

The Ghost In The Machine



Q4 EDITION 2025



ADM Investor Services
International Limited

EDITORS NOTE

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Digitalization, Crypto, Forex, Technology, AI, Sugar, Dairy, Debt, Treasuries, T-Bills, Money Market Funds, Shipping, Net Zero Framework, Middle Office, Risk, Efficiency, Perception, Reality, Investment

Welcome to the Q4 edition of the Ghost In The Machine as the curtains close on another tumultuous year in which trade and geopolitical tensions continue to create uncertainty and ambiguity, but are also vying with the hope of rapid technological advances and investment.

We examine the implications of a strategic shift in US Treasury Debt issuance for money market funds and the potential risks for overall financial market stability, and by extension US federal government financing. FX markets have long been a first adopter of technology, with each shift transforming how liquidity is sourced, priced, and delivered.

There is a gradual convergence and integration of the crypto into the FX world, both due to increasing institutional adoption, and via customer demands for multi-asset exchanges and platforms. Tangential to that is the transformative impact of digital wallets, going well beyond the realm of payments, creating a connected and protected digital society.

Technology is transforming 'Middle Office' functions, increasing oversight, simplifying processes, reducing risk and creating efficiencies, aided by automation and AI. ESG related regulation is no stranger to implementation delays, with the latest edition of 'kicking the can down the road' coming via way of a failure to agree on, and a delay to the IMO Net Zero Framework for shipping.

Soft commodities have been on a roller coaster ride, most notably cocoa and coffee, but sugar has also been buffeted both by trade tensions as well as a dramatic reassessment of supply estimates for the current season, so what is the outlook for key producing countries in 2026.

Dairy prices have also been hit by the threat of a 'milk tsunami' as well as the strength of the Euro, which will likely spill into livestock prices. There is also another look at the 'perception reality divide' in financial markets, specifically in the context of the AI investment boom.



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THE GHOST IN THE MACHINE

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CONTENTS

4-7

J.P. Steiner

New Issuance? No Problem!

Over the past two years, the U.S. Treasury has increasingly been reliant on Treasury bills (T-bills) to meet its financing needs, a shift driven by the high cost of financing long-term debt and volatile macroeconomic environment.

9-11

Tom Higgins

The Rise of Crypto & How This Will Shape the Future of FX

The FX market has always thrived on innovation. From electronic trading to the rise of algorithmic execution, every major technological shift has reshaped how liquidity is sourced, priced, and delivered. We are now at the next major inflection point: the integration of crypto liquidity into the broader FX ecosystem.

12-13

Edwin Burgers

How the dairy market ended up in a perfect storm

The dairy year 2025 has caught nearly everyone off guard, especially in Northwest Europe. At the start of the year, the expectation was that milk volumes would decline. The opposite has happened. Production has increased so rapidly that some people are speaking of a true "milk tsunami".

14-15

Jon Shamah

Digital Wallets: The Future of Secure and Efficient Transactions

As digital transformation is reshaping every aspect of our lives, Digital Wallets emerge as a groundbreaking innovation poised to revolutionise the way we manage our identities and conduct transactions.

16-17

Alberto Peixoto

Sweet Sugar, but sweeter for some than others!

What a beautiful sunny morning, with birds singing and sun shining! Well, that's how Coffee Roasters may be feeling with the 40% tariff on Brazilian Coffee (and other Commodities/Products) being cancelled by the US Gov.

18-19

Marc Ostwald

The Perception Reality Divide Revisited'

In one of the earlier editions of the Ghost in the Machine back in 2016 (click here to read) I wrote about the disconnect between the financial and the real (non-financial) economy.

20-21

Eddie Tofpik

'Tis the Season'...to kick the can down the road!

Another multinational initiative pushed back!

22-24

Nathan Cartmill

Rachel Lindstrom Reimagining the Middle Office

The middle office plays a crucial, yet often underappreciated role in investment banking operations. As the name suggests, middle-office processes, people and technology sit between the client-facing, revenue-generating front office and the operationally-intensive back office.

26

ADMISI Youtube Playlist

27

ADMISI Events ADMISI Social Links

28

About Grains & Oilseeds

29

About Soft Commodities

30

The Ghost In The Machine Library

31

About ADMISI





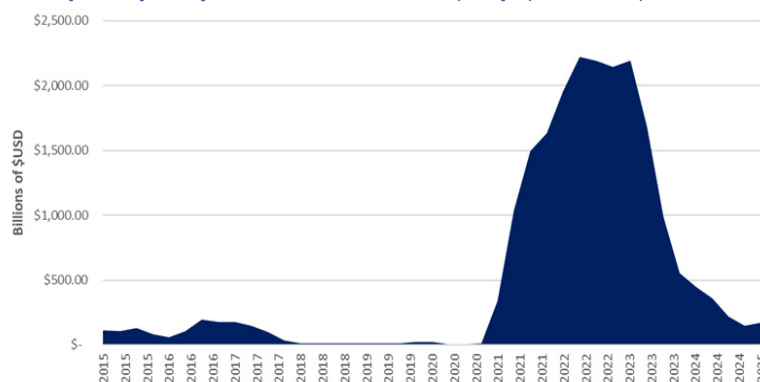
NEW ISSUANCE? NO PROBLEM!

Over the past two years, the U.S. Treasury has increasingly been reliant on Treasury bills (T-bills) to meet its financing needs, a shift driven by the high cost of financing long-term debt and volatile macroeconomic environment.

Following the 2023 debt-ceiling resolution, the Treasury undertook an aggressive reconstruction of its cash buffer, turning decisively toward the bill market to replenish the Treasury General Account. Recent refunding statements continue to reinforce this trajectory, signaling that bills will remain an elevated share of the government's financing mix for the foreseeable future.

With the Treasury signaling a preference for keeping the bill share of outstanding debt in the 15–20% range (via the Treasury Borrowing Advisory Committee/TBAC), and with net borrowing needs expected to remain elevated, the market has come to expect further increases in T-bill issuance in the years ahead. Coinciding with this shift are money market funds (MMFs), which have undergone a historic expansion of their own. Assets under management have surged to roughly \$7.54 trillion, propelled by the sharp rise in short-term rates, heightened demand for safety and liquidity, and the reallocation of cash away from banks. Government MMFs, those that are primarily invested in T-bills and the Federal Reserve's Overnight Reverse Repurchase Facility (ON RRP), have become substantial buyers of short-term government debt.

Chart 1: Overnight Reverse Repurchase Agreements
Treasury Security Sold by the Federal Reserve in the Temporary Open market Operations



Source: St. Louis Federal Reserve

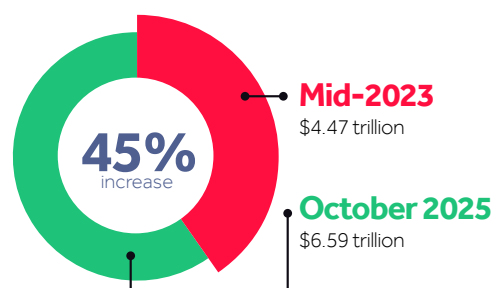
This creates a critical question for the market: Can MMFs continue absorbing rising T-bill supply, especially as the Federal Reserve approaches the end of quantitative tightening (QT)?

Recent market dynamics suggest that that answer is more than likely yes. As T-bill issuance increased sharply through 2023 and 2024, MMFs correspondingly drew down their ON RRP balances, according to the Office of Financial Research, demonstrating MMFs' ability to fund issuance by shifting cash out of the Fed's facility and into bills. As QT slows and reserves stabilize, their capacity to absorb further bill supply may even strengthen. The Federal Reserve's own monetary policy report notes this trend as well, although this should come as no surprise to most. ON RRP balances, once holding massive amounts of excess liquidity, have fallen from a peak of over \$2 trillion in 2022 to around \$900 billion by mid-November 2025, as the Fed's QT winds down and is scheduled to end on December 1, 2025. This shift in liquidity reflects MMFs' ability to redirect cash toward T-bills as supply has increased (Chart 1).

“AS QT SLOWS, MONEY MARKET FUNDS ARE SHIFTING CASH FROM RRP TO T-BILLS, HIGHLIGHTING THEIR INCREASED CAPACITY TO FUND RISING ISSUANCE AMID STABILIZING RESERVES.”

Rising Treasury Bill Issuance

When the debt ceiling was suspended in mid-2023, the Treasury was faced with an urgent need to rebuild its depleted Treasury General Account (TGA). It immediately looked to the T-bill market, issuing hundreds of billions in new bills in a matter of months. In the two years since, the share of T-bills in marketable Treasury debt has expanded from roughly 16–17% to around 22% today. More specifically, outstanding T-bills have grown from \$4.47 trillion in mid-2023 to \$6.59 trillion by October 2025, a 45% increase. In several recent auction cycles, bills have accounted for the majority of new issuance, underscoring the Treasury's increasing reliance on short-term funding to meet elevated borrowing needs.



There are several forces driving higher T-bill issuance:



1. Flexible financing tool

Coupon auction sizes had already grown substantially and could strain investor demand on the long end of the curve. Bills offer the Treasury greater flexibility in managing short-term funding needs without pressuring coupon markets.



