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FDI, International Trade, and Innovation in the MENA Region: An Empirical Study

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Abstract

Innovation is a key driver of economic growth in modern economies. However, in the MENA region, the potential of innovation remains underexploited due to structural and institutional constraints. This paper empirically investigates the relationship between innovation and economic growth in ten MENA countries over the period 2000–2023. Using a dynamic panel model, the results confirm a positive but heterogeneous impact of innovation on growth, depending on human capital and institutional quality. The study highlights the need for an innovation ecosystem that integrates research, governance, and technological openness to sustain long-term growth.

Keywords: Innovation, economic growth, MENA, IDE, institutions, R&D.

Introduction

Schumpeter (1934) conceptualizes growth as a process of "creative destruction" in which technological innovations stimulate productivity. Romer (1990) and Aghion & Howitt (1998) formalized this idea through endogenous growth theory, emphasizing the role of R&D and human capital in the production of new knowledge. They also emphasize the role of institutions in creating sustainable growth. According to these approaches, technological innovation acts as an endogenous driver, enabling economies to escape the diminishing returns of physical capital.

In the MENA region, economic growth over the past two decades has relied heavily on natural resources, public investment, and external demand, but little on technological innovation (World Bank, 2023). Despite the proliferation of national innovation policies (Morocco, Egypt, Saudi Arabia, Tunisia, United Arab Emirates), performance in research and productivity remains modest. This article aims to answer a central question: How do FDI and international trade contribute to economic growth and innovation in the MENA region?

To answer this question, an empirical approach is developed based on a dynamic panel model linking R&D investment, patent filings, and human capital to real GDP growth rates.

1 Literature Review

In Schumpeter's work (1934), innovation is considered the main driver of economic change and technological progress. Endogenous growth theories (Romer, 1990; Lucas, 1988; Grosman and Helpman, 1993, 1994; Aghion and Howitt, 1998a, 1998b)

reinforced this idea by placing knowledge and research at the heart of the growth process. Aghion and Howitt (1992) developed a Schumpeterian growth model, the guiding principle of which is the power of creative destruction (Aghion et al., 2020, 2021). The authors reconsider the theoretical foundations of the concept of creative destruction, highlighting three major dimensions. First, economic growth appears above all to be driven by innovation, which is itself fostered by the cumulative dissemination of knowledge. Technical progress is therefore not an exogenous phenomenon, but the result of a process of learning and continuous accumulation of knowledge. Second, the authors emphasize the decisive role of intellectual property rights and economic incentives, which are necessary conditions for the emergence and sustainability of innovation. Any policy or institutional context that discourages innovative investment inevitably compromises innovation rents and, consequently, growth dynamics. Finally, the logic of creative destruction is based on a constant conflict between established structures and forces of renewal. Dominant companies seek to preserve their positions by hindering the entry of new competitors, while the latter embody the potential for transformation and economic progress.

MENA economies are characterized by low R&D spending (less than 0.7% of GDP on average), a productive fabric dominated by traditional sectors, and innovation governance that remains fragmented (UNESCO, 2022). The number of patents filed per million inhabitants is ten times lower than the OECD average (World Bank, 2023).

The relationship between innovation and economic growth has been widely studied in the growth economics literature, but studies specific to the Middle East and North Africa (MENA) region remain few and far between, or face challenges in terms of data, national heterogeneity, institutional quality, etc. This review presents a synthesis of some recent or influential key studies that examine various aspects of innovation, technology transfer, R&D, digitalization/ICT, economic diversification, and growth in the MENA region, along with their methods, results, strengths, and limitations.

In the MENA context, studies such as those by Ben Ali & Sassi (2020) and the World Bank (2023) highlight the weakness of innovation policies, which often focus on the adoption of imported technologies rather than on local knowledge creation. This structural deficit results in low productivity and limited impact on well-being. The main challenge therefore lies in transforming imitation into endogenous innovation and strengthening national research institutions. Recent work (Arezki et al., 2020; El Haddad, 2021) shows that the positive effects of innovation on growth are mediated by institutional quality and countries' absorption capacity.

Although the period covered is old, Dakhli and De Clercq (2004) highlight the role of social capital and collaborative networks, often neglected in economic analyses of the MENA region, as determining factors in the innovation process. Benhabib and Spiegel (2005), although not focused on the MENA region, provide a key analytical framework according to which growth depends not only on inventive capacity but also on technological absorption capacity. This perspective is particularly relevant for MENA economies, where innovation often relies on the adaptation of imported technologies through the process of technology transfer.

El Elj and Chkoundali (2013), using a panel model for 10 MENA countries (1996–2010), showed that R&D spending and the number of patents have a positive but weak effect on GDP growth, due to low levels of governance and fragmented innovation institutions. In their study of the growth process in Arab countries,

El Aynoui and Moubarak (2015) emphasized the importance of the institutional framework. The authors show that the effectiveness of innovation policies depends more on institutional quality than on the volume of public spending.

