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

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Executive Summary

The U.S. energy revolution has been characterized by abundant natural gas production at affordable prices, benefiting American households and manufacturers, and establishing the United States as the world's top natural gas exporter. Before Russia's war in Ukraine escalated in February 2022, U.S. natural gas exports drove the globalization of natural gas markets. Since then, the United States has been a lifeline for energy consumers in Europe (and globally) as well as a counterbalance to Russia's weaponization of its energy exports.

Amid tumultuous and uncertain times, U.S. natural gas exports have remained near record-high levels per the U.S. Energy Information Administration (EIA)[2], but natural gas prices at Henry Hub, Louisiana, remained as low as $1.70 per million Btu (mmbtu) in early February 2024, marking the lowest real prices for the month on record since 1994.

Nonetheless, in their decision on January 26, 2024, to pause all pending approvals of new LNG export facilities (see here), the Biden administration has continued to point to U.S. liquefied natural gas (LNG) exports, which tripled in volume since 2019,[3] for the potential to raise domestic energy costs.

This decision neglects the evidence that U.S. LNG exports have actually motivated U.S. natural gas production growth and productivity, which in turn have exerted downward price pressures to the benefit of American consumers.

By limiting the growth for U.S. LNG exports, the Biden administration's intervention runs afoul of basic market principles as well as the demonstrated progress that has underpinned economic and energy security for American and global consumers.[4]

LNG Allies asked us to examine the impact of U.S. LNG exports on natural gas prices at Henry Hub by developing a statistically valid framework, updating the model we presented in May 2023 (see here).

The model has continued to explain and predict natural gas prices accurately, showing that U.S. LNG net exports have not had any sustained and significant direct impact on natural gas prices.

This conclusion is based on exhaustive correlation analysis, presented in Section I and detailed in the Appendix, as well as a holistic fundamentals-driven framework that has accurately predicted U.S. natural gas prices, in Section II.

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[1] Chief Economist, Texas Oil and Gas Association.

[2] In February 2024, the U.S. Energy Information Administration (EIA) estimated U.S. LNG exports of 12.0 billion cubic feet per day (bcf/d) and pipeline natural gas exports of 8.0 bcf/d.

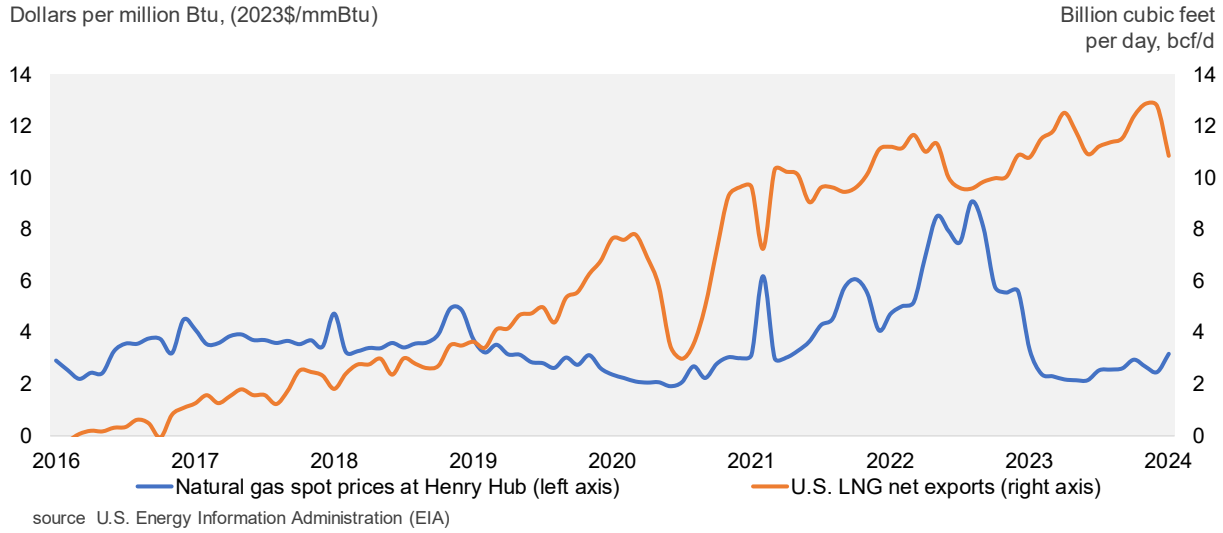
[3] U.S. LNG exports were 4.0 bcf/d in Q1 2019 per EIA.

[4] Environmental gains from the expanded use of natural gas to displace biomass and coal consumption are outside the scope of this analysis, but is well documented from multiple sources including the U.S. Energy Information Administration (EIA), Environmental Protection Agency (EPA).

