The Impact global and domestic uncertainty on FDI: evidence from MENA.

by

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Journal of Business Research

Faculty of Commerce -Zagazig University

Volume 47 - Issue 3 July 2025

link: https://zcom.journals.ekb.eg/

Abstract.

This study examines the impact of global and domestic uncertainty on foreign direct investment (FDI) for 21 countries in the Middle East and North Africa (MENA) over the period from 1990 to 2023, using dynamic panel data(DPD) techniques to consider potential endogeneity of uncertainty and utilized the Generalized Method of Moments (GMM). The findings of the paper reveal an inverted U-shaped relationship between global uncertainty and FDI inflows. We find that global uncertainty plays a central role in shaping foreign investment decisions. Investors tend to increase FDI inflows at moderate levels of uncertainty, but they withdraw or hesitate when global uncertainty levels rise. Additionally, the study finds that increasing the levels of domestic uncertainty, and inflation rate discourages foreign investors from investing in the host country, whereas trade openness and growth rate increase investors' confidence in increasing FDI inflow in the host country.

Key Words FDI; global uncertainty; Domestic uncertainty; MENA;DPD;GMM

JEL F21; F23; E32; D81; O53

1. Introduction

At the core of globalisation, foreign direct investment (FDI) is a crucial channel for the flow of knowledge, capital, goods, and services across economies. FDI is considered one of the main factors of economic growth and development, especially in the developing countries. Theories of FDI is concerned with the factors that determine the inflows of foreign direct investment (FDI) into a host country. One of the first theoretical studies of the determinants of FDI was by Ohlin (1971), who stated that FDI is motivated mainly by the potential of high profitability in the host country. Hymer (1976) asserted that FDI was preferred over other modes of market entry, such as exporting and licensing, due to firm- specific advantages and the desire to control operations abroad in the presence of market imperfections.

According to Buckley and Casson (1981), markets for imperfect intermediate products had high transaction costs when run by separate companies, but these costs would be reduced if multinational corporations integrated the market. The eclectic paradigm, also known as OLI framework (Ownership, Location, Internalization), was developed by (John H Dunning, 1977; 1988). He showed that firms would prefer to invest abroad when all the following advantages are present: (1) ownerships advantages (tangible and insatiable assets foreign firms owned); (2) location advantage (for example, low production costs in host country); and (3) Internalization advantages resulting from internalising corporate relationships rather than outsourcing.

Although the previous traditional theories had provided the conceptual foundation for understanding the determinant of FDI inflows, these theories

fail to account for the role of uncertainty in shaping FDI flows. However, a growing theoretical literature has increased understanding of how uncertainty influences FDI flows. Dixit and Pindyck (1994) provided a new theoretical approach to firms' decisions regarding capital investment, stressing the irreversibility of most investment decisions and ongoing uncertainty of the economic environment in which those decisions are made, indicating that firms delay investment until uncertainty resolves, meaning that higher uncertainty decreases FDI flows. Accordingly, studies introduced a measure of uncertainty, for example, Baker, Bloom, and Davis (2016), introduced economic policy index which capture movements in policy-related economic uncertainty regarding monetary and fiscal policy uncertainty. Ahir, Bloom, and Furceri (2018) computed the world uncertainty index (WUI) covering 143 countries using Economist intelligence unit reports. Geopolitical risk index (GPR) introduced by Caldara and Iacoviello (2022), which captures events associated with wars, terrorism, and any tensions among states and political factors that affect FDI inflows.

The global economy has witnessed several uncertainties. Such as the 2008–2009 Global financial crisis; the persistent global trade disputes, particularly the trade tensions between U.S. and China, the 2015–2016 commodity price shock, especially the fall in oil prices; the UK-EU Brexit vote; the Euro area sovereign debt crisis ; the Covid-19 pandemic, which halting economic activities across the world; the ongoing Russia-Ukraine war, and Palestine war all these events leads to political and economic uncertainty which in turn reduce the FDI inflows as firms would prefer investment in certainty environment.

This study contributes to the literature by investigate the impact of uncertainty on FDI in the Middel east and North Africa countries (MENA) during the period from 1990 - 2023. Besides, the impact of global uncertainty on FDI inflows into MENA countries, this region witnesses specific events leading to region uncertainty arising from geopolitical tensions and economic uncertainty like, ongoing conflicts in Syria, Yemen, Sudan, and Libya; wars in Lebanon and Palestine; Arab spring in Tunisia and Egypt; instability in price and exchange rate; public debt and fiscal sustainability risks, resulting in significant volatility in inward FDI in MENA countries.

According to the world bank database, in the mid-2000s the net inflows of FDI in MENA counties, the region experienced a notable surge in FDI, reaching a peak of approximately USD 108 Billion in 2oo7, driven by high commodity prices and increased investor interest in emerging countries. However, subsequent global and regional shocks 2008 financial crisis and the Arab springs beginning in 2011- led to a notable decline in net inflows FDI, falling to proximality USD 30 billion. Then net inflows of FDI recovery and reached approximately USD 137Billion. The Covid-19 pandemic further suppressed investment, with regional inflows decaling to around USD 84 billion in 2020.

A number of studies have explored the determinant of inward FDI in MENA countries[1] without taking into consideration uncertainty role in FDI inflows. Conversely, a little pay attention to the effect of uncertainty on FDI flows. Nassour, Meftah, and Mirani (2020) investigated the impact of political risk on FD inflows in three MENA countries only (Algeria,

[1] See, for example, Dimitrova, Rogmans, and Triki (2020) and Abdel-Gadir (2010)

Turkey, and Saudi Arabia) during the period from 1984 to 2017, the study found a negative relationship between political uncertainty and FDI. Ogbonna, Ogbuabor, Manasseh, and Ekeocha (2022) framework for 46 African economies over the period 2010–2019 to investigate the impact of global uncertainty on FDI and found that global uncertainty led to a reduction in FDI inflows. As noted, the previous two studies taking into consideration uncertainty impact on FDI inflows during periods before the Covid-19 and on-going wars in Lebanon and Palestine. Besides they highlighted on the of specific kind of uncertainty.

In light of these challenges, this research focuses on uncertainty whether it originates from external or internal sources (global and domestic uncertainty) in MENA countries during the period 1990-2023. Therefore, this study presents the comprehensive view of the determinant of FDI inflows within MENA countries using the modern index of uncertainty established by Ahir, Bloom, and Furceri (2022).

The rest of the paper is organized as follows: Section 2 reviews the related literature; Section 3 presents a brief overview of FDI and uncertainty in MENA countries; Section 4 discusses the methodology; Section 5 contains a description of the data, and the empirical results are presented in Section 6; Section 7 draws policy implications and concludes.

2. Literature Review

Empirical studies on FDI determinants have highlighted several key factors such as market size, economic growth, trade openness, macroeconomic stability, natural resource availability, labor conditions and institutional quality. See for example,(Asiedu, 2002; Azman-Saini, Baharumshah, & Law, 2010); Balasubramanyam, Salisu, and Sapsford

(1996); (Bayraktar-Sağlam & Sayek Böke, 2017; Bhaumik & Gelb, 2005; Borensztein, De Gregorio, & Lee, 1998; Cardoso & Urani, 1995; Chakrabarti, 2001; Globerman & Shapiro, 2002, 2003; Janicki & Wunnava, 2004; Mistura & Roulet, 2019; Noorbakhsh, Paloni, & Youssef, 2001; Resmini, 2000; Schneider & Frey, 1985). These factors form the basis of investors' location decisions.

However, in recent years, increasing attention has been directed toward the role of uncertainty in shaping FDI flows. Uncertainty has emerged as a critical variable influencing investment decisions. Domestic economic uncertainty related to fiscal and monetary policies such as inflation, exchange rate volatility, fiscal deficits, and GDP fluctuations tends to discourage FDI, as firms prefer to postpone decisions in unstable environments. (Aizenman & Marion, 1993; Asmae & Ahmed, 2019; Haque, Biqiong, Arshad, & Yasmin, 2022; Udoh & Egwaikhide, 2008). In addition, according to (Aizenman & Marion, 1993; Azam, Khan, & Iqbal, 2012; Chen, Nie, & Ge, 2019; Honig, 2020; Julio & Yook, 2016; Tabash, 2025), Political and institutional uncertainty, including government stability, corruption environment, democratic accountability, the timing of elections, or policy inconsistency, deter FDI flows.

