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ABSTRACT

This paper investigates how a disturbance in the Strait of Hormuz could impact Pakistan through fuel prices, inflation, and external-sector pressure. Using a nonlinear scenario framework, it models three cases (mild, stress, and severe) by including war-risk premium, exchange-rate effects, separate shocks to motor spirit (petrol) and high-speed diesel, threshold-based indirect CPI impacts, and staggered monthly pass-through. The results indicate that even a mild shock can disrupt Pakistan's recent disinflation trend. The stress and severe scenarios lead to substantially higher inflation because diesel-driven transportation and food-distribution costs amplify second-round effects. The findings also show that the shock affects more than just pump prices; it raises the petroleum import bill, weakens the current account, and limits policy options. The paper concludes that an effective response involves a coordinated approach (based on transparent pass-through, targeted support for critical logistics, and active external-sector management) rather than broad price controls.

1. INTRODUCTION

Oil price shocks remain among the most powerful external disturbances, transmitting into domestic inflation, production costs, and external-sector stress in oil-importing economies. Since Hamilton's seminal contribution, the literature has shown that higher oil prices are not merely a commodity-market event; they alter macroeconomic conditions by raising input costs, compressing household real incomes, weakening aggregate demand, and complicating monetary management (Hamilton, 1983). Oil shocks differ in origin and therefore do not produce identical inflationary or macroeconomic effects across countries and policy regimes (Kilian, 2009). For developing oil-importing economies such as Pakistan, however, the relevant domestic disturbance is rarely crude oil alone. What eventually reaches households, transporters, generators, manufacturers, and retailers is the delivered and administered price of petroleum products after freight, insurance, exchange-rate conversion, margins, and fiscal charges are added to the benchmark price (Hina & Malik, 2024).

This question has become immediately relevant because the Strait of Hormuz has once again become a major conduit for global energy instability. The U.S. Energy Information Administration reports that around 20 million barrels per day moved through the Strait in 2024, equivalent to roughly one-fifth of global petroleum liquids consumption, while the same route also carried a substantial share of global LNG trade (U.S. Energy Information Administration, 2025). In normal times, that alone makes Hormuz strategically important. Under current conflict conditions, the implications are sharper. Recent reporting indicates that the disruption has not only raised benchmark oil prices but has also intensified freight costs, shipping delays, and war-risk insurance premiums, thereby increasing the effective landed cost of petroleum imports for energy-dependent economies. For Pakistan, this means the relevant shock is broader than crude oil alone; it is a compound cost shock transmitted through trade, transport, and pricing channels.

Pakistan's exposure to such a disturbance is structural rather than temporary. According to the State Bank of Pakistan's *Annual Report 2024–25*, the country's total energy import bill stood at US$15.9 billion in FY2025. Within this, petroleum products accounted for US$5.96 billion, crude oil for US$5.45 billion, LNG for US$3.48 billion, and LPG for about US$1.06 billion (State Bank of Pakistan [SBP], 2025). As such, imported energy remains deeply embedded in Pakistan's external account. Even when international prices soften temporarily, the economy remains vulnerable to renewed external price shocks. Petroleum pricing is economically sensitive because petroleum products remain central to transport, production, and fiscal management, while import dependence keeps domestic prices exposed to international volatility (Hina & Malik, 2024). In practical terms, this means that an external oil shock does not stay confined to the energy account; it quickly becomes an inflation, balance-of-payments, and policy-management issue.

Pakistan's inflation trajectory had already begun to turn upward before the latest escalation in the Middle East. The Pakistan Bureau of Statistics reported that headline CPI inflation rose from 5.85 percent in January 2026 to 6.98 percent in February 2026; urban inflation reached 6.79 percent and rural inflation 7.27 percent. Within the CPI basket, Housing, Water, Electricity, Gas, and Other Fuels increased by 9.65 percent year-on-year in February, while Food and Non-Alcoholic Beverages rose by 5.82 percent (Pakistan Bureau of Statistics [PBS], 2026). On 9 March 2026, the State Bank of Pakistan kept the policy rate unchanged at 10.5 percent and cited heightened uncertainty following the outbreak of war in the Middle East (SBP, 2026). On the same day, Reuters reported that Pakistan had also moved into emergency fuel-saving measures after a sharp jump in domestic petrol and diesel prices, underscoring how rapidly external oil-market stress can spill into domestic policy action (Reuters, 2026d, 2026e). The present shock, therefore, is arriving at a moment when inflation risks are already becoming harder to contain.

The domestic transmission of oil shocks in Pakistan is well established in the literature. Asghar and Naveed (2015) find significant long-run pass-through from world oil prices to inflation in Pakistan. Hyder and Hussain (2019) further show that this pass-through is asymmetric and nonlinear rather than constant across episodes. That distinction is important for the present paper. A modest increase in international oil prices may generate a manageable first-round fuel effect. A sustained disruption in Hormuz, by contrast, can trigger a wider chain involving war-risk premia, freight disruption, exchange-rate amplification, and stronger second-round inflation. In Pakistan's context, this transmission also differs across petroleum products. Motor spirit affects household mobility and inflation salience more directly, whereas high-speed diesel has broader downstream consequences for freight, agriculture, food distribution, and supply-chain costs. Once the diesel channel intensifies, inflation moves beyond fuel stations and spreads through the wider cost structure of the economy (Asghar & Naveed, 2015; Hina & Malik, 2024; Hyder & Hussain, 2019).

This is where the present paper departs from a simple oil-price note. The issue is not whether oil matters for Pakistan; that is already known. The real policy question is how to assess a shock in which benchmark crude prices, marine freight, insurance premiums, and exchange-rate pressures can all move at the same time. A single linear elasticity is too blunt for that setting. The paper, therefore, treats the Strait of Hormuz episode as a nonlinear transmission problem for an import-dependent economy. It combines first-pass evidence on Pakistan's oil-price sensitivity with a scenario framework built around war-risk premium, exchange-rate amplification, separate shocks to motor spirit and high-speed diesel, threshold-based indirect CPI effects, and scenario-dependent monthly pass-through weights. The objective is not to create an illusion of forecasting precision. It is to provide a disciplined policy framework on how a Hormuz disruption could pass-through Pakistan's fuel-pricing system, inflation path, and broader macroeconomic vulnerability under mild, stress, and severe cases (Reuters, 2026a, 2026c; SBP, 2025; U.S. Energy Information Administration, 2025).