The fact is that U.S. LNG exports have spurred incremental new U.S. production and led to improvements in technology and resource recoveries, which in turn have generally added to estimated domestic recoverable gas resources. The U.S. Potential Gas Committee's (PGC) most recent estimates suggest the resource base could enable future U.S. gas supply of 3,978 trillion cubic feet (tcf)—equivalent to 100 years of production at 2022 levels.[5]

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

Chart 1. U.S. LNG Exports and Natural Gas Prices at Henry Hub, Jan. 2016 – Jan. 2024



source U.S. Energy Information Administration (EIA)

As a point of departure, consider Chart 1, which compares monthly U.S. LNG net exports and natural gas prices at Henry Hub from 2016 to January 2024. The U.S. became a net exporter of LNG for the first time in 2016. As of January 2024, U.S. LNG net exports increased by a multiple of over 40 compared with the average in 2016, while domestic real natural gas prices remained at record low levels for the month. Historically, there has been little to no evidence of a direct or causal relationship between the exports and domestic natural gas prices. As Chart 1 demonstrates, natural gas prices remained subject to seasonal variation but generally declined in 2019 through mid-2020 —and again beginning in late 2022 — despite increased U.S. LNG net exports.

We can identify periods, however, where there has been a statistically significant direct relationship between the exports and prices. Strong direct correlations appeared over rolling periods of six to 12 months during the 2020 pandemic, when exports and prices both decreased. Of course, the exports, domestic demand and prices for many things fell during the pandemic, so it is important to account for the effects of the pandemic.

Natural gas prices rose, and LNG net exports fell, with winter storm Uri in Feb. 2021. Despite the appearance of a statistically significant inverse correlation at that time, intuitively it is obvious that the storm affected the supply chain, and it was not the change in exports that drove prices. Similarly, as Russia's war in Ukraine began in Feb. 2022, domestic natural gas prices continued to rise through the shoulder season to winter, despite a slippage in U.S. LNG net exports. Consequently, two additional implications are that: (1) it is important to account for seasonal variation; and (2) correlation analysis does not establish causation.

Given the foregoing points, a proper analysis requires a statistically valid model that accurately explains natural gas prices based on the market fundamentals which intuitively should drive them. Before delving into such a model,

[5] Potential Gas Committee reports future natural gas supplies in U.S. at highest reported level on record | Colorado School of Mines | Newsroom (minesnewsroom.com).

however, let us continue with a correlation analysis subject to the caveats about accounting for the pandemic, seasonality, and that correlation is not causation.

Analysis of the monthly LNG levels of exports and natural gas prices, from January 2016 to January 2024, shows a direct correlation of +0.36, which with 97 observations is statistically significant with 95% confidence. Over the same period, however, the correlation between monthly *changes* in LNG exports and natural gas prices shows an inverse correlation of -0.12 and remains positive if we employ past changes in LNG net exports of one to four months. Moreover, if we compare natural gas prices *changes with the changes* in LNG net exports from the prior month, the inverse correlation becomes statistically significant at -0.34 – and can flip sign while remaining insignificant with lagged changes in LNG net exports of up to four months.

Importantly, any inferences about the underlying relationships thus could depend on whether one compares levels, changes in levels, or levels with changes in levels — with or without lags in time. Accordingly, the Appendix presents several alternative correlation analyses and demonstrates that statistically significant direct and inverse correlations can be identified over select 6-month and 12-month periods.

But the key point is that there has been no significant and sustained relationship where U.S. LNG exports have driven higher domestic natural gas prices. In fact, a selective focus on correlation analysis over periods within the data could support opposite inferences. We will avoid such an error and present in Section II a valid model that is suitable for testing hypotheses about the relationship between U.S. LNG net exports and domestic natural gas prices.

II. Econometrically forecasting natural gas prices

Intuition

Let's discuss economic intuition as to why increased U.S. LNG exports could contribute to higher natural gas prices in a static sense but not necessarily in a dynamic sense.

Some domestic industrial consumers (for example, see here) have asserted that the growth of U.S. LNG exports has driven higher domestic natural gas prices. In a static view of LNG exports, shipping domestic gas production internationally could lower domestic supply, all else being equal. By economic fundamentals, less supply generally corresponds with higher prices *if all other things remain equal*. The main counterpoint to this view, however, is that the natural gas market is not static.

The growth of U.S. LNG exports, which enables those with U.S. liquefaction capacity to access premium global markets, has motivated new incremental natural gas production in the United States. For example, natural gas marketed production among the Lower 48 (L48) states increased from 74.1 bcf/d in Dec. 2015 up by 37.1 bcf/d or 50.1% over the period (per EIA).[6] By comparison, U.S. LNG net exports rose by 4.1 bcf/d or 12.5% of the L48 production increase over the same period. With the dynamic growth of U.S. natural gas production, investments in new process and technologies raised U.S. drilling productivity, improved the recovery of natural resources, and raised the estimated amounts of U.S. proved and probable natural gas reserves.[7]

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[6] While access to international natural gas markets at premia above U.S. levels economically motivates LNG export project development, an economic issue for domestic natural gas supply curve has either shifted to the right or simply remained flat, such that developing more domestic resources has not materially lowered productivity or added cost per se. The evidence from EIA and other sources (e.g., FactSet/BTU Analytics and petronerds) show drilling productivity that exceeds its pre-pandemic levels even if one excludes any contributions from previously drilled but uncompleted wells.

