Global liquidity's transmission to the dollar: a systematic evidence review

The relationship between global liquidity and the U.S. dollar is real but fundamentally conditional, not mechanical. A robust body of institutional and academic research — spanning BIS working papers, NBER studies, and top-tier journals — establishes that relative central bank balance sheet expansion drives exchange rates with an elasticity of roughly 0.35% per percentage point of relative balance sheet change, transmitting primarily through currency risk premia rather than interest rate differentials. cepr But this relationship inverts during crises (when safe-haven demand dominates), attenuates during synchronized global easing, and operates with variable lags of 3–18 months depending on the channel. The dollar has replaced the VIX as the best real-time barometer of global risk appetite, bis +2 sitting at the center of a $14 trillion on-balance-sheet (and $26 trillion off-balance-sheet) web of dollar-denominated obligations that amplify every move it makes.

Three channels link liquidity to the dollar

The academic literature identifies three primary transmission channels from global liquidity conditions to the U.S. Dollar Index.

The interest rate and convenience yield channel operates through the dollar's unique role as issuer of the world's dominant safe asset. Jiang, Krishnamurthy & Lustig (2024, *Review of Economic Studies*, "Dollar Safety and the Global Financial Cycle") decompose dollar exchange rate variation into interest rate differentials, currency risk premia, and a convenience yield on dollar-denominated safe assets. They find that as U.S. public debt-to-GDP rose from 64% at the GFC to approximately 120% by 2024, increased supply of Treasury securities compressed convenience yields, exerting secular downward pressure on the dollar. For the yen specifically, the 2021–2024 depreciation of **24% against the dollar** was "mirrored almost perfectly by changes in the interest rate spread between Japan and the US" — but for other currencies and periods, the risk premium channel dominates.

The financial and balance sheet channel runs through the global banking system. Avdjiev, Bruno & Koch (BIS Working Paper 695, 2018; published in *IMF Economic Review*, 2019) demonstrate empirically that a stronger dollar reduces growth in dollar-denominated cross-border bank flows and lowers real investment in emerging market economies. IDEAS/RePEc Springer Bruno & Shin (2015, *Review of Economic Studies*) established the procyclical

feedback loop: Oxford Academic dollar appreciation causes global banks to contract cross-border lending through balance sheet effects, Bank for International Settlements which further tightens dollar credit conditions, Bank for International Settlements which further strengthens the dollar. This "financial channel" of exchange rates runs opposite to the traditional trade competitiveness channel. IDEAS/RePEc

The precautionary dollar demand channel was formalized by Bianchi, Bigio & Engel (NBER Working Paper 29457, 2022, "Scrambling for Dollars"). Settlement frictions in interbank markets create precautionary demand for dollar reserves, generating an endogenous convenience yield. Increased dollar funding risk drives up this yield and appreciates the dollar IDEAS/RePEc NBER — explaining the paradox of dollar strength during crises when the Fed is actively expanding liquidity supply.

The critical empirical contribution on quantifying these channels comes from Dedola, Georgiadis, Gräb & Mehl (2020, *Journal of Monetary Economics*). They find that a typical expansionary QE announcement produces a persistent exchange rate depreciation of approximately **7%** for the announcing country's currency, with the effect bottoming out at 9 months and remaining statistically significant for 18+ months. CEPR The transmission breakdown: roughly **60–70% flows through currency risk premia**, 20–30% through short-term interest rate differentials, and 5–10% through CIP deviations. The key finding is that **relative balance sheet expansion matters, not absolute levels** — when both the Fed and ECB expand simultaneously, exchange rate effects largely offset. Wikipedia

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The Dollar Smile holds up, but faces structural challenges

Stephen Li Jen developed the Dollar Smile framework in 2001 while serving as Managing Director and Global Head of Currency Research at Morgan Stanley. The framework identifies three regimes: the dollar strengthens on the left side of the smile during global crises (flight-to-safety demand), weakens in the middle during moderate synchronized global growth (capital outflows to higher-yielding markets), and strengthens again on the right side when U.S. economic outperformance attracts capital inflows. Gotrade Jen, who holds a PhD in economics from MIT and previously worked at the IMF and Federal Reserve Board, continues developing the framework at Eurizon SLJ Capital, which he co-founded.