Uncertainty not generated only from internal resources, external resources (global uncertainty) like global financial crisis, the Gulf War, the Euro debt crisis, the Brexit vote, and the COVID pandemic also affect the flows of FDI into a certain country or specific regions.

Recent studies take into consideration global uncertainty as the main factor affecting FDI. Using a generalized method of moments (GMM) estimation for a sample of 116 countries over 1996-2017, Nguyen and Lee

(2021) found that as global uncertainty increases, FDI inflows allocate away from lower-income economies to more stable higher-income countries, reflecting the so-called “safe haven effect”, whereby foreign investors avoid unstable and risky countries. According to (2025) global uncertainties reduce FDI inflows in emerging, middle-income, and low-income economies, as investors seek safer assets and delay long-term projects. Advanced economies, however, show resilience due to their stable macroeconomic and institutional structures. The significant impact of global uncertainty on FDI is also emphasized by (Avom, Njangang, & Nawo, 2020; Ho & Gan, 2021; Jardet, Jude, & Chinn, 2023) over the period from 1995 to 2019 in a sample of advanced, emerging market and developing countries. However, over the period from 1997 to 2019, the negative impact of global uncertainty on FDI is not significant in Asian emerging markets, according to Okunoye, Akpa, Boluwatife, and Jimmy (2023).

In the context of the MENA region, numerous studies have examined the determinants of FDI in the region, confirming the importance of gross domestic product (GDP), infrastructure, trade openness, natural resources and institutional quality, see for example,(Abdel-Gadir, 2010; Caetano & Galego, 2009; Dimitrova et al., 2020; Elheddad, 2018; Jabri, Guesmi, & Abid, 2013; Rogmans & Ebbers, 2013). Nevertheless, a little pay attention to the effect of uncertainty on FDI inflows. Nassour et al. (2020) investigated the impact of political risk on FD inflows in three selected MENA countries (Algeria, Turkey, and Saudi Arabia) during the period from 1984 to 2017 using the random effects model, the study found a negative relationship between political uncertainty and FDI. Ogbonna et al.

(2022) used the system GMM modeling framework for 46 African economies over the period 2010–2019 to investigate the impact of global uncertainty on FDI and found that global uncertainty led to a reduction in FDI inflows.

In light of this, this paper adds to the existing literature on FDI and uncertainty by investigating the impact of uncertainty on FDI in MENA countries. We will decompose uncertainty into external and internal components to analyze the relative importance of the two, both across countries and over time. Besides, we will take into consideration the impact of geopolitical risk and other traditional factors of FDI. To our best knowledge, this study will be the first study taking into consideration the comprehensive view regarding the determinants of FDI in MENA countries.

3. Stylized Facts of FDI and uncertainty in MENA

Figure (1) Trends of Average FDI and uncertainty

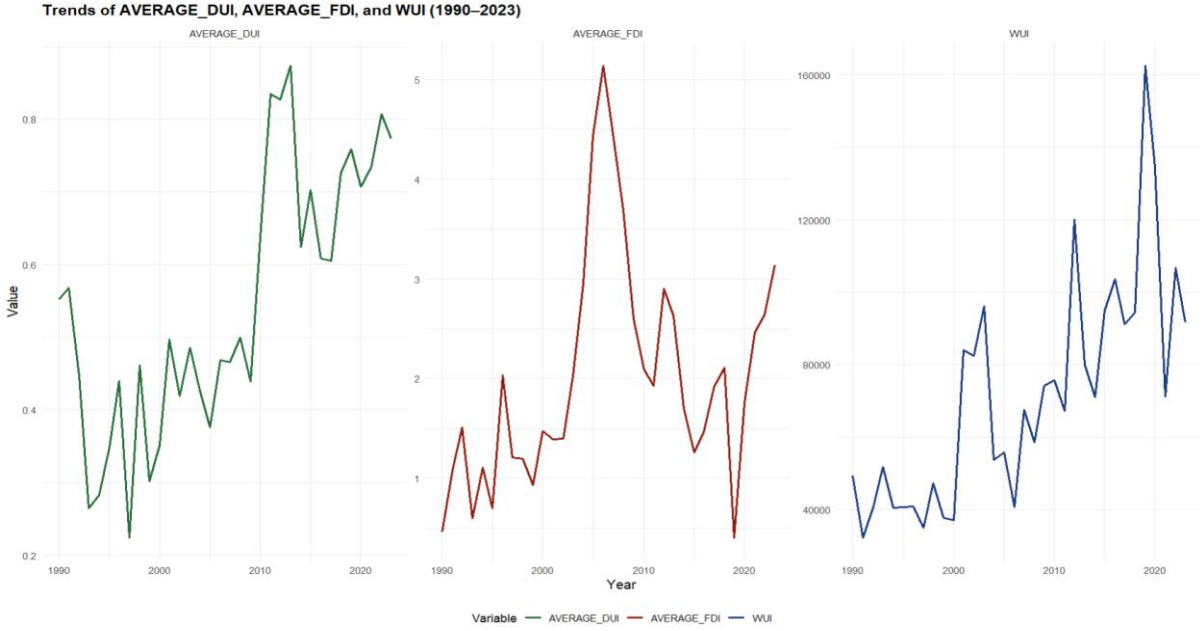
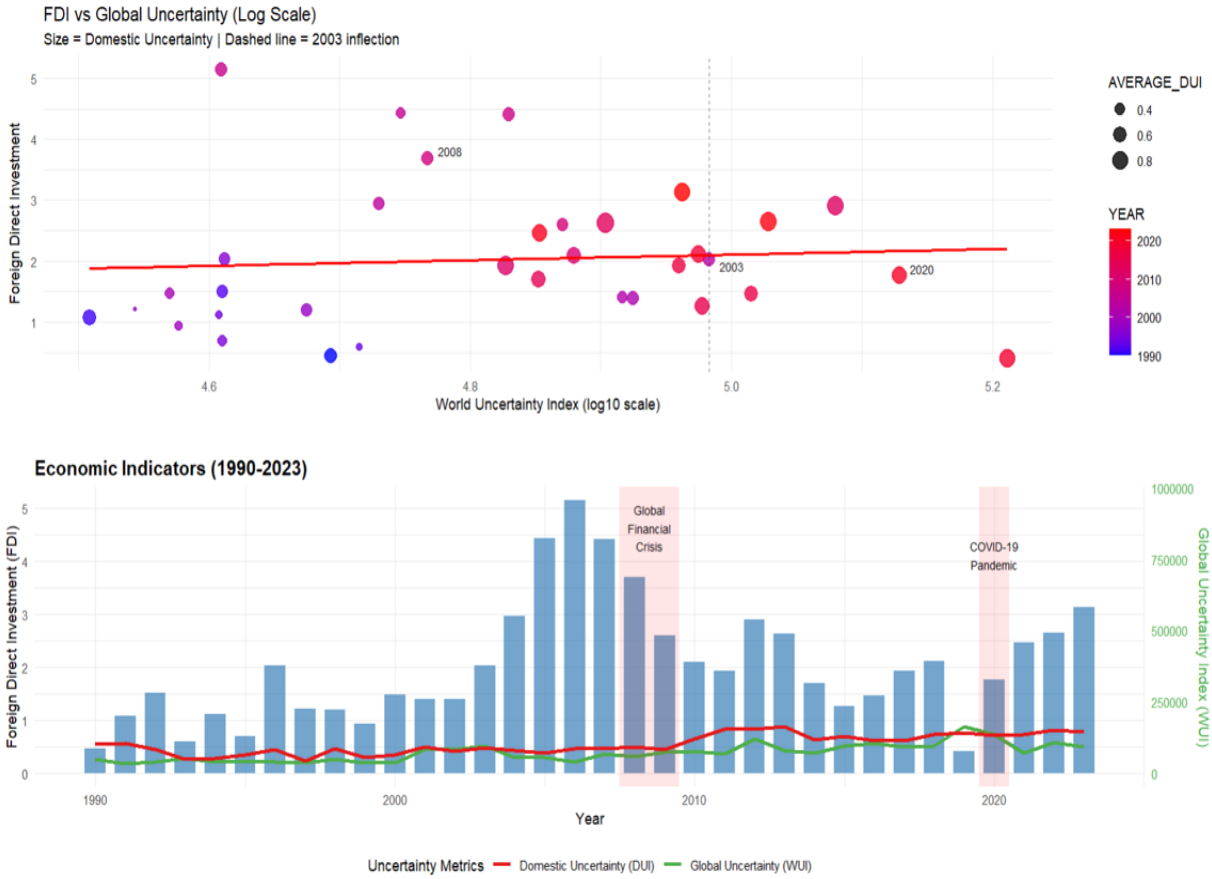