[7] EIA's Drilling Productivity Report (DPR) shows that, despite some decreases over the past year, natural gas rig productivity in Jan. 2024 was estimated to be more than double what it was in Dec. 2015 in the Haynesville production region (E. Texas and Louisiana) and increased by 121% in Appalachia over the same period. Natural gas proved reserves nearly doubled between 2015 and 2021 (latest) per EIA.

Additionally, as LNG exports require dry natural gas with the extraction of natural gas liquids (NGLs) like ethane, propane, butane, and pentanes-plus, another dynamic market feature has been to advantage the primary feedstocks for U.S. petrochemical production. U.S. NGL production grew by nearly 91.6% between Dec. 2015 and November 2023 (latest per EIA) while domestic NGL consumption increased by 35.2% over the same period. So, U.S. natural gas market fundamentals have positively evolved, and we must account for broad market conditions to assess the potential impact of LNG net exports on prices.

Variables to Explain U.S. Natural Gas Prices

With domestic natural gas prices and U.S. LNG exports, we have at this point analyzed two variables of interest but done so in isolation. Other economic measures that should influence natural gas prices include:

- **Price expectations** (the price level and whether it is expected to increase or decrease over time).
- **Working gas storage** (the amount in storage and its position relative to its historical 5-year range).
- **Pipeline natural gas net exports (imports).**
- **Total U.S. natural gas production and consumption.**
- **Seasonality/weather** (degree days) and an indicator for the **2020 COVID-19 pandemic**.

We also considered domestic oil prices since much natural gas production is associated with oil production.[8] Table 1 describes the measures employed here, their units, source, transformation (if any) by which they enter the model, and the sample mean and range for our monthly data spanning Jan. 2016 to Jan. 2024.

Table 1. Variables and Descriptive Statistics

Variable	Units	Transformation	Source	Mean	Min	Max
Natural gas spot prices at Henry Hub	$/mmBtu	first difference	EIA	3.393	1.695	9.143
Nymex natural gas month 1 futures prices	$/mmBtu	first difference	CME Group	0.007	-2.350	1.730
Futures price expectations (ratio of month 1 to month 4)	ratio	n/a	CME Group	0.957	0.687	1.354
Natural Gas Net Withdrawals from Inventory	billion cubic feet, end-of-period	n/a	EIA	0.377	-15.493	32.083
Nat. Gas Storage Position (ratio of current to 5-yr avg.)	ratio	n/a	EIA	1.015	0.911	1.214
LNG net exports	bcf/d	first difference	EIA	0.023	-1.930	1.309
Pipeline nat. gas exports	bcf/d	first difference	EIA	0.023	-1.849	3.002
Natural Gas Lower 48 States (excl GOM) Marketed Production	bcf/d	n/a	EIA	92.742	71.199	107.000
U.S. Natural Gas Consumption	bcf/d	n/a	EIA	83.103	61.033	115.861
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

Most of these variables are interrelated, so we employ a vector autoregression (VAR) framework that is appropriate for interrelated or endogenous variables. Each of them except weather and the pandemic indicator are assumed to be endogenous, so their own past values and past values of each of the other variables can influence the estimation. The weather/heating degree days and pandemic indicator variable are taken to be exogenous, so they are independent of the other variables.

Empirical results

Before estimation, we conducted tests for unit roots, stationarity, and cointegration, and we found that it is appropriate to apply VAR estimation to the data set. Natural gas (spot) prices and futures prices are expressed as first differences, which ensures stationarity. Based on the results of lag exclusion testing, we employ six monthly lags in the regression.[9] 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.[10] Granger causality testing shows that natural

[8] We developed specifications including domestic oil prices but found the variables presented herein were superior in their ability to forecast domestic natural gas prices.

[9] VAR lag exclusion Wald Tests show jointly that the first six monthly lags are significant with more than 99% confidence.

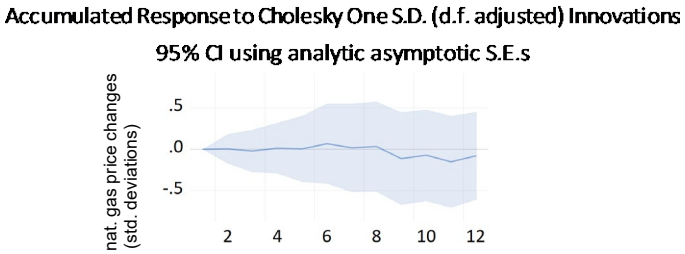
[10] Adjusted R-squared 0.907, F-statistic 3.842, Log likelihood -1.533, AIC 1.487.

gas prices are not Granger-caused by changes in U.S. LNG exports, so one cannot accurately project natural gas prices based on U.S. LNG net exports.[11]

