

Spatial Analysis of Regional Disparities in Education and Unemployment: The Mediating Role of GDP

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Abstract:

The present paper examines the access to the Moroccan labour market. The latter, no doubt, faces several obstacles such as demographic, economic, educational problems. These factors, lead to disparities and hinder the professional insertion of young graduates. Based on an exploratory spatial analysis, this work will evaluate professional insertion, higher education and economic growth in the regional level. For this regional context, we have chosen the educational factor, which reflects the rate of access to higher education and the degree level of the graduates and the economic factor, which expresses the degree of wealth creation. At the end, a lose look will be given job creation rate for each region.

This research adopts a regional exploratory methodology of Geo-referenced Data and confirmatory spatial data analysis techniques to study the link between variables. The global spatial autocorrelation result based on Moran's I statistic confirms the existence of positive spatial autocorrelation and significant clustering of educational inequality, GDP disparity and professional insertion. This study also showed that economic growth mediates the relationship between education and professional insertion. The findings support the ideas of the centre-periphery theory and highlight the functional relationship between what happens at one point in space and what is happening elsewhere.

Keywords: economic growth; higher education; professional insertion; spatial analysis; mediating effect

JEL Classification: C31; R12; P48; R11; R23; A23; I24

Paper type: Empirical Research

1. Introduction:

Given the globalization of trade and the rapidly changing competitive environment, a return to the local level is a real driver for competitiveness. To meet this challenge, Morocco has focused on the region as a territorial level capable of enhancing its potential (natural, human, intangible resources: history or culture) and responsible for its attractiveness. The implementation of the advanced regionalization process, which began in 2011, seeks to give concrete expression to this reflection and to remedy disparities through the economic and social upgrading of its regions and the strengthening of the democratic process through a real decentralization of power.

The regionalization process resulted in 2015 in a territorial division that has 12 regions instead of 16. Each region has assets that allow it to differentiate itself and generate its own development. For example, the region of Fez-Meknes is known for its agricultural potential, the region of Dakhla Oued Ed-dahab is known for its fishing resources, the regions of Casablanca-Settat and Tangier-Tetouan are rather known for industry, Souss Massa and Marrakech-Safi for tourism etc.

Despite this process of regionalisation, undertaken to promote fairer and more participatory regional development, the Moroccan regions continue to experience deterioration at various levels. A growing deterioration in the living conditions of part of the population, faced with rising unemployment, particularly among young people and graduates, who are struggling to find a place in a job market that is not very inclusive, poverty and insecurity, and difficulties in accessing education, health, water, housing, leisure activities, etc. All these factors contribute to the worrying reality of the regional divide. All these factors contribute to a worrying reality: the territorial divide is widening rather than narrowing, compromising the objectives of balanced development set by public policy.

These territorial inequalities refer to the centre-periphery model, which exposes the relationship of domination between a dominant centre, with a concentration of population, production capacity, research and innovation capacity, etc., and a dominated periphery that supplies the centre with (raw materials, labour, etc.) but receives very little in return. According to Viot (1967), “significant and lasting inequalities between regions can compromise the success of a growth policy by aggravating economic imbalances and social tensions.” In the case of Morocco, territorial disparities (between regions) are, according to the Regional and Territorial Inequality report (Economic, Social, and Environmental Council (CESE) 2017), among the most important aspects of inequality to be reduced. Our article considers three scales of disparity: an economic scale for which we have retained the share of regions in the formation of national GDP, a social scale for which we have retained the unemployment rate and a scale relating to access to higher education for which we have retained the number of new students enrolled in higher education.

The great role of education in the development process of developing countries has given rise to several studies (Amaghous and Ibourek 2013; Bonal 2004; UNESCO 2004). These works analyse education indicators from a classical perspective. However, very few works study educational or economic variables from a spatial perspective. Over the last decade, the importance of geography and space in the analysis of economic convergence has been increasingly recognized (Dietrich and Monasterio 2009; Janikas and Rey 2005).

This convergence is widely discussed with reference to the dynamics of economic variables (income, wages, GDP, etc.) or social variables in studies such as (Bakour & Abahamid, 2019; Boumahdi & Zaoujal, 2023; Dadush & Saoudi, 2019). The analysis of spatial convergence (within the same country) based on socio-economic variables with the mediation of GDP is new. These indicators can be a useful complement to understanding the spatial dynamics of regions.

Baumol et al. (1994) consider that the analysis of socio-economic variables can be the best way to study performance disparities between regions, especially in developing countries like Morocco. Today, the observation of spatial disparities in the world shows that they are not only perceptible between different countries. Indeed, they also exist, and are even more pronounced, between the regions of the same country according to its level of development.

Our main research question is in line with the phenomenon of regional disparities in Morocco and aims to assess the influence of socio-economic factors on unemployment. Therefore, we will try to answer the following question: What is the impact of economic growth and education on unemployment in a context of regional disparity?

