empirical signature of an under-identified mix of information frictions, present bias, status-quo bias and limited substitutability across goods, and is therefore best read as an indicator that consumer-side measures alone cannot deliver the implied environmental gains.

2.2. Green finance, ESG and central banks

Green finance, broadly understood as financial flows that support environmental and climate-positive outcomes, is the natural complement to ECCB on the supply side of sustainable choice. Three subliterations are particularly relevant.

2.2.1. Green financial products and household choice

The retail end of green finance comprises green deposits, green loans, green mortgages, ESG mutual funds and sustainability-linked savings and credit instruments. From a household perspective, willingness to pay (WTP) for sustainable goods is itself a financial decision shaped by price salience, perceived risk and information frictions (*Moser 2015; Vecchio – Annunziata 2015*). Studies of consumers' valuation of sustainability-labelled goods, of the financing of low-carbon mobility and of green premia in retail markets connect ECCB to financial decision-making (*Daziano – Bolduc 2013; Rezvani et al. 2015*). Recent cross-country evidence from emerging markets indicates that consumers are concerned about the green transition but reluctant to pay its costs (*Guzmán – Kóczán 2025*), reproducing at the WTP level the same attitude–behaviour gap long documented in the consumer-behaviour literature. From the perspective of welfare economics this is intuitive: where private benefits from green consumption fall short of social benefits, demand-side measures alone will leave a Pigouvian wedge that requires supply-side and regulatory complements.

2.2.2. ESG: ratings, disclosure and the corporate–investor interface

ESG frameworks form the rating-and-disclosure infrastructure through which environmental performance is communicated to financial markets. Bibliometric reviews document a rapid increase in research output on ESG, with consolidation around themes of corporate performance, risk, disclosure and investor behaviour (Mukhtar *et al.* 2025; Mishra – Pandey 2025). The credit-risk dimension has become especially salient: Kiss *et al.* (2025) provide a bibliometric synthesis of how ESG factors relate to corporate credit risk and identify a research frontier in the joint pricing of ESG and default risk. Investor-side responses to ESG information are not uniform across the three pillars: Kovacs *et al.* (2024) show that during the Russia–Ukraine shock, the environmental, social and governance components of ESG carried distinct stock-price effects, suggesting that aggregate ESG scores mask information that markets in fact price separately. Media attention to environmental issues also appears to channel investor attention toward ESG-tilted strategies (Csillag *et al.* 2022). These mechanisms matter for ECCB because the same household that buys an eco-labelled good can (through pension contributions, retail mutual funds or robo-advised portfolios) also act as an ESG investor; the credibility of ESG signals on the asset side therefore conditions the household’s confidence on the goods side.

A central pathology of the ESG infrastructure is greenwashing. Bhullar *et al.* (2025) provide a bibliometric mapping of the field and identify the conditions under which firms strategically misrepresent environmental performance, eroding the informativeness of ESG signals. Greenwashing closes the loop with consumer behaviour: it is precisely when ESG ratings and product labels are systematically informative that ECCB can translate into well-priced demand for sustainability, and precisely when they are not that the attitude–behaviour gap will persist.

2.2.3. Central banks, monetary policy and the green transition

Central banks shape the supply of green finance through three channels. The first is the prudential channel: climate-related financial risk is increasingly treated as a supervised risk category, with disclosure requirements, scenario analyses and, in a small but growing set of jurisdictions, climate-adjusted capital treatment (Dikau – Volz 2021). The Magyar Nemzeti Bank’s Green Preferential Capital Requirement Programme is among the most concrete European examples and has, on the available evidence, supported the issuance of green mortgages and green corporate loans (Kim *et al.* 2024). The second is the monetary policy channel: central bank asset purchases, refinancing operations and collateral frameworks can be configured to incorporate environmental criteria. The macroeconomic and reallocation implications of doing so are explored by Kolozsi *et al.* (2022). The third is the communication channel: speeches and announcements by central banks on green topics carry measurable price effects, indicating that green communication is a policy instrument in its own right (Neszveda – Siket 2025). For consumers, these

three channels jointly determine what green financial products are offered to them, at what spread and with what regulatory backing.

2.2.4. Green attitudes, willingness to pay and the attitude–behaviour gap

Bringing these strands together, the household interface between ECCB and green finance is best summarised by the persistent gap between stated green attitudes and observed green behaviour. The gap is reproduced at every layer: in green-goods markets (Carrington *et al.* 2010, 2014), in green-product premia (Vecchio – Annunziata 2015), in WTP for the green transition (Guzmán – Kóczán 2025) and in uptake of retail ESG instruments (Goodell *et al.* 2021). Mechanism-design responses include information disclosure (eco-labels, ESG ratings, climate-related financial disclosure), nudges (default green options in pension plans), price corrections (Pigouvian taxes, green tax incentives) and regulatory backing (central bank prudential and monetary instruments).

2.3. Bibliometric reviews in the domain

Prior bibliometric work covers green supply chain management (Fahimnia *et al.* 2015), corporate social responsibility in supply chains (Feng *et al.* 2017) and broader sustainability research (Olawumi – Chan 2018; Zhu – Hua 2017). Comparable mappings exist for tourism sustainability (Niñerola *et al.* 2019), for AI and machine learning in finance (Goodell *et al.* 2021), for ESG and corporate credit risk (Kiss *et al.* 2025), for ESG more generally (Mukhtar *et al.* 2025; Mishra – Pandey 2025) and for greenwashing (Bhullar *et al.* 2025). To the best of the author’s knowledge, no prior bibliometric review jointly profiles ECCB and its connection to green finance (incorporating central bank policy and ESG infrastructure), despite the rapidly increasing relevance of this intersection for both scholars and practitioners.

2.4. A conceptual framework: Two layers, one household

For the purposes of this review the relationship between ECCB and green finance is summarised in a deliberately simple framework (Table 1). At the consumption layer, the household chooses among eco-labelled and conventional goods under WTP constraints and information frictions; the natural policy levers are eco-labels, disclosure, nudges and price corrections. At the financial layer, the same household chooses among green and conventional savings, credit and investment products under ESG-rating frictions and risk–return considerations; the natural policy levers are ESG-disclosure regimes, prudential treatment of climate risk and central bank monetary instruments. The two layers are joined by the household’s intertemporal budget constraint and by the common information infrastructure (labels, ratings, disclosures). The bibliometric mapping that follows is anchored on the consumption layer (reflecting the search design) but the discussion in Section 5 explicitly addresses both layers.

Table 1
A two-layer view of environmentally conscious consumer behaviour

Layer	Decision	Frictions	Policy levers
Consumption layer	Purchase of eco-labelled goods, energy use, mobility, food	WTP for green premium, eco-label credibility, attitude–behaviour gap	Eco-labels, disclosure, behavioural nudges, Pigouvian taxation
Financial layer	Holding of green deposits, green loans, green mortgages, ESG funds	ESG-rating noise and greenwashing, risk–return perceptions, climate-finance literacy	ESG disclosure standards, climate-related prudential rules, monetary policy green operations, central bank communication

Note: Layers are joined by the household's intertemporal budget constraint and by a common information infrastructure (eco-labels, ESG ratings, climate-related financial disclosures).

3. Methodology

3.1. Bibliometric approach

Bibliometric analysis evaluates the quality, structure and impact of a research field through quantitative analysis of bibliographic data (Donthu et al. 2021; Singh – Bashar 2021). It complements narrative reviews by providing reproducible measures of productivity, influence and intellectual structure (Goodell et al. 2021; Mongeon – Paul-Hus 2016). The present study combines performance analysis (publication and citation metrics) with science mapping (co-authorship, keyword co-occurrence, bibliographic coupling and thematic mapping), following established protocols (Aria – Cuccurullo 2017; Cobo et al. 2011; Zupic – Čater 2015).

3.2. Database and search strategy

Scopus was selected as the single source database, in line with evidence that it provides broader coverage across disciplines than the Web of Science and stronger consistency for bibliometric work (Harzing – Alakangas 2016; Mongeon – Paul-Hus 2016). The search was executed on 4 April 2025 using the title–abstract–keyword query: (“environmentally conscious consumer” OR “green consumer behavior” OR “sustainable consumption”) AND (“purchase decision” OR “buying pattern” OR “consumer preference”). The query mirrors the wording used in comparable bibliometric studies (Fahimnia et al. 2015; Kumar et al. 2020; Olawumi – Chan 2018), and is intentionally broad on the consumer side and narrow on the choice-behaviour side to ensure that retained articles speak to actual consumer decision-making rather than to unrelated environmental or supply-chain debates.

A deliberate design choice (and a methodological caveat) is that the query does not include explicit finance-side keywords such as “green deposit”, “green loan”, “ESG fund” or “green bond”. This was for two reasons. First, the topic of this review is ECCB, and the inclusion of explicitly financial keywords would have shifted the

corpus toward the institutional and corporate-finance literatures, whose object of study is not consumer choice. Second, a complementary scoping search with finance-side keywords returned a corpus with very limited overlap with the consumer-behaviour literature, confirming that the two literatures have so far developed in parallel. Rather than force them into a single retrieval, the review treats green finance as the institutional supply side that conditions ECCB, engages with it through *Sections 2 and 5*, and flags the systematic integration of the two literatures as itself a future-research priority (*Section 5.5*).

3.3. Inclusion and exclusion criteria

Three filters were applied sequentially, each with an explicit rationale. (i) Document type was restricted to peer-reviewed journal “articles” to maintain a uniform level of scholarly review and exclude conference papers, book chapters and editorials, whose review regimes differ. (ii) Language was restricted to English to keep keyword analysis and topic modelling consistent (a known limitation, addressed in *Section 5.5*). (iii) Publication stage was restricted to “final” to exclude early-access items whose metadata may still be updated. The yield evolved from 247 records to 173 final articles, as documented in *Table 2*.

Table 2 Search procedure		
Filtering criterion	Excluded	Included
Database: Scopus		
Date of search: 4 April 2025		
Initial keyword query (title, abstract, keywords)		247
Time window: 1997 – April 2025	0	247
Document type: peer-reviewed journal articles	53	194
Language: English	5	189
Publication stage: final	16	173

3.4. Analytical tools

Two complementary tools were used. The Bibliometrix R package (*Aria – Cuccurullo 2017*) computed productivity and impact metrics (top authors, sources, countries, articles), trending-topic and thematic-map analyses. VOSviewer (*van Eck – Waltman 2010, 2014; Perianes-Rodriguez et al. 2016*) generated co-authorship, keyword co-occurrence and bibliographic coupling networks. Standard parameter choices were used: full counting for co-authorship; minimum thresholds set to ensure interpretable maps; clustering with the default modularity-based algorithm.

3.5. Robustness checks

Reproducibility was prioritised throughout. Three robustness procedures were undertaken. First, the search string was re-run with relaxed truncation and produced an overlap of more than 95 per cent with the retained corpus, confirming that the final dataset is not driven by truncation choice. Second, descriptive metrics (annual output, top-cited articles, top sources) were independently re-computed in both Bibliometrix and VOSviewer; the results converged. Third, thematic-mapping clusters were inspected at two minimum-occurrence thresholds (5 and 8 occurrences for keywords) and yielded the same four-quadrant interpretation, indicating the stability of the cluster solution. Together these checks support the credibility of the bibliometric findings while remaining within the limits inherent to single-database, English-only retrieval (discussed in *Section 5.4*).

3.6. A note on journal quality and quartile ranking

The corpus was not pre-filtered by Scimago quartile (Q1–Q4) ranking. This was deliberate, for three reasons. First, Scimago quartiles are recomputed annually, so applying a current-year filter would have mechanically mis-classified papers from the earlier part of the time window (1997–2010) for which the contemporaneous ranking is the relevant benchmark and is not in general available. Second, quartile filtering can systematically exclude impactful work published in newer outlets or in interdisciplinary journals that are slow to acquire a strong category ranking, even when the work itself is widely cited (*Donthu et al. 2021*). Third, citation impact (which is computed directly from the data) is itself a revealed measure of scholarly influence and arguably the more transparent quality indicator for bibliometric work.

That said, a quartile lens can usefully be applied *ex post* to the most productive outlets. Of the seven journals contributing four or more articles to the corpus (Sustainability (Switzerland), Journal of Cleaner Production, Foods, Sustainable Production and Consumption, Business Strategy and the Environment, Food Policy and International Journal of Consumer Studies) all are currently classified in the top quartile (Q1) of their primary Scimago subject categories at the time of writing. The high-citation portion of the corpus is therefore concentrated in well-ranked outlets, even though no quartile filter was applied at the retrieval stage. Scopus indexing itself imposes a baseline editorial and peer-review threshold (CSAB) on every journal in the corpus.

4. Results

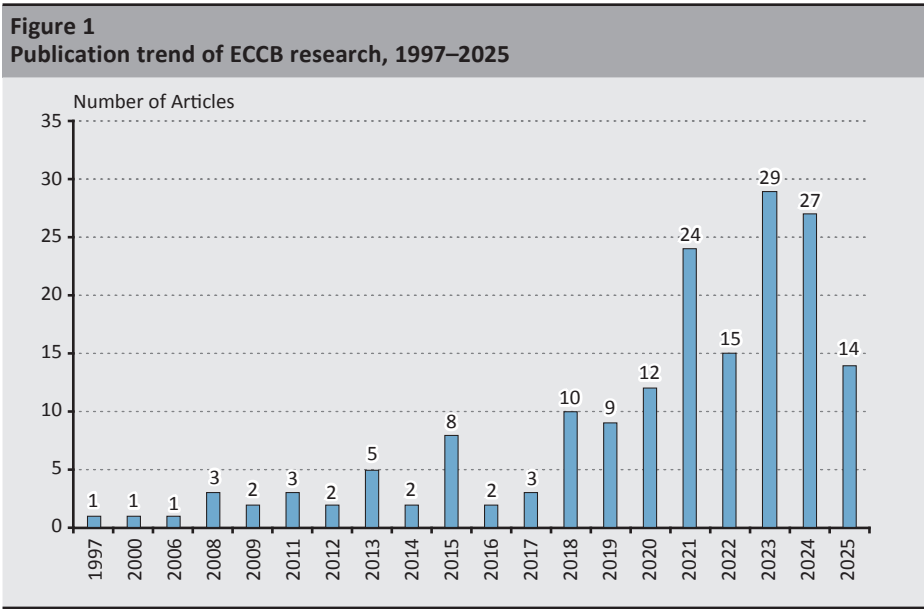
4.1. Sample characteristics

The final sample comprises 173 articles published between 1997 and April 2025 across journals in marketing, sustainability, consumer behaviour and environmental studies. The corpus supports both performance and science-mapping analyses.

4.2. Performance analysis

4.2.1. Publication trend

The publication trend (Figure 1) shows steady growth, followed by acceleration since 2019. The earliest article in the dataset is from 1997 (Hansen – Schrader 1997), confirming that ECCB has been a sustained scholarly concern for nearly three decades. The post-2019 surge mirrors the heightened global awareness of climate risk and the growing salience of sustainable finance instruments (Prothero et al. 2011; Reisch et al. 2016).



4.2.2. Top authors and countries

Table 3 lists the ten most productive authors, ranked by total publications and, within equal publication counts, by total citations. No author contributes more than two articles to the corpus, so the ranking is driven by citation impact: Dhir A. (230 citations), Girod B. (204), Gracia A. (171) and Lim M. (114) are the most-cited contributors, followed by Coderoni S. (68) and Schoormans J. (62). Author names were disambiguated with Scopus author identifiers and a thesaurus file (Section 3.4); initial-only variants that correspond to different individuals were not merged. Two Hungarian-affiliated contributions appear among the most-cited papers of the corpus and are returned to in Section 5.4. Table 4 reports the country ranking, based on full counting of all co-author affiliations (VOSviewer; Section 3.4). The United Kingdom tops the citation ranking with 798 citations across 18 publications, ahead of Canada (627; 8), Germany (623; 21) and India (610; 14), followed by Switzerland (503; 12) and the United States (497; 17). China leads on volume

(28 publications) but ranks seventh on citations (485), a pattern observed in earlier sustainability bibliometrics (Gaur – Kumar 2018; Zhu – Hua 2017). Hungary ranks eighth on citation impact (434 citations from only three publications), reflecting concentrated and highly cited contributions that include *Amberg – Fogarassy (2019)* and *Nekmahmud – Fekete-Farkas (2020)*; Finland (275 citations from four publications) show the same pattern of concentrated, high-impact output.

Table 3
Top authors in ECCB research

Author	Total Citations	Total Publications
Dhir A.	230	2
Girod B.	204	2
Gracia A.	171	2
Lim M.	114	2
Coderoni S.	68	2
Schoormans J.	62	2
Guo X.	41	2
Jiang X.	41	2
Spiller A.	40	2
Jacobs K.	33	2

Note: Author's elaboration using VOSviewer.

Table 4
Top countries in ECCB research

Country	Total Citations	Total Publications
United Kingdom	798	18
Canada	627	8
Germany	623	21
India	610	14
Switzerland	503	12
United States	497	17
China	485	28
Hungary	434	3
Spain	306	13
Finland	275	4

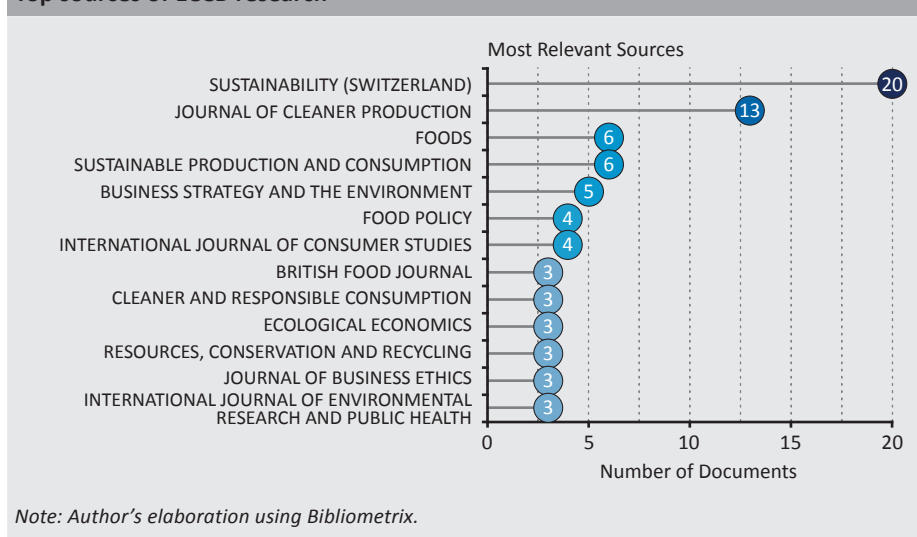
Note: Author's elaboration using VOSviewer.