As is typical for a VAR framework, we present outputs as follows:

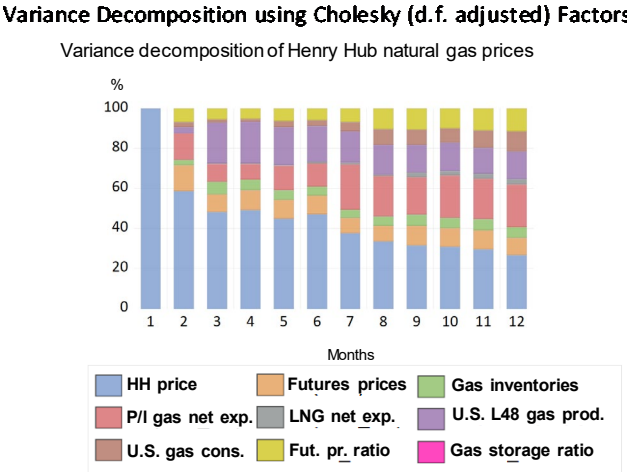
1. Impulse response function (IRF) (i.e., how any given variable responds to shocks in another variable) and quantification of the cumulative sensitivity;
2. VAR variance decomposition (to identify how much a given variable contributes); and
3. Comparisons of actual data versus dynamic forecasts from the model.

1. 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.



An IRF shows the responsiveness over time of one variable to an innovation in another in terms of standard deviations. 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. Consistent with the correlation analysis in Section I, the IRF shows at five and six months a short-lived positive response of domestic natural gas prices to a shock in LNG exports, but it dissipates by month seven and corresponds with lower prices, but not significantly so, in months nine through 12. Consequently, one would not conclude that LNG net exports have a significant and sustained impact on domestic natural gas prices.

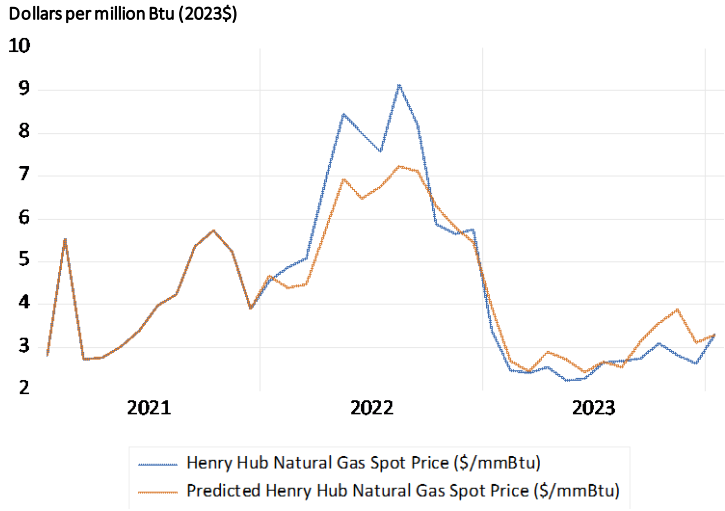
2. VAR Variance Decomposition



[11] Jointly, the specification Granger-causes prices with 99% confidence, but the Chi-square statistic of 11.2 for LNG net exports is not statistically with levels of confidence of 95% or greater.

Contributions to variance in the VAR model are shown and suggest that the past prices and futures price expectations account for over half of the variation in natural gas prices at Henry Hub. U.S. LNG net exports (grey) contributed negligibly to the variance in natural gas prices over a period up to 12 months.

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



A litmus for any model is whether it can forecast accurately out of sample, and this chart shows dynamic forecasts from the specification produced a mean error of +/- $0.29 per mmBtu (+/- 8.1%). This is a valid econometric specification and an appropriate framework by which to gauge relative contributions of the fundamental drivers, and it shows that U.S. LNG net exports are not a statistically significant driver of natural gas prices at Henry Hub.[12]

Implications and Conclusions

Based on correlation analysis as well as VAR analysis, we have demonstrated that U.S. LNG exports are not a significant driver of monthly domestic natural gas prices. This is mainly because LNG exports beget incremental new U.S. natural gas production. These findings are consistent with the commercial development of LNG export projects, which require billions of dollars for each project and where investors require reasonable certainty about the source of natural gas supply.

Until a new LNG export train begins operation, natural gas production and storage must place the new incremental gas production domestically, so it is reasonable to see brief periods when terminals are starting that directly correspond with prices. After operations begin and LNG exports continue at high-capacity utilization rates — almost regardless of domestic market conditions — LNG exports have supported steady gas production growth, drilling productivity, and reserve additions in areas like the Haynesville, Eagle Ford, and Permian basins, which are well positioned to support LNG exports in terms of their geography, infrastructure, and state business climates.

