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A sectoral analysis of institutional quality and foreign direct investment in Mena countries: does sector type matter?

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Abstract
We examine the institutional quality (IQ) and foreign direct investment (FDI) nexus across 10 Middle Eastern and North African (MENA) countries from 1990 to 2018 based on disaggregated FDI data in the primary (extractive), secondary (manufacturing) and tertiary (service) sectors. There is prima facie evidence that IQ plays an important role in determining FDI at the aggregate level in the MENA region. Once we use sectoral FDI flows data, IQ is irrelevant to FDI inflows into the primary sector. Four aspects of IQ: rule of law index, accountability index, property rights and the aggregate IQ index, however, significantly impact secondary and tertiary FDI inflows into the MENA region, while corruption only plays a significant part in reducing FDI in the tertiary sector. Improving IQ is thus key to attracting more manufacturing and service sector FDI.

Keywords Institutional quality · Sectoral FDI · MENA region · 2SLS · Multiple imputation

1 Introduction

Foreign direct investment (FDI) has been viewed as one of the factors that brings transfer technology and skills; increasing competition; jobs; rising domestic investment; integration into global markets; and, ultimately, contributes to economic

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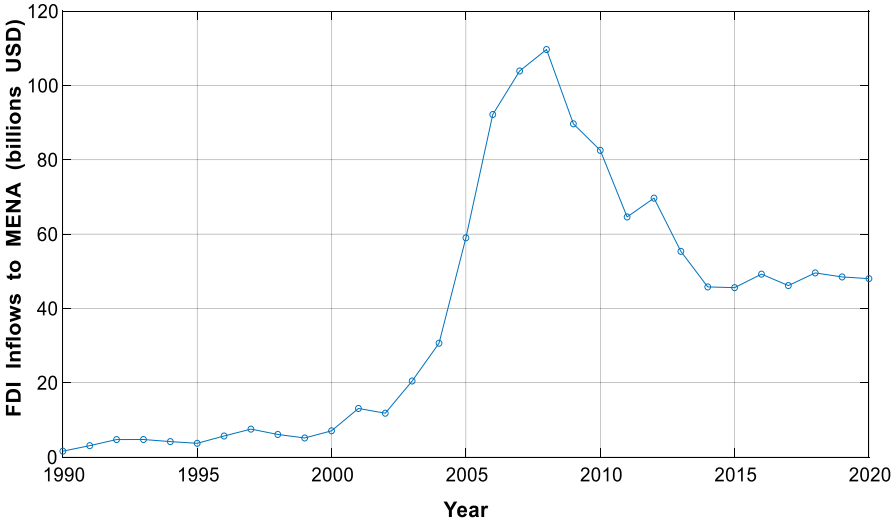

Fig. 1 FDI inflows to MENA (billions USD). *Source*: UNCTAD (2021)

growth and development in host countries (Anwar et al., 2022; Blomström & Kokko, 1999; Lipsey, 2002).

However, FDI inflows are heterogeneous across economies and industries within the same country. According to the United Nations Conference on Trade and Development, developing economies attracted more than 60 percent of global FDI inflows in 2020 for the first-time while the world's developed economies began to receive a reduced share and, by 2020, were the recipients of only about 33 percent of global FDI. In same period, Africa accounted for less than 10 percent of these total inflows (UNCTAD, 2021). The Middle East and North Africa (MENA) region, as a recipient of FDI, has witnessed a dramatic decrease in FDI over the last decade (Fig. 1). For instance, FDI inflows into MENA region remained at a low level, less than 8 billion US dollars a year,[1] until 2001 when it started to rise, reaching 103 billion dollars in 2008. Since then, FDI has continued to decline and by 2020 the region had attracted only 40 billion dollars. Even host countries in the region with abundant natural resources and low wages have not succeeded greatly in attracting FDI (Chan & Gemayel, 2004). Given such heterogeneities in the level of FDI inflows observed in the case of many developing economies, numerous strands of theoretical and empirical literature have been developed around the determinants of FDI – what factors make a firm decide to locate in a specific country – across the world (Blonigen, 2005; Kolstad & Wiig, 2012; Paul & Feliciano-Cestero, 2021). Dunning offered four different types of incentive that drive firms to engage in FDI activities: market-seeking,

[1] Please note that this paper uses the US billion (i.e. 1 billion = 1 thousand million) as opposed to the UK billion (1 million million).

resource-seeking, efficiency-seeking and strategic asset-seeking (Dunning & Lundan, 2008). Yet, while FDI literature has focused largely on economic factors, a significant amount of scholarship has assessed the socio-political factors that affect it (R. G. Blanton & Blanton, 2012). Yu and Walsh (2010) and Burger et al. (2016) noted that FDI inflows are highly sensitive to political stability and institutional quality (IQ).

In this context, North (1990) was one of the first scholars to raise awareness of the influence of institutions on economic activity in general and on investment in particular. Since then, the literature on FDI determinants has shifted its attention towards the association between FDI and institutional factors (Bailey, 2018; Bénassy-Quéré et al., 2007; Daude & Stein, 2007; Gastanaga et al., 1998; Globerman & Shapiro, 2002; Sabir et al., 2019; Wei, 2000). Moreover, studies on determinants of FDI acknowledge its heterogeneous nature across sectors, and call for further research into the sectoral and sub-sectoral determinants of FDI (Blonigen, 2005). As a result, the recent strand of literature on the effect of institutions on FDI inflows underlined the importance of considering sectoral FDI by discussing how institutional variables impact on FDI flows in different sectors and industries (Ali et al., 2010; R. G. Blanton & Blanton, 2012; Doytch & Eren, 2014; Schulz, 2009; Staats & Biglaiser, 2012; Yu & Walsh, 2010).

