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Print ISSN: [3006-2497](#) Online ISSN: [3006-2500](#)Platform & Workflow by: [Open Journal Systems](#)<https://doi.org/10.5281/zenodo.17572353>**Pakistan's Agricultural Exports to SCO Member States: Pre and Post Integration Assessment****Muhammad Waseem Shahzad**

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vaaqaas@gmail.com**Abstract**

This study explores the impact of regional integration on Pakistan's agricultural export performance within the framework of the Shanghai Cooperation Organization (SCO). Using annual panel data from 2010 to 2023, the study employs an advance technique Difference-in-Differences (DID) to estimate how Pakistan's agricultural exports progressed after obtaining full SCO membership in 2017. The empirical model integrates key determinants of trade, including GDP, population, distance, and shared borders, along with country and time fixed effects to control for unobserved heterogeneity and multilateral resistance factors. The findings of the study indicate statistically significant and positive post-integration effect on Pakistan's agricultural exports to SCO countries. The event study confirmed the parallel trends assumption, validating the DID approach, while the robustness tests through alternative estimation Poisson Pseudo-Maximum Likelihood (PPML) verified that the observed trade gains were not driven by random fluctuations. The comparative pre-post overview of agriculture exports analysis highlights that Pakistan's agricultural exports performed better after SCO integration, with both export values and growth rates showing a marked improvement. This suggests that regional integration under the SCO framework has played a supportive role in enhancing Pakistan's agricultural trade performance, potentially due to improved market access, reduced trade barriers, and greater regional cooperation. However, the results also highlight the need for policy focus on diversification, value addition, and institutional reforms to sustain agricultural export growth within the SCO framework.

Keywords: *Agricultural Export, Shanghai Cooperation Organization (SCO), Trade Integration, Pakistan Economy, Pre and Post Assessment*

1. Introduction

In Pakistan's trade structure agricultural exports grasp a significant position, contributing significantly to employment, income generation, and foreign exchange earnings. As a mainly agrarian economy, Pakistan's agricultural sector not only endures domestic livelihoods but also delivers an essential path for export diversification and regional trade expansion. Under the framework of the Shanghai Cooperation Organization (SCO), Pakistan's membership offerings new opportunities to strengthen agricultural trade linkages with regional partners. The SCO's concentration on economic cooperation, connectivity, and policy coordination offers a platform for enhancing agricultural exports through improved market access, harmonization of trade standards, and participation in regional connectivity projects such as the China–Pakistan Economic Corridor (CPEC) (Hanif, 2024; Irshad et al., 2018).

In agricultural trade relationship among Pakistan and SCO member states is particularly relevant due to the complementarity of natural resources and consumption patterns. The Central Asian economies characterized by enormous arable land but imperfect crop diversity signify promising markets for Pakistan's agricultural exports such as rice, fruits, vegetables, and processed food items (Mahmood & Munir, 2018). In the meantime, China and Russia offer huge consumer markets with rising food demand, which bring into line well with Pakistan's export potential. Since accomplishing full SCO membership in 2017, agricultural exports Pakistan to these nations have established gradual enhancement, even though structural challenges continue, including logistical bottlenecks, sanitary and phytosanitary (SPS) barriers, and geopolitical restrictions (Abula et al., 2022; Ali et al., 2020; Govindasamy et al., 2023).

Given this background, the current study aims to empirically evaluate the impact of SCO membership on Pakistan agricultural export performance using the Difference-in-Differences (DID) estimation technique. The study compares the pre- and post-integration periods following Pakistan integration into SCO in 2017 to identify whether SCO-led regional cooperation has produced measurable gains in agricultural exports. The analysis integrates key gravity model variables such as GDP, population, distance, and shared borders and language to isolates the causal impact of integration on Pakistan's agricultural trade performance.

This research contributes to the growing literature on regional integration and trade performance by offering a sector-specific perspective often overlooked in existing empirical work on the SCO. It sheds light on how institutional cooperation, connectivity infrastructure, and trade facilitation policies shape agricultural export outcomes for developing economies. The findings are expected to guide policymakers in designing strategies to enhance Pakistan's agricultural competitiveness, diversify export products, and strengthen sustainable trade linkages within the SCO framework.