The objective of this paper is to study the regional inequalities in Morocco, in terms of education, economic growth and unemployment. This study uses Exploratory Georeferenced Data Analysis and confirmatory spatial econometric analysis to test hypotheses on the impact of education (measured by access to higher education and level of diploma) on unemployment and to validate the introduction of economic growth (GDP) as a mediating variable.

To meet this objective, we have structured our work as follows. The first part will be dedicated to a review of the literature through which we will define the concept of centre-periphery and the links between the selected variables (education, economic growth and unemployment). The second part will be devoted to the research methodology and the presentation of the results of our study.

2. Theoretical overview:

2.1. The centre-periphery approach

The contrast between Morocco's regions in economic and social conditions, and in terms of access to education refers to the centre-periphery approach and to the idea of dualism between a dominant region and another dominated one. This approach is implicitly or explicitly mentioned in various works that we will briefly describe. The theory of central places proposed by Walter (1933), attempts a systematic explanation of the spatial organization of a system of cities based on certain assumptions (Such as: homogeneity of the geographical space...). This author considers cities as central places that provide goods and services to the surrounding countryside. This theory is based on the distinction between centres, which are the seat of a supply of goods and services, and peripheries (region complementary to the centre) where the demand, the user population resides (Pumain, 2005).

The theory of dependence developed in the 1960s by authors such as Samir Amin, Sergio Bagú, Fernando Henrique Cardoso, provides a framework for explaining the centre-periphery duality on a global scale. According to this theory, dependence can take many forms (economic, social, cultural, technological...), and is related to the unfair game of the capitalist system as the centre represented by the great economic powers exploits and uses the resources of the periphery (the underdeveloped countries). Part of the interactions between nations is therefore marked by inequalities. “The centre-periphery couple refers to an asymmetry, a spatial inequality. The centre gathers everything that is attractive, rich, developed, new, etc.; the periphery is defined negatively in relation to the centre. It appears as marginal, depopulated, neglected, underdeveloped, without decision-making autonomy, dominated or even colonized and exploited.” (Reynaud, 1992, cited by Perreur & Huriot, 1995).

Reynaud (1980) is known for having developed the centre-periphery approach in geography, he defines the centre and the periphery in relation to a “territorial system without giving them a geometric meaning, i.e., the centre is not in the middle of a space, nor is the periphery relegated to the margins.” (Cattan 2006). Instead, it is its economic, social, cultural, and political content that makes it an attractive place where the concentration of population, production and service activities, culture, employment, wealth, etc. is reinforced. In the same

way, the periphery is not always positioned away from the centre, "dominated places, delayed development and poverty can be found within the most central zone of a space" (Huriot & Perreur, 1995).

The periphery refers to dependence, subordination and is always expressed in negative terms in relation to the centre. Reynaud (1980) uses the notion of feedback from the systemic approach to expose two possible scenarios for a situation where the different populations of a space experience unequal situations: either a positive feedback loop that amplifies inequalities (e.g. wealth, activities that increase even more in the centre), or a negative feedback loop that brings stability and regulation by acting in the opposite direction (redistribution actions, corrective policies, etc).

2.2. Human capital theory

Examining the relationship between education and unemployment refers us to the theory of human capital. In the general sense, human capital is defined as all the knowledge, skills, aptitudes and personal characteristics that contribute to personal, social and economic well-being (The Organization for Economic Cooperation and Development (OECD) 1998). In a strictly economic sense, it is the set of knowledge and skills mobilized by the individual to produce goods and services (Canisius Kamanzi, 2006). These skills are accumulated through the different training courses followed and during the experiences lived (Fuente & Ciccone, 2003).

The theory of human capital, initiated in 1961 by Schultz, (Denison 1962; Becker 1964) and many others, emerges to provide an explanation for the economic growth observed following the improvement in the quality of the workforce due to the increase in the level of education by workers in the United States. Education or the level of education is thus perceived as a catalyst for economic growth. The precursors of this theory establish a positive and growing relationship between an individual's level of education and the possibility of finding a job and earning a high wage. Education is seen as an investment that leads to future income.

The labour market is at the centre of economic reasoning about human capital, and many labour economists have developed research to show that higher levels of education are most often associated with higher wages, but also with lower unemployment risks (Mincer, 1974). As a result, they provide a tangible assessment of the rate of return to education. Other authors such as (Nauze-Fichet & Tomasini, 2002) have found that a degree reduces the risk of unemployment and promotes opportunities for skilled and well-paid jobs. Similarly, a high level of human capital allows employees to stay in the workforce as long as possible, (Fuente & Ciccone, 2003). Thus, the strengthening of human capital ensures job insertion, better employability and lower unemployment. Education even within the workplace is a guarantee of productivity and gains for the employee, for (Canisius Kamanzi, 2006) "Additional training for workers is a potential resource for increasing the productivity of the company and increasing the earnings of the employees themselves."