The rest of the paper proceeds as follows. Section 2 presents the first-pass evidence on domestic fuel pass-through and CPI basket exposure. Section 3 sets out the analytical framework and nonlinear scenario design. Section 4 reports the Excel-based scenario analysis, while the remaining sections interpret the macroeconomic implications and develop the policy response. The central argument is straightforward: for Pakistan, a Strait of Hormuz disruption should be treated not as a narrow energy-price event, but as a combined inflation, import-cost, and policy-coordination shock (PBS, 2026; SBP, 2026).

2. FIRST-PASS TRANSMISSION EVIDENCE

This section provides a historical view of Pakistan's vulnerability to external oil shocks. The main policy question is not whether international oil prices impact Pakistan; that is already clear. Instead, the more important question is how the shock usually influences domestic fuel prices, whether current conditions are causing a stronger-than-normal pass-through, and which parts of the inflation basket are likely to be affected first. These issues are important because policy cannot rely solely on headlines about oil markets. It must be based on the actual transmission patterns seen in Pakistan's price system.

2.1. Historical Pass-through from Brent Crude to Domestic Petrol Prices

Over the last decade, the relationship between Brent crude prices and Pakistan's retail petrol prices has been positive and economically meaningful, but not one-to-one. Monthly data indicate an average pass-through elasticity of around 0.30 from international oil prices to domestic petrol prices. In practical terms, this implies that a 10 percent increase in world oil prices has historically been associated with an increase of roughly 3 percent in retail petrol prices in Pakistan, while a 20 percent external oil shock would imply a petrol price increase of around 6 percent.

This is an important benchmark because it captures the historical pattern under relatively normal conditions, as shown in Figure 1. Pakistan's retail petrol price does not move mechanically with the crude benchmark. The transmission is filtered through exchange-rate conversion, import-parity pricing, inland freight equalization, dealer and marketing margins, and the policy treatment of petroleum levy and related charges (Hina & Malik, 2024). As a result, international oil shocks do pass-through, but the pass-through is usually partial rather than complete. That interpretation is consistent with the broader Pakistan literature, which finds significant oil-price transmission to inflation without implying a fixed one-for-one retail adjustment in every episode (Asghar & Naveed, 2015; Hyder & Hussain, 2019).

Higher fuel prices affect inflation both directly and indirectly because petroleum products are deeply embedded in the Consumer Price Index (CPI) basket and are also essential inputs for transportation and production. Figure 2 further indicates that petrol price movements are closely aligned with the inflation path, suggesting that fuel-price shocks can transmit beyond the energy component into broader price pressures across the economy.

Figure 1 Brent Crude Prices and Pakistan Retail Petrol Prices: Historical Co-movement

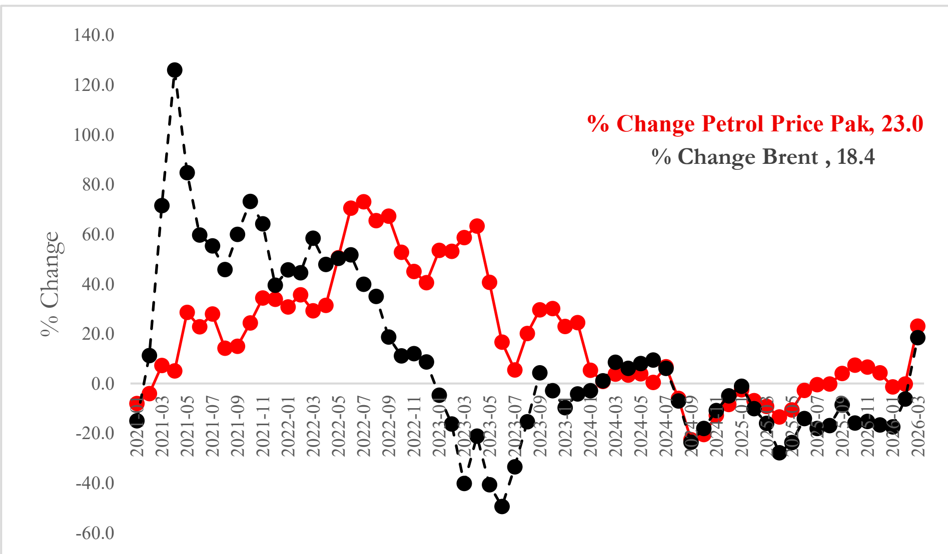
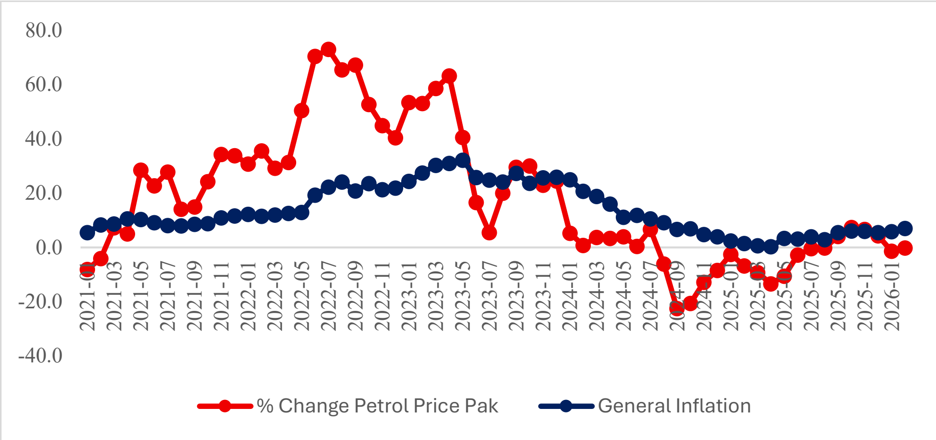


Figure 2. Pakistan Petrol Price Changes and General Inflation



2.2. Why the Current Episode Points to a Stronger Pass-through

The historical elasticity provides a useful baseline, but it is not sufficient for the current episode. Recent price behavior suggests that pass-through has become materially stronger under stress conditions. In the latest price decision, Brent crude increased by about 18.4 percent year-on-year, while domestic petrol prices in Pakistan increased by roughly 23 percent, implying a short-run elasticity of around 1.25. In other words, the recent retail response appears substantially stronger than the long-run historical average.