2. Rebalancing toward the Treasury's preferred maturity structure

The TBAC has repeatedly noted that the bill share of total outstanding debt should fall between 15% and 20% for optimal liquidity and rollover risk management purposes. After falling below this range during the pandemic, the bill share is now moving back toward target. In 2024, the TBAC also acknowledged that the T-bill share could run above 20% for some time, given demand and financing needs.



3. Persistent deficits and refinancing needs

It is no secret that the fiscal outlook for the US necessitates sustained borrowing requirements over the next several years, even with the help of tariff revenues to lower borrowing needs (and even that remains in limbo). With limited room to raise coupons aggressively, bills will absorb much of the incremental financing load.

"RISING T-BILL ISSUANCE IS DRIVEN BY THEIR FLEXIBILITY AS A FINANCING TOOL, A STRATEGIC MOVE TO REBALANCE DEBT MATURITY STRUCTURE, AND ONGOING FISCAL DEFICITS REQUIRING SUSTAINED BORROWING"



The Surge of Money Market Funds

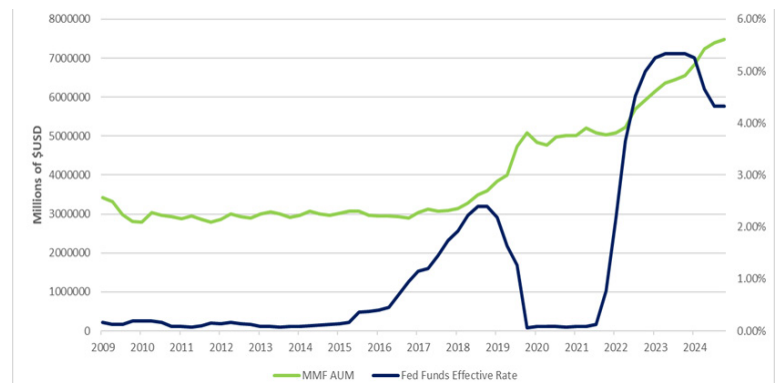
MMFs have grown rapidly alongside this shift in Treasury financing. Following years of low rates that discouraged cash allocations, the Fed's tightening cycle in response to rising inflation dramatically increased yields. The result of which drew a wave of institutional and retail capital into MMFs, which became a natural destination for cash seeking safety and policy-rate-linked returns (Chart 2).

DEMAND DRIVEN BY SEC REFORMS AND WIDENING YIELD SPREADS HAS PROPELLED MMF ASSETS TO \$7.54 TRILLION, MAKING THEM KEY BUYERS OF TREASURY BILLS AMID SHIFTING INVESTOR PREFERENCES

MMF assets have climbed to \$7.54 trillion as of November 2025, up from just over \$5 trillion in early 2022.

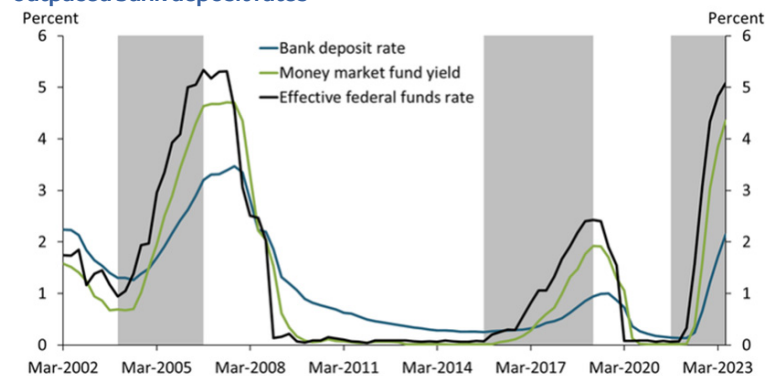
Two structural dynamics have played into this growth. First, the 2014 reform of the SEC's rule 2a-7 led many institutional investors to MMFs for liquidity and safety, away from prime funds more exposed to credit risk. Second, the spread between MMF yields and bank deposit rates widened as banks held deposit rates substantially lower than the Fed Funds rate and MMF yields. As a result, demand for MMFs grew, and the funds became dominant buyers of Treasury bills in 2023–2024, consistently rolling over hundreds of billions in short-term government debt to meet demand (Chart 3).

Chart 2: MMFs Total AUM vs. Federal Funds Effective Rate



Source: St. Louis Federal Reserve

Chart 3: Increases in money market fund yields have significantly outpaced bank deposit rates



Source: Federal Financial Institutions Examinations Council, Board of Governors of the Federal Reserve System, and iMoneyNet.
<https://www.kansascityfed.org/documents/9989/EconomicBulletin24MarshSharmaAcker0207.pdf>



Can Money Market Funds Absorb Higher T-Bill Issuance?

Expanding issuance of any asset, especially in the form of debt, requires confidence that the increase in issuance will be met with strong demand. From the Treasury's standpoint, expanding T-bill issuance requires confidence that the market can digest additional supply without pushing yields excessively higher. Recent history suggests that MMFs are well-positioned to scale accordingly. Over the past two years, MMFs have repeatedly demonstrated their ability to shift allocations toward T-bills when issuance rises. In periods when the Treasury ramps up bill supply, such as the post-debt-ceiling surge in mid-2023, MMFs shouldered the bulk of the increase, funded largely by drawing down their ON RRP balances.

However, these dynamics do not come without risks. MMFs must maintain liquidity buffers, as redemption pressures can force selling and create market stress, basic market dynamics. Dealer balance sheets, constrained by both regulatory limits and risk frameworks, also limit the intermediation available during periods of rapid issuance. Additionally, while MMFs have shifted away from ON RRP, a substantial drop in yields could shift allocations back toward the Fed facility or other overnight instruments, reducing their marginal demand for bills.

“WHILE MMFS ARE SHIFTING TOWARD T-BILLS, RISKS REMAIN—REDEMPTION PRESSURES, DEALER CONSTRAINTS, AND POTENTIAL YIELD DROPS COULD REVERSE THIS TREND AND IMPACT MARKET STABILITY.”

However, there is also another demand factor that is working in the Treasury's favor, as Treasury Secretary Scott Bessent recently noted: stablecoins. Stablecoins, which are cryptocurrencies pegged or tied to a currency such as the dollar, are becoming an increasingly important factor of Treasury funding. State Street CEO Yie-Hsin Hung said about 80% of stablecoin reserves are invested in T-bills or repos, roughly 2% of the overall market. Bessent has further projected that stablecoin demand could reach \$2–3 trillion by 2030, positioning them as a potentially significant marginal buyer of the front end.

These dynamics remain particularly important as the Treasury's financing mix is expected to continue shifting toward bills in the coming quarters. Given rising deficits and limited room to expand coupon issuance, bills offer the Treasury the most flexible tool for meeting short-term funding needs. MMFs (and stablecoins) represent large, flexible, and willing investors in the Treasury market, offering deep pools of liquidity; however, crediting them as a “blank check” for unlimited bill absorption would be a mistake. Monitoring MMF flows, ON RRP usage, stablecoin reserve allocations, and dealer balance sheet capacity will be essential to manage the shifting dynamics. If these lines of demand remain strong, the Treasury's strategy may succeed—but if any weaken, risks could begin to surface.

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THE RISE OF CRYPTO & HOW THIS WILL SHAPE THE FUTURE OF FX

The FX market has always thrived on innovation. From electronic trading to the rise of algorithmic execution, every major technological shift has reshaped how liquidity is sourced, priced, and delivered. We are now at the next major inflection point: the integration of crypto liquidity into the broader FX ecosystem.

Cryptocurrencies, which started as a niche, retail-driven asset class are now widely adopted by the institutional market. They are traded in ways that look remarkably similar to FX, with a focus on tight spreads, deep liquidity, advanced routing, and execution quality. For FX brokers, adding digital assets is a natural extension of their existing offering. Many financial institutions recognise that diversification into this asset class is essential for growth and client retention, particularly if they want to attract the next generation of traders.

As cryptos and FX converge, there has been a re-shaping of the industry, redefining the future of FX.

“AS CRYPTOCURRENCIES AND FX CONVERGE, THE INDUSTRY IS BEING RESHAPED, REDEFINING THE FUTURE OF FX AND OPENING NEW AVENUES FOR GROWTH AND INNOVATION”



“SEAMLESSLY
CONNECTING
FX AND CRYPTO
ECOSYSTEMS
THROUGH
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SIMPLIFYING
OPERATIONS
AND EXPANDING
CLIENT
OFFERINGS”

The Intersection of Cryptos and FX

Over the last few years, we have seen a shift toward multi-asset brokerage models. As this trend continues, FX brokers are increasingly integrating crypto trading alongside traditional FX pairs, responding to client demand and providing seamless access within a single environment. Technology is the key enabler here. The same technology that transformed FX - liquidity aggregation, advanced bridging, smart routing, and sophisticated risk tools - is now being applied to crypto trading.