Despite the increasing importance of IQ and its impact on FDI inflows in the MENA region, a common feature shared by most studies when exploring institutional determinants of FDI is an examination of the relationship between institutional factors and FDI relying on aggregate FDI data; only a few studies have used disaggregate FDI. In fact, to our knowledge, we were able to locate only one paper that implicitly explored the link between IQ and disaggregate FDI in the MENA region (Burger et al., 2016) – and this used only a single index (i.e. political instability) to capture IQ. As the decisions of foreign investors are generally based on a comprehensive range of aspects of IQ, focusing on a single aspect is likely to underestimate the importance of IQ in determining FDI (Ali et al., 2010; Asamoah et al., 2016; Kurul & Yalta, 2017). Following on from these insights, this paper's key objective is to examine the impact of IQ in the MENA region on FDI inflows at the aggregate (total) as well as disaggregate (sectoral) level over the period 1990–2018.

Our paper contributes empirically to the extant literature on IQ and FDI in several ways:

(1) To the best of our knowledge, our study is one of the first that has employed a new approach in measuring IQ (i.e. the V-Dem dataset) in the FDI literature. We use a newly released IQ dataset from the Varieties of Democracy project (V-Dem) by choosing four measures that capture different but related aspects of IQ – namely, rule of law, property rights, corruption and accountability – to test their individual effects on the attractiveness of FDI in the MENA region. Undertaking such an approach would allow policymakers in the MENA region to choose which institutional reforms to focus on based on comprehensive dimensions of IQ.

(2) This is the first study to distinguish the effects of IQ on the components of total FDI inflows – namely, FDI in primary, secondary (manufacturing) and tertiary (services) sectors for the MENA region – in order to investigate whether they vary across different sectors. This distinction in sectoral-level analysis provides clearer evidence than hitherto of how institutional variables affect FDI inflows at the specific sector level. This is particularly relevant in terms of attracting investment in the manufacturing and service sectors in order to reduce the region's high dependence on the natural resource sector.
(3) Our study differs from others in the sense that we address the missing-data problem in sectoral FDI inflow data, which is due to poor coverage by imputing missing data in country-level with at least one observation of sectoral FDI data using the multiple imputation (MI) method. Additionally, we use the instrumental variable (IV) approach, which provides consistent estimates as it solves the endogeneity problem between institutions and FDI.

We discover prima facie evidence that IQ plays an important role in determining FDI at the aggregate level in the MENA region. Once we use sectoral FDI flows data IQ is irrelevant to FDI inflows into the primary sector. Four aspects of IQ: rule of law index, accountability index, property rights and the aggregate IQ index, however, significantly impact secondary and tertiary FDI inflows into the MENA region, while corruption only plays a significant part in reducing FDI in the tertiary sector. Improving IQ is thus key to attracting more manufacturing and service sector FDI and lowering the region's economic dependence on natural resource-based products.

The rest of this paper is structured as follows. Section 2 contains a brief literature review to contextualise our research, whereas Sect. 3 presents a description of the data and methodologies. The empirical results are discussed in Sect. 4. Section 5 documents several robustness checks. Lastly, Sect. 6 concludes with discussion and policy implications based on the findings of the present research.

2 Prior literature

Given the importance of institutional determinants of FDI, the great body of empirical studies that has been devoted to explaining the influence of a country's IQ on its attractiveness for FDI inflows relies almost exclusively on aggregate indices of FDI.[2] Only a few studies have sought to investigate the impact of IQ on sectoral FDI in general and in the MENA region in particular. Below, we provide a brief overview of the studies on IQ and sectoral FDI.

The first serious discussions and analyses of IQ and sectoral FDI were presented by Ali et al. (2010), who analysed the impact of IQ on FDI inflows between 1981 and 2005 into primary, manufacturing and services sectors in a sample of 69 developed and developing countries. According to the authors, there is a significant difference between the institutional determinants of FDI in the three sectors. They

[2] See, among others: Anwar & Iwasaki (2022); Bailey (2018); Bénassy-Quéré et al.(2007); Daude & Stein (2007).

found that the inflows of FDI into the primary sector had no strong linkages with IQ variables. When it came to FDI inflows into the manufacturing and services sectors, however, the authors found that IQ mattered for FDI in manufacturing and, particularly, in the services sector. Yu and Walsh (2010) – like Ali et al. (2010) – held the view that there were differences between the institutional determinants of sectoral FDI. They found that better IQ attracted more secondary and tertiary FDI than primary FDI into an economy.

One of the most oft-cited studies is that of Asiedu (2002), who found that the inflows of FDI into the primary sector, particularly in the petroleum sector, were mainly not dependent on IQ variables (measured by political instability and expropriation risk) in the recipient economy. According to Asiedu (2002), the reason that IQ variables were less relevant for the petroleum sector than for others was that investment returns in this sector were profitable enough to more than compensate for the risk of political instability and expropriation. A similar observation was made by C. Li et al. (2017) and Witte et al. (2017); they reported, for instance, that IQ (as proxies by political instability and control of corruption) did not significantly affect greenfield FDI flows to the resource sector. Also, Blanco et al. (2019), conclude that political instability has no effect on primary sector. (2019) concluded that political instability had no effect on the primary sector. More recently, Paul and Jadhav (2020), Doytch (2021) and Jiang and Martek (2021) followed the same argument as Asiedu, and found that IQ factors appeared to have no significant contribution to FDI in the mining and energy sectors.

Conversely, Poelhekke and van der Ploeg (2013) provided evidence contradicting the above argument. They investigated the effect of natural resources on the different components of FDI (FDI in resource and non-resource sectors). Their study pointed out the positive effect of IQ on FDI in the resource sector. At the same time, the authors found no evidence that IQ had an impact on FDI in the non-resource sector. Similarly, Doytch & Eren (2014) found evidence that investment profile and democratic accountability tended to spur FDI in the primary sector (i.e. the agriculture sector). Lending further support to the findings of Poelhekke and van der Ploeg (2013) were those of Doytch (Doytch, 2015), who analysed how sectoral FDI inflows in South and East Asian economies responded to changes in business cycles. The author controlled for the quality of institutions by "democratic accountability", "anti-corruption", "government stability" and "investment profile". The study provided evidence that IQ produces an effect on FDI that depends on the sector involved. More specifically, FDI in the mining sector benefited from IQ while services FDI did not appear to benefit from it.

