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Foreign Capital Inflows and Financial Development: The Moderating Effects of the Governance Climate and Human Capital across the MEDA Region

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ABSTRACT

In the globalized world, there is a closed relationship between foreign capital inflows (CI) and financial development (FD) of a country. Therefore, this study aims to investigate the relationship between FD and CI across the Southern and Eastern Mediterranean countries (MEDA region), covering the period 2000–2019, since MEDA transitional economies are experiencing a new phase of their development-paths and integration into the global economy through value chains, especially in relation to European partners. By using as moderator factors an original composite index of governance climate (GC) and the mean years of schooling as proxy variables for institutional quality and human capital (HC) formation, respectively, the study brings a significant contribution to the existing body of literature on the relationship between CI and FD. For the empirical analysis, fixed-effects models with robust standard errors and Bayesian mixed-effects models were implemented. Empirical findings show that FD has a statistically significant negative association with foreign investment and remittance inflows. However, its effect is substantially attenuated or reversed by interaction terms with GC and HC. As policy implications, the study suggests that a sounder governance climate and more skilled human capital can enhance the benefits of the MEDA countries' financial development and attract more foreign capital inflows across the whole MEDA region.

Keywords: Foreign Capital; Financial Development; Governance Climate; Human Capital; MEDA Region

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1. Introduction

Foreign capital inflows (CI) can be a vital source of development if well-employed. CI includes foreign direct investment (FDI) and foreign portfolio investment (FPI), which together constitute a whole flow of foreign investment (FI)[1, 2], international remittances (REM)[3, 4], and official development assistance (ODA)[5, 6], as these funds can represent vital resources for transitional and emerging economies and meet their financial needs[7].

To ensure their maximum effectiveness and yield, however, an efficient financial development (FD)[8–11], a sound governance climate (GC)[12, 13], and more skilled human capital (HC)—for instance, in achieving sustainable growth[14, 15]—are pivotal. This research in this field aims to identify macroeconomic factors affecting CI. In particular, the research question (RQ) is twofold. How does FD impact CI across the MEDA region? And how do GC and HC moderate this relationship?

Morocco, Algeria, Tunisia, Libya, Egypt, Israel, Jordan, Lebanon, Syria, and Turkey are the most important South-Eastern Mediterranean countries 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[16–18].

Addressing this RQ using an overall governance climate index and human capital as moderator factors for the CI-FD nexus in developing economies represents a meaningful contribution to the existing body of literature on developing and emerging economies. Empirical studies addressing this topic are very few, and the moderating effects of GC and HC in the CI-FD nexus have not yet been extensively examined, especially in relation to the less investigated cluster of MEDA countries[19–23].

Therefore, this paper aims to fill this gap by investigating the moderating role of governance climate and human capital across the MEDA region. Foreign capital inflows are crucial for the countries' development[24–26]. They can serve as a gateway for introducing knowledge, skills, and resources[27, 28]. FD as a dependent variable refers to the sophistication, efficiency, and growth of a country's financial system[29]. As a proxy variable, the domestic credit to the private sector was used differently than in other studies[30–33].

A developed financial system can play an important role in facilitating capital allocation and savings, providing significant opportunities to investors, and fostering the country's growth[34, 35]. In other words, it serves as a barometer of the overall economic health and attractiveness, promoting the country's development and financial stability[36].

Finally, our findings also offer important insights for policymakers in defining effective policies for promoting MEDA financial systems. Furthermore, foreign stakeholders can use our empirical evidence to better understand the institutional and business environments of MEDA countries.

The study used panel data covering the period 2000–2019 and employing fixed-effect models. The data 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 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 3% of the whole dataset. Moreover, robust standard errors were also implemented to ensure sounder statistical inference on the models. The remaining part of the work is structured as follows. The Section 2 reports the materials and methods. The Section 3 introduces the results. The Section 4 provides conclusions.

2. Materials and Methods

2.1. Literature and Research Gap

Institutional factors are the main driver for the foreign CI[37–39]. Countries with a robust infrastructural endowment, political stability, and a sound institutional and business environment are more likely to attract more foreign capital. Sounder governance enhances attractiveness and is a signal of a favorable institutional and business environment[11, 40, 41].

Sound governance climate provides a better absorptive capacity and a skilled workforce[26, 42], which are widely recognized as fair preconditions for the countries' attractiveness[43]. On the contrary, unsound governance climate causes several constraints to foreign CI, since it is often perceived as an implicit cost on capital that increases uncertainty

and volatility[44].

According to North[45], the formal and informal behaviors contribute to forming the institutional quality of a country. The rules and laws, property rights, and governmental system constitute the formal part, while the informal part consists of people's habits formed in accordance with their historical behaviors and culture[46]. These assumptions suggest that if a country has historically had a strict rule of law, such that no political or other types of influence can bias the bureaucratic and judicial system, people in such a country should tend to commit fraud and deception to a lesser extent, resulting in greater enforcement of contracts and protection of property rights, ultimately with a positive impact on the financial system as well[47–49]. The country's financial development is therefore closely related to the transparency and reliability of transactions, the capital mobility, and the contract enforcement, all of which are only possible when the country has high-quality institutions and a satisfactory governance climate[50–52].