Figure (2) Economic indicators and trend of average FDI and uncertainty



The log-transformed World Uncertainty Index (WUI), which measures global economic uncertainty, and foreign direct investment (FDI) have a strong negative correlation, as seen in Figure 1, demonstrates that increased uncertainty consistently reduces investment flows over time and across nations. Interestingly, a threshold impact is noted: when $\log_{10}$(WUI) surpasses roughly 4.8 (corresponding to WUI = 63,000), the sensitivity of FDI to uncertainty increases. This result is consistent with real options theory, which postulates that investors are more willing to postpone or delay capital commitments in situations involving a high degree of uncertainty**.** Furthermore, the figure's larger point sizes, which represent higher levels of domestic uncertainty (DUI), also tend to group together in

areas with high global uncertainty, demonstrating that DUI exacerbate WUI's investment-suppressing effects. A structural shift in the global investment climate is indicated by the steepening of the slope after the year 2003, which shows that FDI's sensitivity to global uncertainty has increased over time.

By comparing the effects of the COVID-19 pandemic and the global financial crisis of 2008, Figure 2 emphasises the significance of crisis-driven dynamics. Even though both crises were characterised by high WUI levels, the pandemic caused FDI to decline more sharply in 2020 (-81%), as opposed to 47% in 2008. This suggests that pandemic-specific variables, like supply chain disruptions and mobility constraints, put particular negative pressure on investment. Additionally, the recovery paths after crises differ: FDI recovered in three years after the 2008 crisis, but post-2020 levels were still low as of 2023, suggesting a continuous revaluation of global risk. Interestingly, DUI has been high since 2015 even while WUI returned to pre-crisis levels, indicating a decoupling of domestic and global uncertainty and raising the possibility that national-level policy actions are shielding local economies from global volatility to some extent.

these visualizations support a nonlinear framework for understanding the uncertainty–FDI nexus. First, FDI responses are very threshold-dependent; they are steady at low uncertainty levels but drop off dramatically when a crucial WUI level is reached. Second, the type of crisis is important: pandemics like COVID-19 create deeper, longer-lasting contractions, but financial crises like the one in 2008 typically cause slower but more thorough investment recoveries. Third, the increasing spatial disparity between domestic and international uncertainty emphasises how

crucial institutional resilience and national policy buffers are in determining FDI trajectories in the face of uncertainty.

4. The econometric model

In the light of the preceding theoretical discussion and literature review, we employ the following econometric model to explore the impact of uncertainty on FDI inflows in MENA counties during the period 1990-2023:

$$FDI_{it} = \beta_0 + \beta_1 DUI_{it} + \beta_2 WUI_{it} + \beta_3 GPRI_{it} + \beta_4 VI_{it} + \beta_5 TO_{it} + \beta_6 GDPG_{it} + \beta_7 INF_{it} + \beta_8 GNE_{it} + \epsilon_t \quad \textbf{(1)}$$

Where FDI denotes the inflows of foreign direct investment to country i at time t, where $(t = 1, 2, \dots, n)$; DUI_{it} stands for domestic uncertainty; WUI_{it} is the world uncertainty index; $GPRI_{it}$ denotes Geopolitical risk index; $GDPG_{it}$ represents the annual growth rate of gross domestic product; VI_{it} denotes climate vulnerability index; INF stands for the annual inflation rate, calculated from consumer price index ; TO_{it} represents the trade openness- measured as the ratio of exports and imports to gross domestic product; GNE_{it} is gross national expenditure; and ε is the error term.

Elevated levels of economic or political uncertainty tend to increase the perceived risks for foreign investors, often prompting delays, reductions, or even withdrawals investment activities. Uncertainty undermines the attractiveness of a host country's investment climate by increasing the volatility of expected returns and the likelihood of adverse outcomes, thereby incentivizing investors to adopt a more cautious or risk-averse approach. Nonetheless, in specific contexts, uncertainty may also create strategic opportunities. Firms with advanced risk management capabilities or those pursuing high-risk, high-reward strategies may still engage in

investment, particularly if the potential long-term gains are deemed substantial. Despite such exceptions, uncertainty is generally regarded as a deterrent to FDI. Therefore, it is anticipated that the estimated coefficients associated with uncertainty variables (β_1 and β_2) will be negative, reflecting their adverse impact on FDI inflows.

Similarly, geopolitical risks ($GPRI$) are among the most critical constraints on investor decisions. International tensions and conflicts create unstable and insecure environments, prompting investors to avoid affected countries. The climate vulnerability index (VI) serves as an indicator of a country's or region's vulnerability to climate change, reflecting the extent of exposure to climate related hazards, the sensitivity of socio-economic and environmental systems, and the adaptive capacity to cope with or recover from adverse climate impacts. Heightened climate vulnerability may deter international investors due to perceived risks to infrastructure, long term operational stability and the viability of local markets. Countries with higher VI scores are likely to attract lower level of FDI (Shear, Ashraf, & Butt, 2023). elevated inflation rates (INF) are indicative of macroeconomic instability, eroding purchasing power and increasing operational costs for foreign firms (Arbatli (2011);and Elfakhani and Matar (2007)). As a result, the estimated coefficients associated with $(GPRI); (VI); and$ (INF) variables—specifically β_3, β_4, and β_7—are expected to be negative, reflecting their adverse effects on FDI inflows.

Trade openness (TO) is a key driver of FDI, as it signals a country's integration into the global economy and facilitates market access for foreign firms. Open economies reduce trade barriers, expand the movement of goods and capital, and create a more favorable environment for

multinational enterprises (Edwards (1998);and Chakrabarti (2001)). Therefore, countries with higher trade openness are generally more attractive to foreign investors. The coefficient of trade openness (β_5) is expected to have a positive sign reflecting the positive impact of TO on FDI.

The growth rate of GDP ($GDPG$) is a key factor indicator of a country's economic performance. Higher economic growth signals for expanding market opportunities, rising consumer demand and improved profitability prospects for investors. As well as a growing economy suggests macroeconomic stability and a favorable investment climate, which reduce perceived risks and encourage long term capital inflows (Corporations (2009); and Nunnenkamp (2002)). Therefore, higher GDP growth rates have a positive impact on FDI inflows, and the expected sign of (β_6) is positive.

Government spending (GNE) is another factor that affects FDI inflows by shaping the overall investment climate. Asiedu (2006) and Busse and Hefeker (2007) suggests that the Productive public expenditure in education, , health, infrastructure, and security can enhance a country's attractiveness by improving the quality of physical and human capital and reducing business costs. On the other hand, excessive or inefficient government spending, specifically when accompanied by large fiscal deficits or weak governance, may generate macroeconomic instability and crowd out private investment, thereby deterring FDI. The net effect of government spending on FDI depends on its composition, financing, and efficiency.