2. Literature Review

Regional integration emphasizes that economic cooperation among countries can substantially enhance trade by reducing transaction barriers, harmonizing regulations, and improving connectivity (B. A. Balassa, 2011; Wiener & Diez, 2009). In developing economies, regional trade agreements (RTAs) play an important role in

expanding agricultural exports by lowering tariffs and addressing non-tariff constraints (Anderson & Van Wincoop, 2001). Studies across various regions including ASEAN, SAARC, and the European Union reveal that agricultural trade responds positively to integration efforts, especially when supported by infrastructure and institutional linkages (Baier & Bergstrand, 2005; Kien & Hashimoto, 2016).

Agricultural products are often highly sensitive to trade policies, as they are influenced by standards, logistics, and political factors. Regional cooperation helps mitigate such barriers by fostering common standards and enhancing policy coordination (Sun et al., 2021). For developing countries, integration frameworks serve as platforms to secure stable markets and diversify export destinations. Empirical findings from Sub-Saharan Africa, for instance, demonstrate that regional integration has contributed to higher agricultural export intensity and greater resilience against global market volatility (Karaman et al., 2022).

Pakistan's agricultural sector has long been central to its export base, accounting for a major share of foreign exchange earnings and employment. However, its trade structure remains concentrated in a few products such as rice, fruits, and vegetables, making it vulnerable to external shocks (Shoufeng et al., 2013). Empirical studies suggest that limited diversification, high logistics costs, and quality compliance issues have constrained the country's agricultural export growth (Islam et al., 2024).

Regional trade arrangements such as the South Asian Free Trade Agreement (SAFTA) provided limited gains due to persistent tariff and non-tariff barriers (Ahmed et al., 2021). In contrast, the Shanghai Cooperation Organization (SCO), through its broader connectivity and cooperation agenda, offers Pakistan a new platform for expanding agricultural exports beyond South Asia (Shah et al., 2022). Scholars note that Central Asian member states import a large share of food and agricultural products, creating natural complementarities for Pakistan's exports (Ali et al., 2020).

Despite this potential, Pakistan's agricultural trade within the SCO remains underdeveloped due to weak logistics, border management inefficiencies, and a lack of harmonized standards (Abula et al., 2022). These challenges indicate that regional cooperation must go beyond market access to include supply chain development, quality upgrading, and institutional support for exporters.

In Pakistan economy especially in exports sector and employment generation agriculture plays a significant role. Although this sector has comprehensive potential but still faces many challenges such as structural inadequate, energy deficiency, and poor strategies which limits its potential to exploit in world markets. Agriculture sector particularly consisting on fruits, cotton and rice which has a comparative advantage in world market but the low value addition, poor farming strategies and inadequate limit the benefits of this sector. Although China and Pakistan take some initiatives to boost trade especially China Pakistan free Trade Agreement (CPFTA) but due to inefficient structure and poor product diversification the benefits are yet to be achieve (Kamil et al., 2024; H. Khan et al., 2025; Z. A. Khan et al., 2020; Mehmood et al., 2025; Quak, 2025; Trakem & Fan, 2024)

Under Revealed Comparative Advantage (RCA) and the Export Competitiveness Index (ECI) in international markets such as rice, cotton, and fruits and identifies many issues which are limit exports flow such as poor product quality, lack of value addition inadequate in structure and most importantly the rising completion of other trading partners. The authors suggests that creating product differentiation, exports

diversification, developing modern logistics and use of innovative technology in agriculture sector are main pillar to promote exports (Ahmad et al., 2024; Farid et al., 2023; Govindasamy et al., 2023; Naheed et al., 2023).

Empirical evidence consistently highlights the trade-enhancing role of regional integration. Using the gravity model, (Zaman et al., 2021) found that intra-regional agricultural trade in the Gulf Cooperation Council (GCC) increased significantly due to shared infrastructure and reduced trade costs. Similarly, (Bhasin & Manocha, 2015) observed that participation in African RTAs positively influenced agricultural export growth, with the magnitude depending on institutional quality and transport infrastructure.

