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# TOURISM AND ECONOMIC DEVELOPMENT: BASED ON AN EMPIRICAL STUDY OF THE MOROCCAN CASE.

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**Abstract**
This research empirically studies the impact of tourism on economic growth and development in the case of Morocco. Using empirical time-series techniques, the study examines the long- and short-term relationship between international tourist arrivals and tourism receipts, growth and development in Morocco using the autoregressive distributed lag model to the period from 1991 to 2020. The results obtained from the analyzes show that there is a positive link between tourism and growth and hence economic development in Morocco. Furthermore, the results show that there is a unidirectional Granger causal flow between tourism and economic growth in Morocco. The main advantage of the approach is that, in addition to providing robust results in small sample sizes, it does not require any a priori information on the integrating properties of the variables. Our results suggest that Morocco can improve its economic growth by strategically supporting the tourism sector in the country.
**Keywords**: Tourism,; economic growth and development; Autoregressive Distributed Lag Model;

The autoregressive distributed lag (ARDL) threshold testing approach was adopted in this paper to examine the impact of tourism on economic growth in Morocco. As opposed to other cointegrating techniques, ARDL has significant features that make it more suitable for the current study, firstly it does not impose a restrictive hypothesis that all the variables under study must be integrated in the same order. In addition, the ARDL test is suitable for small samples while other cointegration techniques are sensitive to sample size, and thus performing threshold testing will be appropriate for this study, for additional usage features of the ARDL method, see Srinvasan et al. (2012). On the other hand, the ARDL approach suggested by Pesaran, Shin & Smith (2001) is based on the estimation of an unrestricted error correction model (UECM) which has several advantages over the conventional type of cointegration techniques.

To study the relationship between tourism and economic development in Morocco, we will derive an autoregressive distributed lag model (ARDL), developed by Pesaran & Shin (1998) and Pesaran, Shin & Smith (2001). Below, we shall introduce the variables used in our empirical study (I). Then, we will proceed to the mathematical modeling of the ARDL model (II). Finally, we will present the findings and discussions (III).

## I-Variables and conceptual model used

### I-1- Variables and data sources

Our empirical study seeks to examine the effects of tourism on economic development in

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Morocco using annual time series data over the period 1995 to 2020. Our choice of variables is drawn from international empirical work on the study of the relationship between tourism and the economic development of countries.

**The table below provides information on the variables used in our empirical study.**

**Table 1: Description of the variables used in our conceptual model**

| Variable | Code | Description | Sources |
|---|---|---|---|
| Growth rate | GDP_g | Annual growth rate of gross domestic product expressed in %. | World Bank World Development Indicators (WDI) |
| Human Development Index[1] | HDI | The HDI includes three aspects: health; income level; educational level). | The United Nations Development Programme (UNDP) |
| Index of infrastructure | INFRAST | The Infrastructure Index is obtained through the use of principal component analysis. The index includes: access to electricity, total number of fixed and cell phone subscribers per 100 inhabitants, proportion of population with an internet connection, total international internet bandwidth capacity in megabits per second (Mbps), railways (total roads in km), air transportation, transportation of travelers. | World Bank World Development Indicators (WDI) |
| Number of international tourists | TOURISM_ARR | The number of incoming international tourists, i.e., tourist arrivals at border crossings. | World Bank World Development Indicators (WDI) |
| Tourism revenues[2] | TOURISM_REC | International tourism revenues are the expenditures of incoming international visitors. | World Bank World Development Indicators (WDI) |
| Foreign direct | FDI | Foreign direct investment inflows expressed as a percentage of GDP. | World Bank World Development |

[1] Human Development Index (HDI)
[2] Tourism Revenues

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| | | | |
|---|---|---|---|
| investment[3] | | | Indicators (WDI) |
| Gross Enrolment Ratio (secondary) | EDUC | The gross enrollment ratio is the total enrollment in a specific level of education, regardless of age, expressed as a percentage of the officially school-age population at that level in a particular school year. | UNESCO Institute ofStatistics |
| Gross fixed capital Formation (GFCF)[4] | GFCF | Gross fixed capital formation as a percentage of **GDP**. | World Bank World Development Indicators (WDI) |
| Trade Openness Index | TOp | Trade openness rate expressed as a percentage of GDP[5].<br><br>Openness rate = (Import + Export) / GDP. | World Bank World Development Indicators (WDI) |
| Rule of Law Index[6] | RL | The rule of law index includes perceptions of the quality of contract enforcement, property rights, trust in the courts and security forces, and the likelihood of crime and violence. It ranges from -2.5 to 2.5 according to a standard normal distribution. | The World Bank World Governance Indicators |

Source : Author.

**I-2 Conceptual research model.**

In the following, we highlight the conceptual research model adopted (Figure 1). In the creation of the model, we based ourselves on a synthesis of academic and empirical studies that emphasized the relationship between the different variables of the model. The role of the model is to confirm or disprove the presence of a causal relationship between the variables under explanation and the explanatory variable.