5. Data

To estimate the study model, unbalanced panel data were employed, covering a sample of 21 Middle East and North Africa (MENA) countries over the period 1990–2023, with a total of 714 annual observations, chosen based on data availability. The list of countries included in the sample is provided in Table (B) in the study appendix.

The data of uncertainty (both global and domestic) are sourced from Ahir et al. (2022), available at https://worlduncertaintyindex.com/data/. The data of FDI inflows, trade openness, gross domestic product, Inflation Rate, and Gross national expenditure as a percentage of GDP are obtained from the World Bank database.

Ahir et al. (2022), provide a comparable uncertainty index for 143 countries since 1990, using a consistent text-based methodology applied to Economist intelligence uncertainty reports. [2]. Unlike Other sources of uncertainty like economic policy uncertainty (EPU) index, which focus narrowly on economic policy uncertainty, The WUI captures a broader concept of uncertainty-political, institutional, and economic. Besides, other sources are limited to a specific set of mostly advanced countries.

The FDI inflows (FDI) are measured as a percentage of gross domestic product. Trade openness (TO) is measured as total imports and exports over GDP. The annual GDP growth rate of GDP at market prices based on constant local 2015 prices. The annual inflation rate (INF) is calculated based on the consumer price index. Vulnerability Index (VI) controls climate change sourced from Germanwatch organization available at https://www.germanwatch.org/en/cri. Instead of relying on forecasts or

[2] For more details, please see, (Ahir et al., 2022)

simulations, the Germanwatch organization's climate risk index measures a nation's exposure and vulnerability to catastrophic weather events using real data, like as infrastructure and economic losses. This increases the index's legitimacy and applicability. The data of Geopolitical risk index (GPR) is sourced from Caldara and Iacoviello (2022) available at https://www.matteoiacoviello.com/gpr.htm. Dario Caldara and Matteo Iacoviello construct a measure of adverse geopolitical events and associated risks based on a tally of newspaper articles covering geopolitical tensions and examine its evolution and economic effects since 1900. For more details please, see (Caldara & Iacoviello, 2022). Table 1 shows the summary statistics of these variables.

Table 1. *Descriptive summary statistics, 1990-2023 (n = 21)*

	Unit	***Obs.***	***Mean***	***Median***	***Std. Dev.***	***Min***	***Max***	***Normality test***
Dependent Variable:								
FDI, net inflows	(% of GDP)	687	2.016	1.169	3.323	-11.19	29.52	[10638]***
Independent Variables:								
World Uncertainty	(Scale)	714	71.51	69.31	30.67	32.23	162.6	[104.31]***
Domestic Uncertainty	(Scale)	646	0.545	0.365	0.622	0	3.753	[901.82]***
Control Variables:								
Global Geopolitical Risk	(Scale)	714	101.2	96.15	30.17	50.91	176.3	[108.83]***
Vulnerability Index	(Scale 0 - 1)	532	0.428	0.409	0.067	0.352	0.619	[212.73]***
Trade openness	(% of GDP)	620	78.39	78.39	35.75	0.021	202.3	[40.743]***
GDP Growth	(annual %)	701	3.873	3.796	9.300	-64.05	86.83	[20853]***
Inflation	(annual %)	616	14.14	4.513	37.00	-16.12	448.5	[106618]***
Gross national expenditure	(% of GDP)	589	96.51	97.76	19.02	43.46	211.1	[173.67]***

***Note*:** ***, **, * indicate significance at 1%, 5% and 10% respectively.

As for the control variables, the Global Geopolitical Risk Index recorded a relatively high average of 101.2 points, reflecting a global

environment characterized by political and security instability, which may discourage foreign investors. The average of Vulnerability Index (VI) reached to 0.423, this suggests that the countries has experienced significant losses (lives, GDP, and infrastructure) from extreme weather events.

In terms of macroeconomic indicators, the trade openness ratio averaged 78.4% of GDP, suggesting significant engagement in international trade. However, there was substantial variation (standard deviation of 35.75%), with values ranging from as low as 0.02% to as high as 202.3%. Annual real GDP growth averaged around 3.87% but exhibited extreme fluctuations (ranging from -64.05% to 86.83%), pointing to severe economic shocks—such as financial crises or conflicts—in some countries, while others experienced periods of robust growth. Price instability also appears to be a persistent issue across the region, which is a negative signal from the perspective of foreign investors. Inflation rates ranged from -16.12% to 448.5%, with an average of 14.14%, indicating significant changes in price stability. Finally, the average gross national expenditure reached 96.5% of GDP, highlighting the central role of national spending in driving economic activity, though the wide variation also reflects differences in fiscal policy and aggregate demand structures among the countries studied.

Table (2) presents the correlation matrix, which reveals a very weak but statistically significant negative correlation (at the 10% level) between net foreign direct investment (FDI) inflows and global uncertainty, amounting to -6.9%. In contrast, a moderately strong and statistically significant negative correlation (at the 1% level) is observed between FDI inflows and

domestic uncertainty, reaching -23.7%. This indicates that foreign investors place greater emphasis on internal stability, the domestic economic, and policy environment when making investment decisions. Investors appear more adaptable to global volatility than to domestic instability. Additionally, a positive correlation of 20.5% is observed between global and domestic uncertainty indices, suggesting a degree of interdependence between the risks and pressures faced by countries within the global economic and political environment.

Table 2. *Correlation matrix between study variables, 1980-2023 (n = 21)*

		(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
ln FDI, net inflows	**(1)**	1							
ln World Uncertainty	**(2)**	0.069*	1						
Domestic Uncertainty	**(3)**	-0.237***	0.205***	1					
ln Global Geopolitical Risk	**(4)**	-0.009	0.298***	0.052	1				
ln Vulnerability Index	**(5)**	0.433***	-0.110**	0.005	-0.016	1			
ln Trade openness	**(6)**	0.182***	0.115***	-0.075*	0.024	-0.253***	1		
ln GDP Growth	**(7)**	0.056	-0.214***	-0.090**	-0.003	0.040	-0.028	1	
ln Inflation	**(8)**	-0.185***	-0.161***	0.106**	0.015	0.222***	-0.556***	0.118***	1
ln Gross national expenditure	**(9)**	-0.136***	-0.011	0.196***	0.012	0.111**	-0.133***	-0.117***	0.178***

***Note*:** ***, **, * indicate significance at 1%, 5% and 10% respectively.

Regarding the control variables, the strongest correlation with FDI inflows is observed with the Vulnerability index (43.3%), a positive correlation between climate risk and net FDI inflows suggests where MENA countries facing higher climate risks tend to receive more FDI this may reflect increased investment in climate -resilient projects, such as renewable energy or sustainable infrastructure , especially in countries pursuing green transition policies (for example, Egypt, UAE, Saudi

Arabia). It indicates that climate vulnerability is not deterring investment but may be attracting targeted, adaptive FDI. This is followed by inflation, which exhibits a negative correlation (-18.5%), consistent with economic theories that consider high inflation a risk factor reducing investment attractiveness. Trade openness shows a positive correlation of 18.2%, reinforcing the importance of open markets in facilitating capital inflows. National expenditure (-13.6%) and economic growth (6.9%) show weaker and less conclusive associations, possibly reflecting complex economic dynamics influencing investment behavior. Finally, the global geopolitical risk index shows a very weak negative correlation (-0.9%) with FDI.

Table D in the study appendix reports the results of stationary test. All variables are stationary at levels, i.e., integrated of order zero, or I(0). Furthermore, the quality of the study model was checked to make sure there were no measurement errors, ensuring accurate results. Diagnostic testing revealed that the residuals were non-normal and contained serial correlation and heteroskedasticity. These problems are to be expected in a large and heterogeneous sample of countries. However, statistical theory states that OLS estimators gravitate to a normal distribution as sample size rises, therefore non-normality is not regarded as crucial in this context. Therefore, statistical inference will continue to adhere to the typical OLS assumptions of normality in large samples like ours. The DPD model used asymptotic robust standard errors to address the remaining issues, whereas White robust standard errors were used to estimate the FEM to account for heteroskedasticity.

