



NATURAL RESOURCE ENDOWMENT AND DOMESTIC CAPITAL: EVIDENCE FROM CAPITAL FORMATION AND FOREIGN DIRECT INVESTMENT AS A MODERATOR ACROSS THE MEDA REGION

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Abstract: The study investigates the impact of total natural resources rent (RENT) from soil and subsoil on domestic capital formation, proxied by gross fixed capital formation (GFC), across ten MEDA transitional economies over the period 2000-2019. It focuses primarily on the importance of natural resources for the capital formation and used foreign direct investment inflows (FDI) as a moderator. Fixed-effects models with robust standard errors were estimated for the whole sample and excluding Libya, as a “rentier-state”. The findings show that higher natural resource rents crowds-out domestic capital formation, consistently with the “resource-curse” theory. However, FDI significantly acts as a moderator, mitigating the negative impact of RENT. Furthermore, the analysis controls for urbanization, trade openness, governance climate, and human capital, all of which affect capital formation. Additionally, controlling for FDI and the sectoral value-added, FDI shows negative spillovers, especially when controlling for manufacturing and services. However, the positive interaction between FDI and governance climate contributes to mitigating this negative effect, especially in manufacturing. Meanwhile, the interaction terms between FDI with human capital and internet diffusion – as a proxy for the technological advancement – show negative and positive impacts, respectively. Therefore, when institutional quality is strong, natural resources can be used productively, and FDI can yield benefits and boost capital formation. Finally, empirical results provide policy-relevant insights for policymakers on the RENT-

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GFC nexus, promoting a higher domestic capital across the MEDA region, needed for the sustainable development of countries.

Keywords: natural resource, capital formation, foreign direct investment, MEDA region.

JEL-codes: F21, F43, O16, O53, Q32.

INTRODUCTION

Natural resource endowment can be pivotal for growth in emerging and developing economies, especially if they are transitioning towards development (Scalamonti, 2024a). An adequate capital inflow – among them investments in physical assets, machineries, buildings, and infrastructure – is also necessary to ensure the long-term stability and sustainable growth (Scalamonti, 2021). Thereby, policies ensuring consistent capital formation are central for the industrialization process, job creation, and higher productivity. In light of this, the ten most important MEDA transitional economies – Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Syria, Tunisia, and Turkey – deserve further exploration¹ (Scalamonti, 2024b, 2024c, 2025a, 2025b, 2025c, 2025d, 2025e, 2025f).

A key factor is their natural resource endowment, which may generate substantial rents. The nexus between resource rents and economic growth is well established in the literature. The core of this is the “resource-curse” theory. It suggests that resource-rich countries may experience slower growth, greater volatility, extractive elites, resource-export dependence, and numerous other macroeconomic imbalances than countries with a lesser resource endowment (Kaznacheev, 2017; Acemoglu and Robinson, 2023). For instance, a higher dependence on natural resource rent may foster rent-seeking and bribery, ultimately diverting funds from productive economic activities. In fact, this curse often manifests through impacts on domestic capital formation. The “Dutch disease” – as often referred (Corden and Neary, 1982; Hayat, 2018) – causes an appreciation of currencies and crowds-out domestic investment, especially in manufacturing and tradable sectors. However, the resource rent could also provide vital funds for large-scale public and private investments when governance is sound, and elites are inclusive.

Studies argue that foreign direct investment (FDI) could mitigate these effects (Wang and Razzaq, 2022; Sayn-Wittgenstein *et al.*, 2025). FDI may provide access to technology, managerial expertise, and job skills, as well

as access to global markets (Mariotti, 2023). In light of this, it can boost domestic investment or, alternatively, represent the interests of extractive elites, disconnected from real needs, intensifying the crowding-out effects associated with the resource-curse.

Therefore, this study investigates the relationship between natural resource rent and domestic capital formation, with FDI inflows acting as a mediator, addressing ongoing theoretical and political debates related to the less explored MEDA transitional economies. Especially, it provides insights for better understanding whether FDI can reduce the adverse effects of resource-curse crowding out domestic investment across the MEDA region.

