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Trade Policy Persistence and Long-Run Economic Performance: Evidence from Tariff Dynamics in Peru

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Abstract

The resurgence of trade policy interventions in the global economy has renewed interest in the long-run macroeconomic implications of commercial barriers. While previous research has largely focused on the short-term effects of tariff reforms and trade liberalization, relatively less attention has been paid to the persistence of trade policy regimes over time. This study addresses this gap by analysing the relationship between trade policy persistence—proxied by the trajectory of the Nominal Average Tariff (NAT)—and Peru's real GDP during the period 1980–2025. Using a Johansen cointegration framework combined with a Vector Error Correction Model (VECM), the study evaluates both the existence of a long-run equilibrium relationship and the dynamics of adjustment following deviations from that equilibrium. The econometric evidence confirms the existence of a stable long-run relationship between the NAT and aggregate GDP. The normalized cointegrating vector suggests that higher and persistent levels of tariff protection are associated with lower levels of real GDP in the long run. The estimated error-correction mechanism further indicates that deviations from equilibrium are gradually corrected through adjustments in the trajectory of real GDP, whereas the tariff equation does not exhibit a statistically significant adjustment process at conventional levels. This asymmetric structure suggests that trade policy persistence operates as a relatively stable macroeconomic condition, while aggregate GDP gradually adjusts to long-run disequilibria. By framing tariffs not only as policy instruments but also as indicators of persistent policy orientations, the study contributes to the trade and growth literature from a persistence-based perspective. The findings additionally highlight the potential relevance of policy consistency and predictability in small open economies characterized by high external dependence and prolonged processes of trade liberalization.

Keywords: trade policy persistence; tariff dynamics; economic growth; VECM; long-run relationship



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1. Introduction

In recent years, the discussion surrounding trade barriers has regained notable prominence within the international economic debate. The intensification of trade disputes among major economies, together with the adoption in several Latin American countries of measures aimed at increasing commercial protection—including adjustments to tariff structures—has once again placed trade policy at the centre of discussions on economic performance. Within this context, tariff decisions acquire relevance that extends beyond short-term circumstances, as they often reflect relatively persistent policy orientations

which, rather than responding to temporary adjustments, become embedded in broader institutional frameworks shaping the environment in which markets operate and productive activities evolve [1–3].

From this perspective, trade policy may be understood as a set of decisions organised around relatively stable tariff regimes—either more open or more protectionist—that tend to remain in place over extended periods, exerting cumulative effects on economic performance [4,5]. In this study, trade policy persistence is understood in an institutional sense, namely as the continuity of a tariff-policy orientation over extended periods rather than as a purely statistical property of the tariff series. Accordingly, the nominal average tariff (hereafter NAT) is not employed as a direct statistical measure of persistence itself, but as an observable proxy of the prevailing trade-policy regime [6,7]. However, the central issue is not stability itself, but what such stability allows researchers to identify: the distinction between transitory effects and structurally persistent dynamics associated with trade policy. Put differently, when tariff orientations remain broadly unchanged for long periods, their economic effects are less likely to reflect temporary shocks and more likely to correspond to institutional and productive environments that consolidate gradually over time [8–11].

This distinction is particularly relevant because it connects directly with a concern that goes beyond purely theoretical discussion. Sustained output growth remains one of the main determinants of material welfare, as it is associated with higher income, employment opportunities and consumption possibilities for households [12]. For this reason, economic literature has devoted considerable attention to identifying the factors that may either foster or constrain long-run growth, with trade policy occupying a central position within this debate.

International trade theory has long argued that greater openness allows countries to specialise according to comparative advantages, improve resource allocation and gain access to intermediate goods and foreign technologies, thereby increasing productivity and aggregate output [12,13]. By contrast, commercial barriers—particularly import tariffs—tend to raise the prices of tradable goods, distort relative prices and reduce allocative efficiency, ultimately limiting opportunities for international exchange [14].

At the empirical level, several studies have documented that economies characterised by more open trade regimes tend to exhibit higher levels of economic activity and stronger international trade integration [15,16]. Other contributions have shown that significant tariff increases may generate adverse effects on aggregate output at both national and global levels [17–19]. Nevertheless, empirical findings have not always been conclusive, partly because of limitations associated with sample periods and the difficulty of adequately capturing the structural transformations accompanying trade reforms [20].

Despite the extensive literature examining trade liberalisation, tariff reforms and discrete changes in trade policy, the persistence of tariff regimes and their long-run macroeconomic implications have received comparatively less attention. Existing research has generally prioritised the analysis of isolated reforms or temporary shocks, leaving aside the study of sustained policy trajectories over time and failing to distinguish clearly whether economic performance responds mainly to transitory disturbances or to persistent structural orientations shaping the productive environment in the long run.

This gap in the literature is particularly important because it limits understanding of whether the relationship between tariff policy and economic performance reflects short-term dynamics or a structural long-run linkage, as well as the way economies adjust when deviations from equilibrium emerge. More specifically, there is still limited evidence jointly modelling both the long-run relationship and the adjustment mechanisms associated with it. From this perspective, tariffs may be interpreted not only as fiscal or regulatory instruments,

but also as signals of the broader structural environment within which productive and commercial activities operate, conditioning the possibilities for stable long-run growth [21–23].

The Peruvian case provides a particularly illustrative setting for examining these dynamics. During the decades preceding the reforms of the 1990s, Peru maintained a highly protected trade regime associated with the import-substitution industrialisation model [3]. This framework combined elevated tariff levels, multiple non-tariff barriers and significant macroeconomic distortions that eventually contributed to severe imbalances by the late 1980s [24].

From the 1990s onwards, the country initiated a sustained process of trade liberalisation involving a drastic reduction in import tariffs alongside the signing of numerous trade agreements. As a result, the NAT declined from levels close to 66% in the late 1980s to values near 2% in subsequent decades, according to historical data from the Ministry of Economy and Finance [25]. This trajectory reflects profound changes in the orientation of trade policy and suggests the existence of relatively prolonged phases characterised by differentiated tariff regimes, making Peru a particularly useful empirical setting for examining the macroeconomic implications of trade policy persistence.

Within this context, the present study aims to examine the relationship between trade policy persistence—captured through the dynamics of the NAT—and Peru’s real gross domestic product during the period 1980–2025. To this end, the study employs a cointegration framework together with a Vector Error Correction Model (VECM), allowing the identification of both the existence of a long-run equilibrium relationship and the adjustment dynamics following deviations from that equilibrium. In doing so, the study seeks to contribute to the literature by distinguishing between transitory dynamics and persistent structural relationships in the link between trade policy and economic performance, while also explicitly characterising the adjustment mechanism connecting both dimensions within a small open economy.

The study acquires additional relevance in a context where protectionist proposals have regained visibility across several Latin American economies. Under these conditions, assessing whether tariff orientations—when sustained over time—leave a measurable imprint on aggregate output goes beyond purely academic interest. Rather, the issue concerns whether persistent trade regimes ultimately shape the growth trajectory of an economy. In the Peruvian case, the findings provide evidence consistent with this interpretation and offer a basis for discussing, with greater analytical support, the extent to which such policy orientations may have contributed—or not—to sustaining relatively stable long-run growth trajectories.

1.1. Literature Review

1.1.1. Empirical Tariff-Growth Evidence

Empirical evidence on the relationship between trade policy and economic performance presents a broad yet highly heterogeneous landscape, where results vary according to productive structures, institutional conditions and the degree of international integration within each economy. In particular, a growing strand of literature highlights that trade policy does not evolve in an isolated or purely transitory manner, but rather exhibits persistent dynamics capable of shaping long-run economic performance [6].

In general terms, several studies agree that trade openness has contributed positively to economic growth, particularly in developing economies. Evidence for Asian countries such as Pakistan and other regional economies indicates that trade openness exerts a positive and statistically significant effect on output growth, especially when complemented by domestic investment [8]. Similar patterns emerge in historical analyses covering economies such as the United States, the United Kingdom, France, Germany, Italy, Japan, Canada,

Brazil, Mexico, India and Peru, where tariff liberalisation has been associated with the expansion of world trade, although with stronger effects in industrialised economies than in developing countries [26].

