What Does a Middle Eastern War Mean for Gas Prices?

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Introduction[1]

Whenever a crisis occurs in the Middle East, Americans often ask how soon it will affect gas prices. This weekend, that concern became immediate. On Saturday, February 28, the United States and Israel conducted coordinated airstrikes on Iran, resulting in the death of Supreme Leader Ali Khamenei and prompting retaliatory missile strikes throughout the region. By Sunday evening, WTI crude oil futures had risen more than 8%, from about $67 per barrel on Friday to over $72. By Monday morning, prices stabilized near $71, marking a nearly $6 increase in under 48 hours. However, the situation is still in flux so prices could easily spike again.

Economics can answer how quickly crude oil shocks lead to higher gas prices. This article analyzes 20 years of weekly EIA price data using cross-correlation and distributed lag models to provide an empirical-based forecast. Of particular interest is the time lag between oil prices rising and gas prices rising. This article will also estimate the range of potential gasoline prices.

The 20-Year History of Prices

The historical price figure (Figure 1) illustrates two decades of volatile movement between WTI crude oil and U.S. retail regular gasoline. The two price series have a high R-squared value (nearly 0.95) Thus, events such as the 2008 oil shock, the 2014 – 2016 price collapse, the 2020 COVID-19 anomaly, and the start of the Russian-Ukraine war in 2022 affected both similarly. Notably, gasoline prices consistently follow changes in crude oil, not the reverse. This lag is real, systematic, and measurable.

How to Measures the Lag

To measure the lag, we calculate weekly first differences—the change from one week to the next in each price series—and apply a cross-correlation function (CCF). This removes the shared long-term trend and identifies when gasoline prices respond most strongly to a crude oil price increase.

The Cross-Correlation figure (Figure 2), explains the lag between gasoline and oil prices. The highest correlation occurs at lag 0, indicating that the strongest weekly correlation between crude and gasoline prices happens in the same week (the red bar). This occurs because the EIA gasoline price survey, released on Monday, reflects prices collected late in the previous week, allowing a late-week crude price change to appear in both series simultaneously. The correlation then declines but remains statistically significant (or nearly so) through lags of up to seven weeks. This analysis confirms that crude oil movements can influence pump prices for over a month.

The positive R-squared values for some of the negative lags are a statistical artifact of the model used. At first glance, it appears the R-squared of ~0.50 at lag -1 means gasoline changes this week are strongly correlated with crude changes next week. That sounds like gasoline predicting crude, but it's almost certainly not causation. The resaon is a mathematical consequence of crude oil's own autocorrelation. Crude is autocorrelated. A big move in crude this week tends to be followed by an additional move the next week. For example, If crude jumps $3 this week, it often moves another $1 – 2 in the same direction next week.

How Much Do Gas Prices change?

While the cross-correlation model identifies when the price response peaks, the distributed lag model quantifies how much of each dollar-per-barrel crude oil change is reflected in gasoline prices. This model also provides a timeframe. Figure 3 shows the results of the distributed lag model.

The bar chart displays coefficients from a 12-week distributed lag regression. Each green bar, indicating statistical significance, shows the additional cents per gallon added to retail gasoline prices in that week for every $1-per-barrel change in crude oil during the same or previous week. The dominant pass-through occurs at lag 1, the week after a crude price change, with a secondary response at lag 2. By week 7, the effect is no longer statistically significant.

The cumulative pass-through curve illustrates this effect (Figure 4). The curve stabilizes near 6×10^{-4} dollars per gallon per dollar per barrel, or approximately $0.024 per gallon for every $1 per barrel change in crude oil price. Notably, about 70% of the total pass-through occurs within the first two weeks, with the effect flattening by week 6.

Figure 5 provides a different approach to examining oil price shocks. It represents the regression of gasoline and diesel prices against the oil price. As the figure indicates a $1 per barrell increase in oil prices leads to $0.42 change in gasoline prices. The regression slope is higher because it captures the long-run equilibrium relationship between oil and gasoline. That is, over many years, every dollar of crude is fully embedded in the pump price including taxes and margins. The first-difference model captures only the marginal weekly pass-through, which is a subset of the total. Both approaches are correct and answering slightly different questions.