The VAR analysis also reinforces the well-established facts that natural gas prices tend to be correlated with one another over time and that future price expectations, which are economically linked to prices through the trading of natural gas price futures and options, also play an important role in establishing market-based prices. Distinguishing between changes in U.S. LNG exports that could have "surprised" markets, as opposed to those which are expected based on anticipated start-ups would be an additional wrinkle that could be modeled. Unintended events, such as the outage at Freeport LNG beginning in Jun. 2022, tend to increase domestic supplies, while the growth of LNG exports has been anticipated based on long-term planning for the export capacity, which must run at high capacity utilization rates to economically justify the investments.

[12] The t-statistic on the accumulated response of LNG net exports on Henry Hub prices is 0.27, which is statistically insignificant.

In conclusion, our research demonstrates that U.S. LNG exports have not exerted any significant or sustained impact on domestic prices. Whether examining correlation analyses between domestic natural gas prices and U.S. LNG exports or employing robust modeling based on fundamental market drivers, it becomes evident that attributing higher U.S. natural gas prices to LNG exports would be inaccurate. On the contrary, LNG exports have spurred production and fostered productivity gains, thus contributing to sustained downward pressure on prices.

Armed with a clear understanding of these findings, U.S. natural gas producers and industrial consumers can forge more cohesive commercial arrangements that mutually benefit all parties involved. This alignment can also facilitate support for domestic production and infrastructure initiatives, thereby enhancing the resilience of the entire value chain.

Nevertheless, it is crucial to recognize the potential risks posed by short-sighted energy policies. Failure to acknowledge the positive role of natural gas in driving human and environmental progress, particularly in displacing biomass and coal consumption worldwide, could undermine the United States' growth and leadership in natural gas markets. Therefore, it is imperative to adopt forward-thinking policies that prioritize the interests of American consumers while fostering global sustainability and progress.

Appendix

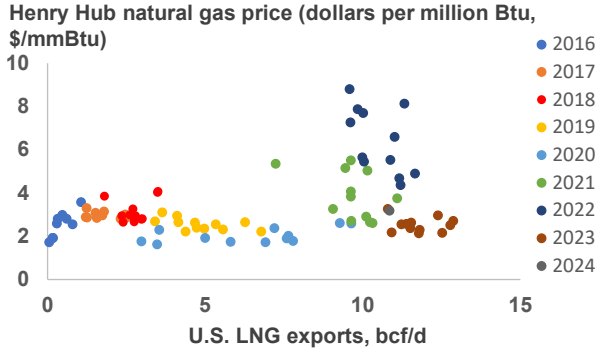
Level vs. Level: U.S. natural gas prices vs. LNG exports

Reinforcing that correlation is not causality, a statistically significant direct correlation exists only for selected periods and has not been sustained

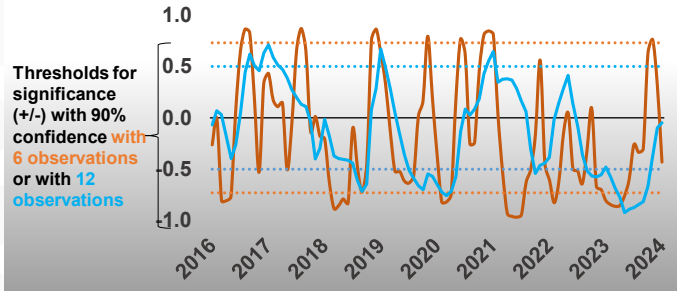
- The top panel on the right shows Henry Hub natural gas prices versus U.S. LNG exports
- The bottom right panel shows correlation coefficients for rolling periods of 6 and 12 months. Statistical significance with 90% confidence requires a correlation coefficient of +0.73 with 6 observations and +0.5 with 12 observations
  - Strongest direct relationships over a 6-month period: Feb. to Aug. 2016 +0.86; Mar. to Aug. 2017 +0.86; Jul. to Dec. 2018 +0.87; Jan. to June 2020 +0.76; Jul. to Dec. 2020 +0.85; May to Nov. 2023 +0.76
  - Strongest direct relationships over 12-month periods: Feb. 2016 to Jan. 2017 with a +0.71; Feb. 2018 to Jan. 2019 +0.67; Feb. 2020 to Jan. 2021 +0.65

Significant direct correlations have not been sustained, and equally significant periods with inverse correlations are apparent

Natural gas prices at Henry Hub vs. U.S. LNG Exports, Jan. 2016 – Jan. 2024



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



source: EIA; author's analysis

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

Reinforcing that correlation is not causality, a statistically significant direct correlation exists only for selected periods and has not been sustained

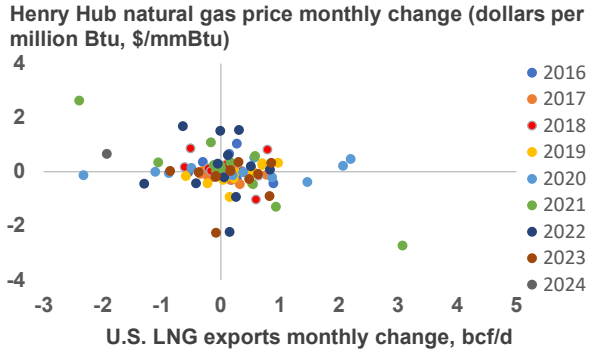
- The top panel on the right shows monthly changes in Henry Hub natural gas prices versus those in U.S. LNG exports
- When a positive and direct relationship exists, points align in the top-right (exports increased, prices rose) and lower-left (exports decreases, prices fell) quadrants
  - 29 of 97 monthly observations (30%) fall into the top right quadrant
  - 16 of 97 monthly observations (16%) fall into the bottom left quadrant

