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Abstract

The main objective of this paper is to analyze the interrelationships between financial integration, inclusion, and stability in the Middle East and North Africa (MENA) region and the role of crises in these linkages. This is the first study attempting to examine the interrelations among these variables in MENA financial markets. To achieve its objective, the paper starts by assessing regional integration among MENA stock markets using correlational analysis and the DCC GARCH models. Then, it builds a PVAR model to examine the relationships between integration, inclusion, and stability in the MENA region. The results show that regional integration is still limited in the MENA region, despite growing linkages with other international markets. Regional integration in the MENA region is more pronounced among countries that lie within closer geographical proximities. Moreover, crises, whether financial or political, also tend to increase regional correlations and linkages among MENA markets, although the impact of financial crises is higher compared to that of political instabilities. The analysis highlighted the positive short-term impacts of regional integration on inclusion in the MENA region; however, these impacts could not be maintained for longer periods. In contrast, international integration had negative effects on inclusion and stability that diminished over time. No linkages were found between financial inclusion and stability in the MENA region.

Keywords: Financial integration, financial inclusion, financial stability, financial contagion, spillover, GARCH, Dynamic Correlation Coefficients (DCC), Panel VAR (PVAR), MENA.

JEL Classifications: C23, C58, F3, G01, G15, O16.

ملخص

الهدف الرئيسي من هذه الدراسة هو تحليل العلاقات المتبادلة بين التكامل والشمول المالي، والاستقرار في منطقة الشرق الأوسط وشمال أفريقيا (MENA) ودور الأزمات في هذه العلاقات. وهذه هي الدراسة الأولى التي تحاول فحص العلاقات المتبادلة بين هذه المتغيرات في الأسواق المالية في منطقة الشرق الأوسط وشمال إفريقيا. لتحقيق هدفها تبدأ الدراسة بتقييم التكامل الإقليمي بين أسواق الأسهم في منطقة الشرق الأوسط وشمال إفريقيا باستخدام التحليل الارتباطي ونماذج الارتباط الديناميكي الشرطي للانحدار العام الذاتي المشروط باختلاف التباين (DCC-GARCH). وبعد ذلك تم بناء نموذجَ مُتجه الانحدارِ الذاتيّ للسلاسلِ المَقطَعيَّةِ (PVAR) لفحص العلاقات بين التكامل والشمول والاستقرار في منطقة الشرق الأوسط وشمال إفريقيا. وتظهر النتائج أن التكامل الإقليمي لا يزال محدودًا في منطقة الشرق الأوسط وشمال إفريقيا، على الرغم من الروابط المتزايدة مع الأسواق الدولية الأخرى. ويتجلى التكامل الإقليمي في منطقة الشرق الأوسط وشمال إفريقيا بشكل أكثر وضوحًا بين الدول التي تقع ضمن مناطق جغرافية أقرب. علاوة على ذلك تميل الأزمات - سواء كانت مالية أو سياسية - إلى زيادة العلاقات الإقليمية والروابط بين أسواق الشرق الأوسط وشمال إفريقيا، على الرغم من أن تأثير الأزمات المالية أعلى مقارنة بعدم الاستقرار السياسي. وقد سلط التحليل الضوء على الآثار الإيجابية قصيرة المدى للتكامل الإقليمي على الشمول في منطقة الشرق الأوسط وشمال إفريقيا، ومع ذلك لا يمكن الحفاظ على هذه الآثار لفترات أطول. في المقابل كان للتكامل الدولي آثار سلبية على الشمول والاستقرار وإن كانت تتضاءل بمرور الوقت. ولم تكتشف روابط بين الشمول المالي والاستقرار في منطقة الشرق الأوسط وشمال إفريقيا.

1. Introduction

Financial markets are considered to play a key role in the economic growth and development of nations. They provide the main transit between saving and investment and are an essential channel for raising funds that should be allocated to profitable business opportunities. However, it has been argued that finance has not benefited the developing economies as expected, and the link between financial development and economic growth, poverty reduction, and income inequality has not been clear or empirically robust. Additionally, the increasing trends of financial market liberalization and openness did not lead to increased levels of financial inclusion or stability. Moreover, the development of world financial markets and the rising tide of globalization have led to increasing financial integration. On the one hand, the introduction of integration and liberalization leads to an increase in the number of investors and funds available for lending, which means more competition, lower transaction costs, lower risks, and decreased cost of capital or equity. On the other hand, financial integration increases contagion effects during crises among markets. However, a regional financial integration, which involves the reduction or elimination of barriers to capital flows among countries that share the same geographical region, benefits the developing countries by mitigating the negative impacts of the volatile international capital flows. This might be particularly important during crises.

Few studies have discussed financial markets in the Arab world and the Middle East. Despite its recently increasing liberalization and openness, financial markets in the Middle East and North Africa (MENA) region remain underdeveloped and are vulnerable to different types of internal and external shocks and instabilities, both financial and non-financial. The region also suffers from one of the lowest levels of financial inclusion in the world. These issues raise questions about the role of financial openness in developing the MENA region's financial sector and the interrelationships between financial integration and other important objectives that should be pursued by any efficient financial system, including stability and inclusion.

Therefore, this research aims to study the relationship between financial integration, inclusion, and stability within the MENA region. It also addresses periods of financial and non-financial crises and analyzes the period following recent Arab uprisings. This is the first study to examine the interrelations among these variables in the MENA region's financial markets. It is also worth noting that the current literature lacks studies trying to establish a conceptual framework that depicts these links and helps understand the complex relationships among these financial phenomena (García, 2016). Thus, the paper will help understand the benefits and costs of financial integration within the MENA region. It will also highlight the potential impact of integration on increasing or decreasing financial inclusion in a region that suffers from the lowest inclusion measures globally. Furthermore, the study will explore the role of inclusion, if any, in promoting financial stability in the MENA region. Finally, it is important to understand the workings of financial markets and the transfer of crises within the region to design policies that might mitigate these negative repercussions. Accordingly, the study attempts to answer the following questions:

Are MENA financial markets regionally integrated? How do crises affect integration in the region? How are financial integration, inclusion, and stability linked in MENA countries? What is the role of other important factors, including financial development, governance, and crises in these interlinkages?

Besides its introduction, the paper is divided into four sections. First, it begins with an overview of the literature on the concepts of financial integration, inclusion, and stability and their interrelationships. Then, it moves on to describe the methodology used to answer the research questions. Afterward, the main findings are discussed in the results section. Finally, the paper ends with conclusions and policy implications based on its results.

2. Literature review

2.1. Financial integration, inclusion, and stability: Main concepts

International financial integration has been used in the literature interchangeably with other terms such as financial openness, financial liberalization, the free flow of capital, and the removal of capital controls (Boubakri and Guillaumin, 2015). Financial integration implies the satisfaction of the law of one price among the integrated markets. The law of one price leads to unified returns or prices of assets that generate the same cash flows regardless of the location in which they are traded, without considering exchange rate differentials, transactions, and tax costs; it also results in increased co-movements of asset prices between different markets. Therefore, financial integration means that assets bearing the same characteristics, such as identical risk and maturity levels, yield the same return regardless of the marketplace (Alotaibi, 2014; Atyeh and Al-Rashed, 2012, 2013; Bentes, 2015; Chiwira and Tadu, 2013; Nardo et al., 2017; Nor, 2012; Srivastava and Chattopadhyay, 2020). A lack of integration between markets translates into arbitrage and risk diversification opportunities for investors working in different countries (Nardo et al., 2017; Neaime, 2012; Wu, 2020). To summarize, the study defines financial integration as the degree of interdependencies among financial markets that, in case of complete integration, lead to unified prices of identical assets as if they are being traded in one market segmented into different geographical locations; this degree of interdependencies can be detected through the free flow of capital and the magnitude of co-movements or correlations between markets.

