Trump Tariffs and Persistence in Crude Oil Prices: A Long-Memory Approach

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Abstract: This paper examines the impact on crude oil prices of the trade tariffs announced by the Trump administration on 2 April 2025 ("Liberation Day"). More specifically, it uses fractional integration methods to analyse daily data on WTI, Brent and Murban oil prices spanning the period from 3 June 2024 to 14 January 2026 for the former two and from 8 October 2024 to 15 January 2026 for the latter. The inclusion of WTI, Brent, and Murban provides a comparative perspective across major regional crude oil benchmarks, making it possible to assess whether the observed persistence is global or benchmark-specific. Their long-memory and persistence properties are investigated initially over the full sample, and then the effects of the Trump tariff announcement are assessed by means of subsample analysis for the pre- and post-announcement period as well as recursive estimation of the fractional differencing parameter d measuring persistence. The results indicate that the unit root null cannot be rejected in any case, whether one considers the full sample or the subsamples, which implies that shocks have permanent effects. Further, the recursive estimation shows a transient loss of precision or instability around the announcement, with no detectable change in persistence as implied by the wide confidence bands.

Keywords: crude oil prices, trade shocks, Trump tariffs, fractional integration, long memory, persistence

JEL Classification: C22, F10, F13.

1. INTRODUCTION

The global crude oil market is very responsive to geopolitical events, trade regulations, and economic uncertainty. One of the most recent policy changes potentially affecting it is the imposition of trade tariffs by the Trump administration in 2025; this marks a significant shift away from post-war trade liberalization and has introduced considerable uncertainty in the international commodity markets. These tariffs have targeted mainly the European Union (EU), China, and other key trading partners. Global supply chains, investment forecasts, and growth outlooks have been affected, with possible repercussions for energy demand and prices.

Crude oil prices play a very important role in the world economy as they have a sizeable impact on inflation, currency rates, fiscal balances, and financial stability, especially in the case of economies that buy and export oil. Therefore, it is crucial to understand the effects of trade policy shocks on oil price dynamics. Although previous research has analysed how trade tensions, economic policy uncertainty, and geopolitical risk affect oil prices (Qian *et al.*, 2022; Dai *et al.*, 2022; Adam and Yacob, 2022; Zaghdoudi, 2025), it has not investigated in depth the possible impact of Trump tariffs on the persistence and long-memory behaviour of crude oil prices. One would expect a significant impact of this type of trade shock on the behaviour of oil prices through the channel of reduced global demand. Moreover, as the size of the tariffs imposed and the number of countries affected was much greater than in the case of the Trump Trade Wars of 2018–2019, the April 2025 trade shock is likely to have had a more sizeable impact on oil demand and prices. The degree of persistence of the latter provides information about market efficiency. More specifically, an order of integration equal to 1 in the log prices is precisely the random-walk benchmark consistent with weak-form efficiency, since first differences are then I(0). Departures from efficiency are signalled by d differing from unity in either direction, with d above one implying long memory in returns and d below one implying mean reversion, both pointing out to market inefficiencies. Also note that the US and Canada in particular are highly interdependent in terms of their energy relationship, Canada being the largest foreign supplier of oil to the US (see https://canada-in-usa.com/), and therefore the effects of trade tariffs can be expected to be particularly pronounced in this case.

The standard stationary $I(0)$ or unit-root $I(1)$ frameworks usually applied in the literature are unable to capture persistence, mean reversion, and long-range dependence in crude oil prices. By contrast, fractional integration models allow the differencing parameter to take non-integer values, and thus encompass a much wider range of stochastic processes with various degrees of persistence. This approach is ideally

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suited to examine whether policy shocks, such as trade tariffs, affect the degree of persistence of oil prices and how quickly these return to their long-term equilibrium level.

There are various reasons why Trump tariffs could have had an impact on the degree of persistence of oil prices. First, higher tariffs and punitive actions may discourage international trade and industrial activity, thereby lowering the demand for oil and increasing market uncertainty. Second, trade disputes can change expectations for future investment and growth, causing oil prices to diverge from their equilibrium values for an extended period of time. Third, increased speculation in oil futures markets and the reinforcement of long-memory dynamics might result from higher uncertainty, which can also cause financial market volatility.

Most existing studies focus on mean effects or short-run volatility, frequently using traditional unit-root or GARCH-type models (Rubio *et al*., 2023; Akgun and Gulay, 2024). Such methods overlook possible shifts in the level of persistence brought about by policy changes. The present study fills this gap in the literature by using fractional integration and long-memory methods to investigate whether Trump tariffs have led to changes in the stochastic behaviour of crude oil prices in particular, whether their degree of persistence differs across policy regimes. This issue is investigated by obtaining subsample as well as recursive estimates of the differencing parameter d measuring persistence. The analysis adds to the literature on policy uncertainty and commodity markets by linking trade policy shocks to long-memory dynamics in oil prices. In particular, three daily series for oil prices are examined, namely WTI, Brent and Murban, the sample period going from 3 June 2024 to 14 January 2026 for the former two, and from 8 October 2024 and 15 January 2026 for the latter.

Furthermore, the April 2025 tariff announcement represents a recent and largely unexplored global trade-policy shock whose implications for the long-memory properties of crude oil prices remain insufficiently understood. Unlike previous studies that primarily focus on conventional price responses to trade or geopolitical shocks, the present one investigates whether the Trump tariffs announcement affected the degree of persistence of WTI, Brent, and Murban prices, offering new evidence on the duration and resilience of oil-market responses to a major contemporary tariff shock.

The findings have important implications for policymakers and market participants. Oil price adjustments to policy interventions may become slower if the effects of tariff shocks are more persistent, thereby making risk management and stabilization policies more challenging. On the other hand, lower persistence and faster mean reversion could lead to greater market resilience.