In contrast to the primary sector, Busse (2004) and Ramasamy & Yeung (Ramasamy & Yeung, 2010) demonstrated that the inflow of FDI into secondary (manufacturing) and tertiary (services) sectors was deeply influenced by IQ (as proxies by democratic rights and political risk). Kolstad and Villanger (2008) examined the host-country determinants of FDI flows into services as a whole, and in the major service industries, and found a positive association between IQ and FDI in the services sector. By considering "democracy" as a product of the proper functioning of IQ, Schulz (2009) argued that the link between democratic institutions and FDI inflows operated on the sectoral level. He analysed sectoral FDI inflows into 44

developing countries between 1993 and 2003. When accounting for different types of FDI, Schulz found that democracy had different effects on FDI: while it encouraged it in the secondary and tertiary sectors, it had no effect on it in the primary sector. A broadly similar point has also recently been made by Kucera and Principi (2014), who focused on FDI determinants at the aggregated and disaggregated level. They found that the positive effects of democracy on FDI for services were greater than those for manufacturing – particularly with regard to finance, insurance and information; negative effects were recorded for mining and oil and gas extraction. Barry (Barry, 2016) found that investors in extractive industries were generally less responsive to the presence of democratic institutions than those operating in manufacturing or services. Unlike Schulz (2009) and Kucera and Principi (2014), Hecock & Jepsen (Hecock & Jepsen, 2014) examined the political determinants of FDI across 15 Latin American countries from 1986 to 2006. They found, conversely, that FDI in the primary-resources subsector valued democratic institutions, as well as property-rights protection. In contrast, they found that FDI in the manufacturing sector tended to be the most volatile and attracted to less-democratic regimes. These latter results were confirmed in the study by S. L. Blanton and Blanton (2009) of US-based FDI.

At the national level, Shah et al. (2015) and Ahmad et al. (2018) investigated the short- and long-term impacts of IQ on sectoral-level FDI in Pakistan by using the ARDL technique. Their results confirmed that, in the long run, IQ attracted FDI in the manufacturing and service sectors while having no effect on IQ in the primary sector. By using a novel dataset on bilateral firm-to-destination overseas investment of Indian international firms, Saikia (Saikia, 2021) concluded that FDI in the manufacturing and service sectors was attracted by those countries with good institutions. Using both a case study of Costa Rica's investment-promotion activities and cross-national industry-level FDI analyses, Bailey & Warby (Bailey & Warby, 2019) contended that democracy and political stability had no effect on FDI in the manufacturing sector but that it was beneficial for the other FDI type that they investigated (i.e. the mining sector).

Interest in the sectoral analysis of FDI in the MENA region has been a recent phenomenon. While most studies have mainly considered the impact of IQ on aggregate FDI inflows,[3] there has been a very clear lack of studies on IQ and disaggregate FDI. We have been able to identify only one paper in this field of study that implicitly discusses the institutional determinants of sectoral FDI. Burger et al.(2016) used the fDi Markets data to examine how foreign investors' decisions in different industries (i.e. natural resources and energy, non-resource manufacturing, tradable services and non-tradable activities) responded to political instability (which is in the literature used as a proxy for IQ) in the MENA region during the period 2003–12. By using the Least Squares Dummy Variable Bias Corrected (LSDVC) estimation method, the authors argued that a country's political instability had different effects on FDI when accounting for different FDI types. Their study found that political instability was associated with significantly reduced FDI flows into the manufacturing and services sectors. By contrast, FDI flows into natural-resource sectors and

[3] For a review, see Dimitrova et al. (2020).

non-tradable activities appeared insensitive to political instability. Although Burger et al. (2016) successfully demonstrated that the impact of political instability on FDI flows was not the same across the four sectors, it had a limitation in terms of measurement. The question of measuring relates to the fact that their study used only a single indicator to capture IQ, which may be misleading in assessing its effect on determining FDI at aggregate and disaggregate level (Ali et al., 2010).

Despite the expanding literature on IQ–FDI linkages, however, there is limited evidence on the impact of IQ on FDI flows in the MENA region through sectoral linkages or sector-level FDI and, therefore, the present study aims to fill this research gap by testing the following research hypotheses:

H1: IQ has a positive influence on aggregate FDI flows into MENA countries.

H2: The effect of IQ on FDI flows differs across FDI sectors (i.e. primary, secondary and tertiary sectors) in MENA countries.

H2a: IQ has no effect on primary FDI flows into MENA countries.

H2b: IQ has a positive influence on secondary and tertiary FDI flows into MENA countries.

3 Empirical model, data, and methodology

3.1 Model

This paper aims to investigate the effect of IQ in host countries (MENA countries) on the level of aggregated (total) and disaggregated (sectoral) FDI flows into them. We estimate the following equations, similar to Ali et al. (2010):

$$FDI_{it}^{s} = \alpha_0 + \alpha_1 IQ_{it} + \alpha_2 X_{it} + \mu_i + \varepsilon_{it} \quad (1)$$

where:

- $\mathbf{FDI_{it}^{s}}$- refers to FDI flows (the "s" superscript corresponds to the primary, secondary and tertiary sectors, as well as the total FDI).[4]
- $\mathbf{IQ_{it}}$- is an indicator of IQ in the recipient country i at period t.
- $\mathbf{X_{it}}$- is a vector of other variables in country i at period t.
- $\boldsymbol{\mu_i}$- is a vector of country dummies used to control for global events that similarly influence all economies.

