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Structural imbalances: why trade is not enough to bridge Morocco's regional economic divide

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Abstract. This article aims to examine the extent to which trade openness shapes regional economic inequalities in Morocco, a question that remains underexplored in a country characterized by one of the most pronounced spatial divides in North Africa. Analyzing a panel of Morocco's twelve regions (2014-2023) with fixed-effects models, we find that structural factors overwhelmingly dominate regional GDP per capita gaps, reflecting deep and persistent spatial hierarchies. To assess trade's role, we construct a regional trade exposure index that interacts initial regional development levels with national trade shocks. Contemporaneous trade exposure shows no significant association with regional outcomes, while lagged trade exposure, though statistically significant, produces economically modest effects that are dwarfed by the structural range between regions. These findings suggest that in contexts of entrenched spatial inequality, trade liberalization produces heterogeneous regional effects that are delayed, differentiated by initial conditions, and insufficient to drive meaningful redistribution. We conclude that complementary, place-based policies targeting the structural disadvantages of lagging regions are necessary for trade to fulfill its redistributive potential.

Keywords: *Trade liberalization; Regional inequalities; Structural persistence; New Economic Geography; Morocco; Panel data.*

1. Introduction

Trade has long been recognized as a driver of economic growth, often associated with improvements in wages, productivity, and overall welfare. Yet the spatial distribution of these gains is far from uniform. New Economic Geography (NEG) theory, developed notably by Krugman (1991), demonstrates that trade liberalization can reinforce existing spatial hierarchies by strengthening agglomeration forces in core regions, even as it creates growth at the aggregate level. Whether trade reduces or widens regional disparities has been empirically confirmed to be highly context-dependent.

In line with many developing countries, Morocco has pursued an ambitious trade liberalization agenda over the past few decades, intensifying regional and international cooperation and diversifying its economic partners beyond traditional ones. These efforts have contributed to significant transformations in the Moroccan economy, yet their benefits did not translate equally across regions, as Morocco continues to record some of the highest levels of regional inequality in North Africa, raising critical questions about the relationship between trade and spatial inequality. The World Bank's World Development Report 2009 places trade at the center of debates on spatial inequality, and the study of regional disparities has captured the attention of prominent economists including Nobel laureates Amartya Sen, Joseph Stiglitz, and Paul Krugman.

Despite a growing literature on trade and regional inequality in developing countries, the bulk of it concentrated in Latin America and Asia, Morocco remains understudied. The existing empirical literature has not resolved whether structural persistence or trade dynamics better explain regional divergence in middle-income countries undergoing liberalization, nor has it

examined this question extensively in the Moroccan context. This gap is particularly consequential given that territorial development and advanced regionalization have been central to Morocco's public policy agenda since 2011, making the spatial effects of trade a question of direct policy relevance.

This article addresses the following research question: to what extent does trade openness influence regional economic inequalities in Morocco? We argue that while trade produces statistically detectable regional effects, these are modest, delayed, and overwhelmed by the structural persistence of spatial hierarchies, a finding that both conditions NEG predictions and challenges policy approaches that treat trade liberalization as a convergence mechanism.

This article makes two main contributions. Empirically, it introduces a regional trade exposure index that captures heterogeneous regional responses to national trade shocks, offering a methodological contribution applicable to other developing countries with similar data constraints. Theoretically, it contributes to the NEG literature by demonstrating that under conditions of powerful structural inertia, trade's capacity to reorganize spatial economies is both delayed and differentiated by initial regional conditions.

The remainder of the paper is organized as follows. Section 2 reviews the literature on trade, spatial inequality, and the Moroccan context. Section 3 outlines the data and empirical strategy. Section 4 presents the results, robustness checks, and discusses the findings and their implications before concluding with a summary of results, limitations and directions for future research.

2. New Economic Geography: Literature Review

a. Core-periphery models

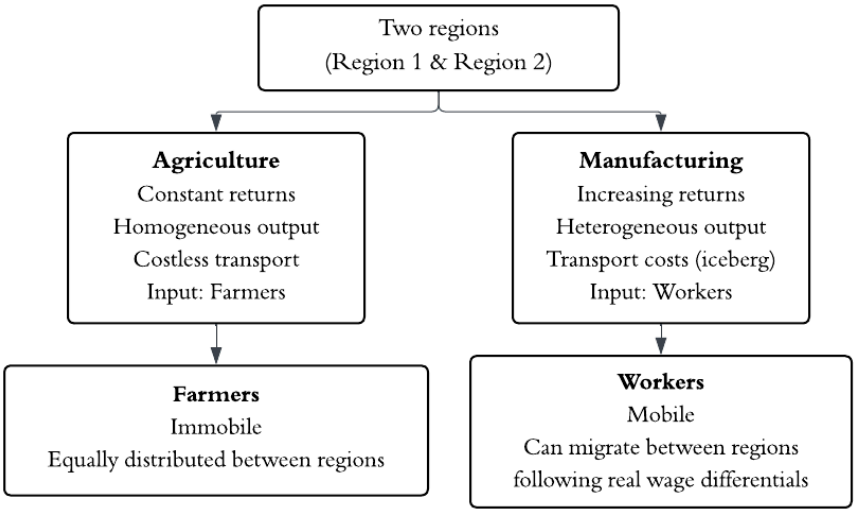
From a classical perspective, the uneven geographical distribution of economic activity is the result of first-nature factors, i.e., natural resources. This is the case in the Heckscher-Ohlin (H-O) model, which explains specialization through differences in factor endowment. However, real world cases where regions with similar endowments exhibit vastly different levels of industrialization puts first-nature advantages at question. Classical trade theories are built on the assumptions of perfect mobility and diminishing returns to scale. These assumptions rarely hold in reality because of restrictions on capital and labor movements as well as agglomeration effects. Moreover, traditional trade theories lack spatial considerations. They aren't designed to explain within-country inequalities because they treat countries as single entities.

To address these limitations, New Economic Geography (NEG), often associated with Paul Krugman (1991), introduces models that incorporate transport costs, agglomeration forces, and factor mobility, providing a more robust framework for analyzing the spatial distribution of economic activity in response to trade. New Economic Geography is a new approach of economic geography with a focus on how different forms of spatial agglomeration emerge. To study the different agglomeration patterns, three main NEG models can be applied: core-periphery models, regional and urban system models, and international models. For the purpose of this paper, we will limit ourselves to the first model.

In core-periphery models, there are two regions, two production sectors (agriculture and manufacturing), and two types of labor (farmers and workers). Manufacturing operates under increasing returns and agriculture operates under constant returns. Manufacturing output is heterogeneous, costly to transport (Samuelson's iceberg), and uses workers as the only input. Agricultural output is homogeneous, costless to transport, and uses farmers as the only input. Workers are mobile between regions, farmers are immobile but equally distributed between regions (Krugman, 1991).

Figure 1 illustrates the basic structure of Krugman's (1991) core-periphery model, showing the key characteristics of each sector and the mobility assumptions.

