

# An Examination of Whether U.S. LNG Exports Drive Domestic Natural Gas Prices

Dean Foreman, Ph.D.\*



---

\* Chief Economist, Texas Oil and Gas Association | 304 W 13<sup>th</sup> Street, Austin, TX 78701 | [dforeman@txoga.org](mailto:dforeman@txoga.org)  
[Economics - Texas Oil & Gas Association](#)

## **Table of Contents**

### Executive summary

- I. Exploratory data analysis of natural gas prices at Henry Hub and U.S. net LNG exports
- II. Econometrically forecasting natural gas prices
- III. Implications and conclusions
- IV. Appendix

## **Executive summary**

Since its original publication in 2023, this study has been updated twice and now enters its third revision. Across all versions, the results have held the test of time: U.S. liquefied natural gas (LNG) exports have not been a significant or sustained driver of domestic natural gas prices.

The U.S. energy revolution has delivered abundant, affordable natural gas, strengthening households, manufacturers, and U.S. global leadership as the world's top natural gas exporter. LNG exports have been critical to global energy security — especially after Russia's 2022 invasion of Ukraine — yet domestic prices at Henry Hub have remained historically low. In 2024, spot prices at Henry Hub averaged \$2.19 per million Btu — the lowest real prices since 1997. At the time of writing, prices remained near \$2.74 per million Btu as of August 20, 2025, still within the lowest 10% of real prices since 1997.

Despite this, some stakeholders have continued to suggest that LNG exports threaten higher domestic prices. The Biden administration's January 2024 pause on new LNG export approvals reflected this concern, pointing to the tripling of export volumes between 2019 and 2022. However, the evidence shows the opposite: LNG exports have motivated U.S. production growth and productivity improvements that exert downward price pressures and benefit American consumers.

Recent price increases from last year's historic lows have sometimes been misattributed to LNG exports. Past events such as the 2022 Freeport outage, which briefly cut export capacity and lifted prices, underscore that temporary shocks — not structural export volumes — are behind such spikes. While LNG remains the leading source of demand growth, the data and modeling here show supply-side fundamentals — production dynamics, storage, weather, and expectations — have been the real drivers

Using both correlation analysis and a vector autoregression (VAR) framework, this study demonstrates:

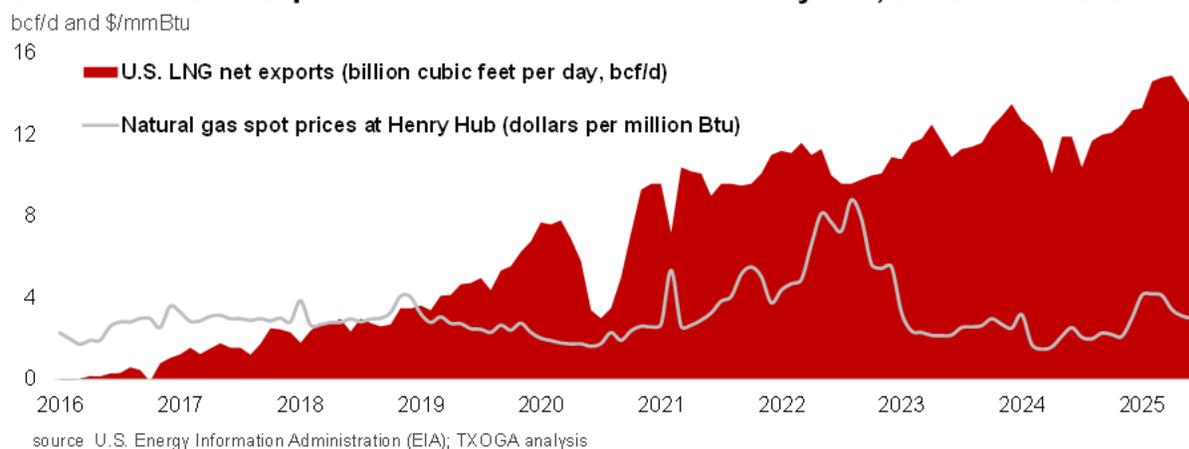
- Correlation between LNG exports and Henry Hub prices is unstable, short-lived, and not causal.
- Econometric modeling shows U.S. LNG exports are not a statistically significant driver of domestic natural gas prices.
- Price expectations, storage dynamics, and production fundamentals dominate the formation of U.S. natural gas prices.