Nevertheless, this relationship remains far from uniform. Comparative evidence suggests that the impact of tariffs on growth depends critically on the underlying economic structure. In a sample ranging from 86 to 94 countries, tariffs may even exert positive effects on growth in economies with high human capital intensity, whereas the relationship becomes negative or statistically insignificant in countries with lower skill endowments [27]. Consistent with this view, more recent evidence for 161 countries during the period 1960–2019 shows that trade liberalisation primarily benefits economies with comparative advantages in manufacturing, while non-manufacturing economies—including several countries in Latin America and Africa—may experience declines in per capita income [28].

This heterogeneity also appears in regional analyses covering multiple World Bank country groups, where the effects of trade liberalisation depend on factors such as institutional quality, technological capabilities and the presence of market failures [23]. Taken together, these findings suggest that trade policy does not operate through a universal mechanism; rather, its effects are shaped by structural conditions capable of amplifying or constraining its impact on economic growth.

From a historical perspective, the evidence is equally inconclusive. For the nineteenth century, findings for economies such as the United States, the United Kingdom, Germany, France, Scandinavian countries, Australia and Canada reveal a positive relationship between tariffs and growth, particularly during early industrialisation stages [29]. However, this historical evidence also suggests that the effects of trade policy do not follow universal patterns, but instead respond to specific structural configurations capable of generating divergent long-run trajectories [30].

At the macroeconomic level, the discussion becomes deeper when tariff dynamics are analysed over time. Contemporary evidence more consistently points towards negative effects associated with tariff increases. Studies covering 151 countries—including both advanced and developing economies—show that higher tariffs generate persistent reductions in output, productivity and employment, while simultaneously increasing inequality and failing to produce significant improvements in trade balances [19,31].

These aggregate effects become clearer when considering the mechanisms through which they are transmitted. Under conditions of strong productive interdependence, trade policy generates indirect effects that spread throughout the economic structure. In economies such as the United States, protectionist measures negatively affect employment in sectors dependent on imported inputs [32], while general equilibrium models show that tariff costs are amplified through interactions across economies [33]. Along similar lines, geopolitical tensions reveal that tariffs may disrupt supply chains and generate adverse macroeconomic effects at the global scale [34].

At the microeconomic level, these mechanisms operate through specific channels. In Ethiopia and India, reductions in tariffs on intermediate inputs improve productivity and firm performance [35,36]. Likewise, evidence from multiple economies—including Indonesia, Colombia, Peru and Sub-Saharan African countries—indicates that barriers affecting inputs and services negatively influence export performance [37]. This suggests that trade policy affects growth through indirect channels operating on productivity and productive efficiency, thereby reinforcing its impact beyond immediate effects on trade flows.

Empirical evidence also suggests that the relationship between trade policy and economic performance extends beyond trade flows and productivity, influencing broader processes of investment and productive reorganisation. In the case of China and the European Union, trade policy also influences investment decisions and the configuration

of international trade flows. Commercial barriers may induce processes of productive reallocation, while preference margins and non-tariff restrictions condition market access across multiple economies [38–40]. This suggests that the effects of trade policy may extend over time through investment decisions and productive reorganisation, rather than merely through isolated tariff changes.

General equilibrium models further reinforce the idea that the effects of trade policy depend on the sectoral structure of each economy. In countries such as South Korea, Japan, India, China and ASEAN economies, trade liberalisation generates heterogeneous outcomes in terms of growth and welfare [41–43]. A coherent reading of this evidence is that the impact of trade policy depends critically on the structural configuration of each economy, reinforcing the need to analyse its effects within specific national contexts.

A complementary perspective emerges from studies that analyse tariff dynamics within individual economies over time. In the case of the United States, analyses based on SVAR models show that tariff shocks reduce GDP growth and generate permanent output losses [19]. A coherent interpretation of these findings is that the effects of tariff policy do not vanish in the short run, but instead tend to consolidate over time, shaping persistent trajectories of economic performance. Similar patterns emerge in trade war contexts—particularly between the United States and China—where contractions in trade flows, slower economic growth and persistent inflationary pressures have been documented at the global level [4].

Moreover, the effects of tariffs may vary according to the time horizon considered. In Angola, for example, differentiated short- and long-run effects on domestic investment have been identified [44], while other approaches suggest that trade policy may influence both the location of productive activity and innovation processes [45]. Taken together, the evidence suggests that the relationship between tariffs and economic performance is shaped by a complex interaction of structural, institutional and productive factors, making its effects highly context dependent.

1.1.2. Time-Series and Cointegration Evidence

A complementary strand of the literature has employed time-series and cointegration approaches, which constitute the principal methodological foundation of the present study. Unlike cross-country analyses, where the relationship between trade-related variables and economic performance is typically examined through cross-sectional comparisons, time-series approaches are primarily concerned with identifying long-run equilibrium relationships and short-run adjustment dynamics. As a result, they provide additional insights into the persistence of trade-related effects over time.

In the Latin American context, cointegration, VECM and ARDL models have been widely applied to examine the relationship between international trade variables and economic growth. Evidence from Mexico, Argentina and Brazil generally supports the existence of long-run linkages between external-sector variables and GDP, although the direction and intensity of these relationships tend to vary according to the country and the period under consideration [46–48]. Studies conducted for Colombia and Uruguay using similar approaches report less robust findings, suggesting that the relationship between trade and economic growth remains highly dependent on the specific structural conditions of each economy [49]. Taken together, these studies indicate that trade-related variables and economic performance often share long-run equilibrium relationships, even when short-run adjustment dynamics differ substantially across countries [46–48].

For Peru, time-series evidence has focused primarily on trade openness, exports and broader indicators associated with the external sector. Studies employing ARDL, ECM and VECM frameworks generally report the existence of long-run cointegration

between external-sector variables and economic growth, supporting the view that trade-related factors constitute an important component of Peru's long-run macroeconomic performance [50–54]. Nevertheless, the existing literature has concentrated mainly on exports, trade openness and broader external-sector dynamics, while tariff policy itself has received comparatively limited attention. Although some evidence suggests that tariff reductions are associated with higher rates of economic growth [3,55], studies explicitly examining the long-run relationship between tariff policy and aggregate output through cointegration and error-correction techniques remain scarce.

Overall, the empirical evidence indicates that the relationship between trade policy and economic performance is complex, heterogeneous and dependent on multiple structural conditions. Nevertheless, one common element emerges with considerable clarity: the effects associated with tariffs tend to persist over time, shaping non-transitory growth trajectories. In the Peruvian case, this limitation becomes particularly evident because existing literature has focused mainly on reforms or isolated shocks—even when documenting an inverse relationship between tariffs and growth—without explicitly modelling long-run aggregate dynamics or the interaction between equilibrium relationships and short-run adjustment mechanisms [55–57].

Consequently, an important gap remains in the literature. While time-series and cointegration approaches have been widely employed to investigate trade-related determinants of economic growth in Latin America and Peru, relatively little attention has been devoted to assessing whether persistent trade policy regimes, proxied through tariff dynamics, maintain a long-run equilibrium relationship with aggregate economic performance. Consequently, the present study seeks to narrow this gap by adopting an approach capable of evaluating the existence of an equilibrium relationship between trade policy persistence and economic performance, while parsimoniously characterising the adjustment process following deviations from equilibrium in a small open economy highly dependent on external conditions. To this end, the analysis examines the relationship between the Nominal Average Tariff (NAT) and Peru's real Gross Domestic Product using a Johansen cointegration framework and a Vector Error Correction Model (VECM).

1.2. Theoretical Framework

Trade policy, rather than constituting a collection of isolated decisions, tends to evolve around relatively stable regimes that shape persistent trajectories over time. From this perspective, the notion of persistence suggests that tariffs do not merely respond to short-term adjustments, but instead reflect structural policy orientations capable of conditioning long-run economic performance. This interpretation is reinforced by modern open-economy macroeconomics, where tariffs may be understood as shocks with durable effects on aggregate variables such as output, investment and productivity, generating deviations from equilibrium trajectories [19,58].