However, the empirical literature has provided mixed results, suggesting that the relationship between CI and FD can vary greatly based on the country's macroeconomic framework, especially regarding financial indicators[53–57] and beyond[58, 59]. For instance, Sharma and Paramati[60] find that an efficient capital allocation supports investment projects. For Krifa-Schneider et al.[61], CI depends on the financial system development, especially in developing and emerging economies heavily reliant on foreign capital. For Jeong et al.[62], FD enhances foreign investors' confidence, allowing easier access to finance in overseas markets and promoting CI.

Concluding, the empirical literature has provided mixed results, suggesting that the relationship between CI and FD depends on the countries' macroeconomic conditions. Based on the literature review, the relationship between CI and FD is not straightforward, and a gap exists in relation to the MEDA region. In fact, for this specific cluster of transitional economies, how the financial development is related to the capital inflows has not been adequately provided, and further investigations are needed. Therefore, the study constitutes an advancement in the existing body of empirical works on the CI-FD nexus in developing economies by analyzing it for the MEDA transitional economies. By using a novel overall governance climate index and human capital as moderator factors in the relationship between capital inflows and financial development, it represents a meaningful contribution to the existing body of literature by filling the gap. Considering the related literature and recognizing the research gap, the following hypotheses were tested:

H1. *FD has a significant impact on CI.*

H2. *GC affects and significantly mediates the CI-FD nexus.*

H3. *HC affects and significantly mediates the CI-FD nexus.*

2.2. Explanatory, Control, and Moderating Variables

FI, REM, and ODA are the three distinct flows of capital used as dependent variables. FD is the explanatory variable of most interest and proxied by the more general and reliable domestic credit provided to the private sector in the economy[30–33]. Furthermore, the following control variables were used: (i) the inflation—INF, proxied by the consumer price index, which represents the macroeconomic stability of the host-country[63–66]; (ii) the real exchange rate—EXC, the price of LCU in terms of USD, because a favorable exchange rate contributes to generating extra-earnings on capital[67–69]; (iii) the interest rate—INT, the average interest rate on loans and deposits for commercial banks, which is an important factor affecting FD[70, 71]; (iv) the domestic investment—GFC, gross fixed capital formation as a proxy for infrastructures necessary for the country's development[2, 72]; (v) the openness to trade—OPEN, computed as the sum of exports and imports as a ratio of GDP, because a country which is more open to foreign trade may formulate policies more favorable to foreign CI[73–77]; (vi) the urban population—URB, as a proxy for market size, because greater urbanization indicates a larger market base[78–82].

Last but not least, as moderating variables: (i) the governance climate—GC, an original and reliable overall composite index conceived by the WGI[83], as a proxy for institutional quality; (ii) the human capital—HC, understood as the skilled labor force, which can make a country more attractive to foreign capital and contribute to its FD[84–86].

A sustainable institutional and business environment can foster financial development and facilitate well-functioning markets[87–89]. In other words, quality institu-

tions and sound governance can reinforce the institutional and business environment by mitigating political risks [90–92], and ensuring economic stability [93–96]. According to the literature above, these control and moderating variables are essential to assess their potential effects on the relationship between CI and FD.

2.3. Model Specification and Estimation Techniques

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

$$y_{it} = \beta x_{it} + \alpha_i + \varepsilon_{it}, \tag{1}$$

where subscripts i and t denote countries and time, respectively; y_{it} is the proxy variable for foreign capital inflows; x_{it} is a set of control variables, also including interaction terms and a time-trend to prevent temporal shocks; α_i 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_{it} 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 [97]. Hence, a panel data approach allows for a more detailed analysis of the investigated phenomenon, providing a time depth within the observed units. However, the inference to be drawn is sensitive to the model specification, the investigated phenomena, and the methodology used. Fixed-effect (FE) model with a heterogenous panel is particularly effective. Since panel includes economies with differences in terms of development stages, 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 time-invariant term is eliminated through a within-transformation (or demeaning) procedure, which subtracts the group mean from each variable and estimates the intercept-free model. Therefore, the FE estimator is always consistent, but it cannot estimate the effect of time-invariant regressors. The FE models were also used to establish a comparison benchmark, hence providing a more general assessment about the basic impacts of regressors. Models using a different Bayesian mixed-effects (BME) approach were instead reported as a robustness check.

The BME is a hierarchical statistical approach that combines fixed-effects and random-effects within a Bayesian framework using priors for parameters to quantify uncertainty and incorporate prior knowledge, offering advantages in small samples and more complex dataset [98, 99]. In these stochastic models, a time-trend is not necessary and the error term of the regressions ε_{it} is given by $u \sim N\left(0, \sigma_u^2\right)$ and $\epsilon \sim N\left(0, \sigma_e^2\right)$. Differently from traditional approaches, the BME approach can provide valuable insights, as the frequentist approach may result in an insufficient representation of the intrinsic uncertainty and variability associated with macroeconomic variables [100].