In South and Central Asia, studies demonstrate that trade facilitation and connectivity projects especially under the Belt and Road Initiative (BRI) and CPEC are key to expanding agricultural exports (Afzaal, 2020; Ibrar, 2020). For Pakistan, empirical findings suggest that improved transport corridors and energy infrastructure have lowered trade costs and enhanced market accessibility (Singh & Magray, 2017; Zahra et al., 2022). However, the empirical literature also warns that trade liberalization alone may not yield strong export growth unless supported by productivity gains and diversification (Vogiatzoglou & Thi, 2016).

While the global literature has extensively explored the effects of regional integration on trade, the specific case of the SCO and Pakistan's agricultural exports remains largely unexplored. Most prior studies on Pakistan's trade focus on overall exports or manufacturing sectors, often neglecting agriculture's unique characteristics and its responsiveness to institutional integration (Mir Sherbaz Khetran, 2019; Rab & Zhilong, 2018). Furthermore, no study to date has used a Difference-in-Differences (DID) framework to identify the causal impact of SCO membership on Pakistan's agricultural exports.

By addressing this gap, the present study adds empirical clarity to the discussion of how regional integration, facilitated by the SCO and associated projects like CPEC, has influenced Pakistan's agricultural trade patterns. The analysis aims to determine whether post-2017 membership has translated into measurable export gains, controlling for structural and macroeconomic factors.

3. Theoretical Framework and model Specification

Building upon the classical and new trade theories discussed earlier, this section bridges the conceptual and empirical dimensions of the study by introducing the Gravity Model of Trade and the Difference-in-Differences (DID) approach as the core analytical frameworks. The following subsections elaborate the theoretical logic of the gravity model, explain the DID framework, and present the empirical methodology, data sources, and estimation strategies that underpin the econometric analysis of Pakistan's agricultural exports within the SCO region.

3.1. Theoretical Framework

The relationship between regional integration and trade performance is deeply rooted in classical and modern trade theories. The early foundations were laid by Adam Smith (1776) through the concept of absolute advantage, and later extended by David Ricardo (1817) under the comparative advantage principle, suggesting that countries benefit by specializing in goods where they have relative efficiency. For agricultural trade, these theories imply that Pakistan can expand exports by focusing on commodities where it possesses favorable natural endowments such as climate and fertile land relative to its regional partners. Furthermore, Regional

Integration Theory (B. Balassa, 1976) provides an institutional perspective, emphasizing that integration deepens economic linkages by reducing tariff and non-tariff barriers, harmonizing standards, and promoting cross-border cooperation. The SCO's regional initiatives including food security cooperation, customs facilitation, and transport connectivity reflect these mechanisms. Under this framework, Pakistan's agricultural export performance after joining the SCO is expected to improve through enhanced trade facilitation, institutional cooperation, and infrastructural development.

Finally, the Gravity Model of Trade (Tinbergen, 1962) provides the empirical foundation for analyzing trade flows among countries. It posits that bilateral trade between two nations is positively related to their economic sizes (usually proxied by GDP) and inversely related to the distance between them. Regional integration modifies these relationships by reducing effective trade resistance and improving institutional connectivity. Incorporating this model allows the estimation of whether Pakistan's agricultural exports to SCO members have grown due to reduced economic distance after joining the organization.

Combining these theoretical perspectives, the current study conceptualizes that regional integration under the SCO acts as a trade-enhancing mechanism, supported by both economic fundamentals (GDP, population, distance) and institutional frameworks (membership and cooperation mechanisms). Thus, an integrated theoretical framework links classical trade efficiency, institutional integration, and geographical proximity to explain variations in Pakistan's agricultural export performance.

3.2. Model Specification

To empirically assess the impact of Pakistan's regional integration with the SCO on agricultural exports, this study employs the Difference-in-Differences (DID) approach within the augmented gravity model framework. The DID design allows for identifying the causal effect of SCO membership by comparing Pakistan's exports to SCO countries (treatment group) before and after 2017 when Pakistan became a permanent member with its exports to non-SCO countries (control group) over the same period.