That divergence is analytically significant. It implies that the average pass-through observed in calmer periods may understate Pakistan's vulnerability when the shock is driven by geopolitical disruption rather than routine market fluctuation. A Strait of Hormuz disturbance does not simply push up the benchmark price of crude. It can also add war-risk premia, increase freight rates, raise marine insurance costs, delay shipping, and tighten import financing conditions. Once those pressures are combined with exchange-rate sensitivity, the domestic response can become much sharper than the historical average would predict. Pakistan had already raised petrol and diesel prices sharply, while the State Bank of Pakistan kept the policy rate unchanged at 10.5 percent and explicitly cited higher global fuel, freight, and insurance costs as inflation risks (State Bank of Pakistan [SBP], 2026).

The policy implication is straightforward. Historical pass-through remains useful as a central tendency, but it is not a safe guide in a conflict-driven shock environment. Once multiple cost channels begin to move together, the retail response can overshoot the average relationship. Therefore, it is critical to use a nonlinear scenario framework for realistic analysis.

2.3. Which Parts of the CPI Basket are Most Exposed

The estimated basket-level elasticities point to a clear ranking of exposure across the CPI. The most sensitive category is transport (0.61), followed by perishable food (0.39), alcoholic beverages and tobacco (0.37), food and non-alcoholic beverages (0.30), non-perishable food (0.29), recreation and culture (0.28), furnishing and household equipment maintenance (0.22), restaurants and hotels (0.21), and general inflation (0.22). By contrast, the sensitivity is much smaller in housing, water, electricity, gas, and other fuels (0.08), clothing and footwear (0.05), and health (0.03), while communication (-0.02) appears broadly insulated from the oil-price channel.

Table 1.
Estimated Elasticity of CPI Baskets with Respect to Oil Prices

CPI basket	Coefficient	Estimated Increase from weighted fuel shock (pp)	Channel
Headline inflation	0.22	1.78	Aggregate
Transport	0.62	5.08	Direct
Food & non-alcoholic beverages	0.30	2.48	Indirect
Non-perishables	0.29	2.36	Indirect
Perishables	0.39	3.18	Indirect
Restaurants & hotels	0.21	1.75	Indirect
Housing, water, electricity, gas & fuels	0.08	0.62	Direct
Furnishing & household maintenance	0.22	1.83	Indirect
Recreation & culture	0.28	2.35	Indirect

The strongest result is the transport coefficient. With an elasticity of 0.62, transport is the most immediate and powerful transmission channel. This is economically intuitive. Petrol and diesel are core inputs into passenger mobility, public transport, freight movement, and logistics services. Once fuel prices rise, transport costs adjust quickly, and because transport is embedded in the distribution of nearly all goods and services, the effect does not stay confined to one basket. It spreads outward through the economy.

2.4. Why food inflation is central to the transmission story

The food-related results are just as important as the transport results. The elasticity of 0.30 for food and non-alcoholic beverages, and 0.39 for perishables, shows that Pakistan's exposure to an oil shock is not simply a narrow fuel issue. It is a supply-chain issue. Higher fuel costs raise the expense of moving agricultural goods across provinces and markets, increase the cost of operating farm machinery and irrigation systems, and add to refrigeration, storage, and wholesale distribution costs. Perishable goods are especially exposed because they depend more heavily on rapid transport and cold-chain handling.

This is where the distinction between petrol and diesel becomes crucial. Petrol is more visible to households and often dominates public discussion, but diesel has broader second-round inflation consequences because it is deeply embedded in trucking, agriculture, bulk transport, and food distribution. Once diesel costs rise, food inflation tends to become more persistent and more generalized. This is particularly important in Pakistan, where food carries a large weight in household consumption and where inflation in basic food items has already been active. According to the Pakistan Bureau of Statistics, Food and Non-Alcoholic Beverages rose by 5.82 percent year-on-year in February 2026, while Housing, Water, Electricity, Gas, and Other Fuels rose by 9.65 percent (Pakistan Bureau of Statistics [PBS], 2026). A fresh fuel shock, therefore, enters an inflation environment that is already sensitive rather than dormant.

2.5. Broader inflation exposure and policy meaning

The basket ranking also shows that the oil shock extends beyond transport and food. Restaurants and hotels (0.21) reflect the effect of higher transport and energy costs on food preparation and service activities. Furnishing and household equipment maintenance (0.22) captures the role of logistics and manufacturing costs in household goods. Recreation and culture (0.28) suggest that operating costs in service sectors also respond meaningfully to fuel-related price pressure. By contrast, categories such as health and clothing appear less directly exposed, which reinforces the point that oil shocks do not generate a uniform CPI response across the basket.

Three conclusions follow from this first-pass evidence. First, Pakistan's domestic fuel pricing does respond to international oil prices, but the average pass-through observed in normal periods is likely to understate vulnerability during a conflict-driven shock. Second, the principal transmission channel runs through transport and then into food, perishables, and wider supply-chains. Third, once freight costs, insurance premiums, and exchange-rate pressures move alongside benchmark oil prices, the domestic inflation response can become stronger and faster than the historical average would imply.

That is the point at which a static elasticity note becomes insufficient. The evidence presented here identifies the main transmission nodes, but it does not yet show how the shock evolves across scenarios or over time. The next section addresses that problem by setting out the analytical framework and the nonlinear scenario design.