6. Estimation technique

In the present context, there is a high likelihood of endogeneity between uncertainty levels and FDI inflows. Estimating the partial effect of uncertainty on FDI presents methodological challenges, primarily due to the potential for simultaneity and reverse causality within the relationship. To address this issue, the study adopts an instrumental variables (IV) approach and employs the Generalized Method of Moments (GMM) estimation technique with either fixed or random effects specifications. The GMM method is particularly effective in addressing endogeneity problems, while fixed or random effects account for economic heterogeneity across countries.

Selecting appropriate instruments is critically important. In practical terms, the instruments must be correlated with the endogenous variable (uncertainty), yet they should not exert a direct influence on the dependent variable (FDI inflows), ensuring orthogonality with the error term. To avoid reliance on potentially invalid external instruments, the study utilizes a dynamic panel data (DPD) approach extended to the system GMM framework, as developed by Arellano and Bond. In this framework, the lagged dependent variable is included as a regressor, enabling the modelling of partial adjustment dynamics, as expressed in the following equation:

$$y_{it} = \alpha y_{it-1} + \acute{\beta} x_{it} + u_i + \varepsilon_{it} \quad (3)$$

The core principle underlying this model's treatment of individual-specific effects is to eliminate them by applying first-difference to the original equation. Consequently, the first-differenced form of equation (3) is given as follows:

$$\Delta y_{it} = \alpha \Delta y_{it-1} + \acute{\beta} \Delta x_{it} + \Delta \varepsilon_{it} \quad \textbf{(4)}$$

It is noted that the composite error term constructed in equation (3) exhibits autocorrelation and is closely correlated with the lagged dependent variable (which now becomes a first- order moving average process MA(1) containing the lagged y_{it-1} and the error term $\varepsilon_{i,t-1}$), thereby violating the strict exogeneity assumption. This may cause an endogeneity problem, which is addressed by using internal instrumental variables, i.e., based on the lagged values of the instrument variables. These instruments may all be correlated with u_i representing the unobserved individual effects. Taking the first difference of the equation removes u_i and the associated omitted variable bias problem.

Therefore, the Arellano & Bond (AB) approach is designed for the following cases:
(i) small T, large N, i.e., short time periods with a large number of cross-sectional units; (ii) a linear functional relationship; (iii) a dynamic dependent variable based on previous knowledge; (iv) explanatory variables that are not strictly exogenous, as they may be correlated with past and possibly current realizations of the error term; (v) the presence of individual fixed effects, implying unobserved heterogeneity; (vi) heteroskedasticity and autocorrelation within individual unit errors, but no correlation across units (Baum & Christopher, 2006).

As an initial evaluation of the impact of uncertainty levels (both local and global) on foreign direct investment inflows, the study will estimate the model using the Fixed Effects Model (FEM) and then proceed to the more advanced Dynamic Panel Data (DPD) technique. This two-step strategy aims firstly to provide a preliminary assessment of the effect of uncertainty

on investment flows and secondly, to evaluate whether the internal instruments used later in the DPD estimates exert any direct influence on foreign investment or whether their effect depends on the uncertainty status of each country.

"The fixed effects (FE) estimator is typically implemented using Ordinary Least Squares (OLS), and it accounts for unobserved heterogeneity across countries by including country-specific dummy variables. This allows the model to control for time-invariant characteristics unique to each country as shown in the following equation

$$y_{it} = \beta_{0i} + \acute{\beta} x_{it} + u_{it} \quad \textbf{(5)}$$

Here, we note that the subscript i is assigned to the intercept term, allowing it to vary across countries. These disparities could result from national features like religion, colonial history, human capital, cultural level, or other factors. This enables the study to take individual variation between nations into account while maintaining the assumption that the slope coefficients are the same in every nation. Accordingly, the phrase "fixed effects" describes how the slope coefficients are constant for every country even while the intercept changes between observations (Gujarati, 2003).

7. Empirical Analysis and Results

7.1. FEM Results and Preliminary Evaluation of Instrument Validity

Table (3) shows that the study model was estimated through five stepwise regressions, reflecting a coherent methodology aimed at testing the robustness and strength of results with each successive inclusion of variables. This incremental approach allows observing the evolution of

relationships among variables while systematically controlling other influencing factors and maximizing the utilization of available country-level data. In the first regression, focus was placed solely on the impact of global uncertainty on foreign direct investment (FDI) inflows. The purpose of this simplification was to verify the preliminary existence of a relationship between these two core variables, covering the widest possible geographic scope of the sample, which included all 21 MENA countries.

Table 3. *Uncertainty and Foreign direct investment: Fixed Effects Model*

Dependent Variable: *ln FDI, net inflows*

Method: *1-way Fixed Effects Model (with white robust standard error)*

	Reg (1)	***Reg (2)***	***Reg (3)***	***Reg (4)***	***Reg (5)***
ln World Uncertainty	**11.042** **[4.171]*****	**10.812** **[4.260]*****	**9.4977** **[2.327]****	**9.0798** **[3.611]*****	**6.9000** **[2.619]*****
ln World Uncertainty squared	**-0.4877** **[-4.104]*****	**-0.4753** **[-4.163]*****	**-0.4251** **[-2.369]****	**-0.4083** **[-3.639]*****	**-0.3089** **[-2.631]*****
Domestic Uncertainty		**-0.0812** **[-2.271]****	**-0.0765** **[-1.857]***	**-0.0471** **[-1.223]**	**-0.0656** **[-1.904]***
ln Global Geopolitical Risk			0.0485 [0.362]	0.0296 [0.395]	0.0673 [0.884]
ln Vulnerability Index			-2.9816 [-2.682]**	-3.5799 [-4.649]***	-3.0659 [-4.110]***
ln Trade openness				0.0602 [1.895]*	0.0908 [1.991]**
ln GDP Growth				0.1043 [4.769]***	0.0776 [3.677]***
ln Inflation					-0.0041 [-0.209]
ln Gross national expenditure					-0.1667 [-1.069]
Constant	-61.296 [-4.171]***	-60.145 [-4.274]***	-54.494 [-2.445]**	-52.768 [-3.831]***	-39.945 [-2.757]***

			Key regression statistics		
No. of Countries	21	19	19	19	18
No. of Obs.	693	642	529	444	371
Adjusted R-squared	76.7%	79.01%	79.6%	80.6%	82.1%
Fisher test (*F* stats.)	92.051***	71.986***	56.551***	48.231***	45.763***
			Effect Size for Uncertainty: Cohen's d		
ln World Uncertainty	0.3236	0.3461	0.2102	0.3597	0.2880
ln World Uncertainty squared	-0.3181	-0.3382	-0.2141	-0.3626	-0.2892
Domestic Uncertainty		-0.1845	-0.1678	-0.1218	-0.1041

***Note*:** ***, **, * indicate significance at 1%, 5% and 10% respectively.

The coefficient of the global uncertainty index is statistically significant at the 1% level, and the squared term of the same variable is also statistically significant. This indicates the presence of a nonlinear relationship between global uncertainty and foreign direct investment (FDI) inflows. Specifically, this nonlinear relationship takes the shape of an inverted U. At low levels of global uncertainty, its effect on FDI inflows to MENA countries is positive, but at high levels of international uncertainty, this effect turns negative. To verify the validity of this nonlinear relationship between international uncertainty and FDI inflows, the Sasabuchi–Lind–Mehlum test was conducted, as shown in Table (4). The test statistics were not statistically significant, indicating acceptance of the null hypothesis of an inverted U-shaped relationship. Moreover, the turning point lies within the actual range of the global uncertainty data, confirming that this is a genuine inverted U-shaped relationship rather than a spurious one.