The research question is the following: *do FDI inflows influence the natural resource rent (RENT) on gross fixed capital (GFC) in MEDA economies?*

The moderating role of FDI in the RENT-GFC nexus represents a novel contribution with reference to MEDA transitional economies. In other words, focusing on a heterogeneous and significant cluster of countries, the study aims to offer valuable insights for sustainable development in the MEDA region.

Methodologically, the study employed a panel data analysis with fixed-effects models. The data cover the period 2000–2019 and were collected primarily from the World Bank's sources (World Development Indicators-WDI and Worldwide Governance Indicators-WGI), and from the UNDP (Human Development Index-HDI) for the mean of years of schooling. In a few cases, time-series were integrated with data from the International Monetary Fund (World Economic Outlook-WEO), the United Nations Conference on Trade and Development (UNCTADstat), or via linear interpolation for only 4% of the whole dataset. Moreover, robust standard errors were implemented in the statistical inference on the models.

The rest of the paper is organized as follows. Section 2 develops the theoretical background and related literature, introducing the research hypotheses. Section 3 explains material and methods, reporting model specification and estimation technique. Section 4 presents the empirical analysis and discusses results. Section 5 reports the conclusions.

THEORETICAL BACKGROUND AND RELATED LITERATURE

Foreign Direct Investment and Resource-curse Theory

FDI has significantly influenced the global economy in this first part of the 21st century (Saini and Singhanian, 2018; Li *et al.*, 2022; Scalamonti, 2024c,

2025a). More recent studies have shown that resource rents can have both positive and negative impacts on capital formation (Shahbaz *et al.*, 2019; Khan *et al.*, 2020; Alvarado *et al.*, 2021; Alnsour *et al.*, 2025; Belloumi *et al.*, 2025; Laghari, 2026).

The “resource-curse” theory is based on studies by Sachs and Warner (1995) and Auty and Gelb (2001), which provided the foundation for examining the role of natural resource endowment on economic growth (Robinson, 2001; Ross, 2001; Henry and Springborg, 2001; Gylfason, 2001). According to the theory, countries rich in natural resources tend to experience slower growth. This negative relationship arises because resource rents slow capital formation.

According to the more recent empirical literature (Ebru *et al.*, 2020; Yasmeen *et al.*, 2021; Rahim *et al.*, 2021), natural resource dependence can exacerbate underdevelopment, unemployment, and inequalities, or inhibit productive sectors.

The resource-curse theory argues that governance of elites, bribery, rent-seeking, and overreliance on resource exports can lead to slower economic growth in resource-abundant countries. The richness of natural resources can hinder growth in diverse ways: (i) the appreciation of the real exchange rate harms manufacturing – i.e., “Dutch disease”; (ii) rent-seeking activity fosters the institutional decline and the volatility of raw-material price; and (iii) productive investments are crowded-out.

In summary, unsound governance and bribery of elites can cause resource mismanagement, leading to resource misallocation and hindering capital development.

Linking resource-curse theory to domestic capital formation, the most direct effect is the “crowding-out” of capital formation in tradable sectors, such as manufacturing, due to exchange-rate effects. This means that resource abundance can lead to capital misallocation or the pursuit of speculative and unproductive rents. Additionally, resource rent can induce pro-cyclical fiscal policies. Economic booms lead to overspending, and downturns trigger sharp cuts in infrastructural capital. Recent research has highlighted a conditional curse. According to this thesis, outcomes depend on institutional quality, financial development, and economic development (Van der Ploeg, 2011; Ross, 2015).

For some MEDA countries more than others – above all, Libya, Algeria, and Tunisia – the resource-curse is inevitable and represents a severe risk,

especially when governance is unsound (Scalamonti, 2024c). Conversely, well-governed resource rents can positively influence capital formation and growth. Natural resource rent may enable the public and private sectors to finance capital formation. Long-term growth arises from investment in both human and physical capital.

