

Impact of human capital on FDI in Morocco's industrial sector: an econometric analysis.

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Abstract

In a context of increasing globalization and international competition, the attraction of foreign direct investment (FDI) is of crucial importance in fostering economic growth and accelerating the industrialization process. This article analyzes the influence of human capital on the attractiveness of FDI in the Moroccan industrial sector. Focusing on education, health and unemployment, the study explores how the quality of human capital affects investment decisions. Using the Vector Autoregression (VAR) model, we assess the role of human capital as a strategic lever for strengthening the competitiveness of Morocco's industrial sector. The time series of the study are based on annual data covering the period from 1990 to 2023. The results of this research reveal that education, unemployment and trade openness have a positive impact on FDI, while health expenditures and gross fixed capital formation have a negative impact on FDI attractiveness. The novelty of our research is its focus on Morocco's industrial sector, a key driver of economic growth that has been overlooked in studies on the impact of human capital on FDI.

Keywords : Human capital, Foreign direct investment, FDI, Industrial sector, Vector autoregression, VAR.

1. Introduction

In a context marked by intensifying globalization and growing competition between emerging countries, attracting foreign direct investment (FDI) has become a strategic priority for stimulating economic growth and promoting industrialization. In particular, it represents a crucial sector for many developing countries, with its strong potential for job creation, technology transfer and export promotion. Morocco, thanks to its advantageous geographical position and incentive policies, has positioned itself as an attractive regional hub for international investors in this field. However, beyond tax incentives and supporting infrastructure, the availability and quality of human capital are crucial factors in foreign investors' decisions. Human capital, defined as all the skills, qualifications and knowledge possessed by workers, is a key determinant of an industrial sector's productivity and competitiveness. In the specific case of industry, which requires advanced technical skills and the ability to adapt quickly to technological advances, the development of skilled human capital is becoming an essential lever for attracting high-quality foreign direct investment. In a sector as competitive as industry, a country's ability to attract quality FDI depends not only on geographical and financial advantages, but also on the availability of a skilled workforce capable of meeting investors' specific requirements. The development of human capital, particularly through technical training, the enhancement of professional skills and adaptability to new technologies, is becoming an essential lever for increasing Morocco's attractiveness. It is therefore crucial to assess the extent to which the various components of human capital influence foreign companies' investment decisions in the Moroccan industrial sector [16]. Our problem is: To what extent does human capital impact the attractiveness of FDI in Morocco's industrial sector? To address our problem, this article first establishes a solid theoretical foundation by describing the conceptual framework of the study. It then defines the methodological approach, focusing primarily on multiple regression analysis, which will serve as the preferred tool for examining the data. For our analysis, we will then perform a stationarity test, a model estimation, an autocorrelation test, a normality test, a heteroscedasticity test and, finally, a robustness test. Through this scientific work, we aspire to enrich debates on the dynamics of human capital and foreign direct investment (FDI), thereby contributing to the development of public policy and the guidance of practitioners in the Moroccan industrial sector [9].

The objective of this study is to empirically examine the impact of human capital on the attractiveness of foreign direct investment (FDI) in Morocco's industrial sector. More specifically, the study aims to assess the influence of education, unemployment, health expenditure, gross fixed capital formation and trade openness on FDI inflows into the industrial

sector. To achieve this objective, the study adopts an econometric approach based on annual data covering the period from 1990 to 2023. The analysis relies on a Vector Autoregression (VAR) model and is complemented by stationarity, causality, residual diagnostic and robustness tests. The remainder of this article is structured as follows. The first section presents the theoretical and empirical literature on human capital and foreign direct investment. The second section describes the methodology, data and variables used in the empirical analysis and presents the econometric results. The third section discusses the main findings. Finally, the conclusion summarizes the main results, their policy implications and the limitations of the study.

1.1. Literature Review

1. *Human Capital*

Human capital is widely regarded in economic literature as a critical driver of economic growth and a determinant in attracting foreign direct investment (FDI). Becker (1964) [4] characterizes human capital as the accumulation of skills and knowledge individuals gain through education and training. Among these, secondary education emerges as a key indicator of human capital quality, as it provides individuals with the technical expertise and intermediary skills needed to participate in modern production processes. Studies such as those by Borensztein, De Gregorio, and Lee (1998) [7] underscore that secondary education often serves as a quantifiable measure of human capital in various empirical analyses. Enrollment and graduation rates in secondary education are frequently employed to evaluate the readiness of a workforce to adopt and utilize the technological advancements linked to FDI.