No peer-reviewed academic paper has formally tested the Dollar Smile by name, but Morgan Stanley's own quantitative validation using Economic Surprise Indices over 20 years (presented by Andrew Watrous, September 2025) produces clear results: the dollar rises an average of **+0.8% per month** when both U.S. and global growth are surprisingly weak (left side), **+1.1% per month** when U.S. growth outperforms expectations (right side), and declines **–0.1% per month** during synchronized global growth (middle). Apple Podcasts

Schroders validated the framework using their proprietary Global Wave model covering 30+ countries and concluded it "remains valid in this new regime." Schroders

The framework's underlying mechanisms are well-supported by formal academic research. Obstfeld & Zhou (2022, *Brookings Papers on Economic Activity*) document that "episodes of high global liquidity are associated with a weak dollar and lead to capital inflows and credit expansion in EMDEs" Brookings — directly mapping to the middle of the smile. Georgiadis, Mueller & Schumann (ECB/NY Fed, 2022) confirm that structurally identified global risk shocks appreciate the dollar, Federal Reserve Bank of New York validating the left side. The regime-switching foundation draws on Engel & Hamilton (1990, *American Economic Review*), who found persistent, identifiable regimes in dollar dynamics.

However, the framework faces a serious structural challenge. JP Morgan Asset Management's Nicolas Wall argued in 2024–2025 that the smile has become a "smirk" due to five post-GFC shifts: the deterioration of the U.S. net international investment position (net equity position fell from +10% to –10% of GDP), the largely unhedged nature of foreign capital in the U.S., the re-emergence of bonds as volatility hedges, the availability of Fed swap lines limiting dollar scarcity, and the dollar's shift from low-yielder to high-yielder. jpmorgan The April 2025 tariff shock, during which the dollar sold off even during risk-off conditions, provided ammunition for this thesis. Wellington Management termed this a "crooked smile," noting that $26 trillion in foreign ownership of U.S. assets (**88% of GDP**) creates vulnerability to capital repatriation. Morgan Stanley defended the framework with quantitative evidence, Watcher Guru and Goldman Sachs Asset Management took a middle position, arguing the curve has "likely flattened" but remains useful. Goldman Sachs Asset Management

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Funding liquidity spirals drive carry trade crashes into the dollar

Brunnermeier, Nagel & Pedersen (2008, NBER Working Paper 14473; published in *NBER Macroeconomics Annual 2008*) established the foundational framework connecting funding liquidity to carry trade dynamics. Their central empirical finding is that carry trade returns exhibit **negative skewness** — small, steady gains punctuated by sudden, large losses — driven by the endogenous unwinding of positions when risk appetite and funding liquidity deteriorate. NBER +2 Using the VIX and TED spread as funding liquidity proxies, they show that "during quarters in which the VIX increases, the carry trade tends to incur losses and is particularly exposed to crash risk." Fmg This creates the characteristic "up the stairs, down the elevator" pattern in carry trade returns.

The amplification mechanism operates through Brunnermeier & Pedersen's (2009, *Review*

of Financial Studies) liquidity spirals framework. Market liquidity and funding liquidity are mutually reinforcing: asset price drops raise estimated volatility, triggering higher margin requirements, forcing liquidation, driving further price declines. Critically, this mechanism generates endogenous negative skewness — negative shocks are amplified while positive shocks are not, because no binding constraint operates on the upside. University of Chicago Press

Menkhoff, Sarno, Schmeling & Schrimpf (2012, *Journal of Finance*) IDEAS/RePEc extend this work by showing that global FX volatility risk explains **more than 90% of cross-sectional carry trade excess returns**. High-interest-rate currencies load negatively on global FX volatility innovations, delivering poor returns in high-volatility states, while low-interest-rate currencies provide a hedge. SSRN Munich Personal RePEc Archive This risk factor prices returns not only in FX but also in U.S. equity and corporate bond markets, establishing a common risk structure across asset classes. PubMed Central

The August 2024 JPY carry trade unwind provided a dramatic real-world test. BIS Bulletin No. 90 (Aquilina, Lombardi, Schrimpf & Sushko, August 2024) documents the mechanics in detail. bis Yen carry trade positions totaled roughly **¥40 trillion (~$250 billion)**, Bank for International Settlements with yen-denominated FX swaps and forwards reaching $14.2 trillion in notional by end-2023. Bank for International Settlements The unwind sequence — BOJ rate hike on July 31, weak U.S. payrolls on August 2, then the August 5 crash in which TOPIX lost 12% and VIX briefly exceeded 60 — demonstrated every element of the theoretical framework. bis JP Morgan estimated **65–75% of global carry trade positioning** was unwound by mid-August. J.P. Morgan Private Bank The BIS explicitly documented that "Bitcoin and Ethereum posted losses of up to **20%**" during the episode, as retail traders faced margin calls and were "forced to close positions even in seemingly unrelated assets." bis By December 2025, the BOJ had raised rates to 0.75% (highest since 1995), and Morgan Stanley estimated approximately $500 billion in carry positions remained outstanding.