Table 4. *Sasabuchi–Lind–Mehlum test for an inverse U-shaped relationship in Reg (1)*

	X_i	X_i^2	Interval		Slope at X_l	Slope at X_h	Sasabuchi test	Extremum Point
	$\hat{\beta}$	$\hat{\gamma}$	$X_{l\,(min)}$	$X_{h\,(max)}$	$\hat{\beta} + 2\hat{\gamma}X_l$	$\hat{\beta} + 2\hat{\gamma}X_h$	*(t-value)*	$-\hat{\beta}/(2\hat{\gamma})$
ln World Uncertainty	11.042 [4.171]***	-0.4877 [-4.104]***	10.381	11.999	0.9164	-0.6618	[1.219]	11.320
							Extremum inside interval	

***Note*: -** *** indicate significance at 1%.

The maximum value (turning point) of the global uncertainty index is approximately 11.320 points (in logarithmic form). Thus, low levels of global uncertainty do not pose a real threat to investors but may create certain opportunities in emerging markets, encouraging increased investment inflows into the region. However, once uncertainty exceeds a certain threshold - here represented by 11.320 logarithmic points - the positive effect reverses to a negative one, as perceived risks dominate the expected gains. This leads investors to refrain from committing more capital in an environment characterized by unpredictability and high volatility.

This result reflects rational behavior by foreign investors, who may perceive some degree of uncertainty as an opportunity for speculation and higher profits. However, this opportunity is conditional on uncertainty not exceeding a certain limit, beyond which the environment becomes a source of risk requiring caution and withdrawal. This is particularly relevant for the study region, which often suffers from fragile economic and political institutions. The coefficient of determination (R^2) shows that the global

uncertainty index explains 76.7% of the variance in FDI inflows, a very high proportion that highlights the profound and direct impact of this variable on foreign investors' decisions. Thus, global uncertainty is a key driver of foreign capital flows in the region.

In the second regression, domestic uncertainty variable was added, which reduced the sample size to 19 countries due to missing data for Palestine and Syria. The inverted U-shaped nonlinear relationship between global uncertainty and FDI inflows persists, although the magnitude of the coefficient slightly decreases due to reduced bias in the model by controlling domestic uncertainty. domestic uncertainty exhibits a negative (linear) effect on FDI inflows at the 5% significance level. This reflects genuine concerns of foreign investors about the domestic environment of the host country. A one-unit increase in domestic uncertainty leads to a 0.08% average decrease in the logarithm of FDI inflows, which is an economically meaningful effect - especially for countries aiming to attract foreign capital to stimulate growth and job creation. This finding underscores the critical importance of policy and institutional stability in creating an attractive and sustainable investment climate. Additionally, controlling for domestic uncertainty increased the explanatory power of the regression to 79.01%.

In the third regression, we controlled global geopolitical risks and vulnerability risk. This aimed to test the impact of non-economic macro factors on foreign direct investment (FDI) inflows, which slightly increased the model’s explanatory power to 79.6%. Controlling these overall risks did not change the fundamental inferences regarding domestic and global uncertainty variables, although the statistical significance of the global

uncertainty index and local uncertainty dropped to 5%, and 10% respectively. Moreover, a negative effect of the vulnerability risk index on FDI inflows was evident - specifically, a 1% increase in the vulnerability risk index leads to an approximate 3% decline in FDI inflows as a percentage of GDP. This aligns with theoretical expectations that countries suffering from climate change tend to be less attractive to foreign capital due to increased uncertainty, higher operating costs, sectoral exposure, and concerns about institutional capacity for climate adaptation. Conversely, global geopolitical risks had no significant effect on FDI inflows to the MENA region. This suggests that investors in MENA prioritize internal and local risks that directly impact returns and costs over broader geopolitical variables.

In the fourth regression, macroeconomic variables - trade openness and economic growth - were added, which raised the model's explanatory power to 80.6%. Additionally, trade openness showed a positive effect on FDI at the 10% significance level, and economic growth had a positive impact at the 1% level. Thus, this regression highlights the importance of "real" economic factors in alleviating investor fears and enhancing investment attractiveness.

Finally, the fifth regression controlled for inflation rate and national expenditure, representing the main model of the study with an explanatory power of 82.1% of the variance in FDI inflows (Yemen was excluded due to lack of data on national expenditure). The nonlinear effect of global uncertainty on investment remained significant at the 1% level, and the statistical significance of domestic uncertainty at the 10% level. This suggests that investors may tolerate some economic fluctuations (such as

inflation) but remain sensitive to the lack of clarity in future local policies. Neither inflation nor national expenditure had a significant effect on FDI inflows to MENA countries. Lastly, the Fisher test rejects the null hypothesis and accepts the alternative hypothesis, confirming the statistical significance of the overall model at the 1% significance level.

7.2 Results of DPD approach

Due to the potential endogeneity and simultaneity between uncertainty and FDI inflows, which may lead to biased and inconsistent estimates under the Fixed Effects Model (FEM), this study employs a Dynamic Panel Data (DPD) approach with appropriate instrumental variables that was employed here. The Sargan test for over-identification (shown at the bottom of Table 5) indicates the validity of the instruments used. The Wald test confirms the joint significance of all explanatory variables at the 1% level.

Table 5. *Uncertainty and Foreign direct investment: DPD Model*

Dependent Variable: *ln FDI, net inflows*

Method: *I-step dynamic panel data (DPD) (with asymptotic standard error)*

	Reg (6)	***Reg (7)***	***Reg (8)***	***Reg (9)***	***Reg (10)***
ln FDI, net inflows(-1)	0.5060 [18.97]***	0.5055 [19.49]***	0.5053 [19.46]***	0.5107 [17.70]***	0.4801 [15.98]***
ln World Uncertainty	**4.7898** **[3.491]***	**5.3011** **[3.972]***	**6.1853** **[4.086]***	**4.2788** **[2.674]***	**6.0456** **[3.444]***
ln World Uncertainty squared	**-0.2119** **[-3.450]***	**-0.2328** **[-3.897]***	**-0.2719** **[-4.030]***	**-0.1882** **[-2.638]***	**-0.2651** **[-3.383]***
Domestic Uncertainty		**-0.1463** **[-7.315]**	**-0.1499** **[-7.410]***	**-0.1278** **[-5.749]***	**-0.1295** **[-5.656]***
ln Global Geopolitical Risk			-0.0573 [-1.282]	-0.0225 [-0.463]	-0.0492 [-0.937]

ln Vulnerability Index			1.3574 [11.66]***	1.4176 [10.48]***	1.6962 [11.39]***
ln Trade openness				0.1400 [6.769]***	0.1429 [5.397]***
ln GDP Growth				0.0533 [3.611]***	0.0736 [4.660]***
ln Inflation					-0.0517 [-4.097]***
ln Gross national expenditure					0.1248 [1.693]*
Constant	-25.737 [-3.371]***	-28.758 [-3.871]***	-32.989 [-3.947]***	-22.929 [-2.592]***	-33.183 [-3.418]***
			Key regression statistics		
No. of Countries	19	19	19	19	18
No. of Obs.	529	529	529	444	371
No. of instruments	428	429	430	386	363
Sargan over-identification (χ^2 stats.)	683.93***	732.76***	724.75***	624.75***	589.51***
Wald (joint) (χ^2 stats.)	1272.4***	1548.9***	1521.3***	1664.8***	1699.8***
			Effect Size for Uncertainty: Cohen's d		
ln World Uncertainty	0.3065	0.3490	0.5441	0.2579	0.3656
ln World Uncertainty squared	-0.3029	-0.3424	-0.3545	-0.2544	-0.3591
Domestic Uncertainty		-0.6428	-0.6518	-0.5545	-0.6004

***Note*:** ***, **, * indicate significance at 1%, 5% and 10% respectively.

Table 6. *Sasabuchi–Lind–Mehlum test for an inverse U-shaped relationship in Reg (10)*

	X_i	X_i^2	Interval		Slope at X_l	Slope at X_h	Sasabuchi test	Extremum Point
	$\hat{\beta}$	$\hat{\gamma}$	$X_{l\,(min)}$	$X_{h\,(max)}$	$\hat{\beta} + 2\hat{\gamma}X_l$	$\hat{\beta} + 2\hat{\gamma}X_h$	*(t-value)*	$-\hat{\beta}/(2\hat{\gamma})$
ln Uncertainty	***World*** 6.0456 [3.444]***	-0.2651 [-3.383]***	10.381	11.999	0.5423	-0.3157	[5.493]***	11.404
							Extremum interval	**inside**

***Note*: -** *** indicate significance at 1%.

The results obtained from the Dynamic Panel Data (DPD) estimation are presented in Table (5). These findings demonstrate greater robustness, statistical strength, and consistency compared to the FEM model. Notably, the nonlinear inverted U-shaped relationship between global uncertainty and FDI inflows remains statistically significant at the 1% level, confirming the persistence of a central role of global uncertainty in guiding FDI decisions, where investors tend to increase inflows at moderate levels of uncertainty but withdraw or hesitate as uncertainty rises beyond those levels even after controlling for potential endogeneity and dynamic feedback. Also, the negative linear effect of local uncertainty on FDI inflows persisted at the 1% significance level, confirming that increased local uncertainty strongly deters FDI inflows. This reflects investors' concerns regarding instability in local policies, laws, or internal economic conditions.

