Theoretical and Applied Economics
Volume XXXI (2024), No. 2(639), Summer, pp. 215-242

What drives Tunisian economic growth: urbanization or rural development?

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Abstract. *A nation's economic growth plays a pivotal role in determining its level of national economic integration and participation in global value chains. This research investigates the impact of urbanization and ruralization on economic growth in the case of Tunisia, utilizing annual data spanning from 1965 to 2019. The findings, derived from the estimation of an autoregressive distributed lag model and an error correction model, reveal a negative correlation between urbanization and Tunisian economic growth. Conversely, ruralization is found to have a positive impact, suggesting that Tunisia may not have reached a stage of urban saturation. The study implies that urbanization, without concurrent industrialization, has encountered limitations. Consequently, Tunisia, having developed without due industrial progress, is no longer perceived as a privileged locale but at times faces exclusion. In addressing the urban crisis, 'urban exodus' becomes, at times, the sole response.*

Keywords: Tunisian economic growth, urbanization, ruralization, ARDL, ECM.

JEL Classification: R01, R03, O44, 047, O55.

1. Introduction

While the historical interaction between urbanization, ruralization, and economic growth is well-acknowledged in developed countries, the dynamics of these phenomena in developing nations exhibit distinct characteristics. In the case of developing countries, a significant historical milestone was marked by the urban explosion following World War II and decolonization movements. This period witnessed a transformative urbanization phenomenon, encompassing the development and expansion of cities and urbanized areas. Urbanization involved not only an increase in the number and size of cities along with their populations but also brought about changes in rural areas. These changes manifested through the adoption of urban behaviors, cultural methods, references, and values. The relationship between urbanization, ruralization, and economic growth in developing countries is intricate and extends over different time periods, with the overarching goal of achieving sustainable economic development through inconspicuous interventions. The term "third worlds," once associated with the 1980s, has evolved, emphasizing the diverse paths taken by developing countries. Notably, ruralization and urbanization are nuanced concepts that carry ideological presuppositions when employed in discourse. Within the context of this article, a central question emerges: What impact do urbanization and ruralization have on Tunisian economic growth? The exploration of this question delves into understanding whether these two phenomena exert similar effects or differ in their influence on economic growth. It underscores the complexity of the relationship, prompting an examination of how urbanization and ruralization dynamics intersect with the economic trajectory in the Tunisian context. In essence, the article seeks to unravel the distinct roles and effects of these phenomena in shaping the economic landscape of Tunisia, contributing to a deeper understanding of the development processes in developing nations.

Urbanization, as a historical movement, is a societal transformation characterized by a notable increase in city population relative to the overall population. It represents the process of city development and population concentration, with spatial-temporal dynamics varying across countries and cities. The surge in urbanization is driven by a confluence of historical, political, social, and cultural factors. Mass migration from rural areas, coupled with the evolution toward an industry and service-oriented society, positions urban centers as primary sources of wage employment. Despite challenges like rising rents and land prices, the cultural and political allure of cities, especially capitals, attracts new residents, fostering continuous urban growth. Economic pressures fuel construction intensification and the utilization of subterranean spaces. Political decisions, particularly in land use planning, significantly shape urbanization. Local plans, urban planners, and sustainable development projects are crucial tools, enabling communities to implement policies steering urban growth. Urban planning techniques guide long-term spatial occupation, while elected officials and technicians navigate contradictory pressures from diverse

stakeholders. Tourist attraction in sunny or coastal areas further contributes to urbanization, leading to the development of densely populated structures. This phenomenon is encapsulated by terms like urban sprawl or coastal formation, representing the gradual occupation of valleys and coastal regions. The multifaceted nature of urbanization, influenced by economic, political, and cultural forces, requires a comprehensive understanding. The interplay of these factors shapes the trajectory of urban growth, and addressing the challenges posed by urbanization demands a holistic approach involving strategic urban planning, sustainable development initiatives, and adept governance.

The challenge of rural population decline poses concerns for both local inhabitants and policymakers alike. The implications of this trend extend beyond demographic shifts, reaching into the realms of service provision, infrastructure development, and economic sustainability. With fewer people populating rural areas, the provision and maintenance of essential services such as public transport and healthcare become threatened. Additionally, the economic viability of developing infrastructure for crucial services like broadband is compromised, leading to the creation of a digital divide between rural and urban areas. The downward trajectory of rural populations also exacerbates age disparities, as older demographics dominate, and younger populations dwindle. This demographic shift, coupled with limited opportunities for work and education, contributes to the perception of rural areas as unattractive and impractical options for the younger generation. The aging profile of farmers, particularly as they approach retirement, further compounds the challenges faced by rural communities. Entering agriculture, a traditional occupation in rural areas, is beset with challenges for the youth. The unattractiveness of farming compared to higher-paying jobs, coupled with the high cost of farmland, poses significant barriers. Family farming, a potential avenue for entry, faces challenges in many developing countries due to persistent inheritance and succession problems. Despite these challenges, rural areas possess inherent qualities that can attract newcomers, including lower house prices, a clean environment, and a close connection with nature. This appeal is particularly evident in scenic rural areas or those in close proximity to urban centers, making them attractive to urban travelers and seasonal residents seeking a second home or a higher quality of life. However, this influx of newcomers brings its own set of challenges and controversies. The less interconnected nature of rural communities can erode social bonds, and in areas with scarce housing, it can strain the viability of life for existing residents. For entrepreneurs, while living in rural areas has its benefits, conducting business can be challenging due to barriers such as limited access to highly qualified personnel and the importance of networks for business success. Digital connectivity is identified as a potential solution to some of these challenges. However, the quality of broadband in rural areas can be a limiting factor, hindering the full realization of the benefits that digital connectivity can bring to rural economies and communities. In navigating these complexities,

policymakers and communities must seek innovative solutions to revitalize rural areas, making them not only attractive but also economically sustainable and socially vibrant.

In 2018, Tunisia experienced a modest increase in economic growth, rising to 2.5% from the previous year's 2%. This growth was attributed to positive contributions from the agricultural and service sectors, with a notable rebound in tourism. Mechanical and electrical industries also played a role in bolstering economic activity. On the application side, growth was further stimulated by increases in both exports and investment. The World Bank's projections align with this upward trajectory, envisioning an average growth rate of 3% in 2020. Looking ahead to the medium term, there is potential for even stronger growth, reaching around 4%. However, the realization of this growth potential hinges on the implementation of reforms aimed at enhancing the investment atmosphere. Paramount among these reform objectives is the improvement of security and the attainment of social stability, critical factors that underpin a conducive environment for sustained economic development. As private consumption is considered a driving force in this economic landscape, fostering an environment conducive to increased investment becomes imperative. The World Bank's optimistic outlook underscores the significance of ongoing reforms in shaping Tunisia's economic future, emphasizing the need for sustained efforts to fortify the foundations of security and social stability.

This study endeavors to scrutinize the trajectory of Tunisian economic growth spanning the years 1965 to 2019, with a specific focus on two interrelated dimensions: (1) the nexus between economic urbanization and growth, and (2) the connection between overall economic growth and its determinants. The objective extends beyond mere examination, emphasizing a deeper exploration of the consequential impact of these relationships. The study aims to contribute not only by testing these linkages but also by elucidating their implications. To achieve this, the methodology unfolds in two primary stages. First and foremost, a meticulous review of a spectrum of scholarly works is undertaken. The selection of these works is not solely based on their prominence in contemporary literature but is guided by the tangible ramifications they carry for the formulation of policies and strategies pertaining to the spatial dimension of economic growth. This critical reading forms the basis for shaping insights that transcend theoretical realms, informing practical considerations crucial for policy development and strategic planning. Subsequently, the study employs two econometric models—the Autoregressive Distributed Lag (ARDL) model and the Error Correction (EC) model. These models serve as analytical tools to systematically address the research problem and offer empirical insights. The ARDL model enables a dynamic assessment of the relationships between economic urbanization, growth, and their impact over time. Simultaneously, the EC model aids in comprehending the short-term deviations from long-term equilibrium, contributing to a nuanced understanding of the economic dynamics under investigation. Through this multifaceted approach, the study

aspires to not only unravel the intricate links between economic urbanization and growth but also to shed light on the broader determinants influencing Tunisia's economic growth trajectory. By merging theoretical insights with empirical analysis, the study seeks to provide actionable knowledge that can inform policymakers and strategists in crafting spatially informed policies conducive to sustainable economic growth.