It should be noted that our objective is to analyze the relationship between tourism and economic development, while taking into account other controlling variables likely to influence this

[3] Foreign Direct Investment (FDI)
[4] Gross fixed capital formation (GFCF)
[5] GDP
[6] Rule of law (RL)

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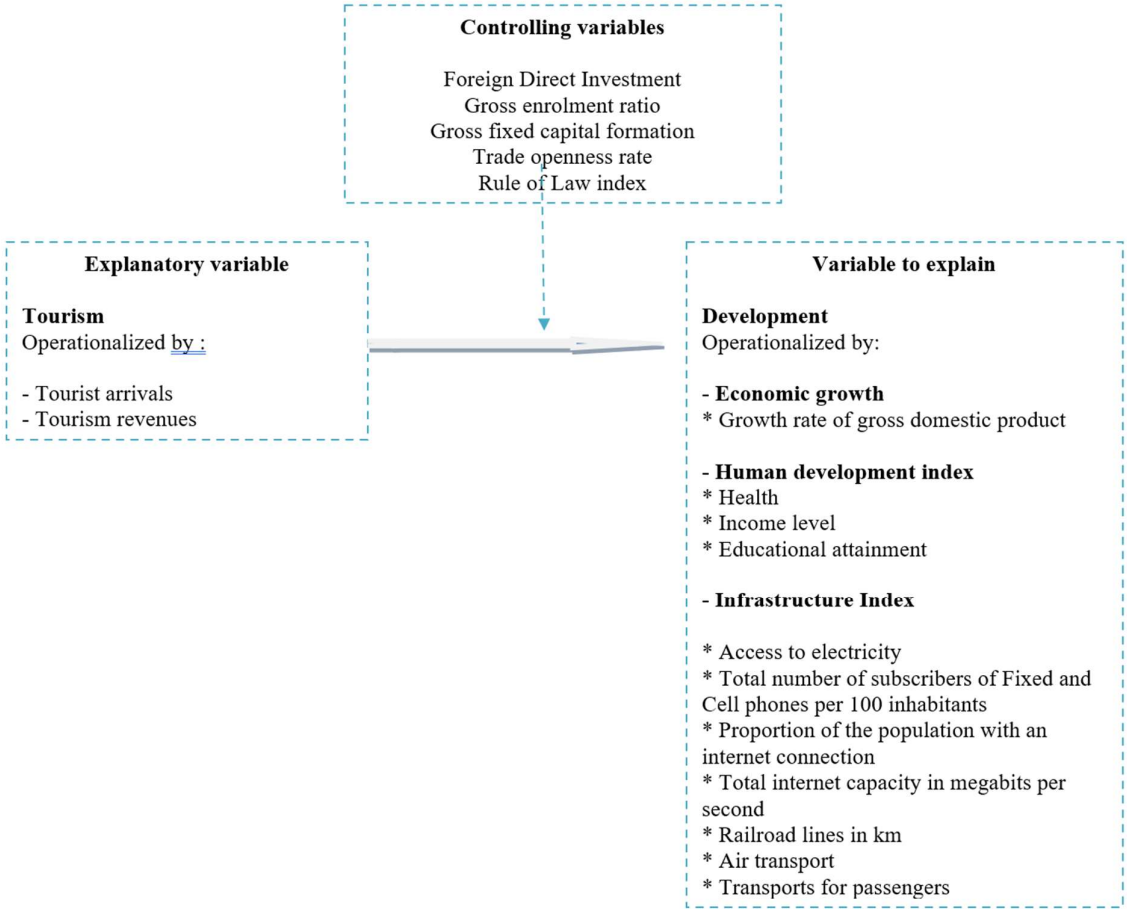
relationship in the case of Morocco.

**Figure 1: Conceptual research model**




## II-Mathematical Formalization of the ARDL Model.

Before performing an econometric estimation, it is worthwhile to do the descriptive analysis to have an overview of the statistical characteristics of our variables. It is noteworthy that all our statistical series are expressed in logarithm to harmonize the measurement scale of our variables, except for GDP_g, HDI, INFRAST and RL.

With regard to the explanatory variable, Table.2 shows that tourist arrivals have an average of 2.75, or 7288,000 incoming tourists for a maximum number of 13109,000. Likewise, tourist revenues average 3.10, with a maximum and minimum value of 9 billion and 1.4 billion dollars. For the variable to be explained, we see from Table.2 that the average economic growth is 3.46%, with a minimum of -6.29% and a maximum of 12.37%. For the human development index, Morocco has a score (average) of 0.58, which is close to 1, fluctuating between a minimum and maximum value of 0.47 and 0.68. As for the index related to infrastructure, we note a negative index on average, which ranges between -3.04 and 3.30.
For the other controlling variables, namely foreign direct investment, trade openness, gross fixed capital formation, level of education and the rule of law index show an average of 2.44%, 4.13%, 3.33%, 4.01% and -0.14 respectively.

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**Table 2: Descriptive statistics of variables**

| Variables | Medium | Standard deviation(SD) | Minimum | Maximum |
|---|---|---|---|---|
| GDP_G | 3.461319 | 3.800390 | -6.293253 | 12.37288 |
| HDI | 0.585615 | 0.064892 | 0.478000 | 0.682000 |
| INFRAST | -7.69E-08 | 2.316525 | -3.046048 | 3.306305 |
| TOURISM_ARR | 2.752169 | 0.032991 | 2.696506 | 2.796599 |
| TOURISM_REV | 3.105896 | 0.029358 | 3.049645 | 3.136395 |
| FDI | 2.446285 | 1.382516 | 0.738436 | 7.158102 |
| Trad Openess Index | 4.130276 | 0.240396 | 3.707473 | 4.425130 |
| GFCF | 3.331861 | 0.112978 | 3.082507 | 3.538556 |
| EDUC | 4.019310 | 0.296804 | 3.601365 | 4.412243 |
| RL | -0.148899 | 0.176453 | -0.385673 | 0.221231 |

Source: Author's calculations using Eviews 9 software.