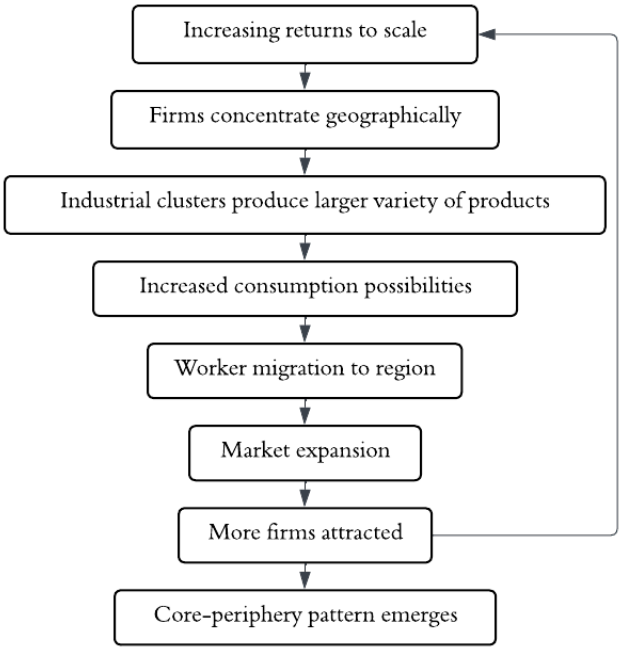
Figure 1: Structure of the Core-Periphery Model (Krugman, 1991)



Source: Authors' elaboration

The basic mechanism behind the emergence of agglomerations in NEG is fairly simple. Increasing returns to scale serve as an incentive for firms to concentrate geographically (centripetal forces). Industrial clusters produce a larger variety of goods, increasing consumption possibilities of the workers in the region. This induces more workers to migrate to this region, thus expanding the market. This in turn attract even more firms into the region. This self-reinforcing process feeds on itself until a core-periphery pattern emerges, with initial advantages determining which region becomes the core and which one remains the periphery. Figure 2 depicts the circular causation mechanism that generates self-reinforcing agglomeration in the core-periphery model.

Figure 2: The circular causation process in agglomeration



Source: Authors' elaboration

This positive feedback loop demonstrates how small initial advantages1 can become magnified through cumulative causation, leading to persistent regional hierarchies.

Working against these centripetal forces, are centrifugal forces. Concentration tends to drive up land rents and housing prices, which can be summed up in congestion costs. Additionally, the existence of immobile factors (farmers) in peripheral areas can act as an incentive for firms who want to avoid competition in the center and serve the periphery, pushing them to defect. To reiterate, agglomerations arise from an interplay between centripetal and centrifugal forces.

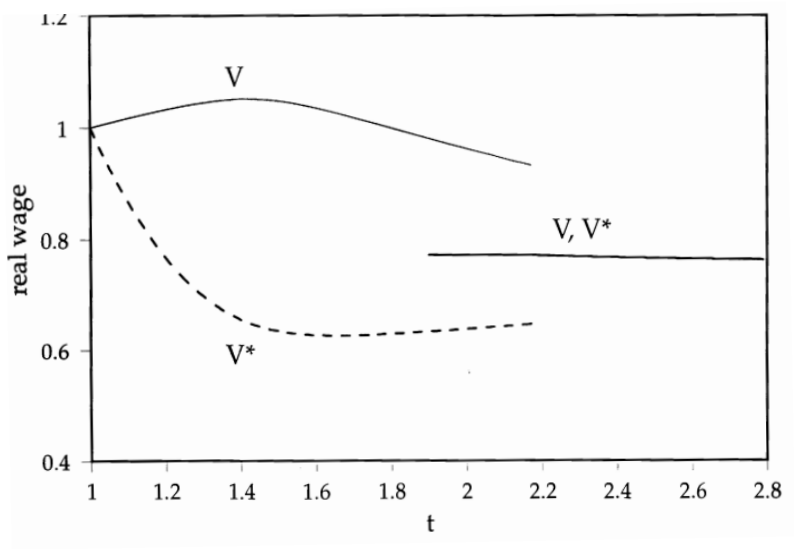
This entire mechanism however, is bound by a very important condition: transportation costs. It is on this front that trade is often integrated into debates on regional convergence.

b. Trade and regional inequality in NEG literature

As countries open to trade, transaction costs generally tend to fall, and industry linkages lose importance as the economy becomes more dependent on international markets while local demand becomes less important. This results in a more dispersed distribution of manufacturing industry across the country, consequently reducing regional disparities (Krugman and Livas, 1996). Paluzie (2001) argues differently, she asserts that regional inequalities increase simultaneously with trade openness. As an economy opens up to trade, firms' markets expand beyond their domestic rural small one. This gives them incentive to locate in urban areas to benefit from agglomeration economies, thus leading to more centralized economies. In line with Paluzie's argument, Fujita, Krugman, and Venables (1999) argued that the home market effect is reinforced by falling transport costs and opening up to trade. This means that the incentive for firms to agglomerate increases, and consequently draws in more workers and other firms. The resulting Marshallian economies act as centripetal forces that reinforce the concentration of production in core areas, thus leading to greater regional disparities. Krugman and Venables (1995) find that both narratives hold some ground, depending on different stages of globalization. Their findings suggest that the effects of globalization on income takes the form of a U-shaped pattern. At a low level of globalization, trade costs are high, so economic activity is dispersed with no clear core-periphery divide. As the world becomes increasingly integrated and trade costs fall, economic concentration takes place, favoring the core and causing a decline in real income in the periphery. However, when trade costs fall below a certain threshold, congestion costs offset the positive externalities of concentration, driving production toward the periphery. Figure 3 illustrates this non-monotonic relationship between transport costs and regional wage inequality.

[1] Initial advantages determine which region becomes core

Figure 3: Trade costs and real wages[2]



Source: Krugman and Venables (1995)

This theoretical framework demonstrates that trade's spatial effects are inherently ambiguous and stage-dependent. Further, trade acts directly on regional disparities by increasing the core's outward engagement at the expense of the domestic hinterland. Remote regions struggle to take advantage of trade integration due to their intrinsic characteristics. They lack domestic markets of significant size to facilitate scale economies that might condition them to compete globally, they face higher transport costs due to their being remote and being underserved in terms of public goods, and they are less exposed to nationally produced knowledge resulting in less competitive human capital and institutions. Additionally, economic activities differ across regions, with some housing industries subject to import competition, while others specialize in export-oriented industries. These disparities are further intensified by the immobility of factors across industries, as workers often require industry-specific skills, and labor markets tend to be rigid (Pavcnik, 2017). On this, Brülhart (1998a) argues that the extent of spatial concentration varies by industry, high-tech industries being more spatially concentrated due to higher economies of scale, whereas resource intensive activities tend to be more dispersed across space.