4.2.3. Top sources

The distribution of publications across journals is shown in *Figure 2*. Sustainability (Switzerland) is the most productive outlet (20 publications), followed by Journal of Cleaner Production (13), Foods and Sustainable Production and Consumption (6 each), as well as Business Strategy and the Environment, Food Policy and International Journal of Consumer Studies (4 each). The mix of sustainability and food-policy outlets reflects both the multidisciplinary character of the field and the rising attention to sustainable food (*Hedin et al. 2019; Schanes et al. 2018; Olawumi – Chan 2018*). As noted in *Section 3.6*, all of these top-source journals are currently Q1-classified in their primary Scimago categories.

Figure 2

Top sources of ECCB research



4.2.4. Top-cited articles

Table 5 lists the ten most-cited articles in the corpus, in descending order of total citations. The first column reports only the article title; the second column reports the citation reference in the journal's author–year style; the third column reports total citations. The ranking spans 1997–2020 and covers determinants of green purchase, industry-specific green marketing, attitude–behaviour barriers, technology adoption, willingness to pay and product-lifecycle considerations, reflecting the breadth of intellectual influences in ECCB.

Table 5
Top-cited articles in ECCB research

Title	Authors (year)	Total Citations
Factors affecting consumers' green product purchase decisions	<i>Kumar – Ghodeswar (2015)</i>	260
Green consumer behavior in the cosmetics market	<i>Amberg – Fogarassy (2019)</i>	253
Understanding consumer resistance to the consumption of organic food. A study of ethical consumption, purchasing, and choice behaviour	<i>Kushwah et al. (2019)</i>	196
Social influence and consumer preference formation for pro-environmental technology: the case of a U.K. workplace electric-vehicle study	<i>Axsen et al. (2013)</i>	183
Why not green marketing? Determinates of consumers' intention to green purchase decision in a new developing nation	<i>Nekmahmud – Fekete-Farkas (2020)</i>	179
Incorporating pro-environmental preferences towards green automobile technologies through a Bayesian hybrid choice model	<i>Daziano – Bolduc (2013)</i>	164
Consumer understanding of product lifetimes	<i>Cox et al. (2013)</i>	153
Climate policy through changing consumption choices: options and obstacles for reducing greenhouse gas emissions	<i>Girod et al. (2014)</i>	153
Consumers' willingness-to-pay for sustainable food products: the case of organically and locally grown almonds in Spain	<i>De-Magistris – Gracia (2016)</i>	140
A modern model of consumption for a sustainable society	<i>Hansen – Schrader (1997)</i>	121

Note: Author's elaboration using VOSviewer.

4.2.5. Top keywords

Table 6 reports the twenty most frequent keywords. "Consumption behaviour" leads (47 occurrences), followed by "sustainability" (34), "sustainable development" (32) and "sustainable consumption" (31). "Decision making" (20) and "consumer behaviour" (19) signal the financial and policy dimensions of the field, while "perception", "consumer attitude" and "marketing" point to consumer-side mechanisms.

Table 6
Top keywords

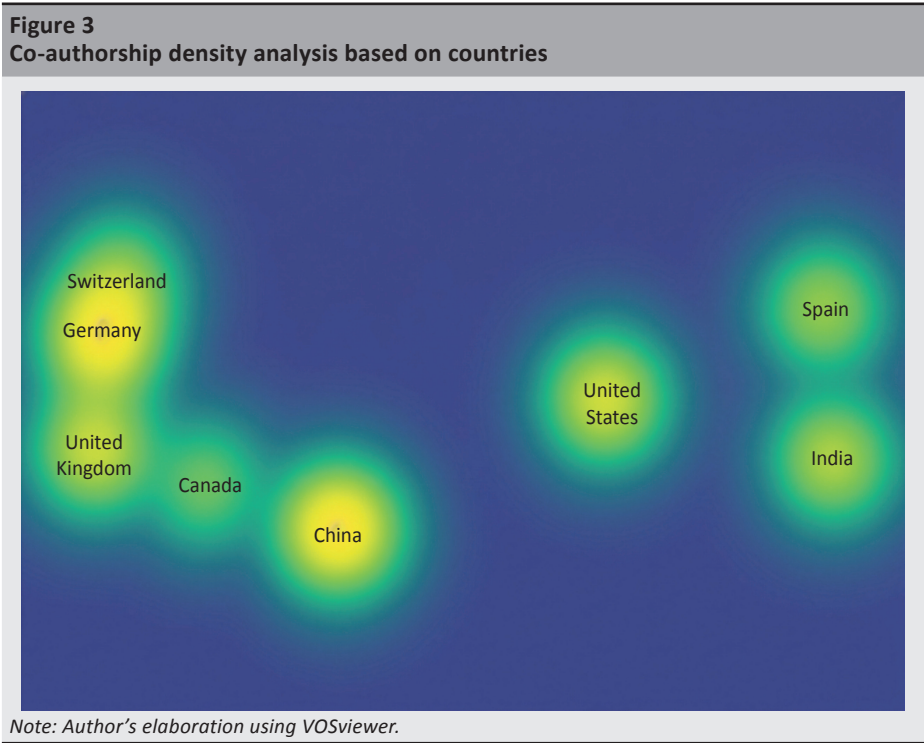
No.	Keyword	Total Occurrences	No.	Keyword	Total Occurrences
1.	consumption behavior	47	11.	purchasing	9
2.	sustainability	34	12.	marketing	9
3.	sustainable development	32	13.	willingness to pay	9
4.	sustainable consumption	31	14.	food consumption	9
5.	decision making	20	15.	consumers' preferences	9
6.	consumer behavior	19	16.	preference behavior	8
7.	sales	11	17.	climate change	8
8.	environmental impact	11	18.	consumer	7
9.	perception	11	19.	environmental economics	7
10.	consumer attitude	9	20.	environmental protection	6

Note: Author's elaboration using VOSviewer.

4.3. Science mapping

4.3.1. Co-authorship density analysis at the country level

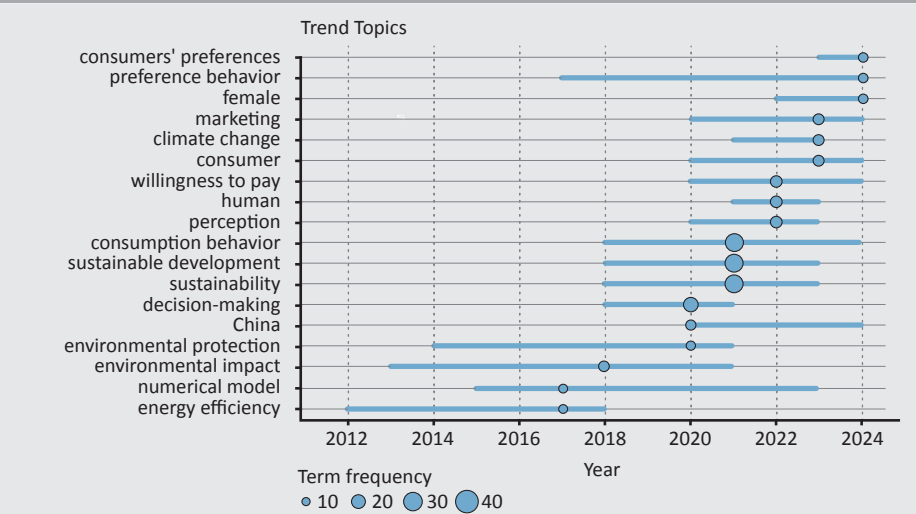
Figure 3 visualises the co-authorship density and regional publication concentration at the country level. The density map reveals four major focal areas of activity: Western Europe (represented strongly by Germany, the United Kingdom, Switzerland, and Spain), North America (the United States and Canada), and East/South Asia (China and India). The United States, China, and the UK emerge as the primary central hubs with the highest concentration of research output. The prominent visibility of China and India reflects the rising attention to ECCB in emerging economies, where rapid growth in consumption levels makes sustainability concerns particularly salient (Kumar *et al.* 2020; Nguyen *et al.* 2017). Meanwhile, coverage from Africa and South America remains thin (Ertz *et al.* 2016).



4.3.2. Keyword analysis: trending topics and thematic map

Figure 4 shows the temporal evolution of research themes. Recent trending topics for 2020–2024 include “consumers’ preferences”, “preference behavior”, “marketing” and “climate change”, reflecting a clear shift from the 2014–2018 emphasis on “environmental impact”, “numerical modelling” and “energy efficiency” toward consumer-side and finance-relevant questions (Dangelico – Vocalelli 2017; White *et al.* 2019).

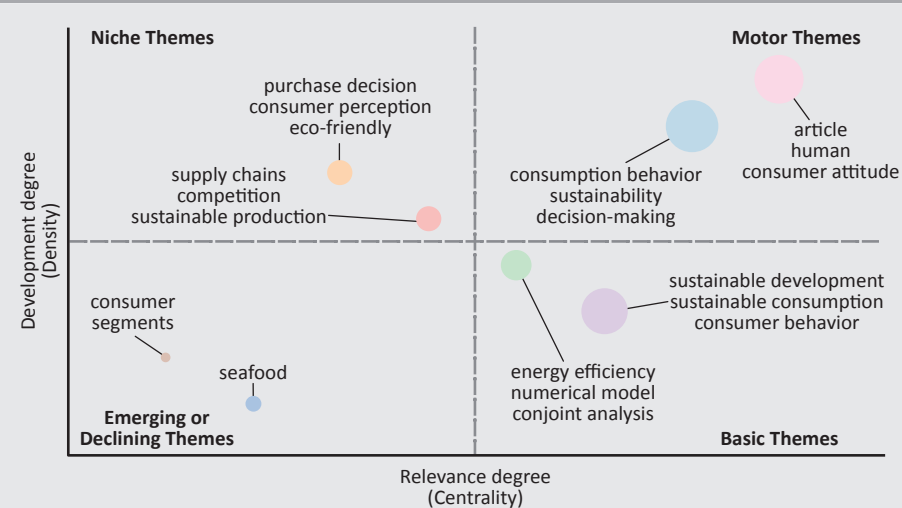
Figure 4
Trending topics based on keywords



Note: Author's elaboration using Bibliometrix. Automated database indexing tags (e.g., 'article', 'human', 'female') were retained in the software-generated visual mapping for raw data transparency.

Figure 5 maps themes into four quadrants by centrality and density (Cobo et al. 2011; Hanaa – Abdul 2023).

Figure 5
Thematic map



Note: Author's elaboration using Bibliometrix. Automated database indexing tags (e.g., 'article', 'human') were retained in the software-generated visual mapping for raw data transparency.

Motor themes (upper right): Two well-developed clusters dominate. The first centres on the consumer and human dimension, highlighted by “consumer attitude” (9) alongside related background indexing terms. The second cluster is anchored by “consumption behavior” (47, the highest count on the entire map), connecting consumption with “sustainability” (34) and “decision-making” (20).

Basic themes (lower right): “Sustainable development” (32) and “sustainable consumption” (31) are central, but theoretically less consolidated. “Consumer behavior” (19) sits here rather than among motor themes, suggesting that general consumer-behaviour theory has not yet been fully integrated with sustainability frameworks. Moreover, methodological terms such as “energy efficiency”, “numerical model”, “conjoint analysis” are also incorporated.

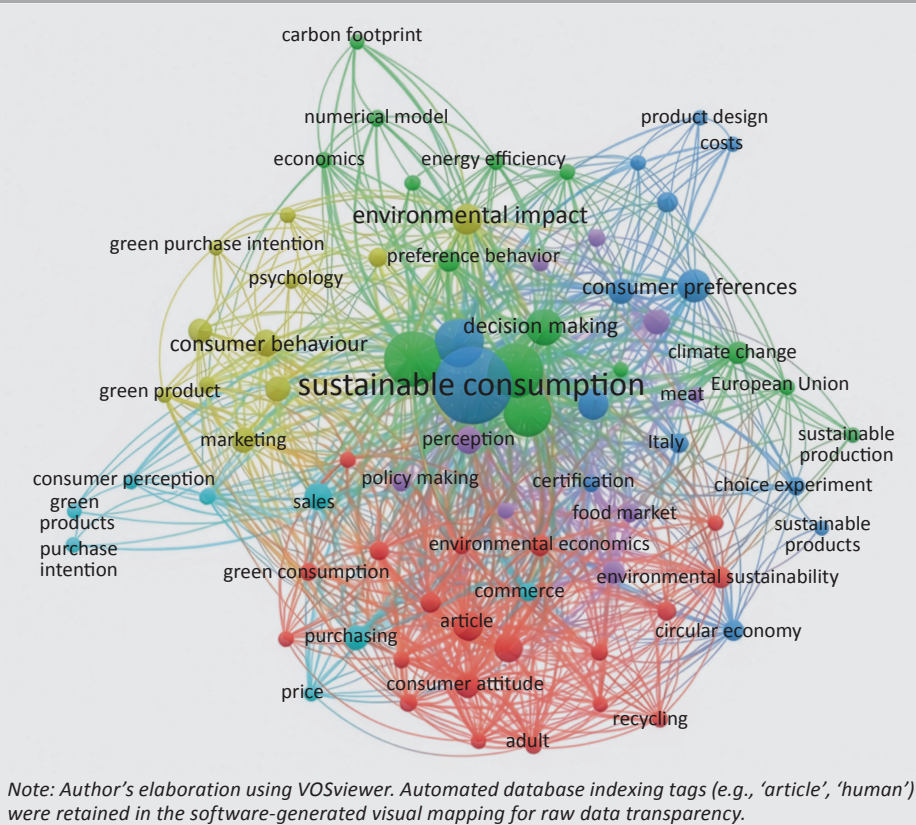
Niche themes (upper left): Two specialised clusters appear. One concerns consumer perception of eco-friendly products (“purchase decision”, “consumer perception”, “eco-friendly”). The other concerns supply chain dynamics (“supply chains”, “competition”, “sustainable production”). These streams are conceptually mature within their domains, but remain peripheral to the core (Joshi – Rahman 2015; Maniatis 2016).

Emerging or declining themes (lower left): Terms such as “seafood” and “consumer segments”, are either in early development or fading. Their direction will need further monitoring (Kumar et al. 2020; Olawumi – Chan 2018).

4.3.3. Co-occurrence analysis

Figure 6 visualises the keyword co-occurrence network. “Sustainable consumption” sits at the centre, with strong links to “decision-making”, “consumers’ preferences”, “environmental impact” and “preferential behavior”. Four colour-coded clusters emerge: a green cluster on environmental impacts, carbon footprint and energy efficiency (Girod et al. 2014; Lorek – Spangenberg 2014); a blue cluster on consumer preferences, decision-making and climate change (Carrington et al. 2014; White et al. 2019); a red cluster on attitudes, purchasing and marketing (Dangelico – Vocalelli 2017; Kumar – Ghodeswar 2015); and a yellow cluster on green purchase intention, psychology and consumer behaviour (Brough et al. 2016; Joshi – Rahman 2015).

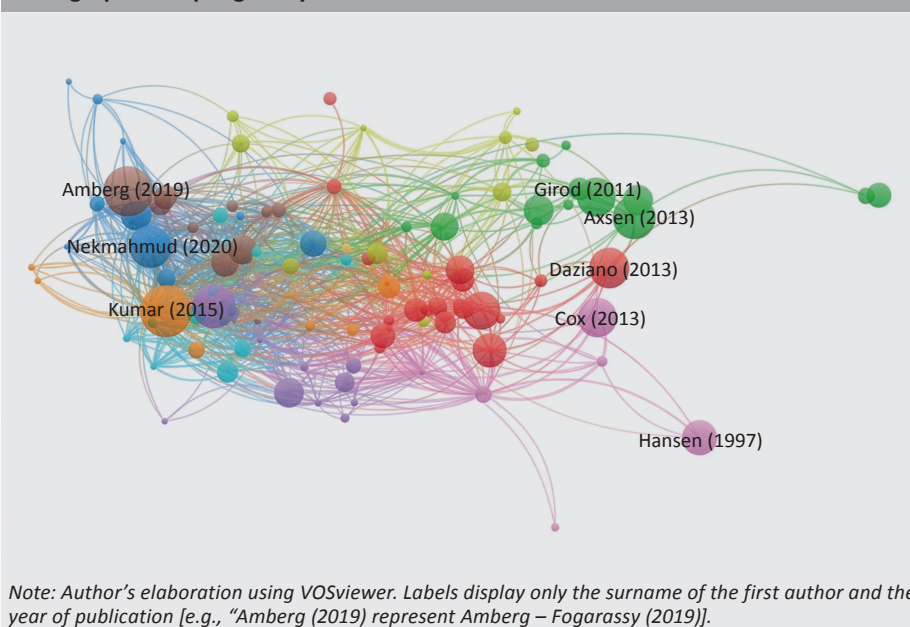
Figure 6
Co-occurrence analysis of keywords



4.3.4. Bibliographic coupling

Figure 7 shows author-level bibliographic coupling, identifying authors who share intellectual foundations (van Eck – Waltman 2014; Zupic – Čater 2015). Five clusters emerge: green consumer behaviour in specific markets (Amberg – Fogarassy 2019; Nekmahmud – Fekete-Farkas 2020); determinants of sustainable product choice (Kumar – Ghodeswar 2015); pro-environmental technology adoption (Axsen et al. 2013; Daziano – Bolduc 2013); product lifecycle and climate implications (Cox et al. 2013; Girod et al. 2014); and foundational sustainable-consumption models (Hansen – Schrader 1997). Interpreted thematically, the five clusters consolidate into four research streams: (i) consumer decision factors; (ii) industry-specific applications; (iii) technology adoption; and (iv) product lifecycle considerations.