Within the framework of our study, we adopt an econometric method based on an autoregressive model with distributed lags (ARDL). This model was originally introduced and developed by Pesaran and Shin (1998) and Pesaran et al. (2000) to test the existence of a long-term and short-term relationship between variables characterized by a different order of integration.

The autoregressive distributed lag model (ARDL) has three advantages over other cointegration methods.

- First, the ARDL model does not require that all the variables of interest be integrated of the same order and it can be applied when the core variables are integrated of order I(1) or I(0).
- Second, the ARDL model is relatively more efficient in the case of small size and finite data.
- Third, the ARDL model provides unbiased estimates of the long-term model (Harris and Solis, 2003).

Nevertheless, if we use the existence check of a cointegrating relationship between variables in an ARDL model, it is important to check the information criteria (Akaike-AIC, and Shwarz-SIC) to determine the optimal lag number.

To understand the short and long term effects of tourism on the economic development of Morocco, the mathematical representation of the ARDL regression model is shown below:

$$\Delta GDP\_g_t = a_0 + \sum_{i=1}^{p} a_{1i}\Delta GDP\_g_{t-i} + \sum_{i=0}^{q} a_{2i}\Delta TOURISM\_ARR_{t-i} + \sum_{i=0}^{q} a_{3i}\Delta TOURISM\_REC_{t-i} + \sum_{i=0}^{q} a_{4i}\Delta FDI_{t-i} + \sum_{i=0}^{q} a_{5i}\Delta TOp_{t-i} + \sum_{i=0}^{q} a_{6i}\Delta GFCF_{t-i} + \sum_{i=0}^{q} a_{7i}\Delta EDUC_{t-i} + \sum_{i=0}^{q} a_{8i}\Delta RL_{t-i} + b_1 TOURISM\_ARR_{t-i} + b_2 TOURISM\_REC_{t-i} + b_3 FDI_{t-i} + b_4 OTOp_{t-i} + b_5 GFCF_{t-i} + b_6 EDUC_{t-i} + b_7 RL_{t-i} + \varepsilon_t$$

$$\Delta HDI_t = a_0 + \sum_{i=1}^{p} a_{1i}\Delta HDI_t + \sum_{i=0}^{q} a_{2i}\Delta TOURISM\_ARR_{t-i} + \sum_{i=0}^{q} a_{3i}\Delta TOURISM\_REC_{t-i} + \sum_{i=0}^{q} a_{4i}\Delta FDI_{t-i} + \sum_{i=0}^{q} a_{5i}\Delta TOp_{t-i} + \sum_{i=0}^{q} a_{6i}\Delta GFCF_{t-i} + \sum_{i=0}^{q} a_{7i}\Delta EDUC_{t-i} + \sum_{i=0}^{q} a_{8i}\Delta RL_{t-i} + b_1 TOURISM\_ARR_{t-i} + b_2 TOURISM\_REC_{t-i} + b_3 FDI_{t-i} + b_4 OTOp_{t-i} + b_5 GFCF_{t-i} + b_6 EDUC_{t-i} + b_7 RL_{t-i} + \varepsilon_t$$

$$\Delta INFRAST_t = a_0 + \sum_{i=1}^{p} a_{1i}\Delta INFRAST_{t-i} + \sum_{i=0}^{q} a_{2i}\Delta TOURISM\_ARR_{t-i} + \sum_{i=0}^{q} a_{3i}\Delta TOURISM\_REC_{t-i} + \sum_{i=0}^{q} a_{4i}\Delta FDI_{t-i} + \sum_{i=0}^{q} a_{5i}\Delta TOp_{t-i} + \sum_{i=0}^{q} a_{6i}\Delta GFCF_{t-i} + \sum_{i=0}^{q} a_{7i}\Delta EDUC_{t-i} + \sum_{i=0}^{q} a_{8i}\Delta RL_{t-i} + b_1 TOURISM\_ARR_{t-i} + b_2 TOURISM\_REC_{t-i} + b_3 FDI_{t-i} + b_4 OTOp_{t-i} + b_5 GFCF_{t-i} + b_6 EDUC_{t-i} + b_7 RL_{t-i} + \varepsilon_t$$

With Δ first difference operator; $\boldsymbol{a0}$ is constant; $\boldsymbol{a1}$ ... $\boldsymbol{a8}$ represent short-term effects; $\boldsymbol{b1}$ ... $\boldsymbol{b7}$ address the long-term dynamics of the model; s$\boldsymbol{t}$ is the error term (white noise).
In our empirical study, we will consider three ARDL models for the variable to be explained (economic development) as represented by the three variables of economic growth, human development and infrastructure index.

**III- Findings and Interpretations**

To analyze the impact of tourism on economic development in Morocco, we will employ an autoregressive distributed lag model (ARDL). To this end, we will first study the stationarity of the time series (variables). Second, we will test the cointegration at the bounds. Third, we will estimate the short and long term dynamics.

**III-1-Augmented Dicky-Fuller (ADF) and Phillips- Perron (PP) stationarity test**

The analysis of the stationarity of the series is a preliminary and indispensable step in conducting an econometric study using the ARDL method. In fact, if the non-stationarity of the series is not treated, it can lead to Regression fallacy. In the present study, we use two tests to check the stationary or non-stationary character ; namely the ADF (augmented Dickey-Fuller) test and the PP (Phillippe-Perron) test. The ARDL analysis is flexible to the extent that the variables used can be stationary in level, in first difference or a mixture of both..