However, despite similarities, FX and crypto have some major differences. FX liquidity is sourced from banks, non-banks, and ECNs whereas crypto liquidity is fragmented across exchanges, OTC desks, and decentralised venues. FX runs 24/5, while crypto operates 24/7. Managing price discovery, risk, and latency in such different environments requires careful consideration but, with support from technology experts across both asset classes, these two ecosystems can be seamlessly connected. In fact, Gold-i's MatrixNET liquidity management platform was built with this in mind, enabling brokers and financial institutions to access both FX and crypto liquidity through a single, unified interface, simplifying operations by having one technology stack, one risk layer, and one integration point.

The Rise of Crypto Prime Brokers

As crypto markets mature, we are seeing the emergence of institutional-grade prime brokers and prime of primes, mirroring the structure that has supported FX brokers for decades. These providers leverage large balance sheets, global regulatory footprints, and deep relationships across liquidity providers to deliver aggregated liquidity and credit intermediation. For brokers, this means they no longer need to maintain multiple exchange relationships. Instead, they gain a single point of access to high-quality, aggregated crypto liquidity, supported by familiar risk-management models.

This development marks a significant step forward. It professionalises the crypto liquidity landscape and makes it easier for FX brokers to expand into digital assets using the same operational approach they use for FX.

The Rise of Cryptos

The SEC's regulatory approval of Bitcoin spot ETFs in January 2024 brought institutional credibility and regulatory oversight to digital assets, accelerating institutional adoption – so much so, that traditional financial institutions now treat digital assets as legitimate components of a diversified portfolio.

Institutional participation has resulted in deeper liquidity, narrower spreads, and greater market stability. Importantly, it has given a level of validation and trust which is fuelling further industry growth.

Volatility in crypto is often cited as a concern, but far from being a threat, it has created compelling growth opportunities for brokers and financial institutions. High-velocity markets generate demand for hedging, leverage, and sophisticated execution which are all core strengths of the FX world.

A further indication of cryptos being brought into the realm of traditional financial markets is that digital assets are often now used as collateral. A growing number of regulated institutions offer crypto margin facilities, enabling clients to deposit digital currencies as margin.

Evolution of Exchanges

Another major trend is the evolution of crypto exchanges. For years, the market was dominated by retail-focused venues. Today, we are seeing the rise of new institutions like Bullish and GFOX, which are designed specifically for institutional liquidity, compliant trading, and robust governance.

These exchanges provide features that look increasingly like those of FX ECNs, including transparent order books, deep liquidity provisioning, audited reserves, segregated accounts, and low-latency infrastructure. The move toward regulated, institutionally-focused venues is one of the clearest signs that crypto is transitioning from speculative retail trading to a widely respected institutional asset class.

“THE MOVE TOWARD REGULATED,
INSTITUTIONALLY-FOCUSED CRYPTO
VENUES SIGNALS THE TRANSITION
FROM RETAIL SPECULATION TO A
WIDELY RESPECTED INSTITUTIONAL
ASSET CLASS”



The Future of FX

Institutional adoption of crypto is clearly impacting FX but there will undoubtedly be significant changes ahead. FX brokers offering crypto trading to clients need to operate at weekends, and this could pave the way for FX to be traded 24/7 too. A recent industry survey by Accuiti backed this theory up, with 80% of respondents believing that 24/7 trading will become a reality in some form. This change would have enormous implications for liquidity provision, risk management, and operational workflows across FX.

We expect to see a rise in the number of FX brokers offering cryptos but we may also see crypto funds and digital-asset specialised prime brokers participating in FX markets too.

As institutional adoption of digital assets accelerates, there may be further shifts that impact FX. For example, FX brokers may use stablecoins as settlement collateral between LPs and exchanges, reducing delays and counterparty risk. They may also run multi-asset offerings where crypto, FX, and tokenised assets share a single liquidity pool.

On a regulatory level, FX and crypto markets could become more integrated, with standardised reporting for both FX and crypto trades, unified market conduct rules, joint supervision of multi-asset brokers, clear capital and liquidity rules for crypto exposures.

Embrace The Change

FX is a mature, robust market but the rise of crypto is forcing a rethink of infrastructure, risk and product offering. The opportunities with crypto are huge but financial institutions need to adapt or they will be outpaced. Those deploying multi-asset thinking now, and treating crypto as a strategic extension of their offering rather than a separate niche, will likely reap the rewards.

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Brokers: providing client-facing trading and risk management.



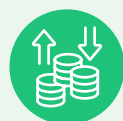
Prime of Primes: offering credit, aggregated liquidity, and market access



Exchanges: centralised venues offering transparent order books.



ECNs: matching engines connecting institutional flows across venues.



Market Makers: providing continuous liquidity and tighter spreads.



Prime Brokers: offering credit, settlement, and financing services for institutional traders.



Custodians: securing digital assets with institutional-grade safeguards.

As crypto and FX converge, these roles will mirror their FX counterparts, but with on-chain settlement, tokenised collateral, and 24/7 operations.

“THE RISE OF 24/7 CRYPTO TRADING COULD TRANSFORM FX LIQUIDITY, RISK MANAGEMENT, AND OPERATIONS, AS MARKETS BECOME MORE INTEGRATED AND INSTITUTIONAL ADOPTION ACCELERATES”



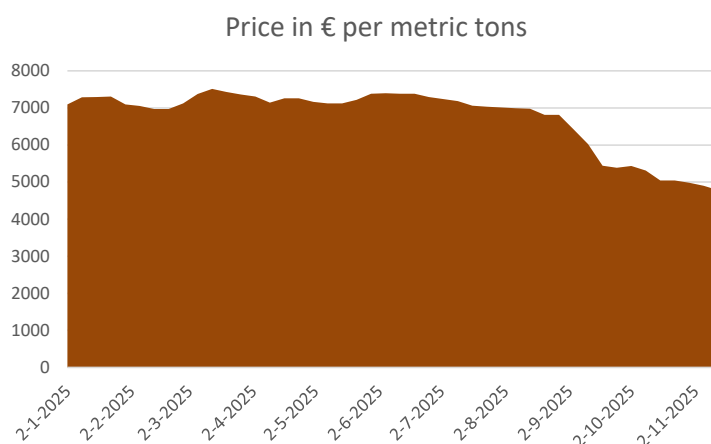
HOW THE DAIRY MARKET ENDED UP IN A PERFECT STORM

The dairy year 2025 has caught nearly everyone off guard, especially in Northwest Europe. At the start of the year, the expectation was that milk volumes would decline. The opposite has happened. Production has increased so rapidly that some people are speaking of a true “milk tsunami”. As a result of that, global dairy prices have fallen sharply in recent months, and a historic correction in milk prices is looming. Below a reconstruction of the past turbulent months.

Rarely have price declines on the European dairy market been as steep as they have been recently. Since June, the butter price in Northwest Europe has fallen by 35% to €4,785 per metric ton by mid-November, the lowest level in more than two years, and the bottom has still not been reached. Gouda foil cheese dropped by a similar magnitude to just below €3,000 per metric ton, roughly €700 under the five-year average, according to DCA Market Intelligence data. Other dairy commodities also lost significant value. Comparable corrections were seen on the Global Dairy Trade, a key global trade platform.

The contrast between the first and second half of 2025 could not be bigger. In the first half, the market remained firm, supported by relatively low milk collection and strong consumption data. Market participants also felt comfortable holding stocks in anticipation of further price increases. Over the summer, sentiment began to shift, although not everyone noticed immediately. The initial price declines were attributed to normal seasonal weakness during the holiday period. But when traders returned to their desks in September, it became clear the situation had changed drastically (Graph 1).

Graph 1: Butter price under pressure



Source: DCA Market Intelligence



Strong milk growth in Europe and beyond

Around that time, the first milk collection figures for August were released, and they were far higher than expected. In June, the German milk supply was still more than 2% below the previous year's level. Two months later, it showed a gain of over 2%. And in September, the increase was almost 5%. In France, August deliveries were up 5% year-on-year, reaching the highest level in ten years. Similar increases were seen in the Netherlands, Ireland and Poland, as well as in the United Kingdom, where records were broken. In the months that followed, growth only accelerated. Milk output is also rising sharply in the United States, New Zealand, and Argentina.

The conclusion is clear: high milk prices and low feed costs have driven global milk production significantly higher. In addition, the bluetongue outbreak has disrupted calving patterns, pushing the European production peak later into the year. In hindsight the strong production growth is explainable, but beforehand almost no one expected it.

“HIGH MILK PRICES AND LOW FEED COSTS HAVE DRIVEN UNEXPECTED GLOBAL PRODUCTION GROWTH, WITH EUROPE AND BEYOND EXPERIENCING RECORD-BREAKING INCREASES”



CURRENCY SHIFTS AND MARKET DYNAMICS LED TO A TEMPORARY SURGE IN DUTCH BUTTER IMPORTS, BUT EUROPE'S RISING MILK OUTPUT IS NOW EASING THE OVERSUPPLY.