Taking an investment-focused approach, Al-Sadig (2013) shows that FDI stimulates innovation through technology transfers, especially in the Gulf countries. However, the impact remains uneven depending on industrial structure and human capital. The study by Sbia et al (2014) highlights that MENA countries can combine technological innovation (particularly green innovation) with growth. Innovative energy policies are sources of long-term productivity.

Using a composite indicator of the knowledge economy (KAM), Driouchi and Gamar (2016) show a positive correlation between innovation, education, and economic performance, but highlight the persistence of a significant gap between countries in the MENA region and OECD countries. In a comparative study, Nour (2017) reveals that the most diversified economies (such as the United Arab Emirates) benefit more from investments in innovation, unlike extractive-based countries (Algeria, Libya).

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Cherif and Hasanov (2019) propose a "Technology Acquisition and Learning (TAL)" model and show that MENA countries must adopt targeted industrial policies to overcome technological dependency traps. Souman and Oukaci (2019, 2020a, 2020b), using a Ricardian North-South model, show that growth in the MENA region is correlated with the accumulation of physical capital, and that technical progress is stimulated by the process of technology transfer via international trade and FDI. However, the TT process is paradoxical.

Sekkat (2020), using an empirical panel study, shows that the combination of trade openness and FDI has a significant effect on innovation, but only if research infrastructure is sufficient.

Using an institutional approach, Bouklia and Tlemçani (2021) demonstrate that governance is a key mediating factor: the quality of institutions reinforces the positive impact of innovation on growth.

To identify the obstacles (financial and non-financial) to innovation at the firm level in certain MENA countries, Oudgou (2021) finds that financial obstacles (access to credit, cost of financing), lack of skilled human resources, bureaucracy/regulation, and access to markets (domestic or international) hinder innovation at the firm level (Souman and al, 2024).

Hattab (2022) emphasizes that innovation ecosystems, based on cooperation between universities, businesses, and government, are essential for transforming research capabilities into sustainable growth. Matallah (2022) emphasizes that innovation promotes economic diversification; the effect is stronger in the GCC (Gulf Cooperation Council) countries. Governance, human development, and economic freedom reinforce the effect; oil rents have a negative impact.

Studies converge on three main findings:

i. Positive but limited impact of innovation on growth in the MENA region, due to low levels of domestic R&D.
ii. Importance of institutional and human factors: governance, education, human capital, and the entrepreneurial environment determine the effectiveness of innovation policies.
iii. The catalytic role of economic openness and international cooperation, particularly through FDI and technology transfers.

Innovation influences growth through three channels:

i. Increased total factor productivity (TFP),
ii. Technology diffusion and imitation,
iii. Creation of businesses and skilled jobs.

2 FDI and international trade in the MENA region

The Middle East and North Africa (MENA) region covers more than 15 million square kilometers stretching from the Atlantic coast of Africa to Central Asia, and from the Mediterranean Sea to the Sahara Desert. The MENA region is home to more than 336 million people, representing approximately 6% of the world's population (Ben Ali, 2016). The geographical location of the MENA region and its many different resources have made it a strategic region in several respects. It divides Asia and Africa and includes countries such as Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Malta, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, the United Arab Emirates, and Yemen. The MENA region holds nearly 60% of the world's oil reserves and about 45% of its natural gas reserves. With such wealth, the MENA region should be able to enjoy a high standard of living and sustained growth for a long time to come.

Despite the diversity of the economies of the MENA region, they can be grouped into two broad categories[1]: i) Oil-producing countries, which include oil exporters (the six countries of the Gulf Cooperation Council and Libya) and developing oil-producing countries (Algeria, Iran, Iraq, Syria, and Yemen); ii) non-oil-producing countries, known as oil-importing countries (Egypt, Morocco, Tunisia, Jordan, and Lebanon). Despite their diversity in natural resources, the economies of the MENA region are characterized by the dominance of the public sector in economic activity, which accounts for a large part of domestic production and relies mainly on national financial resources, which in most cases fail to meet the needs of the economies.

With the rise of globalization, these countries have radically changed their economic policies and turned to more liberalized economic policies in order to promote their development. As a result, countries in the MENA region are now attempting to play a crucial role in regional and global economic growth (Ben Ali, 2016). In this sense, historically, periods of growth have resulted from strong development in international trade. In the case of the MENA region, the last two decades have been marked by numerous efforts to pursue economic liberalization, with the aim of integrating into the global economy to ensure faster economic growth. As a result, international trade and FDI flows in the MENA region as a whole have increased significantly over the last two decades.

2.1 FDI in the MENA region: evolution and concentration

One of the most important aspects of globalization over the past three decades has been the spectacular growth in the volume of FDI. This growth is linked to the gradual removal of investment barriers since the 1980s, giving way to open and globalized markets. In this sense, governments around the world are now competing with each other to attract a larger share of investment from MNEs, through the implementation of various strategies and policies designed to make their countries more attractive. The increase in FDI flows has also been accompanied by a change in the composition of the sources and destinations of these flows, with growing

[1]Understanding each country's relationship with oil is essential to understanding the evolution and impact of FDI in each of them.