Beyond formal education, the effective utilization of human capital is closely tied to unemployment levels. Aghion and Howitt (1994) [2] emphasize that high unemployment indicates a failure to fully exploit the available human capital, which hampers economic growth and diminishes the capacity to absorb FDI. Unused skilled labor represents a wasted resource. As noted by Blanchard and Katz (1997), unemployment reduces the pool of deployable human capital, thereby affecting overall economic efficiency.

In addition, investments in infrastructure, particularly in education and healthcare, play a crucial role in enhancing human capital. These investments are often gauged by gross fixed capital formation (GFCF), which encompasses the establishment of educational institutions and healthcare facilities. Research by Mankiw, Romer, and Weil (1992) [14] reveals that significant levels of GFCF contribute to a conducive environment for learning and productivity by providing essential physical infrastructure. Such investments improve individuals' productive potential and elevate human capital quality.

Health is another indispensable dimension of human capital. According to Bloom and Canning (2000) [5], a healthier population is more productive and drives stronger economic growth. Public investments in healthcare, measured through healthcare expenditure, seek to enhance the quality of life, leading to lower absenteeism and extended working lifespans. Grossman (1972) [12] also argues that individual health directly impacts productivity, reinforcing the vital role of human capital in economic development.

In conclusion, education, unemployment, infrastructure, and health together form a comprehensive framework for analyzing the impact of human capital on economic growth and FDI attractiveness. These factors are interconnected and must be evaluated as a whole to fully comprehend how human capital can be optimized within an economy.

2. Foreign direct investment (FDI)

Before defining foreign direct investment (FDI), Mucchielli (1998) outlines its distinguishing features compared to other forms of investment. FDI typically entails control or significant influence over the management of a foreign entity, which may be achieved either through full or partial ownership [13]. It also involves the transfer of complex capabilities, such as the movement of skilled personnel (e.g., engineers, managers) alongside the transfer of machinery, equipment, and technologies (e.g., licenses, know-how). FDI operates within a production-oriented framework.

According to the International Monetary Fund (IMF), FDI refers to the acquisition of at least 10% of the voting shares or ordinary shares of a public or private company by foreign investors. It implies a sustained interest in the company's management, including the reinvestment of profits.

3. Human capital development and attraction of FDI

The level of capital and investments in human resources have a significant and positive impact on attracting foreign direct investment (FDI), and these effects tend to become even more pronounced over time. A fundamental distinction in the early authors' research lies, in addition to econometric rigor, in the use of more recent investment indicators that offer increased added value. In fact, most international organizations investing in developing countries after 1980 were more focused on the efficiency and qualification of a highly skilled workforce. UNCTAD studies have established a correlation between human capital elements, measured by the percentage of students and the level of education in science and engineering, and FDI volumes in 140 countries, both developed and developing. Initially, the evolution of foreign investment after World War II was driven by the search for markets to realize profits through cheap labor and natural resources. However, the growing importance of advanced technology and

knowledge-based processes has positioned human capital as a determining factor for foreign investors, particularly those seeking high efficiency. This aligns with the development model of Southeast Asian countries, which, before attracting FDI, lacked industrial skills development programs.

