DOI: https://doi.org/10.37075/EA.2025.3.07 Economic Alternatives, 2025, Issue 3, pp. 745-772

Regional Disparities in Morocco and Convergence Question

Received: 08.05.2024
Available online: 30.09.2025

Marwan Rouahi[*], **Redouan Abdenour**[** 1]

Abstract

The purpose of this paper is to analyse regional disparities and the process of convergence between Moroccan regions through a spatial econometric perspective. The contribution of this paper lies in its pioneering approach to understanding and dissecting the multifaceted dimensions of regional inequalities and disparities, and the convergence processes that shape the global intellectual landscape. What sets this research apart is its ability to seamlessly blend traditional quantitative analyses with cutting-edge spatial methodologies, providing a comprehensive and nuanced understanding of the complex interplay between various factors influencing regional equalities. One of the distinctive long-term values added by this paper is its meticulous examination of not just the existence of disparities but also the underlying mechanisms that perpetuate them. By offering a granular perspective on the structural, socio-economic and other factors influencing disparities reduction and region development, our findings transcend mere observation, paving the way for targeted interventions to address systemic issues for political deciders. Moreover, the value added of this research for the literature stands as a testament to the power or possibilities of convergence in a developing economy from a point of view of regional development. The proposed models are the absolute convergence model on one hand, who was estimated first, which showed that the less rich regions did not grow faster than the richer regions, so there was no process of absolute convergence. On the other hand, through the conditional convergence model, the results of the estimation, confirm a process of conditional β-convergence between the Moroccan regions for the period 2014-2020.

Keywords: Regional disparities, absolute convergence, conditional convergence, spatial autocorrelation, spatial econometrics.

JEL: E60, E62, R10

Introduction

Since its independence, Morocco has constantly undertaken structural reforms of the functional framework of the State. The overall aim has been to organise and update the central administration in line with the needs and imperatives of the context and development at the time. Similarly, a succession of reforms aimed at giving citizens a voice at sub-national level have been introduced since 1959, in particular through the Constitution of that year, which

[*] Mohammed V University, Rabat, Morocco
[**] Mohammed V University, Rabat, Morocco

triggered the process of regionalisation and, consequently, decentralisation. Since then, local authorities have come to be seen more as socio-economic actors, and regional territories as vectors for development.

The regionalisation process was given a new impetus in 2015 with the modification of the regional division, reducing the number of regions from 16 to 12. The decision to bring the provinces together under a single region was based essentially on the principle of complementarity. The rationale behind this was efficiency and synergy, with a view to improving the well-being of the local population, triggering the effects of externalities on neighbouring regions and, as a result, reducing inequalities. However, as time goes by, it is clear that disparities still persist in terms of development, and the imbalance between regions is growing. These disparities affect a number of areas, whether economic, social or demographic, and accentuate the phenomenon of coastal development in Morocco, an area with a better standard of living than the country's inland regions.

This inequality distribution of the national wealth between the regions induces us to think on the possible ways of reducing these gaps, in order to trigger the process of economic convergence between the regions. The public policies devised by the central government are now increasingly applied at regional level in almost all sectors and areas of activity. The aim is to promote balanced, equitable and harmonious economic development based on the regions' own potential. Hence the importance of studies on regional growth and development, which give central and local decision-makers an objective view of the reality of the regions.

No one can deny that the problem of regional disparities is a topical issue of crucial importance, given that the regions have more and more autonomy, which would make it easier for them to overcome their difficulties more effectively. In fact, this paper has a main purpose of analysing the existing disparities between the regions and the different interregional spatial effects that exist there, as well as determining the spatial effects on the process of economic convergence.

Within a vast literature, little work has been devoted to the study of regional development in developing countries, and especially an African country like Morocco using a spatial approach. Most papers try to describe the disparities and to estimate the convergence process and its speed ignoring the spatial factor and its importance in this phenomenon. By incorporating geographic context to a social and economic phenomenon, in this study we transcend the limitations of conventional methodologies, offering a richer, more nuanced understanding of how spatial factors influence the convergence dynamics. It also offers an interesting value for the literature focalised on regional disparities and convergence process integrating a spatial/ geographical approach.

So, the novelty and the contribution of this paper reside in the spatial methodology, by unveiling hidden patterns, dependencies and relationships within disparities and convergence through social and economic variables. Moreover, this work adds substantial value to the existing literature by offering a spatially informed perspective on convergence processes of an African and emerging country, which may help to shed light on the regional dynamics in a general way, and in the geographic contexts in a specific manner of an emerging country that increase the further application of an advanced decentralised approach.

This paper is divided into four parts. The first is devoted to a review of the literature on economic convergence and the new geographical economy. The second presents a descriptive analysis of regional disparities. The third one presents the research method including the model's description and data used. The fourth part will be devoted to a spatial econometric modelling exercise to determine the existence of the convergence process between the Moroccan regions, and the various spatial effects that may intervene, as well as a the modelling of the determinants of regional growth to identify the variables likely to reduce regional disparities and, finally, a discussion of the results will be initiated.

Methodologically, this paper adopts a spatial methodology, beginning with a mapping analysis of the different disparities between Moroccan regions through economic and social variables. Then to achieve our objective of testing the convergence hypothesis and the spatial effects that intervene, four spatial models are estimated (SDM, SAR, SEM, SAC) added to the ordinary least square model that does not integrate spatial patterns for each type of convergence hypothesis (absolute and conditional).

Within the framework of this study, using spatial econometric modelling, we are led to develop the following principal research questions:

What are the spatial repercussions on the process of regional convergence? And finally, what are the determinants of regional economic growth?

1. Literary review of convergence and geographical economics

1.1. Disparities and convergence

The upheavals caused by the various crises in the world have accentuated the inequalities between territories, whether countries or regions. The presence of these inequalities and disparities has become a major issue and concern for decision-makers. They reflect a significant and persistent socio-economic dysfunction that is a consequence of global instability. With all this in mind, growth models and theories of economic and territorial development are increasingly being referred to in order to design more effective and targeted public policies, developed from the bottom up[1], in consultation and participation with local stakeholders.

Spatial disparities exist not only between countries, but also between regions within the same country. It is clear that in Morocco, pronounced and persistent inter-regional inequalities in development and well-being persist, despite the efforts of decision-makers. This observation of inter-regional disparities is the consequence of a process in which regions advantaged by historical facts[2] and accidents increasingly attract the creators of wealth, including businesses, which in turn triggers the attractive effects of the agglomeration economies created in these regions, contributing, as a result, to the widening of inequalities and gaps with other neglected regions.

The studies related to regional convergence in an emerging country becomes a beacon illuminating the intricacies of growth, development, and socio-economic

[1] Conti S., Giaccaria P, 2001. Local Development and Competitiveness. GeoJournal Library, Springer Dordrecht.

[2] Meyer Stamer J., 2008. Systemic Competitiveness and Local Economic Development. Meso Partner, Duisberg.

transformation. Each region of the emerging country has its own socio-economic landscape and developmental trajectory. The micro-level analysis offers a nuanced understanding of how regional dynamics contribute to, or hinder, the overall progress of an emerging country. The importance of studying regional convergence in an emerging nation lies in its capacity to inform targeted policy interventions that may guide toward initiatives in strategic levels that foster balanced growth and development.

The convergence phenomenon holds paramount importance for several reasons, reflecting its profound impact on policy formulation, countries comparison and societal progress. Understanding the disparities and its causes is essential for addressing societal imbalances, promoting inclusive development and offering evidence-based insights that can guide the development of effective policies aimed at reducing disparities and fostering convergence for sustained economic and social growth, also reducing social tensions and improving social cohesion and resources allocations.

Low disparities contribute to the stability of a country, specially an emerging country that are not characterized with an important GDP and GDP per capita. The convergence question deserves to be studied and analysed at the regional level of a country to catch the possibility and the potential of improvement of economic and social factors that may help to guide the country to a considerable level of welfare.

So the issue of economic disparities between regions is an underlying theme of development policies. Each region clings to an economic benchmark in order to carve out a path towards development[3]. As a result, living conditions tend to become more homogenous within an area, leading to economic convergence. These inequalities lead us to question the means of reducing them, as well as the possibility of economic convergence between regions.

The concept of convergence is used to describe the process by which poor economies catch up with rich economies, those with a higher level of per capita income. This is because the economies of developing countries have higher long-term economic growth rates than the economies of more developed countries. As a result, the gaps between the levels of the two categories of countries can be reduced.