Previous literature highlighted the multiple benefits arising from financial integration. These benefits include decreasing the cost of capital, improving the efficiency of capital allocation, fighting market deficiencies, such as moral hazard, by reducing information asymmetry, enhancing risk diversification and sharing, promoting specialization among markets, creating new financial instruments, supporting financial development, helping pave the way towards a potential monetary union among countries with integrated financial markets, and, eventually, leading directly and indirectly to higher economic growth and development (Alotaibi, 2014; Chinn and Ito, 2006; Chiwira and Tadu, 2013; Ezzati, 2013; Neaime, 2005a, 2005b; Wu, 2020).

Despite the theoretically appealing benefits of financial integration, the relationship between financial integration and economic growth has not been found to be unequivocally robust on the empirical side (Neaime, 2005a). This might go back to the linkages between financial integration and other variables as emphasized by the literature, such as trade openness and financial market development (Alotaibi, 2014; Alotaibi and Mishra, 2017; Chinn and Ito, 2006; Chiwira and Tadu, 2013; Garali and Othmani, 2015; Nardo et al., 2017; Taghizadeh-Hesary et al., 2019). The role of institutions and governance and the spread of crises among markets due to integration can also be attributed to the empirically controversial relationship between financial integration and both financial development and economic growth (Taghizadeh-Hesary et al., 2019). Moreover, governance also contributes to financial development as found by Gazdar and Cherif (2015) when applying to the case of the MENA region.

Increased integration leads to contagion or spillover effects among financial markets. Contagion refers to the increase in co-movements or correlations between markets in times of crises, which might offset the risk diversification benefits of financial integration and lead to an increased cost of capital (McIver and Kang, 2020; Neaime, Lagoarde-Segot, and Audencia, 2013; Ben Rejeb and Boughrara, 2015). In addition to the contagion effects among integrated stock markets, banks can also suffer from different contagion risks, such as default and distress contagion, due to their growing interconnectedness (Keregero and Fan, 2019). However, contagion is not only the result of increased financial integration. It can be attributed to both fundamental economic factors (fundamental contagion) and the elevated interrelationships between financial markets, which results after controlling for the fundamental effects, or what is known as the "shift contagion" (Chiwira and Tadu, 2013; Neaime, 2012; Sebai and Ellouz, 2017). In light of that, research has sometimes relied on detecting spillover effects to prove integration (Boubakri and Guillaumin, 2015).

However, the majority of contagion research addressed spillover impacts in the developed financial markets (Dania and E. Spillan, 2013). Interest in studying the financial markets of developing countries has only recently started to grow. Moreover, contagion effects originally created in the developed markets and consequently spreading to the developing ones have shed light on the importance of regional integration as an alternative to global or international integration, which was obvious in some regions such as East Asia, where regional integration has taken progressive steps following the global financial crisis of 2008 (Boubakri and Guillaumin, 2015). Ben Rejeb and Boughrara (2015) highlighted the transmission of volatility among emerging markets and between emerging and developed markets with an amplifying impact in case of geographical proximity. Bhunia and Chandra (2017) also referred to the transmission effect from the developed markets to the emerging ones applying on the English and Indian cases. Chiwira and Tadu (2013) examined financial integration and contagion in Africa and discussed the tradeoff between the advantages of integration and avoiding instabilities resulting from the concomitant

contagion effects. Neaime (2016) argued that the more internationally integrated financial markets in the MENA region are increasingly vulnerable to external crises due to their relatively weaker regional integration.

In general, the literature on MENA financial markets is still under development. Additionally, available studies have: focused on international integration in one country or integration among a small group of countries in the MENA region; addressed the relationship between integration and crises contagion in MENA markets; or just theoretically discussed and descriptively tracked financial and trade integration among Arab countries (Abou-Zaid, 2011; Alotaibi, 2014; Alotaibi and Mishra, 2017; Arikat and Saymeh, 2014; Atyeh and Al-Rashed, 2012, 2013; Dania and E. Spillan, 2013; Goucha and Hamdi, 2016; Jamaani and Roca, 2015; Kapar, Olmo, and Ghalayini, 2020; Lagoarde-Segot and Lucey, 2007; Maghyereh, 2006; Neaime, 2005a, 2005b, 2012, 2016; Neaime, Lagoarde-Segot, and Audencia, 2013; Nor, 2012; Paskelian, Nguyen, and Jones, 2013; Sebai and Ellouz, 2017). These papers obtained mixed results; while a group of studies referred to a stronger international integration compared to a weaker regional one, others reported the opposite. In addition, some researchers studied the determinants of global financial integration in the MENA region, including Garali and Othmani (2015), and found significant impacts of per capita income and trade openness.

Financial inclusion refers to the expansion of affordable formal financial services, including savings, borrowing, payments, transfers, and insurance, to cover different segments of the population, especially poor and low-income individuals, families, and businesses (Alber, 2019a; Awad and Eid, 2018; Morgan and Pontines, 2014; Nguyen, 2020). Some papers narrowly define financial inclusion as the percentage of the population with access to formal financial services (Evans and Adeoye, 2016). The opposite term to financial inclusion is financial exclusion, which is associated with higher rates of access to and use of informal financial services that entail increased levels of risk (Alber, 2019b). There are two types of financial exclusion: involuntary and voluntary. Involuntary financial inclusion is primarily due to the lack of access to formal financial services due to unaffordability, shortage of service providers, high-perceived risk, or insufficient public awareness. Voluntary financial exclusion or self-withdrawal from the financial system might be the result of religious beliefs or cultural norms (Alber, 2019a; Awad and Eid, 2018; Evans and Adeoye, 2016). The lack of trust in the financial system can also lead to voluntary financial exclusion. Therefore, this paper defines financial inclusion as the degree towards achieving universal coverage by formal financial services, including savings, borrowings, payments, transfers, and electronic transactions, to encompass all the financial operations overtaken by all population segments and economic sectors in a given country.

The literature refers to the multifaceted nature or the multidimensionality of financial inclusion. These dimensions mainly comprise access or penetration, usage, and quality or efficacy of access

and usage (Alber, 2019a, 2019b; García, 2016; Nguyen, 2020). Some economies might enjoy high levels of financial depth measured by the percentage of bank deposits to GDP, but fall short when it comes to the frequency of using formal financial services or access by the poor and vulnerable to formal financial services (Cull, Demirgüç-kunt, and Lyman, 2012; Evans and Adeoye, 2016; Pearce, 2011). Accordingly, several indicators have been created to assess the different dimensions of financial inclusion. Indicators of financial access include the number of bank branches and ATMs; the frequency of usage, which might be detected through an indicator such as the percentage of adults who own accounts; and quality, which is one of the most difficult dimensions of financial inclusion to assess and lacks concrete indicators to measure. These indicators can be analyzed by measuring the rate of customer satisfaction with financial services, for example (Alber, 2019b; García, 2016). The impact of financial inclusion on improving people's lives is also important to analyze and take into consideration (Alber, 2019a). The goals of financial inclusion are numerous and touch on many economic, financial, social, and political areas simultaneously. On the economic and financial sides, inclusion would help stimulate capital mobilization for saving and investment; revitalize entrepreneurship; enforce the transmission of a country's monetary policies; and promote growth. On the social and political sides, financial inclusion should support efforts to suppress inequalities and alleviate poverty, thus maintaining social coherence and political stability (Alber, 2019a; Awad and Eid, 2018; Neaime and Gaysset, 2018). Accordingly, many countries have recognized the importance of financial inclusion and set it as a national policy objective along with financial stability, integrity, and consumer protection, or what is defined as the "I-SIP" framework (Alber, 2019b).