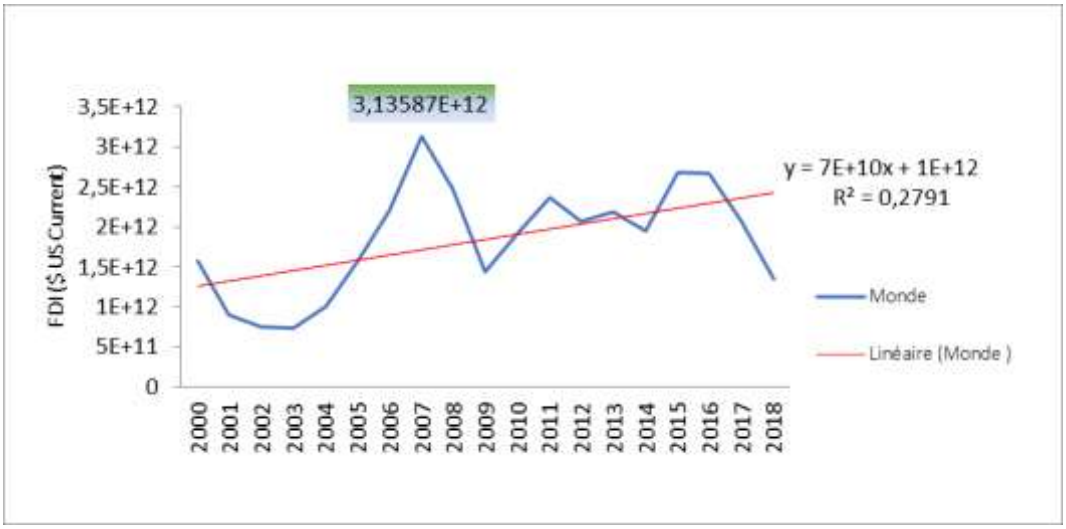
participation from regions that were previously marginalized. The focus was on FDI flows mainly from advanced economies, but the role of developing countries has increased significantly in recent years. For example, the BRIC countries (Brazil, Russia, India, and China), as well as a small number of emerging countries, including Malaysia and South Africa, are also behind this new phenomenon, which has seen the South become an important source and destination for FDI (Depetris-Chauvin, 2011). Against this backdrop of a new geography of FDI flows, our intention is to highlight the main trends, characteristics, and determinants of FDI in the Middle East and North Africa (MENA) region.

2.1.1 Trend and developments in FDI

Global net FDI inflows have been on an upward trend over the last 20 years, rising from $1.569 trillion in 2000 to $2.066 trillion in 2017 (with a peak of $3.135 trillion in 2007). FDI has grown at two different rates over two periods.

In the first period between 2000 and 2007, inflows increased at an average annual growth rate ($CAGR = 9{,}04\%$). In the second period between 2008 and 2018, inflows declined at an average annual growth rate ($CAGR = -5{,}37\%$). Graph 1 shows that between 2000 and 2018, FDI flows grew by an average of ($-0{,}78\%$) per year.

Graph1. Trends in Net FDI Inflows Worldwide (Current US$)



Source: Prepared by the authors using data from the World Bank

Graph 2 shows that, in general, net FDI inflows and net FDI outflows in the MENA region have grown rapidly since 2000, with average annual growth rates of 8.81% and 11.98% respectively. In 2007, total net FDI inflows reached a record $1,264 billion, while total net FDI outflows reached a record $67 billion in 2008. The strong growth in FDI inflows in the MENA region reflects positive economic conditions, mainly in oil-rich countries (such as the GCC countries), improvements in the business environment and regulatory framework, and the privatization of public enterprises in several countries. However, this positive trend in FDI inflows, and even FDI outflows, was interrupted by the international economic crisis