The phenomenon of convergence is widely discussed and analysed in the literature. Since Barro and Sala-I-Martin's study in 1991, numerous works have analysed and studied the convergence process between different territories. Convergence studies are generally based on two measures. One is based on neoclassical economic growth models, in particular that of Solow (1956), in which convergence occurs when a poor economy tends to grow faster than a rich economy. The other, based on the work of Sala-I-Martin (1995), refers to the reduction of regional differences in GDP per capita.

The concept of β-convergence is based on neoclassical growth models (Solow 1956) but is dealt with mainly by Barro and Sala-I-Martin (1995). It is based on the hypothesis that, in the long term, there is a tendency for economies to equalise. In other words, economies move towards the same reference value or equilibrium path. The growth rate of an economy's GDP per capita is positively

[3] Cattan N., 2006. Centre-Périphérie. Dictionnaire Des Mondialisations. Armand Colin.

related to the distance separating it from its steady state, irrespective of the initial conditions in which that economy found itself. There are two types of β-convergence. Either absolute or conditional.

Absolute convergence is a real convergence between countries regardless of their structural characteristics. Conditional convergence is a real convergence achieved conditionally on certain structural characteristics, i.e. an approximation of the living standards of economies with the same structural characteristics such as demographic growth, savings rate, technology, etc. and that the determinants of the stationary state vary from one economy to another and that they converge towards the same growth rate, and towards their own long-term equilibrium path.

As far as σ-convergence is concerned, convergence is associated with the study of the dynamic evolution of an indicator of the dispersion of GDP per capita between economies. The concept of σ-convergence refers to the decrease in differences between territories in terms of dispersion of GDP per capita over time in different countries (Sala-I-Martin, 1995). It is based on the calculation and comparison of the logarithms of standard deviations in different periods. The concept of σ-convergence could therefore be associated with a form of inequality reduction.

This idea is based on neoclassical economic growth models, in particular the Solow-Swan model (1956), in which marginal productivities are assumed to decrease for each factor of production. Marginal returns to factors of production in developing countries are higher, so they should catch up with more developed countries. The rate of productivity gains slows down over time, as the economy approaches the long-run equilibrium situation. Thus, the forces that accelerate growth in developing economies lead to a tendency for per capita output levels to converge over the long term.

In the Solow-Swan model (1956), growth comes from two sources. On the one hand, once the economy has reached a steady state, economic growth is linked to productivity growth and population growth. On the other hand, there is what is termed transitory economic growth, associated with the movement of the economy from an initial situation characterised by an initial capital stock, to a situation where the capital stock is in a steady state. It is from this latter situation that the process of convergence ensues through the dynamics of the transition to the regular state. So, convergence occurs when a poor economy tends to grow faster than a rich economy[4].

From the above, we understand that poor countries can gradually reduce the gaps that separate them from more developed economies. Developing economies have a greater incentive to save and therefore grow faster for a given share of investment. More developed economies have a higher per capita capital stock. As a result, the return on this capital is lower, which limits the speed of capital accumulation compared with poor countries. Thus, there will be convergence in level, in relation to the product and capital per capita in the regular state, and convergence in rate, in terms of the dependence of the growth of the economies in the regular state on the rate of growth of technical progress.

[4] Dramani L., 2010. Convergence Économique Et Spatiale En Afrique: Cas Des Pays De La Zone CFA. Consortium for Economic and Social Research. Université Cheikh Anta Diop, Dakar

The differences in growth rates observed are therefore only transitory[5].

If the economies do not have similar structural parameters, their regular state also differs. The growth rate of a developed economy is higher than that of a poor economy. The latter tends to grow more slowly than a rich economy. Consequently, each economy converges towards its own regular state, and the speed of convergence towards this regular state is inversely related to the distance separating it from this regular state. This is the conditional convergence hypothesis. Economies converge to different regular states but at the same rate of growth to that state.

In empirical studies, it is assumed that the economies studied are not in their regular state, but that they are sufficiently close to it. On this basis, Barro (1991) and Sala-I-Martin (1995) show that the economy's growth rate depends negatively on the initial per capita product. So, according to the neoclassical model, an economy approaches its steady state independently of initial conditions. Similarly, the determinants of the level of per capita output in the steady state are the savings rate and the population growth rate. In the steady state, the higher the savings rate, the higher the level of per capita output. On the other hand, the higher the population growth rate, the lower the level of per capita income. The growth rate of per capita output in the steady state depends solely on the rate of technical progress. The capital stock grows at the same rate as output.

The theoretical and empirical relevance of the neoclassical models was widely criticised in the 1980s. Studies carried out during these years on samples from a wide range of countries around the world refuted the hypothesis of absolute convergence, vindicating certain endogenous growth theorists. This latter family of models asserts that the sign of the partial correlation between the rate of economic growth and the level of initial per capita product should be positive. Faced with this confrontation, Barro (1991) and Sala-I-Martin (1992) point out that the exogenous growth model predicts conditional β-convergence rather than absolute β-convergence.

In the same vein, Mulligan and Sala-I-Martin (1993), in their endogenous growth model, show that there is conditional convergence if the stock of capital is low relative to the stock of accumulable knowledge. Furthermore, in another model relating to Barro and Sala-I-Martin (1997), they propose that the technological discoveries made by the major economies determine the long-term global growth rate. On the other hand, technologically backward economies have the capacity to imitate these innovations, since the costs of imitation are lower than those of innovation. As a result, poor economies will tend to grow relatively quickly and will eventually catch up with the large economies.

1.2. Convergence and the agglomeration economy

The concept of regional disparities is closely linked to that of convergence. Work on the latter emerged in particular from the current of new geographical economics, developed essentially by the work of Paul Krugman (1991). Geographical economics is based on the interactions between operational geographical patterns and socio-economic disparities, known as geographical-growth

[5] Le Gallo J., 2002. Geographic Disparities And Convergence Of European Regions: A Spatial Econometrics Approach. Economies Et Finances. Université De Bourgogne

interactions. The pioneering work of Jeffrey G. Williamson (1965) is at the origin of this economic trend, in which space plays a major role and the phenomena of economic growth are explained.

The forms taken by the geographical distribution of economic phenomena can also be put into perspective with the predictions of spatial economic theories. These theories enable us to understand the location choices and agglomeration processes of economic activities, and show that particular spatial organisations result. More specifically, these are the theories of the New Geographical Economy, initiated by Krugman (1991). They point to a tendency for economic activities to be concentrated in a smaller number of areas.

The geographical distribution of areas rich in economic activity can therefore be characterised by spatial dependency, since agglomeration locations are identified either by natural or first-class conditions, or by the so-called second-class conditions, where the attractiveness of a location depends on the economic activities present there. Furthermore, agglomeration processes appear to be highly cumulative: agglomeration favours agglomeration. So, even if economic activities are geographically homogenous at the outset, an exogenous shock, such as a firm choosing to locate in one place rather than another, can lead to the formation of an agglomeration in that place.

The geographical dimension is therefore of major importance in economic analysis insofar as it is not neutral. Economic interactions are linked, on the one hand, to all forms of market accessibility and, on the other, to the various advantages of proximity provided by the concentration of economic activities. Similarly, location choices based on these same principles lead to a more or less unequal distribution of economic activities and wealth, and consequently of growth, within and between regions.

The aim of geographical economics is therefore to explain the uneven distribution of activities and people in space, i.e. the formation of agglomerations in a small number of locations. The formation of agglomerations appears to be the result of a balance between the forces of agglomeration and dispersion, the content and intensity of which vary according to the spatial scale chosen and the period. Agglomeration economies can therefore be analysed from three angles: industrial, temporal and geographical.[6]

The industrial dimension can be seen in the distinction made between location economies and urbanisation economies. Location economies refer to Marshallian externalities that are external to the firm but internal to the industry. They generally arise from the exchange of knowledge resulting from industrial specialisation. Urbanisation economies, on the other hand, are linked to the global advantages offered by a region or territory. These economies are external to industry, but internal to the region. These economies result in particular from the size of the conurbation, insofar as the greater the number of activities in an area, the greater the economies of urbanisation.

This distinction between location economies and urbanisation economies is not always empirically evident, and is not the sole determinant of the agglomeration phenomenon. Agglomeration is a process that varies according to the sectors, periods and areas considered. A temporal and spatial

[6] Rosenthal S. and Strange W., 2003. Geography, Industrial Organization, and Agglomeration. The Review of Economics and Statistics, 85, (2), 377-393

dimension must be taken into account when analysing this process.