Consequently, a direct relationship between the monthly changes in LNG exports and natural gas prices existed in less than half of the time between January 2016 and January 2024

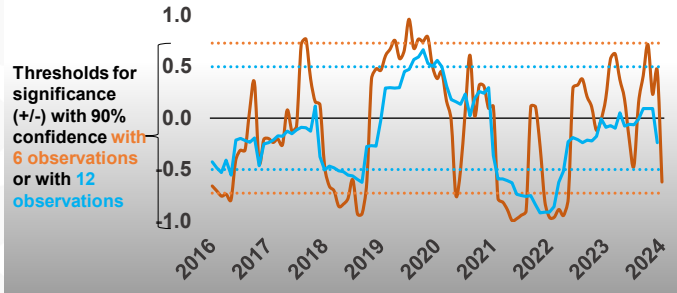
- The bottom right panel shows correlation coefficients for rolling periods of 6 and 12 months. Statistical significance with 90% confidence requires a correlation coefficient of +0.73 with 6 observations and +0.5 with 12 observations
  - Strongest direct relationships over a 6-month period: Apr. to Sep. 2017 +0.77; Apr. to Sep. 2019 +0.76; Feb. to Jul. 2019 +0.96; May to Oct. 2023 +0.72
  - Strongest direct relationship over a 12-month period: Nov. 2018 to Oct. 2019 +0.63

Significant direct correlations have not been sustained, and equally significant periods with inverse correlations are apparent

Changes in natural gas prices at Henry Hub and U.S. LNG Exports, Jan. 2016 – Jan. 2024



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



source: EIA; author's analysis

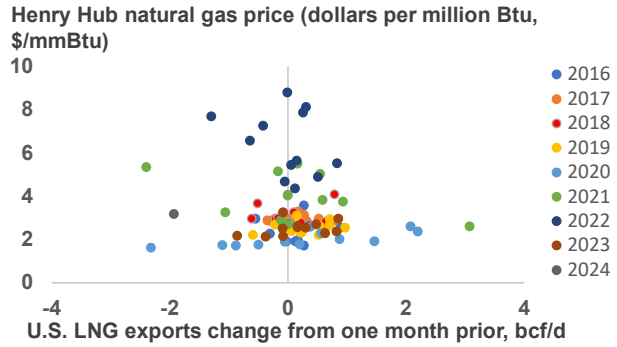
Level vs. change: U.S. natural gas prices vs. monthly changes in LNG exports

Reinforcing that correlation is not causality, a statistically significant direct correlation exists only for selected periods and has not been sustained

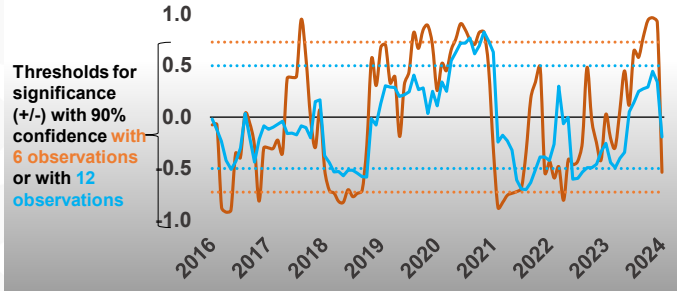
- The top panel on the right shows Henry Hub natural gas prices versus monthly changes in U.S. LNG exports
- No direct upward trend in prices is evident in the historical data
- The bottom right panel shows correlation coefficients for rolling periods of 6 and 12 months. Statistical significance with 90% confidence requires a correlation coefficient of +0.73 with 6 observations and +0.5 with 12 observations
  - Strongest direct relationships over a 6-month period: Mar. to Aug. 2017 with a +0.96 correlation; Jul. to Dec. 2019 +0.89; Jan. to Jun. 2020 +0.91; Jun. to Nov. 2020 +0.83; Jun. to Nov. 2023 +0.97
  - Strongest direct relationship over a 12-month period: Dec. 2019 to Nov. 2020 +0.83

Significant direct correlations have not been sustained, and equally significant periods with inverse correlations are apparent

Natural gas prices at Henry Hub vs. changes in U.S. LNG exports, Jan. 2016 – Jan. 2024