The remainder of the paper is structured as follows. Section 2 reviews the relevant literature on crude oil prices and their persistence. Section 3 outlines the methodology. Section 4 describes the data and presents the empirical results. Section 5 offers some concluding remarks.

2. LITERATURE REVIEW

Global economic conditions, shifts in policy, and geopolitical events all have a significant impact on crude oil prices. In particular, trade disputes and policy uncertainty can have long-lasting effects on oil price dynamics, increasing volatility and persistence. Understanding these issues is essential for forecasting and risk management purposes. The literature on the impact of trade policies and uncertainty on oil price dynamics, as well as the emergence of Murban crude oil as a benchmark and its role in the Asian market, is reviewed below.

2.1. Trade Policy, Tariffs, and Oil Price Dynamics

The trade policy framework created by the Trump administration represents a shift towards protectionism, characterized by the extensive application of tariffs on key trading partners, especially China and the EU. These measures are undermining multilateral collaboration within the World Trade Organization (WTO) and causing considerable disturbances in global trade patterns.

Previous studies suggest that tariffs can affect crude oil prices through financial markets, demand, and uncertainty. Hamilton (1983) provided early empirical evidence that oil price disturbances have persistent effects on aggregate economic performance, influencing output, employment, and investment decisions over extended periods, whilst Kilian (2009) showed that demand-driven oil price shocks tend to generate more persistent movements in crude oil prices than transitory supply disturbances, highlighting the importance of global economic activity in explaining oil market dynamics.

During the Trump administration, trade disputes have decreased industrial production and international trade volumes, thereby weakening the world's energy demand and driving down crude oil prices. Sha et al. (2025) investigated how firms navigate the challenges posed by trade policy uncertainty (TPU) and how such uncertainty translates into variations in corporate financial performance (CFP). Boer and Rieth (2024) showed that trade policy uncertainty and tariff shocks have adverse macroeconomic consequences, reducing economic activity and increasing fluctuations across sectors, while Kyriazis (2021) provided a comprehensive survey of the trade policy uncertainty literature and concluded that uncertainty associated with trade negotiations, tariffs, and protectionist measures significantly increases financial market volatility and macroeconomic instability. Schoeneman *et al.* (2024) also analyzed international trade volatility through a network framework and showed that global trade disruptions propagate across interconnected supply chains, amplifying volatility and extending the duration of shocks.

Many studies have argued that shocks can lead to faster price discovery, thereby reducing persistence. Chaboud *et al.* (2021) documented that price discovery in electronic foreign exchange markets has become increasingly rapid over time due to algorithmic and high-frequency trading. Munro (2026) also found that financial markets often absorb monetary policy shocks within seconds of official announcements. Tsang and Yang (2026) showed that major political shocks produce rapid trading responses and permanent repricing in prediction markets.

Trump tariffs have increased uncertainty, which has an impact on demand, expectations, asset prices, and investment decisions, as discussed in Baker et al. (2016). Greater short-term price swings, futures market volatility and precautionary demand have all resulted from heightened uncertainty in the oil markets.

Previous empirical research also shows that supply chains have been disrupted and global economic growth slowed down during trade disputes between the US and China. For instance, Amiti et al. (2019) show that tariffs increased manufacturing costs and altered global value chains, whilst Bown (2019) provide evidence that tariff escalations had a major impact on bilateral trade volumes. These shocks changed crude oil market dynamics by increasing transportation costs and affecting refining margins and the price of oil-related inputs.

Additionally, oil imports and exports are restricted by trade restrictions and retaliatory tariffs, especially in nations that rely heavily on international energy trade. In particular, Hufbauer et al. (2008) argue that trade restrictions and sanctions raise market uncertainty and limit export capacity, both of which can increase the volatility of oil prices. Therefore, tariffs imposed during the Trump administration can be seen as exogenous trade policy shocks that affect oil prices through three primary channels: (i) decreased energy demand and global economic activity; (ii) increased policy uncertainty and financial market volatility; and (iii) disruptions to supply chains related to energy. As already mentioned, the present study aims to assess whether or not such a trade shock has affected the degree of persistence of crude oil prices by using fractional integration methods. The results yield new insights into the relationship between international trade regimes and global energy markets.

2.2. Persistence and Long Memory in Crude Oil Prices

Several studies have found that crude oil prices exhibit long-memory behaviour and high persistence, with past price movements influencing future dynamics and shocks decaying gradually over time. For instance, Baillie et al. (1996) estimated ARFIMA models for various commodity prices, including crude oil prices, and showed that the effects of shocks fade gradually, which suggests that traditional short-memory models might underestimate persistence. Therefore, long-memory and fractional integration models should be used to capture progressively decaying autocorrelations instead of standard unit roots tests which are known to have low power (Diebold and Rudebusch, 1991; Hassler and Wolter, 1994). The former were first introduced by Granger and Joyeux (1980) and then developed by Hosking (1981). An application of such models to energy price series including oil prices can be found in the paper by Gil-Alana (2004), where semiparametric approaches are used to identify long-memory behaviour. Lahiani and Robe (2019) show that both spot and futures crude oil prices exhibit long-range dependence, especially during times of extreme volatility.

However, overlooking structural breaks can result in unreliable inference in the context of fractional integration models (Diebold and Inoue, 2001; Granger and Hyung, 2004). Trump tariffs represent a trade shock which could have generated such a break in oil markets. Specifically, they have disrupted trade flows and increased oil market uncertainty, which could have increased persistence in crude oil prices (Bown, 2019; Amiti et al. 2019). Examining whether this structural break has led to a change in the degree of persistence of oil prices is the main objective of the present study.

2.3. Policy Uncertainty, Trade Wars, and Long-Memory Effects

Trade disputes and policy uncertainty affect supply and demand and thus the dynamics of commodity prices such as crude oil. For instance, Jurado et al. (2015) create metrics for macroeconomic uncertainty and argue that this plays a key role in driving the dynamics in energy markets. Leduc and Liu (2016) show that risk premia and investment adjust only gradually to uncertainty shocks, which causes persistent fluctuations in commodity prices, including oil prices.