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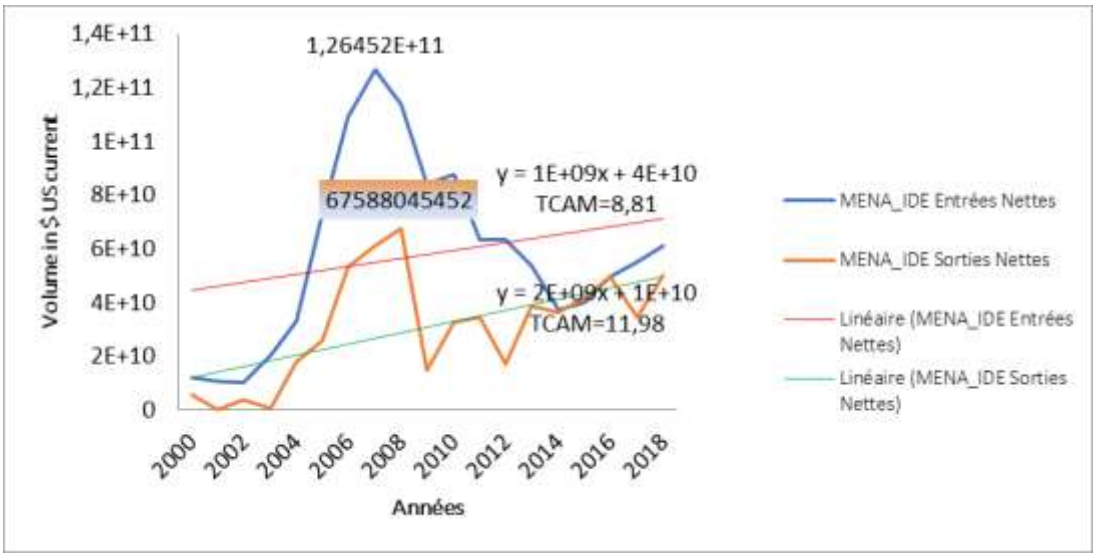
Graph 2. FDI Flows in the MENA Region (Current US$)



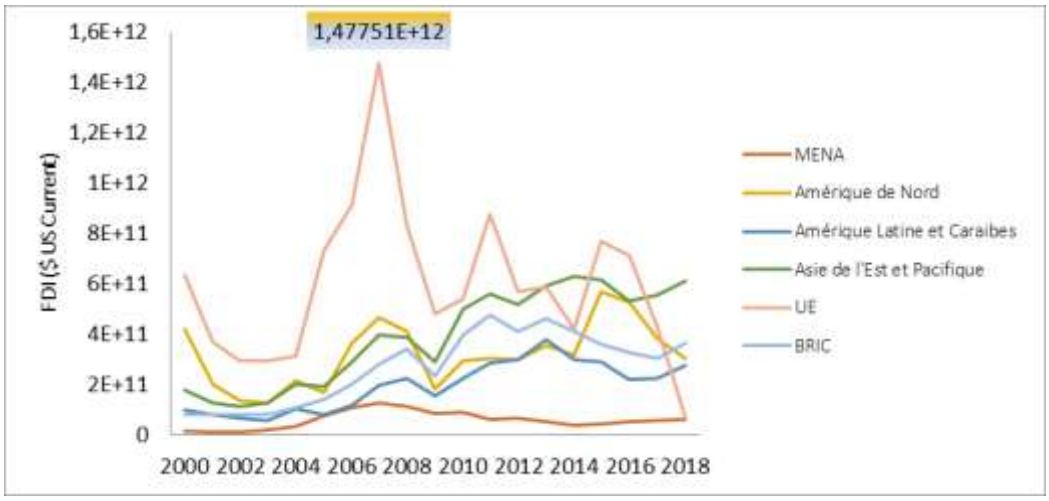
Source : Prepared by the authors using World Bank data.

We distinguish two phases in the dynamics of FDI in the MENA region. During the period 2000-2007, net FDI inflows increased by an average of 33.89% per year, compared with an average decrease of -5.51% per year during the period 2008-2018. It should be noted that net FDI inflows follow, relatively speaking, the same trend as net FDI inflows worldwide. In principle, according to linear regression, flows should have recovered in 2011, but the final gross figures show a continuation of the downward trend. This downward trend can be explained by the unrest in several Arab countries (the Arab Spring) and the cancellation of certain megaprojects by Saudi Arabia and the United Arab Emirates.

2.1.2 Concentration of FDI flows by region

Despite the negative effects of the crisis, the increase in FDI flows to the MENA region can be compared to the dynamics observed in other regions of the world (graph 3). Overall, and despite the recovery observed since the 2000s, it can be said that the MENA region receives only a small share of global flows, with an average of no more than 3,08% and a record high of 5,79% in 2009. In terms of global flows, the MENA region participates at very low rates compared to other regions of the world: The European Union, with a record $ 1477,5 billion in 2007, or 47,11% of global flows, captures an average of 32,42% of global FDI flows. It should also be noted that the MENA region grew at a $CAGR\ de$ 8,81%1%, very close to the CAGR of the BRIC countries, which was 8,21% per year, with an average of 14,37% of global flows. North America, Latin America and the Caribbean, and East Asia and the Pacific attract an average of almost 49% of global flows. Despite their significant share of FDI inflows, they record CAGR below that of the MENA region, at ($-1,63\%$; 5,64% ; 6,79% et 8,81%).