[4] Based on International Standard Industry Classification (ISIC), we classified FDI inflows into the following economic sectors: primary (petroleum, mining); secondary (food, fabricated metals, chemical, electrical, industrial machinery and transportation equipment); and tertiary (depository institutions [financial institutions – a 'depository institution' seems to be a (colloquial) US term for such bodies] and wholesale trade).

- The main parameter of interest is α_1 which shows us how the relationship between FDI flows and IQ variables varies by sector.

3.2 Methodology

It has been known from the literature that institutional variables it might be endogenous variable to FDI flow (Ali et al., 2010; Buchanan et al., 2012; Peres et al., 2018). When multinational corporations are placed in a host country, they may request better institutions that promote good governance. As such, there could be a feedback impact on the quality of institutions (Daude & Stein, 2007). We, therefore, address this problem by using the instrumental variable (IV/2SLS) method. Following Buchanan et al. (2012) and Peres et al. (2018), we use a set of dummy variables for legal origins and lagged values of the independent variables as instruments for institutional variables. Using these instruments has helped us to purge the institutional variables of their endogenous component.

3.3 Data

To test our hypotheses, we examined 10 MENA countries (Egypt, Iran, Jordan, Morocco, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, Tunisia, and Turkey) over a 29-year period from 1990 to 2018. Since this study investigated the impact of IQ on aggregate and disaggregate FDI flow, the main interest variables were total, primary, secondary and tertiary FDI as dependent variables and five IQ measures as a main independent variable. The descriptions and sources of all variables and their summary statistics are presented, respectively, in Table 1 and Table 2.

3.3.1 Dependent variables (aggregated and disaggregated FDI data)

The dependent variables deployed in this paper were net flows of FDI into the primary, secondary and tertiary sectors, as well as total FDI. The sources for these data came from Wright and Zhu (2018a)[5] and the International Trade Center website.[6] We measured FDI flows in two different ways. First, we used FDI as share of total GDP in order to account for country size and to normalize capital flow in terms of gross domestic product (GDP) in our baseline results. Second, as a robustness check, we used the natural log of net FDI flow (Q. Li, 2009) (see Table 1).

3.3.2 Independent variables (IQ data)

A variety of sources and measures of IQ exist in the literature.[7] However, we employed four measures of IQ from the Varieties of Democracy (V-Dem) dataset. We used V-dem for two reasons: (1) it provides annual data since 1789 for nearly all

[5] https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/2NDL6R.

[6] Free data available from https://www.investmentmap.org/investment/search.

[7] According to Asamoah et al. (2016) and Dimitrova et al. (2020), the IQ measures most widely used in the literature are the World Bank Governance Indicators (WGIs).

countries in the world and is freely available; and (2) the V-Dem project was built by numerous country experts and research assistants from all over the world, who had been involved in coding a new dataset that captured distinct features of institutions. "Most [experts] have lived in their countries of expertise for nearly thirty years, and at least 60 percent are nationals of that country" (Bergougui & Murshed, 2020; Lindberg et al., 2014, p. 162; Murshed et al., 2022). In terms of measuring IQ, empirical research on FDI and institutions offered two approaches. The first approach focuses mainly on the impact of a specific institutional aspect, such as rule of law or property rights on FDI (Acemoglu et al., 2008; Jadhav, 2012). The second approach investigates the impact of a composite institutional indicator, which is mostly constructed by computing the average of different dimensions of institutional variables (Ali et al., 2010; Buchanan et al., 2012; Daude & Stein, 2007; Wheeler & Mody, 1992). Following to Ali et al. (2010), Buchanan et al. (2012) and Daude and Stein (2007), Firstly, we selected four institutional variables from V-dem: rule of law index, accountability index, property rights, and corruption index. Next, to capture similar institutional dimensions, we built an IQ index based on the weighted average index of the four individual institutional variables (see Table 1).

3.3.3 Other independent variables

In order to avoid any potential omitted variable bias, we included in our core regression other independent variables that had been defined in the literature and were strongly associated with FDI: GDP per capita used as a proxy for the host-country market size (measured in US dollars at constant prices in 2010); GDP growth and population growth used as a proxy for market growth potential; trade openness, measured by the sum of import and export divided by gross domestic product (R. G. Blanton & Blanton, 2012); resource wealth, for which we employed adjusted net saving as a percentage of gross national income in order to capture a country's natural resource wealth; exchange rate – the index of real effective exchange rate; inflation – the inflation rate measured by the annual percentage change in consumer price index, which was used as a proxy of macroeconomic instability (R. G. Blanton & Blanton, 2012; C. Li et al., 2017); and school – the gross secondary-school enrollment ratio, which was used as a proxy for human-capital endowment (Doytch, 2021) (see Table 2).

3.4 Multiple imputation

Finally, after building the database for all study variables, we observed that the dependent variables have missing observations for a nontrivial proportion of the years from 1990 to 2018 and in most countries. Omitting these values might have deprived the study model of relevant information. Thus, we addressed missingness in the time series by using multiple imputation to estimate the missing values (Wright and Zhu, 2018a). After imputing the missing data, we were able to generate a balanced panel that contains 290 observations from 10 MENA countries, from 1990 to 2018.