In accordance with established analytical frameworks and best practices in empirical research, a BME approach with a Cauchy distribution is a specialized hierarchical modelling approach, often used to improve model robustness or to impose weakly informative priors allowing for heavy tails. In fact, it is usual to choose in empirical studies a normal distribution N(0, 10) for the β-coefficients and a half-Cauchy distribution C(0, 5) for the error terms, thereby considering only positive values for the standard deviations that cannot be negative. By employing a small-scale parameter, half-Cauchy distribution is more informative, as it imposes a stronger constraint towards zero. It avoids the issues associated with improper priors and the pitfalls of inverse-gamma priors, which can place too much mass away from zero when the variance is small. As a result, this model setting avoids overfitting when the variance is small and yields proper posterior distributions even in small samples with few groups, providing robustness against outliers in the data compared to other probability distributions, particularly when used in the context of random effects. These choices are thus motivated by the need to enhance flexibility in parameter estimation and to mitigate the effects of potentially overly stringent prior assumptions [101, 102]. In other words, this reflects a common strategy in applied analysis by using distributions that are flexible and weakly informative while still providing enough structure of parameters to stabilize estimations and avoid unrealistic extremes [103]. This means that this setting of the prior reflects some regularization without strongly influencing the posterior when the data are sufficiently informative, thereby making the model less sensitive to misspecification

of the prior.

The BME approach provides valuable advantages in controlling for unobserved factors and effectively addressing challenges related to heteroscedasticity and endogeneity. It is consistent in conducting subgroup analyses and in providing posterior probability distribution for each estimated parameter, allowing for evaluating the likelihood of a regressor impact on the dependent variable. The BME is a more flexible computational approach. It can handle complex models and small samples by borrowing strength through priors, with posterior results having a direct probabilistic interpretation. These results are not shown here to avoid overloading the analysis but may be requested. Therefore, this analysis implemented the BME approach to evaluate the robustness of the FE estimates.

Finally, additional specification tests were computed over the models. In FE models, to account for potential heteroskedasticity, autocorrelation, and cross-sectional dependence, robust standard errors were implemented [104–106]. In BME models, specification tests include the variance analysis—the error variance (σ_e^2) and random variance across countries (σ_u^2). According to Hox [107], when ($\sigma_e^2 < \sigma_u^2$), the modelling is adequate to capture the specific characteristics of each cross-sectional unit [108]. Coefficients result in statistical significance when their 95% credible interval does not include zero.

Furthermore, Monte Carlo standard errors (MCSE) are assessed. An MCSE value below 0.07 can be evaluated as suitable, while a value under 0.05 can be considered optimal [109]. The acceptance rate should fall within the optimal range (0.2–0.8). A higher minimum efficiency value confirms that the Markov chain Monte Carlo has fully converged. The convergence rate should be strictly close to one.

The latest released version of the open-source statistical software Gretl was used to estimate FE models. While the BME models were developed by training artificial intelligence (AI) and exploiting the potential of Gemini 3 Pro, suitable for advanced math computations and programming analysis, which has employed 1,000 standard iterations for model. Python code outputs are not shown here to avoid overloading the analysis but may be requested.

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 $\ln(1 + x)$ for series with negative values was used.

2.4. 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 do not exhibit an excessive statistical associations among them. However, an approach implementing robust standard errors was also used to prevent a possible multicollinearity bias, as several correlations exceed the threshold encompassing modest correlations for $\rho < 0.3$.

Table 1. Main statistics and description of the variables.

Variables	Main Statistics			Descriptions
	μ	σ_w	σ_b	
FI	44,470	33,830	43,840	Net foreign direct investment and foreign portfolio investment (USD millions)
ODA	11,060	14,750	803.4	Net official development assistance and official aid received (USD millions)
REM	37,460	30,040	38,340	Personal remittances received (USD millions)
FD	50.80	9.636	29.18	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)
GFC	38,481	28,408	53,543	Gross fixed capital formation (USD millions)
OPEN	71.99	13.46	20.56	Sum of exports and imports of goods and services (GDP %)
URB	17,776	44,730	16,523	Number of people living in urban areas (thousands)
GC	42.82	3.203	8.444	Governance climate index (%)
HC	7.441	0.916	2.159	The mean of years of schooling (years)

Table 2. The correlation matrix.

	FI	ODA	REM	FD	EXC	INT
FI	1.000					
ODA	-	1.000				
REM	-	-	1.000			
FD	0.308***	0.652***	0.499***	1.000		
EXC	−0.002	0.109	0.211***	0.099	1.000	
INT	0.052	−0.274***	−0.017	−0.126*	0.025	1.000
INF	−0.127*	−0.165**	0.019	−0.231***	0.586***	0.149**
GFC	0.718***	0.129*	0.073	−0.034	−0.173**	0.096
OPEN	−0.267***	−0.134*	−0.057	0.218***	−0.172**	0.059
URB	0.353***	0.326***	0.234***	−0.169**	−0.095	−0.146**
GC	0.405***	0.112	0.082	0.630***	−0.343***	0.021
HC	0.465***	0.196***	0.056	0.295***	−0.018	0.253***
	INF	**GFC**	**OPEN**	**URB**	**GC**	**HC**
INF	1.000					
GFC	−0.413***	1.000				
OPEN	0.025	−0.441***	1.000			
URB	−0.320***	0.687***	−0.652***	1.000		
GC	−0.562***	0.365***	0.230***	−0.026	1.000	
HC	0.133*	0.155**	0.163**	−0.305***	0.307***	1.000

Note: (***) significance at α = 0.01; (**) significance at α = 0.05; (*) significance at α = 0.10.