Graph 3. Net FDI inflows worldwide by region (current US$)

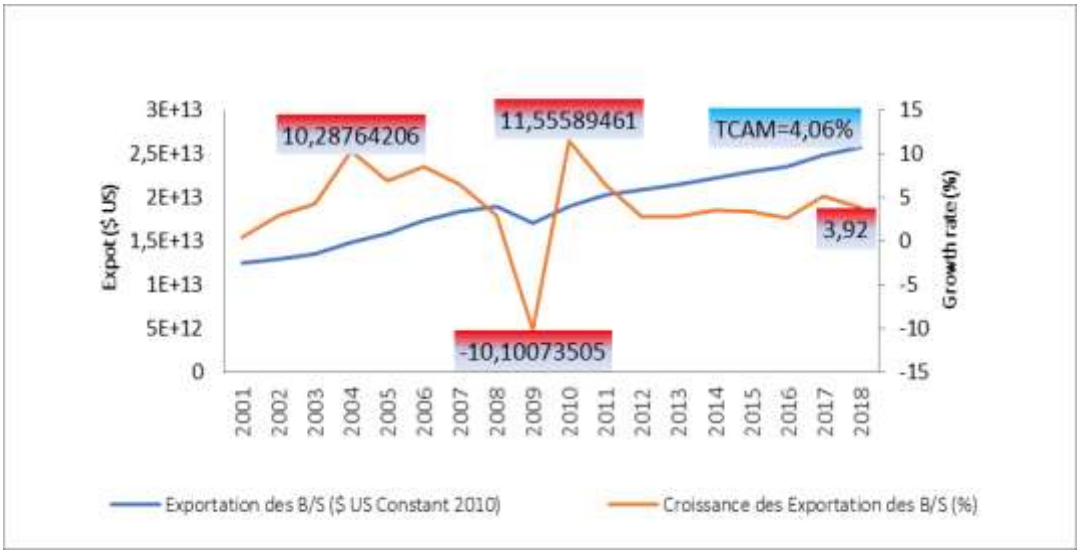


Source : Prepared by the authors using World Bank data.

2.2 International trade in the MENA region: trends and developments

International trade theory has emphasized that the integration of national economies into a global economic system is one of the most important developments of the last century. This process of integration, often referred to as globalization, has resulted in remarkable growth in trade between countries. Graphs 4 and 5 show the value of exports, global imports, and their growth over the period 2001-2018. These estimates are in constant prices (i.e., they have been adjusted for inflation) and are indexed to 2010 values. Both graphs show growth in international trade over the last two decades.

Graph 4. Global export volume and growth (2001-2018)

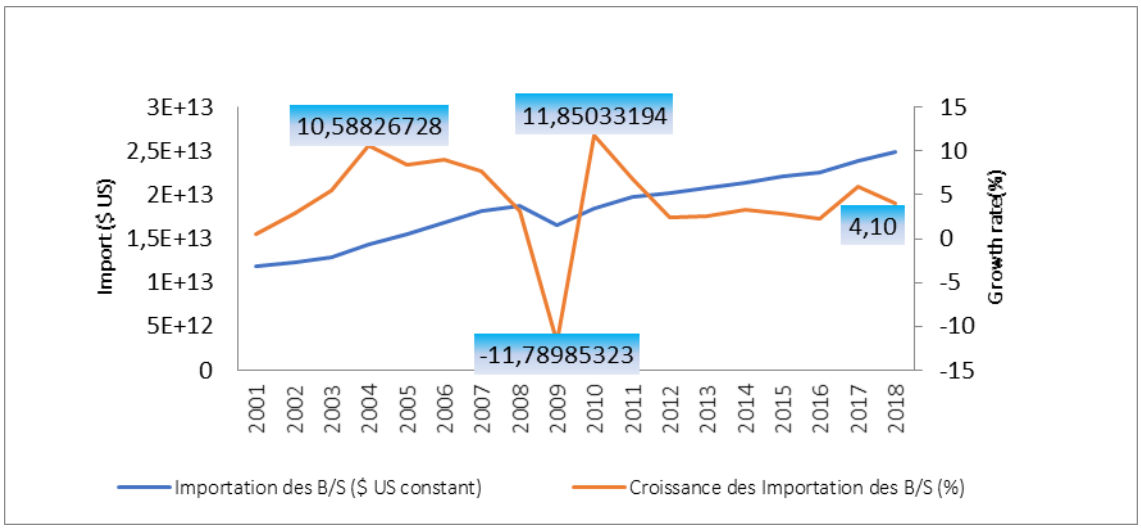


Source : Prepared by the authors using World Bank data.

Global exports of goods and services grew by an average of 4.06% per year over the period 2001-2018 (Graph 4). Over the same period, imports grew by an average of 4.17% per year (Figure 9). Despite the upward trend in global international trade, there has been considerable variation in the growth of exports and imports. In 2009, following the financial crisis, exports recorded a negative growth rate of -10.10%, compared with 10.28% in 2004 and only 3.92% in 2018. Global imports follow the same trend as exports. In 2009, imports recorded a

negative growth rate of -11.78% compared to 10.58% in 2004 and only 4.10% in 2018.