2. Literature Survey

In this section, our exploration centers on identifying and analyzing studies that have delved into the intricate connections between urbanization and economic growth, as well as the interplay between ruralization and economic growth. It is worth noting that the existing literature on these specific relationships may be limited. Consequently, to bridge this gap, we will draw inspiration from studies that investigate the impact of the agricultural sector and the industrial sector on economic growth. By doing so, we aim to glean insights that closely approximate the dynamics of our case study. The quest for relevant studies involves a comprehensive review of scholarly works that have tackled the intricate relationship between urbanization and economic growth. We seek to unearth insights into how the process of urbanization, characterized by the concentration and development of cities, correlates with and influences economic growth. Similarly, the examination of studies exploring the link between ruralization—essentially the opposite of urbanization—and economic growth is undertaken. Here, we aim to discern patterns and dynamics in regions experiencing a shift towards more rural landscapes and their economic implications. Given the potential scarcity of direct studies on urbanization and ruralization, we broaden our scope to include research that investigates the impacts of the agricultural and industrial sectors on economic growth. Agriculture and industry often serve as pivotal components in the economic landscape, and understanding their effects on growth can provide valuable insights. Through this literature review, we aspire to synthesize relevant findings and methodologies from analogous studies. By drawing parallels between these related realms, we aim to develop a conceptual framework that aligns with the specific context of our case study. This approach allows us to glean insights that may be applicable and insightful, even in the absence of a direct body of literature on urbanization and ruralization in the context of economic growth.

2.1. Urbanization and economic growth

Urbanization represents a historical societal transformation characterized by the shift in the forms of society. It is essentially defined as the increase in the urban population in relation to the total population. This process involves the development and concentration of populations within cities, shaping the spatial-temporal dynamics of urbanization that vary across different countries and cities. While large cities stand as symbols of economic and

cultural vitality, they also grapple with a myriad of environmental and ecological challenges associated with urbanization. These challenges encompass issues such as inadequate housing quality, pollution, rising crime rates, and infrastructural overload. The complex interplay of these factors underscores the multifaceted nature of urbanization's impact on the urban environment. However, amid the challenges, urbanization unfolds as a dynamic force that offers extensive opportunities for economic advancement, institutional innovation, and cultural development. Cities become hubs of creativity, diversity, and progress, serving as crucibles for the convergence of ideas and the incubation of innovation. The potential for economic growth and cultural enrichment is inherently linked to the process of urbanization, making it a pivotal aspect of societal evolution. The phenomenon of urbanization is a nuanced and multifaceted process that not only shapes the physical landscape but also profoundly influences the economic, social, and cultural fabric of society. Recognizing both the challenges and opportunities that urbanization presents is essential for fostering sustainable development and creating thriving urban environments.

According to Henderson (2003), there exists a close relationship between the level of urbanization and economic growth. The prevailing belief is that economic growth is intricately linked to the advancement of modern industry and the expansion of urban populations. This perspective suggests that not only does economic growth facilitate the development of contemporary industries, but urbanization itself becomes a catalyst for further economic advancement. The symbiotic relationship outlined by Henderson (2003) implies a reciprocal causation: as economies grow, modern industries flourish, leading to increased urbanization. Simultaneously, the process of urbanization becomes a driving force behind economic growth. This interdependence underscores the dynamic nature of urbanization as both a consequence and a contributor to the economic development of a region. In this context, the growth of urban populations is seen as an integral component of the broader economic landscape. As urban areas expand, they become hubs of economic activity, innovation, and cultural exchange, fostering an environment conducive to sustained economic growth. Henderson's (2003) perspective aligns with the notion that urbanization and economic growth are mutually reinforcing phenomena. The expansion of urban centers not only reflects economic development but actively propels it forward. This understanding underscores the significance of urbanization in shaping the trajectory of economic growth in contemporary societies.

In the opinion of Friedmann (2006), the period of active urbanization in developing countries has been accompanied by a concerted effort to implement policies aimed at fostering economic growth. This perspective underscores the recognition that urbanization and economic development are intricately linked, and policymakers in developing countries have actively pursued strategies to leverage urbanization for economic advancement. Friedmann's (2006) viewpoint acknowledges the rapid pace of change in

global urbanization trends, particularly over the past three decades. The rate of urbanization has accelerated, surpassing historical benchmarks. Additionally, there has been a notable shift in the focus of the urbanization process, transitioning from being predominantly concentrated in developed countries to a more pronounced emphasis on developing countries. This shift in focus suggests that the dynamics of urbanization are evolving, and developing countries are now at the forefront of the urbanization phenomenon. This shift is significant not only in terms of demographic changes but also in the context of economic opportunities and challenges that arise with urbanization. Friedmann's (2006) perspective highlights the transformative nature of urbanization and its role as a key driver of economic growth, especially in the context of developing nations. It emphasizes the need for responsive and strategic policies to harness the economic potential associated with the ongoing urbanization trends.

Cuberes (2009) posits that urbanization plays a pivotal role in demographic change, with more urbanized countries often experiencing an earlier demographic transition. Notably, economies that underwent an early demographic transition, occurring before 1950, are observed to be much wealthier than those that lagged behind. This suggests that, in the early stages of the growth process, urbanization may be more influential than income. However, Bloom et al. (2008) present contrasting findings, indicating no clear evidence that the degree of urbanization directly influences the rate of economic growth. This challenges the conventional wisdom regarding the role of urbanization in economic development. In contrast, Abdel-Rahaman et al. (2006) argue, based on cross-sectional and chronological analyses, that while urbanization is an inevitable byproduct of economic development, the optimal urbanization process occurs when it is controlled and gradual. Their research suggests a nuanced perspective, indicating that the relationship between urbanization and economic growth is complex. Historical series and cross-sectional analyses reveal a negative relationship between urbanization and urban primacy, as well as economic growth. However, a more detailed cross-sectional analysis reveals that all industrialized countries exhibit high levels of urbanization. The apparent dichotomy arises from the understanding that while urbanization is an inherent outcome of economic growth, the pace and nature of urbanization also hold significant importance.

Lewis (2014) conducted a comprehensive examination of the relationship between urbanization and economic growth in Indonesia. Utilizing both time series data spanning from 1960 to 2009 and panel data from diverse regions within Indonesia, the research sought to unravel the dynamics of this nexus. The findings of the study indicate a positive correlation between urbanization and economic growth, implying that as urbanization levels increase, there is a corresponding positive impact on economic growth. However, an intriguing aspect emerges from the results—while overall urbanization positively correlates with economic growth, the rate of change in urbanization has a negative impact on

economic growth. This nuanced insight suggests that the pace at which urbanization occurs can influence its relationship with economic growth, highlighting the importance of considering not just the level of urbanization but also its rate of change. Similarly, Bao and He (2015) conducted an analysis using data from 31 Chinese provinces spanning the period from 1997 to 2013, employing a vector error correction Granger causality model. Their findings revealed a nuanced relationship between urbanization and economic growth across the provinces. In the majority of provinces, no significant relationship between urbanization and economic growth was observed. However, in two provinces, bidirectional causality was identified, indicating a reciprocal relationship between urbanization and economic growth. Additionally, in six provinces, unidirectional causality was found from urbanization to economic growth, suggesting that urbanization influences economic growth. Conversely, in four provinces, unidirectional causality was detected from economic growth to urbanization, indicating that economic growth drives urbanization in these regions. These varied patterns underscore the complexity and regional specificity of the urbanization-economic growth relationship in the Chinese context.