3. ANALYTICAL FRAMEWORK AND NONLINEAR SCENARIO DESIGN

A Strait of Hormuz shock reaches Pakistan through more than the crude benchmark. It also raises freight charges, war-risk insurance, delivery uncertainty, and exchange-rate pressure, all of which increase the landed cost of imported fuel before domestic prices adjust (Reuters, 2026a, 2026b; U.S. Energy Information Administration, 2025). For Pakistan, the relevant issue is therefore not a simple oil-price increase, but a broader transmission process that feeds into fuel prices, inflation, and external-sector stress.

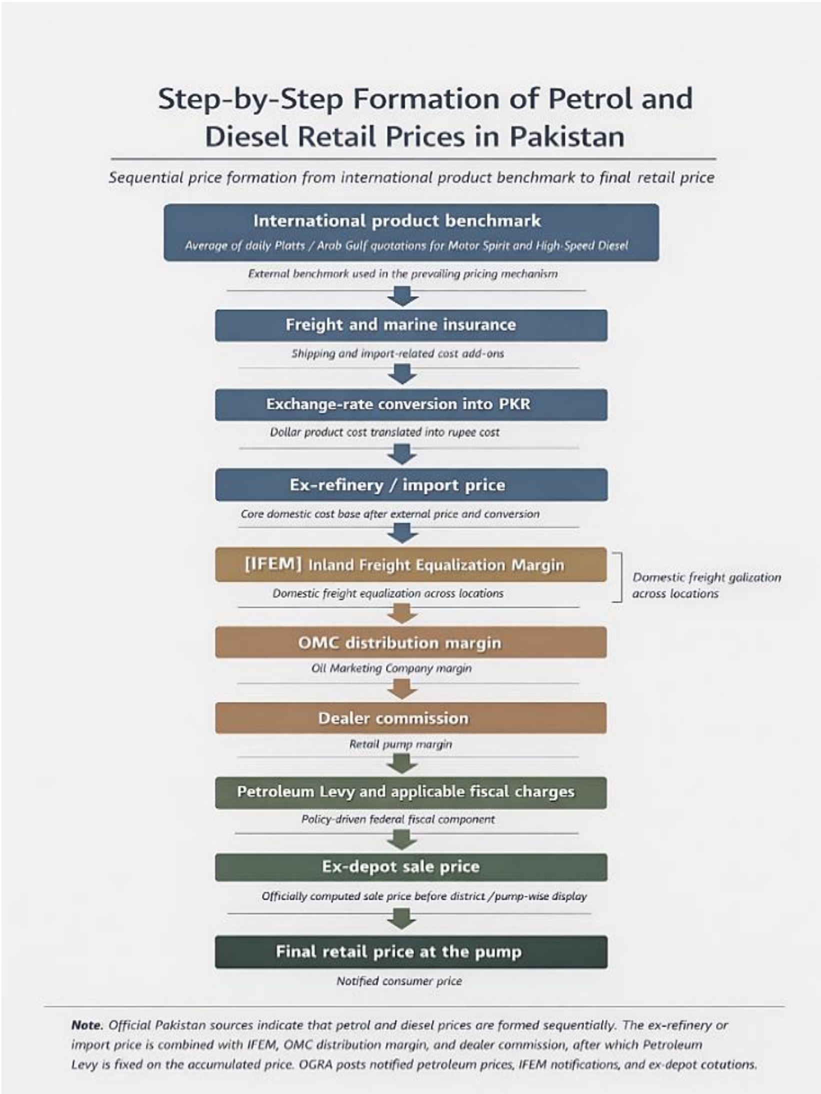
3.1. Domestic fuel pricing and pass-through

Retail petroleum prices in Pakistan are formed through a layered pricing structure. The international benchmark is converted into an import-based landed cost and then adjusted for exchange-rate conversion, freight and insurance, inland freight equalization, dealer and oil marketing margins, and fiscal charges before the final retail price is set (Figure 3). This explains why pass-through is positive but usually incomplete in normal periods. It also explains why stress episodes can produce a stronger retail response: when freight, insurance, and exchange-rate pressures rise together, domestic prices can increase by more than crude-price movements alone would suggest.

Motor spirit and high-speed diesel should also be treated separately. Motor spirit affects household mobility more directly, while diesel has wider downstream effects through freight, agriculture, and food distribution.

In Pakistan, "deemed duty" on petrol and diesel is not a separate retail tax charged to consumers at the pump. It is a refinery-side tariff-protection incentive created under the Pakistan Oil Refining Policy for Upgradation 2023. The policy states that eligible refineries are allowed 10 percent tariff protection / deemed duty on motor gasoline and diesel ex-refinery prices for 6 years from the policy notification and the opening of the joint escrow account with OGRA. It also specifies that 2.5 percent of the deemed duty on diesel and 10 percent on motor gasoline are treated as an incremental incentive to be deposited for refinery upgradation use.

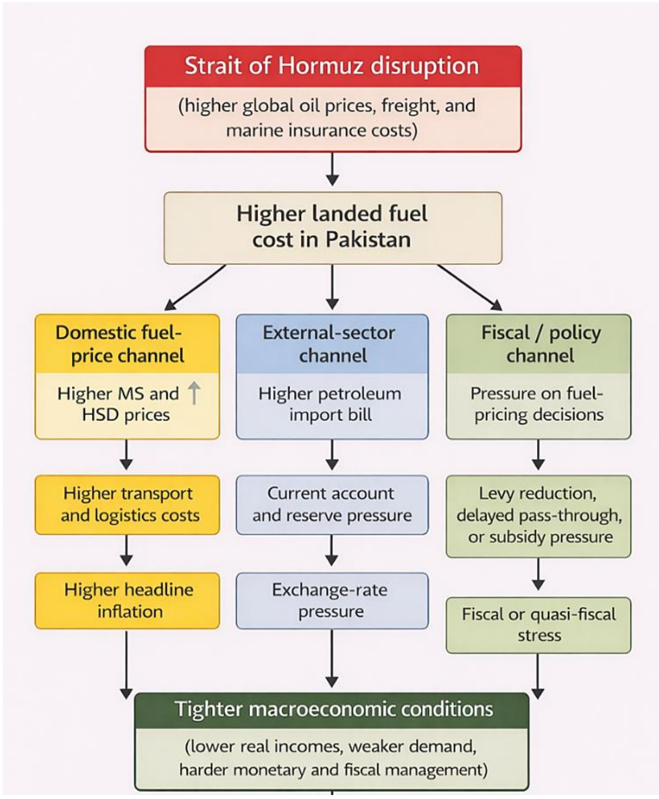
Figure 3. Simplified structure of domestic petroleum price formation in Pakistan