Likewise, the political economy literature on trade suggests that tariff dynamics are influenced by institutional, political and structural factors, helping to explain their inertial character and gradual evolution over time [59,60]. From this perspective, persistence is not a secondary feature, but rather a central element for understanding how trade policy affects economic performance.

From an institutional perspective, trade policy dynamics are also shaped by structural factors. Variables such as democracy, corruption and political polarisation influence tariff evolution [59], while in Latin America preferential liberalisation may coexist with reductions in multilateral tariffs [60]. Taken together, these institutional and political influences suggest that trade policy evolves within broader economic systems whose effects on economic performance require a theoretical explanation.

Within this framework, the relationship between trade policy and economic growth has traditionally been approached through international trade theory, where liberalisation is associated with improvements in resource allocation, productive specialisation and access to technology. However, this relationship is neither linear nor universal. Conceptually, the effects of trade policy depend on economic structure, factor endowments and patterns of specialisation, implying that the same policy measure may generate divergent growth trajectories across economies [57].

Under endogenous growth models, the effects of tariffs depend on economic structure, factor endowments and comparative advantage patterns [23,27,28]. In this sense, trade policy operates as a contingent determinant of growth whose effects emerge through the interaction between productive, institutional and technological capabilities. This perspective also accommodates a more nuanced interpretation of commercial protection. Under the infant industry argument, tariffs may play a strategic role by facilitating learning processes, capital accumulation and the development of productive capabilities, particularly during early stages of economic development [29,42,44].

Nevertheless, from a theoretical standpoint, prolonged protection tends to generate persistent distortions in resource allocation, as it weakens incentives for efficiency while encouraging rent-seeking behaviour. Consequently, trade policy does not operate as a neutral instrument, but rather as a mechanism capable of strengthening or weakening growth trajectories depending on the structural context in which it is implemented [45,58]. This theoretical ambiguity highlights the importance of identifying the specific mechanisms through which tariff policy affects economic performance.

A key element for understanding these effects lies in identifying the transmission channels through which tariff policy affects economic performance. In particular, the literature distinguishes between the final goods channel—associated with external competition—and the intermediate inputs channel, which has gained increasing relevance under conditions of productive integration [61,62]. Conceptually, access to more efficient inputs acts as a transmission mechanism towards higher productivity by reducing costs, improving the quality of productive processes and facilitating technological adoption. These effects are not homogeneous across firms, since they depend on characteristics such as technological capabilities and adaptive capacity, thereby introducing heterogeneity even within the same productive sectors [63,64].

Consistent with this perspective, the analysis of trade policy has increasingly incorporated production network approaches, where tariffs affect not only directly protected sectors, but also those dependent on imported intermediate goods. Under this framework, trade policy acquires a systemic character because changes in costs at one stage of production are transmitted throughout value chains, ultimately affecting the competitiveness of the broader productive system. From this perspective, global value chains may be understood as interconnected production networks through which trade-related shocks propagate across sectors and countries, generating heterogeneous effects on economic performance and systemic resilience. In this context, protectionism may generate indirect effects extending beyond the sectors initially affected [62,65,66].

In addition, general equilibrium models allow researchers to capture the complexity of these effects by considering interdependencies among sectors, production factors and regions. From this perspective, tariff liberalisation affects not only relative prices, but also investment, consumption, production and welfare, generating differentiated outcomes depending on the sectoral structure of each economy [41,43,67]. This reinforces the idea that trade policy should be analysed as part of an interdependent economic system in which effects spread simultaneously through multiple channels. Beyond these economy-wide

interactions, trade policy may also affect long-run performance through its influence on firms' locational and investment decisions.

Trade policy also influences productive location decisions and international investment dynamics. In particular, commercial barriers may encourage firms to reconfigure their strategies by substituting exports with foreign direct investment, reflecting the interaction between trade and investment within globalised economies [37]. Likewise, tariffs may influence the geographical concentration of productive activity and innovation processes, generating productivity effects through knowledge spillovers [44].

The complexity of trade policy becomes even greater when considering the coexistence of tariff and non-tariff instruments, as well as the interaction between preferential agreements and multilateral commitments. Under these conditions, trade flows depend not only on tariff levels, but also on institutional and regulatory factors conditioning market access [40,68]. Theoretically, this allows trade policy to be understood as a dynamic institutional arrangement whose evolution remains subject to political and strategic constraints. Moreover, trade policy evolves through strategic processes in which current decisions are shaped by previous agreements and interactions with other countries, reinforcing its persistent character [56,69]. These institutional and regulatory dimensions become particularly relevant in an increasingly interconnected global environment.

Within a context of intensifying globalisation and geopolitical tensions, trade policy acquires a strategic dimension extending beyond purely economic effects. Conceptually, tariffs fulfil not only an economic function, but also a strategic role within interactions among states, helping to explain both their persistence and their recurrent use across different historical settings. In this sense, their effects should be understood within an interdependent global system [70,71]. Overall, trade policy cannot be analysed as a set of isolated decisions or as an instrument producing merely transitory effects. On the contrary, its persistent nature and its transmission through multiple channels make it a determinant of long-run economic performance.

Although these approaches help explain the variety of mechanisms through which trade policy affects economic activity, the present study focuses on parsimoniously capturing the aggregate relationship between tariff persistence and output. Within this context, the relationship between tariffs and output may be understood as a dynamic process characterised by long-run equilibrium linkages accompanied by gradual short-run adjustments. Consequently, the empirical analysis of this relationship requires an econometric framework capable of capturing both dimensions simultaneously, thereby justifying the use of cointegration techniques and vector error correction models, whose implementation is developed in the following section.

2. Materials and Methods

2.1. Research Design and Data Sources

The present study adopts a quantitative approach of an applied nature, using a non-experimental macroeconomic time-series research design. The analysis is aimed at examining the long-run relationship between trade policy persistence—represented through the dynamics of the nominal average tariff—and Peru's aggregate economic performance during the period 1980–2025. Within this context, the study follows a time-series perspective, since the primary interest does not lie in comparing cross-sectional units, but rather in evaluating the joint evolution of both variables over time and determining whether they maintain a persistent equilibrium trajectory.

The variable associated with economic performance corresponds to Peru's real GDP, expressed at constant 2007 prices. Trade policy, in turn, is approximated through the nominal average tariff (NAT), used as an indicator of the prevailing tariff orientation within

the Peruvian economy. In operational terms, the NAT is employed as an observable proxy of the prevailing trade-policy regime, allowing the empirical identification of prolonged tariff-policy orientations over time. Both variables were transformed into natural logarithms in order to reduce scale-related problems, facilitate the economic interpretation of coefficients and smooth potential extreme fluctuations in the series.

The information employed originates from official sources. Real GDP data were obtained from the Central Reserve Bank of Peru (BCRP, Lima, Peru), while the historical series for the nominal average tariff was collected from the Ministry of Economy and Finance (MEF, Lima, Peru). Annual frequency data were used, allowing a clearer identification of the persistence of tariff regimes and their potential long-run macroeconomic implications (the dataset is available in the Supplementary Materials).

2.2. Preliminary Properties of the Time Series

Before estimating the econometric model, the stochastic properties of the series were evaluated through unit root tests. This procedure is necessary because the estimation of long-run relationships among macroeconomic variables requires prior verification of their order of integration, thereby avoiding spurious relationships generated by non-stationary series.

To this end, the Augmented Dickey–Fuller (ADF) and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) tests were applied, considering both the variables in levels and their first differences. In the case of $\ln(GDP)$, the tests were estimated under specifications including both constant and trend, since real output exhibits a secular growth trajectory consistent with long-run macroeconomic dynamics. By contrast, $\ln(NAT)$ was estimated using a specification including only a constant, given that the nominal average tariff represents an economic policy variable whose evolution responds mainly to institutional changes and trade regimes rather than to a deterministic growth trend. In addition, a Zivot–Andrews structural-break test was employed to identify potential endogenous changes in the tariff regime. This procedure complements the conceptualisation of trade policy persistence adopted in the study by allowing the identification of major regime shifts in the NAT series and, consequently, the distinction between different tariff-policy orientations over time.