What Does this Mean for Gas Prices

Regarding the current crisis in the Middle East, WTI crude increased from approximately $65, its baseline before geopolitical tensions, to $71 as of Monday morning. This was a price shock of about $6 per barrel. Applying the empirical pass-through coefficients yields the following estimates:

- By next week (lag 1): Expect roughly +$0.07 to +$0.10 per gallon at the pump — the dominant single-week response.
- Within 2 – 3 weeks: Cumulative impact near +$0.12 to $0.15 per gallon as lags 1 – 3 accumulate.
- Full pass-through (6 weeks): Approximately +$0.14 to $0.18 per gallon from the $6/barrel move alone — assuming no further escalation.
- Long-term (many months): Approximately $0.25 price increase based on the oil/gas regression line.

Prior to this weekend, U.S. regular gasoline averaged $2.98 per gallon nationally. With the baseline $6 per barrel increase, prices could rise to $3.10 – $3.16 within a month. Rember too, oil prices rose to $130/barrell shortly after the Russian invasion of Ukraine.

Additional Risk Factors

The forecast above assumes the $6 per barrel increase is the only shock, but this may change. The key variable is the Strait of Hormuz, a 21-mile-wide chokepoint through which about 20% of globally traded oil passes. Iranian forces have already attacked two tankers in the strait, and shipping insurers have suspended new coverage for vessels attempting the passage. A sustained closure, even partial, would disrupt supply from Saudi Arabia, Iraq, Qatar, the UAE, and Iran.

If the strait remains closed for several weeks, analysts at UBS and Barclays warn that Brent crude could exceed $100 per barrel. UBS also notes a scenario where prices surpass $120 if conflict spreads to regional energy infrastructure. Saudi Arabia has already intercepted drones targeting an oil refinery, and Qatar Energy has reported attacks on two natural gas facilities.

At $100 per barrel, a $35 increase from pre-crisis levels, the same pass-through calculation results in a pump price increase of $0.84 per gallon, raising national averages to around $3.80 or higher. At $120 per barrel, the increase approaches $1.30 per gallon. These are not predictions but represent empirically grounded outcomes for specific crude price scenarios. Remember too, the $130 oil price after the Russian invasion of Ukraine led to gasoline prices above $5/gallon

Conclusions

Twenty years of data show that changes in crude oil prices will affect gasoline prices within one to two weeks, at a rate of about 2.4 cents per gallon for every dollar per barrel. Longer term, the price increase could be 4.2 cents per gallon for every dollar per barrel. While conflict may be occurring in the Persian Gulf, the resulting impact on gas prices will be felt at stations nationwide before the end of the month.

Data sources: U.S. Energy Information Administration (EIA) weekly petroleum price series. WTI crude oil spot price (RWTC) and U.S. retail regular gasoline (EMM_EPMR_PTE_NUS_DPG), 2006 – 2026. Statistical analysis performed in R using distributed lag regression and cross-correlation methods.