3.2. Why a nonlinear framework is needed

A linear pass-through rule is too narrow for the current shock. Pakistan-specific evidence shows that oil-price transmission is asymmetric and nonlinear across episodes (Hyder & Hussain, 2019). Under present conditions, the domestic effect can intensify through four channels: war-risk premium, exchange-rate amplification, diesel-led indirect CPI effects, and staggered monthly pass-through. This means the same external oil shock can generate very different domestic outcomes depending on its duration and severity. Figure 4 illustrates how a Strait of Hormuz disruption transmits to Pakistan through three linked channels, which together raise inflation and tighten macroeconomic conditions.

Figure 4. Transmission of a Strait of Hormuz shock to Pakistan



3.3. Scenario Design

The framework uses three cases: mild, stress, and severe. Each combines six elements: benchmark oil shock, war-risk premium, exchange-rate amplification, separate motor spirit and diesel shocks, threshold-based indirect CPI response, and monthly pass-through weights. The mild case captures limited disruption. The stress case reflects a longer shock with stronger freight and exchange-rate effects. The severe case captures prolonged disruption with larger diesel-led second-round inflation.

The purpose is not to claim forecast precision. It is to map how a Hormuz disruption could move through Pakistan's fuel-pricing system and inflation path under different levels of stress.

3.4. Baseline Assumptions and Monthly Pass-Through Logic

The scenario framework is anchored in current domestic inflation and fuel-pricing conditions rather than in a long-run equilibrium setting. The baseline represents a no-additional-shock path, while the mild, stress, and severe cases impose progressively larger external cost pressures through oil prices, war-risk premia, freight, insurance, and exchange-rate amplification. This allows the analysis to isolate the incremental effect of a Hormuz disruption on Pakistan's inflation path.

Pass-through is assumed to be partial, staggered, and scenario-dependent. The domestic effect of an external oil shock does not appear fully in one month because fuel pricing, distribution costs, and second-round adjustments work through the system over time. In the mild case, the adjustment is more contained and fades relatively quickly. In the stress case, a larger share of the shock passes through over successive months. In the severe case, pass-through is both stronger and more persistent, especially once diesel-led logistics and food-distribution costs begin to feed into indirect CPI pressure.

This monthly weighting approach is used to reflect realistic policy transmission. It avoids the unrealistic assumption of an immediate full pass-through and captures the fact that inflation persistence rises when the shock is prolonged, amplified by the exchange-rate, and transmitted through supply-chains.

4. SCENARIO ANALYSIS

This section reports the results of the nonlinear scenario engine using February 2026 headline inflation of 7.0 percent as the baseline anchor. The purpose is not to generate a point forecast, but to show how a Strait of Hormuz disruption could move through Pakistan's fuel-pricing system and inflation path under mild, stress, and severe conditions. To keep the analysis transparent, the section begins with the baseline assumptions and the nonlinear transmission assumptions used in the scenario framework.

4.1 Baseline and scenario assumptions

Table 2 reports the baseline macro and pricing assumptions used in the analysis. The starting point is 7.0 percent headline CPI inflation in February 2026, which serves as the paper's no-additional-shock reference path.

Table 2
Baseline Macro and Pricing Assumptions

Metric	Value
Baseline YoY CPI inflation (February)	7%
Monthly petroleum import bill (February)	USD 1,186,104
Monthly current-account balance (February)	USD 121.00
Benchmark external oil shock	10.0%
Freight / supplier premium shock	0.0%
Exchange-rate feedback shock	2.0%
Petroleum levy smoothing on MS	0.0%
Petroleum levy smoothing on HSD	0.0%
MS weight in domestic fuel shock	50.0%
HSD weight in domestic fuel shock	50.0%
Direct share of headline pass-through	62.0%
Indirect share of headline pass-through	38.0%

Table 3 then reports the nonlinear assumptions that differentiate the three scenarios. These assumptions are important because the model does not treat the shock as a simple proportional increase in crude oil prices. Instead, it allows the final domestic effect to depend on war-risk premium, exchange-rate amplification, product-specific pass-through, threshold-based indirect CPI effects, and staggered monthly adjustment.

Table 3

Nonlinear Scenario Assumptions

Scenario	External oil shock	War-risk premium	Exchange-rate amplification	MS pass-through severity	HSD pass-through severity	Indirect CPI threshold effect	Monthly pass-through pattern
Mild	10%	Low	Limited	Moderate	Moderate-high	Weak	Front-loaded but contained
Stress	20%	Medium	Noticeable	Strong	Stronger	Active	Distributed over several months
Severe	30%	High	Strong	Very strong	Very strong	Pronounced	Persistent and cumulative

The mild scenario captures a limited disruption with only partial amplification. The stress scenario assumes a larger and more persistent shock in which freight, insurance, and exchange-rate pressures become more binding. The severe scenario captures a prolonged and disorderly disruption in which the diesel channel and indirect CPI effects become materially stronger.

4.2. Translation into Domestic Fuel Prices

Table 4 shows how the external shock is translated into domestic fuel-price outcomes. The first point is that the retail effect rises sharply across scenarios. The second is that high-speed diesel increases more than motor spirit in every case. That difference is central to the inflation story because diesel has broader downstream effects through freight, agriculture, logistics, and food distribution.