The general gravity model for bilateral trade can be expressed as:

$$\ln Exports_{ijt} = \alpha + \beta_1 SCO_{ijt} + \beta_2 GDP_{it} \times \beta_2 GDP_{jt} + \beta_3 POP_{ijt} \times \beta_3 POP_{ijt} + \beta_4 DIST_{ijt} + \beta_5 LNG_{ijt} + \beta_6 BDR_{ijt} + v_i + \delta t + \varepsilon_{it}$$

While the gravity model explains the structural determinants of trade flows, it does not identify the causal effects of specific policy changes or integration events. To overcome this limitation, the present study adopts the Difference-in-Differences (DID) approach one of the most widely used quasi-experimental techniques in applied economics to estimate the causal impact of Pakistan's accession to the Shanghai Cooperation Organization (SCO) in 2017 on its export performance. The DID methodology originated in labor economics. Ashenfelter-1978 and Card and Krueger (1994) were among the first to apply difference in difference (DID) (Fredriksson & Oliveira, 2019). Since then, the DID framework has become a cornerstone in empirical economics and has been increasingly applied in international trade and integration research (Beyer, 2025; Dung et al., 2024; Liang et al., 2025; Liu & Lin, 2024; Ponnusamy, 2022; Zeng et al., 2024; T. Zhang et al., 2022; X. Zhang et al., 2023).

In the context of this study, the DID framework is integrated within the gravity model to isolate the causal

impact of Pakistan's integration with the Shanghai Cooperation Organization (SCO) on its export performance. The following DID-augmented gravity model specify to empirically test the Pakistan Exports performance with SCO after its association.

$$\ln Exports_{ijt} = \alpha + \beta_1 SCO_{ijt} + \beta_2 GDP_{it} \times \beta_2 GDP_{jt} + \beta_3 POP_{ijt} \times \beta_3 POP_{ijt} + \beta_4 DIST_{ijt} + \beta_5 LNG_{ijt} + \beta_6 BDR_{ijt} + v_i + \delta t + \varepsilon_{it}$$

The empirical model includes several variables grounded in trade theory. The central DID-treatment variable is the SCO membership dummy, which captures the policy effect of regional integration by distinguishing between member and non-member countries, reflecting how Pakistan's accession in 2017 may have enhanced trade through improved market access and cooperation. Economic size and market potential are represented by GDP, expected to positively influence exports as larger economies generate higher trade demand. Population measures market size and labor availability, similarly expected to boost agriculture exports by expanding consumer bases and production capacity. Distance acts as a proxy for trade costs, anticipated to negatively affect exports due to higher transport expenses. The border dummy captures the effect of geographical proximity, with shared borders facilitating trade through reduced costs and stronger connectivity. Common language reflects cultural and communication ties that ease transactions and foster trade relations. α , represents the intercept term, v , represents country fixed effects, δ , represents time fixed effects, and ε , denotes the error term in the model. Collectively, these variables capture economic mass, trade resistance, and integration effects, providing a robust framework for analyzing how SCO membership influences Pakistan's agriculture exports.

In this study the dataset employed comprises of a balanced panel of 32 countries, with both treatment and control groups, observed over 13 years (2011–2023). This gives a total of 416 country-year observations. The data used in this study was sourced from several reputable databases, including the World Indicator Trade Solution, WITS, International Trade Center, ITC, World Development Indicators, WDI and the CEPII database. To assess market size, consumption, and demand potential between Pakistan and its trading partners, the study applied data on gross domestic product, GDP and population from the WDI. In addition, information on linguistic similarities, border commonalities, and geographical distance data was obtained from the CEPII database.

4. Empirical Analysis

The empirical analysis of Pakistan's agricultural exports to SCO countries is structured around several key stages. First, the pre-treatment trends are examined through an event study framework to validate the parallel trends assumption, ensuring the strength of the DID approach. Building on this, the baseline regression results are presented to evaluate the effect of SCO integration on performance of agricultural export. To strengthen the reliability of these findings, the alternative estimation technique PPML applied as a robust analysis which address issues of zero trade value and hetero.

4.1 Descriptive Statistics

Table 01 summarizes the descriptive statistics for the variables used to analyze Pakistan's agricultural exports. The mean value of the SCO variable (0.415) again confirms a balanced distribution between SCO and non-SCO partners, supporting robust treatment–control comparisons. The mean log of GDP (36.63) and

population (34.46) indicate that Pakistan trades agricultural commodities with both populous and economically significant countries within and outside the SCO. The average distance (11.53) remains consistent with the agriculture exports model, reaffirming the inclusion of both proximate and distant trading partners. The border and language dummies (0.545 and 0.454, respectively) underline that a substantial portion of agricultural exports is directed toward culturally or geographically proximate economies a reflection of regional trade gravity. The mean agricultural export value (around 11.25 in log terms) is relatively lower than agriculture exports, suggesting that agriculture contributes a smaller but still significant share to Pakistan's trade basket. The variation in export values (standard deviation 1.84) suggests sectoral diversity and uneven export intensity across trading partners. This heterogeneity underscores the importance of applying a DID approach to assess how SCO integration and improved Pakistan's agricultural export performance.