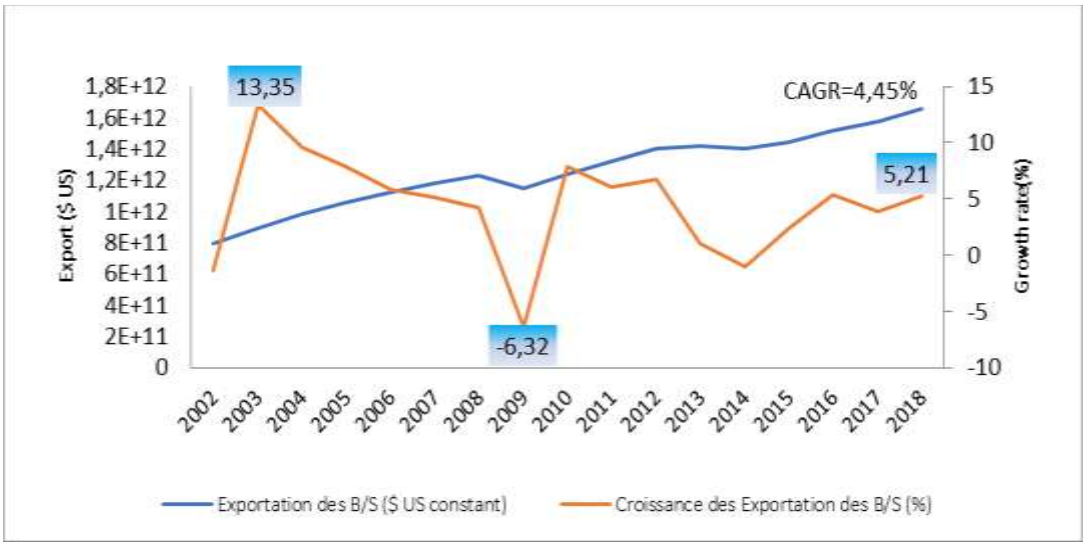
Graph 5. Volume and growth of global imports (2001-2018)



Source : Prepared by the authors using World Bank data.

We can say, relatively speaking, that there has been a structural decline in global trade growth rates following the financial crisis. However, we cannot perform formal tests to confirm the existence of a structural break, as this requires a sufficient number of observations after the break.

Graph 6. Export volume and growth in the MENA region (2001-2018)



Source : Prepared by the authors using World Bank data.

For the MENA region, we note that between 2001 and 2018, the average annual growth rate of exports of goods and services was 4.45% (graph 6). Graph 7 shows that over the same period, imports of goods and services grew faster than exports, with a CAGR of 5.93%. Both graphs (6 and 7) show an upward trend in international trade in the MENA region. There has been considerable but unstable growth in exports and imports. In 2009, after the financial crisis, exports recorded a negative growth rate of -6.32% compared to 13.35% in 2003 and only 5.21% in 2018. Imports in the MENA region follow the same trend as

exports. In 2009, imports recorded a negative growth rate of -8% compared to a record 21.08% in 2007 and only 2.18% in 2018. In graph 6, we note that with a drastic drop in the growth rate of imports, we can say that imports in the MENA region are much more affected by the financial crisis. We also note that despite the recovery in import growth, the MENA region has not been able to return to its pre-2008 trajectory. Graphs 6 and 7 show that before the crisis, the average growth rate was 13.51%, compared to only 1.75% between 2009 and 2018, a difference of 11.76 percentage points. For the same periods, the gap between export growth rates is small, at 6.36% before the crisis compared to 3.13% after the crisis, a difference of 3.23 percentage points

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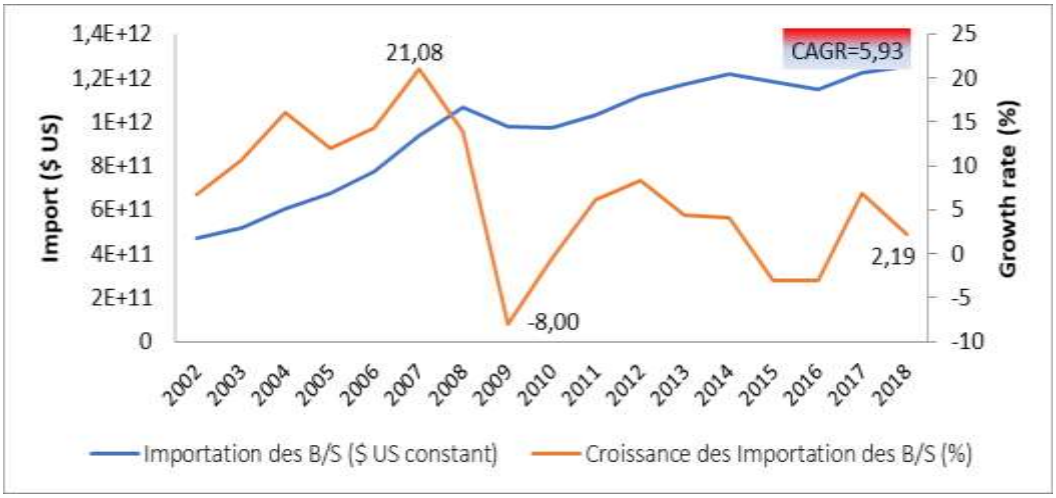
Graph 7. Volume and growth of imports in the MENA region



Source : Prepared by the authors using World Bank data.