The capital formation is therefore essential for wealth and financing public spending in education, technology, and infrastructure such as hospitals, schools, and roads. These productive investments improve competitiveness and productivity, self-reinforcing further capital formation. Additionally, private-sector investors utilizing rents to stimulate innovation and technological progress can further increase the absorptive capacity of their firms. In fact, long-term growth is primarily driven by internal factors – such as technological innovation, human capital formation, and positive externalities from investment – rather than external factors. Investing in machinery and equipment, durable assets, and R&D produces technological advancements and promotes learning-by-doing, know-how, and spillovers, finally boosting returns.

For resource rent to foster sustained growth, it should be directed towards investment in enhancing technology and human capital. Therefore, the adverse effects on capital formation may be mitigated if rent is employed to fund endogenous growth mechanisms (Solow, 1956; Romer, 1990). According to Aghion *et al.* (2023), economic growth depends on the diversification of human capital – closely linked to knowledge accumulation and innovation – and the exchange of ideas among more skilled workers. Furthermore, more openness can influence cross-border capital, know-how transfer, and innovation (Mohamed and Sidiropoulos, 2010).

Regarding governance quality, institutions and policymakers should be inclusive and able to support innovation. Research activity and property rights can directly shape the innovation trajectory, while quality institutions contribute to the growth convergence.

According to the spillover-theory, FDI can contribute to host-country development in several ways (Borensztein, 1998). Firstly, it can generate positive externalities, technology transfers, and backward linkages to local firms, as well as forward linkages to distributors, ultimately contributing to increased countries' competitiveness and productivity. In other words, the labor mobility can facilitate imitation processes and spillovers. Therefore, know-how transits

from foreign workers to domestic ones. Additionally, FDI intensifies domestic competition, compelling firms to improve their organizational efficiency and productivity.

Secondly, by creating a demand for the infrastructure and networks, it enhances expected returns, stimulating domestic capital formation. Domestic firms can learn from the innovation that spreads globally and implement it in their organizations (Alfaro *et al.*, 2010). Therefore, FDI is a key driver of capital formation, as it frequently funds the development of various strategic sectors in country development (Asiedu and Lien, 2011). In light of the literature above, the following research hypothesis was formulated.

H1: the natural resource rent negatively impacts capital formation.

2.2. Capital Formation and Natural Resources Endowment

The empirical literature has well-examined the nature of resource revenues impacting economic growth, highlighting dampening effects (Sachs and Warner, 1995; Auty and Gelb, 2001). Studies examined how natural resource rent affects economic growth through various channels (Vandycke, 2013).

Evidence suggests that natural resources primarily influence economic growth by affecting capital accumulation, with foreign capital being particularly important. Capital formation serves as a key driver of an economy's productive capacity and sustainable growth prospects. Understanding the RENT-GFC nexus is pivotal, as it is central to development debates (Scalamonti, 2024a) in the MEDA region. In addition to the already mentioned "resource-curse", there is the "crowding-out effect" that needs to be explained.

Specifically, both suggest that resource booms may result in real exchange rate appreciation, deindustrialization, revenue volatility, and macroeconomic imbalances, all of which can discourage fixed investment. Furthermore, rent-seeking behavior and unsound institutions may redirect rent away from productive investment. On the contrary, the "resource-blessing" and "spillover-theory" suggest that resource abundance can stimulate growth through infrastructural development and fiscal advantages as the government reinvests rent, increasing demand for goods and capital (Hirschman, 2012).

However, several studies have reported evidence of a crowding-out effect caused by the extraction of resources and their consequent export (Gerelmaa and Kotani, 2016; Cheng *et al.*, 2020; Adewuyi and Awodumi, 2021). On the

one hand, they stimulate economic growth by generating sizable revenues that can be used to fund investments in human and physical capital. On the other hand, when rent is not effectively managed, it can lead to the “resource-curse,” causing underdevelopment, bribery, and instability. The empirical research has also suggested that FDI can transform the resource rent into productive investment (Adams *et al.*, 2017).