Lag selection in the ADF tests was conducted using the Bayesian Information Criterion (BIC), while the KPSS test employed a truncation parameter consistent with the available sample size. This procedure made it possible to identify whether the variables followed stationary processes or were integrated of order one, a necessary condition for the subsequent implementation of cointegration analysis and the Vector Error Correction Model.

2.3. Lag Selection and Cointegration Framework

Once the integration properties of the series had been verified, the dynamic structure of the system was determined through lag selection criteria. This step is relevant because the specification of the optimal number of lags directly affects model stability and the correct representation of temporal dynamics between variables. Lag order selection was conducted using standard information criteria, particularly the Akaike Information Criterion (AIC), the Schwarz Bayesian Information Criterion (BIC) and the Hannan–Quinn Criterion (HQC). Considering the relatively limited sample size and the parsimonious orientation of the study, preference was given to a specification capable of capturing the essential dynamics of the system without introducing unnecessary overparameterisation.

Subsequently, Johansen's cointegration methodology was applied in order to evaluate the existence of long-run equilibrium relationships between $\ln(GDP)$ and $\ln(NAT)$. This approach allows the identification of whether both variables, despite being individually non-stationary, evolve jointly over time following a stable equilibrium trajectory [72]. For this purpose, both the trace statistic and the maximum eigenvalue statistic were employed

under a specification including a restricted constant within the cointegrating space. The use of this methodology is consistent with the central objective of the study, namely to examine whether trade policy persistence maintains a structural long-run relationship with Peru's aggregate economic performance.

2.4. Model Specification

Once the existence of cointegration between the variables had been established, a Vector Error Correction Model (VECM) was estimated. This approach allows the simultaneous integration of short-run dynamics and the long-run equilibrium relationship between the series, thereby avoiding the loss of information associated with models estimated solely in differences. The general specification of the model adopted in this study is as follows:

$$\Delta \ln(GDP_t) = \alpha_0 + \sum_{i=1}^{p-1} \beta_i \Delta \ln(GDP_{t-i}) + \sum_{j=1}^{p-1} \gamma_j \Delta \ln(NAT_{t-j}) + \lambda EC_{t-1} + \delta_1 COVID_t + \delta_2 INFLA_t + \varepsilon_t$$

where Δ denotes the first difference; $\ln(GDP_t)$ corresponds to the natural logarithm of Peru's real gross domestic product; $\ln(NAT_t)$ represents the natural logarithm of the Nominal Average Tariff (NAT); p denotes the optimal number of lags selected using information criteria; β_i and γ_j capture the short-run dynamics of the variables; EC_{t-1} represents the error-correction term derived from the cointegrating vector; λ measures the speed of adjustment towards the long-run equilibrium; $COVID_t$ corresponds to a dummy variable associated with the shock generated by the pandemic, taking the value of 1 for the year 2020 and 0 otherwise.

The inclusion of the $COVID_t$ dummy assumes that the pandemic represented an exceptional short-run disturbance affecting the dynamics of the analysed variables. Accordingly, the shock is treated as temporary in nature and is not assumed to have modified the long-run equilibrium relationship or the structural adjustment mechanism captured by the VECM. $INFLA_t$ represents a dummy variable introduced to capture the hyperinflation episode recorded in Peru during 1989–1990, taking the value of 1 in those years and 0 for the rest of the sample period; δ_1 and δ_2 capture the contemporaneous effects of both exogenous variables; and ε_t denotes the random error term.

The inclusion of the exogenous dummy variable $INFLA_t$ responds to the need to control for one of the most severe hyperinflationary episodes in Peru's recent history, characterised by four-digit inflation rates and significant distortions in economic activity. The specific selection of the period 1989–1990 reflects the fact that these years concentrated the highest inflationary pressures observed in the country, constituting an extraordinary shock capable of temporarily altering the dynamics of the analysed series. In this sense, the inclusion of this dummy variable allows these effects to be partially isolated without altering the central focus of the model.

The incorporation of the error-correction term makes it possible to identify whether deviations from the long-run equilibrium tend to be gradually corrected over time [73]. Furthermore, the VECM framework is particularly suitable for this study, as it provides a parsimonious representation of the interaction between trade policy persistence and aggregate economic performance within a dynamic structure consistent with cointegration theory.

2.5. Research Hypotheses

Consistent with the empirical framework adopted, the analysis is structured around two working hypotheses:

H1. Trade policy persistence, represented by the dynamics of the Nominal Average Tariff (NAT), maintains a structural long-run relationship with Peru's aggregate economic performance, reflected in the existence of at least one cointegrating vector between the two series.

H2. In the presence of deviations from the long-run equilibrium between the Nominal Average Tariff (NAT) and real gross domestic product, the Peruvian economy gradually corrects these disequilibria through adjustments in the trajectory of aggregate output, as evidenced by a statistically significant error-correction term.

3. Results

3.1. Stylised Facts

The joint evolution of Peru's real gross domestic product and the Nominal Average Tariff (NAT) exhibits a historically differentiated trajectory over the period 1980–2025. As shown in Figure 1, during the 1980s the Peruvian economy was characterised by relatively high levels of tariff protection, combined with a context of pronounced macroeconomic instability and weak productive dynamism. During this period, the Nominal Average Tariff exceeded levels of 60%, while aggregate output displayed a more irregular and limited pattern in terms of real expansion.

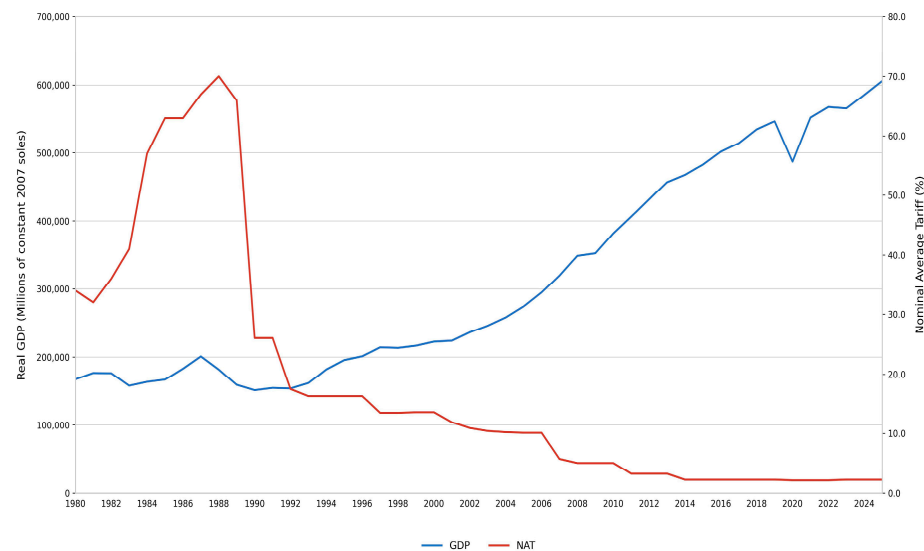


Figure 1. Nominal Average Tariff and Real GDP (1980–2025).

From the early 1990s onwards, a persistent shift in the orientation of Peru's trade policy becomes evident. The progressive reduction in the NAT coincided with a period of greater economic openness and macroeconomic stabilisation, during which real GDP began to exhibit a more sustained growth trajectory. This pattern is particularly visible from the mid-1990s, when the NAT continued to decline gradually until stabilising at levels considerably lower than those observed in the previous decade.

Real GDP, measured in millions of constant 2007 soles, shows a cumulative long-run expansion, interrupted only by specific episodes of macroeconomic disturbance, including the hyperinflationary crisis of the late 1980s and the shock associated with the COVID-19 pandemic in 2020. Despite these episodes, the overall trajectory of output maintains a relatively persistent upward trend throughout most of the period analysed.