The time dimension extends the analysis of agglomeration economies by adding a dynamic aspect. This refers to the theory of endogenous growth, based on four approaches. The first is based on Romer's model (1986), which considers investment as an endogenous source insofar as it provides technological externalities. The second approach concerns Romer's second model (1990), which is based on technological innovation. Technological innovation is the result of research and development and can be used by several different sectors at the same time. The third approach, relating to the Lucas (1988) model, considers human capital as a source of endogenous growth and externalities thanks to the diffusion of individual knowledge. Finally, the fourth approach, based on Barro's model (1990), considers public spending, particularly on public infrastructure, as a source of growth and positive externalities.

Endogenous growth theory does not include the spatial dimension in its analysis, which limits its contribution. This limitation is remedied by the new economics of geography, which takes into account and focuses on the location of firms and their concentration in certain regions.

The geographical dimension, alongside the industrial and temporal dimensions, completes the analysis of regional disparities. This dimension is to be found in the field of geographic economics, which in the 1990s made it possible to analyse the economies of agglomerations by adding a geographic dimension, as in the case of Krugman's centre-periphery theory (1991). This describes the spatial polarisation of firms and jobs in a small number of territories.

The concept of centre-periphery dates back to Karl Marx, who described the relationship between city and country[7]. However, its contemporary significance owes much to the inequality theorists who helped to disseminate it in the 1960s. In the early 1980s, Alain Reynaud developed this concept in geography, defining the centre and the periphery in relation to a territorial system. The centre is characterised by the concentration in one place of a certain mass of population, economic functions, production and service activities and wealth. It has a capacity for innovation and creativity. Through the polarisations it generates, it is a powerful driver of territorial integration. However, the asymmetry of trade is at the root of this integration. With lower living standards, the periphery, which is often landlocked and isolated, sends massive migratory flows towards the centre. They are dependent and subordinate, and always have a negative relationship with the centre.

As highlighted above, agglomeration economies are economies generated by a spatial concentration of activities. This concentration generates returns to scale, which in turn lead to a reduction in costs for local firms. Similarly, these firms can benefit from externalities arising from the achievements of other firms.

2. Empirical review

The regional disparities issue has been a subject of several studies whose objective was to explore the existent inequalities between territories, to discover the possibilities of convergence and contributing factors that can help deciders to build suitable policies

[7] Cattan N., 2006. Centre-Périphérie. Dictionnaire Des Mondialisations. Armand Colin.

to trigger development of territories. In this section, we aim to present some works which are linked to our research question.

Kalra R. and Thakur S. (2014), worked on development patterns in India using 1961-2011 period's data. They found an increasing inequality in per capita net state domestic product. Also, the spatial patterns founded show that the prosperous regions are located in the rich agricultural and industrial states and the lagging regions are the impoverished agricultural states. Results show the importance of the agriculture in reducing disparities of income in India.

Cherodian and Thirlwall (2015) studied regional disparities in terms of per capita income by estimating conditional and unconditional convergence and sigma convergence with cross section equations for 32 regions for India. Their results showed an absence of non-conditional convergence, on the other hand, a weak conditional convergence. In addition, the sigma convergence which represents the distribution or the deviations of income per capita has increased further, but not among the most disadvantaged states.

A work by *Peiró-Palomino, J.* (2019) analyses regional well-being in the OECD for the 2000-2014 period for 395 regions. The results show an absence of convergence and great disparities across the OECD regions. Also, the OECD regions are polarised into two clubs of low and high well-being.

Lewandowska A., Pater R. and Cywinski L. (2019) identified in their work the determinants of innovation of enterprises in the Regional Innovation System context in Poland for less developed regions from the period of 2011-2014 in hope to clarify how the RIS influences innovation-driven growth. They found that the hypothesis that the Regional Innovation System induces innovation was confirmed for very specific instruments. The enterprises benefited from only some of the many instruments proposed by the RIS, which includes the tailor-made consulting and financial assistance from local, public and specialised organisations. Then they found that innovativeness and short term growth are closely and positively correlated. Also, in the case of the poorly developed regions, knowledge diffusion should be carefully monitored to obtain expected results.

Zhang Y. (2021) worked on the regional disparity of influencing factors of technological innovation in China from the high-tech industry in 27 provinces from 2009 to 2016. His results showed that innovation investment, market environment, government support and foreign technology spillover sorting by impact size were the influencing factors. In terms of disparities, for example, the results showed that innovation investment was an important factor for technological innovation, but innovation resources mainly concentrated on Eastern China. Also, market environment was favorable to Eastern and Central China, but unfavorable to Western China.

In a study about inequality and poverty convergence, Aji P. Wibisono I. D. and Suryahadi A. (2021) examined the convergence hypothesis across Indonesia's local government, using data covering the 2002-2019 period. They found that there has been a conditional convergence of these development outcomes across local government areas but at different rates of convergence.

After this brief benchmark treating different types of disparities, we now focus on recent works treating the Moroccan case. *Fadlallah A. and Chakhat Z.* (2019) analysed regional disparities in Morocco and the possibility of catching up from the convergence process from the 2003-2013 period. The results showed a no presence of absolute convergence and a presence of conditional convergence. The absolute convergence speed is 2.6% so the Moroccans regions needs 27 year to reduce at half the existent disparities in term of per capita GDP. The physical capital accumulation had a positive impact on the conditional convergence process, but open trade, activity rate and population growth reduce GDP per capita growth rate.

Koraich A., Sahibi Y. and Hamzaoui M. (2019) explored the convergence hypothesis for employment, added value and productivity for the Moroccan regions from the 2000-2007 period for the old administrative division that includes 16 regions using spatial data and the Shift-Share method. The findings show a presence of absolute convergence of regional added value and productivity and an absence of convergence in employment. Then, to test the conditional convergence, they added as conditional variables, investment rate, students in secondary college, activity rate, regional population rate and the share of kilometers of paved roads. The results suggest a convergence in employment, added value and productivity.

So, the paper's goal is to unveil hidden patterns, dependencies and relationships within disparities and convergence through social and economic variables by spatial methodology. In the vast literature regarding the convergence question, there is a variety of variables that are employed to explain this phenomenon.

Mankiw (1992) proposed the integration of physical and human capital, and population growth rate as variables. However, the consideration of human capital in the model poses two drawbacks. The first is a problem of measuring human capital. The enrollment rate in secondary education (Mankiw 1992) and in primary education can be used. This does not make it possible to measure human capital accurately and precisely and consequently to clearly identify the differences in per capita income between economies. The second disadvantage is that in the augmented Solow model, human capital is considered as a production factor. Therefore, the growth rate of human capital must be linked to that of the economy.

Other authors have proceeded to include other variables such as public physical capital and transfers (Bajo-Rubio 2000), unemployment (Bräuninger and Panneberg 2002), human health capital (Knowles and Owen 1995, McDonald and Robert 2002), research and development expenditure (Nonneman and Vanhoudt 1996). Taking into account these diversity of variables allows models to improve their explanatory power even if they are not formally linked to a growth model, or if they are economic in nature.

Others studies have included variables from different sectors whose expected effects on the growth rate correspond to their influences on the steady state position. In our case, after reviewing the empirical literature relating to regional disparities and convergence in Morocco, we realize that there is no recent work with updated data that addresses this issue. Still, the available works are limited to analyzing disparities by different indicators and their evolution and testing the convergence hypothesis without taking into consideration the spatial aspect and its repercussions on regional dynamics. According to these findings, we suggest in our paper, to integrate this spatial aspect often neglected in the Moroccan case, and not only to test the hypothesis of convergence by the available variables at regional level but to try to estimate the determinants of regional growth, and mentioning the spatial patterns that intervene in this issue.

3. Regional disparities: findings and spatial interactions

3.1. Analysis of regional disparities

Against the backdrop of the global economic crisis, which also has an impact on the Moroccan economy, interest in the geographical distribution of wealth within the Moroccan regions is justified. There are several reasons for this analysis. Firstly, it serves to highlight the importance of the links between economic disparities and geographical location. Secondly, it allows us to assess the links between this pattern of disparities and the economic dynamism of the Moroccan regions.

Nevertheless, the government's efforts have resulted in a concentration of public resources, particularly in terms of public investment, in favour of urban areas, generally the traditional large towns, which now house a large proportion of the Moroccan population and concentrate most of the economic activities and wealth creation. As a result, disparities in wealth have widened between regions, with certain regions dominating.