The implications are clear: LNG exports have spurred incremental production, fostered technological advances, and expanded resource estimates. Far from raising prices, they have reinforced U.S. energy security and global competitiveness. Misattributing price movements to LNG exports risks misguided policies that would undercut these benefits.

## I. Exploratory data analysis of natural gas prices at Henry Hub and U.S. net LNG exports

As a starting point, Chart 1 compares monthly U.S. LNG net exports with Henry Hub natural gas prices from 2016 through July 2025. The United States became a net LNG exporter in 2016; since then, exports have risen more than 27-fold, while domestic real prices have remained historically low. Despite record LNG volumes, Henry Hub prices continue to reflect seasonal variation and supply shocks rather than export levels.

**Chart 1. U.S. LNG Exports and Natural Gas Prices at Henry Hub, Jan. 2016 – Jul. 2025**



For example, prices rose in 2022 amid Russia’s war in Ukraine but subsequently fell to record lows in 2023 and early 2024, even as U.S. exports continued to expand. This simple comparison underscores a key point: there is little evidence of a direct or causal relationship between LNG exports and domestic natural gas prices.

There have been brief episodes where correlations appeared statistically significant. During the 2020 pandemic, both LNG exports and prices declined, generating a short-lived positive correlation. Similarly, during Winter Storm Uri in February 2021, LNG exports fell while prices spiked, producing an inverse correlation. Yet in both cases, common external shocks — the pandemic and the storm — were the real drivers, not LNG export activity.

More recently, both exports and prices have risen, leading some to infer causation. However, correlation analysis alone cannot establish causality. Prices and exports can rise together in response to other underlying fundamentals.

### Correlation analysis

A statistical comparison of monthly LNG exports and Henry Hub prices from January 2016 to July 2025 shows:

- **Levels:** direct correlation of +0.23 (statistically significant at the 95% level).

- **Monthly changes:** inverse correlation of -0.23 (also statistically significant).
- **Lagged changes:** when comparing price changes with prior-month export changes, the correlation shifts back to +0.11 — not statistically significant. With lags up to four months, the sign of the correlation flips and remains insignificant.

These results highlight the instability of simple correlations. Depending on whether one compares levels, changes, or lags, the sign and significance of the relationship can differ. The Appendix provides additional correlation analyses, including rolling six- and twelve-month windows, which similarly show alternating direct and inverse correlations that are not sustained.

### **Key takeaway**

Selective use of correlation can support contradictory inferences, but the evidence provides no basis for concluding that LNG exports systematically drive U.S. natural gas prices. Instead, the patterns confirm that broader market fundamentals must be considered. Accordingly, Section II turns to a more robust econometric model that accounts for production, storage, demand, seasonality, and expectations.

## **II. Econometrically forecasting natural gas prices**

### **Economic intuition**

At first glance, it may seem logical that exporting U.S. natural gas could raise domestic prices. In a static view, sending gas abroad reduces domestic supply, and—holding everything else equal—prices should rise. This reasoning has been central to some stakeholder claims that LNG exports inflate U.S. gas prices.

However, the natural gas market is not static. LNG exports have enabled U.S. producers to access premium global markets, which in turn has motivated new production and investment. Between December 2015 and July 2025, marketed production in the Lower 48 grew from 74.1 bcf/d to 114.3 bcf/d — a 56% increase — while LNG net exports rose by 13.3 bcf/d, or roughly one-third of that growth. Production growth has consistently outpaced export growth, reflecting the dynamic nature of the market.<sup>2</sup>

Moreover, LNG projects require dry natural gas, separating out hydrocarbon gas liquids (HGLs) such as ethane, propane, and butane. This dynamic has fueled growth in U.S. petrochemical feedstocks, with HGL production more than doubling since 2015. In short, LNG exports have reinforced rather than constrained U.S. supply, supporting downstream industries in the process.

### **Variables to explain U.S. natural gas prices**

While LNG exports attract attention, many other fundamentals drive natural gas prices. In constructing the econometric model, we incorporate:

---

<sup>2</sup> EIA's [drilling productivity metrics](#) show that natural gas rig productivity — that is, natural gas production from newly completed wells per rig — in July 2025 was 25.3 mmcf/d in Appalachia and 11.5 mmcf/d in the Haynesville, representing increases of 224.4% and 210.8%, respectively, compared with December 2015.