Arouri et al. (2014) conducted a study to investigate the impact of urbanization on economic growth in Africa. Employing dynamic panel regression with African data, their regression estimation results reveal that the level of urbanization has experienced a significant increase of about 73%. However, the study notes that after reaching a high level of urbanization, there is an association with a decline in per capita GDP. This suggests a non-linear relationship, emphasizing the need for nuanced policies that consider the stage of urbanization. Leitão (2013) explored the relationship between urban accumulation and economic growth across various regions, including Europe, the United States, Japan, New Zealand, and Mexico, during the period 1990 to 2008. Empirical findings indicate a positive association, with urban accumulation being conducive to economic growth. Specifically, a 1% growth in urban accumulation corresponds to a notable 3.19% growth in per capita GDP. This underscores the potential positive impact of urbanization on economic development. Zi (2017) conducted a study employing time series data spanning from 1982 to 2014 for China and utilized a VAR (Vector Autoregressive) model. The findings of the research revealed a long-run unidirectional causality, indicating that land urbanization significantly influenced economic growth in the specified period. This suggests that changes and developments in land urbanization patterns played a consequential role in shaping the long-term trajectory of economic growth in China.

Liddle and Messinis (2015) conducted a comprehensive study utilizing heterogeneous panel causality tests across 100 countries from 1960 to 2009. Their findings revealed distinct patterns based on income levels: in higher income countries, urbanization was found to cause economic growth, establishing a unidirectional causality; middle-income and Latin American countries showed no discernible causality between urbanization and

economic growth; and for low-income countries, especially in Africa, a reciprocal and equilibrium relationship was identified, indicating a bi-directional causality between urbanization and economic growth. This underscores the nuanced and context-dependent nature of the relationship, emphasizing the need to consider income levels and regional contexts in understanding the dynamics between urbanization and economic growth. The findings of Song et al. (2018) align with the notion of a causal relationship from urbanization to economic growth. Their study, focusing on China and utilizing data from 2005 to 2010 alongside input-output analysis, estimated that urbanization played a significant role in contributing to economic growth. Specifically, their calculations indicated that urbanization contributed to 16.40% of the total increase in Chinese output during the specified period. This underscores the substantial impact of urbanization on driving economic expansion in the context of China.

In the case of Tunisia, Bakari et al. (2018) focused on the impact of industrial investment on economic growth over the long run for the period 1969 to 2015. Their analysis, which incorporated cointegration analysis and an error correction model, revealed a negative effect of industrial investment on economic growth in the long run. As a conclusion, the study suggested the implementation of strategies based on the green economy, highlighting the importance of sustainable and environmentally conscious approaches to foster economic growth. Nguyen (2018) conducted an in-depth exploration of the intricate relationship between urbanization and economic growth in ASEAN countries, focusing on the period from 1993 to 2014. Employing a robust methodology, the study utilized diverse statistical methods, including the Granger causality test and regression estimation methods with static and dynamic panel data (FE, RE, Driscoll and Kraay, D-GMM, PMG). The investigation covered seven ASEAN countries: Brunei, Cambodia, Indonesia, Malaysia, Philippines, Thailand, and Vietnam. The study's findings bring to light the presence of a causal relationship between urbanization and economic growth in the selected ASEAN countries. Importantly, the results underscore a positive impact of urbanization on economic growth. However, the study goes beyond a simple linear perspective, revealing a non-linear relationship between urbanization and economic growth. It indicates that urbanization exerts a positive influence on economic growth up to a certain threshold. Beyond this critical point, further urbanization may start to impede economic growth. The estimated thresholds are specified as 69.99% for the static model and 67.94% for the dynamic model. This nuanced insight emphasizes the significance of considering optimal levels of urbanization to maximize economic growth in the unique context of ASEAN nations.

Shaban (2019) conducted a study using cross-sectional data of Indian states for the year 2013 and employed the Ordinary Least Squares (OLS) method. The research findings indicate that a 1% increase in the urbanization rate can result in a per capita income increase

of approximately INR 935. Notably, the study observed that the growth in the population of the largest million-plus city had a more substantial impact on per capita income. Specifically, a 1% increase in the population of million-plus cities led to an increase of INR 745 per capita, whereas a similar increase in the population of the largest million-plus city resulted in a higher increase of INR 1843 per capita among the Indian states. These findings underscore the differential economic effects associated with urbanization patterns, emphasizing the significance of city size in influencing per capita income.

Gross and Ouyang (2020) conducted a study utilizing cross-sectional data from 91 countries to investigate the relationship between urbanization, specifically the sources of in-migration and natural increase, and economic growth. Their findings revealed that urbanization resulting from in-migration positively influenced economic growth. However, in contrast, they observed that the natural increase in the urban population, stemming from urban births and deaths, had no discernible impact on economic growth. This suggests that the economic benefits associated with urbanization are more closely tied to population movements driven by migration rather than natural demographic processes within urban areas.

Jacobs et al. (2023) conducted a study examining the relationship between economic growth and urbanization in Gauteng province. The research employed Granger causality tests and analyzed quarterly data over the period 1997-2020. The key finding of the study indicates a unidirectional causality between economic growth and employment in Gauteng. Specifically, an increase in economic growth was found to contribute to job creation, subsequently attracting a migration of people to the province. This insight suggests a dynamic interplay between economic development, employment opportunities, and population movement within the Gauteng region during the specified period.

2.2. Ruralization and economic growth

The theoretical link between ruralization and economic growth involves a nuanced understanding of the complex interactions between rural development policies and broader economic dynamics. This link is shaped by a combination of socio-economic, environmental, and governance factors, and it has been a subject of extensive theoretical exploration in the literature. Theoretically, ruralization is posited as a potential driver of economic growth, particularly when it involves strategic interventions to enhance rural areas. Improved living conditions in rural regions, driven by targeted policies, can stimulate economic activity. Investments in infrastructure, education, and healthcare in rural areas not only contribute to local development but also create conditions conducive to increased productivity.

One theoretical aspect emphasizes the diversification of economic activities in rural areas. Beyond traditional agricultural practices, a diversified rural economy may include small-

scale industries, services, and other non-agricultural sectors. This diversification, when carefully planned, can reduce dependency on agriculture, enhance income opportunities, and contribute to overall economic growth. The link between ruralization and economic growth also intersects with resource management and environmental considerations. Sustainable rural development practices can mitigate environmental degradation, ensuring the longevity of natural resources crucial for economic activities. Effective resource management is integral to sustaining rural growth and preventing negative externalities. However, theoretical discussions also highlight challenges and governance issues associated with ruralization. These may include equitable distribution of resources, effective implementation of policies, and avoidance of unintended consequences. The success of ruralization strategies relies heavily on the ability to address these challenges and foster an environment conducive to sustainable economic growth.