Foreign capital inflows should be aligned with development purposes of countries. Sound governance can ensure an efficient rent allocation. This means that effective capital allocation can be possible when transparency and accountability increase, reducing corruption risk and misuse of resources (Adams and Atsu, 2020; Badeeb *et al.*, 2021). It is well-known in the literature that FDI can enhance capital accumulation in developed countries with quality institutions and higher education levels.

However, investments in both physical and human capital formation are directly influenced by the resource endowment. The nature and direction of these linkages are often shaped by policies. FDI enhances spillovers, infrastructural and human capital, thus moderating the RENT-GFC nexus. To some extent, the effectiveness of rent depends on the host-country’s absorptive capacity and governance climate (Apergis, 2014; Masi and Ricciuti, 2019).

In other words, development paths rely on the host-countries’ absorptive capacity, adequate human capital formation, efficient financial markets, and infrastructural capital to obtain effective spillovers. In this context, FDI can be a key moderator, influencing both the strength and direction in the RENT-GFC nexus. Its moderating role, however, depends on its catalytic effect. FDI can create backward and forward linkages stimulating domestic capital formation. In light of the literature above, the following research hypothesis was formulated.

H2: FDI enhances capital formation with resource rents acting as a moderator.

3. MATERIAL AND METHODS

3.1. Model Specification and Estimation Techniques

The regression models implement the following econometric specification (1):

$$y_{it} = \beta x_{it} + \alpha_i + \varepsilon_{it}, \quad (1)$$

where subscripts i and t denote countries and time, respectively; y is the proxy variable for domestic capital formation; x is a set of control variables, also including interaction terms and a time dummies to prevent temporal shocks; α is the constant term controlling for cross-sectional specific and unobserved country fixed-effects; β is the vector of unknown parameters to be estimated; finally, ε is the idiosyncratic error-term in regressions.

Panel data analysis is often considered to have a lower level of bias due to the increased number of observations, which raises the degrees of freedom in models (Hsiao, 2022). Hence, a panel data approach allows for a more detailed analysis of the investigated phenomenon, providing a time depth within the observed units.

Fixed-effect (FE) model with a heterogeneous panel is particularly effective, as panel includes economies with differences in terms of development stages, therefore an unrestricted intercept is more plausible. The FE model focuses on eliminating the time-invariant intercept α_i , as it contains unobservable values and is considered an integral part of the error term. The FE estimator is always consistent, but it cannot estimate the effect of time-invariant regressors.

Finally, additional specification tests were computed over the models to account for potential heteroskedasticity, autocorrelation, and cross-sectional dependence. As a result, Driscoll and Kraay (1998) robust standard errors were employed. The latest released version of the open-source statistical software *gretl* was used. All variables enter the models in logarithmic form to reduce the possible skewness and to interpret coefficients as elasticities. Variables that can take zero or negative values, such as INF, INT, and EXC, were inspected, and where appropriate, the transformation with $\ln(1+x)$ or $1+\ln(1+x)$ was used for series with negative values or with values closely near to one, respectively.

3.2. Data, Descriptive Statistics, and Correlations

Table 1 shows the main statistics and description of the variables used in the regressions. While, in Table 2 the correlations across the variables were shown. The correlation analysis shows that the variables can exhibit an excessive statistical associations in some cases. Therefore, an approach implementing robust standard errors was also used to prevent a possible multicollinearity bias.

Table 1: Main statistics and description of the variables

Variables	Main statistics			Descriptions
	μ	σ_m	σ_h	
GFC	38481	28408	53543	Gross fixed capital formation (USD millions)
RENT	9.269	5.888	14.112	Total natural resources rents (GDP %)
FDI	39580	31720	36580	Net foreign direct investment (USD millions)
URB	17776	44730	16523	Number of people living in urban areas (thousands)
OPEN	71.99	13.46	20.56	Sum of exports and imports of goods and services (GDP %)
VA	39.44	3.796	9.938	Voice and accountability index (%)
PS	37.19	9.495	5.895	Political stability index (%)
GC	42.82	3.203	8.444	Composite governance index by Scalomonti (2025g) (%)
HC	7.441	0.916	2.159	The mean of years of schooling (years)
ICT	30.27	21.17	12.78	Individuals using the Internet (population %)
FD	50.80	9.636	29.17	Domestic credit to private sector (GDP %)
EXC	174.6	56.80	470.4	Official exchange rate (LCU per USD)
INT	15.53	13.88	12.68	Real interest rate (%)
INF	25.20	7.962	27.62	Inflation as consumer prices index (% growth)
PRI	11606	62060	15134	Value-added in the primary sector (USD millions)
MAN	24291	15350	34597	Value-added in the manufacturing (USD millions)
SER	84081	52090	106780	Value-added in the service sector (USD millions)