Financial inclusion is affected by several economic and non-economic factors. Studies tried to shed light on the determinants of financial inclusion that seem theoretically relevant, such as income levels, economic growth rates, and inflation. Mixed results were obtained depending on the sample of countries used in the analysis, the period of study, and the analysis technique. Evans and Adeoye (2016) proved that per capita income and literacy have significant effects on financial inclusion in Africa. Alber (2019a) also found a positive impact of GDP per capita in contrast to a negative impact of GDP growth on financial inclusion. On the micro level, Demirguc-Kunt et al. (2018) showed that inequalities of account ownership in developing countries are caused by factors that include gender (being a female), belonging to young age groups, weak income, and low levels of education, whereas Awad and Eid (2018) found that illiteracy, gender, and lack of awareness impede financial inclusion when focusing on the Egyptian case.

Financial stability is expressed through a constant condition of a smoothly run solid financial system that safeguards a sound relationship between savers and borrowers in light of high-quality levels of governance and sustainably developed financial infrastructure. Stability enhances the resilience of a financial system and promotes its capability to absorb shocks and get through stressful conditions, including macroeconomic instabilities or disruptions in income, production, consumption, saving, and investment, without severe malfunctions. In other words, financial

stability aims to maintain the basic functions of a financial system of channeling funds between savers and investors, processing payments, managing risk, and pricing assets even during crises (Alber, 2019b; García, 2016). More broadly, financial stability characterizes a healthy and complete financial system of intermediaries, markets, and infrastructure that can dodge the major negative impacts and imbalances resulting from shocks and crises, in order to ensure an uninterrupted and smoothly working financial system that can maintain its main function of mobilizing savings towards profitable investment opportunities (Gadanecz and Jayaram, 2009; Morgan and Pontines, 2014). Therefore, financial stability can be used in general to refer to a constantly healthy, strong, and resilient financial system that can absorb internal and external shocks and continue performing its basic functions and providing its main services efficiently. However, it is worth noting that stability might not always be associated with enhanced efficiencies within the financial institutions as shown by Alber (2017), who found a trade-off between financial stability and efficiency in banks in the MENA region during 2004-13.

2.2. Linkages between financial integration, inclusion, and stability: Insights from previous research

Since financial integration leads to the enhanced efficiency of capital allocation and increased diversification and sharing of risk, promoting financial integration is supposed to lead to enforced financial stability (Boubakri and Guillaumin, 2015; Chiwira and Tadu, 2013). However, crises with spillover effects that spread among the increasingly integrated markets can offset this benefit and cause financial destabilizations. However, regional integration can compensate for the spillover effects of crises that originate in international markets. Regional financial integration may seem more beneficial to reduce the heightened contagion risk accompanying international integration (Neaime, 2005a). Moreover, regional integration, similar to the international one, can increase the efficiency of capital and resource allocation among markets (Maghyereh, 2006). Focusing on the MENA region, Neaime (2016) emphasized the limited impact of protecting national MENA markets and suppressing their regional integration on achieving financial stability. The paper also concluded that regional integration leads to higher stability in the long run, which in turn contributes to more financial integration and development. Therefore, it is important to study the relationship between both international and regional financial integration and stability as well as the role of crises in this relationship to identify the possible balancing approaches that can mitigate the impacts of crises and maintain financial stability, especially in the developing countries.

The literature has not yet extensively investigated the linkages between financial inclusion and stability (Cull, Demirgüç-kunt, and Lyman, 2012). Furthermore, research has not been decisive on the relationship between financial inclusion and stability. Theoretically speaking, on the one hand, stability should help sustain the low levels of inflation and interest rates that lead to the increased affordability of formal financial services and therefore more financial inclusion. At the same time, financial inclusion can also help enhance stability by giving households more financial capacity to

absorb any shocks and increasing the opportunities of risk diversification through a widened deposit base; accordingly raising the efficiency of financial intermediation. On the other hand, the expansion of financial coverage might jeopardize stability if not accompanied by improved financial education, rigorous regulations, and strong institutions (Alber, 2019b; Alotaibi, 2014; García, 2016; Morgan and Pontines, 2014).

However, the empirical literature has proven that even the default risk, which could presumably increase due to the expansion of financial services to small borrowers, is not as harmful to stability as the large unpredictable lost loans (Cull, Demirgüç-kunt, and Lyman, 2012). Morgan and Pontines (2014) also showed that increased inclusion, in terms of more loans offered to small and medium enterprises, induces more stability. Neaime and Gaysset (2018) found a positive effect of inclusion on stability in the MENA region. Awad and Eid (2018) addressed the relationship between financial inclusion and stability in the MENA region, focusing on Egypt, and illustrated that small depositors and borrowers brought into the financial system through an expanded coverage or inclusion, which is supported by strong regulations, can help maintain financial stability during crises. To conclude, previous research has shown that the relationship between financial stability and inclusion is not unidirectional. In addition, more research is needed to delve deeply into the relationship between financial inclusion and stability, especially in emerging economies, including the MENA region.

3. Methodology

The main objective of the study is to investigate the interlinkages between financial integration, inclusion, and stability in the MENA region over time. These three variables are complex to measure and have no single universal indicators to assess. In addition, data on the MENA region suffer from gaps over longer periods for many of the indicators used to assess integration, inclusion, and stability. Therefore, the choice of variables used to assess international financial integration, inclusion, and stability depends mainly on the most complete available indicators, which were also used by the literature, as the study tries to incorporate the largest possible number of MENA countries in the analysis. The paper focuses on analyzing the stock markets and the banking sectors of the following Arab countries in the MENA region: Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Tunisia, and the United Arab Emirates, in addition to Turkey. Stock exchanges and banks are chosen for the analysis since they are the two biggest dominating segments of the financial system in the MENA region. Moreover, the banking sector and stock markets are closely related. Chinn and Ito (2006) found that the development of the banking sector affects the development of stock markets. The period of study extends from 1998 until the latest available data on the MENA region.

To answer its research questions, the paper tests three main hypotheses:

H11: regional integration has increased over time in the MENA region

H12: financial integration, inclusion, and stability are related in the MENA region

H13: crises affect the linkages between integration, inclusion, and stability in the MENA region

To test the first hypothesis, an assessment of regional integration in the MENA region is needed. In general, the measures of financial integration can be classified into de jure and de facto measures. The de jure indicators detect the regulations that aim to promote financial integration. De facto measures are further divided into quantity-based and price-based indicators (Boubakri and Guillaumin, 2015; Ekpo and Chuku, 2017; Srivastava and Chattopadhyay, 2020; Taghizadeh-Hesary et al., 2019). The quantity-based indicators track the actual flows of capital across financial markets, such as the percentage of foreign assets and liabilities to GDP; whereas the price-based assessment of integration might detect the co-movements or correlations between stock market indices (Ekpo and Chuku, 2017; Mensah and Premaratne, 2018).

Calculating correlations between stock market returns is one of the possible approaches to study regional integration. The Dynamic Correlation Coefficient (DCC) is more suitable for measuring associations over time since the unconditional correlation might suffer from the sensitivity to outliers and the problems of underestimation over some periods or overestimation in times of crises due to the high volatilities that prevail in markets during these times (Nardo et al.. 2017). Moreover, dynamic correlations account for heteroscedasticity (Mensah and Premaratne, 2018). Therefore, the study fits a series of univariate DCC GARCH (1,1) models using returns of MENA stock indexes. Returns are computed using the daily closing prices of each country's stock market index[2] as follows:

$$r_{i,t} = (lnP_{i,t} - lnP_{i,t-1}) \times 100$$

$r_{i,t}$ is the stock market return of country i at time (day) t, $lnP_{i,t}$ is the natural logarithm of the stock market's index closing price of country i at time (day) t, and $lnP_{i,t-1}$ is the natural logarithm of the stock market's index closing price of country i at the previous period (day) $t-1$.