Especially, the correlation between CI and GFC, which is quite high. However, this result can be interpreted as in line with the endogenous growth theory and the expectation that foreign capital inflows are more sensitive to higher infrastructural capital endowments. The domestic capital improves the ability to produce and increase efficiency in different sectors of the economy. When the GFC level arises, this indicates economic confidence in attracting more foreign capital.

3. Results and Discussion

The results of regression are reported in **Table 3** below (Models 1–6). The findings show that FI do not benefit from a higher FD (Models 1 and 2). FD shows a significant and negative impact on FI, suggesting that higher foreign capital perhaps require well-developed and functioning financial systems to bring effective benefits to host-countries [110–113].

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

	FI		ODA		REM	
	1[(a)]	2[(c)]	3[(a)]	4[(b)]	5[(b)]	6[(c)]
FD	−4.082*** (1.241)	−4.082*** (1.410)	3.073 (1.747)	3.073 (2.418)	−2.197 (2.314)	−2.197 (2.747)
EXC	0.331 (0.260)	0.331 (0.193)	−0.773** (0.296)	−0.773 (0.427)	−0.088 (0.481)	−0.088 (0.229)
INT	−0.130 (0.093)	−0.130 (0.085)	0.020 (0.120)	0.020 (0.221)	0.135 (0.115)	0.135* (0.067)
INF	0.138 (0.164)	0.138 (0.111)	−0.590** (0.206)	−0.590* (0.290)	0.281 (0.217)	0.281*** (0.070)
GFC	1.352*** (0.160)	1.352*** (0.172)	0.192 (0.200)	0.192 (0.310)	0.330 (0.255)	0.330 (0.214)
OPEN	1.002** (0.324)	1.002* (0.501)	0.066 (0.332)	0.066 (0.310)	−0.801 (0.542)	−0.801*** (0.269)
URB	−0.527 (0.427)	−0.527 (0.472)	0.124 (0.606)	0.124 (1.064)	−1.158** (0.578)	−1.158*** (0.267)

Table 3. *Cont.*

	FI		ODA		REM	
	1[(a)]	**2**[(c)]	**3**[(a)]	**4**[(b)]	**5**[(b)]	**6**[(c)]
FD x GC	2.150** (0.877)	2.150*** (0.577)	−4.962*** (1.084)	−4.962*** (0.973)	−0.697 (1.339)	−0.697 (1.687)
FD x HC	1.701* (0.847)	1.701 (1.063)	1.920 (1.358)	1.920 (2.883)	2.531 (1.861)	2.531 (2.112)
Constant	yes	yes	yes	yes	yes	yes
Time-trend	yes	yes	yes	yes	yes	yes
Standard error	0.516		0.647		0.508	
Log-likelihood	−127.3		−163.5		−119.9	
Heteroskedasticity (*p*-value)	(0.002)		(0.000)		(0.000)	
Autocorrelation (*p*-value)	(0.139)		(0.003)		(0.000)	
Cross-sect. depend. (*p*-value)	(0.000)		(0.345)		(0.001)	
No. of Observations	182.0		177.0		176.0	
LSDV-R^2	0.835		0.789		0.909	

Note: (***) significance at α = 0.01; (**) significance at α = 0.05; (*) significance at α = 0.10. Standard errors by: (a) Beck and Katz; (b) Arellano; (c) Driscoll and Kraay.

However, the overall effect is mitigated by the positive and significant effects of the interaction terms with GC and HC. For higher GC and HC, the negative effect is reduced or may reverse. Especially, the effect of the interaction term with GC appears to be even more significant in the robust Model 2 [45, 87, 114, 115].

Furthermore, the positive and significant interaction term (FD × GC) indicates that the institutional quality is a crucial driver. This means that better financial development attracts more foreign investment, primarily in contexts with a sounder governance climate. Therefore, these findings tend to support H1 and H2. By controlling for excluding Israel and sub-sampling for before and after the 2011 "Arab Springs" riots, while no longer showing any significance, FD continues to show a negative impact on FI (**Table 4**, Models 1 and 2).

Table 4. Fixed-effects models excluding Israel, robust standard errors in brackets.