The impact of a strong Euro

In addition to abundant milk, currency markets added further pressure. The euro-dollar exchange rate climbed above \$1.17 over the summer, the highest level in three years. A 15% rise within a few months is unusually fast for major currency pairs. This unexpected development is unfavourable for European dairy exporters, given the production surplus that needs to find a home on the world market. With a weaker dollar, U.S. exporters suddenly had the competitive advantage and gained market share. European dairy companies complained loudly about the situation.

The strong euro created another problem. It pushed the price difference between U.S. and European butter to nearly \$3,000 per metric ton, which is an unusually large gap. At that time, the European butter market still felt tight and well supported. This made it attractive for European dairy traders, many operating from the Netherlands, to import large volumes of U.S. butter, mainly for industrial bakery use rather than retail.

In July, the Netherlands imported 1,364 metric tons of U.S. butter, compared with only just 5 metric tons in the same month a year earlier, according to Harmonised System trade data. Monthly imports had not exceeded 100 metric tons in recent years. The July volume equalled nearly 15% of Dutch butter production for that month, which illustrates the scale.

Significant volumes were also imported from New Zealand. In May, the Netherlands imported more than 3,000 metric tons of butter and AMF from New Zealand. This was the highest monthly volume ever, equal to roughly 30% of national production. June and July were also elevated, at nearly 2,000 metric tons and over 1,500 metric tons, respectively. Other EU member states also increased imports, but the Netherlands dominated, accounting for more than 65% of total European imports.

These high import volumes proved temporary. As the market turned, Dutch imports from New Zealand dropped to 360 metric tons in August and 151 metric tons in September. Recent U.S. import data are delayed due to the recent shutdown, but imports likely fell as well. That is fortunate, because Europe's own butter production has surged on the back of higher milk volumes, leaving the market oversupplied (Graph 2).

Milk Prices under big pressure

Falling dairy commodity prices are dragging farm-gate milk prices down this autumn. Based on the raw-material value of milk, farmgate milk prices excluding sustainability premiums in Northwest Europe are falling toward €40 per 100 kilo, and potentially lower. That implies a price decline of roughly €15 per 100 kilo within just a few months. This means that farmgate prices are currently undergoing a very steep decline from a historical perspective. A recovery seems unlikely, as seasonal milk production in the northern hemisphere normally increases again in the run-up to the new peak in May.

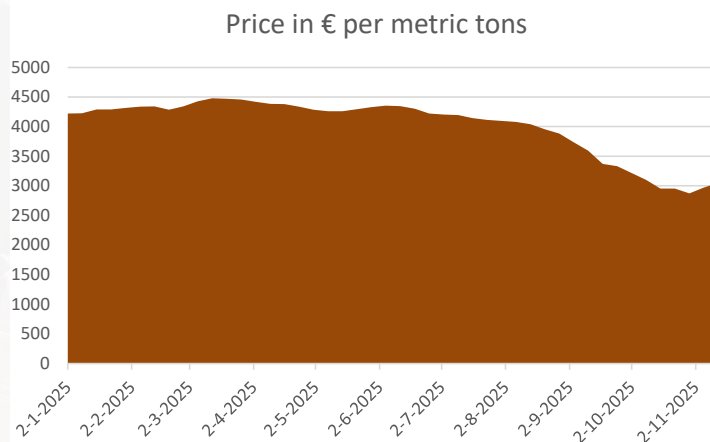
In other words, there will be (far) too much milk in the coming months. An analyst summarized the situation aptly: **"We need more beef and less milkfat."** In other words, sending more cows to slaughter would help relieve the milk market. This would also support the persistently tight beef market, which could readily absorb the additional supply (Graph 3).

Edwin Burgers

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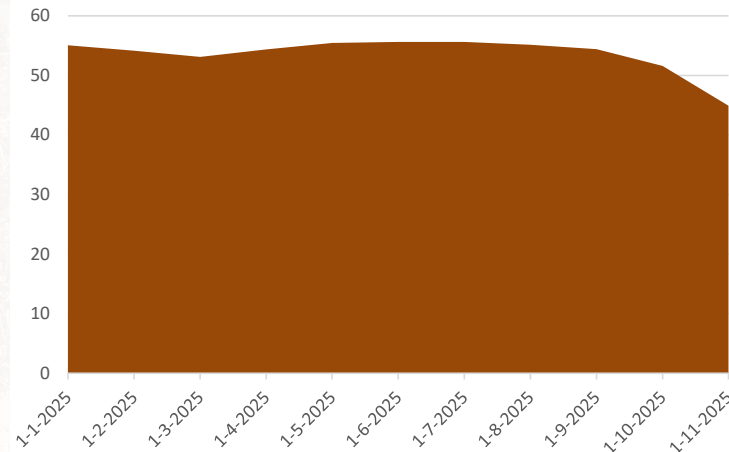
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Graph 2: Cheese prices declined sharply



Source: DCA Market Intelligence

Graph 3: DCA Farm Gate Milk Index (in euro per 100 kilo)



Source: : DCA Farm Gate Milk Price Index below €45 in November (Source: DCA Market Intelligence)

WE NEED MORE BEEF AND LESS MILKFAT - SENDING MORE COWS TO SLAUGHTER COULD HELP RELIEVE THE MILK MARKET AND SUPPORT THE TIGHT BEEF INDUSTRY.



DIGITAL WALLET: THE FUTURE OF SECURE AND EFFICIENT TRANSACTIONS

As digital transformation is reshaping every aspect of our lives, Digital Wallets emerge as a groundbreaking innovation poised to revolutionise the way we manage our identities and conduct transactions.

Society increasingly relies on digital solutions for convenience and efficiency, and the European Union is leading the charge with plans to introduce Digital Wallets by 2026. Supported by robust regulatory frameworks such as eIDAS 2.0 and the Digital Services Act, these initiatives aim to create a more connected, efficient, and secure digital single market, extending benefits to both individuals and organisations.

Digital Wallets represent a significant advancement in digital identity and transaction management, poised to transform society by offering a secure, efficient, and privacy preserving means for managing various credentials and facilitating complex transactions. The European Union is at the forefront of this transformation, with plans to introduce Digital Wallets by 2026, supported by robust regulatory frameworks such as eIDAS 2.0 and the Digital Services Act. These initiatives aim to create a more connected, efficient, and secure digital single market, extending benefits to both individuals and organisations.

A Digital Wallet is far more than just a repository for payment information; it is a versatile tool designed to securely store, manage, and present a wide array of credentials. It can hold a whole lot more than traditional physical wallet contents, including various forms of identification, permits, and payment instructions. Information is stored on your phone, protected by your fingerprint or face biometrics and safely backed up. A key feature is the ability to control information disclosure. Users can show all the details or just what they need to. This includes presenting information via Zero-Knowledge-Proof (verifying information without revealing the underlying data) or a QR-Code, adding a layer of privacy and control to the citizen. Digital Wallets are designed to make complex transactions easy. An illustrative example is buying a kitten by post, which might involve identity verification, permit presentation, and conditional payment instructions such as instruct to pay only when delivered. This multi-lateral functionality streamlines processes that would otherwise be cumbersome.

"DIGITAL WALLET GO BEYOND PAYMENTS, OFFERING SECURE, VERSATILE STORAGE OF IDS, PERMITS, AND CREDENTIALS, WITH PRIVACY CONTROLS LIKE ZERO-KNOWLEDGE PROOFS TO SIMPLIFY COMPLEX, MULTI-STEP TRANSACTIONS."

“THE EU’S DIGITAL WALLET, LAUNCHING BY 2026, WILL FOSTER CROSS-BORDER DIGITAL SERVICES, ENHANCE USER PROTECTION, AND ENABLE ORGANIZATIONAL CREDENTIALS FOR AML AND KYC MANAGEMENT ACROSS THE SINGLE MARKET.”

Two primary models for Digital Wallets are identified. The first is the EU Digital Identity Wallet, which operates within the regulatory domain. It is primarily for officially issued credentials such as passport, driving licence, etc., and requires High-Assurance only. This model is supported by the eIDAS 2.0 (EU) Regulation 2024/1183. The second model is the Open Model, which operates within the contractual domain. It is aimed at B-C flexibility (Business-to-Consumer interactions) and assurance is dependent on pre-agreed terms and conditions (Rules of the Game). This model may involve potentially complex workflows.

The EU is taking a proactive and leading role in the widespread adoption of Digital Wallets. The rollout timeline indicates that the EU will introduce the Digital Wallet by 2026, making it freely available to everyone. The delivery mechanism could be by public and/or private sectors depending on Member State, allowing for national flexibility. In conjunction with the Digital Services Act (DSA), Digital Wallets will contribute to a common set of rules on intermediaries' obligations and accountability across the single market that will open up new opportunities to provide digital services across borders, while ensuring a high level of protection to all users, no matter where they live in the EU. This will foster cross-border digital services and enhance user protection. The utility of Digital Wallets extends beyond individuals. AML (Anti-Money Laundering) and KYC (Know Your Customer) credentials could be drivers for organisational Digital Wallets as well as individuals, indicating their potential for managing verified information for corporate entities.

The overarching benefits of Digital Wallets are centred on efficiency, ease, and security. The primary benefit is summarised as being easier, faster, safer and more efficient. Digital Wallets will make life more efficient and easier by streamlining various interactions and services, ultimately improving the efficiency of daily interactions.