A univariate GARCH (1,1) model depends on two main equations: the mean equation (equation 1) and the conditional variance equation (equation 2), which assume the following specifications:

$$r_{i,t} = \alpha_i + \beta_i r_{i,t-1} + \varepsilon_{i,t} \qquad (1)$$

$$h_{i,t} = \delta_{i0} + \delta_{i1}\varepsilon^2_{i,t-1} + \delta_{i2}h_{i,t-1} \qquad (2)$$

[2] Daily closing prices of MENA countries' stock market indexes are extracted from Thomson Reuters Eikon (Datastream) database; information on the indexes used in the analysis is presented in the appendix.

The mean equation (1) estimates $r_{i,t}$, which is the stock market return of country i at time (day) t, using its lagged value at time (day) $t-1$. α_i and β_i are the model's coefficients and $\varepsilon_{i,t}$ are the model's error terms. Equation (2) is used to estimate the conditional variance $h_{i,t}$, which is a function of lagged errors $\varepsilon_{i,t-1}$ (ARCH term) and lagged forecasted variance $h_{i,t-1}$ (GARCH term) (Abou-Zaid, 2011; Dania and E. Spillan, 2013; Neaime, 2012).

The conditional variance-covariance matrix in the multivariate DCC-GARCH model, H_t, can be written as:

$$H_t = D_t R_t D_t \qquad (3)$$

where D_t is the diagonal matrix whose diagonal elements are the square roots of the conditional variance-covariance matrices of the univariate GARCH models, denoted as $h_{i,t}$; and R_t is the matrix of conditional correlations (Alotaibi, 2014; Alotaibi and Mishra, 2017; Cai, Tian, and Hamori, 2016; R. Engle, 2002; R. F. Engle and Sheppard, 2001; Mensah and Premaratne, 2018).

Moreover, GARCH (1,1) is chosen since it is the most commonly used volatility model which the literature has proven to perform well relative to a large number of higher-lagged and more sophisticated GARCH models for forecasting financial times series such as exchange rates and stock returns (Hansen and Lunde, 2005; Jafari, Bahraminasab, and Norouzzadeh, 2007; Miah and Rahman, 2016).

To construct an index of regional integration, the paper computes the yearly averages of the correlation coefficients for each stock market as a measure of its regional integration with other MENA stock markets.

To test the second and third hypotheses and study the relationships between integration, inclusion, and stability, the study builds a number of Panel Vector Autoregression (PVAR) models. In general, panel models consider heterogeneity among countries, are suitable to address dynamic relationships, and control for missing data (Evans and Adeoye, 2016). Additionally, VAR models can assume endogeneity among all variables used to build the main model (Maghyereh, 2006). One of the main advantages of using a PVAR model is estimating one VAR model with one set of estimated parameters for all countries included in analysis instead of building a separate VAR model for each country, which is the case with the Global VAR models, resulting in increased degress of freedom (Bouvet, Brady, and King, 2013). This might be more helpful and feasible to use, especially in light of the limited number of observations available for analysis and the missing data for some MENA countries during the period of study. PVAR models can also offer better estimates of spillover effects among countries and impulse response functions that are robust to

non-stationarity and co-integration among the analyzed series levels, which is an advantage in interpreting their results (Bouvet, Brady, and King, 2013).

A PVAR model can be specified as follows:

$$Z_{i,t} = A(L)Z_{i,t-1} + BX_{i,t} + u_i + e_{i,t}$$

Z is the matrix of endogenous variables, $A(L)$ is a matrix polynomial in the lag operator L, X is the vector of exogenous variables, if they exist, with parameters B, and u and e as the panel fixed-effects and idiosyncratic error terms (Abrigo and Love, 2016; Bouvet, Brady, and King, 2013).

The three main endogenous variables included in the PVAR model are integration, inclusion, and stability. The paper tries to employ one measure on regional financial integration and another on international financial integration. The regional indicator established out of the correlation coefficients between MENA stock markets is used as the variable on regional financial integration. For assessing international integration, the paper uses two measures of international financial integration, the de jure Chinn-Ito KAOPEN index along with the percentage of net foreign assets to GDP as a de facto measure of integration. The KAOPEN capital account openness index is one of the most famous de jure indicators of international financial integration, which is constructed by applying the Principal Component Analysis on the binary variables included in the Annual Reports on Exchange Arrangements and Exchange Restrictions (AREAER) released by the International Monetary Fund (IMF) to assess regulatory controls or restrictions over capital and current accounts. This index is updated regularly and covers the period 1970-2018 for 182 economies around the world, including the MENA region and Arab countries (Chinn and Ito, 2006, 2008; Ito and Chinn, 2020). Since de jure measures might not reflect actual flows, it is important to use de facto and de jure measures together to accurately assess financial integration (Ekpo and Chuku, 2017). Accordingly, the paper employs the percentage of net foreign assets to GDP as a de facto measure of international integration.

Due to the lack of data for some MENA countries during several years, the indicator of financial inclusion chosen with the most complete data during 1998-2018 is bank deposits to GDP. As with the cases of financial integration and inclusion, financial stability is also multifaceted with no agreed-upon single indicator to measure (García, 2016). The selection of an indicator to assess financial stability depends on the structure of the financial system; therefore, if the banking sector is significantly more important than stock markets, for example, then financial stability can be assessed by measuring the stability or health of the banking sector in the economy (Gadanecz and Jayaram, 2009). Since this is the case in the MENA economies, the main measure used for financial stability is the bank Z-score indicator, which is calculated by dividing the summation of the return on assets and the ratio of equity to assets by the standard deviation of the return on assets for banks

in the economic system (Alber, 2017, 2019b). This indicator is one of the widely used measures to detect financial stability by showing the number of the standard deviations a banking system must fall below to become insolvent, or, in other words, the distance of a country's banking system from insolvency. Therefore, the higher the Z-score, the more stable the country's financial system (Alber, 2019b; García, 2016; Morgan and Pontines, 2014).

Besides the main indicators of integration, inclusion, and stability, other endogenous variables inserted in the PVAR models include financial development and governance indicators. Financial development affects and can be affected by financial integration, inclusion, and stability. The development of financial markets affects integration as found by Alotaibi (2014), Alotaibi and Mishra (2017), and Ananchotikul, Piao, and Zoli (2015). Financial development is also a prerequisite for stability and alleviating negative crises spillover effects (Chiwira and Tadu, 2013). In addition, financial development stimulates inclusion (Cull, Demirgüç-kunt, and Lyman, 2012). Therefore, the model also includes stock market capitalization to GDP as a measure used in the literature to assess financial market development (Garali and Othmani, 2015). This indicator represents the percentage of the total value of all listed shares in a stock market out of GDP. The regulatory quality index constructed by the World Bank among other world governance indicators is used as an indicator of governance. Data on financial integration (percentage of net foreign assets to GDP), inclusion, and stability, in addition to the other control variables used in the analysis, are extracted from the World Bank and the IMF databases.

Finally, to estimate the impacts of crises, one dummy is created to measure the impact of the global financial crisis that assumes the value of one from 2008 until 2010, and the other dummy aims to assess the effect of Arab uprisings and takes on the value of one starting 2011 till 2018 and zero otherwise.