2.3. Okun's Law

The explanation of the relationship between economic growth and unemployment measured by the unemployment rate refers to Okun's law developed in 1962 by the economist Arthur Okun. He established a relationship between the unemployment rate and economic growth and was the first to demonstrate a negative empirical relationship between the two variables using American data from 1947 to 1960. He shows the reaction of the unemployment rate to a decrease or an increase of the GDP, a decrease of the unemployment rate of 1% requires an increase of the growth rate of 3% according to this author. However, this GDP growth does not always imply a decrease in the unemployment rate, and this is due to two factors: the evolution

of the active population and labour productivity. Indeed, the active population is not stable (because the demography of the population has a direct impact on the demand for jobs), if it increases by 1% per year, the growth of production must also increase by 1% to stabilize unemployment, so that the new arrivals on the labour market are "absorbed". Similarly, labour productivity normally increases every year. If this productivity increases by more than half a point, growth must increase by the same amount to stabilize unemployment. This law alone does not therefore resolve the question of the level of growth needed to stabilize the unemployment rate.

In the case of Morocco, different empirical studies have examined the relationship between economic growth and the unemployment rate. In their articles, Ezzahidi and El Alaoui (2014) outlined the different empirical studies inherent to the case of Morocco. (Kapsos, 2006) calculated the employment content of growth for three periods. In the first period from 1991 to 1995, an increase in GDP of 1% was associated with a decrease in employment of 0.09%. The second period is 1995-1999, which was characterized by employment increasing faster than growth (elasticity=1.07). The third period is 1999-2003. It is characterized by an elasticity of employment with respect to growth equal to 0.28. In their in-depth study of the functioning and dynamics of the Moroccan labour market.

3. Hypothesis and Research Model:

Based on our literature review and the research question posed above, three hypotheses were formulated.

3.1. Education and Unemployment: The Direct Link

According to human capital theory (Becker, 1964; Mincer, 1974), knowledge is accumulated through education and training. Thus, obtaining a diploma constitutes the acquisition of a stock of knowledge and skills that can be put to good use in employment and make holders more productive, or even more efficient, on the labour market. The theory of human capital justifies young people's interest in increasing their level of training and therefore their reproductivity.

According to studies carried out by several international organizations (World Bank, Eurostat), a high level of education increases the employment rate. A better-educated individual will be more productive and adapt more easily to the changes and demands of globalization and the development of new technologies.

We propose the following hypothesis:

- **H1:** *Education will have a negative effect on regional unemployment.*
- *This hypothesis includes the following two sub-hypotheses:*
- **H1a:** *access to higher education will have a negative effect on regional unemployment.*
- **H1b:** *the level of the diploma will have a negative effect on regional unemployment.*

3.2. The Mediator Effect

(Schultz, 1961) and (Denison, 1962) show that education contributes directly to growth by improving the qualifications, skills and production capacities of individuals. This economic growth, in turn, affects unemployment, and the relationship between these two variables is described by Okun's law. For manufacturers, to produce more products, more people must be hired. The reverse is also true. But, in normal economic times, employment rises and falls with the rate of production at a given level.

Education has long been regarded as a key determinant of economic growth. (Barro, 1996) and (Mankiw et al., 1992) assembled a large literature on cross-country growth regression and found a significant and positive association between the processes of human capital accumulation and skills development represented by education indicators and economic growth (Krueger & Lindahl, 2001; Sianesi & Reenen, 2003).

On the other hand, some empirical studies indicate the presence of a relationship between economic growth and employment, in particular (Hjazeen et al., 2021; Islam & Nazara, 2000; Seyfried, 2011).

This leads us to propose the following hypothesis:

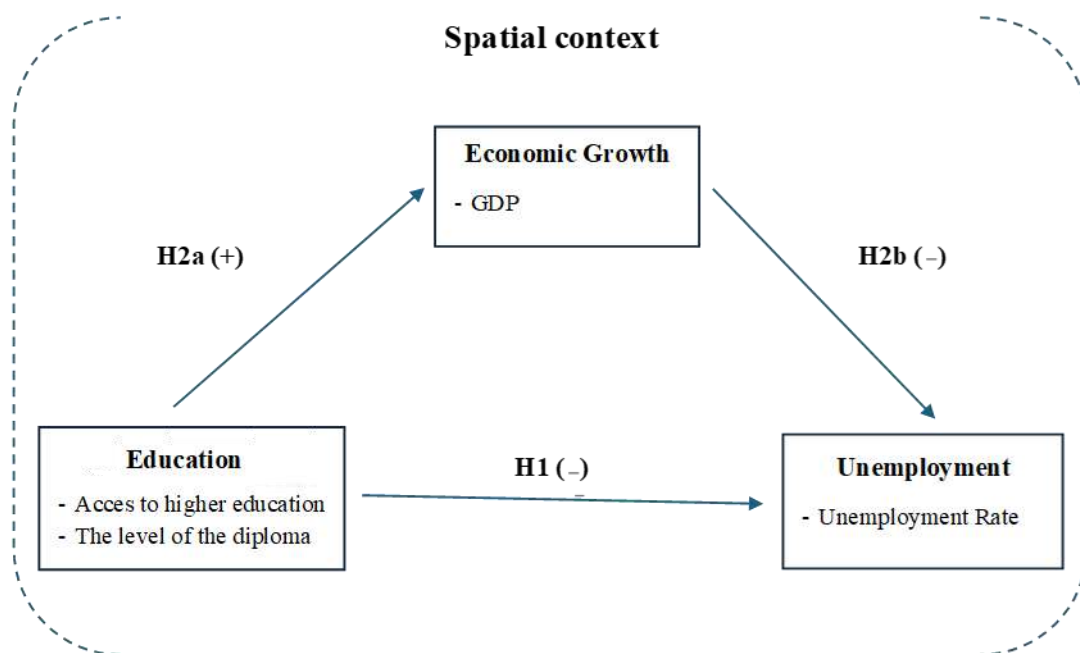
H2: Economic growth mediates the relationship between education and regional unemployment.