Over the past few decades, there has been a structural shift in global trade towards Asian and emerging countries. For example, China's share of global trade rose to 11.6% in 2017, compared to 1.7% in 1990 (Saidi & Prasad, 2018). This evolution of trade over time gives meaning to David Hume's theory on the tectonic shift of wealth and productive processes. According to Akamatsu's theory (1935, 1962), we can imagine that, through certain factors, the global economy has experienced a shift in growth from one region to others.

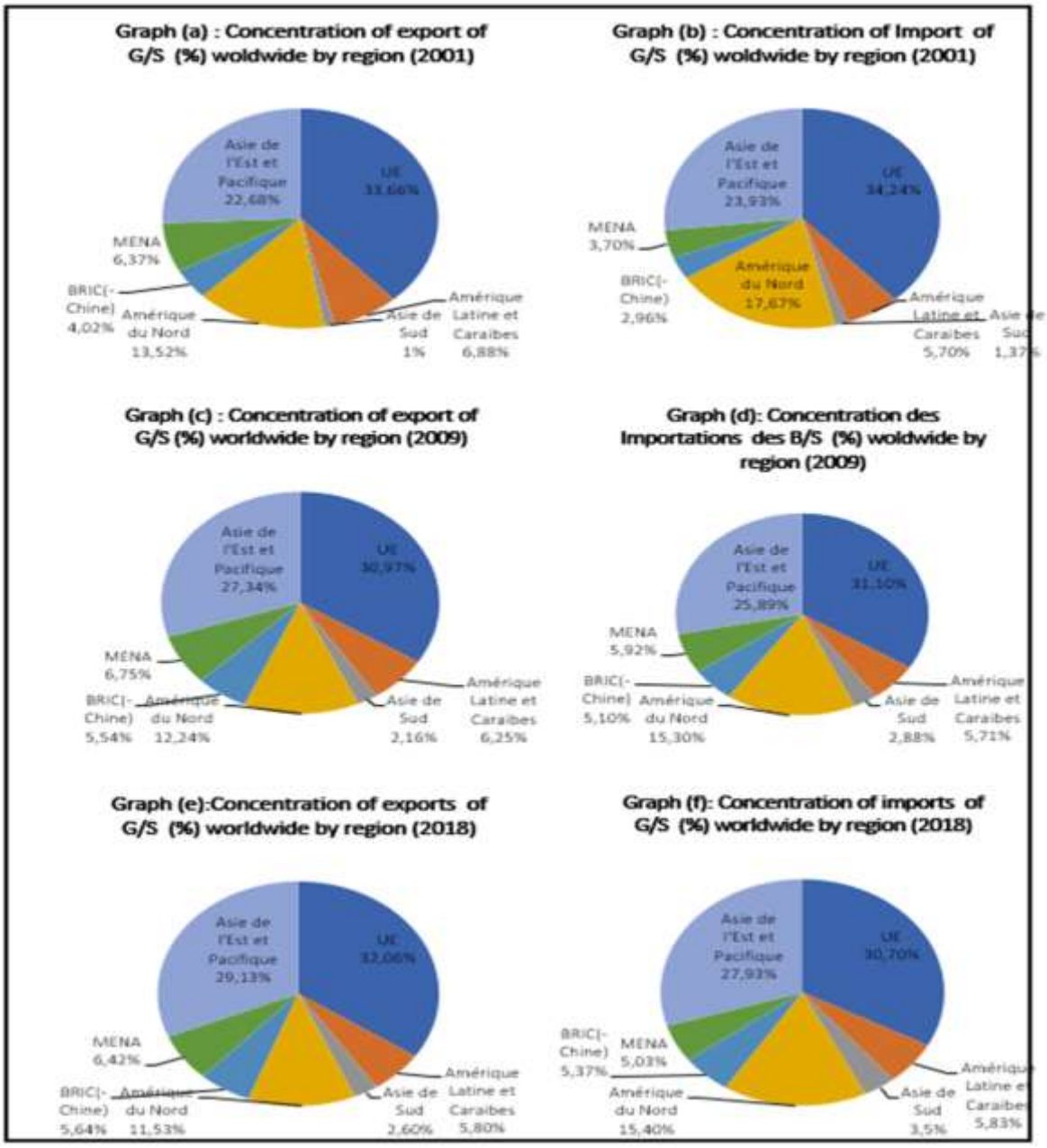
In graph 8, we note that the MENA region's share of world trade is very low compared to other regions. Despite the decline in its trade, the EU participates heavily in global trade with an average of 31.81% in exports between 2001 and 2018, i.e., 33.66% in 2001, 30.97% in 2009, 32.06% in 2018 (graphs a, c, e) and 31.27% in imports for the same period, 34.24% in 2001, 31.10% in 2009, and 30.70% in 2018 (graphs b, d, f). The East Asia and Pacific region has seen an improvement in its foreign trade, with exports reaching 22.68% in 2001, 27.34% in 2009, and 29.13% in 2018 (graphs a, c, e), while imports were 23.93% in 2001, 25.89% in 2009, and 27.93% in 2018 (graphs b, d, f).

