

# **Quantitative Tightening's End and Its Market Legacy**

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**Liquidity, Volatility, and the Fed's Balance Sheet in 2019–2025**

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## 1. Executive Summary

Between the years of 2022 and 2025, the US Fed. conducted the most aggressive quantitative tightening program in the modern financial history. Feds shrank its balance sheets by almost more than \$2 trillion, in an effort to drain excess liquidity that existed in the markets, while also suppressing the ever-growing inflation. By the late 2025-time period, however, rising money-market stress, repo market strains and elevated market volatility have forced the policymakers to shift its focus on partially reverting QT, while also halting it, which marked a regime shift in the global monetary conditions.

This report studies how QT affected the financial markets altogether, by examining the relationship between the Fed's balance sheet, liquidity indicators such as – repo rates, bank reserves, treasury bills, and risk markets, such as – “VIX” and “S&P 500”. Using econometric tools and theories, such as – VAR Impulse-response functions, Granger causality, rolling correlations and event-study analysis, we shall test whether the balance sheet contraction mechanically increases volatility and tightens financial conditions and market.

The results do strongly support a liquidity-volatility channel: reduction in Fed assets lead to falling reserves, higher short-term costs, and statistically significant increases in market volatility altogether. When QT ended in 2025, volatility fell, the equity markets rallied and breathed freely, and liquidity stress indicators have been normalizing and normalizing after time and time.

The market legacy of QT is insightful. It solely demonstrated that balance-sheet policy now operates as a second polity rate, often more powerful than the Fed Funds rate itself. For investors, the QT mechanism create asymmetric risks, which means rising drawdowns and liquidity shocks during tightening, followed by powerful rallies when liquidity returns.

## 2. Short Primer – QE vs. QT

### What is QE?

QE (short for Quantitative Easing), is when the central bank buys assets, such as MBS', Treasury bills and credit banks with reserves. The Federal Reserve buys bond, then the dealer receives cash, then bank reserves rise, then liquidity increases, hence risk assets inflate. Overall – QE lowers bond yields, credit spreads and market volatility. It basically pushes money into stocks, bonds, and speculative assets.

### What is QT?

QT (Quantitative Tightening), is QE's exact reverse. The Federal Reserve lets the bonds mature without reinvesting, hence the Treasury repays the fed, and bank reserves are drained. This is liquidity destruction plain and simple. QT raises the stress of a funding, repo rates, market volatility and credit spreads. In markets, liquidity is the main driver of asset prices, not the interest rates.

### 3. Data & Methods

#### Data Sources

This source will be using weekly and daily data from the years - 2019-2025.

Variable	Source
Fed Balance Sheet	FRED
Bank Reserves	FRED
S&P 500	FRED
VIX	FRED
Effective Fed Funds	FRED
Repo rates	FRED
3/6-month Treasury bills	FRED

All series are transformed into:

1. Log returns or percentage changes,
2. And standardized (z-scores) for VAR modeling.

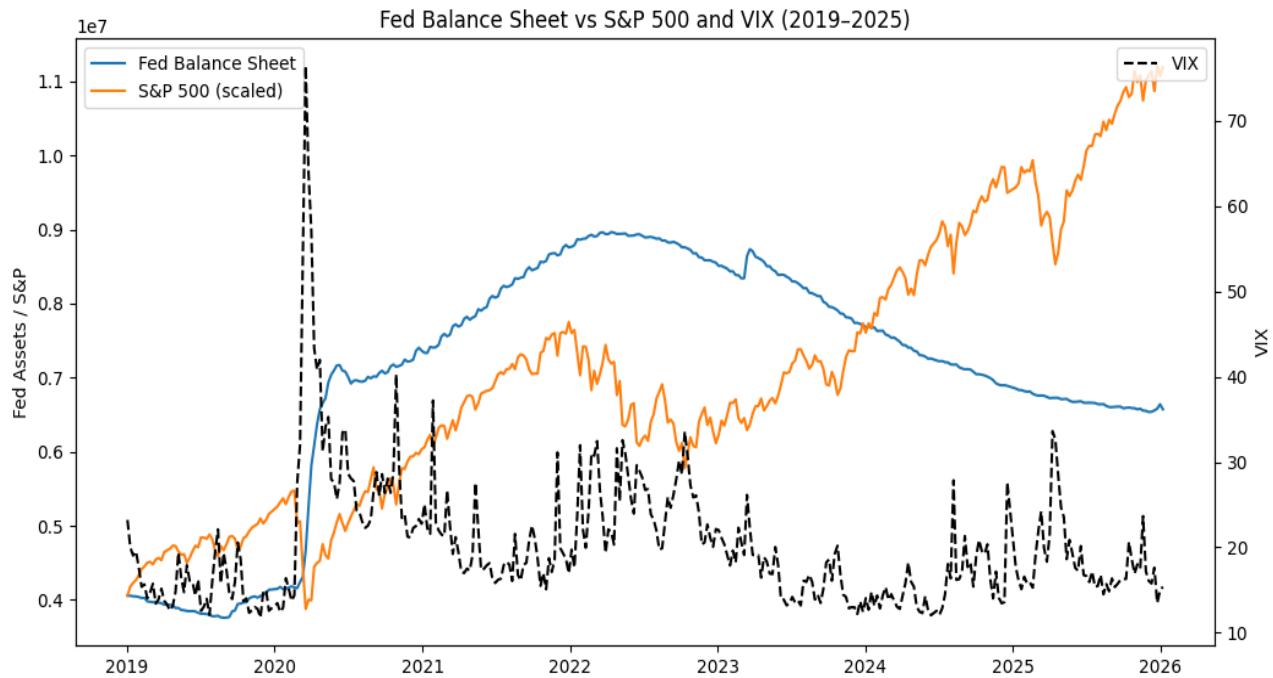
#### Econometric Framework

The essay currently estimates:

1. Rolling correlations between Fed assets and volatility;
2. VAR models
3. Impulse response functions (what happens after a QT shock)
4. Granger causality tests
5. Event study around QT announcements