Table 2: The correlation matrix

	<i>GFC</i>	<i>RENT</i>	<i>FDI</i>	<i>VA</i>	<i>PS</i>	<i>GC</i>	<i>HC</i>
GFC	1.000						
RENT	-0.080	1.000					
FDI	0.714***	-0.336***	1.000				
VA	0.442***	-0.682***	0.436***	1.000			
PS	0.043	-0.009	-0.388***		1.000		
GC	0.365***	-0.580***	0.371***			1.000	
HC	0.155**	-0.352***	0.454***	0.431***	-0.205***	0.307***	1.000
FD	-0.034	-0.766***	0.297***	0.642***	0.033	0.630***	0.295***
ICT	0.403***	-0.350***	0.613***	0.389***	-0.309***	0.176**	0.542***
URB	0.687***	0.113	0.361***	-0.025	-0.086	-0.026	-0.305***
OPEN	-0.441***	-0.063	-0.260***	0.070	0.334***	0.230***	0.163**
EXC	-0.173**	-0.133*	0.008	-0.063	-0.438***	-0.343***	-0.018
INT	0.096	0.099	0.051	0.150**	0.100	0.021	0.253***
INF	-0.413***	-0.012	-0.120	-0.381***	-0.424***	-0.562***	0.133*
PRI	0.751***	0.086	0.417***	0.030	-0.129*	-0.018	-0.265***
MAN	0.915***	-0.213***	0.672***	0.376***	-0.096	0.387***	0.084
SER	0.952***	-0.152**	0.730***	0.465***	-0.079	0.329***	0.286***

	<i>GFC</i>	<i>RENT</i>	<i>FDI</i>	<i>VA</i>	<i>PS</i>	<i>GC</i>	<i>HC</i>
	URB	OPEN	ICT	FD	EXC	INT	INF
URB	1.000						
OPEN	-0.652***	1.000					
ICT	0.113	0.054	1.000				
FD	-0.169**	0.218***	0.492***	1.000			
EXC	-0.095	-0.172**	0.081	0.099	1.000		
INT	-0.146**	0.059	-0.114	-0.126*	0.025	1.000	
INF	-0.320***	0.025	-0.061	-0.231***	0.586***	0.149**	1.000
PRI	0.932***	-0.708***	0.224***	-0.173**	-0.043	-0.265***	-0.312***
MAN	0.807***	-0.589***	0.380***	0.036	-0.211***	-0.408***	-0.447***
SER	0.643***	-0.519***	0.463***	0.029	-0.179***	0.111	-0.357***

Note: (***) significance at $\alpha=0.01$; (**) significance at $\alpha=0.05$; (*) significance at $\alpha=0.10$.

4. EMPIRICAL ANALYSIS

4.1. Results and Discussion

The results indicate that GFC, RENT, and FDI are interrelated, with FDI moderating the negative impact of RENT. However, this relationship varies depending on model specifications, particularly when excluding Libya – a “rentier-state” – and controlling for sectoral value-added (Table 3 and Table A.1 in Appendix A).

The base models 1 and 3 in Table 3 are aligned with H1 and H2, thereby confirming the natural resource-curse and the crowding-out effect across the MEDA region (Havranek *et al.*, 2016; Rahim *et al.*, 2021; Yasmeen *et al.*, 2021). It is also noteworthy that RENT excluding Libya in model 4 is not statistically significant – although still with a negative sign – which can be interpreted as a result of the high dependence of the Libyan economy on the natural resource exports, especially oil (Bhattacharyya and Blake, 2010; Khader and El-Wifati, 2015; Etelawi *et al.*, 2017).