An analysis of the economic disparities between Morocco's regions reveals a number of important findings. While Morocco has made significant progress, the regions have not benefited to the same extent. According to the latest report, "Morocco's Social Indicators", established by the Haut-Commissariat au Plan, the national GDP per capita was 32,055 MAD in 2020. Social inequality in Morocco, measured by the Gini index, fell by one percentage point between 2014 and 2019 at national level, from 39.5% to 38.5%. However, the health crisis of 2020 amplified these inequalities. The Gini index rose from 38.5% in 2020 to 40.3%.

The contribution to wealth creation reflects the persistence and scale of disparities. Three regions account for 59% of national wealth: Casablanca-Settat, Rabat-Salé-Kénitra and Tangier-Tétouan-Al-Hoceima, with 32.2%, 15.9% and 10.9% respectively. However, the southern regions, alongside the three mentioned above, are above the national average. The dispersion of GDP per capita between regions is widening, with the absolute average gap rising from 13,462 MAD in 2019 to 13,850 in 2020.

It appears that the trend in GDP disparities between regions has been sustained over time, with only the Tangier-Tetouan-Al-Hoceima region being able to reach the other two regions of Casablanca-Settat and Rabat-Salé-Kénitra above the national average since 2013. In fact, we can see that some regions have experienced a very high rate of growth compared with others between 2012 and 2019. As the table below shows, three regions have seen their growth rates rise by more than 50%, namely Tangier-Tetouan-Al-Hoceima, the South and the Oriental regions.

Regions	2012-2019
Tangier-Tétouan-Al Hoceima	72,26%
Oriental	50,47%
Fès-Meknès	21,47%
Rabat-Salé-Kénitra	24,05%
Béni Mellal-Khénifra	8,42%
Casablanca-Settat	41,40%
Marrakech-Safi	20,14%
Drâa-Tafilalet	25,43%
Souss-Massa	49,48%
Southern Regions	63,45%

As far as regional GDP per capita is concerned, there has been significant progress, particularly in the South and in the Tangier-Tetouan-Al-Hoceima and Casablanca-Settat regions, with 60,161 MAD, 32,916 MAD and 50,129 MAD respectively in 2020. However, Casablanca-Settat remains the dominant region with a structure of 32.2% in 2020, followed by Rabat-Salé-Kénitra with 15.9%.

In terms of employment, there have been some upward and downward variations by region. Between 2015 and 2019, only the regions of Sud (3.2 points), Tanger-Tétouan-Al-Hoceima and Béni Mellal-Khénifra (0.8 points) and Casablanca-Settat (0.1 points) saw a relative increase in their employment rate. On the other hand, the other regions experienced a negative variation in the employment rate, ranging from -4 points in the Souss Massa region during this period.

As for the unemployment rate, we have seen a decrease in all regions except three. Firstly, the unemployment rate in the Souss-Massa region rose from 7% in 2012 to 10.3% in 2019, a significant increase of 3.3 points. Similarly, the regions of Fès-Meknès and Marrakech-Safi saw their unemployment rates rise by 1.9% and 0.1% respectively over the same period. Despite the downward trend in their unemployment rates, the Southern and Oriental regions are at the top of the table, with relatively high rates of 16.3% and 13.8% respectively in 2019, before the health crisis worsens the situation for all regions in 2020.

Despite the downward trend in their unemployment rates, the South and Oriental regions top the table with relatively high rates of 16.3% and 13.8% respectively in 2019, before the health crisis worsens the situation for all regions in 2020.

3.2. Map analysis

In this sub-section, an analysis of the disparities between the Moroccan regions will be carried out, identifying any proximity effects that may exist, using an exploratory spatial data analysis tool, i.e. spatial autocorrelation. Various cartographic illustrations will be presented, enabling disparities and gaps to be observed in terms of the variables presented above, for the 12 Moroccan regions. The reference year is 2019, as data for several variables are not yet available for more recent years.

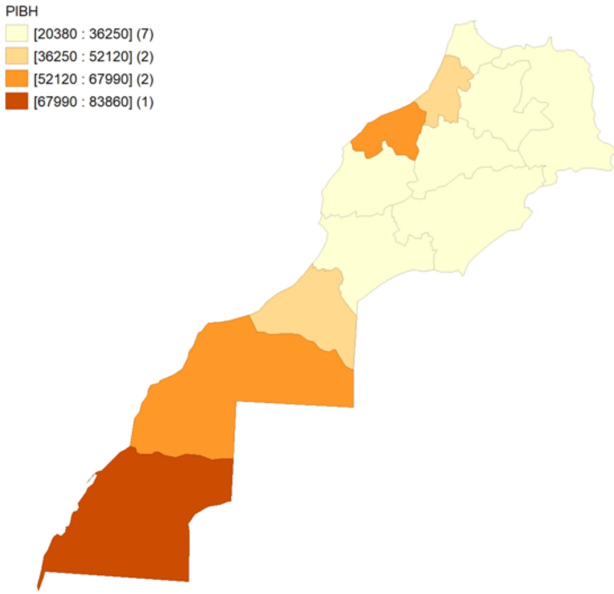


Figure 1. Map of regional GDP per capita in 2019

This mapping of GDP per capita is based on a scale of 4 equal intervals. It reflects a majority concentration of regions with close or similar GDP per capita. The Casablanca-Settat region, on the other hand, is surrounded by regions with a different GDP per capita. The Dakhla-Oued-Eddahab region borders a region with a relatively similar GDP per capita.

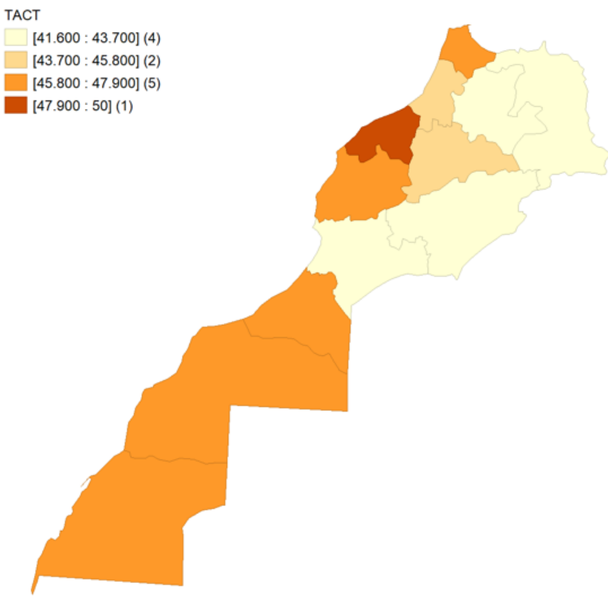


Figure 2. Mapping of the activity rate in 2019

From the map above, we can see that some neighbouring regions tend to have similar levels of activity rates and others do not. Spatial groupings and dependencies are not evident from the illustration.

The mapping of regional investment shows that there is interdependence between some neighbouring regions, while other regions do not show this relationship.

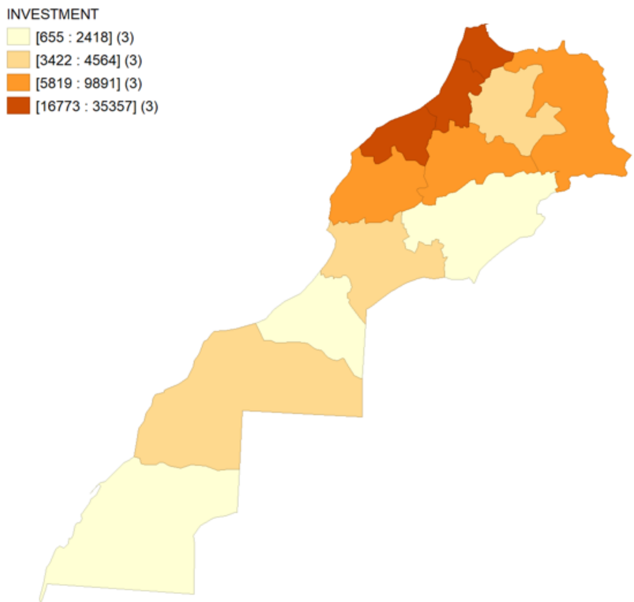


Figure 3. Map of regional public investment in 2019

To confirm or refute these findings, it is essential to carry out a spatial statistical analysis. In our case, this will be through spatial autocorrelation, where its significance and generalities will be presented, followed by the tests and their interpretation.

3.3. Analysis of spatial autocorrelation

Spatial autocorrelation may arise from the fact that the data are affected by processes that link different locations and that are responsible for a particular organisation of activities in space. In our study, positive spatial autocorrelation means that wealthy regions tend to be geographically close to other equally wealthy regions, and vice versa.