Table 01: Descriptive Statistics for the variables

Variables	Mean	Standard Deviation	Minimum	Maximum	Observations
SCO (Dummy)	0.415	0.493	0	1	416
GDP (ln)	36.626	1.987	35.543	38.766	416
Population (ln)	34.461	1.087	32.768	36.786	416
Distance (ln)	11.525	1.870	6.753	11.545	416
Language (Dummy)	0.454	0.497	0	1	416
Border (Dummy)	0.545	0.497	0	1	416
Agriculture Exports	11.247	2.103	6.452	18.823	416

Source: Author calculation

4.2 Correlation Matrix

The correlation matrix results for agricultural exports Table 02 highlight important relationships between the dependent and explanatory variables. Agricultural exports show a positive correlation with most predictors, particularly with border sharing (0.5361), GDP (0.3462), and SCO membership (0.3546), suggesting that proximity, economic size, and regional integration play a supportive role in boosting agricultural trade. A weaker but still positive association is observed with population (0.2224), distance (0.1807), and language similarity (0.1097), indicating that while these factors matter, their influence is less pronounced. On the other hand, SCO membership shows negative correlations with GDP (−0.3676) and population (−0.3201), reflecting structural differences across member economies. Similarly, distance, language, and border variables exhibit some negative interrelationships, yet none are strong enough to suggest serious multicollinearity concerns. Overall, the correlations confirm that geographic, economic, and institutional factors collectively shape Pakistan's agricultural export performance within the SCO.

Table 02: Results of Correlation Matrix

Variables	Agriculture Exports	SCO	GDP	Population	Distance	Language	Border
Agriculture Exports	1						
SCO	0.3546	1					
GDP	0.3462	-0.3676	1				
Population	0.2224	-0.3201	0.68	1			
Distance	0.1807	0.1399	0.0567	-0.0723	1		
Language	0.1097	-0.1846	0.0931	0.6438	-0.2337	1	
Border	0.5361	-0.2387	0.3753	0.6438	-0.2972	0.461	1

Source: Author calculation

4.3 Pre-Treatment Trends (Event Study): Parallel Trends Assumption

To confirm the soundness of the DID methodology, this is crucial to conduct the Parallel Trends assumption. To test this assumption, an event study was conducted to analyzed the pre-treatment trends of exports for both treatment, groups (SCO member countries) and control, group (non-SCO countries) from 2011 to 2016. To support this test visually we also present the graph which helps to analyze pretreatment trends.

Figure 01 illustrates agricultural export trends for Pakistan (SCO member) and non-SCO countries from 2011 to 2023. The blue line represents agricultural exports of non-SCO countries, while the red dashed line shows Pakistan's exports before and after its SCO accession in 2017. Before 2017, both groups display parallel trends, indicating that Pakistan's agricultural exports followed similar patterns to those of non-SCO countries supporting the parallel trends assumption. After 2017, however, the red dashed line rises sharply, diverging from the blue line, signaling a positive change in Pakistan's agricultural export trajectory following SCO membership. The vertical line at 2017 marks the treatment point, after which Pakistan's exports grew notably faster. Overall, the graphical results confirm that agricultural exports remained comparable across groups before integration but increased significantly afterward. This divergence provides strong evidence that SCO membership positively influenced Pakistan's agricultural export performance.