Table 4

Translation of External Shock into Domestic Fuel Price Effects

Scenario	Weighted retail fuel shock (%)	Motor spirit (MS) increase (%)	High-speed diesel (HSD) increase (%)
Mild	8.26	7.24	9.28
Stress	15.28	13.4	17.17
Severe	22.3	19.56	25.05

Under the mild case, the weighted retail fuel shock is 8.26 percent, with motor spirit rising by 7.24 percent and diesel by 9.28 percent. Under stress, the weighted retail fuel shock rises to 15.28 percent, while diesel reaches 17.17 percent. Under the severe case, the weighted retail fuel shock reaches 22.30 percent, with diesel rising by 25.05 percent. These results confirm that the domestic fuel shock becomes progressively more nonlinear as the external disturbance intensifies.

4.3. Month-wise Inflation Path

Table 5 reports the month-wise inflation path under each scenario. Even in the mild case, inflation does not return quickly to the baseline. Instead, the effect accumulates over time as direct fuel-price changes are followed by broader transport and supply-chain adjustments.

Table 5
Month-Wise Headline Inflation Path under Alternative Scenarios

Month	Baseline	Mild	Stress	Severe
Month 1	7.00	7.36	7.85	8.71
Month 2	7.00	7.80	8.63	9.99
Month 3	7.00	8.15	9.25	10.85
Month 4	7.00	8.42	9.72	11.49
Month 5	7.00	8.60	10.10	11.97
Month 6	7.00	8.78	10.41	12.34

Under the mild scenario, inflation rises from 7.0 percent at baseline to 7.36 percent in month one and 8.78 percent by month six. Under the stress scenario, inflation reaches 7.85 percent in month one and 10.41 percent by month six. Under the severe scenario, inflation rises to 8.71 percent in month one and 12.34 percent by month six. The month-wise profile, therefore, shows that the key policy issue is not only the initial shock, but the persistence of pass-through over subsequent months.

4.4. Cumulative inflation effect

Table 6 summarizes the six-month cumulative inflation addition. The mild case adds 1.78 percentage points to inflation, the stress case adds 3.41 percentage points, and the severe case adds 5.34 percentage points. The progression is more than proportional. This is the clearest indication that the transmission mechanism is nonlinear rather than constant. Once freight, insurance, exchange-rate pressure, and diesel-led second-round effects interact, inflation rises faster than a simple linear oil-price rule would imply.

Table 6
Cumulative Inflation Addition and Macro Reading

Scenario	Six-month inflation addition (pp)	Month-6 inflation (%)	Main policy reading
Mild	1.78	8.78	Disinflation is interrupted, but still manageable
Stress	3.41	10.41	Inflation becomes macro-critical
Severe	5.34	12.34	Strong second-round and diesel-led effects

4.5. External-Sector Signal

The same shock also weakens the external balance. Table 7 shows that even in the active mild configuration, the monthly petroleum import bill rises by about US$142.3 million, while the monthly current account position shifts from a surplus of US$121 million to a deficit of about US$21.3 million. This matters because the inflation problem does not arrive alone. It is accompanied by import-bill pressure, reserve stress, and greater exchange-rate vulnerability. The inflation path and the external-sector signal, therefore, reinforce each other.

Table 7
External-Sector Signal under Scenario Conditions (Million USD)

Scenario	Baseline Import	Scenario Import	Monthly Import Increase	Scenario Current Account Balance	Annualized Current Account impact
Mild	1,186.10	1,328.44	142.33	-21.33	-1,707.99
Stress	1,186.10	1,449.42	263.32	-142.32	-3,159.78
Severe	1,186.10	1,570.40	384.30	-263.30	-4,611.57

Taken together, the scenario results yield three clear conclusions. First, even a mild Hormuz disruption is sufficient to interrupt Pakistan's disinflation path. Second, once the shock enters stress territory, the inflation effect becomes nonlinear and macroeconomically more serious. Third, diesel-led indirect effects are what convert a fuel-price shock into a broader inflation problem. For that reason, the policy discussion in the next section cannot be limited to pump prices alone; it must address the wider macroeconomic and external-sector consequences of the shock.

5. EXTERNAL SECTOR AND MACROECONOMIC IMPLICATIONS

The inflation effects reported above are only one part of the policy problem. A Hormuz shock also raises Pakistan's energy import bill, weakens the current account, and increases exchange-rate pressure. Given Pakistan's continued dependence on imported petroleum and related fuels, a rise in landed fuel costs feeds into the balance of payments before it is fully reflected in domestic prices (State Bank of Pakistan [SBP], 2025). The shock should therefore be read as a combined inflation and external-sector disturbance rather than as a narrow fuel-price event.

The scenario results already point in that direction. Even under the active mild configuration, the monthly petroleum imports bill rises, and the current account shifts from a small surplus to a deficit. That matters because the first-round external effect can appear quickly, while domestic adjustment takes longer. Once the import bill deteriorates, pressure on the rupee can intensify, and exchange-rate depreciation can then raise the domestic-currency cost of imported fuel further. In that sense, the exchange-rate is not separate from the inflation problem; it is one of the channels through which imported fuel shocks become more persistent.

This interaction also complicates macroeconomic management. The State Bank of Pakistan has already signaled concern that higher global fuel, freight, and insurance costs have increased uncertainty around the inflation outlook (SBP, 2026). Under such conditions, monetary policy alone cannot absorb the shock. If the pass-through is delayed through ad hoc price suppression, fiscal or quasi-fiscal pressures may increase. If the shock is passed through too abruptly, inflation and expectations may worsen. The policy challenge is therefore one of coordination: fuel-pricing decisions, inflation management, and external-sector planning must move together.

The broader implication is clear. A Hormuz disruption does not simply raise pump prices; it weakens purchasing power, strains the external account, and narrows policy space. That is why the shock should be treated as a macroeconomic coordination problem, not merely as an energy-price adjustment episode.