Trade disputes and tariff increases affect trade flows, lower demand projections, and increase market volatility, thereby enhancing risk in oil markets. Arouri et al. (2012) report that volatility shocks in oil markets exhibit long memory. Hammoudeh, et al. (2022) found out that pandemic and trade policy uncertainty shocks are linked with lower (higher) oil price returns in the short-term (medium-term). Serletis and Gogas (2006) detected long-range dependence in both spot and futures oil prices using fractional integration techniques. Choi and Hammoudeh (2009) & Gil-Alana and Yaya (2016) reported strong evidence of long memory in oil market volatility across several regimes. Furthermore, Charfeddine (2016) concluded that structural breaks associated with policy shocks, such as trade and regulatory uncertainty, can increase the degree of persistence of oil prices. This is the issue we analyse in this paper using the fractional integration approach outlined in the next section.

2.4. Murban as a Crude Oil Benchmark: Emergence and Role in the Asian Market

The global crude oil market has traditionally been dominated by two benchmark crudes: Brent Crude and West Texas Intermediate (WTI). Brent serves as the principal benchmark for Europe, Africa, and much of international crude trade, while WTI is the dominant benchmark in North America. However, both benchmarks have limitations when pricing crude oil flows destined for Asia, which accounts for the largest share of global oil consumption (Scheitrum et al., 2018). As a result, the emergence of Murban Crude has attracted considerable attention as a potential benchmark better suited to Middle Eastern crude exports and Asian refiners (Boersma and Losz, 2022) - both researchers and industry analysts have tried to identify its advantages (e.g., Ji et al., 2019; Yu, *et al*., 2023).

3. METHODOLOGY

The estimated fractional integration model is the following:

$$y(t) = \alpha + \beta t + x(t),$$
$$(1-L)^d x(t) = u(t), \qquad t = 1, 2, \ldots, \qquad (1)$$

where y(t) is the time series under investigation, α and β are unknown parameters, namely an intercept and the coefficient on a linear time trend, and x(t) is assumed to be integrated of order d or I(d), where d can be any real value, including fractional ones; u(t) is I(0) and is assumed to be in turn a white noise or autocorrelated process (in the latter case applying the model of Bloomfield, 1973). The estimation is carried out using a likelihood function in the frequency domain as in Robinson (1994).

Note that the I(d) framework is much more flexible in terms of the model dynamics than the classical methods based on d = 0 (stationarity) and d = 1 (unit roots). Allowing d to take any real value enables one to examine a much wider range of stochastic behaviours, not captured by standard methods, including:

i) anti-persistence, if d is negative,

ii) stationary long memory, if 0 < d < 0.5,

iii) 1/f noise processes, if d = 0.5,

iv) nonstationary mean-reverting patterns, if 0.5 ≤ d < 1,

v) long memory in first differences, if d > 1.

However, as already mentioned, many studies show that fractional integration and long-memory can be artificial artifacts generated by overlooking breaks in the data (Diebold and Inoue, 2001; Granger and Hyung, 2004; Banerjee and Urga, 2005; Bisaglia and Gerolimetto, 2008; etc.). For this reason in the present study we investigate this issue by imposing a break at the time of the tariff announcement made by the Trump administration, namely on 2 April 2025 or "Liberation Day"; this enables us to examine whether the degree of persistence has changed as a result of the introduction of Trump tariffs.

4. DATA DESCRIPTION AND EMPIRICAL RESULTS

We analyse daily data for the three main benchmark crude oil prices, namely, WTI, Brent and Murban, in US dollars per barrel. The data source is Investing.com. The series span the period from 3 June 2024 to 14 January 2026 for WTI and Brent, and from 8 October 2024 and 15 January 2026 for Murban, and are logged for the analysis. This is carried out at first for the full sample and then for pre-tariff and post-tariff subsamples, the selected break date being 2 April 2025, when the new tariff policy was announced, as this can be seen as a trade shock with possible effects on global energy demand, supply chains, and oil markets. The subsample analysis enables us to evaluate whether the tariff announcement changed the long-term dynamics of crude oil prices by comparing their behaviour in the two regimes. Further evidence is then obtained by means of recursive estimation.

Table **1** reports some descriptive statistics. As can be seen, the WTI prices are the lowest and all three series have been lower since the tariff announcement. Specifically, the average price of Murban was $74.95 and $66.88 per barrel before and after the tariff announcement respectively. The corresponding figures are $76.48 and $65.09 for Brent and $72.92 and $61.76 for WTI. Also, all three series have become more volatile since the announcement, as indicated by their standard deviations.

Table 1. Descriptive statistics.

-	Before Trump's tariff announcement			
-	**Min.**	**Max.**	**Mean**	**Std. dev.**
Murban	70.03	83.93	74.95	3.39
Brent	69.19	87.34	76.48	4.49
WTI	65.75	83 .88	72.92	4.55
-	**After Trump's tariff announcement**			
-	**Min.**	**Max.**	**Mean**	**Std. dev.**
Murban	59.87	78.82	66.88	3.62
Brent	58.92	77.01	65.09	7.32
WTI	55.27	75.14	61.76	7.25

Figs. (**1**, **2** and **3**) display the three oil price series and also include a vertical bar showing the date of the tariff announcement, namely 2 April 2025, known as "Liberation Day". This splits the full sample into two subsamples corresponding to the pre- and post-announcement period. Visual inspection suggests that both are characterised by a downward trend, but the average appears to be lower in the second one following the sharp drop in prices on the date of the tariff announcement.