Taken together, NEG literature suggests that agglomeration is likely to favor core regions. These areas benefit from large markets, large labor pools, strong links to international markets, and clusters of diverse suppliers. This reinforces initial advantages through the generation of significant externalities, innovation, and investments. Congestion may disperse these benefits towards nearby regions, while peripheral regions continue to struggle with structural inefficiencies due to lack of access to public goods and weak market linkages, making it difficult for them to emerge as competitive economic hubs. This is not to say that outside of metropolitan cores, regions are doomed to lag behind. Whether they converge or not depends on how effectively they can integrate within regional and global markets, by leveraging their specific regional factors and capitalizing on them to realize trade competitiveness. Nonetheless, one cannot deny the role of geography and first nature advantages, as peripheral regions with

[2] The parameter t represents transport costs (lower t = higher trade integration). V represents real wages in the core region, V* represents wages in the periphery. Reading from right to left (decreasing transport costs), the graph shows how regional wage inequality first rises then falls as economies become more integrated. At very high transport costs (right side), wages are similar across regions. As transport costs fall (moving left), the core-periphery wage gap widens, reaching maximum inequality around t≈1.5. Further reductions in transport costs lead to wage convergence as congestion forces offset agglomeration benefits.

less factor endowments are up against far greater stakes than their better geographically situated homologues.

But economic concentration isn't always bad. According to Myrdal's spread effects, geographic concentration of economic activity is tied to overall growth (as reported by Midelfart, 2004). Economic clusters constitute breeding ground for innovation, recognized by most growth theories as the main driver of growth. These clusters also serve as the ideal transmission environment for other positive externalities including knowledge transfers and spillovers, larger labor pool, larger supply markets, all of which can be grouped under the term Marshallian economies. Additionally, in a core-periphery structure, the center can generate growth in peripheral regions, particularly when these are resource-rich with the ability to serve as the backbone of industrial clusters. In this regard, Midelfart (2004) argues that efforts should focus on developing regional agglomerations rather than impeding the agglomeration of activity or redistributing resources equally across all sub-regions.

c. Trade liberalization and regional inequality: global evidence

The theoretical predictions of New Economic Geography have found empirical support across diverse developing country contexts. A growing body of research examines how trade liberalization affects regional inequalities across developing countries. These are synthesized in Table 1.

Table 1: Empirical evidence on trade liberalization and regional inequality

Study	Country	Period	Main finding
Rodríguez-Pose and Sánchez-Reaza (2003)	Mexico	NAFTA implementation	Increased economic polarization, Northern states gained while Mexico City declined
Kovak (2013)	Brazil	Early 1990s trade reforms	Regions experiencing larger liberalization-induced price declines faced proportionally larger wage declines
Dix-Carneiro and Kovak (2017)	Brazil	1990s trade reforms	Regional effects persist and intensify in the long run (around 20 years following trade liberalization)
Daumal (2013)	India vs Brazil	1980-2004 (India), 1985-2004 (Brazil)	Trade openness contributed to an increase in inequality in India, and a decline in Brazil
Topalova (2010)	India	Post-1991 liberalization	Trade-exposed rural districts experienced slower poverty reduction and weaker consumption growth following liberalization.
Dass and Lahiri (2025)	Indonesia	1993-2000, 1993-2014	Tariff reductions promoted regional growth, reduced inequality, and increased economic mobility, with particularly strong gains for lower-quartile households.
Le Goff and Singh (2014)	30 African countries	1981-2010	Trade effects depend on financial sector development, education, and institutions
Ezcurra and Rodríguez-Pose (2014)	22 emerging countries	1990-2006	Trade openness increased within-country spatial inequality, with stronger effects in poorer developing countries and the emergence of regional winners and losers.

Source: Authors' elaboration

From the extensive literature, several robust patterns emerge. First, initial structural endowments dominate outcomes and compound via agglomeration effects, regions with

superior infrastructure, human capital, and institutional quality systematically capture larger trade gains. Second, sectoral composition mediates regional outcomes, with manufacturing and tradable services offering greater growth potential than traditional agriculture or non-tradable services. Third, factor immobility amplifies spatial divergence, when labor and capital cannot easily relocate, trade shocks create lasting regional disparities rather than convergence through factor price equalization. Fourth, adjustment is slow and persistent, regional effects manifest over years to decades, with short-run disruptions often intensifying rather than dissipating long-term. Fifth, complementary policies matter critically, trade's regional effects depend on financial sector development, education systems, and institutional quality enabling broad-based participation.

d. Trade liberalization and regional inequality in Morocco

In the years following the launch of the advanced regionalization project by the Moroccan government in 2011, there has been a multiplication of academic works and institutional reports that treat regional disparities in Morocco (Haddad et al., 2017; 2022; Bendouro et Abdelbaki, 2024; Amraoui et al., 2019; El Majidi, 2020; Wahyana et Haddad, 2024; Oumhani Eddelani et al., 2019; Bun et El Makhloufi, 2007; Koraich et al., 2019; Akallouch et al., 2025; Kerkouch et al., 2024; Bakour et Abahamid, 2019; Benida et al., 2023). One of the first studies about the spatial distribution of clusters was conducted in the early 2000s by the Directorate of Spatial Planning (Amraoui, 2019). The results revealed the existence of around 50 agglomerations, totaling 35% of Moroccan manufacturing employment, the majority of which is located in urban areas. In 2018, the Office of the High Commissioner for Planning published a regional assessment report. The report presented simple performance indicators of regions in all socio-economic dimensions, namely employment, education, health, demography, housing conditions, poverty, vulnerability, inequality, and GDP per capita (Kerkouch et al, 2024). The main results showed that while performance is positive for all regions in the different indicators, the process of regional convergence in terms of human development is not happening at the same pace at the regional level. Regional analysis conducted by the Office of the High Commissioner for Planning in 2019 reveals the existence of wide disparities in GDP growth rates between regions, with only 7 out of the 12 recording above national average growth rates, which was mainly attributed to the Casablanca-Settat region. In terms of regional GDP per capita, 6 regions out of 12 recorded above national average per capita income (32,394 DH), and the average absolute gap between regions has increased.

In academia, Bendouro et al., (2024) examined the differentiated regional impact of the COVID-19 crisis. In 2021, above national average growth rates were recorded in only four regions (Fès-Meknès, Beni Mellal-Khenifra, Tanger-Tetuán-Al Hoceima and Marrakech-Safi). Their results showed that recovery was not the same across regions, alluding to the differences in economic resilience with all its underlying mechanisms (infrastructure, industrialization, diversification, human capital development…). A regional analysis over the period from 1985 to 2014 shows the predominance of the Casablanca region in terms of enterprise number, industrial production, industrial exports, and employment. Tangier-Tetouan recorded a rise in recent years (Amraoui et al., 2019).