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



source: EIA; author's analysis

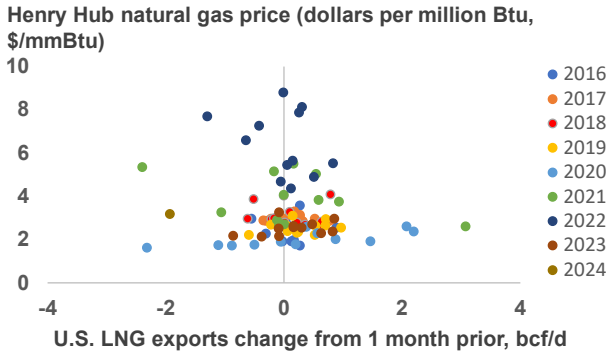
Level vs. change in prior month: U.S. natural gas prices vs. last month's change in LNG exports

Reinforcing that correlation is not causality, a statistically significant direct correlation exists only for selected periods and has not been sustained

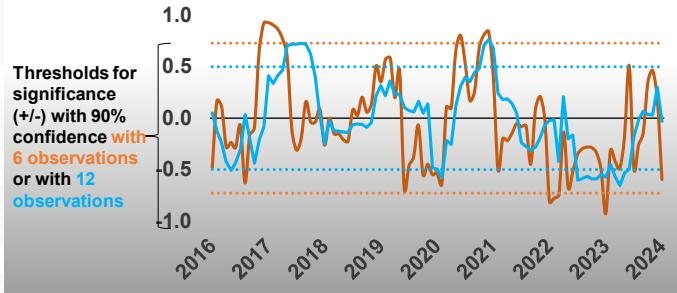
- The top panel on the right shows Henry Hub natural gas prices versus U.S. LNG exports' changes in the prior month
- No direct upward trend in prices is evident in the historical data
- The bottom right panel shows correlation coefficients for rolling periods of 6 and 12 months. Statistical significance with 90% confidence requires a correlation coefficient of +0.73 with 6 observations and +0.5 with 12 observations
  - Strongest direct relationships over a 6-month period: Aug. 2016 to Jan. 2017 +0.93; Jan. to June 2020 +0.81; Jul. to Dec. 2020 +0.84
  - Strongest direct relationships over 12-month periods: Sep. 2016 to Aug. 2017 +0.73; Jan. to Dec. 2020 +0.77

Significant direct correlations have not been sustained, and equally significant periods with inverse correlations are apparent

Natural gas prices at Henry Hub vs. changes in U.S. LNG exports 1 month ago, Jan. 2016 – Jan. 2024



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



source: EIA; author's analysis

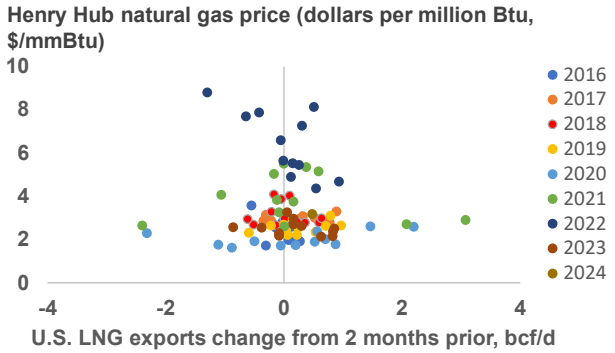
Level vs. change 2 months ago: U.S. natural gas prices vs. changes in LNG exports from 2 months prior

Reinforcing that correlation is not causality, a statistically significant direct correlation exists only for selected periods and has not been sustained

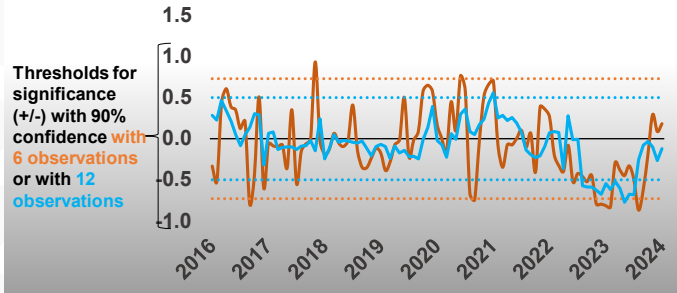
- The top panel on the right shows Henry Hub natural gas prices versus U.S. LNG exports' changes from two months prior
- No direct upward trend in prices is evident in the historical data
- The bottom right panel shows correlation coefficients for rolling periods of 6 and 12 months. Statistical significance with 90% confidence requires a correlation coefficient of +0.73 with 6 observations and +0.5 with 12 observations
  - Strongest direct relationships over a 6-month period: Jun. to Nov. 2017 +0.95; Jan. to June 2020 +0.76
  - No significant direct relationships over 12-month periods

Significant direct correlations have not been sustained, and equally significant periods with inverse correlations are apparent

Natural gas prices at Henry Hub vs. changes in U.S. LNG exports 2 months ago, Jan. 2016 – Jan. 2024