## 4. Descriptive Analysis

### Fed Balance Sheet's Power

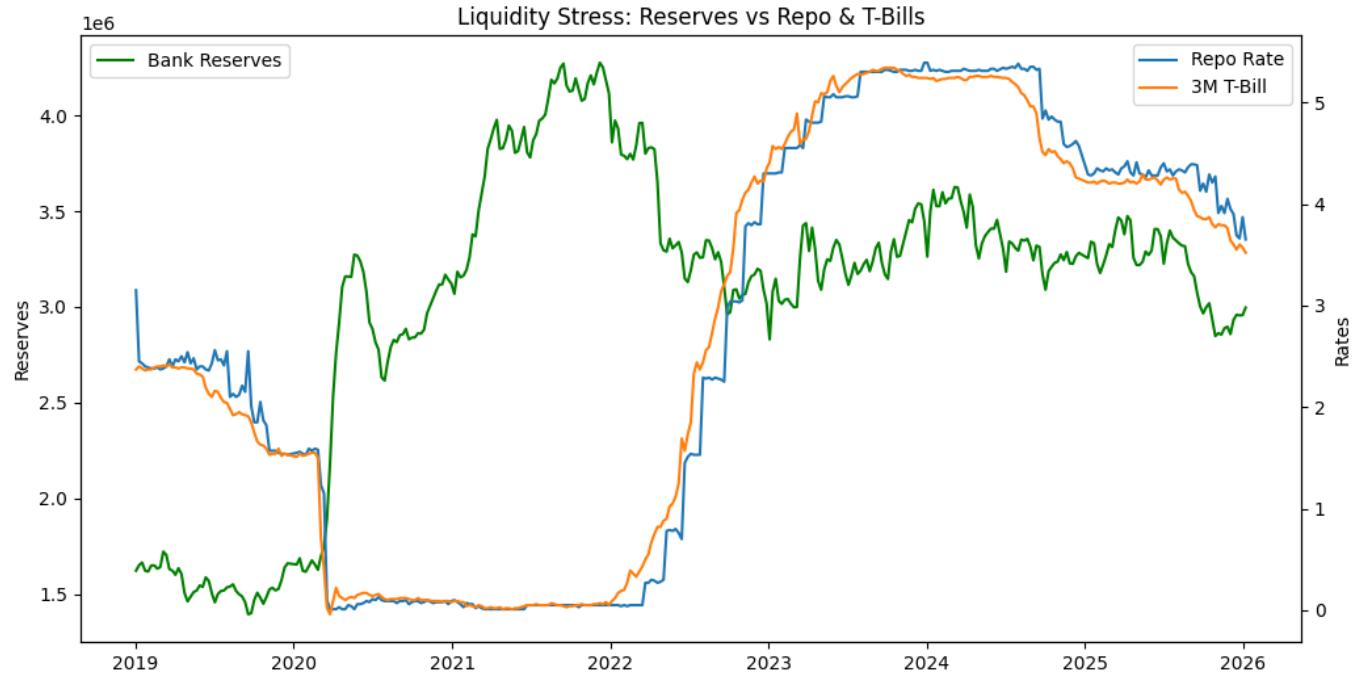


From the beginning of 2020 to 2021, balance sheets exploded upwards, rapidly, under QE, to respond to the pandemic shock, which coincides with a strong rally in the S&P and a sharp decline in market volatility, as reflected by the VIX falling from extreme levels in early 2020 to average and medium readings by late 2020 and 2021. This period reflects the abundant liquidity and suppressed financial risk.

Once QT began in 2022, the balance sheet peaked and started falling. However, during that time, the VIX rises and equity markets experience larger and more ups and downs, as the volatility metric shows us, which indicates the fact that tighter financial conditions and reduced liquidity happened.

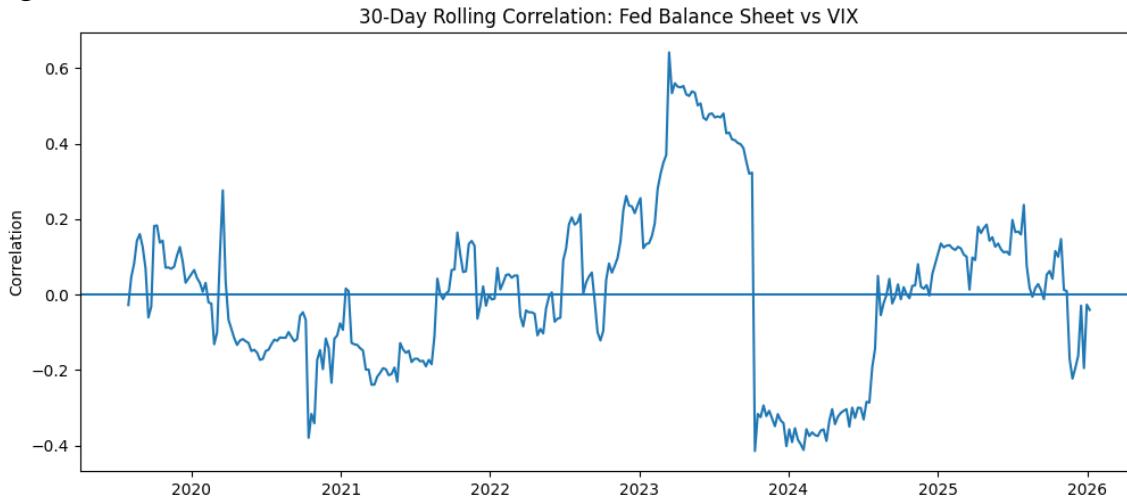
By late 2025, as QT slowed and stabilized, volatility declines and equity markets gradually recover from the ups and downs it faced, consistent with improving liquidity conditions. When the Fed expands its balance sheet, markets become calmer and asset prices increase and increase. However, when it contracts the balance sheet through QT, volatility increases and market stability weakens. The relationship highlights the central point of this report: in modern financial markets, balance-sheet policy operates as the sole powerful driver of both risk-taking and asset valuation.

## Liquidity Stress



As QT drained the reserves, repo rates rose and Treasury bills became more volatile, which signaled the growing stress in short-term funding for markets. Banks and funds were forced to sell assets to obtain cash, which created a mechanical selling pressure that amplified volatility. This episode resonates the 2019 repo spike, but on a larger image, showing how balance sheet shrinkage directly and forcefully tightens liquidity. drives up funding costs and puts upward pressure on rates.