Figure 7
Bibliographic coupling analysis



5. Discussion and implications

5.1. Discussion

The results show a field that has matured substantially since 2019, with output predominantly from advanced and selected emerging economies on a citation basis (India, Germany, Canada and Hungary stand out), while China leads on volume. Sustainability-focused journals dominate the publication landscape, alongside outlets in food policy and consumer studies. Four research streams structure the field: consumer decision factors, industry-specific applications of green marketing, pro-environmental technology adoption and product lifecycle considerations. Recent trending topics, including “willingness to pay”, “climate change” and gender-specific consumption, signal a closer engagement with finance- and policy-relevant questions and align with the rise of green financial products in retail markets (Goodell *et al.* 2021; Vecchio – Annunziata 2015).

Read against the two-layer framework of Section 2.4, the bibliometric picture is unambiguous: the consumption layer is well populated and intellectually mature, while the financial layer is engaged predominantly through the WTP keyword

and through scattered references to green premia. The institutional supply side of green finance (green deposits, green loans, ESG-rated savings vehicles, central bank prudential and monetary instruments) is materially under-represented in the ECCB corpus, despite being the principal route by which household preferences for sustainability are translated into capital flows. This under-representation is itself substantive research finding and motivates the agenda set out in *Section 5.5*.

5.2. Theoretical implications

Four theoretical implications follow.

First, this is to the author's knowledge the first bibliometric synthesis to position ECCB explicitly alongside green finance and to make the institutional supply side (including central banks and ESG infrastructure) analytically visible to consumer-behaviour researchers. The synthesis provides scholars with a structured map for situating new work and clarifies that "green consumer behaviour" is in fact a composite object that spans two layers of choice (*Table 1*).

Second, the four-stream taxonomy supports clearer integration across disciplines that have so far developed in parallel: marketing, environmental psychology, behavioural economics, sustainable finance and the economics of regulation (*Chabowski et al. 2011; Stern 2000; Wilson – Dowlatabadi 2007*). The attitude–behaviour gap, the central anomaly in the consumption-layer literature, can be read in welfare-economic terms as the empirical signature of a Pigouvian wedge between private and social marginal benefits of green consumption. The implication is that consumer-side interventions (information, nudges, marketing) can shift demand but cannot, on their own, close the wedge; supply-side and regulatory complements (green financial products, ESG disclosure, central bank prudential rules) are required.

Third, by integrating the ESG and credit-risk literatures (*Kiss et al. 2025; Kovacs et al. 2024; Mukhtar et al. 2025; Mishra – Pandey 2025*), the review reframes ESG ratings as the central piece of information infrastructure that connects ECCB to capital markets. ESG ratings perform a signalling role analogous to eco-labels on the goods side: where they are informative they price greenness, and where they are subject to greenwashing (*Bhullar et al. 2025*) they fail to price it and reproduce the consumption-side attitude–behaviour gap on the financial side. This places greenwashing at the heart of any theoretical account of ECCB at the financial layer.

Fourth, the inclusion of the central banking literature (*Dikau – Volz 2021; Kim et al. 2024; Kolozsi et al. 2022; Neszveda – Siket 2025*) opens a genuinely macroeconomic frontier for ECCB research. Consumer behaviour is conventionally modelled with the regulatory and monetary environment held constant; recent evidence that central bank communication and prudential design move the price and supply of

green financial products implies that this assumption is increasingly costly. Models that endogenise the policy environment, and empirical strategies that exploit policy variation as a source of identification, are a natural direction for theory-building.

5.3. Practical implications

The practical implications cut across four addressees.

For commercial financial institutions. The prominence of WTP, perception and attitude–behaviour gaps in the corpus translates directly into product-design guidance. (i) Pricing of green deposits and green mortgages should reflect the empirical regularity that consumers express strong green preferences, but are reluctant to pay large premia (*Guzmán – Kóczán 2025*); credible non-price differentiation (transparent use-of-proceeds reporting, third-party verification) is likely to outperform large interest-rate spreads. (ii) Retail ESG products benefit from clear, comparable ESG labelling at the fund level; the evidence on differential pillar effects (*Kovacs et al. 2024*) suggests that headline aggregate scores understate the information that engaged investors actually use. (iii) Climate-finance literacy interventions (embedded in onboarding, statements and digital channels) directly target the information frictions that the attitude–behaviour gap identifies.

For central banks and prudential authorities. The strand of work on monetary policy and the green transition (*Kolozsi et al. 2022*), preferential capital treatment of green exposures (*Kim et al. 2024*), green central bank communication (*Neszveda – Siket 2025*) and the international stocktake of central bank mandates (*Dikau – Volz 2021*) jointly imply that the supply of household green finance is materially shaped by policy. Three concrete levers stand out: (i) climate-related capital and disclosure rules that lower the cost of green retail credit; (ii) collateral and refinancing operations that incorporate environmental criteria, subject to the calibration challenges discussed in *Kolozsi et al. (2022)*; and (iii) communication strategies that signal commitment without overpromising: because green speeches measurably move prices (*Neszveda – Siket 2025*), credibility is itself a policy asset.

For ESG and disclosure regulators. Standardised, comparable ESG disclosures, with explicit anti-greenwashing safeguards (*Bhullar et al. 2025*), are a precondition for retail ESG markets to function as the institutional translator of household green preferences into capital allocation. Disclosures need to be granular enough to expose the pillar-level differentials documented in the empirical literature (*Kovacs et al. 2024*; *Csillag et al. 2022*).

For policymakers and marketers. For marketers and product designers, the prominence of attitude–behaviour and WTP literatures provides actionable insight into pricing, value communication and segmentation (*Dangelico – Vocalelli 2017*; *Kumar – Ghodeswar 2015*; *Testa et al. 2020*). For policymakers, the visible regional variation in research production, and the parallel evidence on regional differences in

the WTP–attitude wedge (Guzmán – Kóczán 2025), underline the need for culturally-adapted policy levers and support a dual emphasis on individual-level behaviour change and structural reform (Geels *et al.* 2015; Lorek – Spangenberg 2014; Spaargaren 2011). The most cost-effective policy mixes are likely to combine eco-labelling and ESG disclosure at the information layer, targeted price corrections at the consumption layer and prudential plus monetary instruments at the supply layer.

5.4. Hungarian contributions

Hungary's rank-8 position on citation impact (Table 4) is driven by a small number of highly cited consumer-behaviour articles, of which two are particularly visible in the corpus. Amberg – Fogarassy (2019) examine green consumer behaviour in the cosmetics market and rank second among the most-cited articles of the corpus (Table 5); Nekmahmud – Fekete-Farkas (2020) study determinants of green purchase intention in an emerging-market setting and rank fifth. These contributions sit in the consumer-decision-factors and industry-specific applications streams of the bibliographic coupling map (Figure 7).

Hungarian scholarship is also visible (and arguably more concentrated) at the green finance end of the literature engaged in Section 2.2. Work on the Magyar Nemzeti Bank's Green Preferential Capital Requirement Programme (Kim *et al.* 2024), on monetary policy and the green transition (Kolozsi *et al.* 2022), on ESG and corporate credit risk (Kiss *et al.* 2025), on media attention and ESG investing (Csillag *et al.* 2022), on the differential pricing of ESG pillars (Kovacs *et al.* 2024) and on the price impact of green central bank communication (Neszveda – Siket 2025) jointly document a Hungarian research strand at the supply side of green finance that complements the consumer-side contributions in the bibliometric corpus. Taken together, the two strands position Hungarian scholarship at both layers of the framework set out in Section 2.4 and make Hungary a natural setting for the kind of integrated ECCB–green-finance research that this review identifies as a priority.

5.5. Limitations and future research directions

Four limitations should be acknowledged. (i) Reliance on a single database (Scopus); future work could triangulate with Web of Science and Google Scholar (Harzing – Alakangas 2016; Mongeon – Paul-Hus 2016). (ii) English-only retrieval may exclude relevant non-English work; multilingual bibliometric reviews would broaden coverage. (iii) The search strategy is anchored on the consumer side, by design (Section 3.2); systematic integration with the green-finance corpus is itself a future-research priority. (iv) Bibliometric methods measure impact and structure rather than methodological quality of individual studies (Prothero *et al.* 2011; Zupic – Čater 2015); complementary systematic and meta-analytic reviews remain valuable.

Future research could pursue the following priorities, ordered in line with the two-layer framework.

At the consumption layer. (a) Cross-cultural comparisons of ECCB across emerging and advanced economies (*Ertz et al. 2016; Nguyen et al. 2017; Thøgersen 2010*); (b) climate-change framing effects on consumer choice (*Girod et al. 2014; van der Linden et al. 2015; Weber – Stern 2011*); (c) digital and AI-enabled tools for sustainable consumption (*Bui et al. 2014; Hanaa – Abdul 2023*); (d) psychological-distance perspectives on sustainable choice (*Spence et al. 2012; Trope – Liberman 2010*).

At the financial layer. (e) Household uptake of green deposits, green mortgages and ESG-tilted retail investment products, with explicit measurement of WTP for the financial-layer green premium (*Guzmán – Kóczán 2025; Vecchio – Annunziata 2015*); (f) the price- and quantity-impact of ESG ratings on retail demand, including the pillar-level differentials in *Kovacs et al. (2024)*; (g) greenwashing detection and its effect on retail trust in green financial products (*Bhullar et al. 2025*).

At the supply and policy layer. (h) Identification of the consumer-side effects of central bank green operations, prudential rules and communication (*Dikau – Volz 2021; Kim et al. 2024; Kolozsi et al. 2022; Neszveda – Siket 2025*); (i) systems-level approaches integrating individual, social, market and regulatory dynamics (*Geels et al. 2015; Spaargaren 2011*); (j) integrated bibliometric and systematic reviews that explicitly bridge the consumer-behaviour and green-finance corpora.

6. Conclusion

This study mapped 173 Scopus-indexed articles on environmentally conscious consumer behaviour published between 1997 and April 2025 and for the first time situated the field in a bibliometric review, alongside the institutional supply side of green finance. The two are conventionally studied in separate literatures; the present review treats them as two layers of one household decision problem and shows that the consumption layer is well populated, while the financial layer is engaged only obliquely. Three substantive findings follow. First, the field has accelerated since 2019 and is concentrated in a small set of high-impact countries, with Hungary in eighth place on citation impact and visible contributions at both the consumption and the green-finance ends of the literature. Second, four research streams structure the corpus (consumer decision factors, industry-specific applications, pro-environmental technology adoption and product lifecycle) and the trending-topic analysis points to a clear shift toward WTP, climate change and gender-specific consumption. Third, the analytical bridges most urgently required are at the information layer (ESG ratings, eco-labels, climate-related financial disclosure) and at the policy layer (central bank prudential and monetary instruments), where supply-side conditions on consumer choice are most concentrated.

For practice, the implications are concrete. Commercial financial institutions can compete on credible non-price differentiation in green retail products rather than on premia that consumers stated-preference research consistently shows they are reluctant to pay; central banks and prudential authorities can shape the supply and pricing of green retail credit through climate-adjusted capital treatment, green refinancing operations and credible communication; and ESG regulators can underwrite the entire architecture by enforcing standardised, granular and greenwashing-resistant disclosure. For scholarship, the most productive next step is to break out of the consumer-behaviour silo and run the joint analysis explicitly, a step the conceptual framework of *Section 2.4* and the future-research agenda of *Section 5.5* are intended to support.

Declarations

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The author has no competing interests to declare that are relevant to the content of this article.

Author contributions

The sole author was responsible for all aspects of this manuscript. The author has read and agreed to the published version of the manuscript.

Data Availability

The data used in this study were obtained from Scopus. Restrictions apply to the availability of these data, which were used under license for the current study.

Ethical Approval

Not applicable. This study did not involve human participants or sensitive personal data requiring institutional ethical approval.

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Role, Challenges and Network of International Financial Centres in a Changing World Order*

János Müller  – Réka Hámori 

In a world order burdened by geopolitical tensions, sanctions and tariff restrictions, the global and regional network of international financial centres plays a key role in supporting the functioning of the international financial system, global capital flows, technological transformation, regulation and in maintaining international economic integration. These global and regional centres constitute one of the fundamental infrastructures of the world economy. Geopolitical tensions, competition between power blocs and wars have a dual effect on their functioning: they temporarily weaken their positions whilst also prompting them to respond to the challenges. In the context of global geopolitical developments, competing economic power blocs generate competition among financial centres, enhancing service efficiency while also creating a need for cooperation to maintain financial stability.

Journal of Economic Literature (JEL) codes: G15, F30, F33, G28

Keywords: importance, ranking, and types of international financial centres (IFCs); their international network

1. Introduction

By the end of the first quarter of the 21st century, the structure of the global economy had undergone a significant transformation. The unipolar financial order of the post-Cold War era was gradually replaced by a more fragmented, multipolar system. Following the 2008 international financial crisis, the global financial system faced major impacts and challenges, such as the acceleration of technological development after the pandemic, the digital transformation of the financial system (FinTech), artificial intelligence and big data, all of which necessitated the provision of sustainable finance and financial inclusion. Trade restrictions, sanctions and tariff

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wars emerged on the international stage, disrupting supply chains and deepening geopolitical tensions. In this dynamically changing environment, we examine the role, development and responsibilities of international financial centres. Our analysis is made particularly relevant by the need to confront the consequences of the wars that have been ongoing for some time and to consider possible responses to them. This is because wartime events have a dual effect. There is a strong, two-way link between international financial centres (e.g. New York City, London, Singapore, Dubai and Hong Kong) and the impact of the ongoing conflicts in the Middle East and the Russia–Ukraine war: financial centres not only respond to wars but also, to some extent, may have a significant impact on the financing opportunities of the parties involved in the war. International financial centres are therefore not mere background players but centres of power on the front line of geopolitics. As hubs of the global financial industry, international financial centres have already begun to respond to these challenges: they organise, facilitate and shape dialogue among societies, companies and financial service providers, enabling an appropriate response to large-scale changes and challenges.

International Financial Centres (IFCs) play a key role in global capital allocation, risk management, financial innovation and maintaining economic integration. To understand their position, role and influence, we need to examine the types of financial centres, their positions, rankings, operational efficiency and global networks. The global network of international financial centres connects capital markets and regulatory systems across continents.

The international economic and financial system has undergone fundamental, systemic changes over the past quarter of a century; therefore, to assess the development and current positions of international financial centres, we must briefly look back at the foundations and roots of the international financial system. The existence and operating conditions of these centres cannot be separated from the development and structure of the global economy and the international financial system.

2. Historical background

The Second World War (1939–1945) was fought between two opposing groups: the Allied Powers (primarily the USA, the Soviet Union and the United Kingdom) and the Axis Powers (whose leading forces were Germany, Italy and Japan). Following the war, which ended in victory for the Allies, the Allies agreed on the division of Europe at the Yalta Conference in February 1945 and then at the Potsdam Conference (July–August 1945). Europe was split into two parts, giving rise to two major spheres of influence, the ‘Western’ and the ‘Eastern’ blocs.

The hope had been to launch a peaceful post-war reconstruction process; instead, however, within a short time – historically speaking, almost immediately – a geopolitical and military rivalry began: the Cold War era had dawned.

In the USA, the Bretton Woods monetary and financial conference took place before the end of the war in 1944, with 44 countries signing the final agreement, which enabled the establishment of a new international monetary (financial) system that became the foundation of the post-war international economic order. In 1944, the International Bank for Reconstruction and Development (IBRD) and the International Monetary Fund (IMF) were established, followed by the World Bank in 1945. All of this meant the establishment of the regulatory framework necessary for the functioning of the international financial system, and at the same time it indicated that the United States had become the dominant, primary power in the international economic system. The US dollar became the dominant currency in international trade; the exchange rates of all other currencies were fixed against the dollar, and the value of the dollar was in turn pegged to gold at a fixed exchange rate.

A new system governing financial and trade relations was established. (London retained its role as a financial centre, whilst the pound sterling remained a key factor in trade amongst the countries belonging to the British Empire and, subsequently, the British Commonwealth.)

Although not a financial matter, one major development in global politics was the establishment in Washington in 1949, under US leadership, of the North Atlantic Treaty Organization (NATO), a military alliance that today comprises thirty-two member states and that further strengthened the USA's dominant position as a global power. The other pole of the world power system was the Soviet Union, together with the countries of Central and Eastern Europe under its occupation, forming the Soviet bloc (from a financial perspective, this bloc constituted a closed system: the Russian rouble and the transferable rouble played no international role, and the exports and imports of the Comecon countries took place within the framework of barter trade agreements). Confrontation between the two blocs became increasingly acute in every respect, a development well symbolised by the erection of the 'Iron Curtain'. The Cold War era began, and a bipolar world power system emerged. This was further reinforced by the General Agreement on Tariffs and Trade (GATT), established in 1947 following the World Bank and the International Monetary Fund; the Organisation for Economic Co-operation and Development (OECD), established in 1961; and subsequently, in 1995, the World Trade Organization (WTO), which succeeded GATT.

From the perspective of analysing financial centres, the following historical developments occurred through cooperation among European countries and the

gradual strengthening of their commitment to cooperation and integration. In 1952, the European Coal and Steel Community (ECSC) was established, followed by the European Economic Community (EEC), the Common Market, and ultimately, in 1993, the European Union (EU). Within the European Union, the Economic and Monetary Union, the Capital Markets Union and the Banking Union also developed successfully. With the integration of the previous two unions, the establishment of the Savings and Investments Union (SIU) in 2025 marked a step forward; its aim was to deepen the integration of capital and banking markets, and to facilitate the financing of economic growth, innovation and the green transition. On 1 January 1999, the euro, the official currency of the European Union, was introduced; preparations for this required establishing the European Central Bank (ECB) (1 June 1998, headquartered in Frankfurt). The euro area was thus established and currently comprises 21 of the EU's 27 Member States.