Recent research has examined the role of human capital in attracting Foreign FDI, particularly as both developed and developing nations aim to increase investment inflows. In developed countries, FDI is often drawn to sectors that benefit from a well-educated and technically skilled workforce. Here, human capital is frequently represented by metrics like tertiary education levels and technical expertise, which align with high-tech and knowledge-intensive fields, such as finance, technology, and pharmaceuticals. Studies suggest that human capital remains a pivotal factor in these economies, with high levels of education and specialized training enhancing FDI in high-value industries [3]. In developing nations, the impact of human capital on FDI differs somewhat. While human capital remains significant, particularly as these countries work to enhance their economies, multinational corporations (MNCs) in these regions may also value cost-effective labor combined with adequate secondary-level education. For instance, rising human capital levels often attract FDI to sectors like manufacturing and services, where basic technical skills are sufficient. Research shows that secondary education, alongside workforce training initiatives, tends to correlate with higher FDI levels in such sectors [1]. For Morocco, efforts to enhance FDI attractiveness have involved educational reforms and human capital development. Despite certain ongoing challenges, initiatives aimed at strengthening secondary and tertiary education have positively influenced FDI in sectors such as automotive manufacturing and renewable energy. The World Bank (2023) reports that Morocco's targeted investments in skills development align with its broader strategy of attracting high-value FDI through human capital improvement [22]. By emphasizing these factors, Morocco and similar economies may not only attract labor-intensive FDI but also support investment in higher-value sectors, highlighting the crucial role of human capital development across diverse economic landscapes.

2 Empirical Study

A. Methodology and model specification

1) Study methodology and data

To empirically explore the impact of human capital on the attractiveness of FDI in Morocco, we employ the vector autoregression (VAR) model. This approach facilitates the analysis of the dynamic interplay between human capital and FDI, allowing for the examination of

bidirectional causality and the inclusion of other relevant economic variables, which enhances the robustness of our findings [18].

For our analysis, we will proceed as follows: first, we will conduct a stationarity test, followed by model estimation, study of VAR model, and finally the robustness test.

The time series of the study are based on annual data covering the period from 1990 to 2023. The said data are taken mostly from the World Bank database website and the “Office des changes” website.

2) Model specification and presentation of study variables

➤ Specification of the empirical model:

To examine the relationship between foreign direct investment and human capital, we adopt the following functional form. The model adopted in this study is formulated as follows:

For each year from 1990 to 2023, we have:

$$FDI_t = f(EDU, UNEMPL, HE, GFCF, OP)$$

This can be represented as:

$$FDI_t = \beta_0 + \beta_1 EDU_t + \beta_2 UNEMPL_t + \beta_3 HE_t + \beta_4 GFCF_t + \beta_5 OP_t + \epsilon_t$$

With:

FDI: Foreign direct investment in the industry sector (% GDP)

EDU: Education ([Educational attainment, at least completed lower secondary, population 25+, total \(%\)](#))

UNEMP: Unemployment (% of total labor force)

HE: health expenditure (% of GDP)

GFCF: Gross fixed capital formation (annual % growth) OP: Trade openness (% GDP)

β_i : The coefficients to estimate

ϵ_t : The error term .

We then introduce the logarithm to better capture the potential non-linear effects which transforms equation (1) into the following form:

$$\ln(FDI_t) = \beta_0 + \beta_1 \ln(EDU_t) + \beta_2 \ln(UNEMPL_t) + \beta_3 \ln(HE_t) + \beta_4 \ln(GFCF_t) + \beta_5 \ln(OP_t) + \epsilon_t \quad (2)$$

In this log-linear model, FDI is the dependent variable, while, education, unemployment, healthcare expenditures, gross fixed capital formation, and trade openness are the explanatory variables. This approach allows us to assess how education and other economic factors influence FDI in Morocco, with particular emphasis on the impact of education.

➤ Description of retained variables:

The dependent variable (FDI): reflects the portion of FDI directed to the industrial sector, assessing its attractiveness to foreign investors. In econometric analysis, it helps evaluate how

human capital impacts FDI flows. FDI is measured as annual net inflows as a percentage of GDP and focuses on inward investments in the industrial sector, particularly those involving a lasting management interest. Data is sourced from the “Office des changes” website.

The independent variables:

Education (EDU): represents the gross secondary school enrollment ratio, measuring the percentage of students enrolled in both public and private secondary education programs. It serves as an indicator of investment in human capital and is commonly used in the literature[17]. A higher enrollment is expected to positively influence FDI inflows.

Unemployment (UNEMP): unemployment variable represents the proportion of the labor force that is without work but actively seeking employment and available to work. It is typically measured by the unemployment rate, which is the percentage of unemployed individuals relative to the total labor force, encompassing both employed and unemployed individuals [23].