The following table shows the results of the Moran Index spatial autocorrelation test based on the Queen's adjacency matrix of order 1. This choice is justified by the fact that, in the Queen's sense of adjacency, regions are considered neighbours provided that they share a common border point. This choice shows the most logical regional connectivity.

The results of the Moran Index calculation confirm the existence of statistically significant spatial autocorrelation in 5 variables, namely: GDP per capita, regional investment, unemployment rate, urbanisation rate and the GINI Index. It can therefore be concluded that there is spatial interdependence between the majority of regions.

Table 2. Moran index and statistical significance

Variables	Moran Index	P-Value	z-score
GDP per capita	0,437	**0.006**	**2.797**
Activity rate	0.165	0.098	1,287
Regional investment	0.237	**0.033**	**2,048**
Unemployment rate	0.536	**0.005**	**2.885**
Employment rate	0.292	0.043	1.826
Urbanisation rate	0.395	**0.012**	**2.429**
Gini index	0.363	**0.025**	**2,071**

Source: Compiled by us using GéoDa

3.4. Analysis of the spatial association of Moroccan regions:

According to the table, most regions have lower than average values for the variables studied in a neighbourhood similar to their own (LL). In other words, most regions form spatial associations with low values in terms of the indicators studied:

GDP per capita: most of the regions, i.e. around 58%, have lower than average GDP per capita values in a neighbourhood that is similar to them in terms of GDP per capita level, forming a spatial association (LL). These are the regions of Draa-Tafilalet, Marrakech-Safi, l'Oriental, Souss-Massa and Tanger-Tétouan-Al Hoceima, Béni-Mellal-Khénifra and Fès-Meknès.

Activity rate: half of the regions have lower than average values in a neighbourhood similar to their own (LL). These are the regions of Draa-Tafilalet, Souss-Massa, Oriental, Fès-Meknès and Béni Mellal-Khénifra.

Regional investment: 50% of the regions have lower than average investment values in a neighbourhood similar to their own (LL). These are the regions of Ed Dakhla-Oued-Eddahab, Guelmim-Oued-Noun, Laâyoune-Sakia-Al-Hamra and Souss-Massa, Draa-Tafilalet and Oriental.

Regional unemployment rate: half of the regions have unemployment rates below the average in a neighbourhood similar to their own (LL). These are the regions of Beni-Mellal-Khénifra, Draa-Tafilalet, Marrakech-Safi, Fès-Meknès, Casablanca-Settat and Souss-Massa.

Regional employment rate: 4 regions have higher than average employment rates in a neighbourhood which is also characterised by a high unemployment rate (HH). These are Rabat-Salé-Kénitra, Béni-Mellal-Khénifra, Marrakech-Safi and Casablanca-Settat. While 4 other regions have lower than average values in a neighbourhood with higher employment rate values (LH). These 4 regions are Oriental, Souss-Massa, Draa-Tafilalet and Fès-Meknès. These latter regions therefore represent a negative spatial autocorrelation.

Urbanisation rate: 42% of the regions (5 regions) have lower than average urbanisation rates in a neighbourhood similar to their own (LL). These are Draa-Tafilalet, Marrakech-Safi, Béni-Mellal-Khénifra, Fès-Meknès and Souss-Massa.

GINI index: half of the regions have higher than average Gini index values in a neighbourhood similar to their own (HH). These are Souss-Massa, Rabat-Salé-Kénitra, Béni-Mellal-Khénifra, Marrakech-Safi, Casablanca-Settat and Draa-Tafilalet.

3.5. Analysis through sigma convergence

Having analysed the disparities and spatial effects between the 12 Moroccan regions using different indicators, it is now essential to carry out a statistical analysis of σ-convergence. This is associated with the study of the dynamic evolution of an indicator of the dispersion of GDP per capita between the regions.

The graph below shows a clear trend towards widening disparities in GDP per capita. For the sample as a whole, it appears that the dispersion is considerably lower in 2012 than in 2020 (σ_{2012}=0.35 and σ_{2020}=0.51). This indicates the presence of divergence between the Moroccan regions in our sample. During the years of the study period, there is an upward trend in dispersion, after a decrease in 2019, then a widening in 2020, most likely due to the COVID-19.

These results suggest the possibility of the existence of two convergence clubs. However, given the great volatility in the evolution of standard deviations, we are led to complete our study with a more complete analysis by integrating variables that could explain this convergence phenomenon. In this sense, the role of spatial proximity, mentioned in particular in the literature on the new geographical economy, is decisive in the analysis of this phenomenon.

4. Research methods:

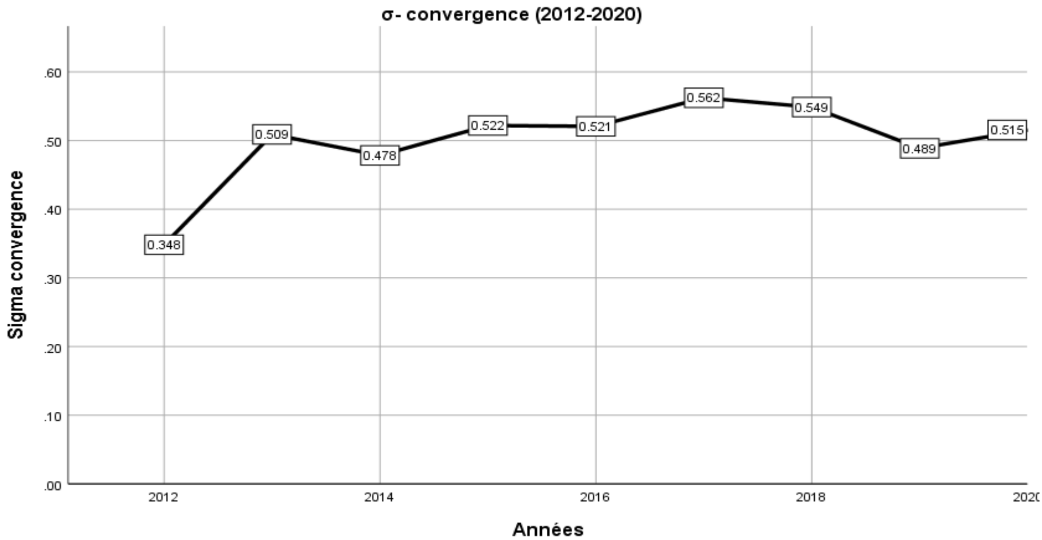
The analysis of the convergence phenomenon requires an exploration of the geographical and spatial dimension, in the interest of showing the existence of geographical patterns likely to be influenced by geographical proximity. Indeed, spatial proximity makes possible interactions and externalities between regions by causing spatial effects such as spatial autocorrelation, which refers to the presence of dependence between geographic observations.

Table 3. Interpretation of the quadrants of the Moran Diagram

	Quadrant HH	**Quadrant HL**	**Quadrant LL**	**Quadrant LH**
GDP per capita	3 regions (25%)	2 regions (16,67%)	**7 regions (58,33%)**	None (0%)
Activity rate	4 regions (33,33%)	3 regions (25%)	**5 regions (41,67%)**	None (0%)
Regional investment	4 regions (33,33%)	None (0%)	**6 regions (50%)**	2 regions (16,67%)
Unemployment rate	3 regions (25%)	2 regions (16,67%)	**6 regions (50%)**	1 region (8,33%)
Employment rate	**4 regions (33,33%)**	1 region (8,33%)	3 regions (25%)	**4 regions (33,33%)**
Urbanisation rate	3 regions (25%)	3 regions (25%)	**5 regions (41,67%)**	1 region (8,33%)
Gini index	**6 regions (50%)**	1 region (8,33%)	3 regions (25%)	2 regions (16,67%)

Source: Compiled by us using GéoDa

Figure 4. Dispersion of GDP per capita between the Moroccan regions



Source: Established by the authors, using SPSS

Our approach consists in estimating for each convergence equation, the non-spatial model with the OLS method, then the four spatial models: Durbin's Spatial Model, The Spatial Autoregressive Model, The Spatial Error Model and The Spatial Autoregressive Confused Model.

The Durbin Spatial Model, focuses on spatial lag effects, representing how the dependent variable in one location is affected by the values in neighboring locations. It incorporates a lagged dependent variable and an error term with spatial lag. The Spatial Autoregressive Model captures spatial dependencies by incorporating a spatial lag term in the dependent variable, reflecting the impact of neighboring observations.