3. Defining the concept of an international financial centre

A brief overview of the international financial system from the end of the Second World War to the end of the Cold War shows that it was relatively straightforward to identify the locations of international financial centres and define their roles. In order, New York, London, Frankfurt and then Luxembourg could be included on the list.

After the Cold War era, the previously bipolar world order transformed into a multipolar system, and global economic, trade and financial links began to develop. The next chapter in this process was a world order undergoing significant transformation, fraught with geopolitical and military tensions, as well as trade and financial sanctions, and a new order that was difficult to predict. Competition in international trade and finance intensified in the pursuit of positions of power, and regional cooperation organisations were established, which required an accessible infrastructure for financial services. As a result, a larger number and variety of international financial centres emerged, each of international significance, performing different functions. We shall review these later; for now, we simply note that there are three main types of international financial centres: global, regional and city-based centres.

In this multipolar, multi-layered system, the concept and definition of international financial centres can only be descriptive, specifying their type, their international role and their position in the ranking of the relevant category. The conceptual framework of financial centres therefore encompasses geographical and urban perspectives, as well as their impact on national and global economies, all of which requires an interdisciplinary approach (*Cassidy 2010*). This means that the location and the financial centres operating there are interconnected, with their primary shared function being to offer a wide range of financial and investment services.

Taking the above into account, an urban area or economic region may be regarded as an international financial centre if it offers significant international financial services, influences global or regional capital flows and serves as a base of operations for international players (banks, investment funds, insurance companies, stock exchanges).

“International financial centres play an important decision-making role in the global economy; however, this position is not subject to unconditional rules” (Cassis – Wójcik 2019:2).

An international financial centre can be defined as a city or organisation whose primary activity, alongside administrative, commercial and cultural functions, is financial intermediation, the provision of a wide range of financial services and the conversion of savings into investments.

4. Development, forms and types of international financial centres

According to economic history, financial institutions, banks, central banks and financial centres already existed as early as the fifteenth century. This early period is examined in a number of significant analyses, such as that by Gál (2010), who argues that geographical presence played a major role in the development of the financial system, particularly later, in the era of globalisation, whilst financial centres also had a significant impact on regional development. At the same time, regional differences and location heterogeneity influenced the movement of money and capital. In the early 21st century there were international economic, financial, global power and geopolitical developments which call for a new analysis of international financial centres, focusing on current challenges. After World War II, financial centres contributed to the development of international trade in the Cold War period and to its financing, but following the Cold War, their roles, responsibilities and challenges transformed, and these centres entered into a phase of dynamic development. The backdrop to this, and the driving force behind it, was the globalisation of the economy, a period in which financial processes accelerated and expanded, international capital flows increased, the scope of foreign direct investment broadened, and the process of deregulation in the financial sector began. During this period, the number of international financial centres playing a key role in the global economy increased, comprising cities or regions where financial services – the banking system, capital markets, insurance and investment management – are highly concentrated. Examples of such centres include New York City, London, Hong Kong and Singapore.

The last quarter of the 20th century saw the most active period in establishing and developing international financial centres. The globalisation of the economy was characterised by a significant strengthening of the financial networks spanning the

globe, which included the dynamic growth of international capital flows and foreign direct investment; consequently, there was a demand for an international financial intermediary system – multinational banks.

“Cross-border mergers and acquisitions (M&A) (2000–2017) reveal a changing landscape of international financial centres (IFCs) within the Global Financial Network (GFN), characterised by the rise of Asia-Pacific centres, the decline of European influence, and the continued dominance of London and New York” (Wójcik et al. 2022:97).

Through their well-established operational systems, international financial centres connect foreign investors with national financial market participants, thereby providing the country or region with access to foreign capital. The development of financial centres continues to be influenced by trade and possible access to foreign sources of capital.

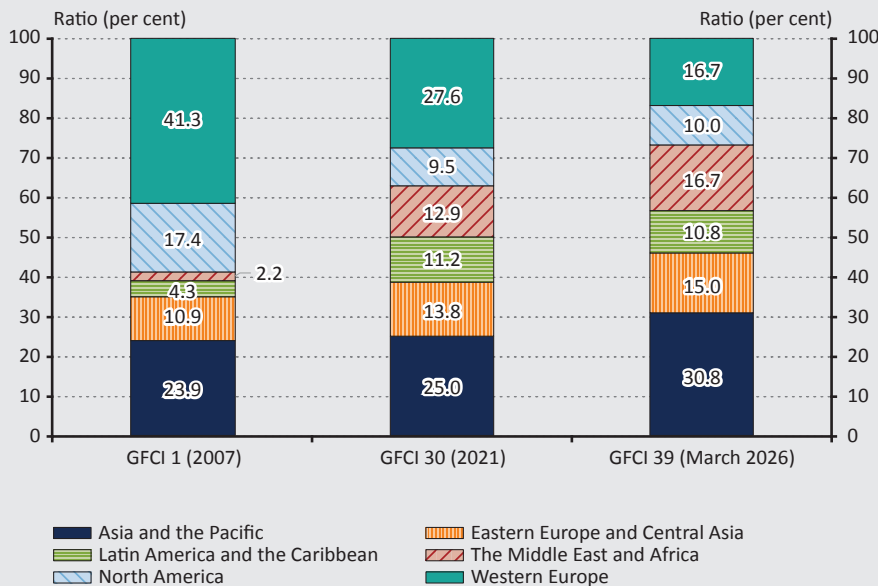
The dynamics of this development are illustrated by the fact that the first survey of global financial centres was conducted by the Z/Yen Group (a City of London think tank) in 2007; at that time, there were 46 such centres, rising to 116 in 2021 and further to 120 by 2026 (*Table 1*).

Table 1			
Number of financial centres based on the Global Financial Centres Index (GFCI)			
Region	GFCI 1 (2007)	GFCI 30 (2021)	GFCI 39 (March 2026)
Asia and the Pacific	11	29	37
Eastern Europe and Central Asia	5	16	18
Latin America and the Caribbean	2	13	13
The Middle East and Africa	1	15	20
North America	8	11	12
Western Europe	19	32	20
Total	46	116	120
<i>Source: Wardle – Mainelli (2007:5), Wardle – Mainelli (2021:5), Wardle – Mainelli (2026:5)</i>			

Z/Yen Group Limited updates its Global Financial Centres Index (GFCI) every six months; the three columns above indicate the serial numbers of the indices compiled every six months from 2007 to March 2026. The last column of *Table 1* presents the data for March 2026 (GFCI 39). The aggregated data show that the number of global financial centres has nearly tripled in just under two decades. This was partly driven by the Russia–Ukraine war, which has been ongoing since 2022, and subsequently by the war in Iran. It is clearly visible that the geographical centre of gravity of global financial centres is continuing to shift towards Asia, indicating

significant growth. The Middle East and Africa have also strengthened, particularly due to Dubai, which has entered the top 10. Western Europe's relative weight has declined: although London continues to hold second place globally behind New York, the region's growth rate is more moderate. Latin America is stagnating, whilst North America remains stable. In summary: competition among financial centres is becoming increasingly multipolar, and the previous Western dominance is gradually fading.

Figure 1
Regional structure of financial centres based on GFCI data



Source: Wardle – Mainelli (2007:5), Wardle – Mainelli (2021:5), Wardle – Mainelli (2026:5)

Figure 1 shows that whereas 23.9 per cent of the centres were located in the Asia-Pacific region in 2007, this proportion had risen to 30.8 per cent by 2026, making it the most dominant region. In 2007, Western Europe was still home to more than 41 per cent of global centres, but by 2026 this share had fallen significantly to 16.7 per cent in the overall ranking. The Middle East and Africa, as well as Eastern Europe and Central Asia, have visibly increased their share of the global network over the past two decades.

“By the 21st century, international financial centres had moved beyond the traditional functions of merely raising and allocating capital; today, they have become indispensable, complex institutions of the global economy and capital

markets. This qualitative transformation was characterised by an explosive expansion of financial services” (Tóth 2012:81–82).

Over the last two decades, this development has led financial service providers, as well as securities and capital market participants, to concentrate their operations in such centres, in order to expand their global and regional connections and financial networks in the face of intensifying competition.

After the Second World War, during the historical phases outlined above, three main forms of international financial centres emerged in response to political, economic, commercial and financial needs: global, regional and city-based centres.

The location, influence, role and effectiveness of international financial centres of global or regional significance are assessed by a number of research and analytical organisations. The most important of these are rating providers; their rankings based on the category of financial centre under examination are presented below. The ranking of financial centres is influenced by assessment and rating criteria; however, whether they are ranked similarly or differently allows for a more accurate assessment of the global or regional influence, significance and integrative power of individual financial centres.

4.1. Global financial centres

The role and functioning of financial centres of global significance affect the development and state of the global economy. They facilitate and execute cross-border financial transactions and allocate capital, thereby strengthening international financial and trade cooperation. They typically exert global influence; most handle significant stock market turnover and serve as hubs of the international banking system and headquarters of international investment funds.

For more than a decade, the position, significance and international influence of these global centres has been assessed and ranked based on criteria jointly established by the World Bank, the OECD, the London-based Z/Yen and the China Development Institute.

On this basis, they publish the Global Financial Centres Index (GFCI)¹ twice a year, which assesses the scores of a total of 120 centres. *Table 2* shows the data for the top 20 centres. The table shows the centres’ competitiveness and their position in the ranking. Analysts consider the following factors: the size and liquidity of financial markets, their international networks, human capital and expertise, capacity for

¹ The Global Financial Centres Index (GFCI) assesses the competitiveness of financial centres based on more than 29,000 online survey responses and indices from over 100 organisations (such as the World Bank, the Organisation for Economic Co-operation and Development, and the Economist Intelligence Unit). This index was first published in March 2007. Since 2015, it has been published jointly by the London-based Z/Yen think tank and the China Development Institute, twice a year.

innovation, international recognition and trust. The most recent list, compiled in March 2026, is presented in *Table 2*.

Centre	GFCI 39 (2026)		GFCI 38 (2025)		Change	
	Rank	Score	Rank	Score	in ranking	in score
New York	1	767	1	766	0	+1
London	2	766	2	765	0	+1
Hong Kong	3	765	3	764	0	+1
Singapore	4	764	4	763	0	+1
San Francisco	5	744	5	754	0	−10
Shanghai	6	743	8	751	+2	−8
Dubai	7	742	11	748	+4	−6
Seoul	8	741	10	749	+2	−8
Shenzhen	9	740	9	750	0	−10
Tokyo	10	739	15	744	+5	−5
Zurich	11	738	16	743	+5	−5
Los Angeles	12	737	7	752	−5	−15
Boston	13	736	17	742	+4	−6
Chicago	14	735	6	753	−8	−18
Frankfurt	15	734	12	747	−3	−13
Luxembourg	16	733	19	740	+3	−7
Washington DC	17	732	13	746	−4	−14
Geneva	18	731	14	745	−4	−14
Paris	19	730	18	741	−1	−11
Amsterdam	20	729	26	733	+6	−4

Note: For changes in ranking, a positive (+) sign indicates an upward movement (improvement) in the ranking, while a negative (−) sign indicates a decline (a drop in position).

Source: Wardle and Mainelli (2026:4)

Table 2 shows the ranking of international financial centres, based on measurements from the last two years, taking into account their weight and influence in the current international, economic, trade and geopolitical context. The GFCI scores are not calculated by simple addition or averaging, but are based on an assessment of a complex set of so-called objective factors (business environment, quality of regulation, levels of corruption, government efficiency, digital infrastructure, telecommunications, human capital, skilled workforce and access to international markets), as well as subjective factors (investment bankers, investment fund

managers, insurers, fintech players, trustees and institutional investors). Consequently, for example, a score of 760 out of 1,000 is not a value in the simple sense, but rather the composite result of a model indicating the relative global competitiveness of the financial centre in question.

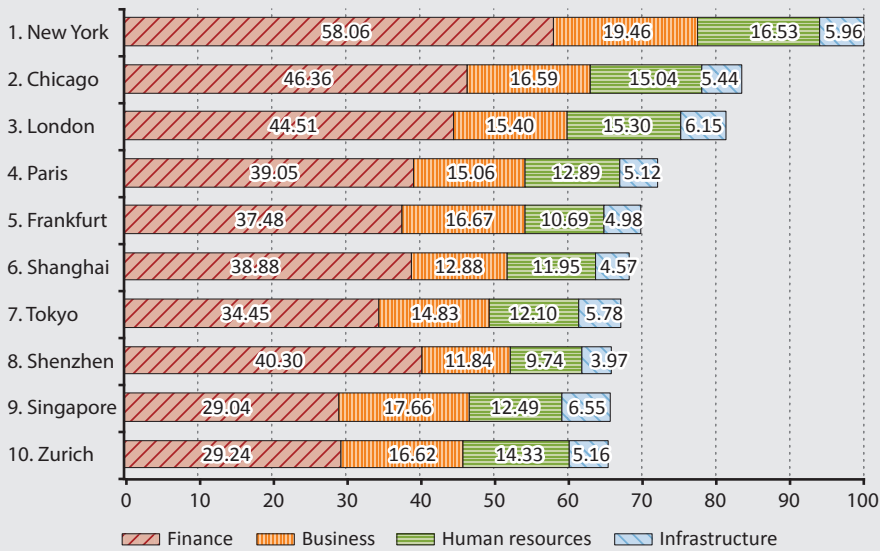
There has been no change in the top five places of the ranking over the past year; however, it is noteworthy that, primarily due to the current military conflicts, the scores – with the exception of the top four – have fallen for every centre. There has been little change at the top of the rankings, although a closer examination of the classifications (rather than the rankings themselves) reveals that several cities have dropped in the rankings. Ongoing geopolitical uncertainty has helped to bolster confidence in financial centres worldwide.

A few results from the rankings are worth highlighting: the top four – New York, London, Hong Kong and Singapore – have retained their positions, reflecting the stable hierarchy of the global financial system. New York remains in first place with 767 points, a minimal improvement of 1 point, whilst London and Hong Kong follow closely behind with 766 and 765 points, respectively. This shows that competition among the leading centres is extremely close, and even a difference of a few points can result in a significant difference in ranking. Overall, it is clear that whilst traditional Western financial centres continue to dominate, Asia and the Middle East are increasingly shaping the new balance of power among global financial centres.

Another indicator examining the status of international financial centres is the Open Financial Ecosystem Index (OFEX). The Louis Bachelier Institute in Paris and the Centre for Financial Studies at Goethe University in Frankfurt am Main jointly developed this index.

They developed a transparent, objective index that serves as a common benchmark for assessing the attractiveness of financial centres. The ranking takes into account the changes in and weighting of four key factors – population size, business environment, market access and infrastructure – to determine competitiveness. *Figure 2* shows the 2025 ranking.

Figure 2
Ranking of the top 10 international financial centres based on the Open Financial Ecosystem Index in 2025 (OFEX)



Source: Institut Louis Bachelier (2025:1)

The activity, role and liquidity of international financial centres can also be measured using other methods. The New International Financial Centres Index ranks countries using quantitative indicators based on the scope and value of financial activity. The index tracks changes in leverage and separately assesses the value of financial services arising from the size of the country in question and from cross-border financial services. The analysis examines 48 countries using 42 indicators. Based on the scores achieved, it classifies financial centres into ten groups. For reasons of space, we present only the first four:

- 1) *The dominant global financial centre*: the United States is the world's highest-scoring centre, with a score of 79 out of 100.
- 2) The United Kingdom is the *dominant* European financial centre: its overall score of 40 is more than 50 per cent higher than Luxembourg's, and nearly double that of Germany or France.
- 3) *Emerging centres*: China is the third-largest centre according to this index, ahead of Japan and Hong Kong.

4) *Catching-up centres*: the performance of the major European economies is mixed, with Germany (7th), France (8th) and the Netherlands (9th) in the top 10, whilst Spain (20th) and Italy (22nd) have relatively low scores (*New Financial 2018*).

4.1.1. The World Alliance of International Financial Centers

There is an international financial organisation of global significance whose operations – due to its nature, scope and the specific nature of its activities – are not covered or measured by the indices of analytical centres, yet which we must highlight: this is the *World Alliance of International Financial Centers* (WAIFC).

The WAIFC is a non-profit international financial organisation with a global reach, founded with its headquarters in Brussels. Regarding its origins and beginnings, it is worth noting that the initiative was proposed in 2016 by the financial centres of Paris, Frankfurt and Moscow, with a view to promoting and strengthening cooperation. The organisation was established in Paris two years later and registered in Brussels on 1 October 2018. It was founded with the participation of eleven countries, and this global alliance now comprises twenty-one major global and regional financial centres (such as Abu Dhabi, Astana, Dubai, London and Frankfurt), whilst another six financial centres support its work as observers.

The WAIFC was established to act as an umbrella organisation for international financial centres, serving as an extensive and expanding network of mutual cooperation to strengthen the sharing of best practices, encourage financial research and facilitate the implementation of projects contributing to sustainable economic development. To this end, they actively support and coordinate research on financial technologies and fintech developments.

4.2. Regional international financial centres

Regional financial centres are cities or geographical regions that serve as headquarters for major financial institutions and multinational investment firms. As such, they play a significant role in banking and financial services, as well as in facilitating capital flows and stock market transactions. They are generally the regional headquarters of multinational banks and companies. In doing so, they help to strengthen the region's economic integration.