	FI		ODA		REM	
	1[(a, c)]	**2**[(b, d)]	**3**[(b, c)]	**4**[(a, d)]	**5**[(b, c)]	**6**[(b, d)]
FD	−1.784 (2.125)	−3.063 (3.715)	1.575 (3.517)	−2.622 (2.985)	−4.234** (1.447)	−7.050** (2.752)
EXC	2.032** (0.711)	0.537* (0.276)	−0.856** (0.327)	−0.587 (0.908)	0.513 (0.908)	0.668** (0.188)
INT	0.018 (0.094)	0.079 (0.165)	−0.088 (0.063)	0.793** (0.352)	0.049 (0.098)	0.043 (0.163)
INF	0.256 (0.165)	0.487 (0.299)	−0.391*** (0.095)	−1.175*** (0.394)	0.338** (0.137)	−0.354 (0.185)
GFC	1.626*** (0.255)	0.697 (0.500)	0.471 (0.361)	−0.612 (0.647)	0.056 (0.223)	0.503 (0.670)
OPEN	1.257** (0.510)	−1.398*** (0.368)	0.606 (0.527)	−2.151** (0.851)	−0.456 (0.558)	−0.884 (0.461)

Table 4. *Cont.*

	FI		ODA		REM	
	1[a, c]	**2**[b, d]	**3**[b, c]	**4**[a, d]	**5**[b, c]	**6**[b, d]
URB	0.589 (1.545)	−1.049 (0.955)	−0.828 (2.823)	0.146 (1.329)	−1.585 (2.370)	−0.879 (1.031)
FD × GC	0.124 (0.954)	0.125 (0.942)	−0.120 (2.067)	0.913 (1.708)	−4.074* (1.811)	6.213** (2.293)
FD × HC	2.066 (1.729)	1.876 (3.480)	−1.643 (2.785)	0.148 (3.405)	8.076*** (2.387)	2.873 (1.903)
Constant	yes	yes	yes	yes	yes	yes
Time-trend	yes	yes	yes	yes	yes	yes
Standard error	0.571	0.254	0.454	0.520	0.494	0.354
Log-likelihood	−73.52	8.157	−51.81	−44.86	−55.78	−14.15
Heteroskedasticity (*p*-value)	(0.063)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Autocorrelation (*p*-value)	(0.222)	(0.011)	(0.000)	(0.004)	(0.000)	(0.000)
Cross-sect. depend. (*p*-value)	(0.003)	(0.443)	(0.949)	(0.008)	(0.831)	(0.503)
No. of Observations	98.0	64.0	99.0	73.0	93.0	63.0
LSDV-R^2	0.819	0.948	0.904	0.844	0.935	0.922

Note: (***) significance at α = 0.01; (**) significance at α = 0.05; (*) significance at α = 0.10. Standard errors by: (a) Driscoll and Kraay; (b) Arellano. Controlling for: (c) Before "2011"; (d) After "2011".

ODA inflows benefit from a higher FD, showing positive but non-significant impacts in both Models 3 and 4 in **Table 3**, hence there is no statistically significant evidence that FD can increase ODA inflows. However, the overall effect of FD is mitigated by the significant negative effect of its interaction term with GC. By controlling for excluding Israel and sub-sampling for before and after the 2011 "Arab Springs" riots, although non-significant effects emerge for FD and its interaction terms with GC and HC, the effects shown before and after 2011 are different (**Table 4**, Models 3 and 4).

Before 2011, FD has shown a positive impact, but both interaction terms have shown negative effects, perhaps indicating that unsound governance and inadequate human capital have negatively contributed to creating inefficiencies in financial systems [36]. While, after 2011, FD has shown a negative impact, and both interaction terms' effects are positive, perhaps indicating that even if there was a deterioration of financial systems' condition, the benefit brought by advancements in the governance climate and human capital formation then contributed positively and in part to mitigating the inefficiencies in financial systems [116].

The reasons for these mixed findings may be several. Countries cannot freely use international aid, which is instead intended for structural upgrading. As a result, countries that receive aid are often economically weak and politically unstable, with underdeveloped financial systems. Moreover, aid may also crowd-out domestic investment and government spending.

Therefore, these results do not tend to support H1, but they tend to support H2. In fact, a significant and negative interaction term (FD × GC) suggests that in contexts with higher institutional quality, the already weak positive relationship between FD and aid inflows is further reduced. In other words, this result may imply that aid is less tied to financial development in MEDA countries or that international donors are less likely to provide aid in contexts perceived as having an underdeveloped financial system.

Finally, REM inflows do not benefit from a higher FD and show non-significant and negative impacts in both Models 5 and 6 in **Table 3**. However, excluding Israel from the sample and controlling for before and after the 2011 "Arab Springs" riots, FD arises with a significant and negative impact, but it is widely mitigated by the positive and significant

effect of the interaction term with GC, after the 2011 riots, and the effect of the interaction term with HC, before 2011 riots (**Table 4**, Models 5 and 6). Therefore, these findings tend to support H1 and H2. Overall, results have highlighted that higher REM inflows, which increase the disposable income of households in recipient countries, require well-functioning financial systems to positively impact domestic aggregate demand and to enable effective and rapid cross-border transfers [117, 118].

The study has also emphasized the importance of considering control factors when analyzing the CI-FD nexus, because these macroeconomic variables are pivotal in the literature and contribute to explaining CI, hence, it has also been necessary to consider them [119–121]. The domestic investment, proxied by the gross fixed capital (GFC), is an important indicator of how more domestic investment can make countries more attractive to CI. In fact, domestic infrastructural capital contributes to a country's development and to creating a sustainable institutional and business environment [72, 122].