The stationarity check of the time series constituting our database, using the Augmented Dicky-Fuller (ADF) and Phillips-Perron (PP) tests, showed that some variables are stationary in level, while the others are stationary in first difference (Table 3). To this end, our variables display different orders of integration (I(0) and I(1)), which justifies the use of the Autoregressive Distributed Lag Model (ARDL).
The results of the tests conducted show that the variables GDPg and FDI are stationary in level as presented by the level of significance at 5%. The other variables in our model, however, are stationary in first differences. In this sense, our series show different orders of integration, which brings us to look at whether there is a cointegrating relationship between the variables or not.

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Table 3 : Augmented Dickey and Fuller (ADF) and Phillippe-Perron (PP) tests

| Variables | **level** | | **First Difference** | | **Order of integration** |
|---|---|---|---|---|---|
| | ADF | PP | ADF | PP | |
| GDP_g | -9.819546* (-3.603202) | -9.130676* (-3.603202) | - | - | **I(0)** |
| HDI | -1.512830 (-3.644963) | -1.150732 (-3.603202) | -3.612199*(-1.863032) | -3.612199* (-2.196871) | **I(1)** |
| TOURISM_ARR | 1.134463 (-3.603202) | 2.128856 (-3.603202) | -3.612199*(-1.054423) | -3.612199* (-0.702743) | **I(1)** |
| TOURISM_REC | 0.595581 (-3.603202) | 0.912625 (-3.603202) | -3.612199*(-3.036367) | -3.612199* (-3.056988) | **I(1)** |
| INFRAST | -0.852892 (-3.603202) | -1.287740 (-3.603202) | -2.991878*(-2.264487) | -3.612199* (-2.126933) | **I(1)** |
| FDI | -5.953956* (-3.603202) | -5.910053* (-3.603202) | - | - | **I(0)** |
| EDUC | -1.494028 (-3.603202) | -2.100503 (-3.603202) | -3.612199*(-2.176330) | -3.612199* (-1.927963) | **I(1)** |
| GFCF | -0.720639 (-3.603202) | -0.465181 (-3.603202) | -5.318283*(-3.612199) | -6.201436* (-3.612199) | **I(1)** |
| TOp | -1.923707 (-3.603202) | -1.959886 (-3.603202) | -5.617089*(-3.612199) | -8.886256* (-3.612199) | **I(1)** |
| RL | -1.810871 (-3.603202) | -1.656054 (-3.603202) | -5.614137*(-3.612199) | -6.250672* (- 3.612199) | **I(1)** |

Source: Author's calculations. Note: () critical value; * significant at 5% (estimates on Eviews 9).

**III-2-Cointegration test at bounds and optimal lag**

Before estimating the short and long term dynamics, it is necessary to carry out the cointegration test at the bounds as well as the optimal lags for all the variables.

For the cointegration test in the ARDL model, the test statistic, i.e. Fisher's F-value, is compared to the critical values that form bounds.

The results of the cointegration test at the bounds confirm the existence of a cointegrating relationship between the variables of our model since the value of F-stat is higher than that of the

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two bounds at the 5% threshold. This finding confirms the existence of cointegration and a long term relationship between the variables of this study. (Table 4)

**Table 4: Results of the cointegration test at the bounds**

| | Model 1(GDP_g) | | Model 2(HDI) | | Model 3 (INFRAST) | |
|---|---|---|---|---|---|---|
| F-Stat. Calculated | 49.33702 | | 3.419629 | | 3.887631 | |
| Critical Threshold | Minimum bound | Maximum bound | Minimum bound | Maximum bound | Minimum bound | Maximum bound |
| 1% | 2.96 | 4.26 | 2.96 | 4.26 | 2.96 | 4.26 |
| 5% | 2.32 | 3.5 | 2.32 | 3.5 | 2.32 | 3.5 |
| 10% | 2.03 | 3.13 | 2.03 | 3.13 | 2.03 | 3.13 |

Source: Author's calculations (estimates from Eviews 9 software).

To select the most appropriate ARDL model, it is necessary to determine the specification that maximizes the information criteria, i.e., to select the most appropriate optimal delay number. To do this, we will use the Schwarz Information Criterion (SIC). According to the values in Figure 1, 2 and 3, the results of our estimations based on the AIC information criteria indicate that the 3 models, namely ARDL model 1 (1, 1, 1, 0, 0, 1, 1, 1), ARDL model 2 (1, 0, 0, 0, 0, 1, 1) and ARDL model 3 (1, 1, 0, 1, 0, 1, 0, 1) are the most applicable.