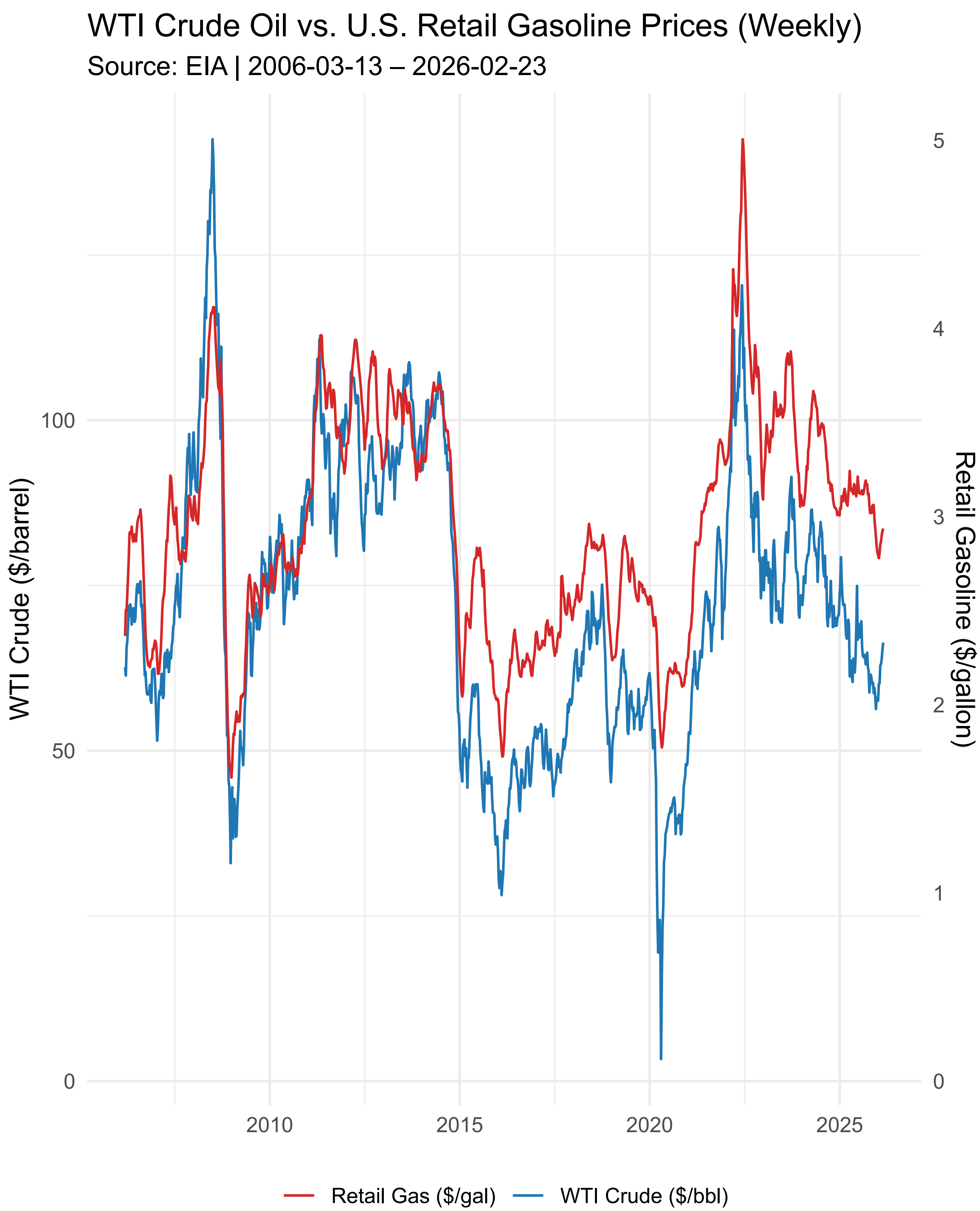

Figure 1. Weekly Oil and Gasoline Prices - 20 Years

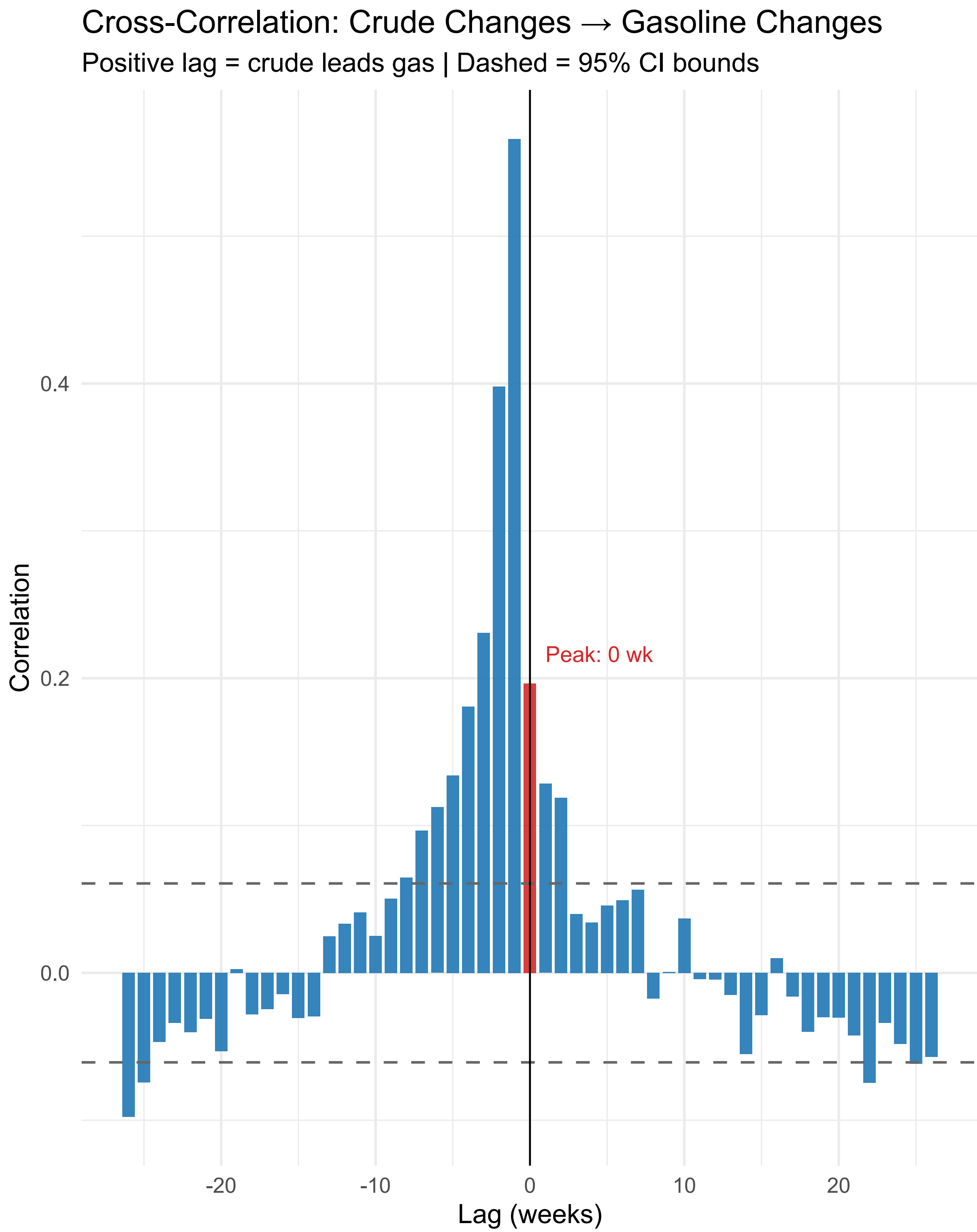