The carry trade–DXY relationship is nuanced because JPY and CHF (major funding currencies that appreciate during unwinds) are DXY components. During the August 2024 episode, the JPY appreciated ~11% against the dollar J.P. Morgan Private Bank and the DXY fell — but during the 2008 GFC, the dollar strengthened despite carry unwinds because dollar shortage dynamics overwhelmed carry effects, as documented by McCauley & McGuire (BIS Quarterly Review, 2009). Bank for International Settlements

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The dollar sits at the center of a $40 trillion offshore web

Hyun Song Shin, BIS Chief Economist, articulated in his November 2016 LSE speech the

thesis that has become central to understanding the dollar's role: "The dollar has supplanted the VIX index as the variable most associated with the appetite for leverage. When the dollar is strong, risk appetite is weak." bis Bank for International Settlements Pre-crisis, VIX and bank leverage were tightly correlated; post-crisis, despite persistently low VIX readings, bank leverage remained subdued. bis The dollar became the operative proxy for global balance sheet constraints. Investing.com

The empirical foundation for this claim rests on several interlocking BIS research programs. Avdjiev, Du, Koch & Shin (2019, *American Economic Review: Insights*) demonstrate that a stronger dollar is associated with wider CIP deviations (higher cost of synthetic dollar funding) and pullbacks in cross-border dollar bank lending. American Economic Association Bank for International Settlements Bruno & Shin (2015, *Journal of Monetary Economics*) provide causal evidence that U.S. monetary policy drives the international risk-taking channel: Economic-policy a decline in the Fed Funds rate is followed by increased U.S. broker-dealer leverage, accelerated capital flows, and credit growth in recipient countries. Bank for International Settlements Bruno & Shin (2019/2023, *Review of Financial Studies*) show that dollar appreciation tightens dollar credit conditions so severely that exporters reliant on dollar-funded bank credit suffer greater declines in both credit and exports — even those exporting to the United States. Bank for International Settlements

The scale of dollar-denominated obligations outside the United States creates powerful amplification. BIS Global Liquidity Indicators show dollar credit to non-bank borrowers outside the U.S. at **$14 trillion** as of end-Q3 2025. But Borio, McCauley & McGuire (BIS Quarterly Review, December 2022) document an even larger "missing" stock: non-banks outside the U.S. owe **$26 trillion** in dollar obligations from FX swaps, forwards, and currency swaps, recorded off-balance-sheet. Non-U.S. banks owe an estimated **$39 trillion** in such off-balance-sheet dollar obligations — more than 10 times their capital. Bank for International Settlements Bank for International Settlements McCauley (2024, Federal Reserve Bank of Atlanta *Policy Hub*) notes that offshore dollar banking amounts to roughly half of U.S. commercial banking, and in 2008 and 2020, the Fed effectively extended its backstop to this global domain through swap lines. Boston University

Miranda-Agrippino & Rey (2020, *Review of Economic Studies*) provide the causal identification linking this architecture to U.S. monetary policy. PubMed Central Using high-frequency movements in federal funds futures around FOMC announcements as instruments, they find that U.S. monetary contractions cause significant deleveraging of global financial intermediaries, decline in domestic credit provision globally, strong retrenchment of international credit flows, and tightening of foreign financial conditions. Oxford Academic EMEs face a "double whammy" — smaller inflows and larger outflows simultaneously. NBER Rey's (2013) Jackson Hole paper famously reframed the Mundellian trilemma as a "dilemma": independent monetary policies are possible if and only if the

capital account is managed, Helenerey because the Global Financial Cycle — driven by U.S. monetary policy and correlated with the VIX — transmits to all open economies regardless of exchange rate regime. CEPR

The most recent synthesis, Miranda-Agrippino & Rey (2022, *Handbook of International Economics*), documents that a single global factor in risky asset prices explains about **25% of the variance** of common variation across countries and asset classes, with remarkably homogeneous factor loadings. Helenerey The Federal Reserve plays the dominant role in driving this factor, with the ECB contributing in a lesser capacity. ScienceDirect This factor correlates strongly with risk aversion, credit spreads, intermediary leverage, and the VIX NBER — and, per Shin's work, with the broad dollar.