In the context of Northern Cyprus, spanning the years 1975 to 2002, Katircioglu (2006) observed that the agricultural sector continued to wield a noteworthy impact on the region's economy. Despite changes in global economic trends and the evolution of other sectors, the agricultural domain retained its relevance. This persistence suggests a resilience and ongoing economic contribution of the agricultural sector in Northern Cyprus during the specified timeframe. The sustained impact of agriculture could be attributed to various factors. These may include the region's agro-climatic conditions favoring certain types of cultivation, the presence of established agricultural practices, and the ability of the agricultural sector to adapt to changing economic landscapes. Katircioglu's (2006) findings imply that, at least during this period, the agricultural sector in Northern Cyprus remained a key player in driving economic activities and influencing overall economic growth.

Similarly, the case of Thailand, as examined by Jatuporn et al. (2011) and Yusuf (2014), presents a scenario where the agricultural sector exhibited a positive impact on economic growth. Jatuporn et al. conducted their study over the extensive period from 1961 to 2009, providing a comprehensive view of the long-term relationship between agriculture and economic growth in Thailand. Their findings align with the notion that the agricultural sector played a pivotal role in contributing to the nation's economic development over several decades. Yusuf (2014) reinforces this perspective by offering additional evidence supporting the significant contribution of the agricultural sector to Thailand's economic growth. This dual confirmation from independent studies affirms the enduring and positive relationship between agriculture and overall economic development in Thailand.

Chandio et al. (2019) conducted a comprehensive examination of the relationship between foreign direct investment (FDI) in the agricultural sector and economic growth in Pakistan from 1991 to 2013. Employing various econometric methods, including the autoregressive distributed lag (ARDL) approach, dynamic ordinary least squares (DOLS), fully modified ordinary least square method (FMOLS), and canonical cointegration regression (CCR), the

study found that FDI in the agricultural sector serves as a causal factor for economic growth in both the long run and short run. This implies a sustained positive impact of foreign investment in agriculture on Pakistan's economic development over an extended period, emphasizing the significance of attracting FDI into the agricultural sector for policymakers and stakeholders in the country.

In the specific context of our case in Tunisia, several studies have investigated the interconnection between rural development and economic growth. Chabbi (2010) delved into the impact of agriculture on Tunisia's economic growth spanning 1961-2007, revealing that agriculture serves as a pivotal determinant of overall economic growth. Similarly, Abdelhafidh and Bakari (2019) explored the influence of agricultural investment on economic growth in Tunisia from 1965 to 2016, utilizing the VECM model and Granger Causality Tests. Their findings highlighted a positive and enduring effect of domestic investment in the agricultural sector on economic growth in the long run. Furthermore, Bakari and Abdelhafidh (2018) extended this exploration by identifying specific areas of agricultural investment that positively impact economic growth in Tunisia over the period 1990-2016. Their study underscored the positive effects of investments in fruit trees, livestock farming, agricultural irrigation, and studies, extension, and research within the agricultural sector, emphasizing the nuanced nature of the relationship between rural development investments and economic growth in the Tunisian context.

In conclusion, the link between ruralization and economic growth is a multifaceted concept that encompasses various dimensions of development. Strategic ruralization, coupled with policies that stimulate diversification, sustainable resource management, and the role of intermediary urban centers, holds the potential to contribute positively to economic growth. Nevertheless, realizing these theoretical benefits requires careful planning, governance, and an adaptive approach that considers the unique characteristics of each region.

3. Data and Methodology

This study delves into the influence of urbanization and ruralization on economic growth in Tunisia through a comparative analysis employing both the ARDL (Autoregressive Distributed Lag) Model and the ECM (Error Correction Model). The investigation utilizes annual time series data encompassing the Tunisian economy from 1965 to 2019. The key variables considered in this study are Economic growth (GDP), Domestic Investment (K), Urbanization (URB), and Ruralization (RUR). All these variables are sourced from the World Bank's World Development Indicators. To assess the impact of urbanization and ruralization on economic growth in Tunisia, with domestic investment as a control variable, the following model is developed:

$$\mathrm{Ln(GDP)_t} = \alpha_0 + \alpha_1 \mathrm{Ln(K)_t} + \alpha_2 \mathrm{Ln(URB)_t} + \alpha_3 \mathrm{Ln(RUR)_t} + \varepsilon_t \quad (1)$$

Where, GDP, K, URB, RUR and ε_t represent real GDP per capita, domestic investment per capita, urbanization, ruralization and error term, respectively. All data are converted into natural logarithm to avoid the problem associated with the distributional properties of the data series. Equation (1) can be written in the ARDL Model form as:

$$\Delta \mathrm{LnGDP}_{(t)} = \mu_1 + \sum_{i=1}^{m} \beta_{1i} \Delta \mathrm{LnGDP}_{(t-i)} + \sum_{i=0}^{n} \beta_{2i} \Delta \mathrm{Ln\ K}_{(t-i)} + \sum_{i=0}^{o} \beta_{3i} \Delta \mathrm{Ln\ URB}_{(t-1)} + \sum_{i=0}^{p} \beta_{4i} \Delta \mathrm{Ln\ RUR}_{(t-1)} + \delta_1 \mathrm{Ln\ K}_{(t-1)} + \delta_2 \mathrm{Ln\ URB}_{(t-1)} + \delta_3 \mathrm{Ln\ RUR}_{(t-1)} + \varepsilon_{(t)} \quad (2)$$

Where μ_1 is the intercept; m, n, o and p are the lags order; Δ is the difference operator; and ε_{1t} is the error terms in the equation. The null hypothesis of no cointegration between is H_0: $\delta_1 = \delta_2 = \delta_3 = 0$ against the alternative hypothesis H_1: $\delta_1 \neq \delta_2 \neq \delta_3 \neq 0$.

Also, Equation (1) can be written in the ECM Model form as:

$$\Delta Ln(GDP)_{(t)} = \sum_{(i-1)}^{k} \beta_0 \, \Delta Ln(GDP)_{t-i} + \sum_{(i-1)}^{k} \beta_{(1)} \Delta Ln(K)_{(t-i)} + \sum_{(i-1)}^{k} \beta_{(2)} \Delta Ln(URB)_{(t-i)} + \sum_{(i-1)}^{k} \beta_{(3)} \Delta Ln(RUR)_{(t-i)} + Z_{(1)} ECT_{(t-1)} + \varepsilon_{(t)} \quad (3)$$

Where Δ is the difference operator; k is the number of lags, $\beta_0, \beta_1, \beta_2$ and β_3 are the short run coefficients to be estimated; $EC1_{t-1}$ is the error correction term derived from the long-run cointegration relationship; Z_1 is the error correction coefficients of $EC1_{t-1}$ and ε_{1t} is the error terms in equation.

4. Empirical analysis

The research methodology encompasses two pivotal stages: assessing the stationarity of variables and exploring cointegration relationships. In the first step, unit root tests, such as the Augmented Dickey-Fuller (ADF) or Phillips-Perron (PP) tests, are applied to each variable, including GDP, K, URB, and RUR. The null hypothesis assumes the existence of a unit root, indicating non-stationarity, while the alternative hypothesis suggests stationary behavior. The rejection of the null hypothesis for each variable would signal stationarity. Once established, the second phase involves examining cointegration relationships between the variables. Successful cointegration would validate the adoption of both the Autoregressive Distributed Lag (ARDL) and Error Correction Model (ECM) for subsequent analysis. This method ensures a robust investigation into the impact of urbanization and ruralization on economic growth in Tunisia, offering reliable results through a comprehensive approach.

4.1. Stationarity analysis

Unit root tests identify the presence of unit root in a series. A time series is stationary if it has no trend or seasonality. The Phillips-Perron test {Phillips and Perron (1988)} will be

used for this purpose. The general form of the PP test is estimated by the following regression:

$$\Delta\omega_t = \alpha + \beta\Delta\omega_{t-1} + \varepsilon_t \quad (4)$$

For the variables to be stationary, the following two conditions must be observed:

- PP statistical test > Critical test at the 1%, 5% or 10% levels
- The probability value must be less than 5%

With:

Δ: is the first difference operator

ω: is a time series

t: is a linear time trend

α: is a constant

ε: is the random error term.