Figure 2. Cross Correlation Results

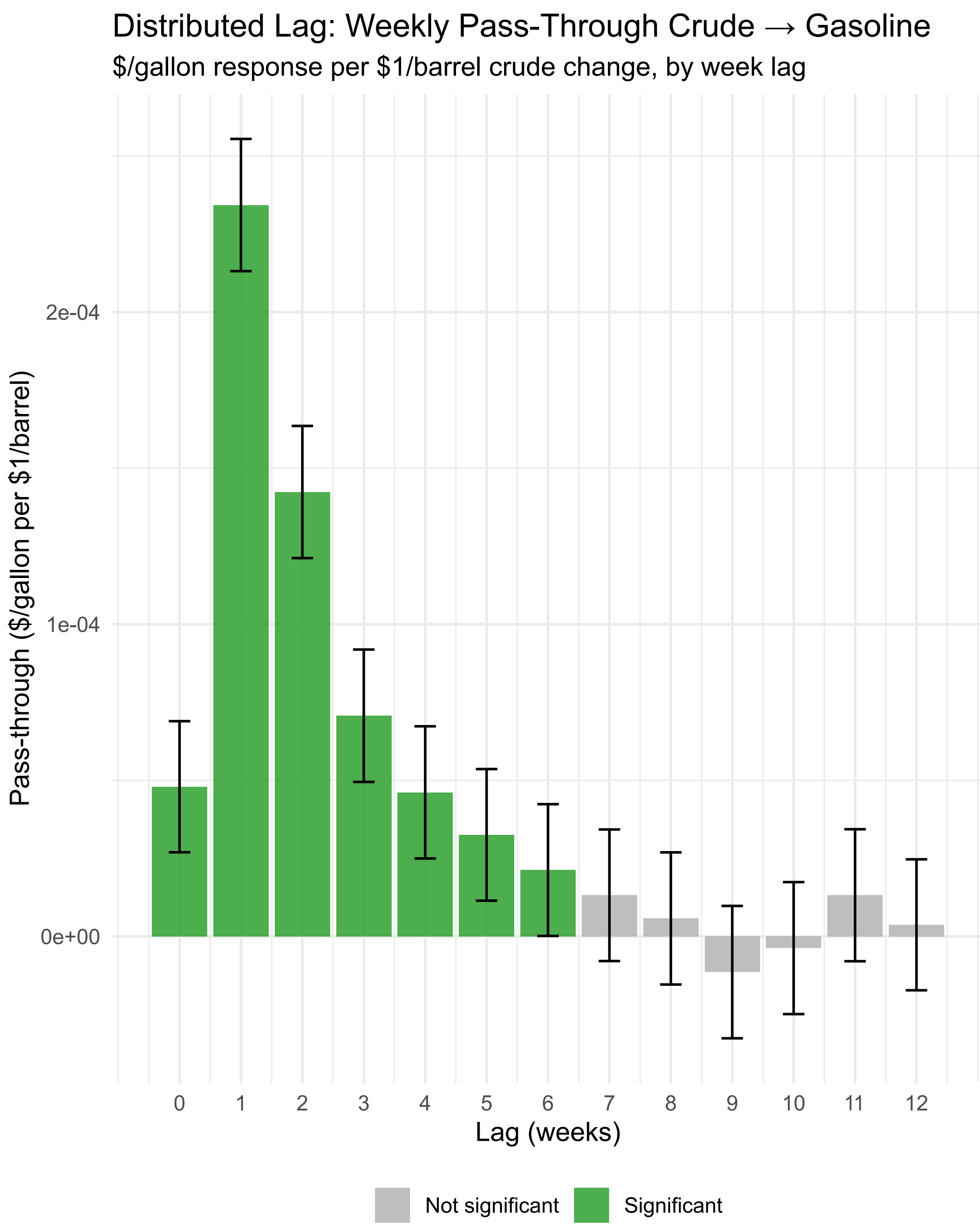

Figure 3. Distributed Lag Results