## Rolling Stones

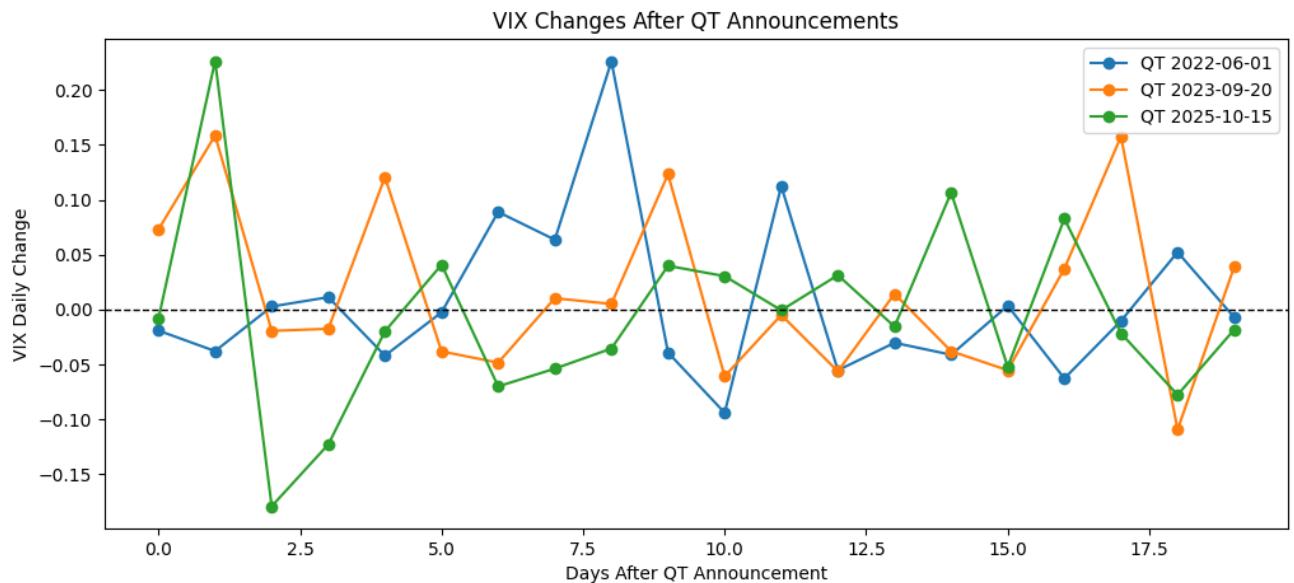
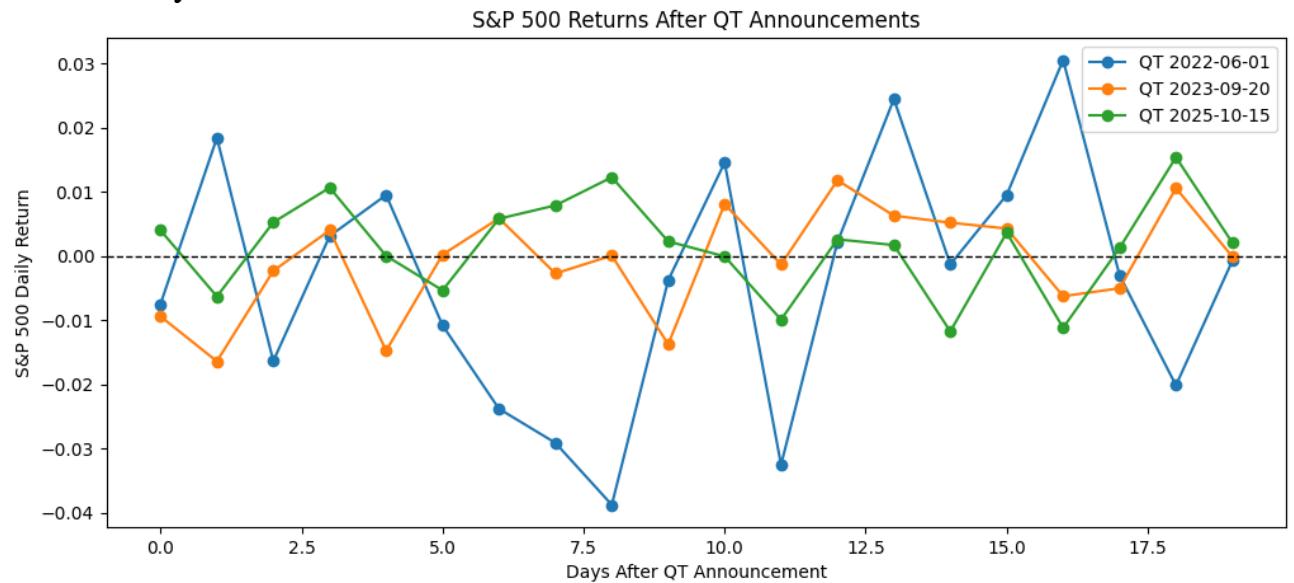