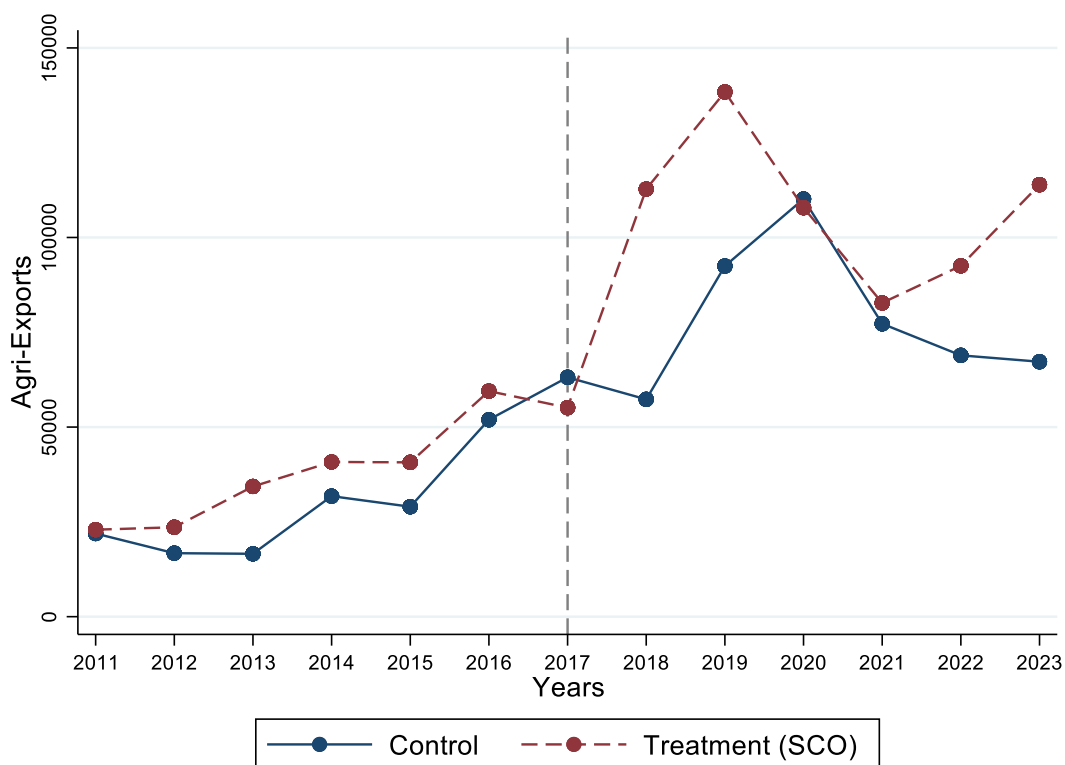


Figure 01: Graphical Representation of Parallel Trend Assumption

Source: Author calculation (Stata generated)

4.4 Baseline DID Results for Agricultural Exports

The baseline DID analysis for agricultural exports focuses on assessing whether SCO membership has influenced Pakistan's performance in this resource-driven sector. Given Pakistan's comparative advantage in agriculture and the demand for food products across SCO economies, the agricultural sector represents a critical test case for regional trade gains. The DID estimates compare pre- and post-integration outcomes, identifying whether membership enhanced market access, improved trade volumes, or diversified agricultural exports within the SCO region.

Table 03: Baseline DID Results

VARIABLES	DID
SCO_{ijt}	0.208*** (0.316)
$GDP_{it} \times GDP_{jt}$	0.064*** (0.0853)
$POP_{it} \times POP_{jt}$	0.399*** (0.099)
$DIST_{ijt}$	-0.869*** (0.206)
LNG_{ijt}	0.695*** (0.888)
BDR_{ijt}	0.814*** (0.444)
Constant	24.084*** (2.713)
Observations	415
R squared	0.681
Country FE	Yes
Time Effect	Yes

“Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ ”

The baseline Difference-in-Differences (DID) results in Table 03 show a strong positive effect of SCO membership on Pakistan’s agricultural exports. The coefficient for the SCO variable (0.208) is positive and statistically significant at the 1% level ($p < 0.01$), indicating that Pakistan’s agricultural exports rose notably after joining the SCO—mainly due to improved logistics, market access, and regional trade facilitation. The combined GDP coefficient (0.064) is positive and significant, suggesting that economic expansion in SCO countries stimulates Pakistan’s agricultural exports, though to a smaller extent than total exports, likely due to structural and supply-chain constraints. Similarly, the combined population coefficient (0.399) is positive and significant, confirming that market size and growing food demand play key roles in driving agricultural trade, consistent with classical trade theory. As expected, distance (-0.869) shows a strong negative effect, reflecting the high sensitivity of agricultural exports to transport costs and perishability, while common language (0.695) and shared border (0.814) have positive and significant impacts, emphasizing the importance of cultural ties and proximity in facilitating trade. The R-squared value (0.68) indicates that the model explains a substantial share of the variation in agricultural exports.