4. Analysis and results

This section starts with an analysis of regional financial integration among stock markets in the MENA region. Figure 1 shows the line charts of daily returns in MENA stock markets using available data during 1998-2019, which illustrate the volatility clustering of returns in these stock markets. Volatility clustering is the tendency of large variations in stock market returns to be followed by similar large variations and vice versa (Maghyereh, 2006). This might refer to the increased co-movements of markets during crises as shown by Goucha and Hamdi (2016), which referred to stronger integration links among MENA countries during the global financial crisis of 2008. Descriptive statistics also show that stock markets in the MENA region are characterized by higher risks (standard deviations) compared to average returns (Table 1). Moreover, volatilities were higher in all MENA markets during the global financial crisis (2008-10) compared to 2011-19, which might imply a weaker impact of political instabilities compared to the impact of the global financial crisis on the performance of stock markets in the MENA region (Table 2).

Correlations also show the weaker regional linkages among financial markets in the MENA region compared to their interrelationships with international markets, including European markets (the United Kingdom and Germany), Brazil, Russia, India, China, and South Africa (BRICS), and the United States markets (Tables 3 and 4). Geographical proximity matters for regional integration as shown in the case of Tunisia, which has the strongest correlation with Morocco compared to weaker or insignificant correlations with other countries in the region. On the other hand, Tunisia had significant correlations with all international markets analyzed except for the United States. The Gulf Cooperation Council (GCC) countries also enjoy higher levels of correlations among each other. Egypt, Lebanon, Morocco, Oman, Saudi Arabia, Tunisia, and Turkey all have significant correlations with the majority of international markets. Almost all the significant regional correlations and correlations with international markets are positive. It is also worth noting that countries with strong links to the United States market such as Egypt, Morocco, and Saudi Arabia witnessed an increase in volatility during the global financial crisis compared to Tunisia, for example, which had a decrease in volatility and does not have a significant correlation with the United States market.

To better assess the co-movements between stock markets, DCC GARCH models are built to measure the dynamic correlations among MENA stock. The ARCH Lagrange Multiplier (LM) test was applied on all the return series and the null hypothesis of no ARCH effect (Cai, Tian, and Hamori, 2016) was rejected. This is a precondition that must be verified before estimating the DCC GARCH models (Mensah and Premaratne, 2018). The models are tested for all MENA stock markets series of daily returns; however, results could only be obtained for a subset of series. Table 5 presents the results of ARCH LM test for the eight series for which the DCC GARCH models could be estimated. These series represent the daily stock returns for Egypt, Lebanon, Morocco, Oman, Saudi Arabia, Turkey, Qatar, and the United Arab Emirates. The test results highlight the presence of ARCH effects in all of these series up to lag 10, except the return series for Morocco, which has the ARCH effects up to lag 3. Additionally, Figure 2 shows the Dynamic Correlations Coefficients. Results indicate significant dynamic correlations between the market of Egypt and those of Lebanon, Morocco, Oman, and Saudi Arabia. The Turkish market is particularly correlated with the GCC markets. There is also an increase in the dynamic correlations over time between Qatar and Saudi Arabia and Turkey and the United Arab Emirates. Peaks in dynamic correlations are also observed during the global financial crisis, which reflects increasing co-movements between markets during crises. The appendix includes the parameter estimates of the fitted DCC GARCH models.

Figure 1. Daily stock returns, MENA markets (1 January 1998 - 31 December 2019)

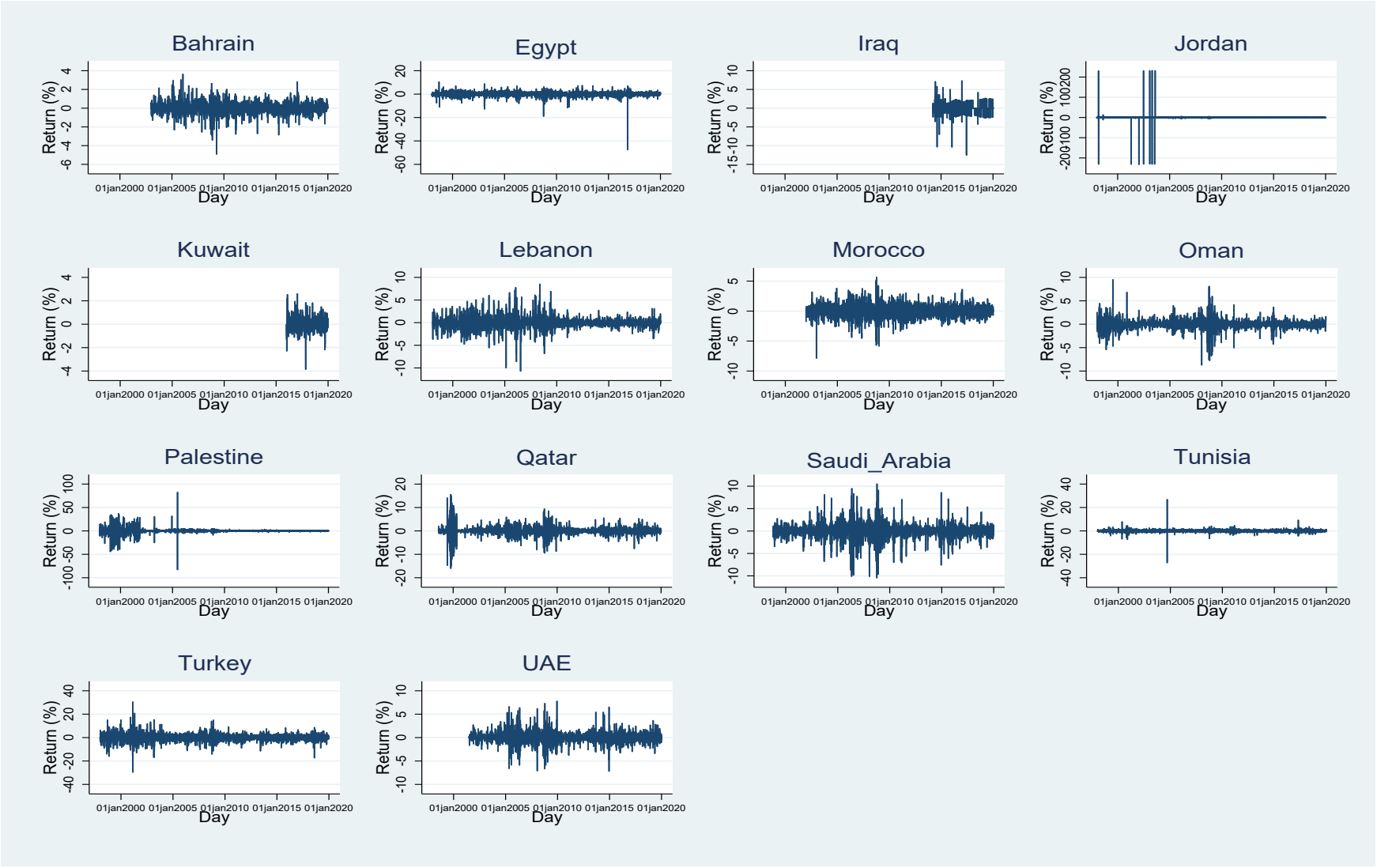


Table 1. Descriptive analysis of daily stock returns, MENA markets (1 January 1998 - 31 December 2019)

	Bahrain	Egypt	Iraq	Jordan	Kuwait	Lebanon	Morocco	Oman	Palestine	Qatar	Saudi Arabia	Tunisia	Turkey	UAE
Number of Observations	4344	5835	1475	5837	1018	5819	4602	5837	5837	6916	6866	7034	7034	5919
Mean	0.010	0.004	-0.059	-0.081	0.037	-0.004	0.029	-0.012	0.034	0.033	0.026	0.014	0.006	0.036
Median	0	0	0	0	0	0	0.015	0	0	0	0	0	0	0
Standard Deviation	0.485	1.577	1.151	10.488	0.507	0.969	0.891	0.814	3.564	1.426	1.199	0.829	2.408	0.920
Min	-4.904	-47.448	-12.516	-231.841	-3.843	-10.688	-7.843	-8.696	-82.607	-15.962	-10.411	-27.074	-29.496	-7.155
Max	3.613	10.372	7.276	231.528	2.590	8.490	5.625	9.482	82.215	15.491	10.479	26.723	30.342	7.738
Skewness	-0.342	-5.400	-1.451	-3.559	-0.391	0.157	-0.324	-0.473	-0.810	-0.268	-0.954	-0.166	-0.189	0.110
Kurtosis	12.152	151.276	25.180	480.569	10.034	19.644	8.571	26.825	147.229	34.466	18.820	324.804	17.798	15.029
Jarque-Bera Test (sig.)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: Calculated based on data from Thomson Reuters Eikon (Datastream) database.