This hypothesis includes the following two sub-hypotheses:

H2a: Education will have a positive effect on economic growth.

H2b: Economic growth will have a negative effect on regional unemployment.

Figure 1: Theoretical Model with Hypotheses.



Source: our own elaborations

4. Methodology and Analysis Instruments:

This research adopts a methodological plurality:

We first proceeded with the regional exploratory method of Georeferenced Data, using Geoda, which is a set of techniques whose purpose is to describe and visualize spaces, identify atypical locations and extreme points, detect patterns of spatial coherence and finally propose spatial regimes or other forms of spatial heterogeneity (Bailey & Gatrell, 1995; Haining, 1990).

The second phase of the research is confirmatory using Stata. This approach puts in place a certain number of measures and statistical tests to establish the level of significance of the relationships studied.

Before starting the analysis, a detailed explanation of the key indicators used in the study and their sources should be provided, to ensure clarity and consistency of interpretation (table1).

4.1. Data collection

Table 1 Definitions and sources of the variables' indicators

Variables	Indicators	Sources
Unemployment	<u>UR: The Regional Unemployment Rate</u> In this study, we adopt the HCP definition, namely the unemployment rate, which expresses the proportion of unemployed in the active population aged 15 and over. This rate is obtained by dividing the number of unemployed by the number of working people aged 15 and over.	Statistical Yearbooks for Each Region, HCP 2018 (Haut-Commissariat au Plan is the Moroccan institution responsible for the production of economic, demographic and social statistical information and for the preparation of the nation's accounts).
Economic Growth	<u>GDP: Regional Gross Domestic Product</u> GDP is the sum of the value added generated by the various economic agents and import duties and taxes. HCP	Regional profiles report, Ministry of Economy, Finance and Administration Reform Morocco, 2017/2018.
Education	<u>The Access Rate to Higher Education</u> This indicator shows how many students will enter higher education. Due to lack of data, we have calculated this indicator while dividing the number of new students by the number of the youth population. <u>Level of Education:</u> The different levels of education are: ➤ No degree; ➤ Middle level diplomas include primary school certificates, secondary school certificates and professional qualification or specialization diplomas; ➤ Higher level diplomas include bachelor's degrees, technical or specialized technical diplomas and higher education diplomas (faculties, prestigious universities and institutes).	Higher Education in figures, Ministry of National Education, Vocational Training, Higher Education & Scientific Research Morocco, 2019/2020.

Source: our own elaborations

4.2. Exploratory Spatial Data Analysis

Spatial autocorrelation is defined as the correlation, positive or negative, of a variable with itself due to the spatial location of the observations.

In general, spatial autocorrelation indices allow us to identify the correlation between geographically close measurements of a measured event (1). If we denote by WY the vector of means of the variable Y in the neighbourhood of each spatial unit, the spatial autocorrelation indices are given by:

$$\text{Corr}(Y, WY) = \frac{\text{Cov}(Y, WY)}{\sqrt{\text{Var}(Y) \cdot \text{Var}(WY)}} \quad (1)$$

The most commonly used signs are the Moran index and the Geary index. The Moran index, noted I, is the most powerful test for detecting the presence of spatial dependence because of its higher overall stability (Cliff et al., 1981; Stoyan, 1986).

Through the Moran diagram, we will answer the following questions:

1. Is the distribution of observations random in space?

When the Moran diagram highlights a particular spatial structure, the calculation of the spatial autocorrelation index aims to answer the following question:

2. Could the values taken by neighbouring observations have been so similar (or so dissimilar) simply by chance?

3. What is the sign of the spatial autocorrelation?

The second question is to test the hypothesis of no spatial autocorrelation for the raw variable y .