Openness (OPEN) is expected to have mixed effects. Generally, more openness may indicate more foreign CI to the host-country [75–77]. Market size, proxied by people living in urban areas (URB), is also an important driving factor, and the greater the urban agglomerates, the better chance there will be more CI to the host-country [82]. Moreover, the financial stability variables, such as inflation (INF), interest rate (INT), and exchange rate (EXC), have shown different coefficients and impacts. This may be due to the low level of MEDA countries' financial development, as a cause of negative macroeconomic backlash effects on the economy [66, 69, 71].

Finally, post-estimation tests justify the suitability of the approach with robust standard errors for all models in **Tables 3** and **4**. Particularly, in **Table 3**, Models 1, 3, and 5, respectively, control for heteroskedasticity but not cross-sectional dependence; heteroskedasticity but not autocorrelation; and heteroskedasticity and autocorrelation but not cross-sectional dependence. While, Models 2, 4, and 6, respectively, implement robust standard errors to consider the cross-section dependence, autocorrelation, and cross-sectional dependence. Additionally, the moderating effects of GC and HC on the CI-FD nexus are reported in the following **Table 5**. Therefore, the average marginal net-effects on CI of FD are given by the combination of FD-coefficient plus the coefficient of interaction terms (FD × GC and FD × HC) multiplied by the representative values at the means of GC and HC. The results show that GC significantly moderates the effects of FD on all forms of CI in the sampled MEDA transitional economies. While HC significantly moderates the effects of FD only for ODA and REM before "2011". These results have pointed-out that GC and HC can enhance or mitigate the positive or negative effect of FD on foreign CI, therefore the findings support our initial hypotheses.

Table 5. The average marginal net-effects.

	FI	ODA	REM	
			Before "2011"	After "2011"
$\beta_{FD} + \beta_{FD\times GC}\times \mathrm{GC}\mu$	4.000*** (0.465)	−15.58*** (1.073)	−19.61*** (0.517)	15.69*** (1.529)
$\beta_{FD} + \beta_{FD\times HC}\times \mathrm{HC}\mu$	−0.511 (0.439)	7.104*** (0.496)	11.66*** (1.611)	−0.891 (0.544)

Note: (***) significance at α = 0.01; (**) significance at α = 0.05; (*) significance at α = 0.10.

Countries with better GC tend to achieve more stable macroeconomic conditions and more durable development, contributing to enhanced FD [40, 85, 86, 123–125]. Therefore, in countries with moderate-to-high governance quality and human capital, financial development substantially can enhance foreign investment inflows, or that as financial systems and governance improve, countries can rely less on concessional external finance, and that better-governed and financially developed systems can facilitate formal remittance channels and increase recorded inflows.

Robustness Check

The FE model is mostly employed to control for fixed factors across different countries. This makes it particularly suitable for datasets characterized by time-series with high

stability over time. On the other hand, the BME approach offers enhanced reliability, as it concurrently addresses fixed and random effects. As a result, BME models are not only well-suited for panel datasets, but they also allow for a more complete analysis of country-specific characteristics, overcoming the limitations of traditional models.

The significant interaction terms for GC and HC shown in **Tables 6** and **7** confirm their meaningfulness as moderators in the CI-FD nexus. Overall, the Bayesian estimates suggest that results are aligned with those from the FE models and offer additional insights, thereby providing a robustness check on the previous outcomes. In particular, the results from the average marginal net-effects shown in **Table 8** and calculated for the statistically significant interaction terms in the models confirm, with the same signs, the results shown in **Table 5**. Therefore, (i) governance climate plays a central role in mediating financial development for foreign investment inflows; (ii) both governance climate and human capital formation, instead, are pivotal in mediating financial development for international aid inflows; (iii) for remittance inflows, the moderating effects of governance climate and human capital are crucial, showing statistically significant moderating effects on financial development both before and after "2011", when controlling for the sub-sample excluding Israel.

Table 6. Results from the Bayesian mixed-effects models.