4.2.1. Regional financial centres in Europe, the European Union and the euro area

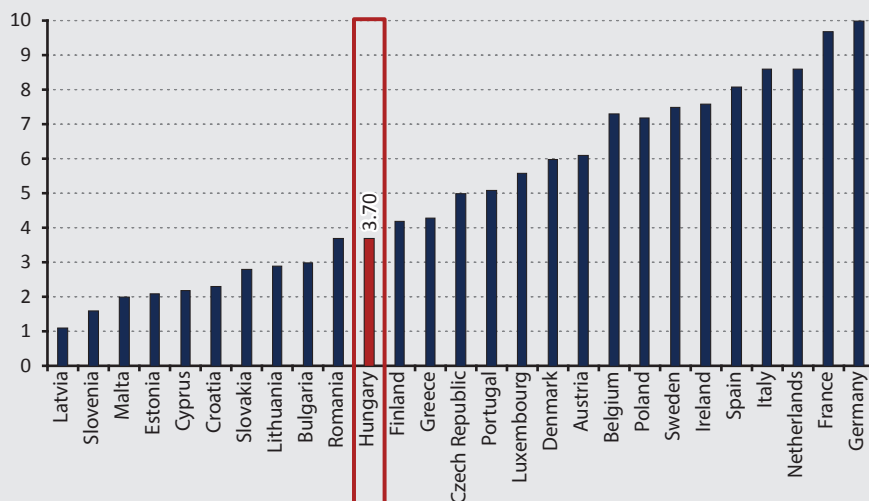
Several regional financial centres operate within the European Union (EU), play a key role in economic and financial development, and attract international financial services.

The *EU Financial Centres Power Index*, developed by Deloitte and Future Finance Poland, shows the efficiency and international financing rankings of these centres

by measuring not only economic performance but also financial influence and the ability to exert global influence. This offers a new approach: it is based on a transparent, data-driven methodology and compares financial centres based on measurable performance, taking into account the size of each country's financial sector, its prospects for economic financing and financial innovation, and its potential for internationalisation. The index measures the role of EU Member States in cross-border financing and capital allocation services, as well as in financial innovation. The 2025 power index is presented in *Figure 3*.

Figure 3

Power index of EU financial centres



Note: On this scale, 10 represents the best performance, whilst 1 represents the worst.

Source: Frankfurt Main Finance (2025:3)

Switzerland is not a member of the EU, but Zurich is one of Europe's most important financial centres. Against this background, it is worth noting that in 2025, to strengthen the EU's international position, the European Commission decided on a comprehensive package of measures aimed at deepening and broadening EU-Swiss relations. The package covers dynamic alignment with EU financial and state aid rules relating to transport and electricity, as well as Switzerland's permanent cohesion contribution (CHF 350 million per year until 2036).

There are variants of the above financial power index that take other factors into account, but the top five places are occupied by the countries mentioned in the index of new financial centres, while Poland is the largest financial centre in the Central European region.

The European financial centres are presented below, according to their role and their financial and capital market services:

- 1) *London*: After the 17th–18th century, London was the commercial and financial centre of the British Empire. The London Stock Exchange is one of the world's oldest stock exchanges. The renowned 'City' of London is the European or global headquarters of several major international banks and financial institutions, and one of the world's largest foreign exchange markets (forex) also operates in London. Although certain financial activities have been relocated to cities such as Frankfurt, Paris or Amsterdam as a result of the UK's withdrawal from the EU (Brexit), London remains one of Europe's largest financial centres.
- 2) *Frankfurt*: One of the euro area's most important financial centres and the headquarters of the European Central Bank and the European Systemic Risk Board (ESRB), it is home to the Frankfurt Main Finance international financial centre as well as numerous international banks and financial institutions. It is a major city for capital markets and financial regulation. It plays a key role in the euro area's financial system and occupies a central position in the European banking and financial infrastructure.
- 3) *Paris*: A major financial centre, particularly in the global capital markets. Two important institutions of the EU are located there: the European Banking Authority (EBA) and the European Securities and Markets Authority (ESMA). The hub for French stock exchanges (e.g. Euronext) and banks.
- 4) *Amsterdam*: A regional financial centre, particularly in the fields of fintech and banking services. The Amsterdam Stock Exchange is one of Europe's oldest stock exchanges. Following Brexit, Amsterdam has also taken over part of London's financial activities, thereby becoming a major player in European financial markets.
- 5) *Zurich*: One of the continent's most important financial centres, which also exerts a strong influence on the euro area's services.
- 6) *Dublin*: It is one of the EU's major technology and financial centres, attracting international companies and financial institutions, particularly through its favourable tax regime. As a result of Brexit, Dublin's role has also been strengthened, as numerous British financial institutions (investment funds, banking services, fintech operations) have relocated their activities there.

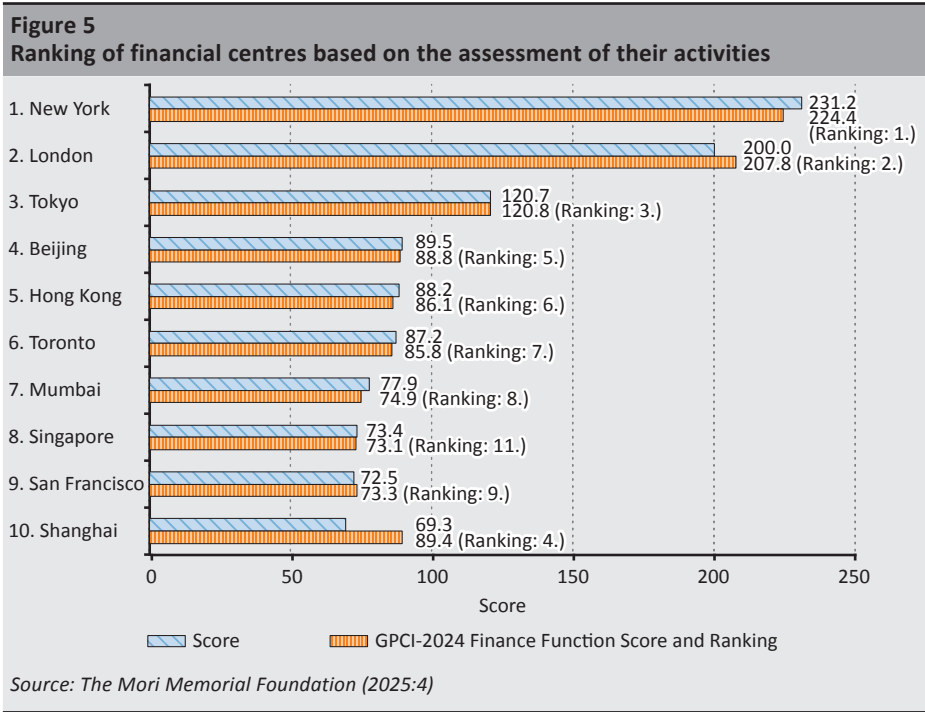
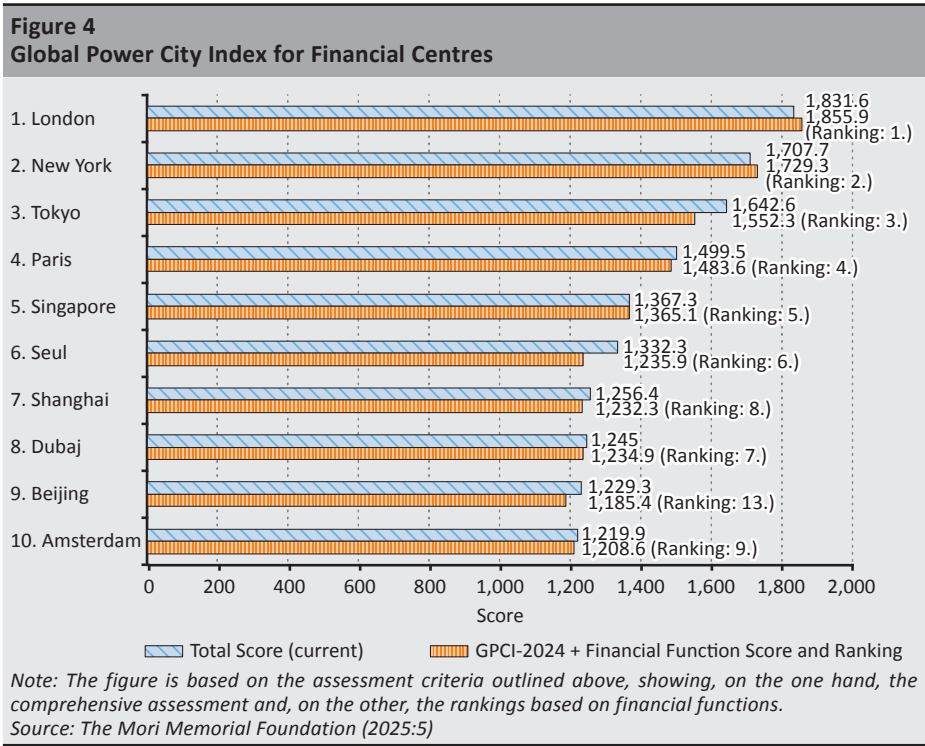
- 7) *Madrid*: One of the main financial centres in Spain, it is home to numerous multinational financial institutions and plays an important role in the Iberian market and in international financial relations.
- 8) *Milan*: An Italian financial centre where stock exchanges and banks operate. It is the venue for a number of international financial activities.
- 9) *Warsaw and Budapest*: Poland and Hungary are not members of the euro area, but they have extensive financial links within their region. For example, the regional headquarters of the internationally significant Bank of China is located in Budapest.

Financial centres of significant global importance operate in the North America and Latin America: among these, New York, Chicago, Toronto and São Paulo stand out. The major regional centres in the Middle East and Africa are Dubai, Abu Dhabi and Johannesburg.

4.3. City-based financial centres

These centres generally serve the financial system of a particular region or country. Primarily as the headquarters of a country's national banks and insurance companies, they manage the financing of domestic firms; they are usually located in the country's capital cities or economic centres, though the majority also play an influential role in international financial relations.

Within the global financial system, and to a considerable extent amid a changing world order marked by growing tensions, competition among city-based financial centres has intensified as they seek to strengthen their position and increase their international influence. These centres aim to achieve this goal by taking on new tasks and offering new types of services. Under these circumstances, it was necessary to revise the measurement criteria of the competitiveness indicator, the Global Power City Index – Financial Centers (GPCI–Financial Centers Index). The index was expanded to include the *financial* function, alongside its previous six assessment criteria (economy, research and development, cultural interaction, liveability, environment, and accessibility). This makes it possible to rank cities' characteristics, strengths and weaknesses as financial centres within the global financial system. Below, we present the rankings based on the comprehensive assessment and the measurement of financial functions (*Figures 4 and 5*).



The key strength of the new GPCI–Financial Centers Index is that it measures global urban competitiveness, together with the function of financial centres, as a complex power structure, thereby enabling the true control hubs of the global economy to be identified more accurately. Both types of measurement in the analysis place New York, London and Tokyo in the top three positions. In the ranking of financial activities, however, it is worth noting that Beijing occupies fourth place and Hong Kong fifth place, which clearly illustrates the extent to which the international financial role of China and the South-East Asian region has strengthened over the past decade (*Figure 5*).

Above we have presented the rankings of international financial centres based on assessments using various indicators, measurement and analytical methods. These are all significant for participants in the money and capital markets, international economic processes, the attractiveness of financial centres and their influence.

4.4. International financial centres in China and the ASEAN region

International financial centres in China and the ASEAN region play a fundamental role in the functioning of global capital markets, and their economic role is also significant. The Association of Southeast Asian Nations (ASEAN) is an intergovernmental organisation comprising eleven member states. It was founded in 1967 to promote economic, political, security and cultural cooperation in the region. With a population of over 700 million and covering an area of 4.5 million km², the association is a dynamically developing region which engages in dialogue not only with the states of the region but also with the wider international community. Its key partners include the Shanghai Cooperation Organisation, the United Nations and other international organisations. The founding member states were the Philippines, Indonesia, Malaysia, Singapore and Thailand.

In recent decades, China has become one of the most influential players in the international financial system, has integrated into the global financial network and plays a significant role in the financing of international infrastructure investments (*Drysdale et al. 2017*).

Shanghai and Hong Kong are prominent international players, but other major cities in the ASEAN region – such as Singapore, Seoul, and Jakarta – also play a key role in the global financial system. In the region, Beijing, Shenzhen and Hangzhou, as well as South Korea, Japan and India – are meeting the ever-increasing capital and financing needs of the new technology industry (*Horváth et al. 2022*).

As a result, the role of international financial centres has become increasingly important in China and the ASEAN region. Among these, we would highlight the following:

- 1) *Beijing*: The centre of the Chinese economy and financial decision-making. It is the venue for the formulation of state policies and guidelines, and Chinese stock exchanges (such as the Shanghai Stock Exchange) and financial institutions also have a strong presence here. Its role is more prominent in government and central bank decision-making than in market trading.
- 2) *Shanghai*: The most important international financial centre in China, home to global financial institutions such as the Shanghai Stock Exchange (SSE) and the Shanghai Futures Exchange. In recent years, the Chinese government has also taken several measures to strengthen Shanghai's role on the world stage, for example by establishing the *Shanghai Free Trade Zone*, which has enabled freer capital flows. In December 2025, in cooperation with the Chinese headquarters, the International Monetary Fund established its own Shanghai centre (IMF Shanghai Centre). The aim is to strengthen cooperation with the Asian and Pacific regions, to ensure that Asian perspectives are taken into account within the International Monetary Fund, and to collaborate with Asian economists, economic experts and academics.
- 3) *Hong Kong*: A special administrative region and one of the most important financial centres in Asia. The city is a hub for international banking, capital markets and insurance services, and serves as a key gateway to Chinese markets. The Hong Kong Stock Exchange (HKEX) is renowned worldwide and continues to play a dominant role in the Asian financial market.
- 4) *Seoul*: A major financial centre in South-East Asia. The city is home to the Korea Exchange (KRX), South Korea's stock exchange. Seoul is the region's economic powerhouse and is gradually becoming a key player in global financial markets.
- 5) *Singapore*: A key financial centre, building one of the most open and developed economies in the South-East Asian markets. It plays an important role in capital markets, banking, insurance and commercial services. Singapore is a hub for global capital flows and one of the region's leading fintech centres.
- 6) *Sydney*: The financial centre of Australia and Oceania.
- 7) *Bangkok*: Thailand's stock exchange, the Stock Exchange of Thailand (SET), is a key player in the financial markets of South-East Asia.
- 8) *Jakarta*: The Indonesia Stock Exchange (IDX) and the Bank of Indonesia also play key roles in the regional financial system.
- 9) *Manila*: The Philippine Stock Exchange (PSE) and the Banko Sentral Philipinas (the central bank) are based here.
- 10) *Kuala Lumpur*: Malaysia's financial centre, with strong banking and financial markets. The city functions as a hub for regional capital market services.

In the preceding sections, we have reviewed the three main types of international financial centres generally identified in the literature. However, these rankings do not include two financial centres of significance to the global economy: the World Alliance of International Financial Centers and the Asian Financial Cooperation Association (AFCA). We have already discussed the former above; below, we summarise the role of the AFCA, given its global and regional significance.

4.4.1. The Asian Financial Cooperation Association

This international financial cooperation organisation (Asian Financial Cooperation Association, AFCA) was established in 2017 with its headquarters in Beijing; the Hungarian Banking Association was one of the first founding members from Europe.

The organisation's establishment was linked to the strategic objectives of China's financial opening-up and the Belt and Road Initiative. AFCA aims to strengthen financial cooperation within Asia and beyond. Within this framework, its main tasks include facilitating cooperation between financial institutions, strengthening international and regional financial stability, supporting the financing of infrastructure and economic development, and organising research and professional forums. It already has more than 100 members, including commercial and development banks, insurance companies, and major national and international financial organisations. The organisation acts as a platform for banks, insurers, investment institutions and financial service providers; it was established to facilitate their activities through the International Financial Services Platform. AFCA strengthens China's financial influence in the region, supports cross-border financial cooperation and contributes to financial integration in Asia.

5. Relationships between the international financial centres, and the network of global and regional economic organisations

International financial centres are closely linked and interdependent with global and regional economic and trade centres, as well as with power blocs. Together, these form one of the most important spatial and institutional networks within the structure of the global economy. These relationships are also characterised by mutual interaction because, in the current multipolar, fragmented international financial system, global financial centres primarily reinforce the power bloc within their sphere of influence, while their connections in turn strengthen the operating conditions and efficiency of the financial centre itself.

Major financial centres – such as New York City, London, Hong Kong or Singapore – function as global financial hubs, supporting the world economy through the concentration of capital, the financing of investments, financial innovation and the coordination of international financial processes.

As mentioned above, financial centres are often linked to political and economic power blocs. For example, the European Union's and Europe's major financial centres are Frankfurt, Luxembourg, Zurich and Paris; those of the countries participating in the North American Free Trade Agreement (USMCA) are New York, Toronto and Chicago; whilst in the Association of Southeast Asian Nations (ASEAN) region, they are Singapore and Shanghai.

It can be concluded that economic and financial centres form a mutually reinforcing global network and are closely linked to regional and global power blocs.

In response to geopolitical tensions restricting international trade (sanctions, punitive tariffs, import restrictions), the key players in the current world order are seeking to expand their economic cooperation. The European Union is one example. In December 2024, the European Union and the countries of the Southern Common Market (Mercosur) — Argentina, Brazil, Paraguay and Uruguay — concluded a comprehensive trade and partnership agreement, which was signed on 17 January 2026, thereby creating one of the world's largest free trade areas and strengthening sustainable development and economic cooperation.²

In 2025, leaders from the EU and China held a summit in Beijing to mark the 50th anniversary of their diplomatic relations. No specific economic or trade agreement was concluded, but they reaffirmed their commitment to deepening their bilateral partnership, thereby enhancing the global strategic significance and impact of their relations.

In January 2026, the European Union and India concluded a landmark free trade agreement (FTA), which significantly reduces tariffs and opens markets to expand bilateral trade, encourage investment and strengthen technological cooperation.