On the one hand, the estimates reveal a statistically significant inverse relationship between GFC and RENT, indicating that higher natural resource rents are associated with lower levels of domestic capital formation. This result is always confirmed by the other model specifications and is aligned with those of previous studies (Shahbaz *et al.*, 2019; Khan *et al.*, 2020; Alvarado *et al.*, 2021; Alnsour *et al.*, 2025; Belloumi *et al.*, 2025; Laghari, 2026), thereby showing that higher natural resource rent is often associated with lower capital formation, but FDI can mitigate its negative impact, acting as a moderator. On

the other hand, the magnitude and direction of the impact of RENT depend on institutional quality, as reflected in governance indicators. In fact, capital formation – like overall growth – is often hindered by the rent misallocation caused by unsound governance climate. Especially, the statistical significance of VA captures constraints imposed by elites, and those of PS supports capital formation. The other governance indicators were included but did not produce significant results, and therefore their respective models were not shown.

Among the regressors controlling for the macroeconomic framework, the significant ones are URB, OPEN, HC, ICT, EXC, and INF. Furthermore, the signs of the impacts of the latter two are consistent with the “Dutch Disease” hypothesis, perhaps suggesting that higher rents may lead to currency appreciation and harm productive sectors, ultimately reducing domestic capital formation.

OPEN negatively impacts, indicating that MEDA countries may suffer from resource-export dependence. Also, HC negatively impacts, indicating that low-skilled human capital does not contribute to development, especially in the absence of adequate quality institutions and absorptive capacity. Finally, although not statistically significant, DC also negatively impacts (Yuxiang and Chen, 2011).

While ICT shows a positive and statistically significant impact, underlining the fundamental role of technology diffusion on development.

Findings also align with the literature on foreign investment, which showed that FDI acts as a complement to domestic investment by introducing new technology and knowledge spillovers (Adams and Atsu, 2020; Badeeb *et al.*, 2021). However, its net effect primarily depends on governance quality and technology diffusion.

Therefore, FDI can enhance the skills and expertise of the workforce, but training and knowledge capital are critical to improving the quality of human capital (Solow, 1956).

Finally, the sensitivity analysis, controlling for FDI and sectoral value-added, reveals negative FDI spillovers, particularly in manufacturing and services (Table A.1 in Appendix A). However, the positive interactions between FDI with governance climate and technology diffusion significantly contribute to mitigating this negative effect, especially in manufacturing. While the interaction term with human capital is negative and significantly exacerbates the negative impact of foreign investment on domestic capital formation (Tao *et al.*, 2025).

Table 3: Fixed-effects models, robust standard errors in brackets

	<i>All MEDA</i>		<i>Excluding Libya</i>	
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
	GFC			
RENT	-0.192** (0.071)	-0.193** (0.086)	-0.142** (0.068)	-0.129 (0.083)
(FDI x RENT)	0.106*** (0.025)	0.137*** (0.037)	0.068*** (0.025)	0.097** (0.043)
VA	-0.558** (0.215)		-0.700*** (0.256)	
PS	0.333** (0.151)		0.379** (0.153)	
GC		0.577 (0.494)		0.554 (0.418)
HC		-0.546* (0.272)		-0.684** (0.321)
ICT		0.097 (0.064)		0.129* (0.071)
FD		-0.108 (0.079)		-0.027 (0.090)
URB		0.928*** (0.257)		0.904*** (0.304)
OPEN		-0.211* (0.110)		-0.245* (0.135)
EXC		0.077 (0.056)		0.056 (0.074)
INT		0.025 (0.043)		-0.016 (0.049)
INF		-0.197** (0.070)		-0.182** (0.076)
Constant	yes	yes	yes	yes
Time-dummies	yes	yes	yes	yes
Standard error	0.191	0.180	0.177	0.159
Log-likelihood	61.23	76.61	71.04	93.02
F-test (p-value)	(0.000)	(0.000)	(0.000)	(0.000)
Welch-F test (p-value)	(0.000)	(0.000)	(0.000)	(0.000)
Heteroskedasticity-test (p-value)	(0.000)	(0.000)	(0.000)	(0.000)
Autocorrelation-test (p-value)	(0.000)	(0.000)	(0.000)	(0.000)
CD-test (p-value)	(0.001)	(0.002)	(0.001)	(0.002)
No. of Observations	182.0	182.0	170.0	170.0
LSDV-R ²	0.979	0.982	0.982	0.986

