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Роль региональной интеграции в экономическом росте: анализ на основе гравитационной модели (на примере АСЕАН И ЦАРЭС)

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Abstract: This paper examines the role of regional integration in economic growth using the gravity model of international trade as its analytical framework. Two regional blocs are compared: the Association of Southeast Asian Nations (ASEAN) and the Central Asia Regional Economic Cooperation (CAREC). Bilateral trade data, GDP, and geographic distance indicators are used to assess how institutional integration affects trade flows. ASEAN's deeper integration has generated measurable intra-regional trade gains, while CAREC continues to face structural barriers rooted in landlockedness and logistical deficiencies. The paper draws policy-relevant conclusions for Uzbekistan, arguing that reducing effective distance through transport infrastructure and harmonized trade regulations is the most viable pathway to leveraging integration for growth.

Keywords: Regional integration, gravity model, ASEAN, CAREC, economic growth, Uzbekistan, bilateral trade, trade costs

Аннотация: В данной статье исследуется роль региональной интеграции в экономическом росте с использованием гравитационной модели международной торговли в качестве аналитической базы. Сравниваются два региональных блока: Ассоциация государств Юго-Восточной Азии (АСЕАН) и Центральноазиатское региональное экономическое сотрудничество (ЦАРЭС). Двусторонние данные о торговле, ВВП и показатели географического расстояния используются для оценки влияния институциональной интеграции на торговые потоки. Более глубокая интеграция АСЕАН принесла ощутимые результаты в виде роста внутрирегиональной торговли, в то время как ЦАРЭС продолжает сталкиваться со структурными барьерами, связанными с отсутствием выхода к морю и логистическими недостатками. В статье сформулированы актуальные для политики Узбекистана выводы, утверждающие, что сокращение эффективного расстояния за счет транспортной инфраструктуры и гармонизации торгового регулирования является наиболее жизнеспособным путем к использованию преимуществ интеграции для роста. **Ключевые слова:** Региональная интеграция, гравитационная модель, АСЕАН, ЦАРЭС, экономический рост, Узбекистан, двусторонняя торговля, торговые издержки.

Ключевые слова: Региональная интеграция, гравитационная модель, АСЕАН, ЦАРЭС, экономический рост, Узбекистан, двусторонняя торговля, торговые издержки.

Annotatsiya (O‘zbekcha): Ushbu maqola mintaqaviy integratsiyaning iqtisodiy o‘sishga ta’sirini gravitatsiya modeli asosida tadqiq etadi. ASEAN va CAREC bloklari taqqoslanib, ikki tomonlama savdo ma’lumotlari, YaIM va geografik masofa ko‘rsatkichlari tahlil qilinadi. ASEAN’ning chuqur integratsiyasi savdo hajmini sezilarli oshirgan, CAREC esa quruqlik bo‘lib qolish va logistika muammolariga duch kelmoqda. Maqola O‘zbekiston uchun samarali masofani qisqartirish yo‘li orqali integratsiyadan foydalanish bo‘yChadagi siyosiy tavsiyalarni ilgari suradi.

Kalit so‘zlar: Mintaqaviy integratsiya, gravitatsiya modeli, ASEAN, CAREC, iqtisodiy o‘sish, O‘zbekiston, ikki tomonlama savdo, savdo xarajatlari.

1. Introduction

Regional integration has emerged as one of the primary mechanisms through which developing economies seek to expand trade and accelerate growth. By reducing tariffs, harmonizing regulations, and coordinating infrastructure investment, integration lowers trade costs and enables more efficient resource allocation across borders. The empirical record on these gains is, however, uneven: outcomes differ substantially depending on the geographic conditions, institutional quality, and pre-existing infrastructure endowments of participating economies.

Two regional frameworks illustrate this variation. ASEAN, formalized into a Free Trade Area in 1992, has seen intra-regional trade grow from roughly 18 percent of total ASEAN trade in the 1980s to over 23 percent by the early 2020s (ASEAN Secretariat, 2022). CAREC, launched in 1997 under Asian Development Bank coordination, connects eight largely landlocked economies in Central Asia and neighboring regions. Despite substantial corridor investments, CAREC's intra-regional trade intensity remains well below ASEAN's, constrained by geography and institutional fragmentation (Asian Development Bank, 2021). This divergence makes the two blocs a productive comparative case for gravity model analysis.

The paper's practical relevance is reinforced by Uzbekistan's active integration agenda. Since 2016, Uzbekistan has pursued bilateral trade agreements and infrastructure partnerships across the region. Identifying which constraints — physical distance, logistics costs, or regulatory gaps — bind most tightly is directly relevant to how that agenda should be prioritized.

2. Literature Review

The gravity model was introduced into trade economics by Tinbergen (1962), who proposed that bilateral trade is proportional to the GDP of trading partners and inversely proportional to the distance between them — an analogy to Newtonian gravitation. The model produced accurate empirical predictions but lacked theoretical foundations for decades. Anderson (1979) addressed this by deriving the gravity equation from a general equilibrium model with constant elasticity of substitution preferences. Anderson and van Wincoop (2003) extended this work by formalizing the concept of "multilateral resistance" — the finding that bilateral trade depends not only on the trade barrier between two partners but on each country's average trade costs with all partners. This insight is central to the current study's panel specification.

On the empirical side, Baier and Bergstrand (2007) demonstrated that ordinary least squares estimates of preferential trade agreement (PTA) effects are upward-biased due to endogeneity, and established the panel fixed-effects approach as the preferred estimator. Head and Mayer (2014) summarize decades of gravity estimates, noting that the distance coefficient has remained stable at approximately −1.0 to −1.5, implying that a doubling of distance reduces bilateral trade by roughly half. For ASEAN, Narayan and Nguyen (2016) find a significant positive membership effect on bilateral trade after controlling for income and distance. For CAREC, Mogilevskii (2012) estimates that landlockedness imposes a trade penalty of 30–40 percent beyond the standard distance variable, and ADB (2021) finds that a 10-percent reduction in corridor transport costs would raise intra-CAREC trade by 5–6 percent.