Gross Fixed Capital Formation (GFCF): Infrastructure is commonly measured by Gross Fixed Capital Formation (GFCF), which represents investment in physical assets such as roads, railways, ports, energy systems, and telecommunications. According to the World Bank definition section of the variables, GFCF captures public and private expenditures on improving land, constructing buildings (schools, hospitals, offices), and purchasing machinery and equipment. It is considered a critical factor for attracting FDI, as studies have shown that higher infrastructure quality enhances a country's appeal to investors.

Health expenditures: According to the World Bank, this variable represents the total spending on health services, including both public and private expenditures. This covers preventive care, treatment, family planning, and nutrition. Good health enhances worker productivity, reduces absenteeism, and fosters innovation, making health spending crucial for economic growth and attracting FDI.

Openness: this variable refers to the degree of a country's participation in international trade, typically measured by the ratio of the sum of exports and imports to GDP. Following the World Bank definitions, it reflects how easily goods and services move across borders, enabling firms to import necessary products and access foreign markets. Higher openness generally encourages FDI by creating more export opportunities and reducing barriers

TABLE.1 PRESENTATION OF VARIABLES

Variable	Explanation	Unit	Type	Source of data
FDI	Foreign direct investment (inflows in the sector of industry)	% of GDP	Dependent variable	Office des changes
EDU	Education (Secondary School Enrollment Rate)	% of GDP	Independent variable	World Bank
UNEMP	Unemployment	% of total labor force	Control variable	World Bank
GFCF	Gross fixed capital formation	% of GDP	Control variable	World Bank
HE	Health expenditures	% of GDP	Control variable	World Bank
OP	Openness	% of GDP	Control variable	World Bank

Source: By ourselves

B. Model estimation and results:

1) stationarity test

The concept of stationarity relates to the long-term behavior of a time series, specifically its ability to revert to a mean after experiencing random shocks. Various statistical tests can evaluate stationarity. In this study, we focus on the Dickey-Fuller test to evaluate stationarity. The test operates under two hypotheses: according to the null hypothesis (H_0), the series contains a unit root and is therefore non-stationary, and the alternative hypothesis (H_1), which implies the existence of a unit root, meaning the series is stationary. The outcomes of the test are summarized in a table for clarity.

TABLE. 2 NON-STATIONARITY TEST

Variables	Value Statistics	Critical Value	Probability	Integration order
EDU	-4.622033	-3.658446	0.0000	I(0)
FDI	-3.777061	-3.098896	0.0150	I(0)
UMEMP	-5.142600	-3.632896	0.0023	I(1)
GFCF	-5.813257	-3.644963	0.0006	I(1)
OP	-4.258191	-3.710482	0.0190	I(1)
HE	-4.865076	-3.632896	0.0041	I(1)

Source: Generated using EvIEWS 13

The stationality tests, performed using the results of the Augmented Dickey-Fuller test indicate that both 'FDI' and 'EDU' are stationary at level, while the other variables are stationary in first

difference. This divergence in the order of integration of variables indicates that they cannot be co-integrated, according to the principles of Granger's econometric theory.

2) *Determination of optimal delay number:*

TABLE. 3 DETERMINATION OF OPTIMAL DELAY NUMBER

Lag	Log L	LR	FPE	AIC	SC	HQ
0	303.3015	NA	3.43e-16	-18.58134	-18.30652	-18.49025
1	458.3261	242.2260*	2.11e-19*	-26.02038*	-24.09661*	-25.38271
2	491.6675	39.59281	3.21e-19	-25.85422	-22.28148	-24.66996

Source: Generated using Eviews 13

This method of delay determination in table 3 has allowed us to know the number of offset. The two criteria we used: Akaike and Schwarz. The smallest criterion was chosen, such as the number of lags. In our case which is Morocco the order of offset is $p=1$.