- H_0 : no spatial autocorrelation
- H_1 : presence of spatial autocorrelation

Define the Neighbours Based on the Distance

It is necessary to determine beforehand the structure of the spatial dependence and its formalization from the notion of weight matrix. In our study, we used the spatial weight matrix W , based on the spherical distance between geographical centroids of the regions. Formally, the spherical distance in kilometres between the centroids of two regions is defined as follows (Dall'Erba, 2004):

$$d_{ij} = 6378 * \arccos \{ \cos |Y_i - Y_j| * \cos X_i * \cos X_j + \sin X_i * \sin X_j \} \quad (2)$$

Where X_i and Y_i are respectively the latitude, longitude of the centroid of region i . Similarly, for X_j and Y_j for region j .

The neighbourhood matrix W (3) measures the similarity between the observations. A value strictly higher than zero means that the observations are judged to be close.

$$W_{ij} = \begin{cases} 1 & \text{if } i \text{ and } j \text{ are connected in space} \\ 0 & \text{if not} \end{cases} \quad (3)$$

Global spatial autocorrelation analysis

The measure of global spatial autocorrelation is traditionally based on Moran's I statistic in the following form:

$$I_t = \frac{z_t' W z_t}{z_t' z_t} \quad t = 1, \dots, 6 \quad (4)$$

- Z_t is the vector of n observations for year t in deviation from the mean.
- W is the row-standardized spatial weights matrix.

Moran's I statistic measures the degree of linear association between the vector z_t of observed values and the vector $W z_t$ of spatially weighted means of neighbouring values called the spatially lagged variable.

Local Spatial Autocorrelation Analysis

Local spatial autocorrelation measures deconstruct the global index to determine the individual contribution of each location. To perform our local spatial correlation analysis, we then observed the spatial structure using the Moran diagram and the Local Indicator of Spatial Association (LISA). Moran's local index is defined as a LISA as follows (Anselin, 1995):

$$I_{i,1} = \frac{(x_{i,t} - \mu_t)}{m_0} \sum_{j=1}^n w_{ij} (x_{j,t} - \mu_t) \quad \text{et} \quad m_0 = \sum_i (x_{i,t} - \mu_t)^2 / n \quad (4)$$

Where $x_{i,t}$ is the observation corresponding to region i and year t , μ_t tests the mean of the observations calculated in year t .

4.3. Confirmatory spatial data Analysis

A second confirmatory step allowed us to test and validate the proposed model and to verify or

invalidate some of the hypotheses assumed. Several models have been proposed in the literature to explain spatial interactions and spatial dependence.

Spatial dependence can be accounted for in an econometric model by including spatially lagged variables, i.e., weighted averages of observations for neighbours in a given location. Spatially lagged variables can be:

- The dependent variable in the case of the spatial autoregressive model (SAR) (5)
- The error terms in the case of the error autocorrelation model (SEM) (6)
- The independent variables in the case of the Cross Regression Model (CRM) (7)
- The combination of all these variables in the case of the founding model of MANSKI (Manski, 1993) (8)

$$Y = \rho WY + X\beta + \varepsilon \quad (5)$$

$$Y = X\beta + u \quad et \quad u = \lambda Wu + \varepsilon \quad (6)$$

$$Y = X\beta + WX\theta + \varepsilon \quad (7)$$

$$Y = \rho WY + X\beta + WX\theta + u \quad et \quad u = \lambda Wu + \varepsilon \quad (8)$$

With the parameters β for the exogenous explanatory variables, ρ for the endogenous interaction effect, θ for the exogenous interaction effects, and λ for the spatial correlation effect of the errors called spatial autocorrelation.

Following the objective of our paper, which is to study the impact of the explanatory variables on the disparity of the dependent variable (unemployment), we chose the two models (SAR and SEM):

$$UNEMP = C + \rho WUNEMP + \alpha'1ACCES + \alpha'2LEVEL + \gamma GDP + \varepsilon \quad (9)$$

$$UNEMP = C + \alpha'1ACCES + \alpha'2LEVEL + \gamma GDP + u \quad et \quad u = \lambda Wu + \varepsilon \quad (10)$$

5. Analysis of results:

IW > 0 => positive spatial autocorrelation

It appears that all variables by regional head are positively and spatially autocorrelated with a critical p-value less than 0.05 (typically ≤ 0.05) (Figure 3).