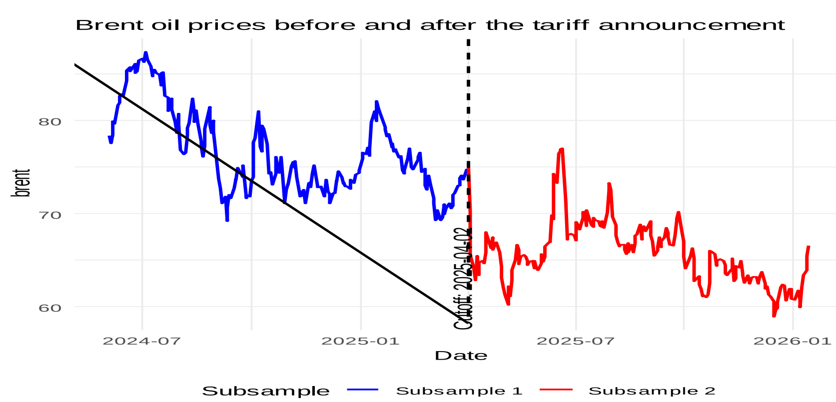

Fig. (1). Time plot of Brent oil prices before and after the tariff announcement.

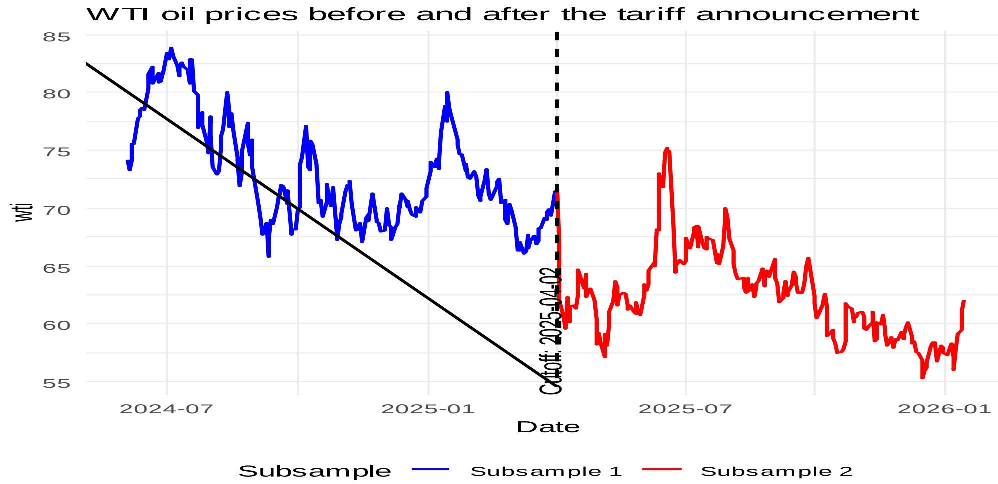

Fig. (2). Time plot WTI oil prices before and after the tariff announcement.

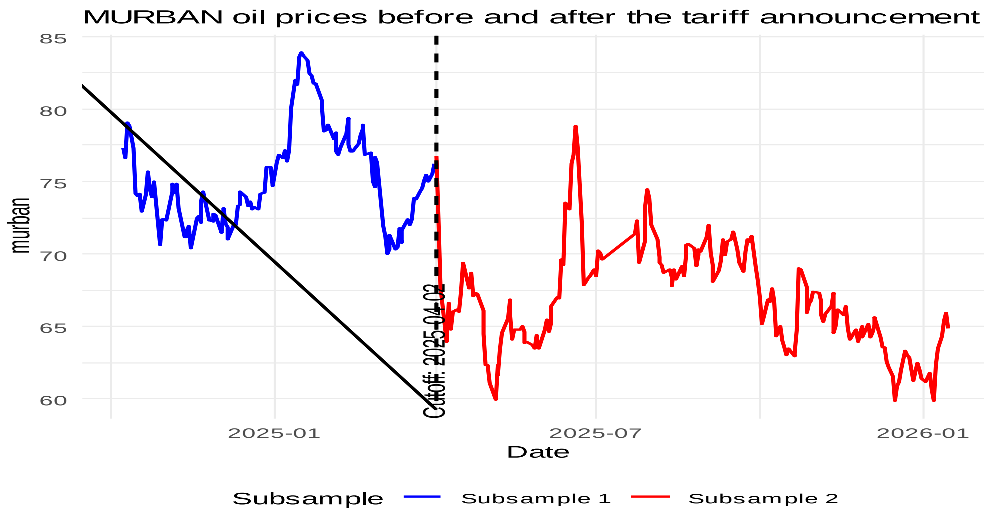

Fig. (3). Time plot MURBAN oil prices before and after the tariff announcement.

Table **2** displays the full-sample estimates of d based on equation (1) under two different assumptions concerning the error term (white noise and autocorrelation) and for the three different specifications, namely: i) without deterministic terms (column 2), (ii) with an intercept only (column 3), and (iii) with an intercept as well as a linear time trend (column 4). The preferred model is selected on the basis of the statistical significance of the regressors, the corresponding estimates being shown in bold in the table. As can be seen, the time trend is found to be statistically insignificant in all cases, the intercept being sufficient to describe the deterministic part of the model.

The table shows the estimates of the differencing parameter d for different model specifications. The figures in bold are those for the selected model based on the statistical significance of the regressors. In parenthesis the 95% confidence intervals. They are based on finite sample critical values obtained by simulation (Gil-Alana, 2000).

Column 2 reports the estimates of d (with their 95% confidence intervals in parenthesis). Columns 3 and 4 display the estimates of the intercept and the time trend (with t-values in parenthesis).

Table **3** displays the estimated coefficients from the selected models. It can be seen that the estimates of d are higher under the white noise specification. This is not surprising as in the case of autocorrelation there are two competing structures (the fractional differentiation and the model of Bloomfield) to describe the time dependence. Nevertheless, the unit root null cannot be rejected for any of the three series and for either type of disturbances. This implies that mean reversion does not occur in any case as shocks have permanent effects. However, these results might be biased by the presence of non-linearities and/or breaks in the data. In particular, we are interested in investigating if the tariff announcement made by the Trump administration has affected the degree of persistence of the data. For this purpose, we carried out Perron's (1989) tests for a single break.[1] The results indicate the existence of a break on 4 March 2025 for Murban and Brent but no break for WTI.[2] This break date is

[1] Using the tests of Bai and Perron (2003) for the detection of multiple breaks produced unsatisfactory results in the three series.