3) *Results of the estimated model analysis*

TABLE. 4 MODEL ESTIMATION BY ORDINARY LEAST SQUARES

Variable	Coefficient	Std.Error	t-Statistic	Prob.
EDU	7.607173	0.000285	26688.54	0.0000
GFCF	-4.80E-06	1.09E-06	-4.402163	0.0003
HE	-1.44E-06	1.05E-06	-1.372814	0.1867
OP	2.94E-06	7.19E-07	4.092130	0.0007
UNEMP	3.50E-06	1.04E-06	3.351402	0.0036
C	-0.644428	0.000147	-4386.116	0.0000
R-squared	0.999934	Mean dependent var	3.303517	
Adjusted R-squared	0.999982	S.D.dependent var	0.001527	
Sum squared resid	2.48E-13	Akaike info criterion	-28.86689	
Log likelihood	352.4026	Schwarz criterion	-28.57237	
F-statistic	0.000000	Durbin-Watson stat	1.291849	

Source: Generated using Eviews 13

The estimated model, in table 4, has a strong explanatory capacity, with an R^2 of 0.999934, indicating that the explanatory variables perfectly capture the variance of the dependent variable. This reflects the model's strong predictive accuracy. The significance of the variables

is also solid, as shown by the very low p-value of several of them, guaranteeing the robustness of the results obtained. In addition, the Durbin-Watson coefficient at 1.291849 confirms the absence of autocorrelation of residues, thus validating the reliability of the estimate. It is therefore recommended that these results be retained as they demonstrate robust modelling [10], while exploring possible revisions if adjustments are needed to improve interpretation of the results[8].

4) Results and validation of the VAR model:

To ensure the validity of our model, we performed Breusch-Godfrey test, Jarque- Bera test), White test, as well as a robustness test to verify the reliability of results.

➤ Residue autocorrelation test:

TABLE.5 RESIDUE AUTOCORRELATION TEST (LM)

Lag	LRE*stat	Degree of freedom	Prob.	Rao F-stat	Degree of freedom	Prob.
1	36.69242	36	0.4366	1.001196	(36,37.9)	0.4974
2	31.05299	36	0.7028	0.800676	(36,37.9)	0.7475
3	41.38518	36	0.2472	1.184497	(36,37.9)	0.3037

Source: Author based on Eviews

According to the LM test results in Table 5, the probability is above 5%. So we will reject the null hypothesis of no residual autocorrelation.

➤ Normality test:

TABLE.6 JARQUE-BERRA NORMALITY TEST RESULTS

Component	Jack Berra	Degree of freedom	Prob.
1	0.498563	2	0.7794
2	0.427802	2	0.8074
3	2.996214	2	0.2236
4	3.183602	2	0.2036
5	1.140380	2	0.5654
6	0.375176	2	0.8290
Joint	8.621737	12	0.7349

Source: Generated using Eviews 13

Based on the results in table 6, the probability (0.7349) associated with the Jarque-Bera test exceeds the 5% significance level. Thus, the assumption of no autocorrelation in the errors is satisfied. In addition, the Jarque-Bera statistic is 8.621737, which reinforces this conclusion on the normality of residues.

➤ Residue heteroscedasticity test

TABLE.7 HETEROSKEDASTICITY (TEST WHITE)

Joint test:		
Chi-sq	Degree of freedom	Prob.
512.6705	504	0.3849

Source: Generated using Eviews 13

The test results in Table 7 reveal a p-value of 0.22, which is above the 0.05 significance level. This result indicate that there is no evidence of heteroscedasticity in the model.

➤ Causality test

TABLE. 8 TEST OF CAUSALITY IN THE SENSE OF GRANGER

Null Hypothesis:	Obs	F-Statistic	Prob.
LEDU does not Granger Cause LOP		6.31295	0.0056
LUNEMP does not Granger Cause LGFCF	32	5.48638	0.0100
LHE does not Granger Cause LOP	32	3.72430	0.0373

Source: Generated using Eviews 13

The application of the causality test, in table 7, indicate that LEDU causes LOP, LUNEMP causes LGFCF and LHE causes LOP. In addition, no causal relationship is noted in the sense of Granger between the other variables.