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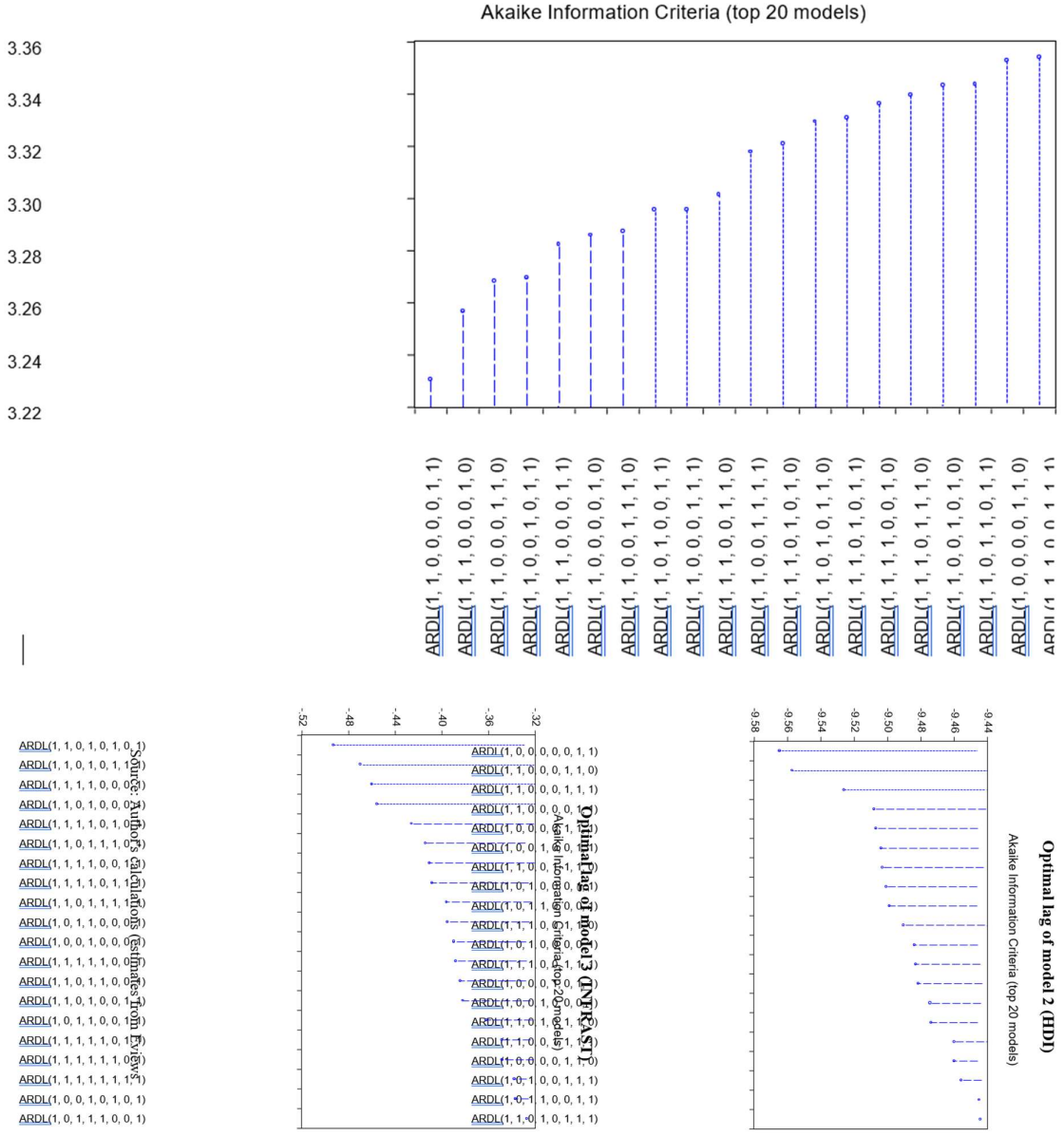
**Figure 1 : Identification of the optimal lag**




**a. Short-term coefficients and long-term dynamics (CT-LT recast)**

The objective of the ARDL model is to check the existence of short and long term relationships between endogenous and exogenous variables. In order to confirm the existence of a long term relationship, the error correction term which represents the speed of adjustment towards the long term equilibrium must be negative and significant. In fact, the results of the estimates grouped in Table 5 show that the adjustment coefficient or recall force is negative and significant in the order of -1.78, -0.74 and -0.23 respectively for models 1, 2 and 3. In this sense, the error correction mechanism is guaranteed, thus reflecting the existence of a long term relationship (cointegration) between the variables. (Table 5)

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As regards the short-term relationship, we find that foreign direct investment has a positive and significant effect on GDP growth in Morocco. In this sense, a 1% increase in FDI accelerates GDP growth by 0.58% in the short term. However, this relationship becomes insignificant with the human development index and the infrastructure index. Moreover, our results indicate that in the short term, education has a negative effect on our three variables to be explained, with a significant effect on the infrastructure index. (Table 6)

In the same vein, we note that gross fixed capital formation has no effect (CT , LT ) on GDP growth and the infrastructure index. Instead, it has an instantaneous influence on the human development index. In fact, a 1% variation in GFCF leads to a 2.3% increase in the human development index.

With respect to our explanatory variables, we find that the number of incoming international tourists has a positive and significant effect except for GDP growth. Thus, when the number of incoming tourists increases by 1%, the human development index and the infrastructure index increase by 0.70% and 76% respectively. As far as tourism revenues are concerned, they have a positive and significant impact on economic growth. Which means that in the long term a 1% increase in tourism revenues leads to a 6.05% increase in economic growth in Morocco.

**Table 5 : Estimation results of the short term coefficients**

| Variables | Model 1 (GDP_g) | Model 2 (HDI) | Model 3 (INFRAST) |
|---|---|---|---|
| D(FDI) | **0.584441**** (0.197288) | 0.000255 (0.000339) | -0.057119 (0.034688) |
| D(GFCF) | -8.601875 (7.146653) | **0.023662***(0.011816) | -1.095154 (1.164119) |
| D(EDUC) | -1.745590 (6.235646) | -0.006868 (0.010875) | -6.111717*** (2.453136) |
| D(RL) | 1.602651 (3.616837) | -0.000233 (0.006034) | -0.377077 (0.761247) |
| D(TOp) | -4.480308 (5.574570) | -0.012377 (0.009273) | -1.488661 (0.880236) |
| D(TOURISM_ARR) | 2.832617 (1.918742) | 0.007069*(0.003398) | 0.768187** (0.261933) |
| D(TOURISM_REC) | **6.055374***(3.383165) | -0.000679 (0.005939) | 0.364793 (0.447900) |
| **CointEq(-1)** | **-1.788515*** (0.098189)** | **-0.740982*** (0.223998)** | **-0.237898*** (0.105663)** |

Source: Author's calculations. Note: () Standard deviation; significant at *10%, **5%, ***1% (estimates on Eviews9).