Then, in contrast to the SAR model, the Spatial Error Model focuses on spatial dependencies in the error term rather than in the dependent variable, where the error term incorporates spatial dependencies. And finally, the Spatial Autoregressive Confused Model, reflects the combination of both SAR and SEM components. It allows for spatial dependencies in both the dependent variable and the error term simultaneously. So the main differences between these spatial models lie in the focus on spatial dependencies in either the dependent variable, error term, or both, making each model suitable for different analytical purposes within the realm of spatial econometrics.

First, we aim to estimate the absolute convergence model that suggests that poorer regions tend to grow at faster rates than richer economies, leading to a reduction in the income gap among countries over time. In other words, economies with lower initial levels of income per capita should experience higher growth rates, closing the gap with richer economies. In econometric representation, the regional GDP per capita for all the period studied is as a function of regional GDP per capita at the initial period. We therefore hypothesize that poorer regions in terms of GDP per capita have not grown more quickly than rich regions.

Then, we estimate the conditional convergence model posits that regions converge to their own unique steady-state levels of income, given certain conditions. Unlike absolute convergence, conditional convergence doesn't assume that all regions converge to the same steady-state. Instead, it allows for the possibility that different regions may have different levels of steady-state income. In our case, the econometric representation assumes that the regional GDP per capita for all the period studied is as a function of regional GDP per capita at the initial period, the regional unemployment rate, the regional activity rate and the regional public investment. In our case, we put forward the following hypothesis: by introducing steady state control variables, we expect a conditional convergence, and a positive impact of GDP per capita at the initial level, of regional investment and the activity rate on the growth of average GDP per capita.

Thirdly, we suggest that it is interesting to estimate a model that shows the influencing variables on the regional economic growth. To this end, the regional GDP is explained by firms created at the regional level, regional household final consumption expenditure, regional population density, the social density of the regional road network and the regional active population.

The data chosen is the data available at regional level for the 12 regions that exists actually. Data for these 12 regions before 2014 (they were 16 regions) are available for just some variables that cannot offer both time series and cross-sectional data sets that have repeated observations over time for the same individuals. There is no retropolated data for the regional level at a larger period. Those limitations have guided us to use theses variables for just this period.

5. Modelling regional convergence in morocco and the determinants of regional growth

In the context of our study, based on the theoretical and empirical literature review, we proceed in this section to analyse the convergence process between Moroccan regions through absolute β-convergence and conditional β-convergence, and we proceed also to identify the spatial effects and patterns of the Moroccan regions. This third part aims to model regional economic convergence in Morocco using spatial econometrics, and the determinants of regional growth that would make it possible to reduce the regional gaps.

5.1. Regional Convergence In Morocco

Our sample is made up of the 12 Moroccan regions covering the period from 2014 to 2020. Empirical studies dealing with convergence have included several variables from different categories. These may relate to the economy, education, health, etc. However, our study will focus essentially on economic and social variables because of their availability at regional level. These are the following explanatory variables:

- GDP per capita in base year
- Regional unemployment rate
- Regional activity rate
- Regional public investment

The empirical study will proceed as follows. The first step will be to estimate the absolute β-convergence model, which seeks to see if the average growth rate of GDP per capita between the initial and final dates is negatively correlated with the initial level of GDP per capita. In a second step, the estimation of the β-convergence will be carried out, by introducing the variables presented previously.

To estimate our models, we use the Elhorst approach. Firstly, the a-spatial model will be estimated using OLS, followed by the spatial models, namely the Durbin spatial model SDM, the autoregressive spatial model SAR, the spatial error model SEM and the autoregressive confused spatial model SAC. Secondly, the optimal model to be chosen is the one with the lowest value of the Akaiké criterion.

5.1.1. Estimation of the absolute β-convergence model

As a starting point, the absolute β-convergence model is written as follows:

$$\left(\frac{Y_{i,2020}}{Y_{i,2014}}\right) = \alpha + \beta \ln\left(y_{i,2014}\right) + \varepsilon \qquad (2)$$

Where:

$\left(\frac{Y_{i,2020}}{Y_{i,2014}}\right)$ is the vector of average GDP per capita growth rates for each region i between 2014 and 2020.

$y_{i,2014}$ is the vector of log GDP per capita observations for all regions i for 2014.

We then proceed to estimate the a-spatial model and the spatial models:

Table 3. Estimation of absolute β-convergence

	OLS	SDM	SAR	SEM	SAC
Constant	6.625 (0.000)*	-0.139 (0.525)	-0315 (0.160)	0.361 (0.198)	-
GDP per capita in initial year (ln)	-0.418 (0.089)***	0.054 (0.0000)*	0.891 (0.000)*	0.979 (0.000)*	-0.323 (0.187)
Spatially Lagged					
GDP per capita in initial year (ln)	-	-0.333 (0.005)*	-	-	-
Rho ρ	-	0.462 (0.000)*	0.223 (0.000)*	-	0.235 (0.303)
Lambda λ	-	-	-	0.495 (0.000)*	0.124 (0.615)
σ^2	-	0.0001 (0.000)*	0.00002 (0.000)*	0.0001 (0.000)*	0.1533 (0.000)*
R^2	0.03	0.91	0.91	0.90	0.90
AIC	94.832	-359.8679	-354.9657	-355.7704	90.6273
BIC	99.694	-345.283	-342.8116	-343.6163	100.3506

NB: Values between brackets are the p-values.
* significance at 1%.
** significant at 5% level
*** significance at 10% level

Source : Authors estimations

According to the estimates above, the spatial model with the lowest value of the Akaiké criterion is the SDM model. In other words, in reality, each region is not independent of the others; there is a spatial dependency.

We note that the explanatory variable is positive and significant, which calls into question the hypothesis of the existence of absolute β-convergence. Therefore, growth in regions with a low level of wealth per capita was not systematically faster than in regions with a higher level of wealth per capita. There was no absolute convergence between 2014 and 2020 between Moroccan regions.

The coefficient rho ρ, which refers to spatial autocorrelation, is positive (0.462) and significant. This means that there is a dependency in terms of GDP per capita growth between Moroccan regions due to their geographical layout. This shows that geographical proximity has a direct impact on per capita GDP growth in neighbouring regions. There is a direct and significant relationship between per capita GDP growth and proximity.

In addition, the lagged endogenous variable shows a value of -0.333. This value shows the spillover effect and indicates that the growth rate in one region is negatively and significantly influenced by the growth rates in contiguous regions.

These results show that spatial association patterns are not neutral in terms of the economic convergence of regions, and that there are disparities in terms of GDP per capita at the national level, and that these disparities are not being significantly reduced. However, it remains essential to undertake an analysis of a conditional β-convergence model.

5.1.2. Estimation of the conditional β-convergence model

$$\left(\frac{Y_{i,2020}}{Y_{i,2014}}\right) = \alpha + \beta \ln\left(y_{i,2014}\right) + \gamma_1 \ln\left(unem\_rt_{i,t}\right) + \gamma_2 \ln\left(actv\_rt_{i,t}\right) + \gamma_3 \ln(inv) + \varepsilon \tag{3}$$

$\left(\frac{Y_{i,2020}}{Y_{i,2014}}\right)$ is the vector of average annual GDP per capita growth rates for each region i between 2014 and 2020.

$\left(y_{i,2014}\right)$ is the vector containing observations of GDP per capita for all regions in 2014.

The results of the estimations provide determination coefficients R^2 greater than 80%. This confirms that the variables selected are globally relevant in explaining the dependent variable. According to Elhorst's approach, the optimal spatial model in our case, this is the DURBIN spatial model (SDM).

According to the estimation, the regional GDP per capita variable in the initial year is positive and significant. In other words, a 1% variation in the initial level of GDP per capita generates an economic growth rate of around 0.86%, with all other variables held constant in the SDM model. Thus, the relationship between the initial level of GDP per capita and its growth is significantly inverse, which is consistent with the basic assumption of conditional convergence. There is therefore a conditional catching-up process from poorer to more developed regions.