Table 1. *Results of PP Test*

Variables		Ln (GDP)	Ln (K)	Ln (RUR)	Ln (URB)
At Level					
With Constant	t-Statistic	-1.7923	-1.2267	-3.3458	-5.7517
	Prob.	0.3804	0.6565	0.0175**	0.0000***
With Constant & Trend	t-Statistic	-1.6339	-2.3122	-0.8696	0.0304
	Prob.	0.7662	0.4203	0.9519	0.9957
Without Constant & Trend	t-Statistic	5.5240	1.2074	3.2024	6.4134
	Prob.	1.0000	0.9400	0.9995	1.0000
At First Difference					
With Constant	t-Statistic	-7.3292	-5.3351	-1.6802	-0.5203
	Prob.	0.0000***	0.0000***	0.4353	0.8787
With Constant & Trend	t-Statistic	-7.6185	-5.2651	-2.0589	-2.5669
	Prob.	0.0000***	0.0004***	0.5561	0.2965
Without Constant & Trend	t-Statistic	-5.0721	-5.1645	-1.6995	-1.0410
	Prob.	0.0000***	0.0000***	0.0843*	0.2649

*MacKinnon (1996) one-sided p-values.

Source: Authors' calculations using EViews 10 software.

The results from Table 1 indicate that all variables exhibit stationarity in their first differences, signifying integration of order 1. Consequently, the conditions for employing the Autoregressive Distributed Lag (ARDL) Model and the Error Correction Model (ECM) are met. With this affirmation, the study proceeds to apply these models to scrutinize the intricate dynamics of the impact of urbanization and ruralization on economic growth in Tunisia, enhancing the robustness and depth of the research findings.

4.2. Cointegration analysis

Before applying estimates based on the ARDL model and the ECM model, we are forced to check the cointegration between the variables included in our model. To achieve our goal, we will apply the most appropriate test which is the Bounds Test.

Indeed, the cointegration test is constructed predominately on the Fisher test (F-stat) for the joint significance of the coefficients of the lagged level variables, i.e., H0: $\delta_1 = \delta_2 = \delta_3 = 0$, which indicates no cointegration, against the alternative H1: $\delta_1 \# \delta_2 \# \delta_3 \# 0$, which indicates that there is integration. After comparing the F-stat value with asymptotic critical value bounds calculated by Pesaran et al. (2001), the null hypothesis of no cointegration is rejected when the value of the F test protrudes the higher critical bounds value, embroilment that there is a cointegration relationship between the elaborated variables.

Table 2. *Bounds Test*

F-Bounds Test				
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	13.78272	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Source: Authors' calculations using Eviews 10 software.

We harness the (Bounds Tests) to ascertain if there is a cointegration relationship in our model or not. Otherwise, to carry out this verification, we will pursue two hypotheses. If the value F-statistic is not higher than any bound value I1, then we indicate that there is no cointegration between these variables. However, if the value F-statistic is higher than any bound value I1 then, we confirm that there is cointegration between these variables.

Table 2 indicates that our test value F (13.78272) is higher than the bound I1 Bound critical value of the 5% threshold (3.67). Therefore, a cointegration relationship exists between the variables of the model. This makes it workable to look into the impact of urbanization and ruralization on economic growth in the long term by using ARDL Model and ECM Model.

4.3. Long run estimations

Since the analyses of stationarity indicate that our variables are stationary in first differences and the Bounds test indicates the existence of a cointegrating relationship between the long-term variables. It will now be possible to estimate the impact of urbanization and ruralization on economic growth in Tunisia. We first start by applying an estimate based on the ARDL model.

4.3.1. Estimation of the ARDL Model

The long-term equilibrium equation according to the estimation of the ARDL model:

$$\mathrm{Ln\,(GDP)} = -0.9532 + 0.0930\,\mathrm{Ln(K)} + 0.1700\,\mathrm{Ln(RUR)} - 0.0992\,\mathrm{Ln(URB)} \quad (5)$$

The Autoregressive Distributed Lag (ARDL) Model is a powerful econometric tool used to analyze the long-run relationships between variables. In the context of the statement you provided, the ARDL Model is applied to understand the impact of urbanization and ruralization on economic growth in Tunisia. The equation describing the long-run

relationship in the ARDL Model helps uncover significant insights into the dynamics between the variables under consideration. In this case, two key factors are explored: ruralization (RUR) and urbanization (URB), with a focus on their impact on economic growth (GDP). The positive effect of ruralization (RUR) on economic growth implies that a decrease in ruralization corresponds to a decrease in economic growth. More precisely, the model suggests that a 1% decrease in ruralization leads to a 0.1700% decrease in economic growth. This relationship may be interpreted in the context of the role rural activities play in contributing to the overall economic development of the country. A reduction in ruralization may signify a shift away from certain economic activities or resources that positively influence GDP. Conversely, the negative effect of urbanization (URB) on economic growth suggests that a decrease in urbanization is associated with an increase in economic growth. Specifically, a 1% decrease in urbanization corresponds to a 0.0992% increase in economic growth. This relationship may be linked to the challenges associated with rapid urbanization, such as infrastructure constraints, unemployment, or other factors that could impede economic growth. The statistical significance of these relationships is emphasized as crucial, highlighting the need for further scrutiny through the estimation of the ARDL Model. This involves conducting rigorous statistical analysis to ensure that the observed relationships are not due to random chance. Confirming the statistical significance of the variables in the long term is essential for drawing robust conclusions about the impact of urbanization and ruralization on economic growth in Tunisia. The ARDL Model, by revealing these insights, provides a structured and empirical approach to understanding the complex relationships between urbanization, ruralization, and economic growth. The findings can have important implications for policymakers and stakeholders seeking to formulate strategies that foster sustainable economic development in Tunisia.

The Error Correction Term (ECT) serves as a pivotal indicator when evaluating the significance of the equilibrium cointegration equation within the Autoregressive Distributed Lag (ARDL) Model. This term is particularly crucial in understanding the long-term relationship between variables, focusing on the dynamics between urbanization, ruralization, and economic growth in Tunisia. In essence, the negative coefficient in the Error Correction Term is foundational. Its negative sign signifies that the model possesses the capacity to correct deviations from the long-term equilibrium. Put simply, when short-term imbalances occur, the model exerts a corrective force, steering the system back toward its stable, long-term relationship.

Equally important is the statistical significance of the Error Correction Term. The statement emphasizes the need for a "significant probability" associated with this term. This probability reflects the statistical confidence in the observed negative coefficient. A negative probability, particularly if it falls below a predefined significance level (e.g., 0.05), reinforces the robustness of the long-term relationship. It indicates that the likelihood of obtaining such a result by random chance is low. Furthermore, the concept of the model

adjusting towards equilibrium is highlighted. This dynamic adjustment process is integral to understanding how the system responds to deviations from the long-term relationship. The negative coefficient in the Error Correction Term points toward the direction of this adjustment, suggesting that the system tends to move back towards equilibrium over time. This feature adds a stabilizing force to the model.

The statement underscores the overall significance of the long-term relationship in comprehending the dynamics between urbanization, ruralization, and economic growth in Tunisia. By affirming the relevance and robustness of the long-term relationship through the Error Correction Term, the statement asserts the practical importance of the model's findings. This information holds relevance for policymakers, researchers, and stakeholders seeking a deeper understanding of the economic dynamics and interrelationships in Tunisia.