Digital Wallets are a transformative technology, set to revolutionise how individuals and organisations manage their identities and conduct transactions in the digital realm. With strong regulatory support from the EU and a focus on security, privacy, and user control, they are positioned to become a cornerstone of the digital single market by the end of 2027, when all regulated entities in the EU will be required to accept Digital Wallets in law. The shift towards Digital Wallets promises a future of easier, faster, safer and more efficient digital interactions for all users.

As we stand on the brink of this digital revolution, it is clear that Digital Wallets will play a pivotal role in shaping the future of secure and efficient transactions. By embracing this technology, we are not only enhancing our daily interactions but also paving the way for a more connected and protected digital society.

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SWEET SUGAR, BUT SWEETER FOR SOME THAN OTHERS!

What a beautiful sunny morning, with birds singing and sun shining! Well, that's how Coffee Roasters may be feeling with the 40% tariff on Brazilian Coffee (and other Commodities/Products) being cancelled by the US Gov.

The week of the 13th of Nov the US Gov cancelled the 10% on many Nations and for many products and Coffee had a setback. On the 20th of November (retroactive to the 13th of Nov) the 40% tariff was erased and Coffee tumbled. That's the life of Commodities, when not only the S&D matters.

Coffee has been one of the last exceptions (Bull Market) after FCOJ, Cocoa and Sugar tumbled.

Economic and Political influences affect many parts of the Agri sector, which is an important component of Inflation data and therefore it matters.

We are also having the COP 30 in Manaus and the World knows that you can't just take everything from Nature and not expect any consequences. Some People and Nations understand it, but not all are dealing to contain their Carbon footprint the same way.

Crop forecasts for 2025 and 2026 show that many Crops in many Nations will produce better yields as better prices in the recent years led to greater acreage in many countries. The Weather has been kind and therefore yields were mostly not affected and in some cases improved.

Sugar has not been an exception with relatively good weather in Brazil, India, EU, CIS, etc.... Where crops were going to reduce, the drop wasn't great and where crops would improve, well, some improved quite well!

The EU Beet crop will be down, but not as bad as expected. Acreage may be down 8% and yields may be up 5%, so a 3% drop overall. EU sugar prices in the domestic market are trading lower than 1 year ago with relatively similar stocks and a lower crop! How come?

EU producers are having to deal with it. It seems likely that not all Beet that will be produced and harvested this year may be processed, given the current market and the Beet priced offered to farmers.

As we go into 2026, the EU Beet acreage may drop again and who knows how the weather will be! The EU will likely carry on importing less and exporting less and becoming a smaller player in the World Market.

Ukraine, Turkey and Iran will produce less and therefore there will be less exports and a bit more imports

The CIS is having a good crop too with better yields in Russia and Belarus, the main producers. Russia will have more to export and therefore the neighbours may have a lesser reason to import from other places.

Pakistan Cane crop had its fair share of Gov interference, and the Gov is "threatening" to de-regulate the sector, which has been on the spotlight due to high sugar prices. Will de-regulating bring lower prices?

The Pakistan coming Cane crop should be better than the domestic needs and the carry over may allow Pakistan to avoid having to import sugars again. Will the domestic market “force” the hand of the Gov again and imports being triggered?

India is expected to have a great Cane crop, and the Sugar production may yield some 2sh mln m/t more than the domestic needs. The carry over from last crop is estimated at 5 mln m/t, but we believe it is half of that! Anyway, the Indian Gov allowed for 1,5 mln m/t to be exported. Early in the year the Indian Gov allowed 1 mln m/t to be exported and only 800k m/t eventually left the country. Why? They didn't like the price that was at least US\$ 50 per m/t more than today!

Thailand is also expected to have a better Cane crop, which could yield 600k/1,3 mln m/t more sugars than the crop before. Any extra production will be for the export market. Cane farmers are not happy with the Cane provisional price that is the equivalent of around 18sh cts/lb. The World market is around 14sh!

Central and South America Cane crops is expected to be reasonable, with some producing a touch more and no drops are expected. The region may have a tiny bit more to export.

So, one may see that the production increments are not massive and there are some countries that will produce less, but overall, more gains than losses.

Sugar Consumption is the main difference on many S&D estimates as some are more “excited” on the drop of sugar consumption due to “Appetite-suppressing injections”, “Weight-loss injections that help you feel full sooner” and “Injections that reduce hunger and cravings”!

These description above encouraged many researchers to cut sugar consumption, more than GDP and population growth would contribute to consumption growth.

Well, according to many reports, by 2029 40 million people would be using or taking them! Well, that's less than 0,5% of the World Population! I would not get too excited about it, yet!

So, it leaves us to talk about Brazil! The 25/26 Cane crop is due to end soon and may finish around 10/20 mln m/t lower on Cane and due to a higher Sugar Mix (% of Cane juice going to sugar vs. ethanol) despite a lower ATR (the amount of sugar in the Cane) the final sugar production will be marginally similar/better than last year.

Sugar stocks in Brazil are similar, and Ethanol stocks lower and by the start of the coming crop, both stocks will be close to not much.

So, why Sugar prices tumbled from 15/17 cts range to 13sh/15 cts range in the past 6 weeks?

During the Sugar week in Brazil (Oct 25), from the first meeting/presentation to the last one (during the week) the emphasis was on the coming Cane crop i.e. higher acreage, better Agri yields and higher sugar content. It was noted that current lower sugar prices, depending on crude prices and the real could shift some of the Juice Mix towards Ethanol. The higher the Cane crop the higher the limitation for Sugar crystallisation in terms of % of the crop.

On the other hand, Brazil is producing more Ethanol from Corn. Brazil is going to produce close to 9,5 bln litres of Corn Ethanol vs. 23,5 bln litres of Cane Ethanol this year, reaching +/- 29% of the overall Ethanol production, equivalent of 22 mln m/t of Corn.

Brazil Corn Ethanol production in 2026/27 may reach 10,5/11 bln litres, 31% of the expected overall Ethanol production and about 25 mln m/t of Corn. Brazil is expected to produce 131/135 mln m/t of Corn in 2026, consume about 65 mln m/t leaving 66 mln m/t for Ethanol and Exports or at least 40/45 mln m/t for the export market. Plenty!

BRAZIL'S 2026/27 SUGAR OUTLOOK IS UNCERTAIN, WITH FUNDS REMAINING MOSTLY SHORT SINCE LATE 2023 AMID SHIFTING SUPPLY AND DEMAND.

Back to Sugar, Brazil 26/27 Cane Centre-South region is expected to reach 630/640 mln m/t about 20/42 mln m/t more vs. 25/26 (598/610 mln m/t) about 1,4 to 2,9 mln m/t more sugar vs. 25/26, depending on ATR and Sugar Mix.

Based on past, current and forward crop estimates and demand, the 24/25 (April/March) S&D went from about 2 mln m/t deficit to about 5 mln m/t surplus in 25/26.

When comes to 26/27 (April 26 to March 27) we will need to see how the weather may or may not affect Brazil as well India, Thailand etc.... We are going from half empty to half full jar of sugar and no guarantees either way for 26/27 but could get a little fuller!

Funds have been playing Sugar from the short side, mostly, since end of Dec 2023. There were few exceptions (weeks), but mostly short. The longest period Funds were nett short was from April 2017 to May 2020.

Producers may be fully priced for 2025 and about 55% on average for 2026 and less than 10% for 2027. Consumers are enjoying the low prices, but of course would prefer lower prices and not be caught long above the market.

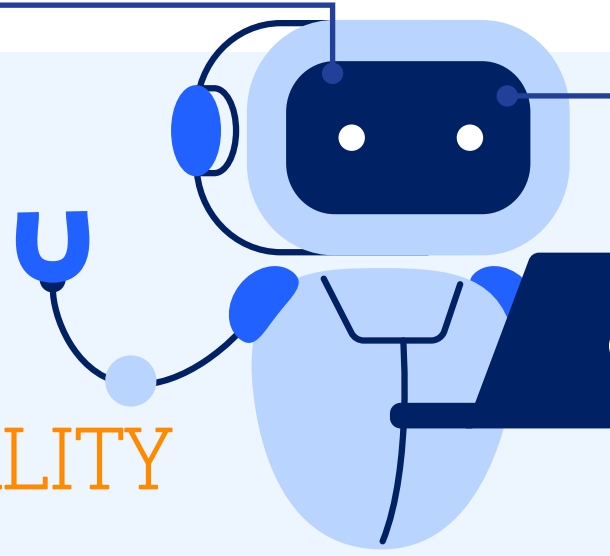
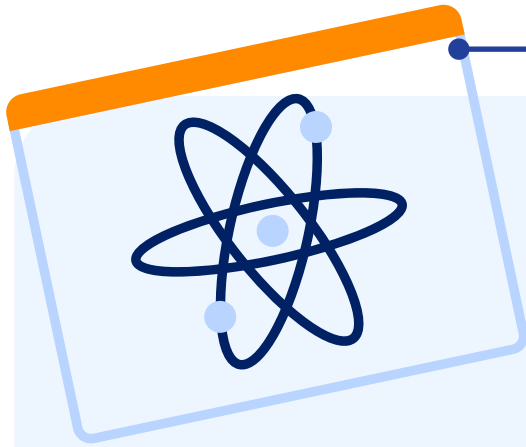
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PRODUCTION GAINS ARE MODEST, BUT SHIFTS IN SUGAR CONSUMPTION, DRIVEN BY APPETITE-SUPPRESSING INJECTIONS, MAY HAVE A BIGGER IMPACT THAN GDP OR POPULATION GROWTH.