Table 1 Variable descriptions and sources

Variables	Definition	Sources
Dependent variables		
Total FDI	Total FDI flows as a share of GDP	Wright and Zhu (2018b) and International Trade Centre (ITC) (InvestmentMap, 2021)
Primary FDI	Primary FDI flows as a share of GDP	
Secondary FDI	Secondary FDI flows as a share of GDP	
Tertiary FDI	Tertiary FDI flows as a share of GDP	
IQ variables		
Rule of law index	To what extent are laws transparently, independently, predictably, impartially, and equally enforced, and to what extent do the actions of government officials comply with the law? *Scale*: Interval, from low to high (0–1)	V-Dem Project Coppedge et al. (2021)
Accountability index	To what extent is the ideal of government accountability achieved? *Scale*: Interval, from low to high (0–1)	
Property rights	Do citizens enjoy the right to private property? *Scale*: Interval, from low to high (0–1)	
Corruption index	How pervasive is political corruption? *Scale*: Interval, from low to high (0–1)	
IQ index	The weighted average index of the four individual institutional variables	
Control variables		
GDP per capita (log)	GDP per capita is gross domestic product divided by midyear population. Data are in constant 2010 U.S. dollars	World Bank (2021)
GDP growth	Annual percentage growth rate of GDP at market prices based on constant 2010 U.S. dollars	
Population growth	Annual population growth rate	
Trade openness (log)	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product	
Resource wealth	Adjusted Net Saving (ANS) as a percentage of Gross National Income (GNI)	
Exchange rate (log)	Real effective exchange rate is the nominal effective exchange divided by a price deflator or index of costs	

Table 1 (continued)

Variables	Definition	Sources
Inflation (log)	Inflation is measured by the consumer price index	
School	Gross secondary-school enrollment ratio	

Table 2 Summary statistics

Variable	Mean	Std. Dev	Min	Max	Obs
Dependent variables					
Total FDI	0.045	0.188	−0.805	1.27	290
Primary FDI	0.007	0.026	−0.118	0.177	290
Secondary FDI	0.011	0.047	−0.181	0.362	290
Tertiary FDI	0.027	0.143	−0.693	0.918	290
IQ variables					
Rule of law index	0.424	0.213	0.037	0.846	290
Accountability index	−0.34	0.747	−1.501	1.476	290
Property rights	0.659	0.166	0.283	0.932	290
Corruption index	0.588	0.206	0.257	0.935	290
IQ index	0.333	0.244	−0.075	0.886	290
Control variables					
GDP per capita (log)	10.739	2.766	7.721	18.304	290
GDP growth	0.046	0.041	−0.074	0.262	290
Population growth	0.025	0.025	−0.045	0.175	290
Trade openness (log)	4.243	0.353	3.375	5.007	290
Resource wealth	0.096	0.127	−0.262	0.338	290
Exchange rate (log)	2.513	2.52	0.003	11.311	290
Inflation (log)	2.152	1.387	−2.307	5.349	290
School	2.159	0.379	1.306	3.203	290

4 Empirical results

The IV/2SLS regression results are presented in Tables 3, 4, 5 and 6. The impact of the relevant IQ variables is shown in columns, with column (1) corresponding to rule of law, column (2) corresponding to accountability, column (3) to property rights, column (4) to corruption and column (5) to IQ index. To assess our sets of hypotheses, we first tested the impact of IQ on aggregate FDI (Table 3) then presented results for foreign investment in all sectors of the economy: primary, secondary, tertiary sectors (Tables 4, 5 and 6).

4.1 IQ and FDI: aggregate analysis

Table 3 presents the IV/2SLS results of the impact of IQ on aggregate FDI flows. With the exception of the insignificant negative impact of corruption index on total FDI (column 4 of Table 3), all other IQ variables seem to have a positive influence on total FDI flows. It appears that the level of corruption in a country is not nearly as important as expected to an investor's decisions about where to invest. On the contrary, the extent of the rule of law index, accountability, property rights and IQ index in the MENA region are the most crucial aspects of their decision. According to the IV/2SLS estimates shown in Column 1 of Table 3, a 1 percent increase in the rule of law index boosts FDI flows by 0.146 million US dollars in the aggregate.

Table 3 The impact of each of the five IQ measures on total FDI. IV/2SLS estimation

Independent variables	Dependent variables: total FDI as share of GDP				
	(1)	(2)	(3)	(4)	(5)
Rule of law index	0.146**				
	(0.0603)				
Accountability index		0.0495***			
		(0.0177)			
Property rights			0.132*		
			(0.0728)		
Corruption index				−0.121	
				(0.0746)	
IQ index					0.150***
					(0.0554)
Control variables	Yes	Yes	Yes	Yes	Yes
Countries	10	10	10	10	10
Years	1990–2018	1990–2018	1990–2018	1990–2018	1990–2018
Observations	280	280	280	280	280
F statistic	303.1	366.2	381.8	320.9	228.1
Hansen J statistic (p-value)	0.584	0.648	0.599	0.644	0.643

Instrument variables are legal origins, and lagged values of the independent. The F statistic is the Kleibergen and Paap (2006) rk statistic, which tests for weak identification and is robust to heteroscedasticity. The Hansen J statistic (p-value) of the test of the endogeneity of institutional variable is from the Hansen (1982) overidentification test of the null hypothesis that institutional variable is exogenous. Robust standard errors are in parentheses

$*p<0.10, **p<0.05, ***p<0.01$

In Columns 2, 3 and 5 of Table 3, a 1 percent increase in the accountability index, property rights and IQ index lead, respectively, to a 0.0495, 0.132 and 0.150 million US dollar increase in total FDI flows. This provides prima facie evidence that IQ plays a powerful role in determining FDI at aggregate level in the MENA region—a finding that is consistent with the literature (Aziz, 2018; Bannaga et al., 2013; Méon & Sekkat, 2004; Mina, 2012).