- **Price expectations** (spot vs. futures levels and changes).<sup>3</sup>
- **Storage** (working gas inventories relative to the five-year range).
- **Pipeline trade** (net pipeline imports/exports).
- **Total U.S. production and consumption.**
- **Seasonality/weather** (degree days).
- **Exogenous shocks** (COVID-19 indicator variable).

Table 1 describes the measures, their units, source, transformation (if any) by which they enter the model, and the sample mean and range for our monthly data spanning January 2016 to July 2025. All non-stationary price series are first differences; storage metrics and flows enter in levels/ratios as shown.

**Table 1. Variables and Descriptive Statistics**

Variable	Units	Transformation	Source	Mean	Min	Max
Natural gas spot prices at Henry Hub	\$/mmBtu	first difference	EIA	0.011	-2.840	2.740
Nymex natural gas month 1 futures prices	\$/mmBtu	first difference	CME Group	0.011	-2.336	1.725
Futures price expectations (ratio of month 1 to month 4)	ratio	n/a	CME Group	0.982	0.687	1.354
Natural Gas Net Withdrawals from Inventory	billion cubic feet, end-of-period	n/a	EIA	0.405	-32.677	29.465
Nat. Gas Storage Position (ratio of current to 5-yr avg.)	ratio	n/a	EIA	1.029	0.902	1.395
LNG net exports	bcf/d	first difference	EIA	0.124	-2.400	3.200
Pipeline nat. gas exports	bcf/d	first difference	EIA	0.008	-3.000	1.800
Natural Gas Lower 48 States (excl GOM) Marketed Production	bcf/d	n/a	EIA	95.963	71.200	115.300
U.S. Natural Gas Consumption	bcf/d	n/a	EIA	84.300	61.030	126.800
Heating Degree Days, U.S. average	degree days	n/a	EIA	341.348	3.547	912.734
Pandemic indicator	binary	n/a	derived	0.227	0.000	1.000

These variables are interrelated, so we use a vector autoregression (VAR) framework, which allows for feedback between them. Weather and the pandemic indicator are treated as exogenous; all others are endogenous.

### Model design and estimation

Before estimation, we conducted tests for unit roots, stationarity, and cointegration, and found that it is appropriate to apply VAR estimation to the data.

- **Stationarity:** Spot and futures prices are expressed as first differences.
- **Lag structure:** Six monthly lags, based on exclusion tests.
- **Significance:** Each estimated equation is highly significant, with the Henry Hub price equation providing a strong fit.
- **Granger causality:** LNG export changes do not Granger-cause U.S. natural gas prices — meaning export data cannot be used to forecast prices reliably.<sup>4</sup>

Each estimated equation is highly significant, and the one of prime interest that explains U.S. natural gas prices at the Henry Hub is a strong fit with the data.<sup>5</sup>

<sup>3</sup> We have also considered domestic oil prices, since much natural gas production is associated with oil production, but ultimately found forecasting performance is superior excluding them.

<sup>4</sup> Jointly, the specification Granger-causes prices with 99% confidence, but the Chi-square statistic of 11.2 for LNG net exports is not statistically significant at the 95% confidence level.

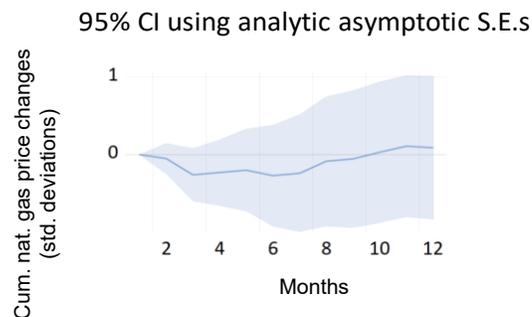
<sup>5</sup> R-squared 0.86, F-statistic 2.83, Log likelihood -15.1, AIC 1.72.

## Results

1. **Impulse Response Functions (IRFs):** A standard deviation “shock” in LNG exports produces no statistically significant effect on Henry Hub prices.