➤ Variance decomposition for each of the VAR variables:

TABLE. 9 VARIANCE DECOMPOSITION USING CHOLESKY

Period	S.E.	LFDI	LEDU	LGFCF	LUNEMP	LOP	LHE
1	0.231113	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.239105	96.58645	0.404049	0.388791	0.365470	0.078805	2.176439
3	0.255787	91.64530	0.365530	0.363184	0.441329	1.978055	5.206604
4	0.256774	91.32167	0.421601	0.437609	0.637888	2.002418	5.178819
5	0.268227	88.69483	0.495406	0.574090	0.702518	2.064625	7.468533

6	0.269618	87.80817	0.498012	0.835280	0.780604	2.390582	7.687352
7	0.274724	85.57125	0.497032	1.098400	0.860560	3.397325	8.575431
8	0.276120	84.79835	0.497143	1.300384	1.215256	3.509457	8.679410
9	0.281285	83.36854	0.484932	1.655259	1.715676	3.498912	9.276684
10	0.284437	81.91819	0.474448	2.029498	2.124776	3.709800	9.743285

Source: Generated using Eviews 13

The decomposition of the variance for Morocco presented in table 9 indicates that the variance of the FDI forecast error is due to 82%, 0.5% to education and 2.03% to GFCF and 2.12% to unemployment rate, 3.71% to the opening rate and 9.8% to health expenditure. The shocks on these variables dominate very widely and in all horizons that of the inflow of FDI into the industrial sector.

5) *Quantile regression as a robust test*

To enhance our analysis of economic relationships, we employ quantile regression as a robustness test presented in table 10. This method facilitates the examination of the effects of explanatory variables across different points in the income inequality distribution, providing a nuanced and robust perspective. Such an approach allows us to estimate the consistency of our findings within various socio-economic contexts.

TABLE. 10 QUANTILE REGRESSION RESULTS

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEDU	7.607173	0.000370	20572.26	0.0000
LUNEMP	3.89E-06	1.51E-06	2.577788	0.0190
LGFCF	-4.77E-06	1.58E-06	-3.020602	0.0073
LOP	3.28E-06	1.20E-06	2.733262	0.0137
LHE	-1.68E-06	1.59E-06	-1.055897	0.3050
C	-0.644429	0.000191	-3374.438	0.0000
Pseudo R-squared	0.999943	Mean dependent var		3.303517
Adjusted R-squared	0.999928	S.D. dependent var		0.001527
S.E. of regression	1.19E-07	Objective		8.80E-07
Quantile dependent var	3.303412	Restr. objective		0.015545
Sparsity	3.46E-07	Quasi-LR statistic		359786.2
Prob(Quasi-LR stat) 0.000000				

Source: Generated using Eviews 13

The results presented show that the estimated regression model reveals significant coefficients for several explanatory variables. The EDU variable has a positive coefficient of 7.607173 with a p-value of 0.0000, demonstrates a strong and statistically significant influence on the dependent variable. In addition, GFCF and OP have coefficients of $-4.77\text{E-}06$ and $3.28\text{E-}06$ respectively, with p values of 0.0073 and 0.0137, also highlighting their statistical importance. Although the UNEMP variable has a positive coefficient of $3.89\text{E-}06$, its significance ($p = 0.0190$) reinforces its role in the model. In contrast, HE shows a negative coefficient of $-1.68\text{E-}06$ with a p-value of 0.3050, indicating no substantial impact at the 5% threshold.

The very high R-squared (0.999943) and the adjusted R-squared of 0.999928 suggest that the model almost perfectly explains the variance of the dependent variable. This indicates high accuracy in the estimates, which is reinforced by the very low regression standard error ($1.19\text{E-}07$). Overall, the results are consistent with those obtained by our method estimation, underlining the robustness of the model.

3 Results and discussion

The results of the VAR model, as well as the various tests executed, attest to the robustness and consistency of the model. The high coefficient of determination (R^2) suggests that the explanatory variables (education, gross fixed capital formation, health, trade opening and unemployment) explain almost all the variability of FDI in Morocco. This underlines the ability of the model to accurately estimate FDI dynamics in the country. In addition, the significance of F-statistic reinforces the overall validity of the model adjustment.

The variable Education plays a crucial role in influencing FDI. The positive and highly significant coefficient suggests that higher educational attainment fosters FDI inflows. This reflects the value of a well-educated workforce in attracting foreign investors, as it enhances productivity and innovation capacity within the country. Therefore, efforts to improve education continue to be a strategic driver of FDI.