Correlation between HH natural gas prices and the change in U.S. LNG exports 2 months ago



source: EIA; author's analysis

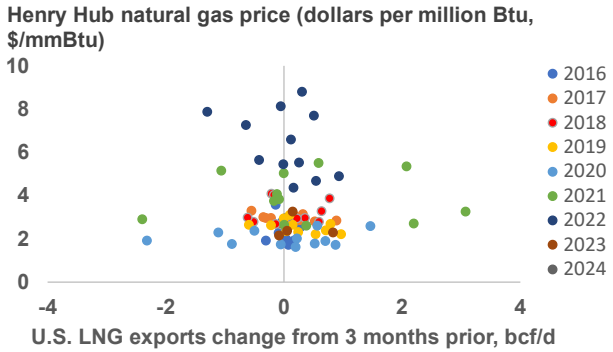
Level vs. change 3 months ago: U.S. natural gas prices vs. changes in LNG exports from 3 months prior

Reinforcing that correlation is not causality, a statistically significant direct correlation exists only for selected periods and has not been sustained

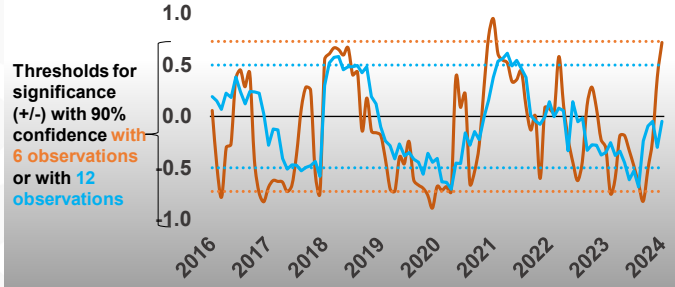
- The top panel on the right shows Henry Hub natural gas prices versus U.S. LNG exports' changes from three months prior
- The bottom right panel shows correlation coefficients for rolling periods of 6 and 12 months. Statistical significance with 90% confidence requires a correlation coefficient of +0.73 with 6 observations and +0.5 with 12 observations
  - Strongest direct relationship over a 6-month period: Aug. 2020 to Jan. 2021 +0.95; Aug. 2023 to Jan. 2024 +0.72
  - Strongest direct relationships over a 12-month period: May 2020 to Apr. 2021 +0.61

Significant direct correlations have not been sustained, and equally significant periods with inverse correlations are apparent

Natural gas prices at Henry Hub vs. changes in U.S. LNG exports 3 months ago, Jan. 2016 – Jan. 2024



Correlation between HH natural gas prices and the change in U.S. LNG exports 3 months ago



source: EIA; author's analysis

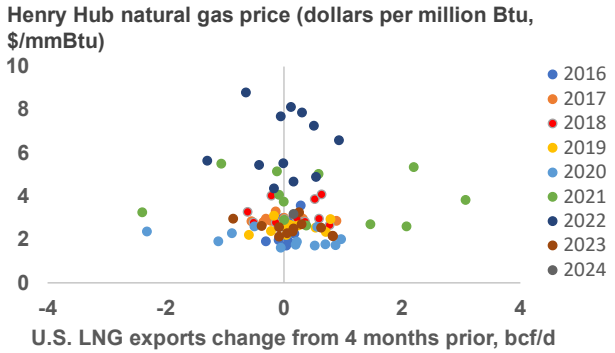
Level vs. change 4 months ago: U.S. natural gas prices vs. changes in LNG exports from 4 months prior

Reinforcing that correlation is not causality, a statistically significant direct correlation exists only for selected periods and has not been sustained

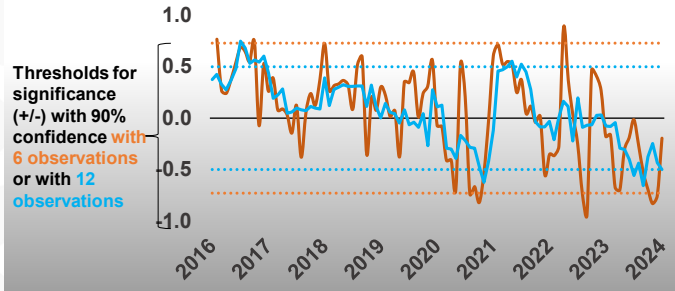
- The top panel on the right shows Henry Hub natural gas prices versus U.S. LNG exports' changes from four months prior
- No direct upward trend in prices is evident in the historical data
- No direct upward trend in prices is evident in the historical data
- The bottom right panel shows correlation coefficients for rolling periods of 6 and 12 months. Statistical significance with 90% confidence requires a correlation coefficient of +0.73 with 6 observations and +0.5 with 12 observations
  - Strongest direct relationships over a 6-month period: Nov. 2021 to Apr. 2022 +0.88
  - Strongest direct relationship over a 12-month period: Jun. 2020 to May. 2021 +0.55

Significant direct correlations have not been sustained, and equally significant periods with inverse correlations are apparent

Natural gas prices at Henry Hub vs. changes in U.S. LNG exports 4 months ago, Jan. 2016 – Jan. 2024



Correlation between HH natural gas prices and the change in U.S. LNG exports 4 months ago



source: EIA; author's analysis