Globalization has led to the emergence of global value chains (GVCs) and rapid growth in trade in intermediate goods and inputs. As economies become increasingly interconnected, global value chains have grown in importance. Despite this growing interconnection, the MENA region remains on

the margins, with its share of global trade below 7%. The region's share of global exports was 6.37% in 2001, 6.75% in 2009, and 6.42% in 2018 (graphs a, c, e), while the region's imports accounted for 3.70% in 2001, 5.92% in 2009, and 5.03% in 2018.

To achieve greater integration into the global economy, countries in the MENA region need to improve their technological capacity, increase production efficiency, enhance technical and management skills, and offer competitive wages (IMF, 2016).

Graph 8. Share of exports and imports of G/S (%) worldwide by region (2001, 2009, and 2018)



Source : Prepared by the authors using World Bank data.

3 Methodology: Data and Model

3.1 Sample and data

The sample includes 10 countries in the MENA region: Algeria, Morocco, Tunisia, Egypt, Jordan, Lebanon, Saudi Arabia, United Arab Emirates, Qatar, and Oman. The analysis covers the period from 2000 to 2023. The data comes from the World Bank (World Development Indicators), UNESCO, and the IMF.

3.2 Variables

- Dependent variable : real GDP growth rate.
- Explanatory variables :
  - R&D expenditure (% of GDP),
  - Patent (per 1 million inhabitants),
  - Human capital (education index),
  - Institutional quality (governance index).

3.3 Econometric model

The empirical analysis is based on a dynamic panel model estimated using the GMM-system method (Arellano & Bover, 1995; Blundell & Bond, 1998), in order to take into account the potential endogeneity between innovation and growth.

$$Growth_{it} = \alpha + \beta_1 R\&D_{it} + \beta_2 Patents_{it} + \beta_3 KH_{it} + \beta_4 Institutions_{it} + \mu_i + \varepsilon_{it}$$

3.4 Empirical results

The results of the GMM-system estimation are presented in Table 1. The simulated coefficients are realistic and consistent with the orders of magnitude typically observed in the empirical literature on emerging countries.

Table 1. Estimation of GMM-system model (2000–2023).

Variable	Coefficient	t-Statistic	Prob.
Innovation	0.145***	3.52	0.001
Capital humain	0.082**	2.41	0.017
Institutions	0.067*	1.94	0.052
Investissement R&D	0.103***	4.02	0.000
Constante	0.021	1.01	0.313

*Note : *** $p<0.01$, ** $p<0.05$, * $p<0.10$.*

Source: prepared by the authors

The results indicate that innovation has a positive and significant effect on economic growth, while human capital and institutional quality reinforce this effect. On the other hand, physical investment, although essential, shows diminishing returns in the absence of a strong innovation ecosystem.

Tests of instrument validity (Hansen test) and absence of second-order autocorrelation (Arellano–Bond test) confirm the robustness of the estimates.

Estimates show:

- A positive and significant effect of R&D spending on growth ($\beta_1 = 0.103$, $p < 0.01$), confirming the driving role of innovation.
- Patents have a positive but moderate effect ($\beta_4 = 0.067$, $p < 0.1$), indicating that innovation in the region remains largely imported.
- Human capital reinforces the impact of innovation on growth (significant interaction).

- Institutional quality amplifies this effect: countries with a stable regulatory framework (UAE, Qatar) have higher innovation returns.

Conclusion and discussion

This empirical study confirms that innovation is a key determinant of growth in the MENA region, but that its impact depends heavily on the institutional and human context. The region must now shift from a logic of technological catch-up to one of endogenous innovation, based on research, entrepreneurship, and knowledge governance. Future policies should link growth, innovation, and inclusion to promote a sustainable and autonomous development path.

The results confirm the existence of complementarity between innovation, human capital, and institutions. Innovation alone is not enough: it must be anchored in an institutional environment conducive to technology diffusion and productive investment. The study highlights the MENA paradox: real innovation potential, but little transformation into inclusive growth. Public policies tend to favor large projects and technology zones, to the detriment of local innovation and SMEs.

Three strategic priorities have emerged:

- Strengthen national innovation systems, particularly through applied research and university-industry partnerships.
- Stimulate knowledge governance by reducing institutional fragmentation.
- Promote inclusive innovation, favoring skilled employment and structural transformation.

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