**IRF for natural gas prices at Henry Hub, showing the accumulated response over 12 months of natural gas prices at Henry Hub to a standard deviation innovation in LNG net exports.**

Accumulated Response to Cholesky One S.D. (d.f. adjusted) Innovations



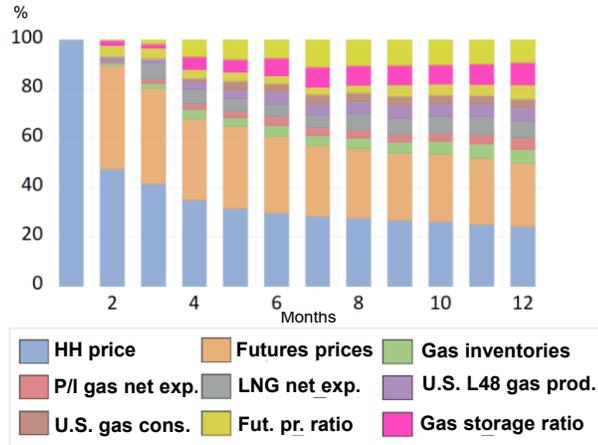
This chart shows the cumulative effect on Henry Hub natural gas prices up to 12 months following a standard deviation increase in LNG net exports. The line in the middle of the shaded region shows the estimated impact on natural gas prices at Henry Hub, which statistically is not significantly different from zero. The shaded region shows a 95% confidence interval that also encompasses and is not significantly different than zero. Consequently, LNG net exports have not had a significant and sustained impact on domestic natural gas prices.

## 2. VAR variance decomposition

Futures prices and past spot prices account for more than half of the variation in Henry Hub prices. LNG exports (grey) contribute negligibly over horizons up to twelve months.

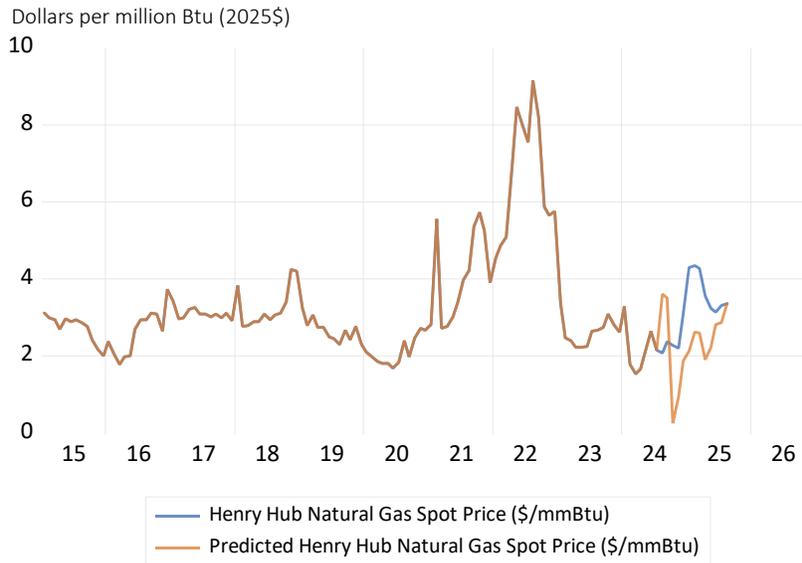
### Variance Decomposition using Cholesky (d.f. adjusted) Factors

Variance decomposition of Henry Hub natural gas prices



### 3. Actual vs. predicted natural gas prices at the Henry Hub

Forecast accuracy: When the model is estimated using data only through July 2024, out-of-sample forecasts for the last 12 months (Aug. 2024–Jul. 2025) produced a mean error of  $\pm\$0.23$  per million Btu ( $\pm 12.3\%$ ). The model is robust and valid for testing hypotheses about LNG exports.<sup>6</sup>



### Key Takeaway

The econometric evidence reinforces what correlation analysis suggested: LNG exports are not a sustained or significant driver of domestic prices. Instead, price expectations, storage levels, and production fundamentals dominate U.S. natural gas price formation.

<sup>6</sup> The t-statistic on the accumulated response of LNG net exports as 12 months on Henry Hub prices is 0.19, which is statistically insignificant.

### III. Implications and conclusions

Based on both correlation analysis and a robust VAR model, this study demonstrates that U.S. LNG exports are not a sustained driver of domestic natural gas prices. The primary reason is straightforward: exports stimulate incremental U.S. production and investment, which expand supply rather than constrain it.