Real interest rates matter for DXY, but less than commonly assumed

The empirical relationship between U.S. real interest rates and the dollar is one of the most studied — and most frustrating — puzzles in international finance. Edison & Pauls (1993, *Journal of Monetary Economics*) found that real exchange rates and real interest rates are nonstationary but **not cointegrated**, Boston University concluding there is "little empirical evidence in support of a systematic relationship." ScienceDirect Baxter (1994, *Journal of Monetary Economics*) confirmed that while the relationship appears visually compelling, formal econometric tests struggle to establish a robust, stable statistical link.

Engel (2016, *American Economic Review*) provides the most careful recent analysis. Using G7 data from 1979–2009, he documents a puzzle: when the U.S. real interest rate is high, the dollar is stronger than average in real terms — **stronger than can be accounted for by the path of expected real interest differentials under UIP**. Existing models of foreign exchange risk premiums predict the high-interest-rate currency should be weaker than average, while the data shows the opposite. NBER The contamination comes from a large, time-varying risk premium that overwhelms the interest rate signal.

The UIP puzzle compounds this difficulty. Decades of research consistently find that regressing exchange rate changes on interest rate differentials yields $\beta < 0$ (the "Fama regression"), meaning high-interest-rate currencies tend to appreciate rather than depreciate — the opposite of textbook predictions. ScienceDirect +2 Lothian & Wu find UIP works over very long horizons (centuries), Fordham University and Chinn & Meredith (NBER Working Paper 6797) find β approaches 1 at 5–10 year horizons. Chaboud & Wright (Federal Reserve IFDP #752, 2003) find UIP holds at intraday frequencies. Federal Reserve The puzzle is concentrated in the 1-month to 3-year horizon most relevant to practitioners.

Schmitt-Grohé & Uribe (2022, *Journal of International Economics*) introduce a critical distinction: transitory interest rate increases cause dollar appreciation (consistent with Dornbusch overshooting), while **permanent increases in the nominal interest rate cause dollar depreciation**. Columbia University This finding is essential for interpreting the 2022–2025 period: the dollar's initial surge tracked rising TIPS yields closely (10-year TIPS moving from approximately –1% to +2.5%), but as the market priced in the permanence of higher rates, the relationship weakened. The DXY reached a multi-decade high in January 2025 before depreciating approximately 5% through September 2025 as the Fed began easing and real rate differentials narrowed.

No direct NFCI-to-FX evidence exists, but the components matter

After exhaustive review of Chicago Fed publications, Federal Reserve research papers, and academic databases, **no study was found that directly links the NFCI Risk, Credit, or Leverage subindexes to FX market behavior or DXY movements**. This represents a genuine gap in the literature. The NFCI and its subindexes were designed by Brave & Butters (2011, 2012) to monitor domestic U.S. financial conditions and predict U.S. economic activity, not exchange rate dynamics. Federal Reserve Bank of Chicago The NFCI does not include exchange rates among its 105 indicators.

However, the individual components captured by NFCI subindexes have been shown in separate literatures to forecast exchange rates. The most directly relevant finding comes from Adrian, Etula & Shin (2010, NY Fed Staff Report No. 361, "Risk Appetite and Exchange Rates"), who demonstrate that funding liquidity aggregates of U.S. financial intermediaries — conceptually related to the NFCI's leverage subindex — **forecast USD exchange rate growth at weekly, monthly, and quarterly horizons, both in-sample and out-of-sample**, against a large set of foreign currencies. The theoretical mechanism: effective risk aversion of dollar-funded intermediaries fluctuates with the tightness of their risk constraints, ResearchGate and this channel is separate from the carry trade channel.

The NFCI subindexes' timing properties, per Brave & Butters (2012, *International Journal of Central Banking*), provide useful context for any future FX application. The **Risk subindex is coincident** with financial stress (peak AUC of 0.99 at zero lag). The **Credit subindex lags** stress by approximately one month. The **Leverage subindex leads** stress by roughly three months. The **Nonfinancial leverage subindex leads** by approximately nine months. If these timing relationships translated to FX — which has not been tested — the leverage subindex would be the most useful forward-looking indicator for DXY movements.