THE PERCEPTION REALITY DIVIDE REVISITED'

In one of the earlier editions of the Ghost in the Machine back in 2016 ([click here to read](#)) I wrote about the disconnect between the financial and the real (non-financial) economy.

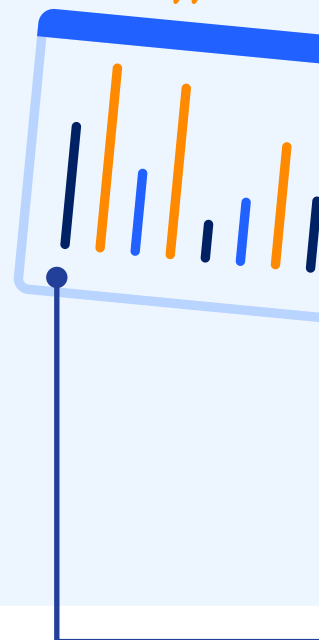
I noted that it was anything but a new phenomenon, but the disconnects are in no small part attributable to a deep-seated human yearning for stability, in which the familiarity of the 'status quo' is generally perceived as preferable to the uncertainty of change. This is known as 'stasis' or 'inertia'. I also noted the applicability of Hirschman's 'Hiding Hand' which argues that creativity is the key problem-solving tool when we face unexpected situations; and that it is only via the experience of impotence when faced with the unexpected that we develop the innovative knowledge to solve problems, and that 'rational choice' dogma often stifles innovation and creativity. Alternatively one could also look to Einstein, who correctly observed that 'we cannot solve problems with the same kind of thinking that created them'. In the current context, AI is and will be a very helpful tool in both problem solving and innovation terms, but the ultimate arbiter will be whether we ask it the right questions, above all from a systemic perspective.

I cited the examples of how financial engineering (or 'Zaitech') led to Japan's lost decade, and the NIRP, ZIRP and QE 'remedies' deployed in the wake of the Global Financial Crisis. **I noted that the lack of what might be termed 'joined up thinking', both in respect of crisis causes and crisis remedies, may prove with the benefit of hindsight, to be 'primus inter pares' in the 'Reality Perception Divide'.** I noted that most theories and many phenomenological investigations falter on their assumptions about what is a constant and what is a variable. In theory, ZIRP, NIRP and a deluge of liquidity should have dis-incentivized saving and incentivized spending, while low debt servicing costs should have facilitated and encouraged borrowing for investment of all forms, as well as extending existing financing for longer periods with significantly lower debt servicing costs. However, as has been the

case with psychology's yearning for recognition as a 'science', the empirical directive too often attempts to 'iron out', or even exclude, the contextual 'noise' (in this case the broad realm of supply chains) which, later in the post hoc historical evaluation, frequently proves to be the element that is highlighted as (often politically expedient) a display of wilful blindness, or dogmatic wishful seeing, predicated on the comfort of a stability born of inertia, and rejecting change and above all conflict.

The final observation of the prior article related to price formation and debt. 'Financial market participants' are ex-ante always more interested in the demand side of any economy, rather than the supply side, outside of the obvious interest in supply/demand mismatches. These mismatches are however primarily seen through the lens of demand 'growth' and (maximizing) 'pricing power' in the hope of high levels of returns. All too often, and above all at that juncture (ca. 10 years ago), this results in insufficient attention to the changing dynamics of supply, above all with respect to production (in all sectors). There can be little doubt that what has been termed the 'fourth industrial revolution' or the marvels of the technology (in the very broadest sense of the word) boom has a very profound effect on price formation. Situationally it was similar to the profound shift in underlying processes that was seen in the late 19th century, a period in which the economies at the forefront of the then 'industrial revolution' experienced protracted periods of deflation. I noted that the 'dotcom' technological boom had a much lower demand for capital, raw materials, facilities and labour than previous boom cycles associated with the arrival of trains or motorized vehicles, (and that it is also true that many associated new products very often have a short business cycle).

"THE FOURTH INDUSTRIAL REVOLUTION PROFOUNDLY IMPACTS PRICE FORMATION, ECHOING LATE 19TH-CENTURY SHIFTS, AS FOCUS ON DEMAND OFTEN OVERLOOKS THE EVOLVING DYNAMICS OF SUPPLY AND TECHNOLOGICAL CHANGE."





The key problem that policymakers, investors and, indeed, academic economists face is that with total global debt having reached three times global GDP at the time, and with much of that debt associated with older industries that are capital, raw materials, facilities and labour 'intense', these new industries may prove to be so 'disruptive' as to leave the older capital intense (i.e. debt-laden) industries staring down the barrel of a gun with very profound consequences for price formation, the financial sector and the global economy.

Ten years later, the evolving technological revolution finds its focal points in the AI and energy transformation booms, as well as facing a sharp shift in financing, energy and raw materials needs from the then minimalism to the current explosive CapEx trend. This threatens to tip the balance from deflation to inflation, in no small part exacerbated by the prior period of underinvestment in upstream supply chains and infrastructure. The current need for massive investment in scientific research, labour skills training, production and processing facilities, sourcing and extraction of raw materials including ensuring secure and stable supply chains, expansion of facilities, distribution and logistical infrastructure, and above all sustainable and affordable energy supplies is all too obvious and imperative. But the sharp pendulum swing from 'under-' to likely 'over-investment' cannot ignore a lack of visibility on short, medium and long-term demand, the fact that technology will be rapidly superseded, and that the herd like instincts of the financial world are not only fickle, but often poorly informed and frequently misdirected. Ironically, for the first time in 20 years, the November 2025 BofA Securities survey highlighted investor concerns that companies are 'overinvesting'.

Two elements of the current AI related investment are of particular concern. For many a year the tech behemoths had strong free cash flow, which helped to justify lofty valuations relative to many other sectors. But the surge in investment spending, accompanied by jumbo bond issuance (as per the recent \$30 Bln issuance from Meta and \$23 Bln from Alphabet) now means that investment spending is outpacing revenue growth by a factor of 5:1, and by extension free cash flow is shrinking rapidly, especially when one considers ongoing share buyback programmes. But rather more worrying are changes to accounting practices, which flatter EPS, but also fly in the face of reason.

Specifically the practice of extending depreciation periods for assets, when it is obvious that the pace of technological evolution has picked up, and therefore technology assets should therefore be depreciated at a faster rather than a slower pace. When one then considers that a ballpark estimate of how many technology start-ups fail is around 85%, and then thinks about the implications for how much of this current investment bonanza may have to be written off, there is good reason to be cautious.

AI technology is also energy hungry, thus requiring any companies involved in this to also invest heavily in obtaining reliable, sustainable and secure supplies, which has understandably seen many turn to nuclear. Anecdotal evidence suggests that a lot of this at prices that are above regular PPA (Power Purchase Agreement) rates, effectively aiming to guarantee long-term supply, and facilitate providers investments. But this will likely crowd out some investment in 'regular' power generation and distribution, and add to inflationary pressures, given the long run underinvestment in grid infrastructure, and a likely parabolic rise in electricity demand in the context of the energy transformation. Now throw in the consideration that critical minerals supply is a major issue, above all because the processing of these minerals is not only controlled largely by China but also requires hefty investment in processes which are currently environmentally unfriendly. It should be also noted that while there has been a sharp increase in investment in recycling industrial metals, particularly copper, much of this recycled output does not meet the quality (in this case purity) requirements for manufacture of many key elements for relevant parts and equipment. Per se there is no room in all of this for wishful seeing or wilful blindness. That is not to say that technology will not evolve to meet these needs, but probably not at a pace that meets demand. The likelihood is that corners will likely be cut to meet enormous immediate demand, which may result in reliability and safety issues, and in turn demand regulatory interventions, which will probably lag behind the technological development curve. The simple point is that the need for systemic thinking has never been higher, and that linear solutions-oriented thinking may prove to be a very substantial risk.

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"AI'S ENERGY DEMANDS AND RELIANCE ON NUCLEAR POWER RISK CROWDING OUT TRADITIONAL POWER INVESTMENTS AND FUELING INFLATION, WHILE CRITICAL MINERAL SUPPLY REMAINS A MAJOR ENVIRONMENTAL AND GEOPOLITICAL CHALLENGE."





'TIS THE SEASON'...TO KICK THE CAN DOWN THE ROAD!

Another multinational initiative pushed back!