Table 2. Volatility by period, MENA markets (1 January 1998 - 31 December 2019)

	Bahrain	Egypt	Iraq	Jordan	Kuwait	Lebanon	Morocco	Oman	Palestine	Qatar	Saudi Arabia	Tunisia	Turkey	UAE
Standard Deviation (1998-2007)	0.502	1.454	.	15.197	.	1.192	0.943	0.775	5.120	1.664	1.264	0.912	2.810	0.944
Standard Deviation (2008-2010)	0.644	1.842	.	1.134	.	1.166	1.187	1.439	1.160	1.680	1.579	0.761	2.317	1.194
Standard Deviation (2011-2019)	0.403	1.622	1.150	0.499	0.507	0.471	0.721	0.515	0.412	0.863	0.890	0.731	1.773	0.750

Source: Calculated based on data from Thomson Reuters Eikon (Datastream) database.

Table 3. Correlations among stock markets in MENA (1 January 1998 - 31 December 2019)

	Bahrain	Egypt	Iraq	Jordan	Kuwait	Lebanon	Morocco	Oman	Palestine	Qatar	Saudi Arabia	Tunisia	Turkey	UAE
Bahrain	1													
Sig.														
Egypt	0.095	1												
Sig.	0.000													
Iraq	0.019	0.015	1											
Sig.	0.459	0.562												
Jordan	0.005	0.031	-0.012	1										
Sig.	0.766	0.020	0.634											
Kuwait	0.230	0.104	0.104	0.020	1									
Sig.	0.000	0.001	0.001	0.535										
Lebanon	0.039	0.046	0.058	0.004	0.005	1								
Sig.	0.010	0.001	0.027	0.759	0.883									
Morocco	0.041	0.077	0.041	0.008	0.073	0.057	1							
Sig.	0.007	0.000	0.112	0.606	0.020	0.000								
Oman	0.219	0.154	0.020	0.030	0.154	0.071	0.079	1						
Sig.	0.000	0.000	0.446	0.022	0.000	0.000	0.000							
Palestine	0.034	0.015	0.030	0.003	0.070	0.024	0.019	0.0131	1					
Sig.	0.025	0.267	0.251	0.811	0.026	0.070	0.196	0.3155						
Qatar	0.157	0.119	0.023	0.022	0.183	0.038	0.054	0.198	0.024	1				
Sig.	0.000	0.000	0.371	0.095	0.000	0.004	0.000	0.000	0.073					
Saudi Arabia	0.089	0.138	-0.002	0.013	0.182	0.073	0.069	0.159	0.040	0.103	1			
Sig.	0.000	0.000	0.945	0.333	0.000	0.000	0.000	0.000	0.003	0.000				
Tunisia	0.015	0.006	0.001	-0.002	0.036	0.032	0.244	0.041	0.015	0.025	0.020	1		
Sig.	0.339	0.650	0.966	0.895	0.254	0.017	0.000	0.002	0.254	0.039	0.102			
Turkey	0.032	0.087	0.018	-0.009	0.016	0.016	0.145	0.048	0.046	0.049	0.081	0.084	1	
Sig.	0.035	0.000	0.495	0.501	0.602	0.239	0.000	0.000	0.001	0.000	0.000	0.000		
UAE	0.161	0.164	0.018	0.000	0.174	0.054	0.047	0.344	0.070	0.368	0.215	0.020	0.076	1
Sig.	0.000	0.000	0.484	0.982	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.117	0.000	

Source: Calculated based on data from Thomson Reuters Eikon (Datastream) database.

Table 4. Correlations between stock markets in MENA and international markets (1 January 1998 - 31 December 2019)

	Bahrain	Egypt	Iraq	Jordan	Kuwait	Lebanon	Morocco	Oman	Palestine	Qatar	Saudi Arabia	Tunisia	Turkey	UAE
UK	0.027	0.088	0.091	0.028	0.076	0.061	0.221	0.058	0.012	0.069	0.093	0.157	0.361	0.178
Sig.	0.115	0.000	0.002	0.064	0.030	0.000	0.000	0.000	0.422	0.000	0.000	0.000	0.000	0.000
Germany	0.005	0.072	0.077	0.018	0.056	0.058	0.246	0.044	0.012	0.037	0.107	0.168	0.354	0.139
Sig.	0.761	0.000	0.008	0.220	0.112	0.000	0.000	0.003	0.420	0.013	0.000	0.000	0.000	0.001
Brazil	-0.003	0.048	0.006	0.000	0.050	0.047	0.151	-0.010	0.024	0.004	0.068	0.059	0.293	0.032
Sig.	0.863	0.001	0.829	0.986	0.156	0.002	0.000	0.485	0.102	0.804	0.000	0.000	0.000	0.434
Russia	0.061	0.066	0.025	0.012	0.100	0.032	0.160	0.084	0.002	0.041	0.101	0.065	0.321	0.220
Sig.	0.000	0.000	0.393	0.437	0.004	0.032	0.000	0.000	0.871	0.006	0.000	0.000	0.000	0.000
India	0.035	0.133	0.092	0.005	0.045	0.061	0.100	0.078	-0.010	0.094	0.085	0.058	0.209	0.269
Sig.	0.040	0.000	0.002	0.716	0.201	0.000	0.000	0.000	0.505	0.000	0.000	0.000	0.000	0.000
China	0.037	0.086	0.014	0.013	0.078	0.056	0.085	0.079	0.002	0.091	0.082	0.048	0.109	0.148
Sig.	0.043	0.000	0.643	0.467	0.027	0.002	0.000	0.000	0.916	0.000	0.000	0.008	0.000	0.000
South Africa	0.024	0.082	0.053	0.011	0.071	0.051	0.218	0.047	0.021	0.042	0.098	0.164	0.393	0.155
Sig.	0.158	0.000	0.069	0.469	0.042	0.001	0.000	0.002	0.168	0.006	0.000	0.000	0.000	0.000
US	-0.026	0.030	0.047	-0.013	-0.009	0.027	0.097	-0.031	0.006	0.001	0.079	0.023	0.246	0.040
Sig.	0.125	0.045	0.107	0.393	0.804	0.074	0.000	0.036	0.711	0.963	0.000	0.116	0.000	0.318

Source: Calculated based on data from Thomson Reuters Eikon (Datastream) database.