3. Methodology

The baseline gravity equation is:

$$T_{ij} = A \times (M_i \times M_j) / D_{ij}$$

where T_{ij} is the value of bilateral trade between countries *i* and *j*; M_i and M_j are GDP levels; D_{ij} is geographic distance; and *A* is a proportionality constant. The log-linear estimation form is:

$$\ln(T_{ij}) = \alpha + \beta_1 \ln(GDP_i) + \beta_2 \ln(GDP_j) + \beta_3 \ln(D_{ij}) + \beta_4 PTA_{ij} + \beta_5 Border_{ij} + \varepsilon_{ij}$$

The GDP coefficients (β_1, β_2) reflect the supply and demand capacity of each economy; empirically these cluster near 1.0. The distance coefficient (β_3) is expected to be negative, capturing transportation, information, and transaction costs associated with geographic separation. PTA_{ij} is a binary variable equal to 1 when both countries share a preferential trade arrangement (AFTA for ASEAN; CAREC framework for Central Asia); its coefficient (β_4) isolates the "club effect" of

integration net of income and distance effects. $Border_{ij}$ controls for the well-established adjacency premium in bilateral trade.

GDP and trade data are drawn from the World Bank's World Development Indicators (World Bank, 2023) and IMF Direction of Trade Statistics (IMF, 2023). Distance and geographic controls are sourced from the CEPII GeoDist database (Mayer & Zignago, 2011). The panel covers 2000–2022 with country-pair and year fixed effects, following the multilateral resistance correction of Anderson and van Wincoop (2003).

4. Discussion: ASEAN Experience and Lessons for CAREC

ASEAN's gravity model results are consistent across studies: the PTA coefficient for intra-ASEAN pairs ranges from 0.4 to 0.9 in log-linear specifications, implying that membership increases bilateral trade by 50 to 150 percent relative to non-member pairs of comparable size and distance (Narayan & Nguyen, 2016). The gains are real but unevenly distributed. ASEAN's wealthier members — Singapore, Malaysia, Thailand — captured a disproportionate share because their logistics infrastructure was already capable of converting tariff reductions into supply chain efficiency. Vietnam's post-2007 integration trajectory is instructive: pairing WTO accession with targeted port and road investment, it grew intra-ASEAN manufacturing exports roughly fourfold between 2007 and 2019 (ASEAN Secretariat, 2022). Notably, however, the distance coefficient within ASEAN has not declined materially over time — indicating that tariff liberalization alone did not reduce effective trade costs; logistics and institutional capacity were the complementary inputs.

CAREC faces a structurally harder problem. Six of its eight members are landlocked, making all international trade dependent on transit arrangements through neighboring countries. ADB corridor assessments record travel times two to three times longer per kilometer than in East Asian corridors, with border crossing delays of 12 to 30 hours at major checkpoints (Asian Development Bank, 2021). Gravity estimates for CAREC pairs show a steeper negative distance coefficient than ASEAN pairs, and Pomfret and Sourdin (2012) attribute a 30–50 percent trade gap between Central Asian country pairs and comparable pairs elsewhere to transaction cost differentials. Unlike ASEAN, CAREC's institutional framework is advisory rather than binding, and lacks enforcement mechanisms that would make trade facilitation commitments credible.

Uzbekistan sits at the intersection of these dynamics as a doubly landlocked economy. Its World Bank Logistics Performance Index ranking of 99th out of 160 in 2023 — with customs and infrastructure scoring below regional peers Kazakhstan and Georgia — quantifies the structural distance penalty it carries (World Bank, 2023). The export base is substantive: Uzbekistan is among the world's top cotton producers, holds significant gold and uranium reserves, and supplies textiles to European markets. The gravity model framework implies that reductions in effective distance — border crossing hours, freight rates, regulatory compliance burdens — would translate directly into trade expansion. ADB scenarios suggest a 10-percent reduction in corridor transport costs yields a 5–6 percent increase in intra-CAREC trade volumes (Asian Development Bank, 2021), with Uzbekistan a primary beneficiary given its central position in the corridor network.

5. Conclusion and Policy Recommendations

The gravity model analysis confirms that economic mass and geographic distance are consistent determinants of bilateral trade in both ASEAN and CAREC. The key differentiator between the two blocs is the size and composition of the distance penalty. In ASEAN, tariff liberalization generated significant trade growth, though the gains were mediated by logistics quality. In CAREC, geographic landlockedness, weak corridor performance, and soft institutional arrangements compound the standard distance effect into a substantially larger trade cost.

Three recommendations follow. First, Uzbekistan and CAREC partners should treat logistics corridor investment — multimodal connectivity, border management reform, and transit agreement reliability — as the primary integration lever, ahead of further tariff reduction. Second, CAREC's institutional architecture should shift toward binding trade facilitation commitments modeled on ASEAN's Single Window system, which demonstrably reduced non-tariff compliance costs across member states. Third, Uzbekistan's export diversification should target sectors with lower transport

cost sensitivity, including pharmaceuticals, high-value agricultural products, and tradable services, where the distance penalty is structurally lower and where regional market access through CAREC channels is viable near-term.

The gravity model does not resolve the political economy of integration, but it does clarify where the binding constraints lie. For Uzbekistan and Central Asia broadly, effective distance in its physical, logistical, and regulatory dimensions is the constraint that matters most. Addressing it through coordinated investment and credible institutional commitments is the mechanism by which regional integration can translate into measurable economic growth.

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