Table 3. *Estimation of ARDL Model in the long run*

Dependent Variable: DLOG (GDP, 2)				
Selected Model: ARDL (2, 0, 1, 1)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG (GDP (-1), 2)	0.177149	0.112164	1.579373	0.1214
DLOG(RUR)	-1.424180	0.923262	-1.542552	0.1301
DLOG(URB)	-2.594736	0.377757	-6.868793	0.0000
ECT	-1.451534***	0.167410	-8.670551	0.0000
R-squared	0.727436	Mean dependent var	0.000362	
Adjusted R-squared	0.710400	S.D. dependent var	0.044911	
S.E. of regression	0.024168	Akaike info criterion	-4.533737	
Sum squared resid	0.028037	Schwarz criterion	-4.383642	
Durbin-Watson stat	2.091177	Hannan-Quinn criter.	-4.476194	

*** denotes significances at 1% level

ECT: Error Correction Term: the cointegration equation of long-term equilibrium.

Source: Authors' calculations using Eviews 10 software.

The findings presented in Table 3 highlight the importance of the error correction term, a key component in the Autoregressive Distributed Lag (ARDL) Model. The error correction term exhibits a notable negative coefficient of -1.451534, coupled with a probability below the commonly used 5% threshold (0.0000). This robust statistical evidence underscores the significance of the equilibrium cointegration equation, providing strong support for the existence of a meaningful long-term relationship among the variables under consideration. The negative coefficient in the error correction term, along with its statistically significant probability, reinforces the notion that the model possesses a dynamic adjustment mechanism towards equilibrium. This implies that, over time, deviations from the long-term relationship are corrected, adding depth to the understanding of the economic dynamics being examined. As a result of these compelling findings, it can be confidently asserted that, in the long run, ruralization plays a pivotal and positively influential role in fostering economic growth. Conversely, urbanization is identified as a factor exerting a negative impact on economic growth. These conclusions are drawn from the observed relationships between the variables, as elucidated by the equilibrium cointegration equation.

Moreover, the results from the ARDL model estimation contribute to a comprehensive understanding of the determinants of economic growth over the long term. The emphasis on the pivotal role of ruralization and domestic investment as significant factors underscores their importance in shaping the economic landscape. This insight is valuable for policymakers, researchers, and stakeholders seeking to formulate strategies that promote sustainable economic development, providing a nuanced understanding of the contributing factors in the examined context.

4.3.2. Estimation of the ECM Model

The long-term equilibrium equation according to the estimation of the ECM model:

$$\mathrm{Ln\,(GDP)} = -0.1719 + 0.1845\,\mathrm{Ln(K)} + 0.0734\,\mathrm{Ln(RUR)} - 0.0591\,\mathrm{Ln(URB)}$$

The long-run relationship equation derived from the Error Correction Model (ECM) provides valuable insights into the dynamics between ruralization (RUR), urbanization (URB), and economic growth (GDP). The equation reveals the impact of changes in ruralization and urbanization on economic growth over the long term. According to the equation, ruralization (RUR) demonstrates a positive effect on economic growth (GDP). Specifically, a 1% decrease in ruralization corresponds to a 0.0734% decrease in economic growth. This positive relationship suggests that, in the long run, a reduction in ruralization may have an adverse effect on economic growth. Conversely, urbanization (URB) is indicated to have a negative effect on economic growth (GDP) in the long run. A 1% decrease in urbanization leads to a 0.0591% increase in economic growth. This negative relationship implies that, over the long term, a decrease in urbanization may contribute positively to economic growth. To assess the equity or significance of this long-term relationship, it is crucial to conduct significance tests by estimating the ECM Model. These tests are essential for verifying whether the observed effects of ruralization and urbanization on economic growth are statistically significant and not merely due to chance. The significance tests will provide valuable information about the reliability of the relationships indicated by the long-run equation. Statistical tests typically involve examining the coefficients of the variables, evaluating their standard errors, and assessing the associated probabilities (p-values). If the estimated coefficients are statistically significant, it strengthens the confidence in the validity of the long-term relationship. The derived long-run relationship equation from the ECM Model suggests that ruralization and urbanization have distinct impacts on economic growth. To validate the equity and significance of these relationships, rigorous testing through the estimation of the ECM Model is imperative. This analytical approach ensures a robust evaluation of the observed effects, contributing to a more comprehensive understanding of the economic dynamics under consideration.

The significance of the equilibrium cointegration equation, indicating a long-term relationship between variables, is established when the Error Correction Term (ECT) exhibits a negative coefficient and a probability below a certain threshold. In Table 4, the ECT displays a compelling negative coefficient of -1.353285 and a probability less than 5% (0.0007). This evidence supports the assertion that the equilibrium cointegration equation is indeed significant, signifying a meaningful long-term relationship between the variables under consideration. The negative coefficient in the Error Correction Term suggests a dynamic adjustment process toward equilibrium. In practical terms, deviations from the long-term relationship prompt a corrective force, leading the system back to its stable state. The statistical significance of this term, as indicated by the probability below 5%, lends further credence to the robustness of the long-term relationship. Given these findings, it can be affirmed that, in the long run, ruralization exerts a positive effect on economic growth, while urbanization exerts a negative impact. This conclusion is supported by the significant coefficients in the equilibrium cointegration equation. The importance of this analysis extends beyond mere correlation, providing empirical evidence for the enduring relationship between ruralization, urbanization, and economic growth. The results presented in Table 4 reinforce the significance of the equilibrium cointegration equation, substantiating the existence of a long-term relationship between the variables. The negative coefficient and significant probability in the Error Correction Term lend credibility to the assertion that, in the long run, ruralization positively influences economic growth, while urbanization exerts a negative impact.

Table 4. *Estimation of ECM Model in the long run*

Dependent Variable: D(DLOG(GDP))				
Method: Least Squares (Gauss-Newton / Marquardt steps)				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1): ECT	-1.353285	0.367134	-3.686079	0.0007
C(2)	0.127685	0.268106	0.476248	0.6364
C(3)	0.036036	0.168680	0.213633	0.8319
C(4)	-0.131312	0.064110	-2.048238	0.0470
C(5)	-0.094436	0.054726	-1.725629	0.0919
C(6)	-1.843494	3.112939	-0.592204	0.5570
C(7)	0.173283	3.480508	0.049787	0.9605
C(8)	-3.878610	3.813116	-1.017176	0.3150
C(9)	2.699782	3.554958	0.759441	0.4519
C(10)	0.038009	0.017437	2.179836	0.0351
R-squared	0.577888	Mean dependent var		-0.001528
Adjusted R-squared	0.485229	S.D. dependent var		0.043217
S.E. of regression	0.031007	Akaike info criterion		-3.935279
Sum squared resid	0.039420	Schwarz criterion		-3.556489
Log likelihood	110.3496	Hannan-Quinn criter.		-3.790532
Prob(F-statistic)	0.000017	Durbin-Watson stat		2.031056

*** denotes significances at 1% level

ECT: Error Correction Term: the cointegration equation of long-term equilibrium.

Source: Authors' calculations using Eviews 10 software.

The results obtained from the estimation of the Error Correction Model (ECM) in Table 4 underscore the significance of ruralization and domestic investment as essential factors influencing economic growth over the long run. These findings add depth to our understanding of the multifaceted dynamics shaping the economic landscape. To further enhance the credibility and reliability of our results derived from both the Autoregressive Distributed Lag (ARDL) and ECM models, it is prudent to subject them to a battery of diagnostic tests and stability checks. These tests serve to validate the robustness of our models and ensure that the conclusions drawn are not compromised by statistical anomalies. The application of diagnostic tests and stability tests is a prudent step to validate and fortify the results obtained from both the ARDL and ECM models. These tests serve as a rigorous method to assess the underlying assumptions and the reliability of the estimated parameters, enhancing the overall integrity of the analytical framework.