In addition, this spatial model makes it possible to identify the direct effects of the conditioning variables on convergence. Here, the coefficients express the spatial effect of the independent variables on the endogenous variable. The regional activity rate and regional public investment have a positive and significant impact on the process

Table 4. Estimation of the conditional β-convergence

	OLS	SDM	SAR	SEM	SAC
Constant	0.1776 (0.880)	-0.454 (0.251)	-0.449 (0.095)***	-0.028 (0.913)	-
GDP per capita in initial year (ln)	-0.1914 (0.053)**	0.861 (0.0000)*	0.848 (0.000)*	0.929 (0.000)*	-0.139 (0.029)**
Unemployment rate (ln)	0.2210 (0.039)**	0.014 (0.216)	0.021 (0.097)***	0.016 (0.202)	-0.184 (0.010)***
Activity rate (ln)	1.7971 (0.022)**	0.241 (0.064)***	0.281 (0.003)*	0.240 (0.015)**	2.232 (0.000)*
Regional public investment (ln)	0.7258 (0.000)*	0.030 (0.056)***	0.045 (0.002)*	0.054 (0.000)*	0.753 (0.000)*
Spatially Lagged					
GDP per capita in initial year (ln)	-	-0.167 (0.194)	-	-	-
Unemployment rate (ln)	-	0.052 (0.064)***	-	-	-
Activity rate (ln)	-	0.886 (0.656)	-	-	-
Regional public investment (ln)	-	0.028 (0.196)	-	-	-
Rho ρ	-	0.263 (0.028)**	0.154 (0.012)**	-	0.131 (0.010)***
Lambda λ	-	-	-	0.295 (0.038)**	-0.701 (0.000)
σ^2	-	0.00014 (0.000)*	0.000016 (0.000)*	0.00016 (0.000)*	0.0094 (0.000)*
R^2	0.8875	0.94	0.93	0.93	0.94
AIC	-79.665	-368.1392	-366.0989	-363.9346	-122.9856
BIC	-67.511	-338.9664	-346.6524	-344.4881	-105.9699

Source: Authors estimations

of conditional regional convergence, with coefficients of 0.241 and 0.030 respectively. However, the unemployment rate variable displays a positive and insignificant sign, which casts doubt on its positive impact on convergence.

In this spatial Durbin model, the coefficient rho ρ, which is a coefficient that captures spatial dependence, is positive and significant with a value of 0.263, i.e. the convergence of a particular region is influenced by the convergence process of neighbouring regions. In other words, there is positive spatial dependence and there are unobserved (spatial) characteristics other than the introduced variables.

The exogenous spatial effects, which make it possible to estimate the geographical spillover effects, suggest that the unemployment rate of a contiguous region tends to increase the convergence process of a region by 0.052. We can deduce that if a region absorbs more unemployed from neighbouring regions, it will facilitate their convergence process. Also, the growth of a region is not influenced by the GDP per capita of neighbouring regions. The lagged GDP per capita variable displays a negative and insignificant sign (-0.167).

The results of this estimation therefore suggest that proximity effects, expressed in our model in terms of contiguity, favour the process of conditional convergence, although the latter remains relatively weak.

5.2. Regional Disparities Reduction: Determinants of regional growth

After testing the existence of the convergence hypothesis, in particular absolute β-convergence and conditional β-convergence, we arrived at the results of the absence of the former and the presence of the latter. It is now fundamental to try to see how regional disparities in economic growth can be reduced, which would favour the convergence process. In this respect, we link the reduction of disparities to regional economic growth. In this sense, we look at the different variables likely to strengthen regional economic growth and, consequently, reduce disparities.

To this end, 6 regional variables are introduced for the 2012-2020 period, namely:

- Regional GDP (dependent variable)
- Firms created at regional level
- Regional household final consumption expenditure
- Regional population density
- The social density of the regional road network
- Regional active population

Using the same estimation methodology, the results are as follows:

Table 5. Determinants of regional growth estimations

	OLS	SDM	SAR	SEM	SAC
Constant	1.385 (0.000)	-	-1.116 (0.236)	0.8138 (0.040)	-
Firms Created R. L.	0.00000768 (0.050)	0.00000918 (0.003)	0.00000980 (0.002)	0.00000614 (0.068)	0.00000178 (0.592)
R. Household F. C. E.	0.443 (0.000)	-0.2514 (0.047)	0.559 (0.624)	-0.1052 (0.436)	0.147 (0.281)
R. Pop. density	0.0009 (0.000)	0.0019 (0.000)	0.00074 (0.140)	0.0013 (0.000)	0.0016 (0.000)
S. D. R. Road Network	0.0032 (0.124)	-0.0065 (0.001)	0.010 (0.160)	0.0088 (0.039)	0.0015 (0.458)
R. Active Population	0.200 (0.067)	0.615 (0.000)	0.560 (0.000)	0.70633 (0.000)	0.400 (0.000)
Spatially Lagged					
Firms Created R. L.	-	0.000000904 (0.822)	-	-	-
R. Household F. C. E.	-	-0.878 (0.000)	-	-	-
R. Pop. density	-	0.0017 (0.000)	-	-	-
S. D. R. Road Network	-	-0.0369 (0.000)	-	-	-
R. Active Population	-	0.292 (0.099)	-	-	-
Rho ρ	-	-0.091 (0.475)	0.439 (0.000)	-	-0.016 (0.581)
σ^2	-	0.0021 (0.000)	0.00135 (0.000)	0.00137 (0.000)	0.033 (0.000)
Lambda λ	-	-	-	0.6503 (0.000)	-0.514 (0.001)
R^2	97.50	96.73	90.65	96.62	96.88
AIC	-262.594	-336.567	-326.430	-330.428	-283.591
BIC	-246.5012	-304.382	-302.291	-306.289	-262.134

Source: Authors estimations

Based on Elhorst's approach, we are led to retain Durbin's spatial model, as it has the strongest explanatory power compared with the other spatial models estimated.

In terms of direct spatial interaction, all variable coefficients are significant, and only the variables Regional Household Final Consumption Expenditure and Social Density of the Road Network tend to have a negative impact on regional economic growth. The exogenous spatial interaction shows that all variables are significant with the exception of the Firms created variable. This suggests that a region's economic growth is positively dependent on the population and labour force density of neighbouring regions, and negatively dependent on regional final household consumption expenditure and the social density of neighbouring regions' road infrastructure.

The creation of new firms therefore has a positive but weak influence on regional economic growth. Similarly, for population density and the active population, these variables play an important role in the generation of regional output.

With regard to the endogenous interaction between neighbouring regions, the ρ statistic, which refers to the spatial dependence between the endogenous variable of each region, is negative (-0.091), which means that the economic growth of one region depends negatively on the economic growth of a neighbouring region.

6. Discussion

The aim of this paper is to verify the hypothesis of absolute and conditional β-convergence for the 12 Moroccan regions for the period 2014 to 2020. It also aims to verify the impact of proximity effects on the convergence process. To identify this spatial impact, we used spatial econometric modelling.

To test the hypothesis of absolute β-convergence, the Durbin spatial model was chosen, as it has the best explanatory power and provides the most information according to the Akaiké criterion. The results of our estimation indicate that there was no absolute β-convergence between 2014 and 2020. The hypothesis that poorer regions grew faster than richer regions is not confirmed in our model.

Regarding conditional β-convergence, the Durbim SDM spatial model is the optimal model. According to the estimation results of this model, it is concluded that there is a spatial dependence between regions in terms of the growth rate of regional GDP per capita. In other words, the convergence of a region is positively influenced by the convergence of neighboring regions. The coefficients associated with the activity rate and regional public investment variables are positive and significant. They have a positive spatial impact on the growth of GDP per capita.

In addition, the spatial autocorrelation in the two estimated β-convergence models suggests that there is spatial clustering of regions with similar values for the variables studied. This means that geographically close locations have similar characteristics. In our case, regions with low (high) GDP per capita growth rates tend to be geographically close to each other.

The spatial regime in our case is that of spatial agglomeration (Krugman, 1993). This spatial regime describes a spatial configuration where similar regions are close together. In this regime, economic or social variables are expected to be more concentrated in spatial groupings that include a few regions. These areas can be referred to as poles or clusters. Similarly, spatial concentration favours growth and, in turn, economic growth can reinforce polarisation processes that can lead to a more egalitarian distribution between regions. Geographical patterns can therefore be structured by growth processes and they can, in turn, shape growth patterns.

This can be explained as follows: since economic activities are unevenly distributed in space, cumulative agglomeration processes take place and most economic activities tend to be concentrated in a small number of locations. And since economic growth is stimulated by the geographical concentration of economic activities, patterns of uneven development are observed. And finally, through the initial conditions of the regions and the cumulative nature of the growth and agglomeration processes, the geographical distribution of rich and poor regions can be relatively stable over time.

It can be confirmed that spatial association patterns are not neutral with respect to the economic performance of Moroccan regions. Thus, the more a region is surrounded by dynamic regions in terms of economic growth, the higher its growth rate will be. Consequently, these similarities provide sufficient stimulation for the process of conditional convergence due to geographical proximity.