Why liquidity does not mechanically predict the dollar

The Meese-Rogoff (1983, *Journal of International Economics*) puzzle remains the starting point: standard macroeconomic models cannot outperform a random walk in out-of-sample exchange rate forecasting, even when using actual realized future values of fundamentals. Federal Reserve Bank of Philadelph Rossi's (2013, *Journal of Economic Literature*) definitive survey concludes: "The answer to the question 'Are exchange rates predictable?' is, 'It depends' — on the choice of predictor, forecast horizon, sample period, model, and forecast evaluation method." Traditional monetary predictors (money supply, prices, output) are **not** favorable. Taylor rule fundamentals and net foreign asset positions show the most promise, but even these work inconsistently.

Engel & West (2005, *Journal of Political Economy*) partially resolve the puzzle theoretically: if fundamentals are nonstationary and the discount factor is near unity, exchange rates should approximate random walks even if fundamental-based models are correct. University of Wisconsin IDEAS/RePEc The random walk is a feature of the asset pricing structure, not evidence against fundamentals mattering. ScienceDirect

The liquidity-to-DXY relationship specifically breaks down under four identified conditions. First, during risk-off crises, the dollar appreciates despite massive Fed liquidity injections because precautionary dollar demand overwhelms supply — the GFC saw a **14.3% dollar appreciation** against G10 currencies even as the Fed expanded aggressively. Second, during synchronized global easing, relative balance sheets do not shift, and dollar effects are muted. Third, when U.S. growth exceptionalism attracts capital inflows, the dollar strengthens despite ample liquidity (the right side of the Dollar Smile). Fourth, when dollar funding stress emerges — visible in CIP deviations and widening cross-currency basis — the dollar appreciates mechanically regardless of aggregate liquidity. Bank for International Settlements

Structural breaks further complicate the picture. Du & Schreger (2021, NBER) document that CIP — a foundational arbitrage relationship — broke down after the GFC and **never fully recovered**, Bank for International Settlements reflecting tighter balance sheet constraints from Basel III and the supplementary leverage ratio. Bank for International Settlements NY Fed research (Goldberg, 2025) estimates that EME currency sensitivity to the VIX spiked from 4.2 to 12.3 percentage points immediately post-GFC, then dropped below pre-GFC levels, reflecting regulatory changes that altered the transmission mechanism.

Michael Howell's CrossBorder Capital framework offers the practitioner perspective on this question. He defines global liquidity as "the gross flows of credit and international capital feeding through the world's banking systems and wholesale money markets" Amazon — a roughly $170 trillion funding pool Substack — and identifies a **65-month Global Liquidity Cycle** driven by debt refinancing needs. Bankless Howell reports that global liquidity leads

asset markets by 9–13 weeks Substack ROGER MONTGOMERY and is negatively correlated with business activity at –0.4 with a 3-month lag. ROGER MONTGOMERY His framework treats the dollar as the primary transmission channel: a strong dollar equals a global liquidity squeeze, a weak dollar signals easing. X His 2020 book *Capital Wars* (Springer) provides the most comprehensive practitioner treatment, though it is not peer-reviewed academic research.

Conclusion

The transmission from global liquidity to the dollar operates through three well-documented channels — convenience yields, financial balance sheets, and precautionary demand — but is mediated by regime conditions that determine which channel dominates. The quantitative evidence is precise where it exists: **0.35% exchange rate movement per percentage point of relative balance sheet change**, with 60–70% transmitting through risk premia. But this precision is misleading if applied mechanically, because the relationship inverts during crises, attenuates during synchronized easing, and is overwhelmed by dollar funding stress dynamics.

The most important insight from the literature is Shin's (2016) observation that the dollar has become the system's primary risk barometer, Bank for International Settlements not merely a price that responds to liquidity. bis The **$14 trillion in on-balance-sheet and $26 trillion in off-balance-sheet dollar obligations** outside the United States mean that every dollar move creates balance sheet effects that amplify the initial impulse. Bank for International Settlements This reflexive quality — where dollar strength tightens conditions which attracts more dollar demand — is what makes the relationship simultaneously powerful and unpredictable. The Dollar Smile captures the regime structure correctly (and Morgan Stanley's 20-year backtest confirms its three regimes quantitatively), Morgan Stanley +3 but the structural shifts identified by JP Morgan Fair Observer and Wellington Management suggest the smile's shape is evolving as foreign ownership of U.S. assets reaches 88% of GDP. Wellington Management The NFCI-to-FX connection remains the clearest gap in the literature — Adrian, Etula & Shin's work on intermediary leverage forecasting exchange rates points to the leverage subindex as the most promising candidate, but no one has tested this directly. ResearchGate