These findings align with the commercial realities of LNG development. Projects cost billions of dollars, require long-term supply certainty, and operate at high utilization rates once online. This structure ensures that LNG exports are matched with new production capacity rather than diverting supply from existing domestic uses.

#### Market Implications

- **Production growth:** LNG exports have supported output increases in key basins such as the Haynesville, Eagle Ford, and Permian.
- **Productivity gains:** Drilling technology, recovery rates, and reserve estimates have all improved alongside export growth.
- **Downstream benefits:** LNG processing yields hydrocarbon gas liquids (HGLs), bolstering U.S. petrochemicals and manufacturing.

#### Price Formation

The VAR results underscore two enduring truths:

1. **Prices are self-reinforcing:** Natural gas spot prices are strongly correlated with their own past values.
2. **Expectations matter:** Futures prices are a dominant driver of today's spot prices.

By contrast, LNG exports consistently contribute little to explaining price variation. Even when shocks occur — such as the 2022 Freeport LNG outage, which briefly reduced U.S. export capacity by about 2 bcf/d and lifted prices — the effect is temporary and tied to unexpected disruptions, not to the structural presence of LNG exports.

#### Policy Implications

Attributing higher natural gas prices to LNG exports is not supported by evidence. Misdiagnosing the drivers risks misguided interventions that could stifle investment, harm consumers, and weaken U.S. global energy leadership. Instead, policymakers should recognize:

- **Exports as a strength:** LNG links U.S. supply to global markets, encouraging domestic investment while supporting allies abroad.

- **Supply-side dynamics:** Storage, production, and weather — not exports — are the fundamental determinants of U.S. natural gas prices.
- **Energy security benefits:** U.S. LNG has enhanced resilience for global consumers while reinforcing the affordability and availability of gas at home.

### **Conclusion**

Across three updates spanning nearly a decade of data, the results remain consistent: U.S. LNG exports have not driven sustained increases in domestic natural gas prices. On the contrary, exports have spurred production, productivity, and resource growth that place downward pressure on prices over time.

For U.S. households, manufacturers, and policymakers, this conclusion should be reassuring: LNG exports and affordable domestic natural gas are not in conflict. They are complementary outcomes of the same energy revolution — one that continues to strengthen both American competitiveness and global energy security.

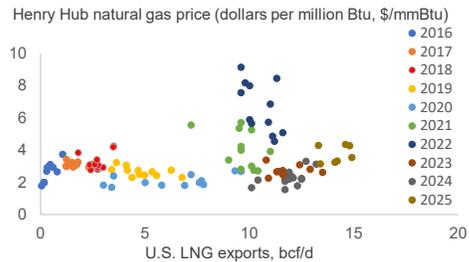
## IV. Appendix

### Level vs. Level: U.S. natural gas prices vs. LNG exports

#### No significant, sustained correlation

- Correlation is not causation. The left panel compares LNG exports and natural gas prices
- A positive relationship would show an upward slope: higher exports with higher prices (top-right) and lower exports with lower prices (bottom-left)
- The right panel shows rolling 6- and 12-month correlation coefficients. For statistical significance at 90% confidence, correlations must exceed +0.73 (6 months) or +0.50 (12 months)
- While the past year shows 12-month correlations that reach statistical significance, this likely reflects parallel upward trends in LNG exports and natural gas prices rather than a causal link. In other words, the recent significance is consistent with a spurious correlation between trending levels, not an enduring relationship

**Natural gas prices at Henry Hub vs. U.S. LNG exports, Jan. 2016 – Jul. 2025**



**Correlation between U.S. LNG exports and natural gas prices**



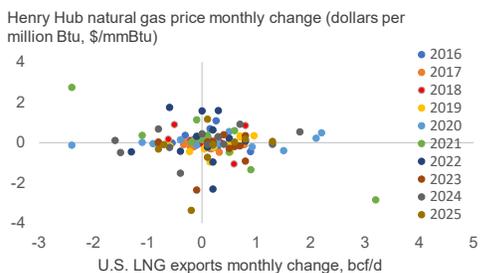
sources: EIA; TXOGA analysis

### Change vs. change: U.S. natural gas prices vs. LNG exports

#### No significant, sustained correlation

- Correlation is not causation. The left panel plots monthly changes in LNG exports against changes in natural gas prices:
  - A positive relationship would show points in the **top-right** (exports up, prices up) and **bottom-left** (exports down, prices down)
- The right panel shows rolling 6- and 12-month correlation coefficients. Statistical significance at 90% confidence requires a correlation of **+0.73 (6 months)** or **+0.50 (12 months)**
- Results show no consistent correlation strong enough to infer that LNG exports drive changes in natural gas prices