As one of the key actors in the global order, China has developed close strategic, economic and trade cooperation with the BRICS and ASEAN³ countries over the past decade. These two groups now comprise 20 member countries, whose aim is to achieve sustainable economic growth and to counterbalance US dominance by reducing the role of the US dollar (de-dollarisation). *“Over the past 25 years, the proportion of dollar-denominated assets in the foreign exchange reserves of the world's central banks has gradually declined” (Naszódi 2025).* These cooperative arrangements between the EU and China, which have formed a geopolitical and

² A political agreement was reached on 6 December 2024, but the agreement was not signed until 17 January 2026, and its ratification may still take a long time. An important new development is that in September 2026 the EU invited Canada to become an associated member of the EU, the final approval is in progress.

³ BRICS countries: Brazil, Russia, the Republic of South Africa, India, China, Egypt, Iran, Ethiopia, the United Arab Emirates and Indonesia.

ASEAN (Association of Southeast Asian Nations): Together with East Timor, which joined in 2025, the members are: Brunei, the Philippines, Indonesia, Cambodia, Laos, Malaysia, Myanmar, Singapore, Thailand and Vietnam.

economic blocs, are closely linked to global financial centres and are key factors in the secure functioning of the international financial system.

6. Roles of international financial centres and the challenges they face

We have reviewed the network of international financial centres, which spans almost the entire world, recognising that they play a key role in the world economy and the global financial network (Cassis – Wójcik 2019). The Global Financial Network (GFN) of international financial centres is a worldwide interconnected system of banks, financial institutions, markets, governments and international organisations that facilitates the flow of money, credit, investment and financial information between countries.

Over the past decade, the previous multipolar world order has undergone significant transformation, and international political, economic and financial relations have changed and been restructured. The new multipolar world has entered an era in which US dominance has waned, and the world has split into three blocs defined by the US, the European Union, and China and the South-East Asian region. India has been aligning more closely with these blocs in recent years. This established order was unexpectedly and adversely affected in 2022 by the Russia–Ukraine conflict, and in 2023 by the outbreak of the war in the Middle East, followed by the closure of the Strait of Hormuz, which both strengthened and, to some extent, undermined the international financial system; the outcome and impact of these events cannot yet be assessed.

International financial centres must operate within this global power dynamic environment and define their roles and objectives accordingly. *“International financial centres are not state actors, nor are their members. However, the full financial weight of a country’s savings and investment system is a fundamental element of governmental sovereignty”* (Biedermann 2026:1). There are, however, exceptions in some financial centres, where regulation and development are the responsibility of the central authority. An example of this is Singapore, where the Monetary Authority of Singapore (which also serves as the central bank) plays a leading role and sets the operational framework. The presence of these centres and their transnational links are therefore fundamental for the country and its society.

Their primary goal is to strengthen international cooperation, financial links and stability. At the same time, competition between individual centres is inevitable, as their task is to ensure the financial autonomy and stability of their own power base and to strive for independence. This competition has beneficial effects, as it stimulates regulatory and technological innovation, improves service quality and may reduce transaction costs.

In this competition, financial centres seek to increase their weight and influence within the power blocs underpinning their operations. In recent decades, power blocs have relied on regional economic and trade alliances, which financial centres seek to draw into their sphere of influence or even render financially dependent. The multipolar world order represents not only a challenge to power for international financial centres, but also a compulsion to cooperate, thereby strengthening the role of regional integration.

Regional economic organisations and blocs play a significant role in establishing financial centres and in adapting existing centres' strategies. Competition between financial centres is particularly intense amongst regional centres seeking to occupy a leading position.

6.1. The most important functions of financial centres

- 1) *Cooperation and alliances*: There are numerous forms of cooperation and alliances amongst financial centres, driven by their objective of facilitating and supporting the development of international economic and trade relations, as well as the functioning of financial, capital and investment markets. One common feature of the organisation of financial centres is that they aim to operate forums where the interests of the public and private sectors can converge, thereby facilitating developments that improve the business environment and stimulate innovation.
- 2) Cooperation between financial centres is key to *sustainable economic growth*, thereby providing a framework for cross-border corporate financing and the creation of investment markets that encourage infrastructure investment and entrepreneurial endeavours. ESG requirements are a key element of the sustainability transition and the promotion of green finance.
- 3) *Digital technological transformation* poses a challenge for international financial centres. The digital era of the Fourth Industrial Revolution – and, as part of this, fintech, big tech and blockchain technologies – has fundamentally transformed financial services.

Adapting to digital challenges, the potential for and process of introducing central bank digital currencies (CBDCs) will become a tool in the competition between power blocs, which directly affects their financial centres. From this perspective, we review the position of the three leading power blocs, emphasising that the status of their currencies is decisive in global trade.

Preparations for the introduction of CBDCs began at the start of the decade in the centres of the top three currencies by global weight. According to IMF-COFER data from March 2026, the US dollar accounts for 56.77 per cent of foreign exchange reserves, the euro for 20.25 per cent and the Chinese renminbi for 1.95 per cent.

The combined share of the Japanese yen, the British pound, the Australian dollar, the Canadian dollar and the Swiss franc stood at 15.18 per cent at the end of 2025.

Preparations for the introduction of the digital dollar began in 2020–2021, but in January 2025, the President halted the rollout of the digital dollar by executive order.

In early 2020, the European Commission began preparing to introduce the digital euro by launching consultations on the Digital Finance Strategy and the Retail Payments Strategy. Subsequently, the Council of the EU formally launched the EU's digital transformation process, which includes introducing the digital euro. The ECB completed the preparatory phase for the digital euro at the end of 2025. According to current plans, the EU will develop the legal framework for implementation in 2026, test feasibility in 2027 (pilot test) and introduce it in 2029.

China is a frontrunner in the early implementation of digital central bank money, the digital renminbi. The Chinese digital yuan, officially known as the e-CNY (electronic Chinese yuan), is not only in the trial phase but is already in practical use. Pilot programmes began in 2019, and the digital yuan is now available in dozens of cities and provinces. Its infrastructure is also becoming increasingly sophisticated: China has established an international e-CNY hub in Shanghai to strengthen cross-border applications, as well as another control centre in Beijing. On 1 January 2026, a new phase of development commenced, with the new system increasingly integrating the digital yuan into the traditional financial system, thereby transforming it into a 'digital deposit'.

The era of digital development characterised by digital central bank money had not yet come to a close when artificial intelligence (AI) emerged on the global stage, triggering a need for adaptation, development and regulation within the financial system (and particularly for financial centres), whilst also exerting a significant influence on international competition (*Frost et al. 2026*).

4) Regulation: In a changing world order, the balance of power is shifting; mounting competition and geopolitical risks are having an adverse effect on the functioning of the international financial system. However, sustainable economic growth requires mitigating these adverse effects and ensuring the unhindered flow of international financing and capital. International financial centres and their associations often serve as bridges between financial actors, central banks and regulators, showcasing best international practices and providing a meeting point for regulators and financial institutions. Financial centres may provide regulators assistance and information on financial fraud, money-laundering attempts and transactions that raise suspicions of terrorist financing, thereby helping to strengthen confidence in the financial system and its reliability. It is important

for regulators to have a better understanding of digital services and the financing needs of sustainability, to which financial centres may contribute by identifying international market opportunities and risks. Continuous communication between regulators and the financial sector is crucial, and cooperation between financial centres and their organisations may help to facilitate this.

The lessons learned from the 2008 international financial crisis show that the reforms of that time, the amended financial regulations, have indeed made the global financial system safer and more resilient. In the current uncertain and unpredictable geopolitical situation, it would be necessary to modernise and simplify regulatory frameworks to maintain stability and resilience. The analyses and global information of international financial centres can assist regulators in managing emerging sources of risk and improving the flexibility of the financial systems.

Financial centres are important partners for the European Union in the areas of financial regulation and stability. The EU Roundtable of Financial Centres was established to bring together the major European financial centres with a view to strengthening the EU's financial ecosystem, competitiveness and regulatory harmonisation.

In parallel, the European Financial Roundtable Platform operates within the EU. This is an advisory body where leaders of the European financial sector – including banks, investment funds and insurers – as well as representatives of the EU institutions meet regularly. These forums provide an opportunity to review the challenges facing the financial sector at the European level, to facilitate regulatory harmonisation and to offer strategic guidance.

6.2. Challenges

For international financial centres, the tasks listed above also present a challenge. In a world order marked by shifting geopolitical tensions and the threat of war, the conflicts in Russia and Ukraine and the Middle East are causing uncertainty in the financial markets. As a result, financial transactions may slow down or come to a halt, investment decisions may be postponed and a temporary withdrawal of capital may also begin. Trade conflicts, punitive tariffs and sanctions sever many banking and financial links, leading to fragmentation of the financial system and a loss of confidence in it. Financial centres not only react to wars, but also, to some extent, may have a significant impact on the financing opportunities of the parties involved in the war.

Wars affect financial centres in several ways. To summarise a few factors: energy market shocks, inflationary uncertainty, volatility in the equity and bond markets, damage to funding markets and increased security risks for key regional centres (Dubai, Istanbul, Abu Dhabi).

Conversely, financial centres can also influence, and do influence, wars, primarily through their funding requirements and the establishment of their financing capacity. Financial centres can therefore finance, stabilise or even sanction war-making systems.

7. Summary and conclusions

In a changing, unpredictable and tension-filled global order, international financial organisations and the Global Financial Network (GFN) encompassing these organisations play an increasingly important role in ensuring sustainable economic growth and stability. Together, these form a globally interconnected system comprising banks, financial institutions, markets, governments and international organisations. Our analysis provides a comprehensive overview of the current full range of financial centres. There are three main types of these centres: global, regional and city-based centres. Their ranking is assessed on the basis of their efficiency, global or regional influence and attractiveness, using various indices and metrics from international analysis centres. We have reviewed these rankings, taking into account the dynamic and spatial changes triggered by geopolitical tensions.

International financial centres are economic hubs where financial services – such as the banking system, capital markets, insurance and investment management – are highly concentrated. The operation of financial centres is closely linked to global geopolitical developments. The world's three main economic poles – the United States, the European Union and China, plus the South-East Asian region – generate fierce competition amongst financial centres. This competition drives innovation and enhances the efficiency of financial services, whilst also creating a need for cooperation to maintain financial stability. Global and regional economic and trade centres, power blocs and international financial centres are closely linked through mutual interdependence. We have reviewed their key tasks in the areas of strengthening international cooperation, establishing alliances, promoting sustainable economic growth, digital transformation and international regulation. War-related tensions are affecting financial centres; these centres not only react to these tensions but also, through their resources and influence, may have a significant impact on the financing opportunities of the parties involved in the war.

Looking to the future, these centres collectively form one of the most important spatial and institutional networks within the structure of the global economy. This clustering of financial services into such groups fosters innovation, cooperation between financial centres and the sustainable growth of the global economy.

Financial centres and their associations play a key role in fostering connections, coordinating tasks, bridging differences and sharing best practices, so that the development of the financial system can meet the needs of society and serve its best interests.

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Author contributions

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Data Availability

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Clarifying the Conceptual Framework of Sustainable Finance and Periodising Research in the Field*

Balázs Sárvári  – Izabella Kuncz  – Petra Németh 

The topic of sustainable finance has become a rapidly developing field of research in recent decades, positioned at the intersection of market, regulatory and academic perspectives. In this article, we review the conceptual frameworks and the historical development of the literature. On the one hand, we systematise the key concepts (namely environmental, carbon, climate, green and sustainable finance), highlighting their overlaps and hierarchical relationships. On the other hand, we propose a periodisation approach that distinguishes three main phases: the forerunners of sustainable finance research (from the 1970s to 2010), early research (2010–2021), and the era of mature research (from 2021 onwards) – all broken down into sub-periods and aligned with landmark international developments. The conclusions highlight the interactions between market innovations, policy decisions and scientific research, as well as the temporal shifts between them. With this article, we aim to contribute to conceptual clarification and to lay the foundations for future research directions.

1. Introduction

The topic of sustainable finance has become one of the most dynamically developing areas of economic and financial thought over the past two decades. The economic impacts of climate change, the rise in physical and transitional risks, and new challenges to the stability of the financial system have collectively contributed to making the integration of environmental and sustainability considerations into financial decision-making a priority at both the academic and policy levels. This rapid development, however, has been accompanied by considerable conceptual diversity, which continues to shape the discourse within the field to this day. Our article is based on a corpus comprising 4,436 academic publications, covering the literature from 2001 to 2024 as indexed in Scopus and the Web of Science

* The papers in this issue contain the views of the authors which are not necessarily the same as the official views of the Magyar Nemzeti Bank.

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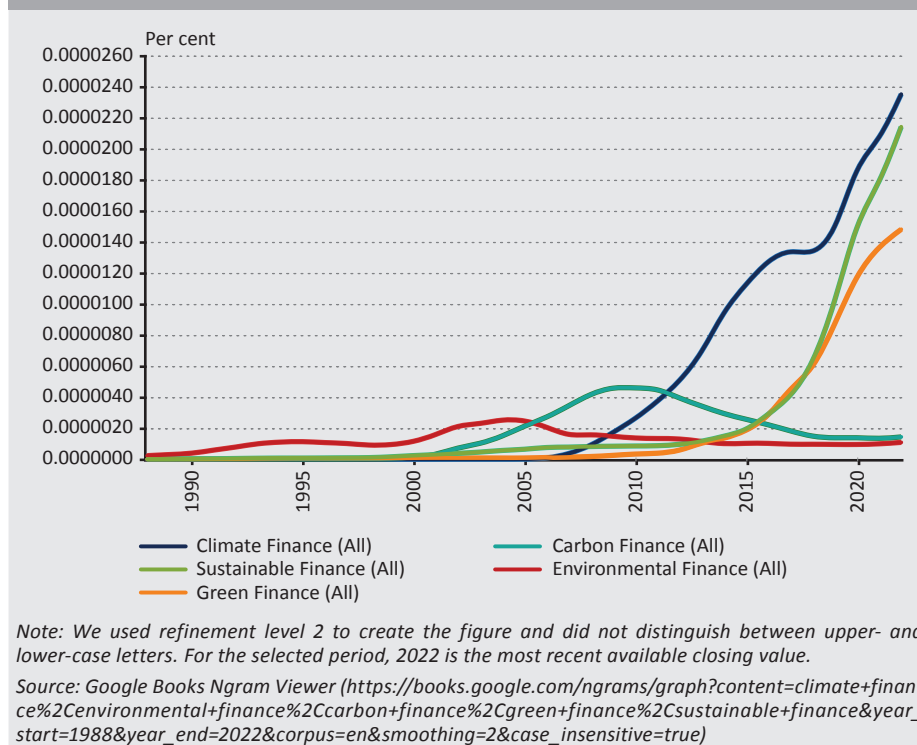
(see Sárvári 2024; Sárvári et al. 2026). This article presents the concepts in detail, clarifies their interrelationships, compares the main bibliometric analyses and briefly summarises the periodisation already outlined in the previous analysis.

2. The conceptual framework of sustainable finance

One of the most striking features of the literature on sustainable finance is the coexistence of various concepts that partially overlap. This is the result, on the one hand, of the fact that research topics have changed frequently over a short period of time, and, on the other hand, of the fact that researchers have approached environmental and economic phenomena through the lens of their own taxonomies.

While *Figure 1* illustrates this conceptual diversity, it also demonstrates the fact that distinct periods can be identified for each concept. The starting date of the graph is 1988, the year the Intergovernmental Panel on Climate Change (IPCC) was established, whilst the end date is the most recent year available on the platform. It is important to note that this Figure reflects the content of books analysed by Google Ngram, rather than that of scientific journal articles.

Figure 1
The rise of various terms based on Google Ngram between 1988 and 2022



According to *Figure 1*, the term *environmental finance* was the first to gain prominence in books (1987–2001), followed by the emergence of the term *carbon finance* as the dominant designation. The term *climate finance* began to spread rapidly after 2006, and at the same time, the *carbon finance* concept also declined in significance and frequency. The terms *green finance* and *sustainable finance* became significantly more common after 2015. Given their significance, it became clear after 2020 that the term *sustainable finance* was emerging as a central concept. Meanwhile, use of the term *climate finance* continued to gain prominence and retained its dominant role in the literature throughout this period.

The classification of these concepts is justified on two grounds: one is the conceptual hierarchy (which concept is a subset of the other), and the other is the period-based classification (which periods the various conceptual frameworks were characteristic of). The former is covered in this section, whilst the latter is discussed in *Section 4*.

Few studies have undertaken a comprehensive attempt to define the concepts or to determine their relationships to one another. *Table 1* presents a comparison of three of these few examples. *Bhatnagar – Sharma (2022)* only carried out a conceptual comparison, but did not construct a conceptual hierarchy; therefore, the table follows the order of the conceptual hierarchies in the other two studies, and uses merged cells to represent categories that did not appear as separate entries in the study in question.

Table 1			
Comparison of the interpretation of sustainable finance concepts in the literature			
	<i>Bhatnagar – Sharma (2022)</i>	<i>Singhania et al. (2024)</i>	<i>Sárvári et al. (2026)</i>
Carbon finance	Mitigation of greenhouse gas emissions		
Climate finance	Mitigation activities and climate change adaptation		
Green finance	Renewable energy, green investments, environmentally friendly infrastructure	The concept of climate finance is expanded to include further environmental objectives	Integration of further environmental considerations (pollution prevention, biodiversity, resource efficiency)
Environmental finance	Addressing the negative impacts of environmental damage		A broader ecological approach; challenges the primacy of economic growth
SDG* finance	Socially, economically and environmentally inclusive development	The concept of green/ environmental finance is complemented by non-environmental SDGs	The concept of environmental finance is complemented by the social and corporate governance dimensions of ESG
Sustainable finance		SDG finance is supplemented by the governance dimension of ESG	
Note: * Sustainable Development Goals (SDGs).			