Table 6 provides the estimated long-term coefficients or eligibility. As in the short term, the effects of foreign direct investment on economic growth in Morocco remain positive in the long term and are more than proportional: an increase in FDI of 1% of GDP stimulates economic growth in the long term by 0.56%. Similarly, in the long term, GFCF has a positive and significant effect except in the case of the human development index.

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The results of the long-term estimation show a positive and significant effect of the number of incoming international tourists on the human development index and the infrastructure index, but it becomes negative for economic growth. However, the estimation of the long-term relationship indicates that the coefficient of tourism revenues is significant and positive, which implies that a 1% increase in tourism revenues will lead to a 6.13% increase in Morocco's economic growth. However, this relationship becomes inverse and the effects on the human development index remain negative in both LT and CT.

**Table 6: Estimation results of the Long Term coefficients**

| Variables | Model 1(GDP_g) | Model 2(HDI) | Model 3 (INFRAST) |
|---|---|---|---|
| FDI | **0.563073***** (0.172879) | 0.000345 (0.000417) | -0.493066 (0.290098) |
| GFCF | -4.809507 (3.971232) | 0.031934*(0.017993) | -4.603453 (5.755125) |
| EDUC | -0.976000 (3.483099) | -0.009269 (0.015129) | -5.333969 (6.747219) |
| RL | 0.896079 (2.041170) | -0.000314 (0.008118) | -1.585033 (3.499180) |
| TOp | -2.505044 (3.139941) | -0.016704 (0.014209) | -1.923685 (5.545844) |
| TOURISM_ARR | -5.664468** (2.043009) | 0.026410** (0.011840) | 3.229054*(1.646345) |
| TOURISM_REC | 6.137230*** (1.511534) | -0.013089*(0.006428) | 5.145736 (3.448509) |
| C | -15.298515 (21.274230) | -0.116118 (0.106277) | -118.419253*** (44.883845) |

Source: Author's calculations. Note: () Standard deviation ;significant at *10%, **5%, ***1% (estimates on Eviews9).

**III-3-Diagnostic tests**

After analysis of the long and short term relationships, we need to test the robustness of our models and the relevance of the results obtained. For this purpose, we use the common hypothesis tests and the stability test of CUSUM and CUSUM Square.

**The common hypothesis tests**

The first test concerns the validation hypothesis tests, the Breusch-Godfrey LM test of autocorrelation was applied to determine if there is a sequential dependence problem,The Breusch-Pagan-Godfrey test was applied to determine whether there is a heteroscedasticity problem and the Jarque-Bera test for normality of errors. The results of the tests in Table 7 are above the 5% significance level, meaning that all three models were well specified. Based on the tests that help diagnose the estimated ARDL model, we understand that the residuals of the model

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are normally distributed, there is no problem of change in variance (a homoscedasticity of errors) and there is no autocorrelation of errors.

**Table 7: Test of model validity**

| **Hypothesis testing** | | | **Model 1 (GDP_g)** | **Model 2 (HDI)** | **Model 3 (INFRAST)** |
|---|---|---|---|---|---|
| **Auto-correlation** | (Breusch-Godfrey) | T stat (p-value) | 0.120591 (0.8876) | 0.762608 (0.4896) | 0.472177 (0.6369) |
| **Heteroscedasticity** | (Breusch-Pagan-Godfrey) | T stat (p-value) | 0.566249 (0.8242) | 1.866823 (0.1449) | 0.665766 (0.7542) |
| **Normality** | Jarque- Bera | T stat (p-value) | 7.950545 (0.187774) | 0.519290 (0.771325) | 1.723511 (0.422420) |

Source: Author's calculations. Note: () p-value (estimates on Eviews 9).

The second test checks the stability of our model, it is a graphical representation of the test of the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUM Square) developed by Brown et al. (1975). This test is performed on the error correction estimates obtained to determine the level of their reliability; they are usually represented in a graphical form (Fig. 2).

The findings of the CUSUM test show that all three models are structurally stable as the recursive residuals remain within the interval at the 5% confidence level at all times. Similarly, the CUSUM Square test shows that the cumulative sum of squares of the recursive residuals always remains within the interval for the 5% confidence level, suggesting that the residual variance is stable. In summary, our different tests confirm the correct specification of our models and that all coefficients are stable over the period studied.