	FI				ODA				REM			
	Mean	**Std. Dev.**	**MCSE**	**[95% Cred. Int.]**	**Mean**	**Std. Dev.**	**MCSE**	**[95% Cred. Int.]**	**Mean**	**Std. Dev.**	**MCSE**	**[95% Cred. Int.]**
FD	−2.412**	1.080	0.043	[−4.561, −0.313]	1.805	1.204	0.052	[−0.536, 4.094]	−3.202**	1.415	0.070	[−5.928, −0.471]
EXC	0.136	0.119	0.010	[−0.082, 0.371]	−0.351	0.213	0.031	[−0.874, 0.029]	−0.032	0.247	0.041	[−0.584, 0.456]
INT	−0.147	0.095	0.004	[−0.332, 0.038]	0.076	0.120	0.005	[−0.156, 0.313]	0.123	0.106	0.005	[−0.094, 0.329]
INF	0.120	0.142	0.006	[−0.157, 0.395]	−0.492**	0.181	0.008	[−0.844, −0.132]	0.328**	0.150	0.007	[0.036, 0.631]
GFC	1.149**	0.135	0.006	[0.876, 1.402]	0.193	0.163	0.006	[−0.124, 0.515]	0.311**	0.152	0.006	[0.010, 0.610]
OPEN	1.017**	0.253	0.006	[0.510, 1.514]	0.150	0.299	0.007	[−0.451, 0.736]	−0.701**	0.266	0.007	[−1.229, −0.191]
URB	−0.618	0.358	0.025	[−1.431, 0.020]	0.418	0.389	0.024	[−0.316, 1.220]	−0.107	0.457	0.040	[−1.026, 0.811]
FD × GC	1.979**	0.823	0.028	[0.373, 3.544]	−3.786**	0.858	0.034	[−5.502, −2.140]	0.335	1.061	0.044	[−1.738, 2.487]
FD × HC	0.263	0.515	0.026	[−0.725, 1.325]	2.212**	0.682	0.034	[0.901, 3.566]	2.487**	0.680	0.047	[1.215, 3.862]
Constant	yes				yes				yes			
σ_e^2	0.275				0.434				0.266			
σ_u^2	0.667				2.559				6.437			
No. of Groups	10.0				10.0				10.0			
No. of Observations	182.0				177.0				176.0			
Acceptance Rate	0.736				0.731				0.736			
Efficiency (min)	25.86				22.84				35.59			
Convergence Rate	1.030				1.049				1.098			

Note: (**) significance at the 95% credible interval.

Table 7. Results excluding Israel and controlling for before and after "2011" with BME models.

	Before "2011"			**After "2011"**		
	CI	**ODA**	**REM**	**CI**	**ODA**	**REM**
FD	−0.383	0.173	−3.163	−2.236	−2.857	−4.718**
EXC	0.079	0.027	0.037	0.129	−0.275	0.432
INT	−0.031	−0.014	0.042	0.050	0.664**	0.016
INF	0.195	−0.337**	0.265	0.523**	−0.931**	−0.346
GFC	1.199**	0.516**	−0.431**	1.004**	−0.062	0.616
OPEN	1.088**	0.745**	−0.392	−0.669	−1.739**	−0.870
URB	−0.279	−0.010	1.459**	−0.679	0.393	−0.844
FD × GC	−0.112	0.617	−2.230	1.748	2.389	4.883**
FD × HC	0.994	−0.719	5.061**	−0.057	0.130	1.419
Constant	yes	yes	yes	yes	yes	yes
σ_e^2	0.352	0.217	0.262	0.073	0.306	0.131
σ_u^2	0.220	1.911	7.736	2.956	3.717	4.125

Table 7. *Cont.*

	Before "2011"			After "2011"		
	CI	**ODA**	**REM**	**CI**	**ODA**	**REM**
No. of Groups	9.0	9.0	9.0	9.0	9.0	9.0
No. of Observations	98.0	99.0	93.0	64.0	73.0	63.0
Acceptance Rate	0.790	0.794	0.797	0.820	0.820	0.823
Efficiency (min)	6.910	23.54	28.75	12.16	22.65	18.36
Convergence Rate	1.012	1.038	1.082	1.410	1.173	1.137

Note: significance at 95% credible interval.

Table 8. The average marginal net-effects from BME models.

	CI	**ODA**	**REM**	
			Before "2011"	**After "2011"**
$\beta_{FD} + \beta_{FD\times GC}\times \mathrm{GC}\mu$	5.026*** (0.428)	−12.42*** (0.819)	−11.58*** (0.283)	13.16*** (1.202)
$\beta_{FD} + \beta_{FD\times HC}\times \mathrm{HC}\mu$	−1.860*** (0.068)	6.449*** (0.571)	11.66*** (1.611)	−1.676*** (0.269)

Note: (***) significance at α = 0.01; (**) significance at α = 0.05; (*) significance at α = 0.10.

Consequently, MEDA transitional economies should undertake institutional reforms to continue upgrading their institutional and business environments. This indicates that a better institutional and business environment can contribute to mitigating the impacts of a less developed financial system, ultimately highlighting the essential role of regulatory frameworks in fostering foreign capital inflows.

Finally, the efficiency and convergence statistics show that the error variance (σ_e^2) is substantially lower than the random variance between countries (σ_u^2) in all models in **Tables 6** and **7**, excepting Model 1 where the Israel exclusion seems to have made the MEDA sample more uniform. This confirms that the differences between countries are important in the analysis. The MCSE for the coefficients shown in **Table 6** are considerably smaller than the standard deviation. This result is a clear confirmation of the stability in the Monte Carlo Markov chains. In other words, this result confirms that the Markov chains converged effectively, ensuring that estimates are reliable and consistent. The acceptance rates are recorded within the optimal range in all models. The minimum efficiency value is high in all models, supporting that the Markov chains have fully converged. The convergence rate for most models is good. The higher values shown in **Table 7** for the models after "2011", while remaining within an acceptable range, are mainly due to the shortness of the time-series.

4. Conclusions

4.1. Concluding Remarks and Contribution

The study has examined the impact of financial development on foreign capital inflows with a focus on the moderating effects of institutional quality and human capital formation, respectively proxied by a composite index of new conception such as the governance climate index by Scalamonti[83], and by the mean of years of schooling from the HDI-UNDP, across the MEDA region from 2000 to 2019. Employing a novel overall governance climate index and human capital as moderator factors in the relationship between capital inflows and financial development in MEDA transitional economies, the work has extended the existing body of literature on the CI-FD nexus in developing countries.