Overall, these findings provide robust evidence that SCO membership has significantly boosted Pakistan’s agricultural exports. The results highlight how regional integration, market size, and geographical connectivity collectively enhance trade performance, while logistical barriers remain a challenge gradually mitigated by

projects such as CPEC and the BRI.

4.5 Application of PPML Technique for Robustness Analysis

To access the robustness of the treatment estimations effect of Pakistan membership with SCO on its exports, the study applied different estimation techniques such as PPML to justify the consistency of the baseline DID estimations.

PPML model is well-suited designed model for international trade data, particularly when dealing with zero trade flow and non-negative values. PPML more effective for issues like heteroskedasticity and zero trade data, contributing reliable estimations in spite of these challenges. The PPML model shows a little higher positive impact of SCO integration on exports than other estimations, with 0.689 R-squared value, displaying a well-adjusted model.

Table 04: PPML Estimated Results

VARIABLES	PPML
SCO_{ijt}	1.312*** (0.231)
$GDP_{it} \times GDP_{jt}$	1.033*** (0.077)
$POP_{it} \times POP_{jt}$	-0.247*** (0.065)
$DIST_{ijt}$	-0.457*** (0.142)
LNG_{ijt}	-0.819*** (0.270)
BDR_{ijt}	10.079*** (0.205)
Constant	-6.848*** (2.607)
Observations	273
R-squared	0.730
Country FE	Yes
Time Effect	Yes

“Standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ ”

Table 6.11 provides the result of PPML assessment, confirm that the statistically significant and positive effect of SCO membership on agriculture exports of Pakistan is not attained by model specification problems or the treatment of zero trade flows. The reliability between the two methods further strengthens the strength of the original findings, offering for more dependable conclusion regarding the role of SCO integration in promoting trade performance of Pakistan.

5. Conclusion

The empirical findings for agricultural exports also support the positive and significant impact of Pakistan's participation in the SCO align with objective (9), validating Hypothesis 2. Empirical baseline Difference-in-Differences (DID) analysis indicating that SCO membership increased Pakistan's agricultural exports. Determinants such as economic size, population, distance, common language, and shared borders further explain trade variations, while the positive treatment effect reflects how SCO cooperation and trade frameworks facilitate agricultural flows. The robustness of these results is strengthened by multiple checks. The placebo test demonstrates that the positive impact is not driven by random factors, while log-linear estimations show consistent, statistically significant results even after accounting for fixed effects and controls. Similarly, PPML estimation confirms the results not distorted by model-specification, issues or zero-trade flows, lending greater credibility to the results. Overall, the evidence demonstrates that SCO membership has positive and statistically significant effect on agricultural exports Pakistan by boosting trade volumes, diversifying product categories, and strengthening ties with Central Asian and Chinese markets. However, structural bottlenecks, geopolitical tensions, and product-specific competitiveness gaps continue to limit the full realization of agricultural export potential within the SCO.

6. Policy Recommendations

In the context of Pakistan agriculture exports to SCO countries, the positive post-integration growth signals the need for a targeted national export strategy tailored to SCO markets. Pakistan must identify high-potential products for each SCO country and develop bilateral trade roadmaps that are aligned with mutual economic interests. The findings show significant gains in trade with Central Asian SCO members post-2017, however, exports to some key markets, such as India, Iran, and Russia, declined. Therefore, the government should implement policies to diversify agricultural exports beyond primary goods and invest in Agri-processing industries that can create value-added export products. Development of certification and quality assurance frameworks is essential to meet international sanitary and phytosanitary standards. To enhance competitiveness, Pakistan must upgrade storage, cold-chain logistics, and invest in research and development for high-yield and exportable crop varieties. Regional trade promotion campaigns targeting SCO countries should highlight Pakistan's agricultural strengths, supported by government-subsidized participation in regional Agri-expos and trade fairs. It is also vital to improve institutional coordination among ministries of commerce, agriculture, and foreign affairs to streamline trade facilitation for Agri-exporters and resolve non-tariff barriers faced in SCO markets.

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