Note: (***) significance at $\alpha=0.01$; (**) significance at $\alpha=0.05$; (*) significance at $\alpha=0.10$.

5. CONCLUSIONS

5.1. Concluding remarks and contribution

Recent global crises and challenges have highlighted the need for responsible and resilient governance better capable of effectively adapting to the instability of the economic cycle through coordinated policies and country system-wide responses (Mariotti, 2022, 2024; Valli, 2025). Therefore, the study has examined the link between natural resource rent and capital formation, with foreign direct investment as a moderator across the MEDA transitional economies over the period 2000-2019, employing fixed-effects regressions.

Empirical findings show that using gross fixed capital formation as a proxy for domestic capital, when the governance climate is unsound, natural resource rent reduces domestic capital formation, and foreign direct investment yields minimal spillovers. However, when institutions are sounder, natural resource rent may be used productively, and investment from outside the resource sector yields broader benefits, boosting GFC. Additionally, controlling for FDI and the sectoral value-added, FDI shows negative spillovers, especially when controlling for manufacturing and services. However, the positive interaction between FDI and governance climate contributes to mitigating this negative effect, especially in manufacturing. Meanwhile, the interaction terms between FDI with human capital and internet diffusion – as a proxy for the technological advancement – show negative and positive impacts, respectively.

In conclusion, higher natural resource rents are associated with crowding-out dynamics that displace productive domestic investment, thereby supporting the resource-curse hypothesis. However, the resource-curse associated with rents can be mitigated by FDI, thus functioning as a moderator, encouraging sustainable capital formation. Overall, the findings have confirmed that natural resource rents can crowd-out domestic capital formation, but also that this effect can be mitigated by FDI inflows, especially under sounder governance and technological diffusion.

5.2. Policy implications

FDI can promote structural diversification, strengthen institutional quality, and improve the efficiency of resource rent allocation, as well as enhance the country's absorptive capacity through knowledge spillovers and infrastructural capital.

The establishment of national funds to allocate resource revenues to public projects could encourage private investment in MEDA countries, and more focus should be directed to foreign investment in renewable energy sectors.

Furthermore, when investors extract resources, they should also support local suppliers and invest in infrastructural projects. This should help convert resource-based revenues into tangible assets, attracting more private investment. Equally important, it establishes favorable fiscal incentives for R&D activities.

Strengthening governance is also crucial for MEDA policymakers. It must be vital to adopt anti-corruption rules and increase transparency to ensure a sounder rule of law and prevent foreign investors from seeking quick capital gains. Last but not least, strengthen the banking and financial system and combine public and private investment, as well as improve educational systems to raise human capital and countries' absorptive capacity.

Alongside this, provide supplier training and business support, thus turning foreign capital into domestic investment. Encourage private investment growth beyond the extractive industry. Negotiate effective know-how transfers, training agreements, and the definition of industrial clusters. Ensure positive spillovers deepen domestic capital. Finally, promote shared-risk arrangements to reduce vulnerability to external shocks.

5.3. Limitations and suggestions

Although this study provided interesting insights into understanding the RENT-GFC relationship in the MEDA region, future research could employ more advanced econometric models, such as GMM panel data estimators controlling for endogeneity and serial correlation, or the unique methods of the moment quantile regression (MMQR) developed by Machado and Silva (2019). The latter is an estimator capable of handling non-normal data and is particularly suitable for analyzing heterogeneous and asymmetric relationships. These assumptions make it more suitable for assessing whether FDI's moderating effect varies between low- and high-investment economies (Koenker, 2017).