From a descriptive standpoint, the evolution of both series suggests the existence of a historical relationship between the persistence of tariff orientation and aggregate economic performance. In particular, the sustained reduction in the NAT since the 1990s coincides with a phase of progressive expansion in real GDP, forming a historical pattern

consistent with persistent changes in the orientation of Peru's trade policy. However, given that both variables exhibit long-run trajectories, the series were transformed into natural logarithms and subsequently subjected to unit root and cointegration tests in order to avoid spurious relationships and formally assess the possible existence of a long-run equilibrium between them.

3.2. Unit Root Tests and Lag Selection

The results of the unit root tests indicate that both $\ln(\text{GDP})$ and $\ln(\text{NAT})$ are non-stationary in levels, but become stationary when expressed in first differences (see Table A1—Appendix A). In the case of $\ln(\text{GDP})$, the ADF test estimated with constant and trend yields a statistic of $\tau_{\text{ct}} = -2.136$ with a p -value of 0.524, so the null hypothesis of a unit root cannot be rejected. This result is consistent with the KPSS test, which reports a statistic of 0.270 with $p < 0.01$, leading to rejection of the null hypothesis of stationarity. Together, these results indicate that real GDP is non-stationary in levels.

When the series is analysed in first differences, the behaviour changes markedly. The ADF test reports a statistic of $\tau_{\text{ct}} = -5.294$ with $p = 4.594 \times 10^{-5}$, allowing rejection of the unit root hypothesis. Complementarily, the KPSS test yields a statistic of 0.108 with $p > 0.10$, so stationarity cannot be rejected. This confirms that the first difference of the logarithm of real GDP is stationary, classifying it as an integrated series of order one, $I(1)$.

A similar pattern is observed for $\ln(\text{NAT})$. The ADF test estimated with a constant only produces a statistic of $\tau_{\text{c}} = -0.377$ with a p -value of 0.910, preventing rejection of the unit root hypothesis. The KPSS test, in turn, reports a statistic of 1.536 with $p < 0.01$, again rejecting stationarity. Therefore, the NAT is also non-stationary in levels. However, when analysed in first differences, the ADF test reports $\tau_{\text{c}} = -6.148$ with $p = 5.216 \times 10^{-8}$, while the KPSS statistic is 0.111 with $p > 0.10$. Both results indicate stationarity in first differences, allowing $\ln(\text{NAT})$ to be classified as an $I(1)$ variable.

Overall, the evidence from the ADF and KPSS tests confirms that both variables share the same order of integration. This constitutes a necessary condition for proceeding with cointegration analysis and avoiding spurious regressions between series with long-run stochastic trends.

In addition, in order to determine the most appropriate dynamic structure of the model, a VAR system was estimated considering a maximum of three lags, and different information criteria were subsequently evaluated. The Akaike (AIC), Schwarz (BIC) and Hannan–Quinn (HQC) criteria all reach their minimum values at the first lag, consistently indicating that the optimal specification corresponds to a VAR of order 1 (see Table A2—Appendix A).

In particular, the model with one lag reports $\text{AIC} = -3.144$, $\text{BIC} = -2.980$ and $\text{HQC} = -3.084$, all lower than those obtained for the specifications with two and three lags. This convergence across criteria supports the adoption of a parsimonious dynamic structure, avoiding the inclusion of additional lags that would unnecessarily reduce the available degrees of freedom.

Furthermore, sequential likelihood ratio tests do not provide sufficient evidence to justify the inclusion of additional lags. The probability values associated with the VAR(2) and VAR(3) models are not statistically significant, suggesting that additional lags do not substantially improve the explanatory power of the system. Taken together, these results support the use of a VECM with one lag, a specification that is also consistent with the available sample size and the parsimonious approach adopted in this study.

Finally, given the substantial trade policy reforms implemented during the late 1980s and early 1990s, the stationarity of $\ln(\text{NAT})$ was additionally evaluated using the Zivot–Andrews unit root test, which allows for one endogenous structural break. The results (see Table A3 in Appendix A) do not reject the null hypothesis of a unit root in levels

and indicate that $\ln(\text{NAT})$ remains non-stationary even after accounting for a structural break. Therefore, the variable continues to be classified as $I(1)$.

3.3. Johansen Cointegration Test

The results of the Johansen cointegration test indicate the existence of a long-run equilibrium relationship between Peru's real GDP and the NAT. As shown in Table 1, both the trace statistic and the maximum eigenvalue statistic reject the null hypothesis of no cointegration ($r = 0$). In particular, the trace statistic reaches a value of 24.618 with a p -value of 0.010, while the maximum eigenvalue statistic records 21.994 with a p -value of 0.003. Both results are statistically significant at the 5% level.

Table 1. Cointegration Results Based on the Johansen Procedure.

Null Hypothesis (r)	Eigenvalue	Trace Test Statistic	Trace Test p -Value	Max-Eigen Statistic	Max-Eigen p -Value
$r = 0$	0.38661	24.618	0.0103	21.994	0.0036
$r \leq 1$	0.05664	2.624	0.6580	2.624	0.6569

Author's estimations, based on BCRP and MEF data, using GRETL 2025c.

However, when testing the null hypothesis of at most one cointegrating vector ($r \leq 1$), the results are no longer statistically significant. The trace statistic reaches a value of 2.624 with $p = 0.658$, while the maximum eigenvalue statistic reports the same value of 2.624 with $p = 0.656$. Consequently, the empirical evidence supports the existence of a single cointegrating vector between the two variables. These findings suggest that, despite exhibiting non-stationary trajectories in levels, real GDP and NAT maintain a structural long-run relationship. In other words, both series share a common dynamic that prevents their paths from diverging indefinitely over time. This result justifies the estimation of a Vector Error Correction Model (VECM), allowing for subsequent analysis of short-run adjustment dynamics in response to deviations from the identified long-run equilibrium.

In addition, the normalised cointegrating vector reported in Table 2 suggests an inverse long-run association between NAT and Peru's real GDP.

Table 2. Normalised Cointegrating Vector.

Variable	Coefficient
$\ln(\text{GDP})$	1.000
$\ln(\text{NAT})$	0.487
Constant	−14.077

Cointegrating vector normalised on $\ln(\text{GDP})$. Author's estimations based on BCRP and MEF data using GRETL 2025c.

Re-arranging the estimated cointegrating relationship yields:

$$\ln(\text{GDP}) = 14.077 - 0.487 \ln(\text{NAT})$$

This coefficient should be interpreted as a conditional long-run association within the estimated bivariate system rather than as a structural elasticity or causal effect. Nevertheless, the negative sign indicates that higher and more persistent levels of tariff protection are associated with lower levels of aggregate output in the long run, a pattern consistent with the literature linking trade barriers to economic performance.

3.4. Dynamic Adjustment Toward Long-Run Equilibrium

Once the existence of a cointegration relationship between real GDP and NAT had been established, a Vector Error Correction Model (VECM) was estimated in order to

analyse the short-run adjustment dynamics associated with this equilibrium relationship. The long-run relationship identified through the Johansen cointegration procedure provides the equilibrium framework within which short-run adjustment dynamics can be evaluated. Within this context, the equation corresponding to output growth allows us to assess whether deviations from the long-run equilibrium are gradually corrected through adjustments in the trajectory of real GDP, as well as to identify the effects of extraordinary shocks on its short-run dynamics.

From a dynamic adjustment perspective, the results reported in Table 3 show that the error-correction term associated with the real GDP equation is negative and statistically significant at the 1% level ($EC_{t-1} = -0.082$; $p < 0.01$). This confirms the existence of an adjustment mechanism towards the long-run equilibrium between NAT and Peru's aggregate output. In economic terms, the coefficient suggests that approximately 8.2% of the accumulated disequilibria between the two variables is corrected each year through adjustments in the trajectory of real GDP. The statistical significance and negative sign of the coefficient further indicate that aggregate output responds systematically to deviations from the long-run equilibrium previously identified through the Johansen cointegration test.