Table 5. Results of the LM test for autoregressive conditional heteroskedasticity (ARCH)

Egypt			
lags(p)	chi2	df	Prob>Chi2
1	1657.109	1	0.0000
2	1245.627	2	0.0000
3	1664.494	3	0.0000
4	112.219	4	0.0000
5	107.447	5	0.0000
6	103.201	6	0.0000
7	100.583	7	0.0000
8	98.307	8	0.0000
9	106.520	9	0.0000
10	114.183	10	0.0000
Lebanon			
lags(p)	chi2	df	Prob>Chi2
1	315.388	1	0.0000
2	325.390	2	0.0000
3	363.632	3	0.0000
4	163.730	4	0.0000
5	172.462	5	0.0000
6	173.657	6	0.0000
7	224.664	7	0.0000
8	141.473	8	0.0000
9	103.740	9	0.0000
10	104.291	10	0.0000
Morocco			
lags(p)	chi2	df	Prob>Chi2
1	216.246	1	0.0000
2	292.736	2	0.0000
3	383.208	3	0.0000
4	4.733	4	0.3158
5	4.268	5	0.5115
6	6.959	6	0.3246
7	8.000	7	0.3326
8	6.000	8	0.6472
9	4.000	9	0.9114
10	2.000	10	0.9963
Oman			
lags(p)	chi2	df	Prob>Chi2
1	402.467	1	0.0000
2	266.722	2	0.0000

3	501.172	3	0.0000
4	210.505	4	0.0000
5	203.928	5	0.0000
6	194.551	6	0.0000
7	187.493	7	0.0000
8	185.306	8	0.0000
9	180.215	9	0.0000
10	172.199	10	0.0000

Saudi Arabia

lags(p)	chi2	df	Prob>Chi2
1	1170.412	1	0.0000
2	1089.821	2	0.0000
3	1106.660	3	0.0000
4	1050.703	4	0.0000
5	1054.294	5	0.0000
6	1100.650	6	0.0000
7	1149.974	7	0.0000
8	1174.011	8	0.0000
9	1159.818	9	0.0000
10	1154.970	10	0.0000

Turkey

lags(p)	chi2	df	Prob>Chi2
1	918.467	1	0.0000
2	879.309	2	0.0000
3	1040.145	3	0.0000
4	1003.532	4	0.0000
5	987.275	5	0.0000
6	984.564	6	0.0000
7	986.763	7	0.0000
8	983.043	8	0.0000
9	992.605	9	0.0000
10	983.321	10	0.0000

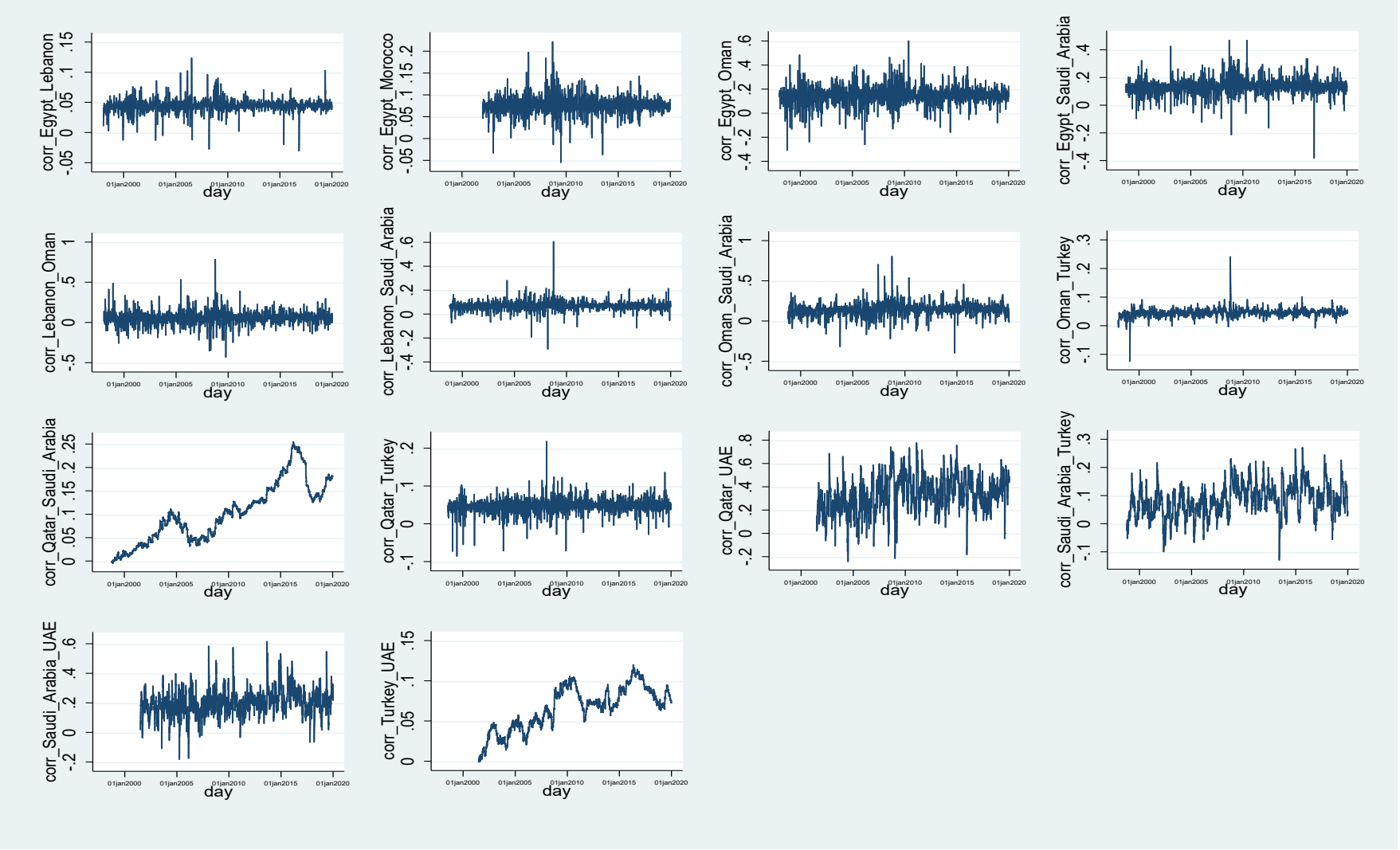
Qatar

lags(p)	chi2	df	Prob>Chi2
1	2230.927	1	0.0000
2	2122.480	2	0.0000
3	1987.780	3	0.0000
4	1892.646	4	0.0000
5	2005.671	5	0.0000
6	2085.197	6	0.0000
7	2239.396	7	0.0000
8	2283.207	8	0.0000

9	2291.705	9	0.0000
10	2297.707	10	0.0000
	UAE		
lags(p)	chi2	df	Prob>Chi2
1	517.928	1	0.0000
2	593.504	2	0.0000
3	630.097	3	0.0000
4	552.006	4	0.0000
5	554.485	5	0.0000
6	556.913	6	0.0000
7	578.760	7	0.0000
8	595.374	8	0.0000
9	559.142	9	0.0000
10	577.581	10	0.0000

Source: Calculated based on data from Thomson Reuters Eikon (Datastream) database.