Despite the different approaches, contexts, and dimensions covered by these studies, most of them, academic and institutional, reveal the presence of a “two-speed” regional development, with some regions experiencing greater growth and prosperity than others. The size of the gaps recorded between the best and the worst performing regions alludes to the structural nature of regional disparities. Crucially, this spatial distribution of economic activity across regions didn’t develop hazardously overnight. It is the result of an interplay of factors. NEG theory recognized the weight of initial advantages in shaping regional outcomes. This holds true for

the case of Morocco. Geography plays an important role in the economic specialization of Moroccan regions (Benduro and Abdelbaki, 2024), factors such as soil quality, climate, and water sources are necessary for agricultural production, and as such, regions with relatively high endowments in these resources will tend to specialize in agricultural production (comparative advantage). Location on the other hand is of great importance for trade. Industrial production, especially export-oriented production, will find it more advantageous to locate in more connected regions, with closer access to trade routes (Benida et al., 2023). As time progressed, these initial advantages were reinforced through historical and economic events, as well as public policy interventions. Historically, regional disparities saw their birth under colonial regimes, as colonial authorities concentrated resources, infrastructure, and economic activities in Casablanca referred to as "useful Morocco" while the rest of the country remained marginalized and labeled as "useless Morocco". Post-independence, the government began implementing a series of economic reforms, with the promise of modernizing the economy and developing underprivileged regions through investment in infrastructure, agriculture, education and health, and the promotion of industrialization and urbanization (Benduro and Abdelbaki, 2024). However, as the country became more and more integrated into the global economy, competitive pressure reoriented priorities. Efforts became increasingly concentrated on creating economic regions capable of mobilizing local and regional resources for a better insertion of the national economy into the world economy (Oumhani Eddelani et al., 2019). This new strategy targeted the regions capable of creating synergies at the productive and territorial levels, which are unsurprisingly the ones already equipped with the prerequisites for industrial expansion, due to historical and geographical advantages.

Under the guidance of international institutions, namely the World Bank and the International Monetary Fund, Morocco took on a series of economic and industrial reforms around the 1990s. They mainly concerned trade and finance liberalization, privatization, and taxes (Office of the High Commission for Planning, 2009). With the growing openness came challenges. The Moroccan economy wasn't fully developed to face foreign competition or impose itself on international markets. This inspired national policy makers to place economic diversification at the core of development policies, by promoting sectors such as industry, information technologies, tourism and renewable energy (Benduro and Abdelbaki, 2024). This era was marked by a structural transformation in the productive fabric, with the emergence of new specializations, particularly automotive and aerospace industries (Amraoui et al., 2019). However, in doing so, development policies acted as a reinforcing agent of pre-existing disparities. Certain sectors and industries took precedence over others, and in doing so, development plans overlooked the comparative advantage of certain regions, particularly those where agriculture remains a key economic driver. Later, to address the growing regional divide, Morocco built its territorial development plan around industrial parks, free zones, and clusters (the National Pact for Industrial Emergence). This resulted in perceptible positive changes in exports, skilled employment, and FDI, especially in industrial activities. However, yet again, this cluster-promotion policy ended up having adverse effects. Industrial clusters were concentrated in a few regions, particularly the Casablanca-Settat region (Amraoui et al., 2019), and naturally, the resulting gains were also confined within these regions.

The differences in industrial development across regions were reinforced by public investment biases. In its quest for deeper economic integration and enhanced trade performance, Morocco has invested heavily in its infrastructure to improve national and international connectivity. However, the large-scale projects like highways, ports, and special economic zones were disproportionately concentrated within certain regions, particularly in and around urban centers (Akallouch et al., 2025; Benduro and Abdelbaki, 2024). The unequal distribution of public investments undermines regional attractiveness, initiating a circular causation process by which

the concentration of economic activity within specific regions is exacerbated. As certain regions gain in attractiveness, they attract more and more investments, giving rise to agglomerations and widening the gap with less favored areas (Haddad et al., 2022). Besides its implications for investments, infrastructure development mediates trade's impact on regional imbalances. Regions with relatively better connectivity offer easier access to both domestic and foreign markets, enhancing their export capacity.

In the same sense, major investments tend to concentrate in export-oriented industries, which are located mainly in coastal areas. Regional output analysis indicates a spatial concentration of specific activities (Wahyana and Haddad, 2024): food in Souss-Massa, textiles and leather in Fès-Meknès, mechanical, metal, and electrical products in Tangier. While services concentrate in larger metropolitan cities like Rabat, Casablanca, and Marrakech, the latter specializes in tourism related services. Certainly, this economic specialization has serious implications for local economic development, as wealth generation isn't uniform across all economic activities. But it also has serious implications for trade integration, as not all regions are equally able to connect local productive capacities to global value chains. Some regions, such as Tangier and Casablanca, are well integrated into global markets, whilst others, such as Drâa-Tafilalet, Marrakech-Safi, and Souss-Massa, rely more on domestic trade and internal production chains (Wahyana and Haddad, 2024), which limits their capacities to diversify local economies and further confines them to traditional sectors such as agriculture. This further aggravates regional disparities, as highly integrated regions benefit from strong international trade linkages and spillovers, leading them to experience higher productivity and GDP shares. This however, is not unconditional, the economic growth of export dependent regions is contingent on their ability to compete in international export markets. Thus, we can say that specialization can either be an advantage or a handicap depending on the nature of the sector.

To sum up, trade favors regions with strong industrial bases, export-oriented sectors, and high-quality infrastructure, which happen to be the coastal regions.

3. Methodology

a. Data

The panel comprises 120 annual observations spanning 12 Moroccan regions over 10 years (2014-2023). The study period was determined solely based on data availability. Trade openness data (exports plus imports as share of GDP) comes from World Bank Development Indicators. Regional GDP and population data are sourced from Morocco's High Commission for Planning. Due to unavailability of consistent annual regional data on infrastructure, employment, or sectoral structure, the model excludes additional control variables. Results should therefore be interpreted as descriptive correlations rather than causal estimates. The study documents observable associations between national trade openness changes and shifts in regional economic positions.

b. Variable construction

i. Leave-One-Out Regional GDP Per Capita Gap ($G_{apr,t}$)

The dependent variable is the regional GDP per capita gap relative to the national average. To avoid mechanical endogeneity arising from including a region in its own benchmark, we construct the dependent variable using a leave-one-out national average:

$$Gapr,t\ (\%) = 100 \times [\log(GDPpcr,t) - \log(n\_GDPpc\text{-}r,t)]$$

where

- GDPpcr,t is the per capita GDP of region r in year t
- n_GDPpc-r,t is the national per capita GDP excluding region r

This formulation ensures that the benchmark is truly exogenous to each region's own economic performance, eliminating the spurious correlation that would arise from using the standard national average. The logarithmic transformation yields symmetric and interpretable deviations, while the percentage scale makes regional differences readily comparable.

ii. Regional Trade Exposure Index (TradeExp)

The primary limitation of available data is the absence of region-specific trade statistics. Ideally, trade exposure would be measured using regional trade flows or sectoral employment shares weighted by trade intensity. Lacking such data, we construct a regional trade exposure index that captures heterogeneous regional responses to national trade shocks based on predetermined economic structures:

$$TradeExpr,t = Baseline\_Stdr \times \Delta TOt$$

Where

- Baseline_Stdr is the standardized GDP per capita of region r in the baseline year (2014), calculated as:

$$(GDPpcr,2014 - \mu GDPpc2014) / \sigma GDPpc2014$$

where $\mu GDPpc_{2014}$ is the average and $\sigma GDPpc_{2014}$ is the standard deviation of regional GDP per capita across all regions in 2014.

- ΔTOt is the annual change in national trade openness (TOt - Tot-1)

This shift-share design creates region-specific variation from the interaction of time-invariant initial conditions with time-varying national shocks.