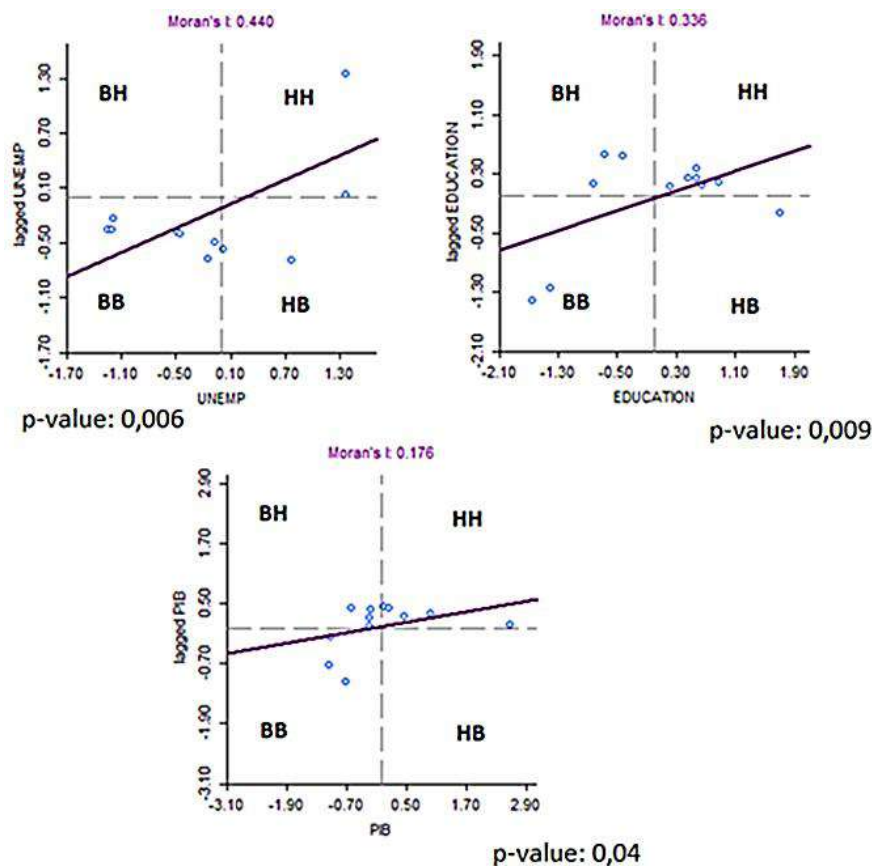
The positive spatial autocorrelation of our variables refers to spatial concentration and validates the hypothesis of disparity in education, economic growth and unemployment. Regions with similar levels of inequality, therefore, tend to be spatially concentrated. Thus, it is possible to reject the null hypothesis of no spatial autocorrelation. This confirms the regional disparity. Regions with relatively high indicators of the variables tend to be located near other regions with relatively high indicators more often than if this location was purely random.

5.1. Local Spatial Autocorrelation Analysis

The value of the Moran index can thus be translated as the share of variance that can be explained by the neighbourhood (Oliveau, 2004). A Moran index (unemployment) of 0.44 would thus attribute 44% of the variance to neighbourhood values. An index (education) of 0.33 would impute 33% of the variance to neighbourhood values, and the growth index would attribute 17% of the variance to neighbourhood values.

The Moran diagram (Figure 2) allows us a quick interpretation of the spatial structure. It is a scatterplot with the values of the variable y centred on the x-axis and the mean values of the variable for neighbouring observations Wy on the y-axis (where W is the normalized weight matrix). The two properties y centred, and W normalized mean that the empirical mean of Wy is equal to that of y and therefore equal to 0. We also plot the linear regression line of Wy versus y and the equation lines $y = 0$ and $Wy = 0$ that bound the quadrants.

Figure 2: Diagram and Moran index of regional disparity of variables.