**Changes in natural gas prices at Henry Hub vs. U.S. LNG exports, Jan. 2016 – Jul. 2025**



**Correlation between monthly changes U.S. LNG exports and natural gas prices**



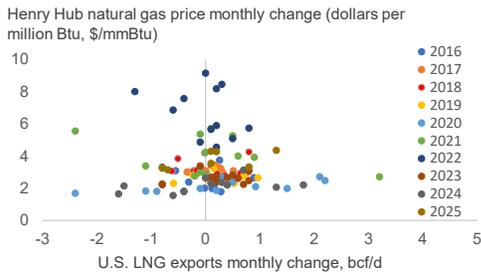
sources: EIA; TXOGA analysis

## Level vs. change: U.S. natural gas prices vs. LNG exports

### No significant, sustained correlation

- Correlation is not causation. The left panel compares natural gas prices with monthly changes in LNG exports:
  - A positive relationship would show points in the **top-right** (exports rising, prices rising) and **bottom-left** (exports falling, prices falling)
- The right panel shows rolling 6- and 12-month correlations. Statistical significance at 90% confidence requires a coefficient above **+0.73 (6 months)** or **+0.50 (12 months)**
- Over the past year, correlations briefly reached statistical significance, but then weakened. This likely reflects short-term parallel movements rather than a durable causal link—consistent with a spurious correlation between trending series

**Natural gas prices at Henry Hub vs. monthly changes in U.S. LNG exports, Jan. 2016 – Jul. 2025**



**Correlation between natural gas prices and monthly changes in U.S. LNG exports**



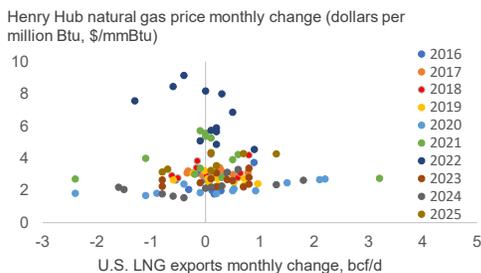
sources: EIA; TXOGA analysis

## Level vs. last month's change: U.S. natural gas prices vs. LNG exports

### No significant, sustained correlation

- Correlation is not causation. The left panel compares Henry Hub prices with prior-month changes in LNG exports
- A positive relationship would appear as an upward slope: larger export increases associated with higher gas prices
- The right panel shows rolling 6- and 12-month correlations. Statistical significance at 90% confidence requires coefficients above **+0.73 (6 months)** or **+0.50 (12 months)**
- Results show no consistent or sustained correlation. While some short periods approach significance, they quickly reverse, underscoring that monthly LNG export changes do not explain natural gas price movements. This suggests that other factors—such as weather, storage, production, and broader demand shifts—remain the dominant drivers of U.S. natural gas prices

**Natural gas prices at Henry Hub vs. prior-month change in U.S. LNG exports, Jan. 2016 – Jul. 2025**



**Correlation between natural gas prices and the prior-month's change in U.S. LNG exports**



sources: EIA; TXOGA analysis

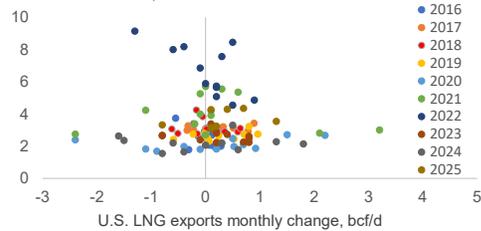
## Level vs. change 2 months ago: U.S. natural gas prices vs. LNG exports