The concept of environmental finance also demonstrates that, in the literature, financial concepts relating to environmental sustainability form interrelated categories that partly overlap, whilst their meanings are not uniform. Some interpretations use it as a synonym for green finance (IFC 2016), whilst other approaches regard it as a broader category that also encompasses “finance and investment regarding the ecological environment (Air, water, soil, etc.)” (Noh 2018:4). The term originally referred to the financial applications of environmental economics; however, it was later narrowed to focus more on the impact of environmental costs and environmental risks on financial decisions (Cowan 1998; Linnenluecke et al. 2016; Németh-Durkó 2020).

The narrowest category is carbon finance, which focuses on financial mechanisms linked to the mitigation of greenhouse gas emissions. According to the World Bank’s definition, carbon finance “is a generic term used for the revenue streams that can be generated by low-carbon projects and activities from sale of their global greenhouse gas (GHG) emission reductions by sources, or GHG emission removals by sinks, or from trading in carbon credits” (World Bank 2018:xiii). Essentially, all financial measures necessary to combat greenhouse gases fall under this category (including the Clean Development Mechanism) (Lewis 2010; Mohsin et al. 2020). Mosharrafa and Mahmuda (2014) define carbon finance as a subset of environmental finance.

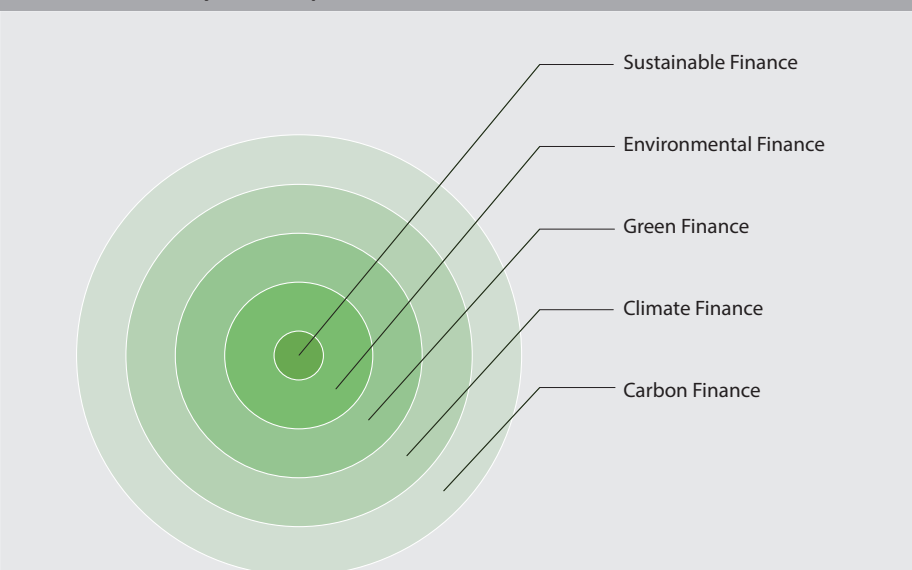
This focus is broadened by the concept of climate finance, which, in addition to mitigation actions, now also encompasses climate change adaptation (Hong et al. 2020; Zadek 2011). According to the United Nations Framework Convention on Climate Change (UNFCCC), “Climate finance aims at reducing emissions and enhancing sinks of greenhouse gases and aims at reducing vulnerability, and maintaining and increasing the resilience of human and ecological systems to negative climate change impacts” (UNFCCC 2018:25). The United Nations Environment Programme (UNEP) treats this as a sub-category of green finance (UNEP 2015).

Green finance has become a key concept since the 2010s and represents a broader approach than previous forms of targeted financing. It is aimed not only at supporting individual projects, but also at transforming the financial system as a whole from an environmental perspective, and in particular at supporting the transition towards a low-carbon and resource-efficient economy (Soundarrajan – Vivek 2016). This includes the financing of climate and environmental projects and the “greening” of resource flows; however, social sustainability goals do not yet form part of the concept (Rashid – Uddin 2019; Lindenberg 2014).

The broadest category within this conceptual framework is the concept of sustainable finance, which, in addition to environmental considerations, also integrates social and governance dimensions (ESG) and is linked to the more comprehensive framework of the SDGs (Lindenberg 2014; Singhania et al. 2024; European Commission 2025). Sustainable finance can thus be understood as a comprehensive framework that does not replace earlier concepts, but rather encompasses them as interrelated sub-categories.

This conceptual diversity is not merely a question of terminology, but also reflects differences in research focus, methodologies and policy objectives. As discussed above, we followed the order of Figure 1, but the hierarchy of the conceptual framework (Figure 2) shows that *carbon finance* is the narrowest concept, relating specifically only to the mitigation of greenhouse gas emissions, which *climate finance* extends to include adaptation. The concept of *green finance* integrates additional environmental considerations (e.g. pollution prevention and the conservation of biodiversity) into the remit of the financial system, whilst the concept of *environmental finance* – which is sometimes used synonymously with it – questions the primacy of economic growth. The term *sustainable finance*, however, also encompasses social and governance considerations. The current discourse on sustainable finance seeks to harmonise these different approaches; henceforth, we regard all the previous terms as part of this concept.

Figure 2
Thematic hierarchy of concepts



Note: Umbrella terms at a higher level are denoted by a darker shade.

The term “sustainable finance” is an umbrella term encompassing all the concepts listed above. The various terms cover, in part, different subject areas. Following this overview of the conceptual development of the term, we first present the most important bibliometric analyses below.

3. Background to bibliometric analysis of sustainable finance research

In recent years, the bibliometric analysis of sustainable finance has become a distinct research field, the aim of which is to map the development of the academic discourse, its main themes and key publications. Based on a review of the literature, previous bibliometric studies can be categorised into four main groups: analyses focusing on green finance; climate finance and ESG-oriented studies; works analysing the relationship between the financial system and sustainability; and general bibliometric reviews of sustainable finance. (The *Appendix* provides a comprehensive overview of the bibliometric analyses presented below.)

The first group comprises studies that specifically examine the development of green finance. This includes *Bhatnagar and Sharma (2022)*, who analysed research trends and the financing of renewable energy based on 666 Scopus publications, identifying green bonds and regulatory incentives as key themes. A similar approach is taken by *Debrah et al. (2022)*, who highlighted the growth in research and the role of sustainable investment mechanisms. *Muchiri et al. (2022)* also mapped out trends in development, whilst *Desalegn and Tangl (2022)* focused on the relationship between green finance and economic development. These studies identify important thematic clusters; however, their analysis is typically based on a single database and a relatively limited number of publications.

The second group comprises a bibliometric mapping of climate finance and ESG-oriented research. *Carè and Weber (2023)* examined the structure of the climate finance literature and highlighted research trends in mitigation actions and climate change adaptation. *Kouwenberg and Zheng (2023)* analysed the global development and geographical distribution of climate finance based on 1,347 publications, emphasising the growing role of renewable energy financing. *Kashi and Shah (2023)* mapped the ESG-oriented literature on sustainable finance, highlighting the relationships between banking performance, sustainability indicators and ESG criteria. *Khan et al. (2024)* and *Naeem et al. (2023)* analysed the bibliometric patterns of sustainable investments and ESG-based portfolios. These studies already adopted a broader perspective, but their time frames typically end around 2021.

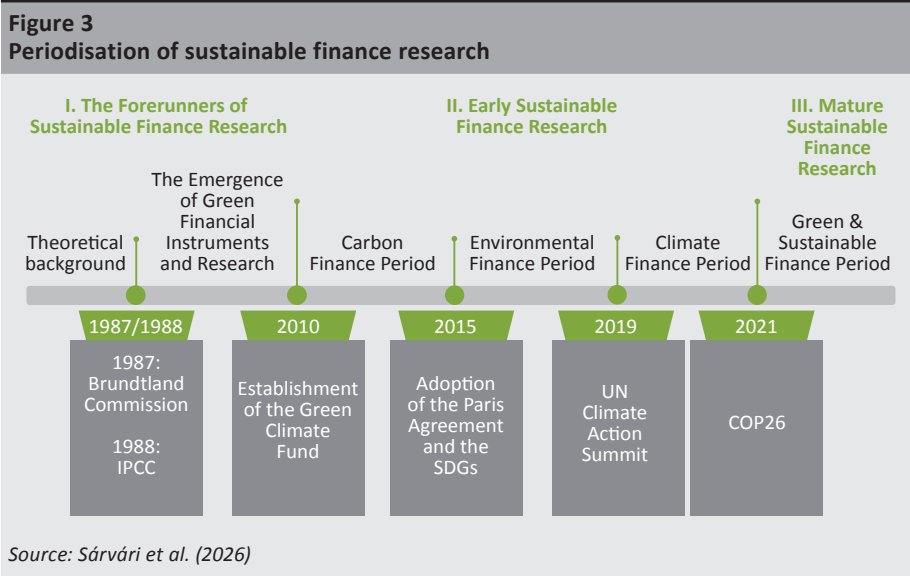
The third group comprises studies that analyse the relationship between the financial system and sustainability using bibliometric tools. *Linnenluecke et al. (2020)* explored the relationship between climate risks and financial stability, whilst *Kumar et al. (2022)* and *Luo et al. (2022)* examined the links between financial markets and sustainability risks. *Tao et al. (2022)*, *Yu et al. (2021)* and *Zhang et al. (2019)* published further analyses on the development of a sustainable financial system, with particular regard to the growing role of sustainable investments and financial innovations. These studies reveal important connections, but do not aim to provide an integrated overview of the entire literature on sustainable finance. The study by *Sárvári et al. (2026)*, which uses a corpus comprising 4,436 publications, also falls into this category. Based on a combined analysis of the Web of Science and Scopus databases, this corpus is significantly larger than that of the other analyses cited here. The study covers the period from 2001 to 2024, which allows for the inclusion of the latest trends in sustainable finance. The start of this period is more recent than in some other analyses because the authors did not thematically classify older studies, which other authors had categorised as sustainable finance, into this group. The study provides a systematic overview of developments in this field through a combined analysis of publication trends, co-citation networks, keyword mapping and geographical distribution.

The fourth group comprises general bibliometric reviews of sustainable finance. *Cai and Guo (2021)* presented a scientometric analysis of research trends in environmental finance, whilst *Cunha et al. (2021)* examined the development of sustainable financial instruments. *Akomea-Frimpong et al. (2022)* analysed the literature on green finance in banking, highlighting the role of regulatory and institutional factors. *Singhanian et al. (2024)* and other studies reviewed the growth of the sustainable finance literature and its key players. Whilst these studies provide a more comprehensive picture, they typically examine between 50 and 1,300 publications and, in most cases, rely on a single database.

Following this review of bibliometric analyses, we summarise below the sub-themes typically examined in academic research and how these aligned to major policy decisions and institutional changes over time. We associate the concepts presented in *Section 2* with the periodisation of this developmental trajectory.

4. Eras of research into sustainable finance

Based on the above conceptual distinction and landmark international decisions, Sárvári *et al.* (2026) proposed a periodisation of research into sustainable finance, as illustrated in Figure 3. Periodising this field of study is not merely a historical exercise: it helps to explain how market innovations, regulatory turning points and academic interest interact with one another at different speeds and at different points in time. This segmentation also highlights that the scientific literature often reacts belatedly to regulatory and market influences (Cziráki *et al.* 2024; Vancsura – Bareith 2025). Periodisation is particularly justified in a field where concepts are diverse, institutional changes are rapid, and where academic discourse is closely intertwined with policy and regulatory developments. The names of the three main periods reflect the extent to which the research characteristic of each period reflects a comprehensive, system-level approach to sustainable finance, as currently understood.



The era of the pioneers of sustainable finance research spans from the 1970s to 2010. The turning point was the publication of the Brundtland Commission's report (1987) and the establishment of the Intergovernmental Panel on Climate Change (IPCC) in 1988. Alongside the *UNFCCC* (1992) and the 1997 Kyoto Protocol,¹ these examples also illustrate that the emergence of normative and institutional

¹ <https://unfccc.int/process-and-meetings/the-kyoto-protocol>

frameworks preceded innovation in market-based instruments. During this period, financial economics did not fundamentally consider the environmental dimension as part of its field, and addressing environmental problems was primarily regarded as the responsibility of government regulation and environmental economics. Towards the end of this period, the first green bonds were issued (by the European Investment Bank² in 2007 and the World Bank in 2008), representing a qualitative innovation in the financial instruments market. At the same time, researchers also began to pay increasing attention to the subject, however, the literature at this stage was predominantly characterised by qualitative, conceptual, and framework-oriented contributions.

Early research into sustainable finance covers a shorter period (2010–2021), but due to the rapid development of the field, it can be divided into three distinct phases: carbon finance (2010–2012), environmental finance (2015–2019) and climate finance (2019–2021). In the first period, which began with the establishment of the Green Climate Fund, the focus was primarily on investor behaviour and risk-return relationships (e.g. weather derivatives). Following the Paris Agreement, during the environmental finance phase, both market and regulatory interest in the topic grew significantly (e.g. reporting procedures were developed; in 2016, Poland issued its first sovereign green bond, and in 2019, Italy issued its first sustainability-linked bond). Towards the end of this era, following the 2019 UN Climate Summit, key milestones in the climate finance period included the EU Taxonomy (from 2020) and preparations for COP26.³ Research focused on the fields of CSR,⁴ ESG and risk management, as well as the related impacts of the COVID-19 pandemic; the number of publications rose rapidly, and interdisciplinary approaches became increasingly common (*Benedek 2021; Bozsik et al. 2024; Sárvári 2021; Zöldy et al. 2022*).

Since 2021, mature research into sustainable finance has been closely linked to the issue of financial stability, as well as to the central bank and the prudential regulatory discourse (*Bethlendi – Holczinger 2026; Gafoor et al. 2025*). The measurability of climate risks, their stress testing and their integration into capital requirements have become central themes. Key considerations now include the adaptability of the financial intermediary system and the financing of the green transition. Bibliometric patterns indicate that the themes of publications have become more focused (e.g. analysis of product markets, the validity of ESG methodologies, climate risk stress tests and reporting standards, as well as the risk of greenwashing), whilst the methodology and empirical grounding have become more sophisticated (*Szendrey – Dombi 2024*). Meanwhile, earlier, primarily climate-

² EIB CAB: European Investment Bank Climate Awareness Bond.

³ COP26 was the 26th United Nations Climate Change Conference.

⁴ Corporate Social Responsibility (CSR).

centred interpretations are complemented by a new approach that focuses on the living world as a whole (Bhatnagar – Sharma 2022; Carè – Weber 2023; Kiss et al. 2025; Muchiri et al. 2022; Putzer – Posza 2026; Zhang et al. 2019).

5. Summary and directions for future research

Following a detailed conceptual presentation and a bibliometric comparative analysis, we have described the conceptual development as a gradual expansion of content leading from carbon finance to sustainable finance. Within this, carbon finance represents the narrowest category, as it focuses primarily on the mitigation of greenhouse gas emissions. The concept of climate finance is broader: it also encompasses the financing of climate change adaptation. Green finance integrates further environmental objectives into the financial system, such as the prevention of pollution and the conservation of biodiversity. Environmental finance represents an even broader ecological perspective and places greater emphasis on challenging the primacy of economic growth. Sustainable finance brings all these elements together and extends them to social and governance aspects, as well as to all sustainable development goals.

This periodisation highlights how research into sustainable finance was initially marginal, then rapidly expanded, and eventually became an established academic discipline. The development of research into this subject area has not been linear, but rather a process closely intertwined with global economic, political and environmental changes. Clarifying conceptual frameworks and distinguishing between different periods helps to make the field's findings comparable and more easily interpreted. The widespread adoption of comparable, auditable indicators and open, documented methodologies is a prerequisite for direct use in policy-making and supervision. A key challenge is the under-representation of developing countries in the sustainable finance discourse (across market, policy and academic spheres), which may distort the picture of global impacts. The prudential management of climate risks is of paramount importance for future research, as are the real-economy impacts of sustainable financial instruments and the role of central banks in supporting the green transition.

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The authors have no competing interests to declare that are relevant to the content of this article.

Author contributions

Conceptualization: B.S.; Methodology: B.S., I.K., P.N.; Software: I.K., P.N.; Validation: B.S.; Formal analysis: B.S., I.K., P.N.; Investigation: B.S., I.K., P.N.; Resources: I.K., P.N.; Data Curation: I.K., P.N.; Writing – Original Draft: B.S., I.K., P.N.; Writing – Review & Editing: B.S.; Visualisation: B.S., I.K., P.N.; Supervision: B.S.; Project administration: B.S. All authors have read and agreed to the published version of the manuscript.

Data Availability

Data sharing is not applicable to this article as no new datasets were generated or analysed during the current study.

Ethical Approval

Not applicable. This study did not involve human participants or sensitive personal data requiring institutional ethical approval.

Use of AI Tools

The authors did not use any generative AI tools in the creation of this manuscript.

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Appendix

Overview of bibliometric background

Authors	Year	Corpus (number of studies)	Data source	Time frame of the corpus	Areas of focus, results
<i>Akomea-Frimpong et al.</i>	2022	46	Scopus	1990–2019	Applies content analysis to evaluate key journals, authors, countries and institutions, examine research methods, identify relevant topics, and highlight research gaps and future directions.
<i>Bhatnagar – Sharma</i>	2022	666	Scopus	1997–2021	Describes publication trends and sources, authors' data and subject areas, conducts a thematic analysis, and presents co-citations and bibliographic links.
<i>Cai – Guo</i>	2021	172	Scopus	2005–2020	Provides a comprehensive overview of publications, the most productive regions and countries, the universities and institutes with the most publications, as well as the most prestigious journals, the most prolific authors, the most frequently cited publications, the co-occurrence of authors' keywords, and also includes a thematic map.
<i>Carè – Weber</i>	2023	315	Scopus	2001–2021	Describes and analyses the most important areas and development trends in climate finance research (with a performance analysis and a scientific map), and identifies research gaps in the climate finance literature.
<i>Cunha et al.</i>	2021	166	Web of Science, Scopus	1952–2020	Identifies the terms most frequently used in each period and the concepts associated with them. Summarises the main actors, their characteristics and motivations, as well as the key research questions, and describes the methodological features.
<i>Debrah et al.</i>	2022	995	Web of Science, Scopus, ScienceDirect, Google Scholar	1989–2021	Their findings reveal six main areas of research focus and, based on research gaps, propose 29 future research directions. They also provide an insight into the most important applications.