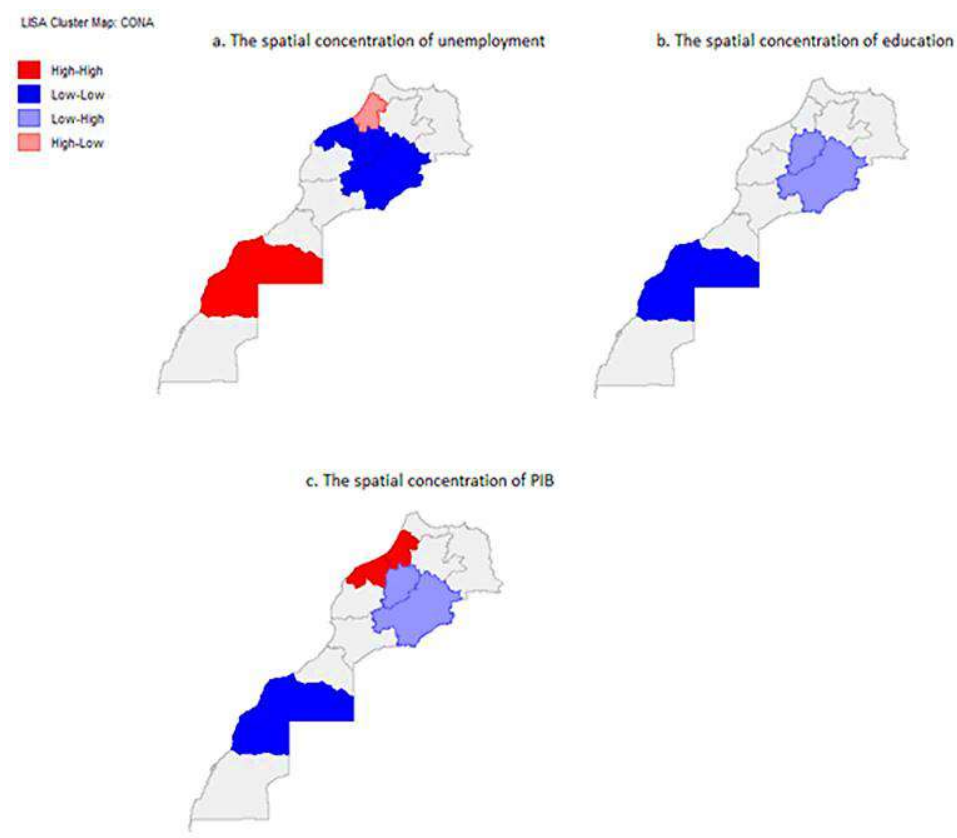
Source: Geoda Output

The Moran diagram of the 3 variables shows particular spatial structures, the slope of the linear regression is non-zero since there is a correlation between y and W_y . Each of the quadrants defined by $y = 0$ and $W_y = 0$ corresponds to a particular type of spatial association.

The spatial concentration of the variables confirms the "centre-periphery" model and visualizes the inequalities between the centre and the peripheries (Figure 3):

- HH quadrants show regions associated with **high** value surrounded by regions associated with **high** values: the peripheries are characterized by high unemployment and the centre is characterized by a higher level of wealth.
- The BB quadrants (a **low**-value region surrounded by **low**-value regions) represent positive spatial autocorrelation because they indicate a spatial clustering of similar values (z_i and $(Wz)_i$ are similar): the peripheries are determined by a low rate of access to higher education and low wealth creation, while the core is characterized by a low unemployment rate
- The BH quadrants show the regions associated with a **low** value surrounded by regions associated with **high** values: regions close to the centre are marked by a low rate of access to higher education and a tiny GDP (Drâa-Tafilalet and Béni Mellal-Khénifra).
- The HB quadrants (a region associated with a **high** value surrounded by regions associated with **low** values) represent negative spatial autocorrelation because they indicate a spatial clustering of dissimilar values (z_i and $(Wz)_i$ are dissimilar).

Figure 3: The spatial concentration of the variables.



Source: Geoda Output

Our selection of the spatial model between the SAR and SEM models is based on the bottom-up approach of (Florax et al., 2003), which consists in performing tests of the Lagrange multiplier ((Anselin et al., 1996) for specification tests of the SAR and SEM models, robust to the presence of other types of spatial interactions) and then deciding between the SAR, SEM or non-spatial model.

In our case, we chose the SEM model (the spatial error model), following the various tests of the Lagrange multiplier (LM) and because of its wide use in the literature and given its extreme flexibility (table 2).

Table 2 Lagrange multiplier test

	Statistic	p-value
SEM	5.426	0.020*
SAR	5.205	0.023

* Lower p-value (0.020 < 0.023)

Source: Stata Output

5.2. Testing the research hypotheses

Given mediating variables in our research hypotheses, we can distinguish three Baron & Kenny (1986) steps in testing the hypotheses of our structural model. A mediation analysis consists of three regression sets: $X \rightarrow Y$, $X \rightarrow M$, and $X + M \rightarrow Y$.

Following the methodology of (Baron & Kenny, 1986), the regression is first conducted to investigate the direct effect of the independent variable on the dependent variable. Second, the effect of the independent variable on the mediating variable is tested. Third, the effects of the independent and mediating variables on the dependent variable are tested in a single model. Accordingly, the models proposed in our study to test the hypotheses are as follows:

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$$UNEMP = C + \alpha_1 ACCES + \alpha_2 LEVEL + u \quad \text{et} \quad u = \lambda Wu + \varepsilon \quad (11)$$

The Impact of Education on Economic Growth

$$GDP = C + \beta_1 ACCES + \beta_2 LEVEL + u \quad \text{et} \quad u = \lambda Wu + \varepsilon \quad (12)$$

The Mediating Effect of Economic Growth

$$UNEMP = C + \alpha'_1 ACCES + \alpha'_2 LEVEL + \gamma GDP + u \quad \text{et} \quad u = \lambda Wu + \varepsilon \quad (13)$$

The results are summarized in Table 3. Of these, models 1, 2 and 3 correspond to equations (11), (12) and (13), respectively.