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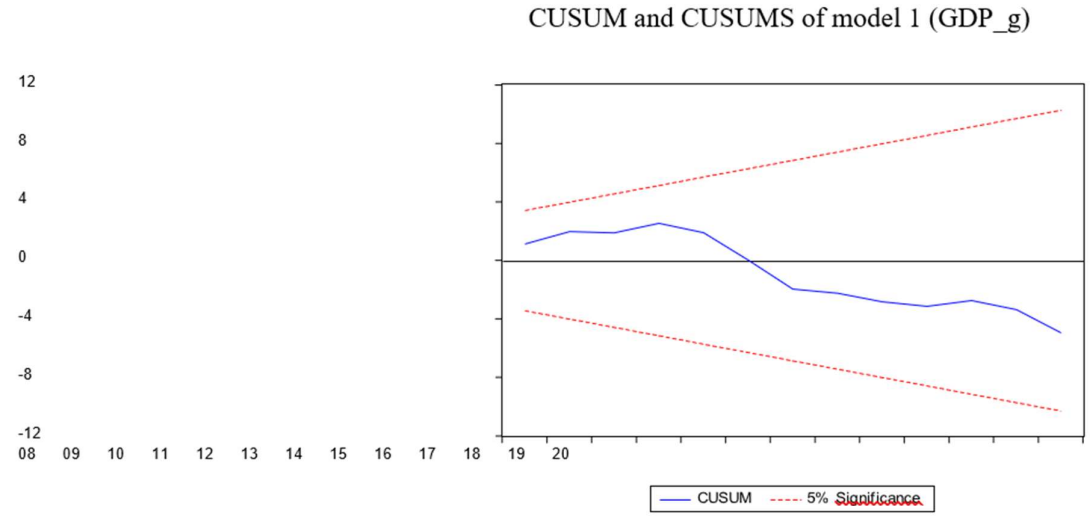
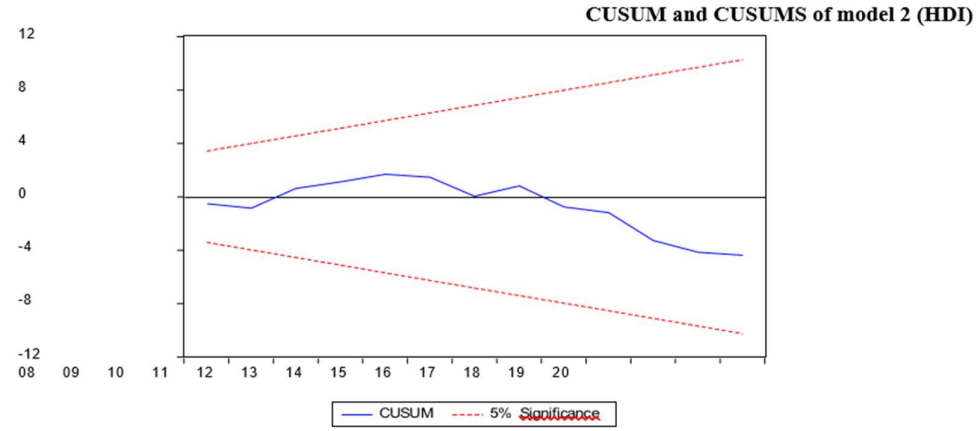
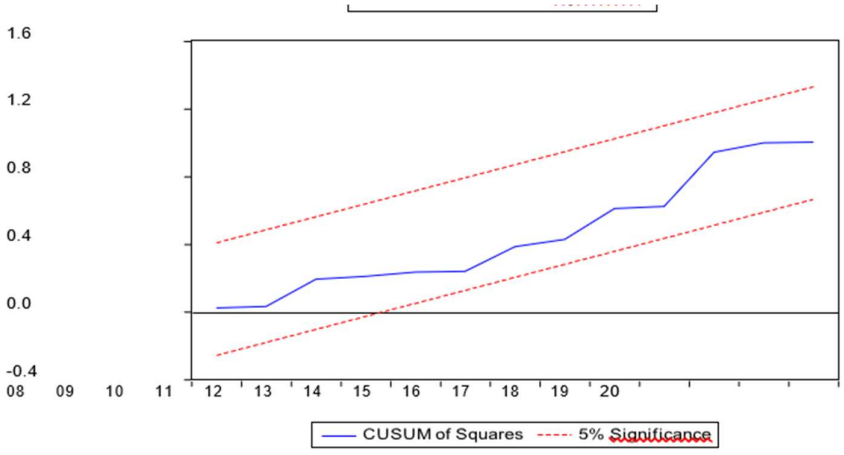
**Figure 2 : Stability testing of CUSUM and CUSUM Square**



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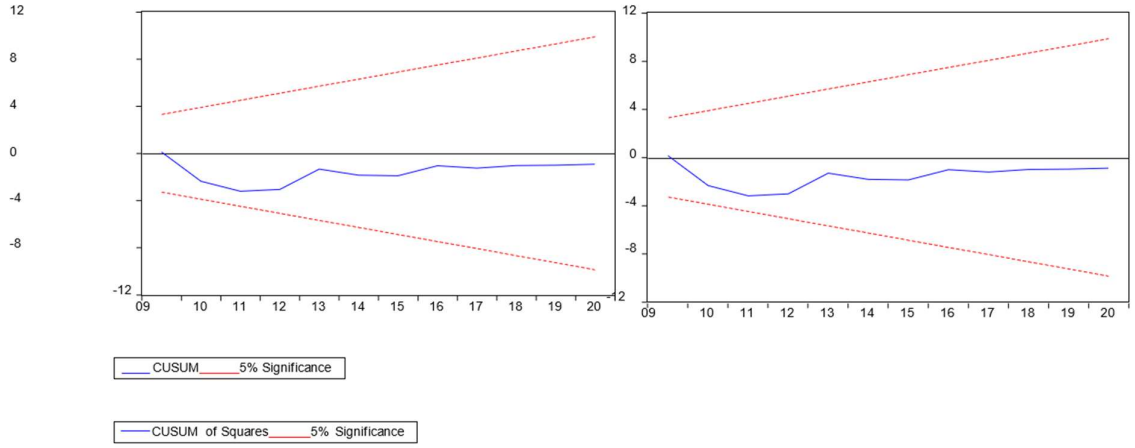
**CUSUM and CUSUMS of model 3 (INFRAST)**




Source: Author's calculations (estimates from Eviews 9 software).