Authors	Year	Corpus (number of studies)	Data source	Time frame of the corpus	Areas of focus, results
<i>Desalegn – Tangl</i>	2022	146	Web of Science, Scopus	2015–2022	Analyses green finance instruments and metrics, highlights general research trends and presents the most influential authors, countries, publishers and journals. Critically analyses the corpus and highlights regulatory issues.
<i>Kashi – Shah</i>	2023	723	Scopus	2001–2021	Conducts a bibliometric performance analysis and applies content analysis. Describes trends in the literature on sustainable finance and possible directions for future research. Identifies the most important research topics and conducts a bibliometric network analysis.
<i>Khan et al.</i>	2024	507	Scopus	2013–2023	Presents a critical review, describing the current state of research, the key contributors, the topics and possible future research.
<i>Kouwenberg – Zheng</i>	2023	1,347	Scopus	1991–2021	Lists the most influential publications, authors and journals in the field, presents the geographical distribution of published studies, conducts a co-citation analysis, and summarises the topics and methods of the most frequently cited articles. Also identifies influential authors and sub-fields within climate finance literature.
<i>Kumar et al.</i>	2022	936	Scopus	1986–2020	Lists the most impactful studies, as well as the most significant journals, authors, institutions and countries. Also summarises the methodologies used in sustainable finance research and outlines the context of such research. Sets out a number of recommendations for the future.
<i>Linnenluecke et al.</i>	2020	1,338	Scopus, journal websites	2015–2022	Lists the most cited studies and models the main research directions, whilst providing citation statistics. Also identifies emerging research trends and topics.
<i>Luo et al.</i>	2022	3,786	Web of Science	2000–2021	Summarises the co-occurrence of scientific fields, publication characteristics, collaborations, influences, co-occurrence of keywords, shared citations and structural variation.

Authors	Year	Corpus (number of studies)	Data source	Time frame of the corpus	Areas of focus, results
<i>Muchiri et al.</i>	2022	321	Web of Science	2015–2022	Provides an overview of green finance following the Paris Agreement, highlights annual research outputs and presents a variety of analyses (3-field diagram, co-citation, co-occurrence).
<i>Naeem et al.</i>	2023	1,413	Scopus	1990–2021	Presents research findings, identifies the most prolific authors, the most influential documents and sources, the most significant institutional affiliations and countries, provides a co-citation analysis and identifies trends within sustainable finance.
<i>Sárvári et al.</i>	2026	4,436	Web of Science, Scopus	2001–2024	Provides an integrated overview of the development of sustainable finance research, identifies its key historical phases and outlines possible future directions. The study combines an analysis of publication trends, shared citation networks, keyword mapping and geographical distribution to capture the structure of the literature. Systematises the development of the field, highlights influential authors and journals, and identifies emerging and under-explored areas of research.
<i>Singhania et al.</i>	2024	1,269	Web of Science, Scopus	1984–2021	Summarises publication trends, presents co-authorship networks, leading research topics, the most significant journals, countries and institutions, and also includes keyword and cluster analysis. Furthermore, the study outlines key themes and indicates future research directions.
<i>Tao et al.</i>	2022	892	Web of Science	1971–2020	Identifies the main research directions and presents the most popular research topics. Also outlines areas of research, presents a review of the literature and highlights emerging research topics.
<i>Yu et al.</i>	2021	888	Web of Science	1989–2020	Describes the historical development of green finance and the classification of research focal points based on the distribution of countries, authors and institutions, as well as the distribution of journals and co-citation analysis.
<i>Zhang et al.</i>	2019	381	Web of Science	2001–2018	Presents the main journals, authors' countries of origin, an analysis of keywords and citations.

Achievements of Successful Women in Economics and Finance*

István Kőrösi 

Katalin Botos:

Jeles nők dicsérete [In Praise of Distinguished Women]

Kairosz, 2026, p. 166

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Professor Katalin Botos's series of acclaimed books has now been supplemented with an interesting new addition. The latest volume features 16 outstanding women who – through their character, knowledge, activities and influence – created a lasting legacy and contributed significantly to the world's progress. In this review, I highlight ten women from the book who have made outstanding contributions in the fields of economics, business and finance, earning a place in the history of their respective professions. I summarise the achievements of these distinguished women with the aim of drawing attention to them. The book provides insight into the background to their work, the scope of their activities, and their economic, social and historical context. Their journeys, their goals and the excitement of achieving these results are all revealed. These are all compelling reasons to read this work.

Anna Eleanor Roosevelt and *Frances Perkins* lived in the United States in the middle of the last century. Their names are associated with political and economic policy-making, as well as the establishment of their country's pension system. In Sweden, *Alva Myrdal* played a key role in the development of the welfare state, in addition to her theoretical work. These women are also linked by their contribution to economic policy and to the establishment and successful operation of welfare systems.

Anna Eleanor Roosevelt, wife of Franklin Delano Roosevelt and niece of former president Theodore Roosevelt, was a great advocate of social reforms and did much to improve the status of women in the United States. She advocated the introduction of a 48-hour working week, a minimum wage and a ban on child labour. Ahead of her time, she championed equal rights for African Americans. She

* The papers in this issue contain the views of the authors which are not necessarily the same as the official views of the Magyar Nemzeti Bank.

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launched economic initiatives to create modern housing of an acceptable standard for workers. At the end of her short film “Women in Defense”, she had the narrator say: “*Women are vital to securing a healthy American home life and raising children, which has always been the first line of defense*”. Her husband died in 1945, but she continued her work in his footsteps. President Truman appointed her as a US delegate to the United Nations, where she served as Chair of the Commission on Human Rights and became one of the drafters of the Universal Declaration of Human Rights. During the Kennedy administration, she once again served as a UN delegate and also chaired the commission examining the status of women. She emphasised that equality for women could best be achieved not by forcing uniformity, but by recognising circumstances arising from differences between the sexes and by promoting women’s opportunities to fulfil their potential.

Frances Perkins was the first woman to serve in a US presidential cabinet. During the New Deal, she served as a member of the administration for three terms. She played a prominent role in establishing the social security system. She devoted considerable attention to women’s working conditions. The US Social Security Act covered old-age benefits and unemployment insurance, but did not regulate health insurance. President Truman invited Perkins to serve on the Civil Service Commission. In that role, too, she maintained that social security was important because the security and well-being of the average person were essential to the advancement of society as a whole. She was a true humanist who translated principled consistency into practice through concrete measures.

Botos very aptly describes Alva Myrdal as the architect of the Swedish welfare state. Together with her husband, Gunnar Myrdal, she argued that the Swedish welfare state represented a democratic, liberal society, while at the same time requiring a socially responsive market economy with substantial government redistribution. Through her work, she sought to put this vision into practice. In the book, Botos rightly observes that Alva Myrdal was not merely a theoretical scholar but also a public figure and a practical politician, who concluded that, realistically, starting a family and pursuing a professional career could only be achieved sequentially. Together with her husband, she wrote the book “Crisis in the Population Question” (*Kris i befolkningsfrågan*, 1934). A year later, her first independent volume “Urban Children: A book on their education in large nurseries” was published. She was concerned with pre-school education both in theory and in practice and she herself participated in the training of nursery-school teachers. Another of her independent volumes was published under the title “Nation and Family: The Swedish Experiment in Democratic Family and Population Policy” (1945). After the Second World War, the Secretary-General of the United Nations offered Myrdal a position, and she became head of the UN Department of Social Affairs in New York.

Later, after returning to Europe, she held a senior position at UNESCO in Paris. Upon returning to Sweden, she devoted her work to research into international economic issues and subsequently headed the portfolios for disarmament and ecclesiastical affairs in the Swedish government. She focused particularly on the arms reduction negotiations between the two superpowers, the United States and the Soviet Union, and her analysis of these negotiations formed the basis of her work “The Game of Disarmament” (1976). Alva Myrdal was awarded the Nobel Peace Prize in 1982 (shared with the Mexican politician Alfonso García Robles). Thus, both members of the Myrdal couple became Nobel laureates, as her husband had received the Nobel Memorial Prize in Economic Sciences in 1974, jointly with F.A. Hayek. The Myrdals contributed greatly to establishing the institutions of the Swedish welfare state and ensuring their effective operation.

Indira Gandhi, India’s “Iron Lady”, is well known internationally for her political career and role, but this volume also sheds light on her economic role. During her premiership, Indira Gandhi, daughter of Jawaharlal Nehru, confronted the divisions within Indian society and the country’s immense poverty. Her principal concern was ensuring an adequate food supply for the population. She saw that developed countries often paid farmers even to reduce production in order to prevent grain prices from falling. In India, increasing grain production required a solution to the problem of irrigation, so she implemented significant irrigation support programmes. To address India’s economic problems, she considered nationally organised economic production necessary and supported it. For her, it was inconceivable that food supplies should be left entirely to market forces, as this would have meant starvation and death for millions. For this reason, a cap was placed on the amount of land a single family could own, and the remainder was distributed amongst the landless, naturally amidst fierce resistance from the wealthy. In the economy, she promoted the creation of employment opportunities through public work schemes.

In the economics of developing countries, an important role is played by the use of “intermediate technology”, which gives priority to labour-intensive solutions over capital-intensive ones, as labour has been and remains abundantly available in India and other developing countries, while domestic capital resources are scarce. Gandhi placed great emphasis on education and training, recognising their importance in laying the foundations for development. If we consider what a major exporter of information technology India has become today, we may conclude that her country has reason to be grateful to Mrs Gandhi. She stated that vocational training was neither the sole nor the most important task of schools; their most important task was to educate young people to become good human beings. This is a message worth taking to heart in our own society as well. One of her remarkable achievements in healthcare was that India’s mortality rate was reduced by half.

Botos highlights the essence of Gandhi's foreign policy, noting that, as a "third way" leader, she sought to keep her country out of the ideological struggles between the two superpowers of the time. *"She believed that the problems of the real economy were not system-specific and had to be resolved independently of ideologies"* (p. 62).

Joan Robinson made an outstanding contribution to labour economics. She became known for her study analysing exploitation. She argued and demonstrated that exploitation exists and can be explained even according to the non-Marxist principles of economics. In 1932, her work entitled "The Economics of Imperfect Competition" was published. In 1936, she published an important article entitled "The Long-Period Theory of Employment". Robinson extended Keynes's analysis to a longer time horizon. In 1956, her important academic work "The Accumulation of Capital" was published. One of Robinson's major theoretical contributions was her analysis of wage formation. She demonstrated that employers possess greater bargaining power than workers and are therefore able to pay workers less than the new value added they produce, retaining the surplus as "rent". Robinson analysed in detail the wage level at which a worker is willing to offer his or her labour on the market. Wage and salary earners can survive without work for a shorter period than owners of capital who can afford to continue bargaining. The bargaining positions are very different, and if a family environment does not provide a livelihood, then taking on work is a necessity for workers, rather than a choice. Mobility also differs, as a worker cannot simply pick up their home and move, whereas financial capital can be transferred to another country or another continent at the touch of a button. Technological progress, which is a key factor in economic growth, is not distributed proportionally between companies and workers, and affects different groups of workers in different ways. Botos quotes Robinson's famous observation: *"The misery of being exploited by capitalists is nothing compared to the misery of not being exploited at all."* For this leads to a rise in unemployment. This is why job creation and the security and protection of employment are of exceptional importance.

Sheila Bair and Brooksley Born are two outstanding figures in financial regulation in the United States; both made outstanding contributions to the US banking system and financial supervision. In 2009, they were both awarded the John F. Kennedy Profile in Courage Award. This award, presented in recognition of exceptional courage, takes the form of a silver ship's lantern. It symbolises that the recipient is courageous, honest and of strong character and, in Botos's apt formulation, *"finds a way through the darkness around them despite the pressure bearing down on them"* (p. 86).

Sheila Bair was Chair of the US Federal Deposit Insurance Corporation (FDIC), whilst Brooksley Born worked at the US Securities and Exchange Commission (SEC) as head of the division responsible for supervising derivatives trading. Both noticed that, after 1990, there was a dramatic increase in high-risk transactions in the US financial

sector, which carried the risk of enormous losses. The two honourees firmly stood their ground against the Chair of the Federal Reserve and highlighted the causes of the crisis. In 1996, Born became Chair of the US Commodity Futures Trading Commission. She sought to have dangerous derivatives, i.e. derivative transactions, prohibited. Her firm legislative proposal was voted down by Congress in 1999. In 2009, following the global financial crisis, Born became chair of the committee investigating the financial crisis. There she worked together with Bair.

Bair headed the US Federal Deposit Insurance Corporation during the most critical period. She had to confront the Secretary of the Treasury. Bair opposed the bailout of the major banks during the crisis. Within the Basel Committee on Banking Supervision, which operates in cooperation with the central banks of the G10 countries, she advocated raising capital requirements for banks in proportion to the risks they posed. She argued that, in the interests of banking-system stability, the FDIC under her leadership should be granted broader powers to supervise major banks. Bair considered financial education important; she wrote a book on the causes and management of the financial crisis and sought to promote financial literacy in books written for young people. The work of these two outstanding financial experts combined courage with expertise. This is what made them genuinely valuable and respected figures in the field of financial supervision.

Elinor Ostrom was the first woman to be awarded the Nobel Memorial Prize in Economic Sciences in 2009, which she shared with Oliver Williamson. She earned her doctoral degree not in economics but in the field of political economy. At Indiana University in Bloomington, she researched and taught organisation theory, public administration and economic issues. She conducted an in-depth analysis of the problem widely known as the “tragedy of the commons”. She demonstrated that users of common pastures drive more and more animals onto them, and that this excessive grazing irreversibly destroys the ecological condition of the land. Ostrom founded a new school of thought, the institutional school of public goods (commons), and was awarded the Nobel Memorial Prize in Economic Sciences for her work. She also reached important new conclusions in organisation theory, political science and public choice theory. Traditional economics divides goods into market and non-market goods. In the case of private goods, profit generally reflects utility, but in the case of complex social dilemmas, profit is not an ideal indicator. The state must influence self-interested actors through rules and taxes so that they do not deplete resources and so that selfish behaviour is kept in check. With regard to common goods, Ostrom demonstrated that the shared use of natural resources, pastures, fishing grounds and forests works well when managed by appropriate cooperatives and trusts, that is, through appropriate joint decision-making processes. The system must be monitored, and illegal use must be curbed. The most important factors in achieving this are sound institutional

rules for the protection of ecological systems and the building of trust amongst participants. These findings earned her the recognition of the Nobel Committee. In the debate between the market and the state, the extremely important role of local communities and the pursuit of common interests must not be overlooked. Therefore, the effective coordination of local human communities, interest groups and ecological considerations plays a vital role in development.

Malala Yousafzai, a public activist and the youngest Nobel laureate to date, was born in Pakistan in 1997 and is a Muslim refugee. The Taliban attempted to kill her, but following the attack she was saved after undergoing several operations and has since made a full recovery. She has received numerous international awards for her efforts to promote peace. On her 16th birthday, she delivered a powerful speech to the UN General Assembly on girls' right to education. In her home country, the Taliban destroyed around 400 schools and banned girls over the age of 10 from attending school. Malala became a young children's rights activist. In 2013, at the age of 17, she was awarded the Nobel Peace Prize, which she shared with the Indian children's rights activist Kallash Satyarthi. She set up a foundation and used donations to build a school in her homeland, Pakistan. Since then, her work has extended to Brazil, Kenya, Sierra Leone, Nigeria and Lebanon. In 2018, in collaboration with Apple, she succeeded in organising IT education for around 100,000 girls in India and Latin America. Botos summarises the principal lessons of Malala's young life as follows: rejection of fanaticism, recognition of the exceptional importance of education, and combining fame with organisational ability. Malala achieved these results together with her father. This is a fine example of family cooperation for the common good.

Esther Duflo, a mentor to the poor, was born in Paris in 1972. She graduated from the Massachusetts Institute of Technology (MIT). In her doctoral thesis, based on a research programme in Indonesia, she demonstrated and proved that expanding access to education improves future earning potential. She provided empirical evidence that improving education is not merely a public expenditure but an investment that yields substantial returns. Duflo worked with Abhijit Vinayak Banerjee, a US economist with Indian roots, and with Michael Robert Kremer, an economist at the University of Chicago. The trio of researchers was nominated for the Nobel Memorial Prize in Economic Sciences in 2019 for their achievements in the fight against global poverty. Duflo was the second woman to receive the Nobel Memorial Prize in Economic Sciences. She conducted extensive empirical research on the financing of healthcare and education, the avoidance of financial exclusion and financial issues in household economics. In her introduction to Duflo, Botos highlights the most important lesson: that caring for children is an inevitably demanding, time-consuming and personal task. Duflo's principal goal, which she

set herself at a young age, was to make life on Earth better. And she added: “*My work is my life*” (p. 162).

Why is it worthwhile and enriching to read Botos’s new book? In this book review, I have summarised only the main professional achievements of a few of the remarkable women it features. These achievements serve as a starting point for getting to know their lives, their journeys and their work. The book provides answers to many, many questions.

Who came from where and how far did they go? Their life stories are extremely interesting and varied. These differences stem from their family, social and national roots, as well as their circumstances. Consequently, the women featured in the book represented widely differing perspectives and attitudes, whilst achieving lasting results. A great strength of Botos’s book is that it explores historical contexts and driving forces in depth. I have not elaborated on these in this review due to space constraints. The book also recounts the journey towards success and the difficulties faced by the women selected. I find it interesting to consider who made what efforts in order to fulfil their potential. Exploring the mechanisms by which their social environments influenced them is also instructive. Alongside their struggles, the book also examines the reasons behind their failures. These outstanding women are characterised by a values-based approach. It cannot be copied, but it is worth following as an example!

Katalin Botos’ new book can be considered a pioneering work that fills a gap in the literature.

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