This measure assumes initial GDP per capita proxies for trade exposure, as more developed regions typically have greater market integration through infrastructure, export industries, and trade linkages. However, this is imperfect, trade exposure also depends on port access, sectoral composition, and connectivity that may not correlate perfectly with initial income. Our measure therefore tests whether trade shocks have heterogeneous effects based on initial development levels, rather than directly measuring trade intensity.

c. Model specification

The baseline specification employs a fixed-effects panel model:

$$Gapr,t = \alpha r + \gamma t + \beta\ TradeExpr,t + \varepsilon r,t$$

Where αr represents region-fixed effects (capturing time-invariant regional characteristics such as geography, colonial legacy, and baseline infrastructure), γt represents year fixed effects (controlling for common temporal shocks affecting all regions simultaneously, such as national policy changes, macroeconomic conditions, or the COVID-19 pandemic), and εr,t is the error term. The year fixed effects are essential given that our main regressor, trade exposure, is constructed from a national-level variable (ΔTO) that could otherwise conflate trade effects with other nationwide time-varying factors. Robust standard errors clustered at the regional level are employed to address potential heteroskedasticity and within- region correlation.

This data-constrained approach provides meaningful regional variation while acknowledging that more granular measures would strengthen causal inference. The use of fixed 2014

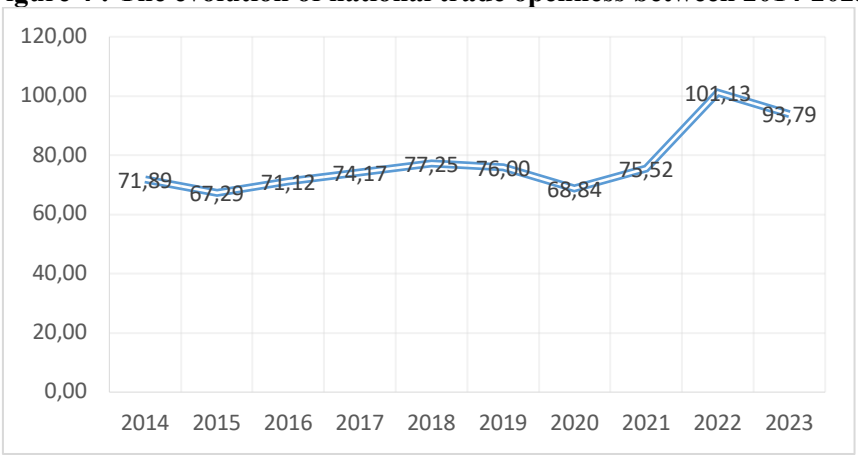
characteristics mitigates reverse causality concerns, as these predetermined weights cannot be affected by subsequent trade or GDP dynamics.

4. Regional economic outcomes in Morocco: Results and discussions

a. Descriptive statistics

Figure 4 shows the evolution of the national trade openness ration from 2014 to 2023. The values are consistently high (above 60-70% for most years), with an average of 77.7% during the study period, ranging from a minimum of 67.29 to a maximum of 101.13%. This steady growth indicates a sustained policy shift toward a more open and integrated economy. The relatively high standard deviation (10.49) reflects significant fluctuations in Morocco's trade integration, suggesting the economy is sensitive to global commodity prices, exchange rates, or demand for its key exports/imports. This is reflected in the dip in 2020, which most certainly reflects the impact of the COVID-19 pandemic. The ratio appears to rebound after 2020, which aligns with the global economic recovery and a surge in trade as restrictions eased.

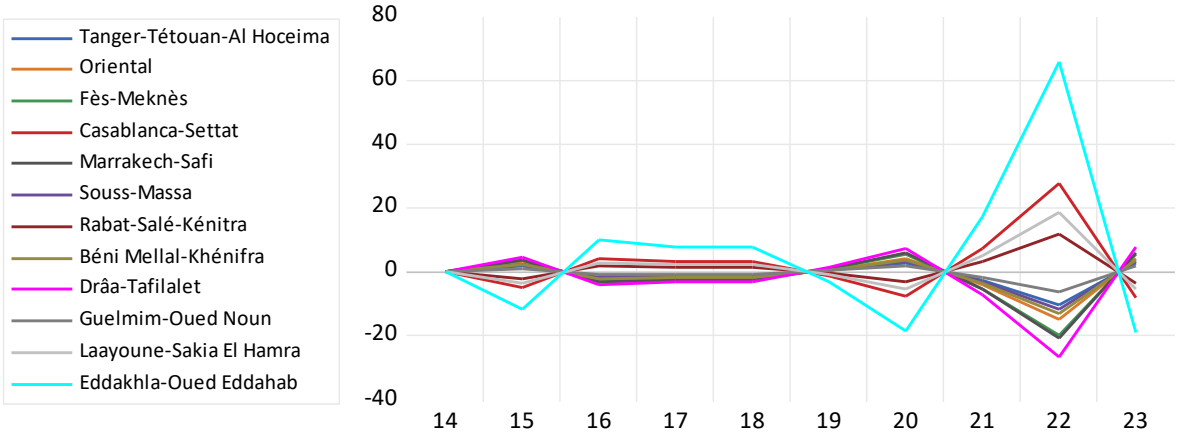
Figure 4 : The evolution of national trade openness between 2014-2023



Source: Author's calculations using Excel

The TradeExp variable (Fig. 5) seems to be oscillating around a mean and median near zero. At the top of this list, are regions like Tanger-Tétouan-Al Hoceima and Casablanca-Settat. This is expected seeing as these regions are home to the country's major ports, giving them immense exposure through both goods and services trade. Following closely are regions like Rabat-Salé-Kénitra and Souss-Massa, the latter being deeply tied to the global agro-industry. Other regions like Fès-Meknès, Oriental, Béni Mellal-Khénifra, and Marrakech-Safi, have more moderate and mixed exposure, whose exposure is likely mostly driven by services trade. At the bottom, is Drâa-Tafilalet. As a vast, landlocked region focused on oasis agriculture and tourism, its physical and economic distance from ports and major industrial centers minimizes its direct integration into international trade flows. Its economy is primarily oriented toward domestic markets and internal tourism. In summary, the level of regional trade exposure decreases as one moves southward and inland, highlighting a core-periphery dynamic within the Moroccan economy where a few powerful coastal regions act as the primary conduits for global exchange.