4.4. Diagnostics tests

In our pursuit of assessing the robustness of the model and the reliability of our results, we have employed a series of diagnostic tests, specifically focusing on heteroscedasticity and serial correlation. These tests serve as crucial tools to scrutinize the assumptions and performance of the model, ensuring the validity of our analytical framework. The heteroscedasticity tests, including the Breusch-Pagan-Godfrey, Harvey, Glejser, and ARCH tests, are designed to examine whether the variance of the residuals remains constant across observations. Simultaneously, the Breusch-Godfrey Serial Correlation LM Test is employed to detect the presence of any systematic patterns in the residuals over time.

Table 5. *Diagnostics tests of ARDL Model*

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.972817	Prob. F(7,44)	0.4628
Obs*R-squared	6.969248	Prob. Chi-Square(7)	0.4321
Scaled explained SS	12.31452	Prob. Chi-Square(7)	0.0907
Heteroskedasticity Test: Harvey			
F-statistic	1.049888	Prob. F(7,44)	0.4113
Obs*R-squared	7.442357	Prob. Chi-Square(7)	0.3843
Scaled explained SS	7.326816	Prob. Chi-Square(7)	0.3957
Heteroskedasticity Test: Glejser			
F-statistic	1.271671	Prob. F(7,44)	0.2864
Obs*R-squared	8.749968	Prob. Chi-Square(7)	0.2711
Scaled explained SS	10.10134	Prob. Chi-Square(7)	0.1829
Heteroskedasticity Test: ARCH			
F-statistic	0.050188	Prob. F(1,49)	0.8237
Obs*R-squared	0.052183	Prob. Chi-Square(1)	0.8193
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.600315	Prob. F(2,42)	0.2139
Obs*R-squared	3.682089	Prob. Chi-Square(2)	0.1587

Source: Authors' calculations using Eviews 10 software.

Table 6. *Diagnostics tests of ECM Model*

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.560180	Prob. F(14,36)	0.8775
Obs*R-squared	9.122846	Prob. Chi-Square(14)	0.8231
Scaled explained SS	13.02798	Prob. Chi-Square(14)	0.5243
Heteroskedasticity Test: Harvey			
F-statistic	1.215974	Prob. F(14,36)	0.3065
Obs*R-squared	16.37393	Prob. Chi-Square(14)	0.2911
Scaled explained SS	13.02976	Prob. Chi-Square(14)	0.5242
Heteroskedasticity Test: Glejser			
F-statistic	0.734120	Prob. F(14,36)	0.7272
Obs*R-squared	11.32645	Prob. Chi-Square(14)	0.6602
Scaled explained SS	11.68151	Prob. Chi-Square(14)	0.6319
Heteroskedasticity Test: ARCH			
F-statistic	1.445652	Prob. F(1,48)	0.2351
Obs*R-squared	1.461859	Prob. Chi-Square(1)	0.2266
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.656163	Prob. F(2,39)	0.5245
Obs*R-squared	1.660252	Prob. Chi-Square(2)	0.4360

Source: Authors' calculations using Eviews 10 software.

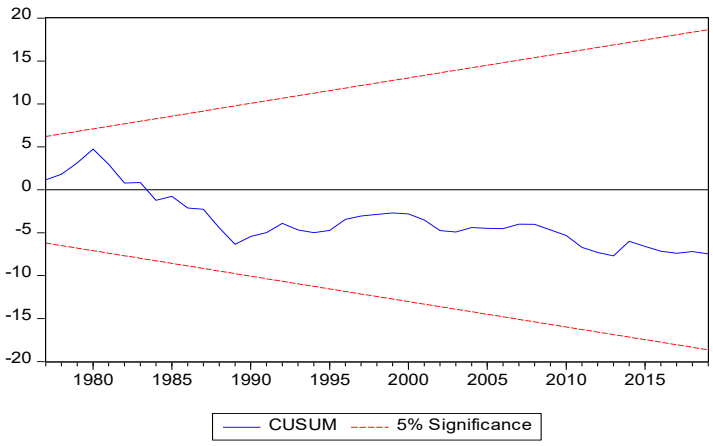
The results of these diagnostic tests, as outlined in Table 5 and Table 6, provide reassurance regarding the acceptability of the estimation results. Specifically, the probabilities associated with the heteroscedasticity tests and the Breusch-Godfrey Serial Correlation LM test are observed to be greater than 5%. This implies that there is no compelling evidence to reject the null hypothesis of homoscedasticity and no serial correlation in the residuals. The significance of probabilities exceeding the 5% threshold is noteworthy. It indicates that the assumptions of constant variance and absence of systematic patterns in the residuals hold, affirming the reliability of the model. The acceptability of these diagnostic test results strengthens our confidence in the validity of the estimated parameters and the overall integrity of the analytical framework. The application of heteroscedasticity tests and the Breusch-Godfrey Serial Correlation LM Test has contributed to the validation of our model's assumptions. The probabilities exceeding 5% in these tests provide evidence in favor of the acceptability of the estimation results, further solidifying the robustness of our analytical findings.

4.5. Stability tests

The examination of parameter stability, a crucial aspect in assessing the reliability of long-run relationships, has been conducted using the Cumulative Sum (CUSUM) Test, as suggested by Brown et al. (1975). The CUSUM Test is instrumental in evaluating the stability of long-run parameters over time. The results, visualized in Fig. 1 and Fig. 2, lend strong support to the contention that both the Error Correction Model (ECM) and the Autoregressive Distributed Lag (ARDL) model employed in this study are well-established and stable. Fig. 1 and Fig. 2 present the outcomes of the CUSUM Test, indicating the

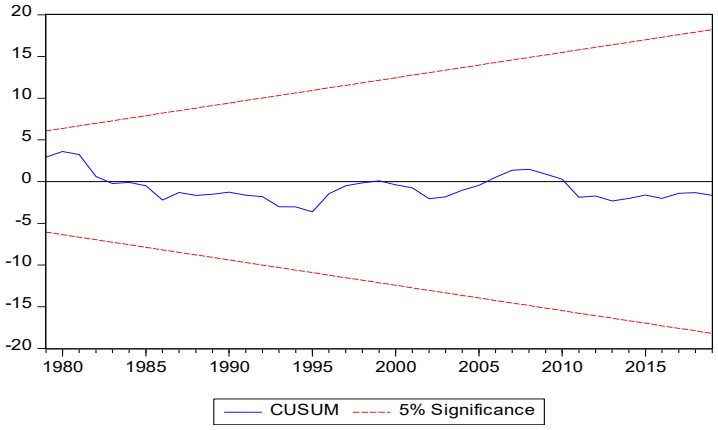
cumulative sums of the estimated coefficients. The stability of these cumulative sums over time is crucial in affirming the robustness of the models. The absence of significant fluctuations or trends in the CUSUM plots suggests that the long-run parameters remain stable throughout the observed period.

Figure 1. *CUSUM test of ARDL Model*



Source: Authors' calculations using Eviews 10 software.

Figure 2. *CUSUM test of ECM Model*



Source: Authors' calculations using Eviews 10 software.

The stability of the ECM model is particularly crucial as it underlines the durability of the correction mechanism and the long-term relationships between the variables. Similarly, the stability of the ARDL model is essential for ensuring that the estimated coefficients retain their validity over time. The conclusion drawn from the CUSUM Test results is that both the ECM and ARDL models used in the study exhibit stability. This implies that the

estimated results are reliable and consistent, providing a solid foundation for policy practices. Policymakers and practitioners can have confidence in the models' ability to capture and explain the long-term relationships between variables, making the findings applicable and useful for guiding decision-making in practical scenarios. The CUSUM Test results, as depicted in Figure 1 and Figure 2, provide compelling evidence that the ECM and ARDL models employed in this study are stable. This stability enhances the credibility of the estimated results, reinforcing their suitability for informing policy practices in the context of the examined economic dynamics.