### No significant, sustained correlation

- Correlation is not causation. The left panel compares natural gas prices with LNG export changes two months earlier
- A positive relationship would imply that increases in LNG exports are followed by higher natural gas prices after a short lag. The right panel shows rolling 6- and 12-month correlations
- Statistical significance at 90% confidence requires coefficients above +0.73 (6 months) or +0.50 (12 months)
- Results show no consistent or sustained relationship. While occasional spikes approach or exceed significance thresholds, they reverse quickly—suggesting that any apparent linkage is short-lived and likely spurious. Overall, LNG export growth two months prior does not provide a reliable signal for subsequent U.S. natural gas price changes

#### Natural gas prices at Henry Hub vs. change in U.S. LNG exports 2 months prior, Jan. 2016 – Jul. 2025

Henry Hub natural gas price monthly change (dollars per million Btu, \$/mmBtu)



#### Correlation between natural gas prices and change in U.S. LNG exports from 2 months prior



sources: EIA; TXOGA analysis

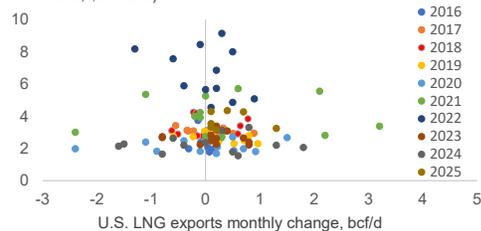
## Level vs. change 3 months ago: U.S. natural gas prices vs. LNG exports

### No significant, sustained correlation

- Correlation is not causation. The left panel compares Henry Hub natural gas prices with LNG export changes three months earlier
- If LNG export growth reliably influenced gas prices with a three-month lag, we would expect to see a clear upward-sloping relationship
- The right panel shows rolling 6- and 12-month correlations. Statistical significance at 90% confidence requires coefficients above +0.73 (6 months) or +0.50 (12 months)
- Correlations fluctuate but rarely reach significance and lack persistence. Even where short-term correlations appear, they quickly fade—suggesting no systematic lagged effect of LNG exports on gas prices. Overall, LNG export changes three months prior do not provide a consistent or predictive signal for U.S. natural gas prices.

#### Natural gas prices at Henry Hub vs. change in U.S. LNG exports 3 months prior, Jan. 2016 – Jul. 2025

Henry Hub natural gas price monthly change (dollars per million Btu, \$/mmBtu)



#### Correlation between natural gas prices and change in U.S. LNG exports from 3 months prior



sources: EIA; TXOGA analysis

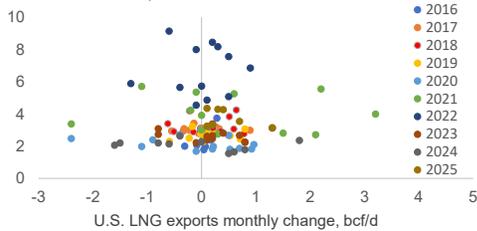
## Level vs. change 4 months ago: U.S. natural gas prices vs. LNG exports

### No significant, sustained correlation

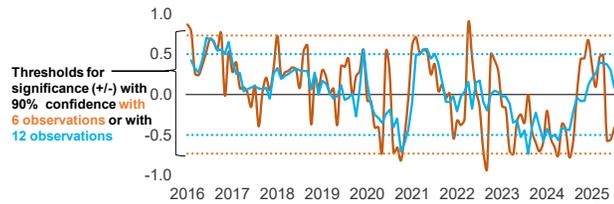
- Correlation is not causation. The left panel compares Henry Hub natural gas prices with LNG export changes four months earlier
- If LNG exports had a systematic four-month lagged effect, we would expect to see a consistent upward-sloping pattern
- The right panel shows rolling 6- and 12-month correlations. Statistical significance at 90% confidence requires coefficients above +0.73 (6 months) or +0.50 (12 months)
- Correlations occasionally spike but lack persistence and often reverse quickly, failing to meet significance for sustained periods. Overall, LNG export changes four months prior show no consistent predictive relationship with U.S. natural gas prices, reinforcing that other drivers—such as seasonal demand, storage, and production dynamics—dominate.

### Natural gas prices at Henry Hub vs. change in U.S. LNG exports 4 months prior, Jan. 2016 – Jul. 2025

Henry Hub natural gas price monthly change (dollars per million Btu, \$/mmBtu)



### Correlation between natural gas prices and change in U.S. LNG exports from 4 months prior



sources: EIA; TXOGA analysis