[2] Separating the subsamples around 4 March 2025 produced almost identical results than those reported in the paper.

relatively close to the tariff announcement by the Trump Administration on 2 April 2025. To obtain evidence on the possible effects of this trade shock on persistence in oil prices, first we estimate the orders of integration of the series for each of the two subsamples, pre- and post-tariff announcements. Figs. (**A1** and **A2**) in the Appendix show the periodograms for each subsample using the logged data (Fig. **A1**) and the first differenced data (Fig. **A2**). In the case of the logged data, there are large values at the smallest frequency, consistently with the need for first differentiation; however, in the case of the first differenced data, the plots show values close to zero at the zero frequency, which suggests over-differentiation and the need for fractional differentiation.

Table 2. Estimates of d. Log prices.

i) White noise errors			
Series	No terms	With an intercept	With an intercept and a time trend
Murban	0.99 (0.92, 1.08)	**1.01 (0.91, 1.13)**	1.01 (0.91, 1.13)
Brent	1.00 (0.93, 1.08)	**0.99 (0.91, 1.09)**	0.99 (0.91, 1.09)
WTI	1.00 (0.93, 1.07)	**0.97 (0.88, 1.06)**	0.97 (0.88, 1.06)
ii) Autocorrelated errors			
Series	No terms	With an intercept	With an intercept and a time trend
Murban	0.98 (0.87, 1.13)	**0.83 (0.68, 1.03)**	0.83 (0.68, 1.03)
Brent	0.99 (0.90, 1.12)	**0.89 (0.73, 1.08)**	0.89 (0.70, 1.09)
WTI	0.99 (0.90, 1.13)	**0.87 (0.72, 1.08)**	0.86 (0.71, 1.08)

Table 3. Estimated coefficients from the selected model. Log prices.

i) White noise errors			
Series	**No Terms**	**With an Intercept**	**With an Intercept and a Time Trend**
Murban	1.01 (0.91, 1.13)	4.348 (234.74)	---
Brent	0.99 (0.91, 1.09)	4.361 (240.91)	---
WTI	0.97 (0.88, 1.06)	4.307 (217.61)	---
ii) Autocorrelated errors			
Series	**No Terms**	**With an Intercept**	**With an Intercept and a Time Trend**
Murban	0.83 (0.68, 1.03)	4.344 (244.09)	---
Brent	0.89 (0.73, 1.08)	4.362 (244.50)	---
WTI	0.87 (0.72, 1.08)	4.308 (222.55)	---

The results for the two cases of white noise and autocorrelated errors respectively are reported in Table **4**. It can be seen that the estimates of d do not differ significantly between the two subsamples – specifically, they are slightly higher in the post-tariff announcement period, especially in the case of Murban, and lower instead with autocorrelated errors. However, the unit root null (d = 1) cannot be rejected in any case, which suggests insignificant differences between the estimates. Standard LR procedures along with Hualde's (2013) and Wang and Chan's (2016) tests of equality in the orders of integration provide no statistical evidence of differences in the degree of integration across the subsamples for any of the series examined. The values in brackets are the 95% confidence bands in the case of d and the t-statistics in the case of the intercept.

Next we examine the possible effects of the Trump tariffs announced on 2 April 2025 by estimating d recursively, starting with a sample ending on 2 January 2025 and then adding one observation at a time. This period is selected to provide some evidence on the degree of persistence prior to the introduction of the tariffs and then on their subsequent impact. Figs. (**4**, **5**, and **6**) display the results for Murban, Brent and WTI under the assumption of autocorrelated errors, which is more general and might capture more accurately the behaviour of the series.

Similar patterns are found in the cases of Brent (Fig. **5**) and WTI (Fig. **6**) respectively. In particular, an anomaly in the behaviour of the confidence bands can be observed at the time of the tariff announcement, but there is little change in the estimates of d except for that based on the subsample ending on 20 June 2025. The wide confidence interval corresponding to the April 2025 trade shock might reflect the significant increase in US tariffs on steel and aluminum announced at the time; subsequently the legality of the trade measures adopted by the Trump administration was questioned by court rulings.

Table 4. Estimated coefficients from the selected model with pre- and post- tariff announcement data.

i) White Noise Errors				
Series	**Pre-tariff Announcement Data**		**Post-tariff Announcement Data**	
	d (95% band)	**Intercept (t-value)**	**d (95% band)**	**Intercept (t-value)**
Murban	0.94 (0.83, 1.09)	4.347 (277.63)	1.00 (0.86, 1.18)	4.281 (226.42)
Brent	0.93 (0.84, 1.05)	4.363 (260.94)	0.97 (0.84, 1.12)	4.248 (226.42)
WTI	0.93 (0.83, 1.05)	4.307 (232.28)	0.94 (0.82, 1.09)	4.198 (206.87)
i) Autocorrelated errors				
Series	**Pre-tariff Announcement Data**		**Post-tariff announcement data**	
	d (95% band)	**Intercept (t-value)**	**d (95% band)**	**Intercept (t-value)**
Murban	0.86 (0.68, 1.12)	4.346 (282.67)	0.75 (0.58, 1.08)	4.254 (232.82)
Brent	0.88 (0.71, 1.10)	4.362 (263.84)	0.79 (0.59, 1.16)	4.230 (237.26)
WTI	0.86 (0.68, 1.10)	4.309 (236.32)	0.79 (0.64, 1.12)	4.182 (216.16)