Regarding the control variables, both trade openness and economic growth exhibit a positive and statistically significant effect on FDI inflows at the 1% level. These results confirm the critical role of macroeconomic factors in enhancing the investment environment and attracting foreign capital. National expenditure shows a positive effect at the 10% significance level. Public expenditure may stimulate investment but likely require more efficient allocation or complementary factors to exert a stronger impact. In contrast to the FEM results, inflation exhibits a statistically significant negative effect on FDI inflows at the 1% level, highlighting investors' sensitivity to inflation as a signal of macroeconomic instability and diminished expected returns. Meanwhile, global geopolitical

risks remain statistically insignificant across all model specifications, indicating consistent and robust findings in this regard.

A noteworthy and radical divergence from the FEM results is observed in the effect of the Vulnerability index. While FEM indicated a negative impact, the DPD results reveal a positive effect. Although this aligns with the correlation matrix, which shows a moderate positive correlation (43.3%) between Vulnerability index and FDI inflows, it contradicts standard economic expectations. Typically, climate change is viewed as a risk deterring investment. This anomaly might reflect increased investment in climate -resilient projects in MENA countries, such as renewable energy or sustainable infrastructure, especially in countries pursuing green transition policies (for example, Egypt, UAE, Saudi Arabia). It indicates that climate vulnerability is not deterring investment but may be attracting targeted, adaptive FDI.

Statistical significance, which is commonly evaluated using p-values, helps the rejection of the null hypothesis by indicating the probability that an observed link is not the result of chance. However, the findings' qualitative and practical value cannot be expressed solely by statistical significance. The effect size, a quantitative indicator of the intensity or amplitude of the correlation between variables, is crucial to assessing a relationship's practical usefulness. Effect size enhances the quality of inferential decision-making in empirical research by supplementing p-values and offering more information about the practical significance of outcomes[3].

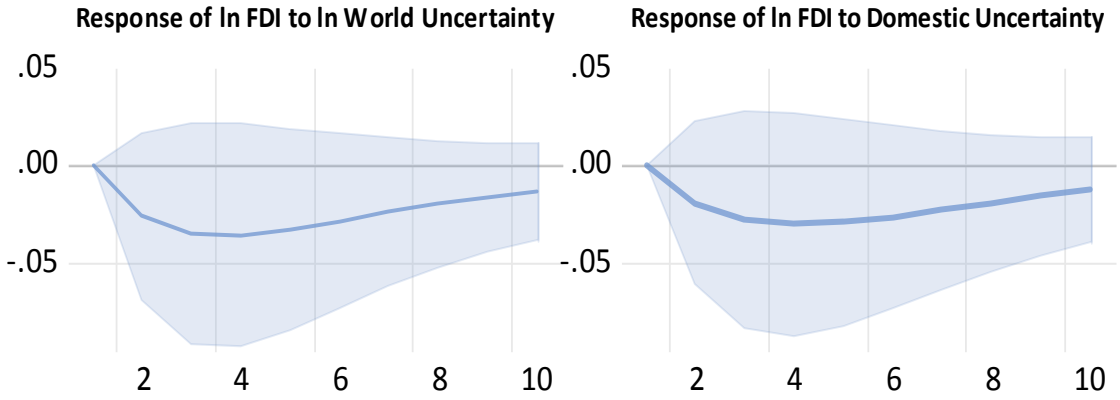
[3] There is extensive discussion surrounding Null Hypothesis Significance Testing (NHST). Consequently, the American Psychological Association (APA) in Section 1.01 of the *Publication Manual of the American Psychological Association* (5th edition, 2002) recommends that all published statistical reports include effect size measures alongside significance tests.

Here, effect size is computed from the partial correlations between uncertainty and FDI inflows, controlling for other variables in the model (assuming they also influence the dependent variable). Cohen's (1988) statistics, presented at the bottom of Table (5), indicate a small effect size for international uncertainty and a medium effect size for local uncertainty. These findings suggest that reducing local uncertainty has a larger practical impact on enhancing FDI inflows in MENA countries compared to international uncertainty. This provides strong support for theory development and policy formulation aimed at attracting FDI to MENA by primarily focusing on lowering local uncertainty.

7.3 Impulse Response Functions and Variance Decomposition Analysis

Figure (3) presents the impulse response functions (IRFs) along with the 5% confidence intervals generated by Monte Carlo simulations (1,000 repetitions). These IRFs provide insights into how shocks to one endogenous variable affect other endogenous variables dynamically over time. Specifically, Figure 1 shows that shocks to both international and local uncertainty indices lead to a decline in foreign direct investment (FDI) inflows into MENA countries, with the effect of international uncertainty being more pronounced than that of local uncertainty. The negative impact begins to materialize from the second period following the shock and gradually diminishes over time. This indicates that investors reduce their investments in response to rising uncertainty but tend to restore their confidence as conditions stabilize. These results highlight the critical importance of mitigating sources of uncertainty at both the international and local levels to enhance investment attraction and achieve sustainable economic growth in the region.

Figure 3. Impulse Response Function results (Response of ln FDI, net inflows)



The variance decomposition analysis in Table (7) reveals that foreign direct investment (FDI) inflows are influenced by a variety of economic and political factors over time. The decline in the share of FDI from 100% to approximately 88% during the first ten periods indicates an increasing influence on external variables. The importance of both international and local uncertainty indices grows over time, with international uncertainty exerting a stronger effect, reflecting the sensitivity of FDI flows to global risks. Geopolitical risks also play a significant role, while trade openness demonstrates a strong and increasing positive impact on attracting investment. Economically, economic growth positively affects FDI, whereas inflation has a negative effect. National expenditure shows a relatively limited impact. Overall, these results suggest that reducing political and economic uncertainty, alongside adopting openness policies and encouraging sustainable growth, is key to stimulating foreign direct investment inflows in the MENA region.

Table 7. *Variance Decomposition results (Variance of ln FDI, net inflows)*

Period	*S.E.*	*ln FDI*	*ln WUI*	*DUI*	*ln GPRI*	*ln VI*	*ln Open*	*ln Growth*	*ln INF*	*ln GNE*
1	0.4302	100.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.5300	98.7924	0.2298	0.1243	0.5924	0.0099	0.1133	0.0001	0.1142	0.0237
3	0.5774	97.0490	0.5426	0.3232	1.2784	0.0329	0.3433	0.0014	0.3722	0.0569
4	0.6029	95.2713	0.8316	0.5345	1.8226	0.0698	0.6668	0.0027	0.7148	0.0859
5	0.6178	93.6521	1.0601	0.7214	2.1979	0.1202	1.0633	0.0034	1.0763	0.1054
6	0.6273	92.2403	1.2250	0.8684	2.4409	0.1829	1.5127	0.0038	1.4109	0.1151
7	0.6338	91.0246	1.3365	0.9736	2.5952	0.2562	1.9956	0.0041	1.6965	0.1177
8	0.6387	89.9733	1.4081	1.0427	2.6940	0.3382	2.4940	0.0046	1.9286	0.1166
9	0.6427	89.0523	1.4520	1.0840	2.7591	0.4269	2.9926	0.0053	2.1124	0.1154
10	0.6460	88.2325	1.4775	1.1057	2.8038	0.5208	3.4794	0.0065	2.2567	0.1171

7. Concluding remarks

Although the traditional theories had provided the conceptual foundation for understanding the determinant of FDI inflows, these theories fail to account for the role of uncertainty in shaping FDI flows. However, a growing theoretical literature has increased understanding of how uncertainty influences FDI flows. Dixit and Pindyck (1994) provided a new theoretical approach to firms' decisions regarding capital investment, stressing the irreversibility of most investment decisions and ongoing uncertainty of the economic environment in which those decisions are made, indicating that firms delay investment until uncertainty resolves.