6. CONCLUSION

A Strait of Hormuz disruption should not be read as a narrow oil-price episode for Pakistan. The analysis shows that it is a broader macroeconomic shock transmitted through landed fuel costs, domestic pricing, diesel-led logistics, food distribution, and exchange-rate pressure. Even under a mild scenario, the shock is sufficient to interrupt the recent disinflation path. Under stress and severe conditions, the inflation effect becomes materially larger because pass-through is not linear and the second-round impact through transport and food becomes more pronounced.

The main policy lesson is equally clear. The greatest risk does not come from the initial fuel-price increase alone; it comes from delayed adjustment, weak coordination, and the amplification of the shock through the external account and supply-chains. For that reason, the appropriate response is not broad price suppression. It is a credible adjustment path, close monitoring of diesel-sensitive inflation channels, targeted protection for essential logistics, and active coordination across fuel pricing, inflation management, and external-sector policy.

In practical terms, Pakistan's vulnerability to a Hormuz shock is not only a matter of oil dependence. It is a matter of how quickly an external cost shock can spread across prices, imports, and macroeconomic policy space. The stronger the disruption, the higher the cost of delay.

7. POLICY RECOMMENDATIONS

Recommendation	Rationale	Lead implementing agency	Time horizon
Adopt a transparent, time-bound fuel pass-through schedule	Reduces uncertainty, avoids abrupt pricing reversals, and prevents the shock from being shifted into a larger future adjustment	Petroleum Division, OGRA, Ministry of Finance	Short-term
Treat high-speed diesel as the main inflation-risk product	Diesel drives freight, agriculture, and food distribution, making it the key channel for second-round inflation	Petroleum Division, Ministry of National Food Security, provincial transport departments	Short-term
Establish a weekly diesel-to-food monitoring system	Links diesel prices with freight charges, wholesale food transport costs, and retail food margins so second-round inflation can be detected early	PBS, Ministry of Finance, provincial price control authorities	Short-term
Provide targeted temporary support to essential food	Protects the most exposed supply chains and vulnerable users	Ministry of Finance, Petroleum Division,	Short-term

logistics and public transport	without the fiscal cost of a broad fuel subsidy	provincial governments	
Create a joint SBP-Finance-Petroleum coordination mechanism	Aligns fuel-pricing decisions with inflation management, external financing, and exchange-rate monitoring	SBP, Ministry of Finance, Petroleum Division	Short-term
Protect the external account through advance trade-finance and payment planning	Higher landed fuel costs quickly widen the import bill and can intensify exchange-rate pressure	SBP, Ministry of Finance, commercial banks, major fuel importers	Medium-term
Publish a monthly fuel-shock dashboard	Improves policy credibility by showing the link between fuel prices, transport costs, food inflation, and the current account	Ministry of Finance, PBS, SBP	Medium-term
Move toward a rules-based fuel pricing framework	Reduces repeated crisis-driven intervention and makes pass-through more predictable and credible	Petroleum Division, OGRA, Ministry of Finance	Long-term
Reduce diesel dependence in freight and food logistics	Lowers the main structural channel through which external fuel shocks become wider inflation	Ministry of Planning, Ministry of Energy, provincial transport and logistics authorities	Long-term

AI Disclosure Statement

“During the preparation of this work, the authors used Grammarly A.I. to improve grammar, sentence structure, clarity, and readability. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the originality, accuracy, and integrity of the final content. The research idea, conceptualization, methodology, empirical analysis, interpretation of results, and conclusions are entirely the author’s own.”

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APPENDIX A. TECHNICAL METHODOLOGY

A1. Overview

The paper applies a **scenario-based transmission framework** to evaluate how a Strait of Hormuz shock affects Pakistan through domestic fuel prices, inflation, and external vulnerability. The framework combines:

(i) historical pass-through estimation from international oil prices to domestic petrol prices;

(ii) basket-level transmission from petrol prices to CPI components; and

(iii) a nonlinear scenario engine that maps external fuel-cost shocks into domestic MS and HSD prices, direct and indirect inflation effects, and external-sector pressure.

A2. Historical oil-to-petrol pass-through

The historical pass-through from international oil prices to domestic petrol prices is estimated using:

$$\ln P_t^{pet} = \alpha_0 + \alpha_1 \ln P_t^{oil} + \varepsilon_t \quad \text{(A1)}$$

where P_t^{pet} is the domestic retail petrol price and P_t^{oil} is the international oil benchmark. The estimated coefficient α_1 captures the average reduced-form pass-through elasticity. The paper reports:

$$\hat{\alpha}_1 = 0.30 \tag{A2}$$

This is interpreted as a long-sample average relationship, not as a structural pricing coefficient.

A3. Event-window pass-through ratio

To capture the recent stressed episode, an event-window pass-through ratio is also calculated:

$$\phi_{event} = \frac{\Delta P_{event}^{pet}}{\Delta P_{event}^{oil}} \tag{A3}$$

Using the observed changes in the recent episode:

$$\phi_{event} = \frac{23.0}{18.4} = 1.25 \tag{A4}$$

This is interpreted as a short-run event-window ratio, not a structural elasticity. The difference between $\hat{\alpha}_1$ and ϕ_{event} reflects different horizons, measurement concepts, exchange-rate and freight effects, and administrative catch-up in a stressed period.

A4. Petrol-to-CPI basket transmission

The transmission from petrol prices to inflation baskets is represented as:

$$\pi_{j,t} = \beta_{0j} + \beta_{1j}\Delta P_t^{pet} + u_{j,t} \tag{A5}$$

where $\pi_{j,t}$ is inflation in basket j, and β_{1j} is the basket-specific slope parameter. The reported coefficients are:

$$\beta_{transport} = 0.61, \beta_{perishable} = 0.39, \beta_{food} = 0.30, \beta_{nonperishable} = 0.29 \tag{A6}$$

$$\beta_{recreation} = 0.28, \beta_{furnishing} = 0.22, \beta_{restaurants} = 0.21, \beta_{headline} = 0.22 \tag{A7}$$

$$\beta_{housing\_energy} = 0.08, \beta_{clothing} = 0.05, \beta_{health} = 0.03, \beta_{communication} = -0.02 \tag{A8}$$

These coefficients are used to identify the relative sensitivity of CPI baskets, with the strongest effects concentrated in transport and food-related categories.