4.2 IQ and FDI: disaggregate analysis

The impact that we identified for aggregate (total) FDI suggested that institutional variables were important for attracting FDI. The aggregate results may conceal important differences in the effect of IQ on FDI flows across industrial sectors. Thus, in this section we examined whether the influence of IQ varied across industrial sectors by estimating the effect of each of the five of IQ measures on FDI flows in three sectors: primary, secondary, and tertiary. The sectoral results supported two important findings:

Table 4 The impact of each of the five IQ measures on primary FDI. IV/2SLS estimation

Independent variables	Dependent variables: primary FDI as share of GDP				
	(1)	(2)	(3)	(4)	(5)
Rule of law index	0.0119				
	(0.0114)				
Accountability index		0.00191			
		(0.00350)			
Property rights			0.0114		
			(0.0112)		
Corruption index				−0.0161	
				(0.0111)	
IQ index					0.00612
					(0.0107)
Control variables	Yes	Yes	Yes	Yes	Yes
Countries	10	10	10	10	10
Years	1990–2018	1990–2018	1990–2018	1990–2018	1990–2018
Observations	280	280	280	280	280
F statistic	303.1	366.2	381.8	320.9	228.1
Hansen J statistic (p-value)	0.509	0.690	0.725	0.714	0.700

Instrument variables are legal origins, and lagged values of the independent. The F statistic is the Kleibergen and Paap (2006) rk statistic, which tests for weak identification and is robust to heteroscedasticity. The Hansen J statistic (p-value) of the test of the endogeneity of institutional variable is from the Hansen (1982) overidentification test of the null hypothesis that institutional variable is exogenous. Robust standard errors are in parentheses

$*p<0.10, **p<0.05, ***p<0.01$

(1) The impact of IQ on FDI flow was not the same across the three sectors in the MENA region, which indicates the importance of considering sectoral analysis when assessing institutional determinant of FDI;
(2) All IQ measures had a strong positive association with FDI flow in the manufacturing and service sectors.

4.2.1 Effect of IQ on FDI in primary sector

The IV/2SLS regression results presented in Table 4 contain the results of model 1, using FDI flows in the primary sector as dependent variable. Unlike for aggregate FDI, each of the five IQ measures are irrelevant to investor's locational decisions for FDI flows into the primary sector—as is confirmed by the insignificance coefficient estimates of the IQ measures. These results echoed the findings of Ali et al. (2010), Burger et al. (2016), Paul and Jadhav (2020), Poelhekke and van der Ploeg (2013), Schulz (2009), Spar (1999), and Witte et al. (2017), who argued that IQ is unrelated for primary FDI – particularly in the oil sector in the host country. Plausible explanations for why foreign investors in the MENA region do not value IQ in the primary sector perhaps include: (1) investment returns in this sector are sufficiently

Table 5 The impact of each of the five of IQ measures on secondary FDI. IV/2SLS estimation

Independent variables	Dependent variable: secondary FDI as share of GDP				
	(1)	(2)	(3)	(4)	(5)
Rule of law index	0.0328**				
	(0.0164)				
Accountability index		0.0110**			
		(0.00462)			
Property rights			0.0301*		
			(0.0177)		
Corruption index				−0.0271	
				(0.0194)	
IQ index					0.0336**
					(0.0143)
Control variables	Yes	Yes	Yes	Yes	Yes
Countries	10	10	10	10	10
Years	1990–2018	1990–2018	1990–2018	1990–2018	1990–2018
Observations	280	280	280	280	280
F statistic	303.1	366.2	381.8	320.9	228.1
Hansen J statistic (p-value)	0.641	0.801	0.774	0.777	0.800

Instrument variables are legal origins, and lagged values of the independent. The F statistic is the Kleibergen and Paap (2006) rk statistic, which tests for weak identification and is robust to heteroscedasticity. The Hansen J statistic (p-value) of the test of the endogeneity of institutional variable is from the Hansen (1982) overidentification test of the null hypothesis that institutional variable is exogenous. Robust standard errors are in parentheses

$*p<0.10, **p<0.05, ***p<0.01$

high and remain positive, even controlling, for low IQ; (2) the lack of choice when choosing between alternative location sites. Overall, the lesson from Table 4 is that in the MENA region, investments in the primary sector are relatively insensitive to IQ. This finding is in line with our expectations, as stated in H 2a.

4.2.2 Effect of IQ on FDI in secondary sector

Table 5 summarizes the findings for the effects of each of the five IQ measures on FDI in the secondary sector in the MENA countries. Unlike in the primary sector, a country's IQ score has a positive effect across the first three columns and column 5. Once corruption index is included to capture IQ (column 4), the effect turns insignificance negative. These results confirm that investors of secondary (manufacturing) sector FDI value IQ. A rise of 1 percent in the rule of law index increases secondary-sector FDI inflows by 0.0328 million US dollars, whereas a 1 percent increase in the accountability index, property rights and IQ index lead, respectively, to a 0.011, 0.0301 and 0.0336 million US dollar increase in FDI flows in the secondary sector. To sum up, investors in the secondary sector preferred four IQ aspects (i.e. rule of law index, accountability index, property rights and IQ index) when investing in the

Table 6 The impact of each of the five of IQ measures on tertiary FDI. IV/2SLS estimation

Independent variables	Dependent variables: tertiary FDI as share of GDP				
	(1)	(2)	(3)	(4)	(5)
Rule of law index	0.238***				
	(0.0469)				
Accountability index		0.0532***			
		(0.0136)			
Property rights			0.151**		
			(0.0665)		
Corruption index				−0.200***	
				(0.0584)	
IQ index					0.162***
					(0.0435)
Control variables	Yes	Yes	Yes	Yes	Yes
Countries	10	10	10	10	10
Years	1990–2018	1990–2018	1990–2018	1990–2018	1990–2018
Observations	280	280	280	280	280
F statistic	303.1	366.2	381.8	320.9	228.1
Hansen J statistic (p-value)	0.253	0.579	0.631	0.588	0.582

Instrument variables are legal origins, and lagged values of the independent. The F statistic is the Kleibergen and Paap (2006) rk statistic, which tests for weak identification and is robust to heteroscedasticity. The Hansen J statistic (p-value) of the test of the endogeneity of institutional variable is from the Hansen (1982) overidentification test of the null hypothesis that institutional variable is exogenous. Robust standard errors are in parentheses

$*p<0.10, **p<0.05, ***p<0.01$

MENA region while one of the five IQ variables (i.e. corruption index) did not seem to matter for secondary FDI into the region. Our results tended to support the findings of other related studies (Ahmad et al., 2018; Ramasamy & Yeung, 2010; Shah et al., 2015).