Numerous studies have examined the determinants of FDI in the MENA region, confirming the importance of gross domestic product (GDP), infrastructure, trade openness, natural resources and institutional quality, Nevertheless, pay little attention to the effect of uncertainty on FDI inflows. In light of this gap, this study extends existing literature by

focusing on the effect of FDI global and domestic uncertainty in MENA, unbalanced panel data from 1990 to 2023. Our estimations find that uncertainty significantly and negatively affect MENA ’s FDI inflows. The statistically significant negative impact of uncertainty is consistent with the Dixit and Pindyck theory. Our regressions are robust to different specifications and potential endogeneity of uncertainty.

Given our findings, MENA countries should enhancing economic and institutional stability Through disciplined fiscal and monetary policies and institutional independence, to mitigate the impact of global environmental volatility; Mitigating investment risks during periods of heightened uncertainty through the use of insurance and guarantee mechanisms, as well as by signing investment protection agreements to enhance investor confidence; Improving transparency and information flow by publishing accurate and timely economic data and adopting international disclosure standards; and Focusing on value-added sectors, such as technology and renewable energy.

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Appendices

Table A. *Statistical Power analysis (A-priori Sample Size for Multiple Regression)*

	minimum required sample size for study
Anticipated effect size (f^2):	0.15
Desired statistical power level (p):	0.99
Number of predictors:	8
Probability level (α):	0.01
Minimum required sample size:	**263**

Table B. *Study sample according to income level*

Low-income Countries (3 Countries)	**Middle income Countries**		**High income Countries (6 Countries)**
	Lower (7 Countries)	**Upper (5 Countries)**	
Sudan, Syria, Yemen	Egypt, Jordan, Lebanon, Mauritania, Morocco, Palestine, Tunisia	Algeria, Iran, Iraq, Libya, Türkiye	Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates

Table C. *Description of the study variables*

Symbols	**Description**	**Source**
FDI	**Foreign direct investment, net inflows (% of GDP);** It is the net inflow of investment to acquire a permanent management interest (10 percent or more of the voting shares) in an enterprise operating in an economy other than that of the investor.	WB
WUI	**World Uncertainty Index;** measures the volatility of global economic and political confidence by analyzing the occurrence of the term "uncertainty" in international reports.	WU
DUI	**Domestic Uncertainty Index;** measures the level of ambiguity and volatility within a specific country by analyzing media or official content that reflects	WU

	economic or political tensions.	
GPRI	**Global Geopolitical Risk Index;** measures the level of geopolitical tensions worldwide, such as wars and political crises, by analyzing international news content to assess their impact on the economy and markets.	GPR
VI	**Vulnerability Index;** measures the susceptibility of a country or region to the adverse impacts of climate change, considering exposure, sensitivity, and adaptive capacity	Germanwatch organization
Open	**Trade (% of GDP);** Is the sum of exports and imports of goods and services measured as a share of GDP.	WB
Growth	**GDP growth (annual %);** Annual growth rate of gross domestic product at market prices based on constant local currency. Totals are based on constant 2010 US dollars.	WB
INF	**Inflation, consumer prices (annual %);** The annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be constant or change over specified time periods.	WB
GNE	**Gross national expenditure (% of GDP);** It is the sum of final consumption expenditure of households, final consumption expenditure of general government, and gross capital formation.	WB

***Sources*:** - **WB**: World Bank; - **WU**: World Uncertainty database; - **GPR**: Global Geopolitical Risk database.

Table D. *Standard Unit root test results*

	Levin, Lin & Chu	***Im, Pesaran & Shine***	***ADF Fisher***	***PP – Fisher***	***Results***
ln FDI, net inflows	-6.1713***	-7.0179***	133.91***	163.86***	***I(0)***
ln World Uncertainty	-8.1443***	-4.1176***	73.973***	58.774**	***I(0)***
Domestic Uncertainty	-8.6226***	-8.7985***	141.82***	140.96***	***I(0)***
ln Global Geopolitical Risk	-3.4388***	-8.9268***	153.47***	151.85***	***I(0)***
ln Vulnerability Index	-1.6758**	2.2786	26.570	21.796	***I(1)***
D(ln Vulnerability Index)	-17.996***	-17.661***	307.14***	308.47***	
ln Trade openness	-17.264***	-9.4297***	73.152***	64.379***	***I(0)***
ln GDP Growth	-8.4948***	-10.383***	189.97***	207.13***	***I(0)***
ln Inflation	-2.5169***	-4.6385***	92.242***	91.327***	***I(0)***
ln Gross national expenditure	-4.4212***	-5.0842***	90.254***	96.399***	***I(0)***

***Note*:** ***, **, * indicate significance at 1%, 5% and 10% respectively.

Table E. *Interpreting the meaning of the different effect sizes*.

Effect Size			Interpretation	
Cohen's d	***r***	***η^2***	***Cohen (1988)***	***Hattie (2009)***
< 0	< 0	-	Adverse effect	
0.0	0.00	0.000	No effect size	Developmental effects
0.1	0.05	0.003		
0.2	0.10	0.010	Small effect size	The teacher raised
0.3	0.15	0.022		
0.4	0.20	0.039		Desired area of influence
0.5	0.24	0.060	Medium effect size	
0.6	0.29	0.083		
0.7	0.33	0.110		
0.8	0.37	0.140	Large effect size	
0.9	0.41	0.168		
≥ 1.0	0.45	0.200		

الملخص

استهدفت هذه الورقة البحثية قياس أثر عدم اليقين العالمي والمحلي على الاستثمار الأجنبي المباشر (FDI) لـ 21 دولة في منطقة الشرق الأوسط وشمال إفريقيا (MENA) خلال الفترة من 1990 إلى 2023، باستخدام تقنيات بيانات اللوحة الديناميكية (DPD) للنظر في إمكانية نشوء عدم اليقين واستخدمت الدراسة أسلوب العزوم المعممة (GMM). وتُظهر نتائج الورقة وجود علاقة على شكل حرف U مقلوب بين حالة عدم اليقين العالمية وتدفقات الاستثمار الأجنبي المباشر (FDI).و نجد أن عدم اليقين العالمي يلعب دوراً محورياً في تشكيل قرارات الاستثمار الأجنبي. يميل المستثمرون إلى زيادة تدفقات الاستثمار الأجنبي المباشر عند مستويات معتدلة من عدم اليقين، لكنهم ينسحبون أو يترددون عندما ترتفع مستويات عدم اليقين العالمية. بالإضافة إلى ذلك، وجدت الدراسة أن زيادة مستويات عدم اليقين المحلي ومعدل التضخم تمنع المستثمرين الأجانب عن الاستثمار في البلد المضيف، في حين أن الانفتاح التجاري ومعدل النمو يزيدان من ثقة المستثمرين في زيادة تدفق الاستثمار الأجنبي المباشر في البلد المضيف.

الكلمات الدالة : الاستثمار الأجنبي المباشر - عدم اليقين العالمي - عدم اليقين المحلي - دول المينا -DPD-GMM.