Table 3. Short-Run Dynamics for the $\Delta \ln(GDP)$ Equation.

Variable	Coefficient	Std. Error	t-Statistic	p-Value	Sig.
COVID	−0.155313	0.0436746	−3.556	0.0010	***
INFLA	−0.0893279	0.0305424	−2.925	0.0056	***
EC_{t-1}	−0.0820360	0.0134647	−6.093	3.19×10^{-7}	***
Model summary $\Delta \ln(GDP)$	$R^2 = 0.564938$, Adjusted $R^2 = 0.533104$, Durbin–Watson = 1.706728				

Significance level: *** $p < 0.01$. Author's estimations based on BCRP and MEF data using GRETL 2025c.

On the other hand, the dummy variable associated with the COVID-19 shock shows a negative and statistically significant coefficient (-0.155 ; $p = 0.0010$), indicating that the pandemic generated a substantial contraction in output growth during the period analysed. Similarly, the *INFLA* dummy variable, corresponding to the hyperinflation episode of the late 1980s, also exhibits a negative and significant effect on aggregate output dynamics (-0.089 ; $p = 0.005$), which is consistent with the severe macroeconomic deterioration experienced in Peru during those years. Taken together, these results suggest that the adjustment towards the long-run equilibrium falls primarily on real GDP, while the extraordinary shocks included in the model—particularly the pandemic and the hyperinflation episode—exerted statistically significant contractionary effects on the short-run dynamics of economic growth.

Turning to the results for the NAT equation (see Table 4), the dummy variable associated with the hyperinflation episode presents a negative and statistically significant coefficient at the 1% level (-0.497 ; $p = 0.000$), suggesting that the period of greatest macroeconomic instability in Peru was accompanied by a substantial reduction in the dynamics of NAT. By contrast, the variable associated with the COVID-19 shock is not statistically significant ($p = 0.984$), indicating that this episode did not generate identifiable effects on the short-run evolution of NAT within the period analysed.

Table 4. Short-Run Dynamics for the $\Delta \ln(\text{NAT})$ Equation.

Variable	Coefficient	Std. Error	t-Statistic	p-Value	Sig.
COVID	0.00357053	0.182798	0.01953	0.9845	
INFLA	−0.497635	0.127834	−3.893	0.0004	***
EC _{t-1}	0.104085	0.0563561	1.847	0.0720	*
Model summary $\Delta \ln(\text{NAT})$	$R^2 = 0.310751$, Adjusted $R^2 = 0.260318$, Durbin–Watson = 2.207903				

Significance level: * $p < 0.10$; *** $p < 0.01$. Author's estimations based on BCRP and MEF data using GRETL 2025c.

On the other hand, the error-correction term associated with the NAT equation is not statistically significant at the conventional 5% level ($p = 0.072$). Consequently, the evidence does not allow a conclusive statement that NAT actively participates in the adjustment process towards the long-run equilibrium identified between the variables. Overall, the results suggest that the system's adjustment dynamics fall primarily on aggregate output rather than on the trajectory of NAT.

3.5. Robustness Checks and Limitations

In order to assess the statistical consistency of the VECM specification, this section presents complementary diagnostic tests applied to the model's residuals. It also discusses relevant methodological considerations for properly interpreting the results and delimiting the empirical scope of the findings.

3.5.1. Model Diagnostics

Post-estimation diagnostic tests allow for the evaluation of the overall statistical consistency of the VECM specification. First, the residual correlation matrix shows a relatively low correlation between the residuals of both equations (-0.208), suggesting the absence of severe contemporaneous dependence within the system (see Appendix B, Table A4). Additionally, the eigenvalues of the residual covariance matrix remain positive, supporting the internal consistency of the estimated residual structure (see Appendix B, Table A5).

Regarding residual autocorrelation, Rao F statistics up to lag 4 do not allow rejection of the null hypothesis of no serial correlation at conventional significance levels (see Appendix B, Table A6). The associated p -values remain above the 5% threshold, indicating no evidence of persistent serial correlation problems. In practical terms, this suggests that the dynamic specification adequately captures the temporal interaction between the variables included in the model. Similarly, conditional heteroskedasticity tests do not show evidence of ARCH effects up to lag 4, as all p -values remain above conventional significance levels (see Appendix B, Table A7). This result indicates that the variance of the residuals remains relatively stable throughout the analysed period.

On the other hand, the multivariate Doornik–Hansen normality test rejects the null hypothesis of residual normality ($p = 0.001$) (see Appendix B, Table A8). However, this result does not invalidate the VECM estimation nor necessarily compromise the overall consistency of the model. In models estimated by maximum likelihood, it is common for econometric inference to retain general validity even when residuals deviate from strict normality. Overall, the diagnostic tests suggest that the estimated model provides a reasonably adequate empirical representation of both the long-run relationship and the short-run adjustment dynamics between NAT and Peru's real GDP.

3.5.2. Limitations of the Study

Although the results identify a long-run equilibrium relationship between NAT and Peru's real GDP, several limitations related to the empirical scope of the study should be considered. First, the analysis relies on continuous official series available for the period 1980–2025. While some historical references exist for earlier tariff levels, much of this information lacks statistical continuity or comparable methodological criteria. Incorporating such data would have required reconstruction or interpolation processes that could affect the consistency of the series used.

Furthermore, the adopted specification follows a deliberately parsimonious approach, consistent with the time dimension of the available sample. Introducing a large number of endogenous variables could lead to overparameterisation and instability in the system's estimation. For this reason, the model focuses on capturing the long-run aggregate relationship between NAT and real GDP, incorporating only exogenous variables associated with major shocks relevant to the analysed period.

Similarly, the results should be interpreted primarily in terms of long-run dynamic relationships and macroeconomic adjustment mechanisms rather than as evidence of full structural causality. Accordingly, the model does not aim to exhaust all determinants of Peru's economic growth, but rather to examine specifically the empirical relationship between trade policy persistence and aggregate economic performance within a cointegration and error-correction framework. Future research may extend the time horizon as more consistent historical series become available and explore multivariate specifications incorporating additional macroeconomic channels linked to trade policy and economic growth.

3.6. Summary Assessment of Research Hypotheses

Overall, the results provide empirical support for both hypotheses proposed in this study. First, the evidence derived from the Johansen cointegration test confirms the existence of a structural long-run relationship between NAT and Peru's real GDP (see Table 1). Both the trace and maximum eigenvalue statistics reject the null hypothesis of no cointegration at the 5% significance level, supporting hypothesis H1, according to which trade policy persistence maintains a long-run equilibrium relationship with aggregate economic performance.

Complementarily, the VECM results show that the error-correction term associated with the real GDP equation is negative and statistically significant at the 1% level (see Table 2). This finding supports hypothesis H2, indicating that deviations from the long-run relationship are gradually corrected through adjustments in the trajectory of aggregate output. In economic terms, the estimated coefficient suggests that approximately 8.2% of accumulated deviations from equilibrium are absorbed each year through adjustments in real GDP growth.

4. Discussion

The results suggest that Peru's trade policy, proxied by the trajectory of NAT, maintains a structural long-run relationship with the country's aggregate economic performance. The presence of statistically significant cointegration and the normalised cointegrating vector— $\ln(\text{GDP}) = 14.077 - 0.487 \ln(\text{NAT})$ —indicate a negative long-run association between tariff levels and real GDP within the estimated bivariate system. This coefficient should be interpreted as a conditional long-run association within the estimated bivariate system rather than as a structural elasticity or causal effect. Given the parsimonious nature of the model, this association may also reflect reverse causality, common long-run trends, policy responses to crisis episodes or broader reforms not explicitly included in the specification. Therefore, the negative sign should be read as evidence of a long-run

equilibrium association, not as proof of an isolated tariff effect on output. In this context, higher and sustained levels of tariff protection are associated with lower levels of real GDP in the long run. Beyond statistical significance, this finding is relevant because it allows trade policy to be interpreted not merely as a short-term instrument, but as a relatively stable macroeconomic orientation which, when sustained over time, is associated with the aggregate trajectory of the Peruvian economy.