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**1- Causality analysis between variables**

The causality analysis was applied to understand if there is a causal relationship between the variables and, if so, in which direction. When the variables are integrated at different orders the traditional Granger causality test becomes ineffective, in this case the Toda-Yamamoto (1995) causality test is used which is based on the Wald "W" statistic. The null hypothesis highlights the absence of causality between the variables (probability > 5%).

The results of the analysis presented in Table 8 show that there is bidirectional causality in the Toda-Yamamoto sense between investment (GFCF) and the infrastructure index. There are also unidirectional causalities which are presented below:

- Economic growth is determined by education (3.195), while the infrastructure index is determined by tourism revenues, GFCF, trade openness, education and rule of law;
- The number of tourist arrivals is driven by tourism revenues, while these latter are generated by the infrastructure index and the rule of law;
- Foreign direct investment (FDI) is driven by the human development index, on its part, GFCF is driven by economic growth and the infrastructure index;
- Trade openness is determined by the number of tourist arrivals, tourism revenues, education and rule of law;
- Education is determined by the number of tourist arrivals, tourism revenues, and GFCF;

**Table 8 : Toda-Yamamoto Causality Test Results**

| Variables | GDPg | HDI | Infrast | Tourism_ Arr | Tourism_ Rec | FDI | GFCF | TOp | EDUC | RL |
|---|---|---|---|---|---|---|---|---|---|---|
| GPg | - | 1.164 (0.334) | 1.324 (0.289) | 0.889 (0.427) | 0.496 (0.616) | 0.171 (0.843) | 0.499 (0.614) | 1.937 (0.171) | 3.195* (0.063) | 0.243 (0.786) |
| HDI | 0.191 (0.827) | - | 1.102 (0.353) | 1.749 (0.202) | 1.285 (0.300) | 0.327 (0.725) | 0.469 (0.633) | 1.544 (0.240) | 1.660 (0.217) | 0.837 (0.448) |

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| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Infrast | 0.691 (0.512) | 0.627 (0.545) | - | 1.557 (0.236) | **5.420**** (0.013) | 0.454 (0.641) | 3.971** (0.036) | 4.441** (0.026) | 2.759* (0.088) | 4.740** (0.021) |
| Tourism_Arr | 0.504 (0.611) | 0.625 (0.546) | 0.160 (0.852) | - | 4.214** (0.030) | 0.387 (0.684) | 2.569 (0.102) | 0.311 (0.736) | 0.602 (0.557) | 1.194 (0.324) |
| Tourism_Rec | 0.675 (0.520) | 0.604 (0.556) | 2.636* (0.097) | 0.874 (0.433) | - | 0.387 (0.684) | 1.859 (0.183) | 2.210 (0.137) | 1.812 (0.190) | 1.910** (0.016) |
| FDI | 1.598 (0.228) | 2.802* (0.087) | 0.424 (0.660) | 0.245 (0.785) | 0.395 (0.679) | - | 0.137 (0.872) | 1.420 (0.266) | 2.350 (0.122) | 0.220 (0.804) |
| GFCF | 4.286** (0.029) | 1.802 (0.193) | 3.113* (0.067) | 0.580 (0.569) | 0.811 (0.459) | 0.689 (0.514) | - | 0.547 (0.587) | 0.338 (0.717) | 2.042 (0.157) |
| TOp | 0.185 (0.831) | 1.491 (0.251) | 2.487 (0.109) | 5.40** (0.013) | 4.214** (0.030) | 0.284 (0.755) | 0.373 (0.693) | - | 2.916* (0.078) | 3.256* (0.060) |
| Educ | 1.858 (0.183) | 10.276 (0.001) | 0.495 (0.617) | 8.247** (0.002) | 3.789** (0.041) | 0.337 (0.717) | 2.824* (0.084) | 2.128 (0.146) | - | 2.071 (0.153) |
| RL | 0.240 (0.788) | 0.161 (0.852) | 0.863 (0.437) | 0.257 (0.775) | 1.910 (0.175) | 0.882 (0.429) | 1.203 (0.322) | 0.504 (0.611) | 1.615 (0.225) | - |

Source: Author's calculations. Note: () p-value, significant at *10%; **5% (estimates on Eviews 9).

**Conclusion of the empirical study section.**

For many countries nowadays, tourism is an indispensable source of foreign currency and development. In recent years, the tourism sector has been one of the main sectors that shapes the economic development process worldwide, and Morocco is no exception. In fact, the tourism sector is considered a strategic priority in Morocco and a catalyst for economic and social development.

In this respect, our work empirically studies the relationship between the tourism sector and economic development in Morocco over the period 1995-2020. Our empirical methodology is based on ARDL modeling which allows us to determine the short and long term relationships between the dependent and independent variables.

In the long term, the number of tourists has a significant and positive effect on the human development index and the infrastructure index but becomes negative for economic growth. On the other hand, the coefficient of revenue from tourism is significantly positive, which implies that a 1% increase in revenue from tourism will lead to a 6.13% increase in Morocco's economic growth, however this relationship becomes inverse and the effects on the human development index remain negative.

In the short term, the number of arriving international tourists has a positive and significant effect on both the human development and the infrastructure index. However, it is found that tourism revenues only affect economic growth in a positive and significant way.

In short, our findings corroborate the crucial role that tourism sector plays in economic development. To this end, the action of the public authorities is primordial to develop tourism in

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Morocco, in particular through an improvement of the investment in the infrastructures of hosting foreigners and the diversification of the tourist offer.