A5. External fuel-cost shock

For each scenario $s \in \{M, S, V\}$, the total landed-cost shock is defined as:

$$\Delta LC_s = \Delta O_s + \Delta W_s + \Delta E_s \tag{A9}$$

where:

- ΔO_s= benchmark oil-price shock
- ΔW_s= war-risk and freight premium
- ΔE_s= exchange-rate amplification

This captures the paper's core proposition that a Hormuz shock affects Pakistan through more than the crude benchmark alone.

A6. Domestic fuel-price translation

The landed-cost shock is translated separately into motor spirit (MS) and high-speed diesel (HSD):

$$\Delta MS_s = \theta_{MS,s}\Delta LC_s \tag{A10}$$

$$\Delta HSD_s = \theta_{HSD,s}\Delta LC_s \tag{A11}$$

A composite retail fuel shock is then defined as:

$$\Delta F_s = \omega_{MS}\Delta MS_s + \omega_{HSD}\Delta HSD_s \quad \text{(A12)}$$

subject to:

$$\omega_{MS} + \omega_{HSD} = 1 \quad \text{(A13)}$$

This allows separate product shocks while preserving a summary retail-fuel measure.

A7. Direct and indirect inflation effects

The direct inflation effect is defined as:

$$\Delta\pi_s^D = \lambda_{MS}\Delta MS_s + \lambda_{HSD}\Delta HSD_s \quad \text{(A14)}$$

where λ_{MS} and λ_{HSD} are direct CPI transmission coefficients.

The indirect inflation effect captures second-round transmission through freight, logistics, agriculture, and food distribution, and is modeled primarily through HSD:

$$\Delta\pi_s^I = \gamma\tau_s\Delta HSD_s \quad \text{(A15)}$$

where γ is the base indirect transmission coefficient and τ_s is a scenario-specific nonlinear multiplier satisfying:

$$\tau_M < \tau_S < \tau_V \quad \text{(A16)}$$

The total inflation addition is:

$$\Delta\pi_s = \Delta\pi_s^D + \Delta\pi_s^I \quad \text{(A17)}$$

This is the incremental inflation effect relative to baseline, not a standalone forecast.

A8. Baseline and implied inflation

Let baseline inflation be denoted by π_0. The paper uses:

$$\pi_0 = 7.0\% \quad \text{(A18)}$$

The implied inflation under scenario s is then:

$$\pi_s = \pi_0 + \Delta\pi_s \quad \text{(A19)}$$

Thus, scenario results are interpreted as additions to the baseline path.

A9. Monthly pass-through dynamics

The model distributes the total inflation addition across six months using scenario-specific weights $w_{s,m}$, where:

$$\sum_{m=1}^{6} w_{s,m} = 1 \quad \text{(A20)}$$

The monthly inflation addition is:

$$\Delta\pi_{s,m} = w_{s,m}\Delta\pi_s \quad \text{(A21)}$$

Cumulative inflation by month m is:

$$\Delta\Pi_{s,m} = \sum_{k=1}^{m} \Delta\pi_{s,k} \quad \text{(A22)}$$

and implied inflation by month m is:

$$\Pi_{s,m} = \pi_0 + \Delta\Pi_{s,m} \quad \text{(A23)}$$

This structure captures staggered pass-through and persistence.

A10. External-sector signal

A simplified external-sector block is included to reflect the effect of higher landed fuel cost on the petroleum import bill and the current account.

Let:

- M_0= baseline monthly petroleum import bill
- CA_0= baseline monthly current account position
- η_s= scenario-specific import-bill sensitivity parameter

Then:

$$\Delta M_s = \eta_s \Delta LC_s \quad \text{(A24)}$$
$$CA_s = CA_0 - \Delta M_s \quad \text{(A25)}$$

This block is intended as a macro signal rather than a full balance-of-payments model.

A11. Consistency with official pricing structure

The scenario design is consistent with Pakistan's official sequential fuel-pricing framework, which can be represented as:

This explains why long-sample crude-to-petrol pass-through can be relatively low even when short-run event-window pass-through appears high.

A12. Implementation steps

The scenario tool follows these steps:

$$\pi_0 = 7.0\% \quad \text{(A27)}$$
$$\Delta LC_s = \Delta O_s + \Delta W_s + \Delta E_s \quad \text{(A28)}$$
$$\Delta MS_s = \theta_{MS,s} \Delta LC_s, \Delta HSD_s = \theta_{HSD,s} \Delta LC_s \quad \text{(A29)}$$
$$\Delta \pi_s^D = \lambda_{MS} \Delta MS_s + \lambda_{HSD} \Delta HSD_s \quad \text{(A30)}$$
$$\Delta \pi_s^I = \gamma \tau_s \Delta HSD_s \quad \text{(A31)}$$
$$\Delta \pi_s = \Delta \pi_s^D + \Delta \pi_s^I \quad \text{(A32)}$$
$$\Delta \pi_{s,m} = w_{s,m} \Delta \pi_s \quad \text{(A33)}$$
$$\Pi_{s,m} = \pi_0 + \sum_{k=1}^{m} \Delta \pi_{s,k} \quad \text{(A34)}$$
$$CA_s = CA_0 - \Delta M_s \quad \text{(A35)}$$

A13. Scope and limitation

The framework provides transparent and policy-relevant scenario paths rather than full structural forecasts. Its value lies in combining product-specific fuel transmission, basket-level inflation sensitivity, nonlinear indirect effects, and monthly pass-through dynamics in a single applied framework. The results should therefore be read as conditional scenario estimates, not unconditional forecasts.

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