Additionally, ARDL or PMG models could be estimated, controlling for the short- and long-run dynamics. However, PMG allows heterogeneous short-run coefficients but does not account for heterogeneity.

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Appendix A

Table A.1 – Fixed-effects models controlling for sectoral value-added, robust standard errors in brackets

	<i>All MEDA</i>			<i>Excluding Libya</i>		
	<i>1</i>	<i>2^(a)</i>	<i>3</i>	<i>4</i>	<i>5^(a)</i>	<i>6</i>
	GFC					
RENT	-0.052 (0.086)	-0.099 (0.077)	-0.052 (0.092)	-0.015 (0.076)	-0.069 (0.072)	0.099 (0.064)
FDI	0.110 (0.560)	-0.056 (0.572)	-0.023 (0.698)	0.559 (0.540)	-0.062 (0.481)	-0.296 (0.616)
(FDI x GC)	0.446 (0.461)	0.613 (0.397)	0.605 (0.562)	-0.006 (0.353)	0.743*** (0.231)	0.916* (0.484)
(FDI x HC)	-0.487* (0.273)	-0.528 (0.343)	-0.537* (0.277)	-0.513 (0.309)	-0.710** (0.344)	-0.618*** (0.210)
(FDI x ICT)	0.072 (0.056)	0.128** (0.061)	0.091 (0.056)	0.059 (0.061)	0.142** (0.067)	0.014 (0.061)
FD	-0.080 (0.094)	0.072 (0.085)	-0.109 (0.076)	0.095 (0.108)	0.144 (0.107)	0.122 (0.077)
URB	0.633** (0.259)	0.391 (0.307)	0.907*** (0.273)	-0.033 (0.258)	0.381 (0.364)	0.293 (0.194)
OPEN	-0.077 (0.166)	-0.021 (0.155)	-0.178 (0.198)	0.140 (0.188)	-0.068 (0.177)	0.407*** (0.105)
EXC	0.098* (0.051)	0.064 (0.080)	0.085 (0.066)	0.100 (0.066)	0.062 (0.120)	0.183* (0.092)
INT	0.029 (0.045)	0.091 (0.058)	0.029 (0.052)	-0.007 (0.050)	0.054 (0.052)	0.011 (0.028)
INF	-0.189** (0.068)	-0.154** (0.073)	-0.193** (0.072)	-0.157* (0.077)	-0.130 (0.084)	-0.041 (0.056)
PRI	0.161 (0.136)			0.469*** (0.144)		
MAN		0.365** (0.132)			0.362** (0.159)	
SER			0.049 (0.226)			1.130*** (0.070)
Constant	yes	yes	yes	yes	yes	yes
Time-dummies	yes	yes	yes	yes	yes	yes
Standard error	0.179	0.164	0.180	0.148	0.145	0.110
Log-likelihood	78.09	89.14	76.76	106.7	103.0	157.0
F-test (p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Welch-F test (p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

	<i>All MEDA</i>			<i>Excluding Libya</i>		
	<i>1</i>	<i>2^(a)</i>	<i>3</i>	<i>4</i>	<i>5^(a)</i>	<i>6</i>
Heteroskedasticity-test (p-value)	(0.000)	(0.000)	(0.000)	(0.001)	(0.099)	(0.000)
Autocorrelation-test (p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CD-test (p-value)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
No. of Observations	182.0	170.0	182.0	170.0	158.0	170.0
LSDV-R ²	0.982	0.986	0.982	0.988	0.989	0.994

Note: (***) significance at $\alpha=0.01$; (**) significance at $\alpha=0.05$; (*) significance at $\alpha=0.10$; (a) no Syria.

NOTE

1. These countries are the most important on the South-Eastern shore of the Mediterranean Sea for territorial extension and economic size, as well as the main signatory partner countries – Libya as permanent observer – of the Euro-Mediterranean Agreements in Barcelona in the mid-nineties (European Union, 1995; Tino, 2012; Kim, 2022).

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