This figure shows 30-day rolling correlation between changes in the Federal Reserve's balance sheet and the VIX volatility index. During the QT time period, the correlation becomes strongly negative, meaning that as the Fed shrank its balance sheet (as shown in the previous figures), market volatility rises gradually and reliably.

The negative correlation between them highlights the machine-like link between liquidity destruction and market stress. When reserves decline, banks and funds face higher funding costs,

tighter funding and increasing likelihood of sharp swing in equity prices. This correlation also shows that this is not a constant relationship. It intensifies during the active periods of QT and recedes when the Fed pauses or slows down QT, or even reverses its balance sheet reductions.

### Event Study



You see the pattern between these two graphs? Figure 4 shows daily S&P 500 returns and VIX changes in the 20 days following the QT announcements from the Federal Reserve. Evidence clearly shows that this is an inverse relationship between equities and volatility. When the S&P500 rises, VIX tends to fall, and when the S&P500 falls, VIX tends to rise. QT amplifies this dynamic by tightening liquidity, which increases magnitude of both equity swings and volatility spikes. Overall, this highlights that market reactions to QT are automatically and always linked to liquidity stress, with the Federal Reserve's balance sheet policy shaping the market behavior altogether.

## 5. Econometrics

To enumerate the effects of the QT, we conducted several series of econometric analyses.

### VAR Model

We estimated a Vector Autoregression model (VAR) including Fed balance sheet growth and decline, S&P500 returns and VIX was estimated to assess market responses to liquidity shocks. Impulse and speculative response analysis show that a negative shock to Federal Reserve's assets causes VIX to rise sharply for 25-65 days, S&P500 returns to fall and volatility to remain elevated. Conversely a positive QE shock leads to less volatility, rising equities and increased risk appetite. These changes together confirm the fact that changes in liquidity are causal drivers of market behavior rather than correlated with market movements.

### Granger Causality

Granger Causality results showed that changes in Fed assets significantly predict VIX movements -  $p < 0.01$ , though, VIX does not predict changes in Fed's assets. This demonstrates that QT causes volatility rather than other way around, which reinforces the causal relationship implied by the VAR model.

### Difference-in-Differences (DiD)

DiD analyses compared volatility during the time period of pre-QT, 2020-2021, with the full QT time period of 2022-2025, controlling for interest rates and inflation. The analyses reveal that volatility factors were structured higher during QT even after accounting for other economic factors. This confirms that QT operates as an independent tightening mechanism and channel affecting the market behavior beyond traditional policy tools.

## 6. Policy and Portfolio Implications

For Central banks, QT is very risky because it drains reserves unevenly and unbalanced way, destabilizes markets, and amplifies market crashes. The QT pause of 2025 demonstrated its breaking point, and balance-sheet policy now functions as a de facto interest rate, with broader market influence.

For investors, QT creates hostile market environment characterized by high risk, high volatility, liquidity shocks and sudden drawdowns. When QT ended, asset prices surged, volatility collapsed and risk appetite returned. Portfolio strategies should be corrected accordingly. During QT, investors should reduce duration, hold Treasury bills, avoid leverage and maintain cash buffers. When QT ends, the investors should increase equity exposure, buy long-term assets and add risk assets, and most importantly rotate into growth positions. Liquidity has become the dominant variable in the financial markets, which drives almost everything.

## 7. Conclusion

QT from 2022 to 2025 proved that central bank's central sheets now dominate the financial markets. QT drained reserves, destabilized funding markets, increased volatility and suppressed the asset prices. When QT was halted in 2025, markets did indeed respond in a heartbeat. Volatility fell, and equities surged. The legacy of QT and QE are permanent. Balance-sheet policy is as strong and powerful as interest-rate policy. Future crises will not be managed by interest rate cuts or increases

alone, but will also require QE or QT relaunches/launches. The markets have become liquidity-dependent systems and QT only exposed this structural fragility.

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