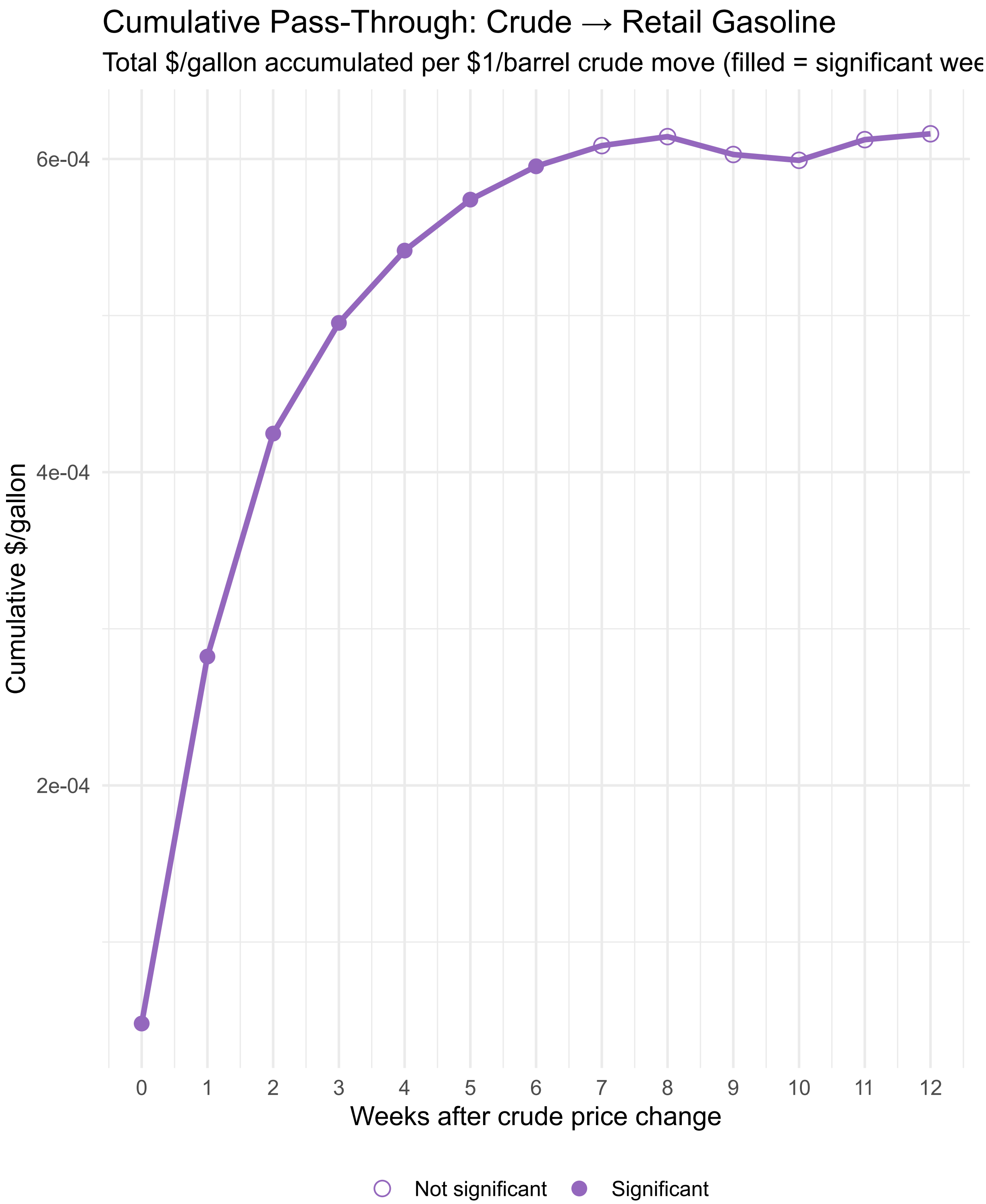

Figure 4. Price Pass Through Curve

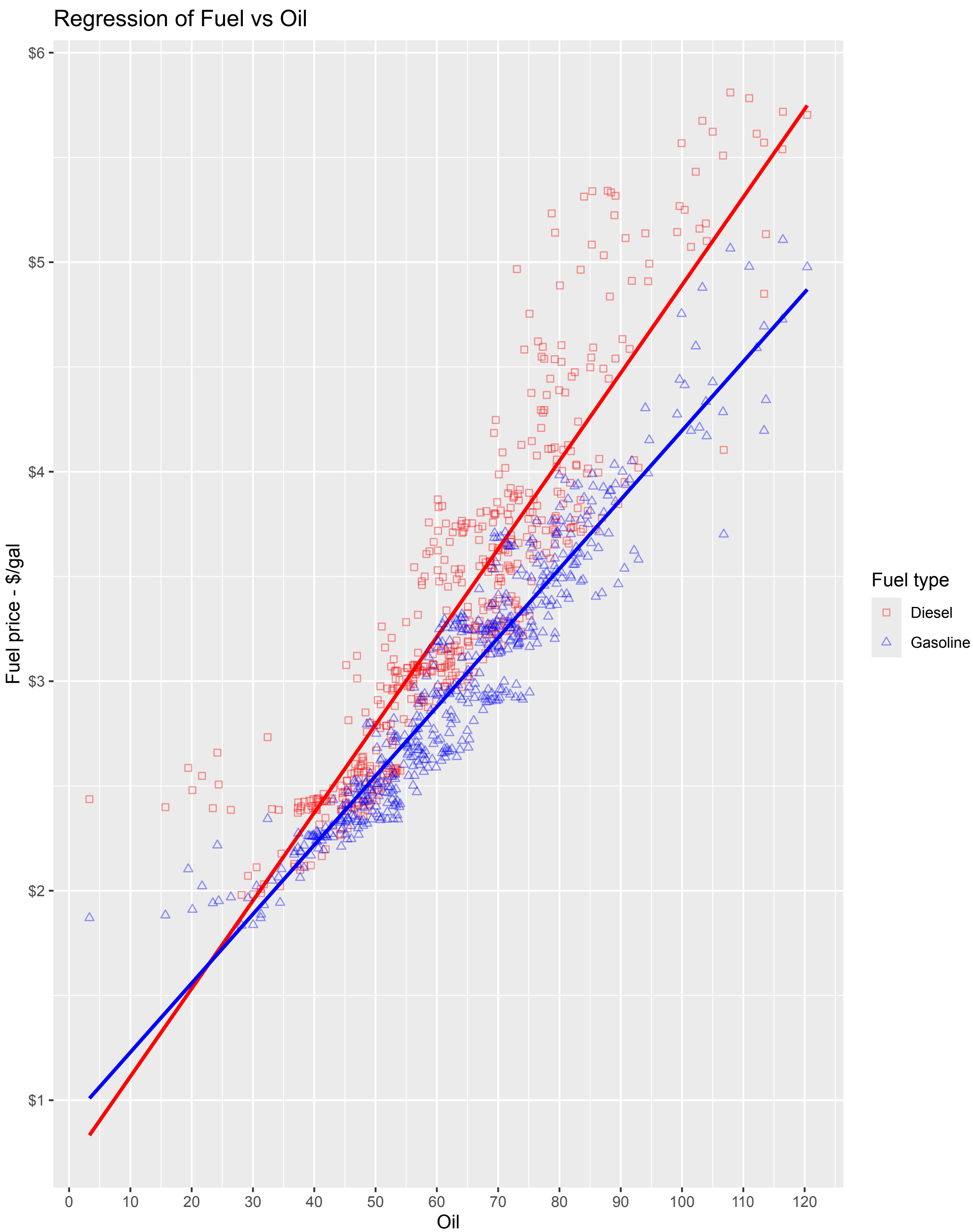

Figure 5. Regression of Gas and Diesel Prices Against Oil Prices

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