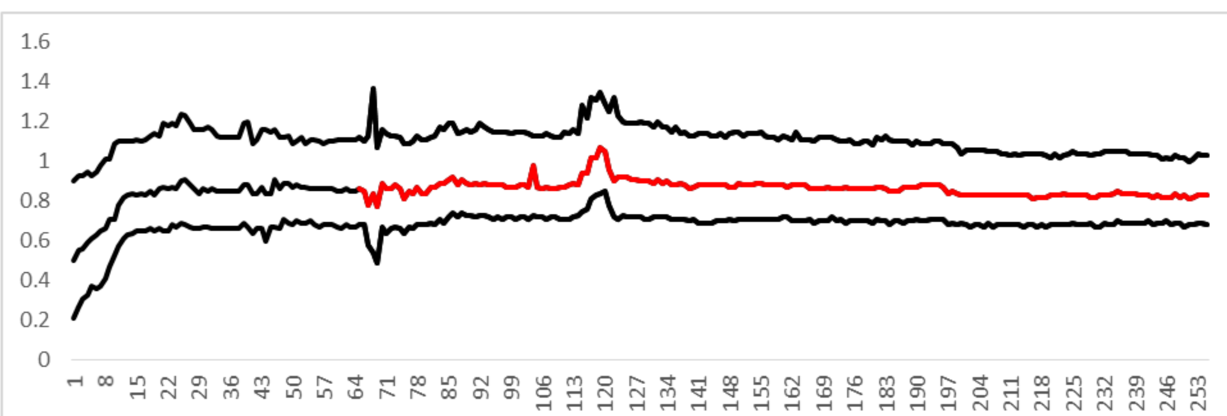

Fig. (4). Recursive estimates of d and 95% confidence bands. Murban. The middle line displays the estimates of d while the upper and lower ones are the 95% confidence bands. The first observation (no. 1) corresponds to a sample ending on 2 January 2025. Then one observation at a time is added until the end of the sample (no. 253). The values in red correspond to the sample ending on 2 April 2025, again one observation at a time being added afterwards.

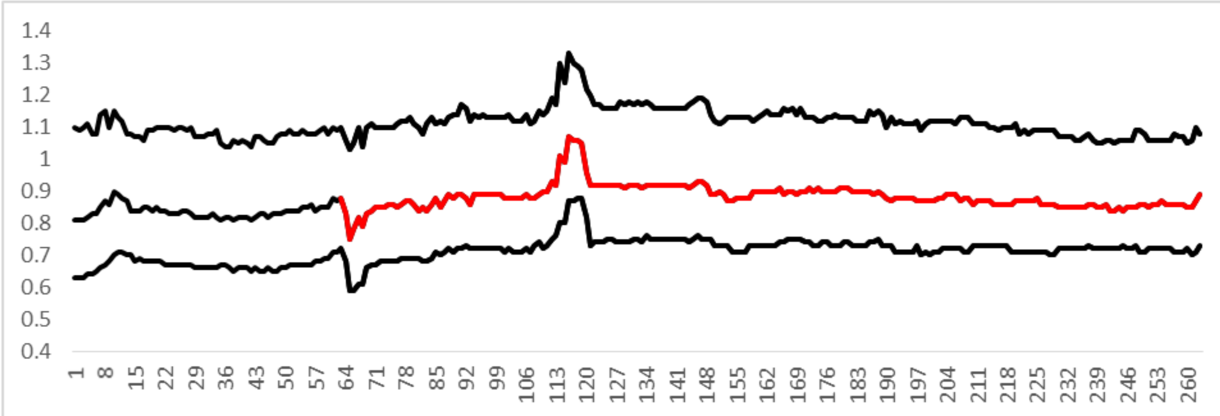

Fig. (5). Recursive estimates of d and 95% confidence bands. Brent. The middle line displays the estimates of d while the upper and lower ones are the 95% confidence bands. The first observation (no. 1) corresponds to a sample ending on 2 January 2025. Then one observation at a time is added until the end of the sample (no. 253). The values in red correspond to the sample ending on 2 April 2025, again one observation at a time being added afterwards.

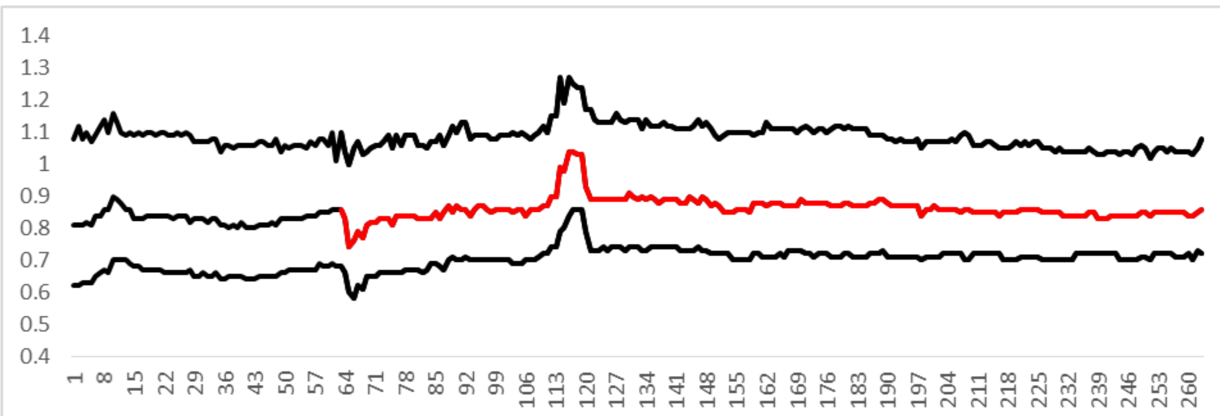

Fig. (6). Recursive estimates of d and 95% confidence bands. WTI. The middle line displays the estimates of d while the upper and lower ones are the 95% confidence bands. The first observation (no. 1) corresponds to a sample ending on 2 January 2025. Then one observation at a time is added until the end of the sample (no. 253). The values in red correspond to the sample ending on 2 April 2025, again one observation at a time being added afterwards.