'Tis the season'...to kick the can down the road as yet another multinational initiative is delayed by a year. My piece in last quarter's 'Ghost...' was about, at the time of writing, the possible delay for a second year in EUDR or the European Union Deforestation Regulation. This still has not been fully settled but there are calls to push the enforcement back to December 2026 and the key date to note for this will be Monday the 15th of December 2025 when a resolution to the situation, will need to be made. However, this piece of legislation is not the subject of my piece today, rather it is another bit of 'can kicking' that took place on the 17th of October this year, when the International Maritime Organisation's ('IMO'), Marine Environment Protection Committee ('MEPC'), unexpectedly chose to push back its Net-Zero Framework ('NZF') by a year.

The NZF would have progressively set tougher carbon intensity requirements for marine fuels between the years 2028 – 2035...and beyond!

The U.S., along with the Russian Federation & the Kingdom of Saudi Arabia had consistently pushed to block the NZF in recent months¹. The delay went through with a narrow 57 – 49 margin in favour after sustained pressure against countries adopting the NZF from the U.S. including such measures as investigations into anti-competitive practices & blocking vessels from U.S. ports, visa restrictions, imposing commercial penalties, additional port fees & evaluating sanctions on officials². This October vote is far away from the earlier vote in April which had approved the draft NZF with a large 63 – 16 majority. In that instance, the People's Republic of China had voted in favour of the draft NZF but then voted against it in the October vote¹. So...what's next after this delay...this 'can' being kicked down the road?

Well, there has been discussion about this leading to further regional fragmentation with some states and state groupings potentially taking unilateral measures¹. The EU already has its own EU ETS & FuelEU Maritime regulations with EU ETS being fully phased in from 2026, covering 50% of emissions from voyages entering or leaving the EU & 100% for voyages within the EU plus FuelEU maritime penalties will increase every 5 years until 2050¹. Neighbouring Turkey is moving to issue its own maritime emissions tax, approving a law in the Turkish Parliament in July 2024¹. In Africa, Djibouti & Gabon have progressed with a carbon pricing scheme to cover 50% of international voyage emissions under an organisation backed by the African Union called the Africa Sovereign Carbon Registry Foundation. Allegedly 13 other African states are considering joining, including Guinea & Morocco¹.



**“LOOKING AT THE POSITIVE SIDE
THOUGH, NZF WASN'T REJECTED...”**



So what does this mean for carriers?

It has been suggested that such regional measures could lead to a greater fragmentation of the Dry Bulk market with modern & alternatively fuelled vessels focusing on the EU, Turkey plus certain African states as penalties for those non-compliant increase¹. However, some of the immediate reaction from participants in the marine fuel industry saw this delay as a temporary measure & cited that NZF was not dropped...just delayed! Maria Skipper Schwenn, Director of Public Affairs at the global marine fuels group Bunker Holdings said 'Looking at the positive side though, NZF wasn't rejected and the work on guidelines for its implementation continues when the WG (Working Group) convenes already this Monday'³. Some saw the momentum & demand for biofuel bunker for marine vessels still growing in Europe and the delay was just a short-term 'blip'. Bastien Declercq, CEO of Marex division CSC Commodities stated 'Shippers had stated planning their biofuel procurement strategies, and producers were counting on an increased demand – they will need to reassess their plans. But despite the deal falling through for now. Shippers are unlikely to abandon their exposure to biofuels. The EU's FuelEU Maritime is still operational, and EU member states have long-term biofuel blending mandates in place. This favourable European regulation means the market will remain resilient'⁴. For guidance, Rotterdam – Europe's largest bunkering location had 198,515 MT of biofuel bunker sales in Q3 2025, up 44.7% on the same period in 2024...but total sales for 2025 have been at 467,772 MT, down 26.2%...though this has been seen as due to limited supply for biomethane & increased prices⁴.

However, all these responses may have been an immediate reaction following the result of the surprise vote, as a more recent survey by marine fuel brokerage firm Nautical Supply International ('NSI') of its clients found that of the 156 responses received, 76.9% voted to reject the NZF with 21.8% voting to adopt it & 1.3% expressing no preference⁵. A further breakdown of the results saw some 80% of NSI's tanker clients & 84% of dry bulk clients voting against, whilst there was stronger support for the NZF from container & passenger shipping segments. An NSI spokesperson said that 'This indicates a broad-based apprehension about the practicality and feasibility of the proposed framework across the entire industry'.

Watch this space, as the can is now well & truly kicked down the road... but whether it will be there, ready to implement or ready to be kicked again, is still an open question.

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1. Braemar 360 Degrees (20th October 2025)
2. U.S. Department of State - Taking Action to Defend America from the UN's First Global Carbon Tax – the International Maritime Organisation's (IMO) "Net-Zero Framework" (NZF) (10th October 2025)
3. Ship & Bunker News Team (20th October 2025)
4. Ship & Bunker News Team (21st October 2025)
5. Ship & Bunker News Team (7th November 2025)



"...A BROAD-BASED APPREHENSION ABOUT THE PRACTICALITY AND FEASIBILITY OF THE PROPOSED FRAMEWORK."

REIMAGINING THE MIDDLE OFFICE

The middle office plays a crucial, yet often underappreciated role in investment banking operations. As the name suggests, middle-office processes, people and technology sit between the client-facing, revenue-generating front office and the operationally-intensive back office. Today, the middle office is recognised as a strategic function, essential for risk management, regulatory compliance and boosting operational efficiency. The middle office is traditionally known for providing support to the front office and serving as a control function for the investment bank; staff were responsible for ensuring that trades were accurately captured, maintained and reconciled throughout their lifecycle. This positioning established the middle office as a key control function; however, its role was often seen as reactive and 'back-end' in nature.

There is a wide range of organisational models found within investment banks, from asset class-aligned teams to departments focused on transversal functions. Some rely on regional control centres, while others leverage shared services across business lines. Defining the scope of the middle office is difficult because its precise structure and function varies significantly from bank to bank (see Figure 1).

Figure 1: Key Processes that were the Traditional Middle Office Remit

Front Office	Middle Office	Back Office
Trade Execution	Trade Support	Trade Settlement
Institutional Sales	Trade Capture / Booking	Payments
Asset Structuring	Regulatory Reporting	Custody Services
Corporate Finance	Price Validation	IT & Systems Support
Research & Strategy	Risk Management	Data Archiving
Market Data Specialist	Collateral Management	Corporate Actions Processing

Source: GreySpark analysis

New technologies, platforms and the globalisation of workforces mean that firms are beginning to realign the middle-office structure and responsibilities; many taking on tasks that traders once handled, such as trade amendments, allocation management and lifecycle oversight. Here, the middle office typically reports to the front office and undertakes delegated functions, reflecting the drive for front-office productivity and the response to more agile, modern technology available.

“THE EVOLVING MIDDLE OFFICE IS INCREASINGLY TAKING ON TRADER RESPONSIBILITIES, DRIVEN BY TECHNOLOGY AND THE PUSH FOR GREATER FRONT-OFFICE EFFICIENCY.”

MIDDLE-OFFICE STRUCTURES

The way the middle office exists in its present form plays into strategic decisions. However, on top of those fundamental business metrics banks are deciding:

- Whether to align teams by product or adopt transversal, function-based groups;
- Whether to operate globally or regionally; and
- How to blend onshore, offshore and outsourced delivery.

Transversal vs. Product-aligned Models

The most common form of middle-office structure is siloed by asset class or by transversal, function-based teams. Each approach offers distinct advantages and trade-offs, and the optimal structure often depends on the bank's business model, scale and technology platform.

A siloed middle-office allows faster issue resolution, nuanced support and a strong understanding of product-specific risks and lifecycle events. However, as each asset class builds its individual support infrastructure, firms may face duplicated efforts, inconsistent workflows across business lines and challenges in delivering a unified client experience.

The transversal model makes common processes across asset classes the responsibility of horizontal teams; promoting standardisation, scalability and efficient use of technology. Centralised teams drive the use of consistent control frameworks, simplify oversight and enable streamlined onboarding of new products or regions. However, the lack of product-focused teams, reduces the asset class-specific knowledge needed to handle some trade lifecycle specifics when exceptions occur.

Regional vs. Global Models

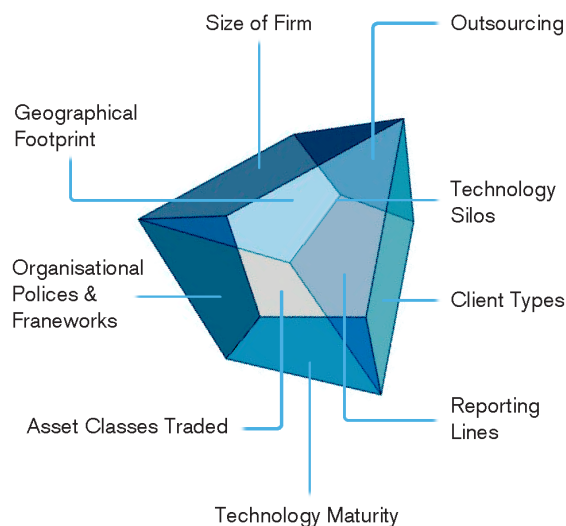
Banks must consider whether to organise their middle office globally or regionally. A global model allows for standardised processes, 24-hour, follow-the-sun coverage and centralised technology. It can, however, create challenges where there are regional business differences, specific market conventions and divergent regulatory regimes. In contrast, a regional model positions local middle-office teams nearer to local front office, lowering response times, and providing deeper familiarity with local regulations. However, it can result in duplicated infrastructure and business practices across geographies that increasingly diverge over time. Many institutions prefer to adopt a hybrid approach, centralizing for efficiency, while maintaining regional or asset-class-specific teams where local expertise and front-office intimacy are essential. Some of the complexities of middle office organisational structuring are illustrated in Figure 2.