Results from fixed-effects and Bayesian mixed-effects models have shown that the association between financial development and the different forms of capital inflows is not uniform. However, the results have also shown that the financial development of MEDA host-countries contributes to attracting capital inflows, especially in relation to foreign investment. The moderating effects of governance climate and human capital are significant. The average marginal net-effects (**Tables 5** and **8**) of financial development on foreign capital inflows show that governance climate and

human capital improve or mitigate the effects of financial development in the models, thereby playing a crucial role in attracting more foreign capital inflows into the MEDA region.

Empirical results confirm that financial development has a statistically significant negative association with foreign investment and remittance inflows. However, its effect is substantially attenuated, and in several specifications reversed by interaction terms with governance climate and human capital formation. Overall, the findings have highlighted that institutional quality and human capital formation are key drivers influencing the impact of financial development on different types of capital inflows. Concluding, the findings have pointed-out that financial development improves foreign capital inflows by enhancing the availability of funds and resources across the MEDA region, considering the most significant macroeconomic variables considered. Furthermore, results also highlight that transitional economies with a sounder governance climate and more skilled human capital can have a relatively better financial development.

In advancing the existing body of literature, this study has provided the following contributions. Firstly, it represents a novel analysis of the mechanisms through which financial development influences the governance quality and both influence foreign capital inflows in the MEDA region.

Considering an innovative composite governance index, it adds nuance to how governance shapes foreign capital inflows. Secondly, the study is the only one that analyzes the moderating effect of governance quality and human capital with a focus on financial development across the MEDA region.

As a result, analyzing the moderating effects, it contributes to better understanding the institutional and business environment's quality in economic development theories. Thirdly, the study is inter- and trans-disciplinary, as it integrates different theoretical frameworks expanding the boundaries of traditional capital mobility theories. Finally, the study reveals that the relationship between financial development and foreign capital inflows depend on governance [126]. Overall, the study furthered understanding of the links between foreign capital inflows and financial development in the MEDA region, ultimately providing useful information for economic actors in fostering broader regional economic development.

4.2. Policy Implications

MEDA policymakers should enhance their financial markets and regulatory frameworks attracting more foreign capital inflows, prioritizing information transparency, market efficiency, and property rights [127]. Furthermore, promoting financial interconnections could further increase the attractiveness of MEDA countries. Therefore, reducing information gaps, facilitating cross-border capital flows, and strengthening foreign investors' confidence through sound governance and effective policies are crucial political commitments necessary to the development of the MEDA region.

To enhance capital inflows, MEDA governance should focus on reducing bribery and improving the role of law and policy commitment. Strengthening institutions and labor regulations is also vital for regional stability. Structural adjustment policies should expand regulatory frameworks and enhance the legal systems to increase stakeholder protection. Particularly, promoting public-private agreements may improve infrastructural endowment, while investing more in educational systems for more skilled workers and effective healthcare could contribute to boosting productivity and competitiveness, making the MEDA region more attractive to foreign investors, especially European ones [128, 129]. A conducive institutional and business environment can be fostered only with sound policies ensuring operational efficiency in the markets, for instance, enhancing investment monitoring, capital allocation, liquidity, and regulatory supervision through a close adherence to sound governance practices within countries. Finally, MEDA policymakers should also consider environmental concerns and sustainable development goals in their policies promoting capital inflows [130].

4.3. Limitations and Suggestions

Even though the study has offered significant insights, it is crucial to recognize some of its limits. The study focused on some macroeconomic and institutional factors. Future research could consider more control variables to provide a more thorough examination of the impacting factors. Therefore, future research could explore other dimensions, such as environmental and social factors, or the banking system [131, 132], that may contribute to affecting financial development in transitional economies. Alternatively, although

less reliable, further indicators could be used as a proxy variable for financial development, such as the stock market capitalization of listed companies [40, 41, 117, 133–135].

Furthermore, the dependent variable CI with one order of lags on the right side of the model equation was not included in FE models to avoid a possible endogeneity concern and to keep the specification simpler. Lagged foreign capital inflows can impact foreign capital mobility in a self-reinforcing manner [11, 41, 136]. When the institutional and business environment of the host-country is sound or at least satisfactory, capital mobility will tend to increase, and new foreign capital will be attracted. Using this model specification, more suitable dynamic-panel estimators could be effectively implemented in future studies, considering the endogeneity, and controlling for reverse causality that may affect estimates when the dependent variable with one order of lags is used as a regressor. Additionally, one could consider the individual governance indicators to observe the contribution of each. Finally, results may not be generalized to different geographical areas due to the peculiarities distinguishing MEDA countries' development-paths.

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Conflicts of Interest

The author declares no conflict of interest.

AI Use Statement

During the preparation of this work, the author used Gemini 3 Pro to compute Bayesian mixed-effects models. After using this AI tool, the author consequently reviewed and edited the content as needed and takes full responsibility for the outcomes.

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