This reading gains additional depth when considered in light of Peru's own historical experience, which reflects a clear contrast between two persistent trade policy regimes. During the import-substitution period, high and highly dispersed tariff structures were associated with distortions in resource allocation, limited external competitiveness and constrained productive expansion. In particular, elevated protection levels contributed to an anti-export bias by increasing the cost of imported inputs, thereby affecting sectors in which the economy held comparative advantages [74]. By contrast, the liberalisation process initiated in the early 1990s, characterised by a sustained reduction in NAT, was accompanied by improved access to intermediate goods and capital inputs, greater exposure to international competition and a gradual strengthening of productivity dynamics [75,76]. From this perspective, the evolution of NAT can be understood not only as a policy variable, but as a proxy for persistent shifts in the broader economic environment shaping production, investment and trade integration.

This interpretation is consistent with the literature suggesting that the effects of trade policy tend to consolidate over time rather than being limited to transitory disturbances [77]. In this context, persistence should not be understood simply as statistical stability of a tariff series, but as the temporal continuity of a relatively coherent trade orientation—either more open or more protectionist—capable of gradually shaping investment incentives, resource allocation and productive strategies [41,59]. In this sense, the results align with recent evidence documenting negative effects of tariff increases on output, productivity and employment [19,31].

The findings also relate to previous studies applied to the Peruvian case. Evidence based on OLS models had already identified inverse relationships between tariffs and economic growth [3,55]. However, the contribution of the present study lies not only in confirming this negative association, but also in showing that it can be interpreted within a dynamic long-run equilibrium framework. While traditional linear approaches identify contemporaneous relationships, the cointegration and error-correction approach allows an assessment of whether NAT and real GDP share trajectories consistent with a joint equilibrium over time.

From a methodological perspective, this point is relevant because trade policy does not typically evolve through random or instantaneous adjustments, but through relatively stable orientations shaped by institutional, political and structural factors [59,60,69]. In the Peruvian case, this is reflected in the transition from a highly protectionist regime in the 1980s to a more open trade strategy consolidated since the early 1990s. The 1980s combined high tariff protection, hyperinflation, macroeconomic distortions and weak productive dynamism; subsequently, the reforms of the 1990s promoted a sustained reduction in NAT, together with macroeconomic stabilisation and international integration. The structural break identified by the Zivot–Andrews test is consistent with this historical transition and supports the interpretation of Peruvian trade policy as a sequence of relatively persistent tariff regimes rather than a series of isolated policy changes. In practical terms, the evidence points to a protectionist phase associated with comparatively high tariff levels, followed by a liberalised phase characterised by substantially lower tariffs. In this sense, the trajectory of NAT may be interpreted not merely as an isolated trade indicator, but as a proxy for persistent changes in the country's economic orientation.

The estimated adjustment dynamics reinforce this interpretation. The error-correction term associated with the real GDP equation is negative and statistically significant ($\lambda = -0.082$; $p < 0.01$), indicating that approximately 8.2% of disequilibria relative to the long-run equilibrium are corrected each year through adjustments in output. By contrast, although the error-correction term for NAT is marginally significant at the 10% level ($p = 0.072$), the adjustment effect remains considerably weaker than that observed in the GDP equation. This suggests that any response of tariff policy to long-run disequilibria is limited in economic terms and does not alter the dominant role of output in the adjustment process. Therefore, the convergence process continues to rest primarily on output rather than on tariff dynamics.

From an economic perspective, this asymmetric pattern is consistent with the functioning of a small open economy such as Peru, where economic activity adjusts gradually to cumulative changes in trade conditions [74,78], while tariff orientation tends to change less frequently. Moreover, given that in a VECM the significance of the error-correction term already implies dynamic causality in the Granger sense within the system, conducting an additional Granger causality test would have been largely redundant [79]. Nevertheless, the interpretation remains cautious: real GDP also depends on other macroeconomic, institutional and external factors not explicitly included in this parsimonious specification. In this sense, the results are better understood as evidence of a long-run dynamic relationship between trade orientation and aggregate economic performance, consistent with persistent macroeconomic adjustment mechanisms.

The magnitude of the error-correction coefficient implies a half-life of approximately eight years, calculated as $HL = \ln(0.5)/\ln(1 - 0.082)$. This suggests that the Peruvian economy requires a relatively long period to absorb roughly half of the accumulated disequilibria. Such a result indicates that the effects of sustained changes in trade orientation are not transmitted instantaneously, but through gradual processes of productive adjustment, investment and resource reallocation.

This relatively slow convergence is consistent with the literature highlighting the systemic nature of trade policy and its indirect effects on productivity, competitiveness and value chains [61,62,65,66]. Sustained changes in tariff barriers may gradually alter production costs, access to inputs, investment strategies and patterns of economic integration [80]. This is particularly relevant in an economy such as Peru, where a significant part of the productive structure depends on imported inputs, capital goods and external markets [81,82].

The results also align with approaches linking trade openness, allocative efficiency and economic growth [59]. Evidence suggests that reductions in tariffs on intermediate inputs may improve productivity and export performance [35,36], while higher barriers on inputs and services tend to reduce aggregate competitiveness [37]. From this perspective, the negative relationship identified between tariffs and output is consistent with mechanisms through which lower trade barriers facilitate gradual processes of productive upgrading and economic integration.

However, international evidence also indicates that the effects of trade policy are not universal and depend on structural characteristics [23,27,28]. Historical experiences exist in which tariffs were positively associated with growth during early industrialisation stages [29]; nevertheless, such trajectories were linked to specific institutional and productive configurations that cannot be readily generalised to the contemporary Peruvian context [30,42,44]. Accordingly, the results should be interpreted within Peru's own trajectory: high protection and macroeconomic instability during the 1980s, followed by trade liberalisation and external integration from the 1990s onwards.

Finally, although the COVID-19 and hyperinflation dummies show negative and statistically significant effects on output dynamics, these controls were included only to

isolate extraordinary shocks and do not constitute the core focus of the analysis. Overall, the evidence suggests that sustained trade orientation constitutes a relevant component of Peru's long-run macroeconomic trajectory. The main contribution of the study lies not merely in identifying a negative relationship between tariffs and output, but in showing that this relationship forms part of a dynamic process of equilibrium and gradual adjustment. From this perspective, trade policy is no longer interpreted as a sequence of transitory measures, but as a relatively persistent institutional and macroeconomic environment associated with aggregate economic performance over time.

4.1. Policy Implications

The results suggest that trade policy should not be understood solely as a set of temporary measures responding to specific circumstances, but also as a relatively persistent macroeconomic environment associated with long-run economic performance [83]. In the Peruvian case, this implication is particularly relevant given the relatively stable trade orientation maintained since the early 1990s, characterised by consistently low tariff levels (close to 2% in recent decades), broad external openness and an extensive network of trade agreements, which together define a sustained policy regime rather than isolated policy interventions, suggesting that trade policy operates as a persistent framework shaping long-run allocation decisions rather than as a sequence of transitory interventions.

From this perspective, the findings indicate that consistency and predictability in trade policy may constitute relevant elements for macroeconomic stability and long-term productive planning [84]. In small open economies such as Peru, where a large share of the productive structure depends on imported intermediate goods, capital equipment, technology and external markets, abrupt or highly volatile changes in tariff orientation may generate cumulative effects on production costs, investment expectations and economic integration processes, particularly through disruptions in access to imported inputs and changes in relative prices affecting sectoral competitiveness, thereby reinforcing path-dependent adjustment dynamics in which temporary policy shifts may generate persistent effects on resource allocation and sectoral composition.