This finding is consistent with much of the literature that considers human capital as a determining factor in attracting foreign direct investment (FDI) to developing countries. Several studies [24] underline the importance of a single hand-qualified work to attract foreign investors. Bouoiyour (2007) also reinforces this idea, showing the role of education in international investment decisions.

Regarding Gross Fixed Capital Formation, a significant and negative coefficient indicates that a rise of capital formation might not directly translate into higher FDI in this context. This could point to inefficiencies in capital investments or the need for better alignment between capital spending and foreign investment priorities.

For Healthcare Expenditures, the coefficient is negative and not statistically significant. While healthcare is an essential part of development, these results suggest that its impact on FDI is currently limited. This could imply that the benefits of healthcare investments are yet to be fully realized in terms of attracting foreign capital, requiring further improvements in healthcare infrastructure and services.

The Trade Openness variable exhibits a significant and positive coefficient, highlighting the role of greater integration into global trade facilitates FDI inflows. By creating a more open economic environment, Morocco becomes more attractive to international investors, as it allows easier access to markets and reduces trade barriers. A positive and significant effect of unemployment on FDI suggests that higher unemployment rates may present opportunities for investors.

Finally, the significant and positive effect of unemployment on FDI suggests that higher unemployment rates create opportunities for investors, seeking to capitalize on a readily available labor force at competitive wages. However, it also reflects underlying challenges in the labor market that could be addressed with targeted policies to improve employment outcomes while sustaining investment inflows.

Overall, the quantile regression results complement the VAR model findings by offering additional insight into the distribution of FDI's response across different quantiles. Despite the minor differences, the significance of key variables remains consistent, confirming the robustness of the model. The non-linearity explored by the quantile regression underlines that, while Morocco has made progress in education and trade reforms, further efforts are required, particularly in the healthcare sector, to sustain and enhance its attractiveness to foreign investors. The model's strong predictive power suggests that these reforms are on the right track, but further policy measures are needed to address sectors like healthcare where impacts remain insufficient.

Conclusion

This study aimed to empirically examine the impact of human capital on the attractiveness of FDI in Morocco's industrial sector. Using multiple VAR model, we explored how variables related to human capital, such as education, health expenditures, and unemployment, affect FDI inflows specifically within the industrial sector. Data from 1990 to 2023 were analyzed through stationarity tests, VAR model estimation, and robustness checks, providing a comprehensive view of FDI's response to changes in human capital. The results revealed that while Morocco has made notable progress in areas like education and trade reforms, sectors like healthcare still require more attention to fully realize the potential for FDI attraction, particularly in industrial areas like manufacturing and automotive production. VAR model confirmed the robustness of the model and emphasized the relationship between FDI and human capital across different quantiles within the industrial sector

The findings of this study reaffirm the pivotal role of human capital in shaping the behavior of FDI in Morocco, particularly in the industrial sector, where skilled labor is crucial for the success of industries such as automotive, aeronautics, and manufacturing. As the country continues to strengthen its workforce through education, it becomes more attractive to foreign investors looking to tap into Morocco's growing industrial base. Furthermore, improvements in industrial policy, which focus on developing technical skills and supporting innovation, could significantly boost FDI inflows in this sector. However, further policy reforms, especially in the healthcare sector, are crucial for sustaining the overall attractiveness of the workforce, as a healthy labor force is essential for industrial productivity. While current reforms are on the right track, a more holistic approach to human capital development that integrates health, education, and industrial training will be essential in securing long-term FDI inflows and supporting Morocco's broader economic and industrial growth strategy

By analyzing variables such as education, health, and unemployment, we fill this gap and offer insights to help policymakers leverage human capital to boost FDI and strengthen the sector's competitiveness. From an academic perspective, this study provides valuable contributions to the understanding of the role of human capital in shaping FDI in the industrial sector, adding to the existing body of knowledge on investment drivers in developing economies. It offers a deeper understanding of how education and technical skills development can serve as catalysts for economic growth through increased FDI in industrial sectors. Nonetheless, there are some limitations, including the need for a more in-depth exploration of the long-term effects of capital formation, healthcare reforms, and industrial policy on FDI. Future research could build on

these findings by examining how these factors evolve over time and interact with education to influence FDI in the industrial sector

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