4.2.3 Effect of IQ on FDI in tertiary sector

For FDI in the tertiary (service) sector, the main results are summarized in Table 6. As the table indicates, rule of law index, accountability index, property rights and IQ index are associated with increased levels of FDI in the sector. These results will confirm our *H 2b* expectation that investors in the tertiary sector appreciate an improved IQ. On the other hand, the corruption-index result is negative and significant, pointing to the repulsion of FDI by countries that display a higher corruption level. Obviously, higher corruption levels increase the cost of doing business in a country and discourage FDI. These results tend to support the findings of other related studies like Wei (Wei, 2000) and Busse and Hefeker (2007), which found that multinational corporations refrain from investing in countries where the level of corruption is high.

5 Robustness check

In Tables 7, 8 and 9 we examine whether the baseline results in Tables 3, 4, 5 and 6 hold when using the following strategies:

(1) Alternative measures of dependent variables (using the natural log of FDI inflows instead of FDI as a share of GDP);
(2) Dropping all control variables, except the institutional variables; and
(3) Post-Arab spring period (post-2011).

5.1 Alternative measure of dependent variables

In Table 7 we examine whether the baseline results in Tables 3, 4, 5 and 6 hold when alternative measures of dependent variables are employed. To that end, we use the natural log of net FDI flow (Q. Li, 2009), as an alternative measure of FDI flow as share of GDP. Data are taken from Wright and Zhu (2018b) and International Trade Center website.[8]

Reassuringly, as we can see in Columns 1–5 of Table 7, the effects of IQ measures on aggregate and disaggregate FDI in the MENA region did not undergo any substantial change in the main results as reported in Tables 3, 4, 5 and 6, with but a couple of exceptions. For instance, in Panel D, column 4: the significant negative effect of corruption index on FDI in tertiary sector becomes insignificant, but the negative signs remain.

5.2 Dropping all control variables

For the data shown in Appendix Table 8, we use the IV 2SLS in order to further test the results. We examine whether the baseline results hold when we drop all control variables.

Reassuringly, as we can see in Table 8, the effects of IQ measures on aggregate and disaggregate FDI in the MENA region are consistent with our baseline estimations – with only a couple of exceptions. One of these is found in Table 8, Column 4: the insignificant negative effect of corruption index on total FDI has vanished and become significant, but the negative signs remain.

5.3 Temporal break (post–arab uprisings period)

One might argue that the effects of IQ on FDI should have differed post–Arab uprisings period (i.e. post-2011). Thus, we have chosen the post-2011 period as a temporal break to check whether our main results will hold or not. We add an interaction term between each of IQ measures (i.e. rule of law index, accountability, property rights, corruption index and IQ index) and a post-2011 dummy variable, which takes

[8] Free data available from: https://www.investmentmap.org/investment/time-series-by-industry.

the value 0 for the years 1990 to 2011 and 1 for the years 2011–2018. Appendix Table 9 present the IV/2SLS estimation results in order to examine whether the post-2011 period drove our baseline results.

Reassuringly, as we can also see in Columns 1–5 of Table 9, the effects of the term interacting IQ measures with the post-2011 period on aggregate and disaggregate FDI are in line with our baseline estimations – with only a couple of exceptions. One of these is found in Panel C, Column 10: the positive effect of property rights on secondary FDI has vanished and become insignificant, but the positive signs remain.

6 Conclusion

In this paper, we have examined the effect of institutional quality in host countries on total and sectoral FDI flows in 10 economies of the MENA region for the period 1990–2018. We have aimed to test whether or not the influence of IQ varies across the type of investment-receiving sector by estimating the effect of each of the five IQ measures on FDI flows in three sectors: primary, secondary and tertiary. Our model has controlled for GDP per capita, GDP growth, population growth, trade openness, resource wealth, exchange rate, inflation and human capital. We have applied the instrumental variables two-stage least squares (IV/2SLS) approach in order to control for potential endogeneity problems. The main results of this paper can be summarized as follows.

First, there is prima facie evidence that IQ plays an important role in determining FDI at aggregate level in the MENA region. It seems that different facets of IQ (with one exception: the corruption index) have a consistent effect on total FDI when considering various controlling variables. Hence, IQ can be seen as a critical factor for aggregate FDI.

Second, analysing disaggregate FDI data (i.e. FDI in the primary, secondary and tertiary sectors of the economy) sheds a more nuanced light on the relationship between IQ and (sectoral) FDI, contributing to a more inclusive understanding of FDI institutional determinants. We have found that the IQ–FDI relationship is conditional on the type of investment-receiving sector. Specifically, IQ was irrelevant to investors' location-choice decisions for FDI flows into the primary sector. The latter conclusion, as hypothesized by us, supports the views of Spar (1999), who argued that investments in the primary sector of a host country were insensitive to IQ. Unlike in the primary sector, investors in the secondary and tertiary sectors preferred evidence of four aspects of IQ (i.e. rule of law index, accountability index,

property rights and IQ index) when investing in the MENA region. While one of the five IQ aspects (corruption index) did not have a robust impact on secondary FDI, it reduced FDI flows into the tertiary sector.

All in all, our findings in regard to the secondary and tertiary sectors suggest that IQ can be an important determinant of FDI into the MENA region, and thus, efforts targeted at improving IQ aspects and reducing corruption should be implemented by policymakers in the region who wish to attract more secondary and tertiary FDI. The above findings are new to the literature, as FDI for the MENA region has not hitherto been considered at the disaggregated level. There is a need for further research in the field of sectoral institutional determinants of FDI in order to establish whether or not these findings are applicable to other regions and other determinants of FDI. Improving institutional quality is central to reducing the region's economies dependence on natural resources and avoiding premature deindustrialization (Rodrik, 2016).

Appendix A

See Tables 7, 8 and 9.