Table 3 Results of Estimation and Mediating Effect Testing

		Coef.	*P> z	Squared corr.	LM test	LR test	Log likelihood
	UNEMP			0.449	4.483 (0.034)	6.464 (0.011)	-124.80939
Model 1	ACCES	-140.5454	0.029				
	LEVEL	-9.613326	0.000				
	_cons	42.32201	0.000				
	lambda	-1.790458	0.007				
	PIB			0.260	0.254 (0.614)	0.521 (0.470)	-114.21029
Model 2	LEVEL	-1.218829	0.321				
	ACCES	203.7967	0.001				
	_cons	2.795747	0.346				
	lambda	-.6336575	0.506				
Model 3	UNEMP			0.444	5.426 (0.020)	10.702 (0.001)	-122.47728
	ACCES	-45.80625	0.486				
	LEVEL	-10.17992	0.000				
	PIB	-.4896686	0.020				
	_cons	43.91691	0.000				
	lambda	-2.377333	0.000				

* Statistically significant at 5% level

Source: Stata Output

6. Discussion

Our exploratory spatial analysis proved the existence of disparity between Moroccan regions, something that has been tested and proven by several other studies in Morocco. Such as the Akallouch et al. (2025) study based on a comparative study found that urban centres such as Casablanca Settat and Rabat Salé Kénitra demonstrated significant increases in literacy and economic activity, supported through investment and policy targeting. In contrast, rural areas and underdeveloped regions such as Drâa Tafilalet and Béni Mellal Khénifra still encounter barriers such as high unemployment and limited access to education, which deepen the socio-economic gap.

The estimated model examines the relationship between unemployment, education and economic growth (as a mediating variable) in a Moroccan regional context. We first examine the impact of the education variables (level of education and access to higher education) on the unemployment rate. The relationship is negative and significant, which is consistent with theoretical predictions about the importance of education and educational level in youth employment and in preventing unemployment. The impact of the level of education on the unemployment rate is to be taken with a precaution since the statistics published by the HCP reveal a different reality, according to the latest statistics it is those without diplomas who face less unemployment, the highest unemployment rates concern mainly the graduates and reach 18.5% against an unemployment rate for those without diplomas of 5.6%. We conclude that the

result inherent to the variable level of education is more impacted by the effect of no diploma on the unemployment rate. The non-absorption of young graduates by the labour market can be explained by two factors: The first factor of a quantitative nature, concerns the increasing input of graduates on the labour market, according to data from the Ministry of National Education, Professional Formation, Higher Education and Scientific Research, the number of graduates for the academic year 2018-2019 is 141 558 graduates, an increase of 6.66% compared to the academic year 2017-2018. The creation of jobs does not keep pace with the number of graduates entering the labour market, which means that the market does not absorb these newcomers. The second explanatory factor is qualitative and concerns the non-adaptation in two senses, an inadequacy of the formations with the expectations and the demand of the labour market, i.e. the companies do not find on the labour market the adequate profiles, and an inadequacy of the jobs created with the expectations of the graduates, i.e. that the jobs created on the market are not sufficiently qualified and do not correspond to the level of training of the young graduates, these last ones choose to undergo the unemployment while waiting to find a job which corresponds to their expectations.

The two conditions of mediation (significance of the variable x and solid theoretical background) allow us to introduce a mediator variable (regional GDP) that will explain the indirect relationship between the education variables and the unemployment rate (Expressed as the rate of contribution of each region to national GDP), the results of the regression of the regional GDP on the education variables show a positive and significant relationship between the variable access to higher education and the regional GDP but not significant when it comes to the level of education.

Theoretical contributions exposing the relationship between education and economic growth support this relationship, the work of (Becker 1964) for instance, consider education as an investment since it will provide high remuneration, wage gains to productivity gains and therefore to growth. The theory of endogenous growth developed by Romer (1986) and Lucas (1988) introduces the increase in human capital as an explanatory factor of growth, i.e., an individual who invests time in training will draw higher incomes in the future and will accumulate a stock of human capital enabling him to be more productive and innovative. Consequently, the economy will benefit from this productive human resource that allows to generate growth. Finally, the relationship between regional GDP and the unemployment rate is negative and significant, which validates the third mediation condition. This is supported by the (Djamal & Brahim, 2025) study based on data from North Africa over the period 1991-2023, which validated Okun's law in the Moroccan model.

We can conclude that the influence of access to higher education on the unemployment rate is transmitted by economic growth, and that the mediation effect is total, especially since the impact of access to higher education on the unemployment rate is not significant (fourth condition verified).

7. Conclusion

Taking into account the effect of regional disparity, our paper has focused on the impact of education and economic growth on unemployment. The theoretical literature review was based on the notion of centre-periphery to better represent the division between the different Moroccan regions and on the theory of human capital and Okun's law to understand the nature of the relationships between unemployment, education and economic growth. The empirical results validated the presence of the mediation effect and the influence of the education variable (access to higher education) on the unemployment rate through economic growth, thus confirming the role played by economic growth in the creation of new qualified job opportunities contributing to facilitate the integration of a well-trained and qualified human resource in the labour market.

In conclusion, we add that a better performance of the regions needs to reduce disparities, especially those of an economic, social and educational nature, a reduction in the effects of disparities requires, among other things, the promotion of public policies and public actions that arise from the regions in the context of a participatory approach that includes all stakeholders (institutions, local authorities, researchers, experts, etc.), local authorities, researchers, experts, etc.) and bearing in mind the specific characteristics and challenges of these regions, rather than adopting policies that are ready to be adopted and applied to all the regions and that are far from taking into account the realities and challenges of each of them.

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