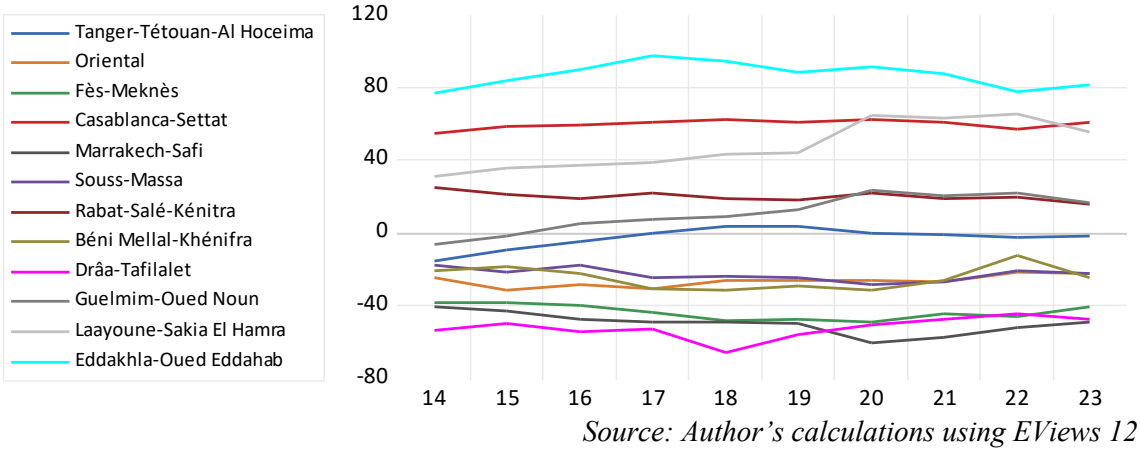
Figure 5 : The evolution of regional trade exposure between 2014-2023



Source: Author's calculations using EViews 12

Fig. 6 further illustrates the core-periphery dynamic within Morocco. Casablanca-Settat and Rabat-Salé-Kénitra are among the top performing regions in terms of regional GDPpc. As the financial, industrial, and administrative capitals, they concentrate high-value economic activities, pulling the national average upwards. Alongside them Laayoune-Sakia El Hamra and Eddakhla-Oued Eddahab. The presence of these southern regions among the top performers is not surprising, as they have lower population density and benefit from significant government investments and subsidies. Tanger-Tétouan-Al Hoceima, despite being a trade powerhouse due to Tanger Med, seems to perform below the national average. This could be due to uneven distribution of wealth, high in-migration, or a large informal sector that suppresses average income figures. The most disadvantaged regions appear to be the inland and geographically isolated ones, such as Drâa-Tafilalet, Fès-Meknès, and Oriental and Béni Mellal-Khénifra. Their economies, reliant on vulnerable agriculture and tourism, struggle to generate GDP per capita that meets the national standard. This ordering maps out a national geography where economic participation and output are heavily concentrated in the Atlantic coastal axis, leaving the northern and interior regions in a state of economic catch-up.

Figure 6: The evolution of regional Gap between 2014-2023



Source: Author's calculations using EViews 12

b. Unit Root Test

Panel unit root tests with short time dimensions (T=10) have notoriously low power and often yield contradictory results. Our tests confirm this (Tab. 2). TradeExp is stationary at level, as all three tests (LLC, ADF, and PP) reject the null hypothesis of a unit root at the 1% significance level ($p < 0.01$). For Gap, results are mixed. The LLC and PP tests reject the null at the 1% level, whereas the ADF test does not. However, given the strong evidence from LLC and PP,

the variable can be considered stationary in levels. This result is mirrored at first difference. The stationarity of Gap implies that regional disparities are not permanent but rather fluctuate around a long-term equilibrium, which is a positive sign for regional convergence policies in Morocco.

Table 2 : Unit Root Tests

Variables	Levels						1st difference					
	LLC[3]		ADF[4]		PP[5]		LLC		ADF		PP	
	t-stat	p-value	t-stat	p-value	t-stat	p-value	t-stat	p-value	t-stat	p-value	t-stat	p-value
TradeExp	-17.0621	0.0000	128.162	0.0000	76.5549	0.0000	-	-	-	-	-	-
Gap	-2.32452	0.0100	25.1532	0.3975	42.7238	0.0107	-1.58029	0.0570	29.0183	0.2194	77.7163	0.0000

Source: Author's calculations using EViews 12 Version

Since both variables are stationary in levels, the model can be estimated in levels without differencing or cointegration adjustments. The model is estimated using both fixed-effects and random-effects specifications, with the choice guided by the Hausman test.

To ensure robust inference, standard errors are adjusted for heteroskedasticity and serial correlation using Panel-Corrected Standard Errors (PCSE) with a Period SUR covariance structure. The use of PCSE is confirmed by diagnostic checks, which confirm significant cross-sectional dependence in the regional data (See Table A in Appendix). This method provides inference robust to cross-sectional dependence, heteroskedasticity, and serial correlation. While more advanced estimators (e.g., Driscoll-Kraay) would be preferable, they were unavailable in our software package. The findings should therefore be interpreted as robust descriptive evidence.

Table 3 : Estimation results

Variable	FE Model	RE Model
TradeExp	-0.055 (0.061) [0.371]	-0.031 (0.063) [0.623]
Constant	0.241 (0.000) [0.000]	0.241 (13.365) [0.986]
Model statistics		
R-squared	0.982	0.001
Adjusted R-squared	0.978	-0.007
F-statistic	250.286	0.116
Prob(F-statistic)	0.000	0.734
Durbin-Watson stat	0.643297	0.311715
Observations	120	120

Notes: Standard errors in parentheses, p-values in brackets. The FE model includes both cross-section (region) fixed effects (11 dummies) and period (year) fixed effects. The RE model includes neither, explaining the dramatic difference in R^2. Both models use Period SUR (PCSE) to address cross-sectional dependence.

The regression results reveal that there is no statistically significant contemporaneous relationship between trade exposure and regional economic disparities in Morocco. The coefficient for TradeExp is $\beta = -0.055$ ($p = 0.371$), indicating that changes in trade exposure do

[3] Levin, Lin & Chu test
[4] Augmented Dickey–Fuller test
[5] Phillips-Perron test

not systematically predict same-year changes in regional GDP per capita gaps, after controlling for region and year fixed effects. The model achieves an R^2 of 0.982, indicating that region and year fixed effects jointly explain 98% of the variation in regional GDP per capita gaps. This decomposition reveals that the drivers of regional inequality operate primarily through two channels. First, structural factors captured by region fixed effects create massive differences through time-invariant regional characteristics. The most advantaged region, Dakhla-Oued Eddahab (αr = +86.95), exceeds the least advantaged, Drâa-Tafilalet (αr = -52.57), by 140 percentage points. These fixed effects capture geography, colonial legacy, baseline infrastructure, and entrenched industrial structures that define each region's economic position. Second, common temporal shocks captured by year fixed effects represent nationwide events affecting all regions simultaneously, including macroeconomic conditions, national policy changes, and the visible 2020 COVID-19 impact shown in Figure 1.

In light of these findings, the contemporaneous trade exposure variable explains virtually none of the residual variation. This strongly suggests that regional inequality in Morocco is deeply embedded in time-invariant characteristics rather than being responsive to short-term changes in trade integration. The overwhelming explanatory power of fixed effects indicates that the spatial hierarchy is remarkably rigid, with current economic positions largely predetermined by historical and geographical factors that evolved over decades or centuries.

The low Durbin-Watson statistic of 0.64 signals positive autocorrelation in the residuals, implying that a region's GDP gap in one year is positively correlated with its gap in the previous year. This persistence indicates that economic advantages and disadvantages are sticky and path-dependent. Regional economic positions do not fluctuate randomly but rather exhibit strong inertia over time, with shocks having lasting effects that compound over multiple periods. While our Panel-Corrected Standard Errors are designed to produce valid inference despite this autocorrelation, the persistence itself is a substantive finding pointing to self-reinforcing regional dynamics where initial conditions create trajectories that are difficult to alter.