The study of the convergence hypothesis must be accompanied by an exploration of the ways of reducing regional disparities. To reduce disparities between regions, the latter should benefit from economic growth that will enable them to catch up with the more advanced regions. To this end, we have chosen to estimate an econometric model that allows us to see the determinants of regional economic growth.

The results of the estimations suggest that the creation of more firms at the regional level favours growth, which can be explained by the added value they create, the employment opportunities they offer to the regional population, as well as the various positive externalities they can provide. Added to this is the density of the regional population, which also has a positive impact on regional growth. This means that social agglomeration can offer economies of scale and diversified human capital. The geographical concentration of the population allows businesses to share fixed costs such as infrastructure and public services, which can lead to greater economic efficiency. Similarly, it offers social interaction that can create business networks that in turn promote regional growth.

The regional workforce also has a positive influence on regional growth. A large, skilled workforce can increase a country's economic productivity. The more people working and contributing to the economy, the greater the production potential. What's more, if the workforce is skilled and well trained, it can provide the specific skills needed for high value-added industries. A well-educated and skilled workforce can attract national and international investment. Similarly, a working population with jobs has purchasing power, which stimulates local economic activity. Companies have a market for their products and services, which encourages expansion.

Our estimations therefore suggest that the spatial regime of our regions is one of spatial agglomeration (Krugman 1993). Spatial agglomeration, according to Paul Krugman, refers to the economic phenomenon where economic activities and populations are geographically concentrated in certain regions. In our case, this means that the process of convergence and regional economic growth are the consequence of spatial dependency between Moroccan regions.

Conclusion

The problem of regional disparities is a concern that hinders the equitable development of regions. Reducing these disparities is the aim of public policies, which today are developed by integrating the territorial aspect, and more specifically the regional context. In our country, despite the efforts made over the decades, through various public policies aimed at human or territorial development, regional gaps and inequalities persist. This issue raises the question of the extent to which the less developed regions are catching up and moving closer to the country's most developed regions. This analysis of regional convergence is the subject of this paper.

This catching-up process has been the subject of a number of theoretical and empirical literary works. These works justified and explained why some countries are richer than others. It is argued that differences in the available stock of human capital in the countries justify these differences. The classical movement, in particular A. Smith, considered the role of the quality of the workforce in increasing productivity and long-term growth. More recently, others have emphasised the role of the accumulation of physical capital as a factor in growth. Endogenous growth models showed the importance of human capital in growth, such as education and the experience effect. Added to this was the role of research and development and innovation.

The theories of the new geographic economy are adding their grain of sand to the explanation of the location of wealth and its determinants. One of the main concepts of this theory is that of agglomeration economies. These occur when companies and industries cluster together in the same geographical location. This spatial concentration offers advantages to companies, including efficiency gains, economies of scale, spatial externalities, knowledge and innovation synergies, and a skilled and specialised workforce. These agglomeration economies can lead to the formation of industrial clusters and regional competitiveness.

Concerning the limitations that we faced principally, we have to cite the limited data available at the regional level and for a short period. This made us use the available data that are related to literature and economic instinct to explain preliminary the convergence question in an emerging country like Morocco that faces lack of data at the regional level in order to improve and deepen the investigation in the future when the data offer will be improved. This work may contribute as comparison for other similar small economies and emerging countries. This paper offers an example of the challenges that currently emerging countries are suffering and specially Africans.

Finally, this work needs to be completed by incorporating spatial heterogeneity, which plays a crucial role in the distribution of economic activities and resources. Some regions may be rich in natural resources, while others may have a highly skilled workforce. These differences can influence business and firms location choices and patterns of spatial competition between regions.

Moreover, we cannot evaluate regional growth and development without surrounding potential growth of the regions. This area might be developed with future studies and investigations in order to improve the offer of literature regarding the regions in Morocco where the attention is specially focused at the macroeconomic level. Thus, identifying clearly the regions characteristics, social constructions, economic potential, comparative advantages we might contribute to building a sophisticated territorial project and regional growth model that might bring a considerable value of regional people's life quality.

References:

Angeon V. And Callois J-M., 2005. Fondements Théoriques Du Développement Local: Quels Apports Du Capital Social Et De L'économie De Proximité. Économie Et Institutions. Open Edition.

Bourdin S., 2003. Pour Une Approche Géographique De La Convergence: Les Inégalités Régionales Dans l'Union Européenne Et Leur Évolution. L'Espace Géographique. 3, Pp. 270-285.

Bun M. and El Makhloufi A., 2007. Dynamic Externalities, Local Industrial Structure And Economic Development: Panel Data Evidence For Morocco. Regional Studies. Taylor & Francis Journals, Vol. 41(6), Pages 823-837.

Carré D. And Levratto N., 2011. Dynamique Des Territoires, Agglomération Et Localisation Des Firmes. Innovations. N°35. Pp.183-206.

Catin M., Hanchane S. And Kamal A., 2007. Structure Industrielle, Externalités Dynamiques Et Croissance Locale Au Maroc. Région Et Développement, N° 25, Pp. 45-63

Catin M., 1997. Disparités Spatiales De Productivité, Accumulation Du Capital Et Économies D'agglomération. Revue Économique, Volume 48, N°3.

Cattan N., 2006. Centre-Périphérie. Dictionnaire Des Mondialisations. Armand Colin, Pp.47-49.

Geppert, K., and Stephan, A., 2008. Regional Disparities In The European Union: Convergence And Agglomeration. Papers In Regional Science, 87(2), 193–217.

Chatri A., Ezzahid E., Maarouf A., and Oumansour N., 2018. Human Capital, Growth, And Speed Of Convergence Evidence From African Economies With Augmented Solow Model. Les Cahiers Du Plan. Numéro Special, Volume 1.

Cherodian, R., and Thirlwall, A. P., 2015. Regional Disparities In Per Capita Income In India: Convergence Or Divergence? Journal Of Post Keynesian Economics. 37(3), 384–407.

Combes P., 2000. Structure Économique Et Croissance Locale: France, 1984-1993. Journal Of Urban Economics. Vol. 47, N° 3, Pp. 329- 355.

Conti S. and Giaccaria P., 2001. Local Development And Competitiveness. Geojournal Library. Springer Dordrecht

Dramani L., 2010. Convergence Économique Et Spatiale En Afrique: Cas Des Pays De La Zone CFA. Consortium for Economic and Social Research. Université Cheikh Anta Diop, Dakar

Glaeser E., Kallal H. D., Scheinkman J. and Shleifer A., 1992. Growth In Cities. Journal Of Political Economy. Vol. 100, Issue 6, 1126-52.

Kalra R. and Thakur S., 2014. Development Patterns In India: Spatial Convergence Or Divergence?. Geojournal. Vol. 80, No. 1, Pp. 15-31

Kuma J. K., 2020. Economic Convergence Concept: Theoretical And Empirical Review. Working Papers. hal-02425003, HAL.

Koraich M., Sahibi Y. and Hamzaoui M., 2019. Inequalities Of Growth And Regional Dynamics In Morocco. Revue D'études En Management Et Finance D'organisation. N° 8.

Le Gallo J., 2002. Disparités Géographiques Et Convergence Des Régions Européennes: Une Approche Par L'économétrie Spatiale. Economies Et Finances. Université De Bourgogne.

Le Gallo J., Ertur C. And Baumont C., 2006. Clubs De Convergence Et Effets De Débordements Géographiques: Une Analyse Spatiale Sur Données Régionales

Européennes, 1980-1995. Économie Et Prévision, Programme National Persée, Vol. 173(2), Pages 111-134.

Lewandowska, A., Pater, R., Cywiński Ł., 2019. Determinants Of Business Innovation In The Regional Innovation System Context. Policy Implications For A Less Developed Region. Studia Regionalne I Lokalne, Vol. 1 (75), Pp. 5-27

Meyer Stamer J., 2008. Systemic Competitiveness And Local Economic Development. Meso Partner, Duisberg.

Peiró-Palomino, J., 2019. Regional Well-Being In The OECD: Disparities And Convergence Profiles. Journal Of Economic Inequality, 17(2), 195–218.

Rosenthal S. and Strange W., 2003. Geography, Industrial Organization, and Agglomeration. The Review of Economics and Statistics, 85, (2), 377-393

Zhang Y., 2021. The Regional Disparity Of Influencing Factors Of Technological Innovation In China: Evidence From High-Tech Industry. Technological & Economic Development Of Economy, 27(4), 811–832.