5. CONCLUSIONS

This paper examines the impact on crude oil prices of the trade tariffs announced by the Trump administration on 2 April 2025. These could have affected their behaviour by reducing international trade and thus demand for oil, lowering expectations concerning investment and growth, and increasing speculative activity in the oil futures market. The existing literature has analysed extensively the impact of trade wars on production costs such as oil and supply chains (*e.g.*, Amiti *et al.*, 2019) and on trade volumes (*e.g.*, Bown, 2019), but fewer studies have focused on their implications for the long-memory properties of oil prices (Serletis and Gogas, 2006) and the possible effects of structural breaks such as trade policy changes on the degree of persistence of the series (Charfeddine, 2016). This is the issue investigated in the present study in the specific case of the Trump tariffs, whose impact on the persistence of oil prices has not been previously evaluated. More specifically, fractional integration methods are used to analyse daily data on WTI, Brent and Murban oil prices spanning the period from 3 June 2024 to 14 January 2026 for the former two and from 8 October 2024 to 15 January 2026 for the latter. Their long-memory and persistence properties are investigated initially over the full sample, and then the effects of the Trump tariff announcement are assessed by means of subsample analysis for the pre- and post-announcement period as well as recursive estimation of the fractional differencing parameter d measuring persistence.

The results indicate that the unit root null cannot be rejected in any case, whether one considers the full sample or the subsamples, which implies that shocks have permanent effects. Further, the recursive estimation shows a transient loss of precision or instability around the announcement, with no detectable change in persistence given the wide confidence bands. The fact that the Trump tariffs seem to have caused only a brief spike in uncertainty which has affected oil markets temporarily suggests that these have a high degree of resilience. Fossil fuels remain the main form of energy currently being used, and therefore demand for them is relatively stable, with prices mainly being determined by supply changes due to geopolitical or other types of shocks which have an impact, for instance, on cargo availability.

These features of oil markets account for their persistence structure remaining relatively unchanged following trade shocks.

On the whole, the evidence presented in this study implies a permanent downward level shift in prices accompanied by no detectable change in the persistence regime following the introduction of the Trump tariffs, which casts doubt on the need for policy changes to address the degree of persistence of shocks. As for the implications for hedgers, note that lower persistence implies that the behaviour of prices is more similar to random noise and therefore hedgers need to adjust their portfolios more frequently in order to protect themselves from risk. However, our results suggest that no significant changes in portfolio choices are required in the case under investigation.

It should be acknowledged that this study has some limitations, in particular its short time frame, and the fact that it is not possible within our framework to distinguish between trade shocks and other shocks including geopolitical ones such as the ongoing conflict between Russia and Ukraine. Moreover, our research only focuses on crude oil prices. Future work should also analyse the behaviour of refined products, natural gas and other energy sources in order to obtain further evidence of the impact of trade shocks on energy markets.

DATA AVAILABILITY STATEMENT

The data are publicly available from the website Investing.com

AUTHORS' CONTRIBUTION:

GM Caporale: conceptualization, methodology, writing, project supervision; LA Gil-Alana: conceptualization, methodology, writing, empirical analysis; OO Ojo: conceptualization, writing, data management

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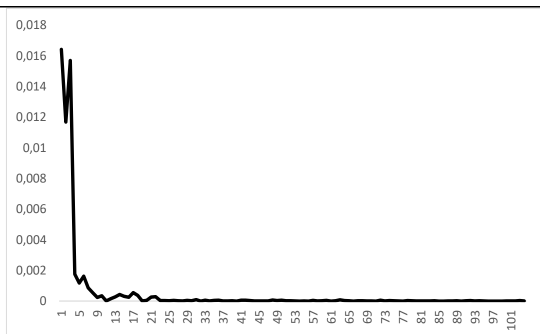
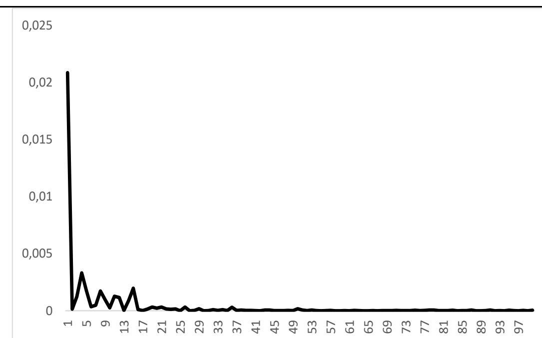
APPENDIX

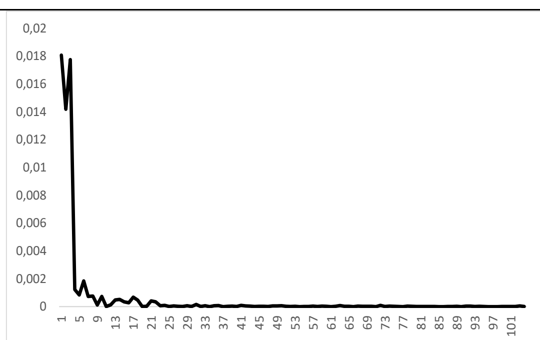
Brent (pre-Tariff data)



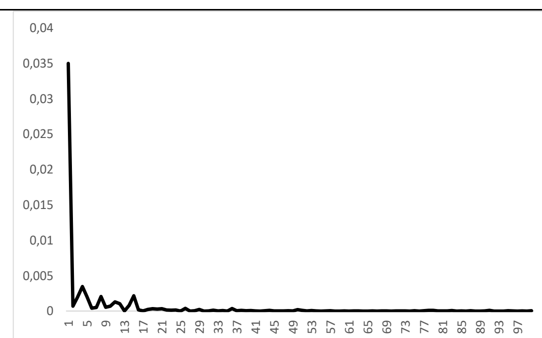
Brent (post-Tariff data)