We also estimated a random-effects (RE) model for comparison. The Hausman test ($\chi^2 = 2.198$, $p = 0.14$) fails to reject the null hypothesis of RE consistency. However, the dramatic difference in explanatory power, with R^2 of 0.982 for FE versus 0.001 for RE, demonstrates that region-specific characteristics dominate the variation in gaps. While the Hausman test suggests these characteristics may not be systematically correlated with trade exposure, which would allow RE to be consistent, their overwhelming economic importance makes FE the theoretically appropriate specification for our research question. The FE model explicitly quantifies the structural factors central to understanding regional inequality, whereas the RE model treats them as unexplained random variation. We therefore focus on FE results, with RE reported for completeness and transparency.

Table 4 : Hausman test results

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	2.198	1	0.1382

Source: Author's calculations using EViews 12

The central takeaway from this analysis is that profound economic inequalities between Moroccan regions are driven primarily by structural, time-persistent factors intrinsic to each region, alongside common national shocks that affect all regions simultaneously. The contemporaneous effect of trade exposure, as measured through our index, is statistically indistinguishable from zero. This does not necessarily mean trade is irrelevant to regional

outcomes, but rather that any effects are not detectable through contemporaneous changes in our measure. This absence of immediate effects could reflect several possibilities: adjustment lags where trade impacts materialize with delay, measurement limitations in our proxy that uses initial GDP to capture trade exposure, or genuine absence of immediate trade-gap relationships where trade affects regions uniformly in the short term.

c. Robustness checks

To ensure the robustness of our main findings, we conducted several additional tests. We re-estimated the FE model while excluding Dakhla-Oued Eddahab, which exhibits extreme economic characteristics ($\alpha r = +86.95$, the highest fixed effect by far). The contemporaneous trade exposure coefficient changes to $\beta = 0.023$ ($p = 0.810$), remaining statistically insignificant but shifting from slightly negative to slightly positive. This sign reversal suggests the contemporaneous relationship is not robust and is sensitive to the inclusion of this outlier region. Dakhla's unique characteristics, including low population density, significant state subsidies, and resource-based economy, make it influential. The lack of a stable, robust contemporaneous relationship across specifications reinforces our conclusion that immediate trade effects are not systematically detectable in our data.

A key extension tests whether trade effects manifest with a delay. Using one-period lagged trade exposure (TradeExpt-1) on the full dataset, the coefficient becomes statistically significant and negative: $\beta = -0.096$ ($p = 0.008$). This indicates that trade shocks affect regional gaps with a one-year lag, suggesting that the adjustment mechanisms through which trade influences regional economic positions operate gradually rather than instantaneously.

The significant lagged effect, contrasted with the insignificant contemporaneous effect, reveals an important temporal pattern in how regional economies respond to trade shocks. This temporal structure suggests that regional economies do not instantly adjust to changes in trade openness. Instead, changes in production patterns, factor reallocation, or infrastructure utilization require time to manifest in measured GDP gaps. The delay may reflect the time needed for firms to enter or exit markets, for workers to acquire new skills or migrate between regions, or for existing infrastructure to be repurposed toward trade-oriented activities. Additionally, the negative sign of the lagged coefficient indicates that initially more developed regions experience smaller increases in their relative advantage, or equivalently larger decreases, following trade expansions. This is consistent with some degree of catch-up dynamics, where trade shocks create opportunities that are differentially exploited across regions in ways that moderately favor convergence, though the underlying mechanism requires careful interpretation given the measurement constraints we face.

While statistically significant, the lagged effect remains economically modest relative to the structural disparities documented earlier. A one-standard-deviation increase in lagged trade exposure, approximately 0.5 units, is associated with a 0.048 percentage point reduction in regional gaps (0.5×-0.096). To contextualize this magnitude, we note that the structural range between regions spans 140 percentage points, from Drâa-Tafilalet at -52.57 to Dakhla-Oued Eddahab at +86.95. Moreover, trade openness changed by roughly 22 percentage points over the study period, rising from 71.89% in 2014 to 93.79% by the end of the study period.

Even accounting for the lagged effect, cumulative trade changes over the entire decade explain only a small fraction of observed regional inequality. The lagged effect provides evidence that trade does influence regional gaps through heterogeneous impacts that differ between initially richer and poorer regions, but the magnitude is modest relative to the overwhelming structural persistence captured by fixed effects. This finding suggests that while trade operates as a

convergence force at the margins, its effects are too small and too slow to fundamentally reshape Morocco's regional hierarchy without complementary policy interventions.

d. Discussion

The extracted region fixed effects (Table C) reveal profound structural inequalities in Morocco's economic geography. Coastal, historically advantaged regions like Dakhla-Oued Eddahab (+86.95) and Casablanca-Settat (+59.67) enjoy massive advantages, while interior regions like Drâa-Tafilalet (-52.57) and Marrakech-Safi (-50.17) face persistent disadvantages spanning 140 percentage points. These time-invariant factors (i.e. geography, colonial legacy, infrastructure, industrial path dependencies) explain 98% of variation in regional gaps, demonstrating that Morocco's regional inequality is fundamentally structural.

Against this structural dominance, trade's role is secondary and temporally complex. Contemporaneous trade exposure shows no significant relationship with regional gaps (β = -0.055, p = 0.37), suggesting immediate effects are either absent or undetectable with our measurement approach. This could reflect genuine absence of instantaneous effects, limitations in our proxy measure, or offsetting positive and negative channels. However, the one-period lagged coefficient is statistically significant and negative (β = -0.096, p = 0.008), indicating trade shocks manifest with a one-year delay. This temporal pattern reveals that regional adjustment mechanisms (i.e. factor reallocation, production restructuring, infrastructure utilization) require time to translate trade changes into observable gap changes.

While statistically robust, the lagged effect remains economically modest. A one-standard-deviation trade shock reduces gaps by only 0.048 percentage points, trivial compared to the 140-point structural range. Morocco's trade openness increased approximately 22 percentage points from 71.89% in 2014 to 93.79% by the end of the study period. Even if this entire increase manifested through the lagged channel, cumulative effects would remain small relative to entrenched structural hierarchies. Trade's effect, while detectable with a lag, is faint against the overwhelming noise of structural persistence.

Our trade exposure index tests whether initially richer regions respond differently to national trade shocks. The negative lagged coefficient indicates that when trade expands, initially more developed regions experience smaller increases in relative advantage, consistent with catch-up dynamics. This could be due to the possibility that developed regions may have exhausted trade-driven growth opportunities, reaching saturation where additional openness yields diminishing returns. Alternatively, trade benefits may gradually spread to less-developed regions through supply chains, factor mobility, or knowledge spillovers. Developed regions might also face greater import competition while less-developed regions find new export opportunities.