Table 7 IQ and FDI: alternative measures of dependent variables. IV/2SLS estimation

	(1) Rule of law	(2) Accountability	(3) Property rights	(4) Corruption	(5) IQ index
Panel (A). Dependent variable: log (total FDI)					
IQ variables	0.458***	2.123*	12.74***	− 2.501	6.769*
	(0.128)	(1.125)	(4.643)	(4.866)	(3.367)
F statistic	315.2	338.0	407.2	417.7	528.9
Hansen J statistic (p-value)	0.427	0.225	0.513	0.939	0.138
Panel (B). Dependent variable: log (primary FDI)					
IQ variables	0.153	− 0.301	2.749*	− 1.237	− 0.570
	(1.769)	(0.400)	(1.619)	(2.077)	(1.162)
F statistic	315.2	338.0	407.2	417.7	528.9
Hansen J statistic (p-value)	0.152	0.0976	0.109	0.891	0.0637
Panel (C). Dependent variable: log (secondary FDI)					
IQ variables	0.147*	0.0744*	0.610***	− 0.187*	0.303**
	(0.0886)	(0.0400)	(0.227)	(0.102)	(0.153)
F statistic	315.2	338.0	407.2	417.7	528.9
Hansen J statistic (p-value)	0.390	0.200	0.392	0.894	0.154
Panel (D). Dependent variable: log (tertiary FDI)					
IQ variables	2.867*	1.519**	5.903**	− 1.137	4.575**
	(1.660)	(0.595)	(2.441)	(1.956)	(1.709)
F statistic	315.2	338.0	407.2	417.7	528.9
Hansen J statistic (p-value)	0.911	0.962	0.382	0.626	0.626

Instrument variables are legal origins, and lagged values of the independent. The F statistic is the Kleibergen and Paap (2006) rk statistic, which tests for weak identification and is robust to heteroscedasticity. The Hansen J statistic (p-value) of the test of the endogeneity of institutional variable is from the Hansen (1982) overidentification test of the null hypothesis that institutional variable is exogenous. Robust standard errors are in parentheses

$^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.01$

Table 8 IQ and FDI: Dropping all control variables. IV/2SLS estimation

	(1) Rule of law	(2) Accountability	(3) Property rights	(4) Corruption	(5) IQ index
Panel (A). Dependent variable: total FDI as share of GDP					
IQ variables	0.159**	0.0369***	0.0995***	−0.127*	0.105***
	(0.0572)	(0.0115)	(0.0355)	(0.0653)	(0.0340)
F statistic	315.2	338.0	407.2	417.7	528.9
Hansen J statistic (p-value)	0.609	0.135	0.0896	0.502	0.0478
Panel (B). Dependent variable: primary FDI as share of GDP					
IQ variables	0.0199	−0.00148	−0.00416	−0.0308**	−0.00558
	(0.0122)	(0.00239)	(0.00573)	(0.0126)	(0.00679)
F statistic	315.2	338.0	407.2	417.7	528.9
Hansen J statistic (p-value)	0.294	0.112	0.165	0.639	0.269
Panel (C). Dependent variable: secondary FDI as share of GDP					
IQ variables	0.0364*	0.00825***	0.0233***	−0.0294	0.0237***
	(0.0174)	(0.00265)	(0.00776)	(0.0197)	(0.00762)
F statistic	315.2	338.0	407.2	417.7	528.9
Hansen J statistic (p-value)	0.111	0.733	0.412	0.557	0.963
Panel (D). Dependent variable: tertiary FDI as share of GDP					
IQ variables	0.103**	0.0301***	0.0804**	−0.0665	0.0873***
	(0.0384)	(0.00991)	(0.0310)	(0.0433)	(0.0298)
F statistic	315.2	338.0	407.2	417.7	528.9
Hansen J statistic (p-value)	0.179	0.379	0.951	0.987	0.333

Table 9 IQ and FDI: Temporal break of post-2011 period. IV/2SLS estimation

	(1) Rule of law	(2) Accountability	(3) Property rights	(4) Corruption	(5) IQ index
Panel (A). Dependent variable: total FDI as share of GDP					
IQ variables * post-2011	0.209***	0.0828***	0.0257	−0.136***	0.106**
	(0.0509)	(0.0127)	(0.0422)	(0.0485)	(0.0526)
F statistic	172.0	242.8	357.1	290.9	199.2
Hansen J statistic (p-value)	0.551	0.572	0.930	0.584	0.769
Panel (B). Dependent variable: primary FDI as share of GDP					
IQ variables x post-2011	0.00441	0.00187	−0.00148	−0.00722	−0.000385
	(0.00748)	(0.00173)	(0.00488)	(0.00453)	(0.00545)
F statistic	172.0	242.8	357.1	290.9	199.2
Hansen J statistic (p-value)	0.977	0.268	0.389	0.246	0.359
Panel (C). Dependent variable: secondary FDI as share of GDP					
IQ variables x post-2011	0.0555**	0.0285***	0.00808	−0.0349*	0.0363*
	(0.0225)	(0.00483)	(0.0178)	(0.0186)	(0.0209)
F statistic	172.0	242.8	357.1	290.9	199.2
Hansen J statistic (p-value)	0.358	0.629	0.226	0.277	0.262
Panel (D). Dependent variable: tertiary FDI as share of GDP					
IQ variables x post-2011	0.0739**	0.0311***	0.0114	−0.0395	0.0441
	(0.0325)	(0.00844)	(0.0259)	(0.0268)	(0.0344)
F statistic	172.0	242.8	357.1	290.9	199.2
Hansen J statistic (p-value)	0.351	0.883	0.540	0.405	0.493

Instrument variables are legal origins, and lagged values of the independent. The F statistic is the Kleibergen and Paap (2006) rk statistic, which tests for weak identification and is robust to heteroscedasticity. The Hansen J statistic (p-value) of the test of the endogeneity of institutional variable is from the Hansen (1982) overidentification test of the null hypothesis that institutional variable is exogenous. Robust standard errors are in parentheses

$*p<0.10, **p<0.05, ***p<0.01$

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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