WTI (pre-Tariff data)



WTI (post-Tariff data)



Murban (pre-Tariff data)

Murban (post-Tariff data)

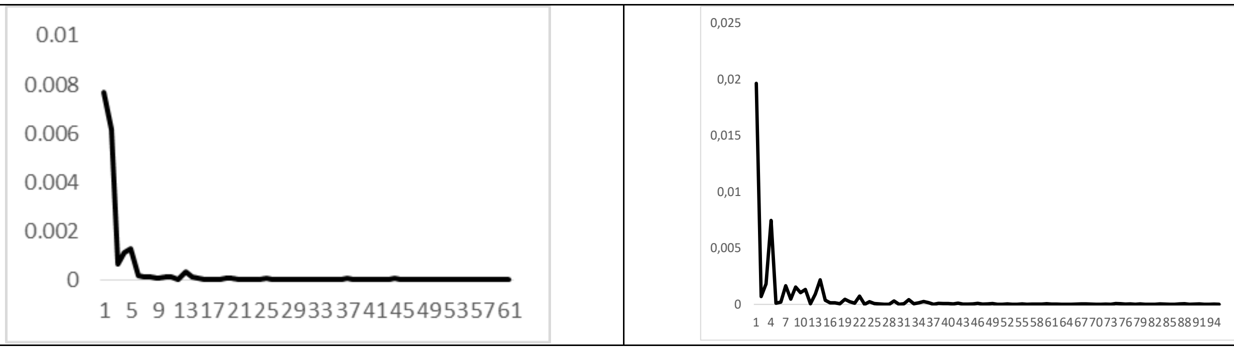
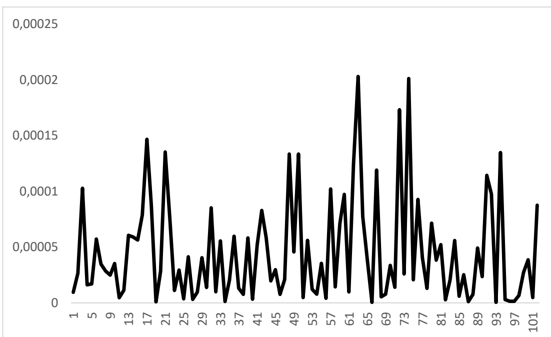
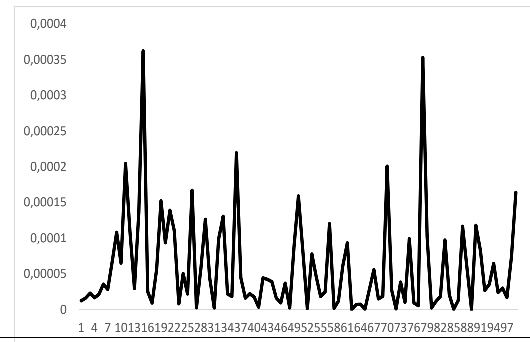


Fig. (A1). Periodograms of the logged series in the two subsamples.

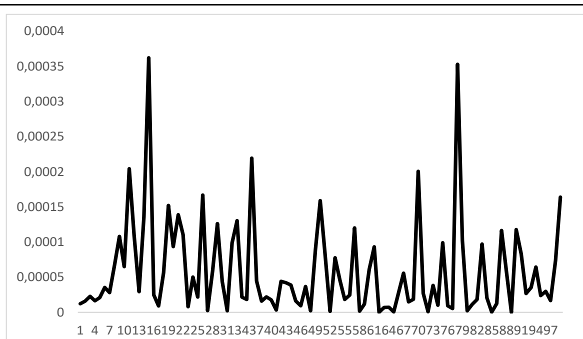
Brent (pre-Tariff data)



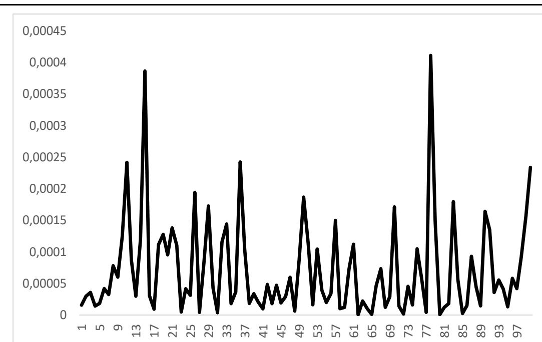
Brent (post-Tariff data)



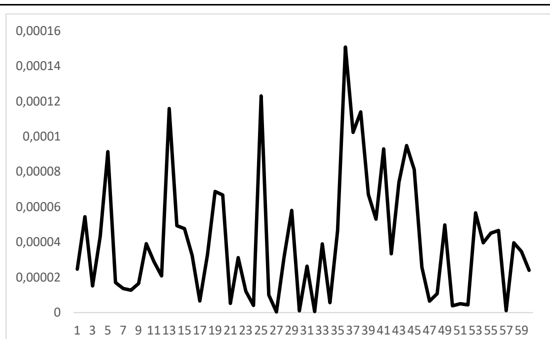
WTI (pre-Tariff data)



WTI (post-Tariff data)



Murban (pre-Tariff data)



Murban (post-Tariff data)

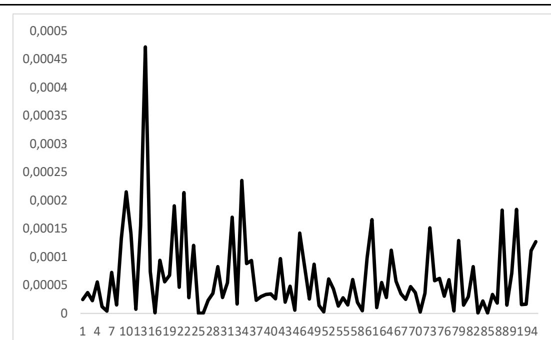


Fig. (A2). Periodograms of the first differences of the log-series in the two subsamples.

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