Hybrid Onshore / Offshore Model

A hybrid onshore / offshore model blends the efficiency of outsourced operations with the control and responsiveness of in-house teams and strikes a balance between scalability and oversight. Banks increasingly delegate routine, high-volume, repetitive and data-intensive middle-office processes to third-party offshore service providers, in areas where standardisation allows for efficiency without compromising control, whilst retaining strategic or complex processes in-house to ensure business critical processes are kept close to the business.

This hybrid model offers several clear benefits including cost optimisation, improved quality and oversight, access to global talent, and improved scalability. A hybrid model provides a flexible framework for banks to modernise their middle office operating model without sacrificing control, compliance or client service.

Figure 2: Determinants of the Shape of the Traditional Middle Office



Source: GreySpark analysis

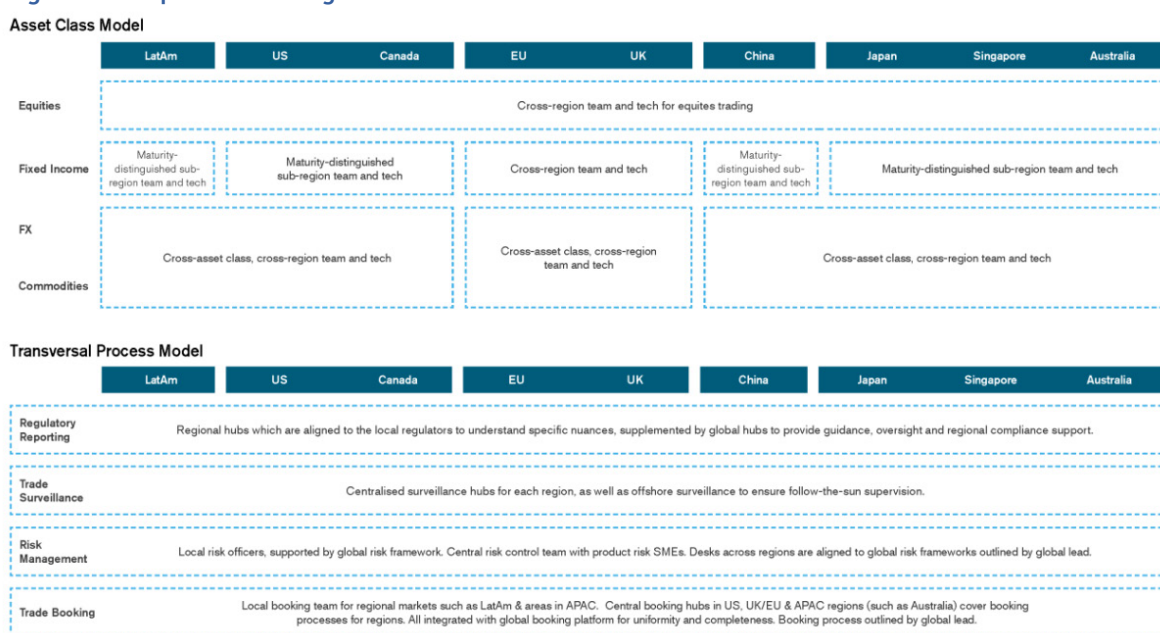
“A HYBRID ONSHORE/OFFSHORE MODEL ENABLES BANKS TO OPTIMIZE COSTS, ENHANCE OVERSIGHT, ACCESS GLOBAL TALENT, AND MODERNIZE THEIR MIDDLE OFFICE WHILE MAINTAINING CONTROL AND COMPLIANCE.”



AI AND AUTOMATION

The middle office has long relied on manual processes, particularly in areas such as trade reconciliations, settlements and performance calculation and attribution. While significant investment has been focused on front-office transformation, the middle office has been hampered by the bespoke nature of its workflows and the lack of off-the-shelf technology solutions. With the emergence of AI technologies, Machine Learning and Robotic Process Automation (RPA) investment banks are increasingly looking to not only drive efficiency but to increase oversight, simplify processes, reduce risk and create efficiencies in their workforces (see Figure 3).

Figure 3: Examples of Team Organisations in 2025



Source: GreySpark analysis

According to one report, investment banks could reduce middle-and back-office costs by up to 30% through the effective use of AI and automation technologies. This is not only through labour substitution, but also through error reductions, improving compliance and accelerating workflows. These gains are not without risk, however. If AI-driven platforms are not properly configured or monitored, they can introduce new vulnerabilities. As AI tools take on more operational tasks, middle-office staff are increasingly shifting into roles focused on exception management, oversight and strategic analysis. Rather than completely replacing human capital, AI is reshaping it, freeing up capacity and elevating the role of the middle office within the broader organisation.

Outlook for the Middle Office

Hybrid delivery models and selective outsourcing are helping firms strike a balance between efficiency and control. Meanwhile, AI and automation are enhancing accuracy, reducing manual workloads and allowing middle-office staff to focus more on oversight and exception handling.

The middle office is becoming more connected to both strategic priorities and day-to-day trading activity. Its continued evolution, both operational and technological, will be increasingly central to how banks manage complexity, scale efficiently and adapt to both regulatory and market changes.

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“AI AND AUTOMATION ARE TRANSFORMING THE MIDDLE OFFICE, REDUCING COSTS BY UP TO 30% AND SHIFTING STAFF FOCUS TOWARD OVERSIGHT, EXCEPTION MANAGEMENT, AND STRATEGIC ANALYSIS.”



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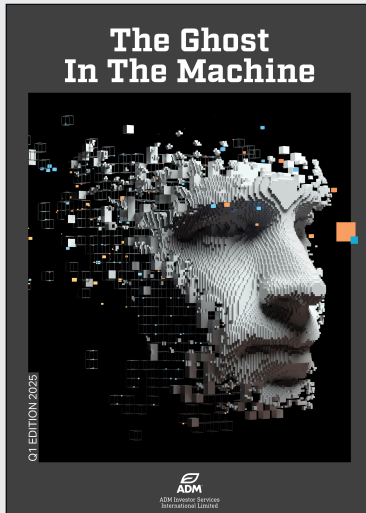
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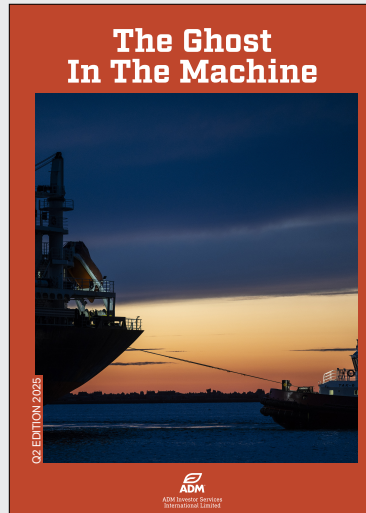


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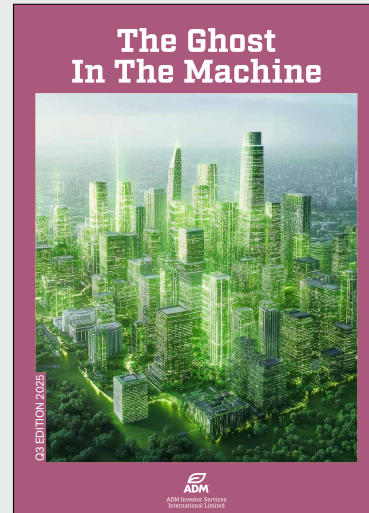
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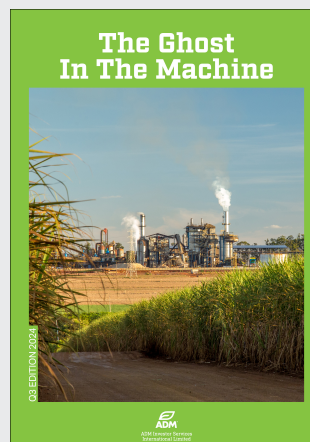
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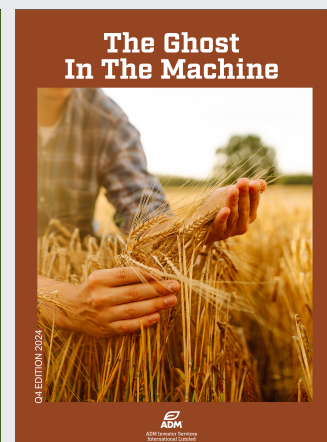
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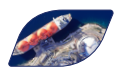
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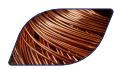
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The Ghost In The Machine

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