This finding refines New Economic Geography predictions for Morocco. While standard NEG emphasizes agglomeration and cumulative advantage through home market effects, our results reveal mild heterogeneous effects that favor gradual catch-up rather than rapid divergence. These operate slowly and are overshadowed by structural persistence: NEG's core–periphery dynamics emerge, but only as delayed and economically modest adjustments rather than disruptive reorganizations of space. The absence of contemporaneous effects alongside significant lagged ones indicates that regional production structures, labor markets, and infrastructure adjust only gradually to trade policy changes as firms reallocate, workers migrate or retrain, and infrastructure evolves. The one-year lag likely captures only the beginning of longer dynamic processes beyond our panel's horizon. These findings nuance NEG theory by showing that trade's reorganizing power depends critically on structural context. In Morocco, initial advantages created enduring path dependencies that mute trade's short-term impact. The spatial economy exhibits strong inertia, responsive at the margins yet fundamentally shaped by

historical and geographical asymmetries. The dominance of fixed effects provides quantitative evidence of a deeply entrenched regional hierarchy, consistent with the "two-speed Morocco" narrative where coastal regions retain historical advantages and interior regions remain peripheral. National trade liberalization alone cannot offset these forces, effective strategies must be explicitly place-based, targeting the structural foundations of lagging regions rather than assuming market mechanisms will diffuse growth.

5. Conclusion

This study demonstrates that regional economic disparities in Morocco are fundamentally structural and persistent. Regional fixed effects capturing 98% of variation in GDP per capita gaps show that economic position is primarily determined by deep-seated, time-invariant characteristics (i.e. geographical endowment, colonial legacy, foundational infrastructure, and entrenched industrial structures). These create a rigid hierarchy where coastal regions like Casablanca-Settat and Dakhla-Oued Eddahab vastly outperform interior regions like Drâa-Tafilalet and Marrakech-Safi, with gaps spanning 140 percentage points.

Trade's role is secondary and temporally complex. Contemporaneous trade exposure shows no significant association with regional gaps (β = -0.055, p = 0.37), but lagged exposure demonstrates statistically significant effects (β = -0.096, p = 0.008). Trade shocks influence regional gaps gradually with one-year lags, and effects are heterogeneous, initially more developed regions see smaller increases in relative advantage during trade expansions, suggesting mild catch-up dynamics. However, economic magnitude remains modest: one-standard-deviation trade shocks reduce gaps by only 0.048 percentage points, trivial compared to 140-point structural divides. Regional economic standing is thus rooted fundamentally in time-persistent attributes, with trade playing a secondary, temporally-delayed role as a gradual adjuster overwhelmed by structural persistence.

These findings carry two contributions. Empirically, the regional trade exposure index developed here captures how national trade shocks translate differently across regions depending on initial development levels, a methodological approach applicable beyond the Moroccan case. Theoretically, the results qualify NEG predictions by showing that structural persistence can suppress and delay trade's spatial effects, suggesting that the conditions under which trade drives convergence or divergence deserve greater attention in future work. These results also extend New Economic Geography theory more broadly. While NEG's core-periphery logic operates in Morocco, effects are delayed and modest, acting as gradual adjusters rather than transformative forces. In contexts of entrenched spatial inequality, historical advantages create powerful path dependencies that mute trade's immediate impact, challenging implicit assumptions in some NEG models that falling trade costs automatically trigger significant spatial reorganization. Structural inertia can be so powerful that trade's effects, while detectable, remain economically small relative to the fundamental forces maintaining spatial hierarchies. NEG predictions should therefore be conditioned on the strength of structural factors when applied to contexts of severe and persistent regional inequality.

These findings also have direct implications for policy. Effective intervention requires pairing trade policy with transformative, place-based policies directly targeting the structural fundamentals that lock regions into disadvantaged positions. This means, first, strategic infrastructure investments linking peripheral areas to national and international markets, including the Nador West Med port in Oriental, dry ports in Béni Mellal-Khénifra, and improved road and rail connections to landlocked regions. Second, sector-specific industrial strategies that leverage regional comparative advantages rather than imposing uniform models: Drâa-Tafilalet's solar potential, Souss-Massa's agro-processing capabilities, and underserved

regions' tourism assets all represent underexploited anchors for local development. Third, place-based human capital development, with education and training systems aligned with regional economic structures and potential growth sectors.

This study faces several limitations. The short ten-year panel limits the detection of long-term dynamics, the testing of structural breaks, and the inclusion of region-specific trends capturing diverging trajectories independent of trade. Limited time variation makes it difficult to distinguish trends from fixed effects plus common shocks. The absence of regional-level control variables means estimates reflect descriptive correlations rather than definitive causal effects, and omitted factors correlated with both trade exposure and regional gaps might bias estimates, though fixed effects mitigate time-invariant confounder concerns. Additionally, our trade exposure measure using initial GDP per capita as a proxy for trade integration is imperfect, actual regional trade flows, sectoral employment shares weighted by trade intensity, or geographic proximity to ports would provide more direct measures and stronger identification. Future research would benefit from longer time series and granular regional data on infrastructure quality, human capital stocks, sectoral composition, institutional quality, and direct regional trade exposure. Comparative analysis across North African countries facing similar structural challenges could further illuminate whether Morocco's experience represents broader patterns in contexts of severe spatial inequality.

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Appendices

Table A: Cross-section dependence test results

Test	Statistic	d.f.	Probability
Breusch-Pagan LM	186.2262	66	0.0000
Pesaran scaled LM	10.46435	-	0.0000
Bias-corrected scaled LM	9.797681	-	0.0000
Pesaran CD	-1.702043	-	0.0887

Source: Author's calculations using EViews 12

Table B: Robustness checks

Variable	Model 1	Model 2
TradeExp	0.023 (0.096) [0.810]	-
TradeExp (-1)	-	-0.096 (0.028) [0.008]
Constant	-7.623 (0.049) [0.000]	-
Model Statistics		
R-squared	0.975	0.985
Adjusted R-squared	0.970	0.982
F-statistic	174.820	291.758

Prob(F-statistic)	0.000	0.000
Durbin-Watson stat	0.652	0.849
Observations	110	120

Notes: Standard errors in parentheses ( ). p-values in brackets [ ]. Both models include cross-section and period fixed effects. Model 1 excludes Eddakhla-Oued Eddahab region due to extreme economic characteristics. Model 2 uses full sample with one-period lagged trade exposure. Constant not reported for Model 2 as it is subsumed by the fixed effects structure.

Table C: Extracted region fixed effects

Region	Fixed Effect	Economic Status
Tanger-Tétouan-Al Hoceima	-2.982676	Near Average
Oriental	-26.87609	Structural Disadvantage
Fès-Meknès	-43.87624	Severe Disadvantage
Casablanca-Settat	59.67129	Major Advantage
Marrakech-Safi	-50.17440	Severe Disadvantage
Souss-Massa	-23.22367	Structural Disadvantage
Rabat-Salé-Kénitra	19.86974	Moderate Advantage
Béni Mellal-Khénifra	-25.07689	Structural Disadvantage
Drâa-Tafilalet	-52.56722	Extreme Disadvantage
Guelmim-Oued Noun	10.59432	Moderate Advantage
Laayoune-Sakia El Hamra	47.69581	Strong Advantage
Eddakhla-Oued Eddahab	86.94602	Extreme Advantage
Range: 139.51 points (from -52.57 to +86.95)		
Mean Absolute Effect: 38.74 points		
Advantaged Regions (Positive): 4 regions		
Disadvantaged Regions (Negative): 8 regions		