At the same time, the results should not be interpreted as evidence that lower tariffs automatically guarantee higher economic growth. Aggregate output depends on a broader set of institutional, fiscal, monetary, technological and external factors beyond the scope of this model. Nevertheless, the evidence is consistent with the view that relatively stable trade regimes may contribute to more predictable environments for long-term economic decision-making, reducing uncertainty and facilitating gradual processes of investment and productive adjustment, while also enhancing policy credibility, insofar as sustained trade orientations reduce the perceived risk of reversal and support forward-looking investment decisions.

These considerations gain additional relevance in the current international context, characterised by renewed trade tensions and protectionist measures even among traditionally open economies. For countries such as Peru, highly integrated into global trade and dependent on external markets, this reinforces the need to carefully assess the potential costs associated with persistent changes in trade orientation, particularly when such changes may alter established production structures and long-term investment decisions, or generate cumulative losses in productivity associated with reduced access to external inputs and technologies over time [85,86]. Consequently, rather than focusing exclusively on tariff levels, the results suggest that the stability and coherence of trade policy may constitute a relevant component of strategies aimed at sustaining relatively stable long-run growth trajectories, not only by preserving predictability, but also by avoiding persistent distortions that may constrain the economy's productive frontier in the long run.

4.2. Future Research

The findings open several avenues for future research. First, it would be relevant to extend the analysis by incorporating other trade policy instruments beyond NAT. While this study adopts a parsimonious approach, contemporary trade dynamics also involve non-tariff barriers, sanitary measures, technical restrictions and preferential agreements, which may exhibit persistent relationships with long-run economic performance.

Additionally, future research could explore sectoral transmission mechanisms. Given the heterogeneity of Peru's productive structure and its dependence on imported inputs in certain sectors, it is plausible that the effects of persistent trade policy changes are uneven across economic activities. In this sense, sectors such as manufacturing, agro-exports or mining offer relevant spaces for disaggregated analysis using cointegration or sectoral VECM approaches.

Another important line of research involves incorporating complementary macroeconomic channels related to private investment, productivity, exports, employment or the real exchange rate. This would allow a more precise understanding of the mechanisms through which trade policy persistence becomes associated with economic growth. Finally, future studies could extend the analysis to other Latin American economies and assess how recent geopolitical and trade tensions are reshaping the relationship between trade openness, macroeconomic stability and long-run growth.

5. Conclusions

The aim of this study was to examine whether the persistence of trade policy, approximated through the dynamics of NAT, maintains a long-run equilibrium relationship with Peru's real GDP during the period 1980–2025. The econometric evidence confirms the existence of a stable long-run relationship between both variables, indicating that sustained changes in trade policy orientation are associated with aggregate economic performance over time. More specifically, the normalised cointegrating vector suggests that higher and persistent levels of tariff protection are associated with lower levels of real output in the long run.

The dynamic results reinforce this interpretation. The error-correction mechanism indicates that the Peruvian economy gradually absorbs deviations from the long-run equilibrium through adjustments in output. Although the speed of adjustment is relatively slow, the negative and statistically significant coefficient confirms a systematic convergence process through which disequilibria are progressively reduced. The estimated half-life suggests that this adjustment occurs over several years, consistent with gradual processes of productive adaptation, investment and resource reallocation.

By contrast, the absence of a significant adjustment mechanism in the tariff equation suggests that NAT behaves as a relatively persistent component of the system, while the burden of adjustment falls on output. This asymmetric structure indicates that trade policy persistence operates as a relatively stable macroeconomic condition, whereas the real economy adjusts gradually to long-run disequilibria within the estimated dynamic system.

From a broader perspective, the findings contribute to the literature by distinguishing between temporary policy changes and persistent trade policy regimes. In the Peruvian case, this is particularly relevant given the transition from a highly protectionist regime in the 1980s to a prolonged period of trade liberalisation and external integration since the 1990s. Within this context, NAT can be interpreted not only as a trade indicator, but also as a proxy for persistent changes in economic policy orientation.

More generally, the empirical framework provides a parsimonious and replicable approach for analysing how persistent trade policy regimes interact with long-run macroe-

conomic performance in small open economies, offering a basis for future research on the structural implications of trade policy persistence.

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Abbreviations

The following abbreviations are used in this manuscript:

NAT	Nominal Average Tariff
GDP	Gross Domestic Product
BCRP	Central Reserve Bank of Peru
MEF	Ministry of Economics and Finance
VECM	Vector Error Correction Model

Appendix A. Complementary Econometric Tests

Table A1. Unit Root Tests.

Variable	ADF Test	ADF Result	KPSS Test	KPSS Result	Integration Order
$\ln(\text{GDP})$	$\tau_{\text{ct}} = -2.13683$ $p = 0.5245$	Non-Stationary	KPSS = 0.270867 $p < 0.01$	Non-Stationary	I(1)
$\Delta \ln(\text{GDP})$	$\tau_{\text{ct}} = -5.29488$ $p = 4.594 \times 10^{-5}$	Stationary	KPSS = 0.108116 $p > 0.10$	Stationary	I(0)
$\ln(\text{NAT})$	$\tau_{\text{c}} = -0.377958$ $p = 0.9106$	Non-Stationary	KPSS = 1.53652 $p < 0.01$	Non-Stationary	I(1)
$\Delta(\ln \text{NAT})$	$\tau_{\text{c}} = -6.14859$ $p = 5.216 \times 10^{-8}$	Stationary	KPSS = 0.111926 $p > 0.10$	Stationary	I(0)

Author's estimations based on BCRP and MEF data using GRETL 2025c.

Table A2. VAR Lag Length Selection Criteria.

Lags	Log-Likelihood	<i>p</i> (RV)	AIC	BIC	HQC
1	71.61183	—	−3.144736 *	−2.980904 *	−3.084320 *
2	73.24389	0.51464	−3.034600	−2.706935	−2.913767
3	74.56040	0.62099	−2.909786	−2.418288	−2.728537

The asterisks indicate the optimal lag length according to each information criterion: AIC, BIC and HQC. Author's estimations based on BCRP and MEF data using GRETL 2025c.

Table A3. Zivot–Andrews Unit Root Test Results for $\ln(\text{NAT})$.

Variable	ZA Statistic	Break Year	<i>p</i> -Value	Conclusion
$\ln(\text{NAT})$	−3.094	1989	0.881	Non-stationary

The Zivot–Andrews test allows for one endogenous structural break in the intercept. The null hypothesis is that the series contains a unit root. Critical values are −5.276 (1%), −4.811 (5%) and −4.566 (10%). Author's estimations based on MEF data using GRETL 2025c.

Appendix B. Post-Estimation Diagnostic Tests

Table A4. Residual Correlation Matrix (VECM).

	$\Delta \ln(\text{GDP})$	$\Delta \ln(\text{NAT})$
$\Delta \ln(\text{GDP})$	1.0000	−0.20885
$\Delta \ln(\text{NAT})$	−0.20885	1.0000

Author's estimations based on BCRP and MEF data using GRETL 2025c.

Table A5. Eigenvalues of the Residual Covariance Matrix.

Eigenvalue
0.791145
1.20885

Author's estimations based on BCRP and MEF data using GRETL 2025c.

Table A6. Residual Autocorrelation Tests.

Lag	Rao F	Approx. Distribution	<i>p</i> -Value
1	2.468	F(4, 82)	0.0512
2	1.766	F(8, 78)	0.0967
3	1.259	F(12, 74)	0.2612
4	1.370	F(16, 70)	0.1827

Author's estimations based on BCRP and MEF data using GRETL 2025c.

Table A7. Tests for Conditional Heteroskedasticity.

Lag	LM Statistic	Degrees of Freedom	<i>p</i> -Value
1	8.243	9	0.5098
2	15.810	18	0.6058
3	28.747	27	0.3733
4	37.244	36	0.4116

Author's estimations based on BCRP and MEF data using GRETL 2025c.

Table A8. Doornik–Hansen Multivariate Normality Test.

Test	Statistic	Degrees of Freedom	<i>p</i> -Value
Doornik–Hansen	17.6926	4	0.0014

Author's estimations based on BCRP and MEF data using GRETL 2025c.

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