5. Conclusions and recommendations

This research explored the impact of urbanization and ruralization on the economic growth of Tunisia spanning the period from 1965 to 2019, utilizing data from the World Bank. Employing both the ARDL and EC models, the study produced consistent outcomes, revealing a detrimental effect of urbanization and a favorable impact of ruralization on the country's economic growth. The observed negative influence of urbanization is attributed to Tunisia's preference for imports over domestic production in response to heightened food demand in urban areas. This practice, defined as the "urban bias," is identified as a disruptor of major macroeconomic balances, thereby impeding overall economic growth. Consequently, the study asserts that urbanization may not invariably contribute to economic growth and can, in fact, have adverse consequences. It underscores the importance of factors such as controlled urbanization, industrialization, tertiarization, and global openness as essential prerequisites for fostering economic growth and development.

Elloumi (2006) perceptively observed the historical and diverse nature of Tunisia's rural development experience through past economic policy initiatives. These policies, often supported by regional and agricultural development, have undeniably influenced the living and working conditions in rural areas. While there may not be complete convergence, various indicators demonstrate a noteworthy improvement in these conditions over time. Nevertheless, the enhancement of living standards in rural areas, without genuine economic diversification, especially in lower-lying rural regions, has imposed significant strains on natural resources. The resultant pressures have led to the overexploitation and degradation of these resources in certain areas. However, challenges persist, particularly with the diminishing protection for the agricultural sector. This poses a threat to further weakening the rural sector, a concern compounded by the impact of liberalization on employment. The evolving dynamics question the traditional complementarity between agricultural activities and those of other economic sectors. Addressing these complexities, the development of rural areas necessitates a delicate balance: a simultaneous increase in production and productivity, coupled with the imperative of sustainable resource use. In response to these

challenges, novel approaches to rural development are frequently proposed, emphasizing globalism, multi-sectorality, partnership, participation, and territoriality. While these approaches may yield improvements in the effectiveness of interventions in rural areas, contextualization is crucial, particularly in the case of Tunisia. Despite genuine political will, the implementation of such approaches encounters obstacles. The challenge lies in reconciling the comprehensive and diversified activities envisioned with the difficulty of promoting non-agricultural activities in certain rural areas. This difficulty is rooted in the historical context and peripherality of these regions, compounded by a development orientation geared toward external niches that often lack clear identification. Implementing this innovative approach demands a qualitative leap in project design and execution, necessitating the integration of different economic sectors and fostering connectivity between rural areas and their broader territories. This shift toward an associative fabric requires active participation and empowerment of partners within society, highlighting their role as a priority in driving actions in this domain.

Moreover, as highlighted by Bakari et al (2018), the trajectory of Tunisian industry has witnessed growth in diverse directions, aligning with the cadence of modernization and advancements across various regions, sectors, and industries. Despite its pivotal role in economic development, the industrial sector has yet to fully capitalize on the current and future opportunities at its disposal. The landscape presents unexplored avenues and substantial potential for expansion. Effectively leveraging these prospects necessitates strategic decision-making, entailing the judicious selection of sectors that align with national priorities. Additionally, playing a decisive role in fostering research and innovation is imperative to enhance the competitiveness of industrial products. A proactive approach involves robustly engaging with the foreign market, thereby broadening the scope of industrial activities. Diversification of the industrial fabric emerges as a crucial element, requiring a thoughtful expansion into sectors with established comparative advantages. Crucially, any viable industrial strategy should be underpinned by adaptability to the unpredictable and ever-changing international situation. This entails a continuous process of monitoring, analysis, and flexibility to navigate the dynamic global economic landscape. These key considerations underscore the multifaceted nature of an effective industrial strategy, highlighting the need for a comprehensive approach that integrates decision-making, innovation, competitiveness, global engagement, diversification, and adaptability to secure the sustained growth and development of the Tunisian industrial sector.

Tunisia currently experiences a deceleration in its urbanization process, a trend likely influenced by the country's evolving role in the global economy. The trajectory of urbanization in Tunisia hinges upon the specific role the nation assumes on the world stage. Consequently, adjustment policies should ideally prioritize enhancing productivity in both rural and urban areas, fostering a conducive environment for the long-term development of

the industrial sector. Interestingly, a consequence of a renewed emphasis on ruralization could be a reinvigoration of the urbanization process. This paradox arises due to the agglomeration economies that cities inherently facilitate, potentially leading to a resurgence in urban growth. Consequently, policymakers are urged to acknowledge the pivotal role of small towns and cities. These urban centers act as vital links between rural and urban areas, not only providing farmers with numerous opportunities to market their products but also serving as conduits to share in the benefits of economic growth. Recognizing and strategically leveraging the catalytic potential of these intermediary urban entities becomes imperative for steering Tunisia's urban and rural development in tandem with broader economic goals.

The study offers valuable insights into the complex dynamics between urbanization, ruralization, and economic growth in Tunisia. To enhance the robustness of future research in this area, policymakers and researchers should consider the following recommendations. Firstly, a more granular exploration of the factors influencing the observed negative impact of urbanization on economic growth is essential. Understanding specific policy interventions contributing to this effect can guide targeted reforms. Additionally, further investigation into the mechanisms driving the favorable impact of ruralization is warranted. Exploring the role of sustainable agricultural practices, resource management, and the promotion of rural industries can provide actionable policy recommendations. Moreover, policymakers are encouraged to focus on a balanced development approach, integrating urban and rural development strategies for holistic economic growth.

Despite its valuable contributions, this study has certain limitations that warrant consideration. Firstly, the reliance on World Bank data, while providing a comprehensive dataset, may not capture all relevant variables influencing economic growth. Future research should explore additional datasets and incorporate a wider range of socio-economic indicators for a more nuanced analysis. Furthermore, the study primarily utilizes econometric models, and the findings are contingent on the assumptions and limitations inherent in such modeling approaches. A more in-depth qualitative analysis, including stakeholder interviews and case studies, could complement the quantitative results. Additionally, the study's temporal scope (1965-2019) may not fully capture recent changes in economic policies and global economic dynamics, underscoring the need for updated analyses reflecting current conditions.

The limitations identified are inherent in empirical research and acknowledging them is crucial for maintaining the integrity and transparency of the study. The reliance on existing data sources is often a necessity, and while World Bank data offers a comprehensive overview, incorporating additional datasets could enhance the study's comprehensiveness. Econometric models, while powerful, are simplifications of reality, and their results should be interpreted with caution. By recognizing the limitations, the study sets a foundation for

future research to build upon and refine methodologies for a more comprehensive understanding of the dynamics between urbanization, ruralization, and economic growth in Tunisia.

Looking ahead, this research lays the groundwork for several avenues of exploration. Future studies might delve into the temporal evolution of urbanization trends in Tunisia beyond the study period, considering the impact of evolving global economic scenarios. Additionally, examining the effectiveness of specific policy measures aimed at mitigating the negative effects of urbanization and enhancing the positive aspects of ruralization can provide actionable insights for policymakers. The dynamic nature of the global economy and shifting geopolitical landscapes underscore the importance of ongoing research in understanding how Tunisia's economic development strategies can adapt to these changes. Future research efforts should also consider interdisciplinary approaches, incorporating insights from environmental science, sociology, and geography to provide a more holistic understanding of sustainable development in Tunisia.

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