Figure 2. Dynamic Correlation Coefficients, MENA markets (1 January 1998 - 31 December 2019)

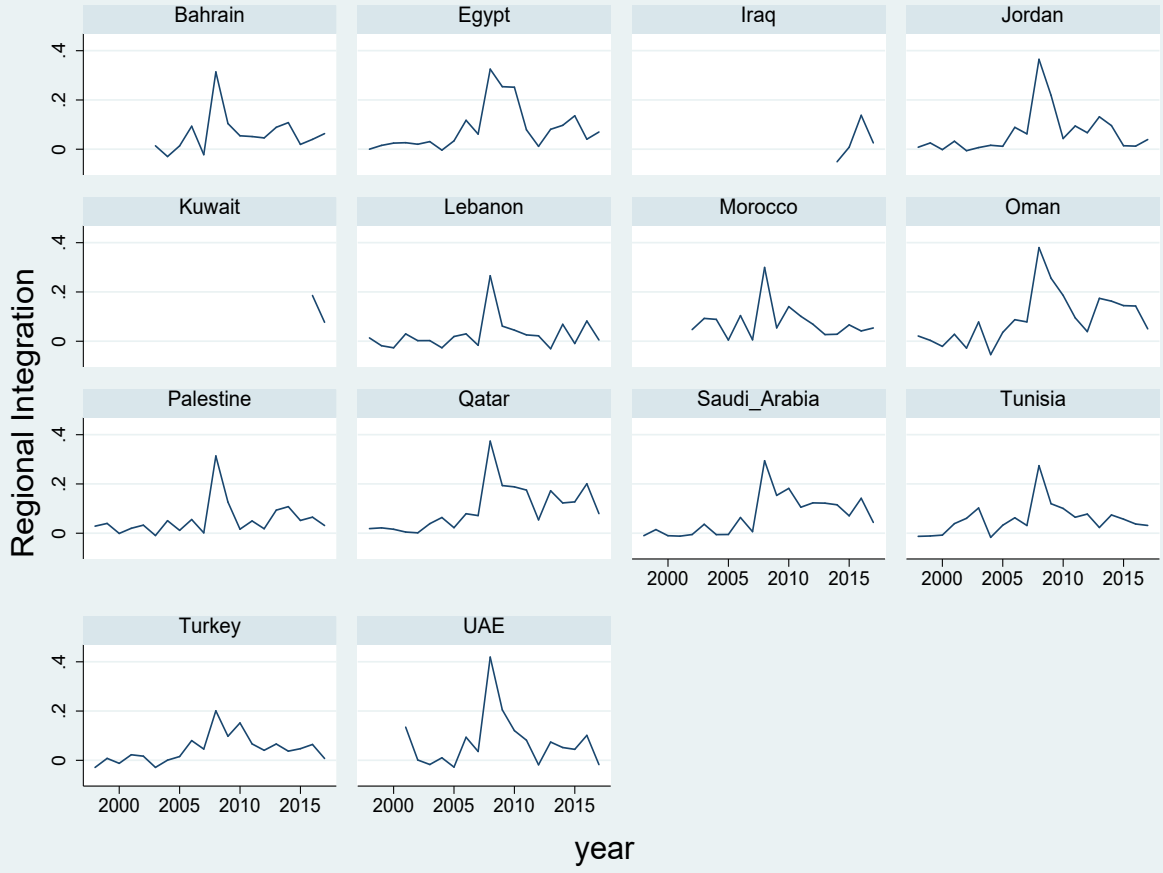


Source: Constructed based on the DCC GARCH (1,1) models results.

To examine the relationships between financial integration, inclusion, and stability, the study builds a PVAR model that includes the potential indicators of these variables. Moreover, financial development and governance, which are other potential variables that could affect these relationships, are employed in the analysis. The available data on all indicators extends from 1998 until 2017.

Financial integration is divided into regional and international integration. An index of regional integration was constructed by calculating the yearly averages of the correlation coefficients for each stock market with other MENA markets. Figure 3 shows constant correlational trends over time with peaks during the global financial crisis.

Figure 3. Regional Financial Integration Index among MENA markets (1998 - 2017)



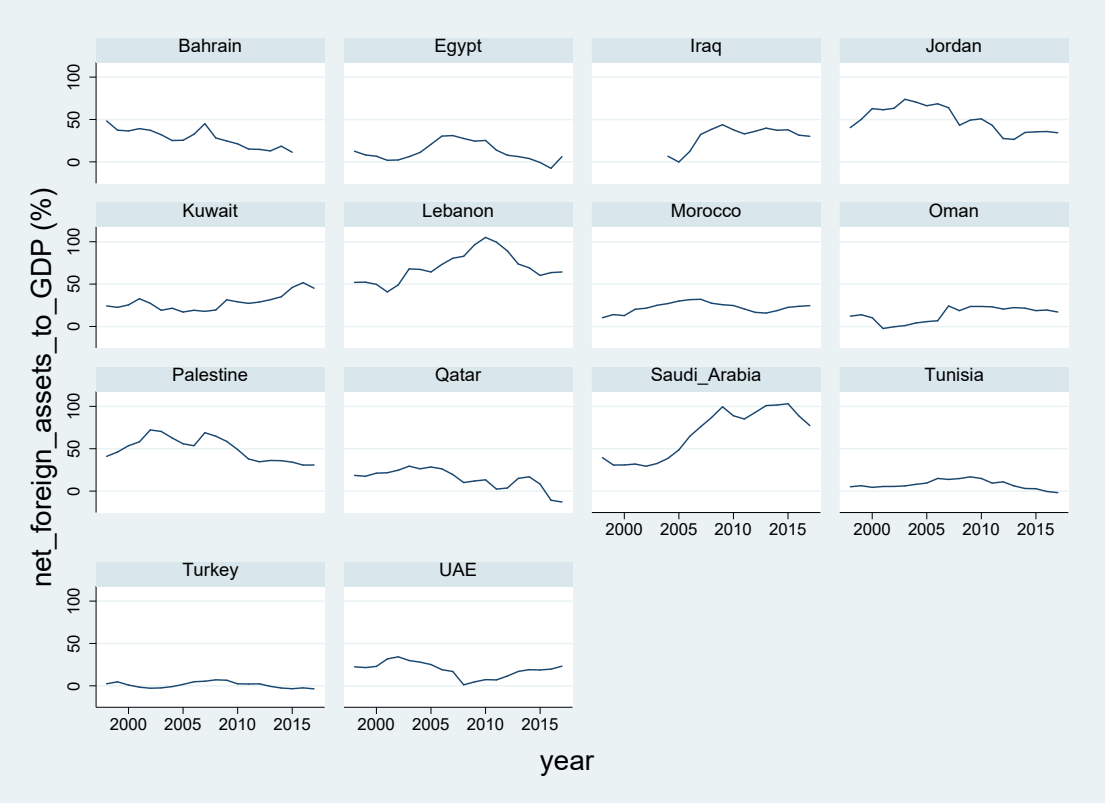
Source: Calculated by the researcher.

International integration is measured by one de jure and one de facto indicator. The Chinn-Ito KAOPEN is used as the de jure index of international integration. It covers all MENA countries of study during 1998-2018, except Palestine. The normalized values of the index ranges from zero to one; the closer the index is to one, the more open the market. Detecting the index values over

time for the MENA region shows that countries such as Bahrain, Qatar, and the United Arab Emirates achieved complete openness since the 1970s. Jordan and Oman have also been achieving a perfect score since 2001 and 2003, respectively. Other MENA countries have witnessed fluctuations, such as Egypt, which achieved a complete score in 2008 that decreased to 0.17 in 2016 and increased afterwards in 2017 and 2018 to be 0.42 out of 1. The Moroccan score also decreased from 0.42 in 1995 to 0.16 in 1996 and remained stable at this level until 2018. Furthermore, the Tunisian economy showed the same behavior as the Moroccan one. The Lebanese score decreased from 0.88 in 1998 to 0.45 in 2017 and 2018. Despite not having a perfect score, the Turkish market worked on removing capital controls starting 2008 to reach a score of 0.45 out of 1 in 2017, but then it decreased to 0.16 out of 1 in 2018. It is worth noting that the Chinn-Ito KAOPEN index scores have not changed for all MENA countries between 2017 and 2018, except for Turkey.

Net foreign assets to GDP are the de factor indicator used by the study to measure the international integration of MENA countries. Figure 4 shows the relatively low levels of foreign assets for the majority of MENA countries and the decreasing trends during the last few years.

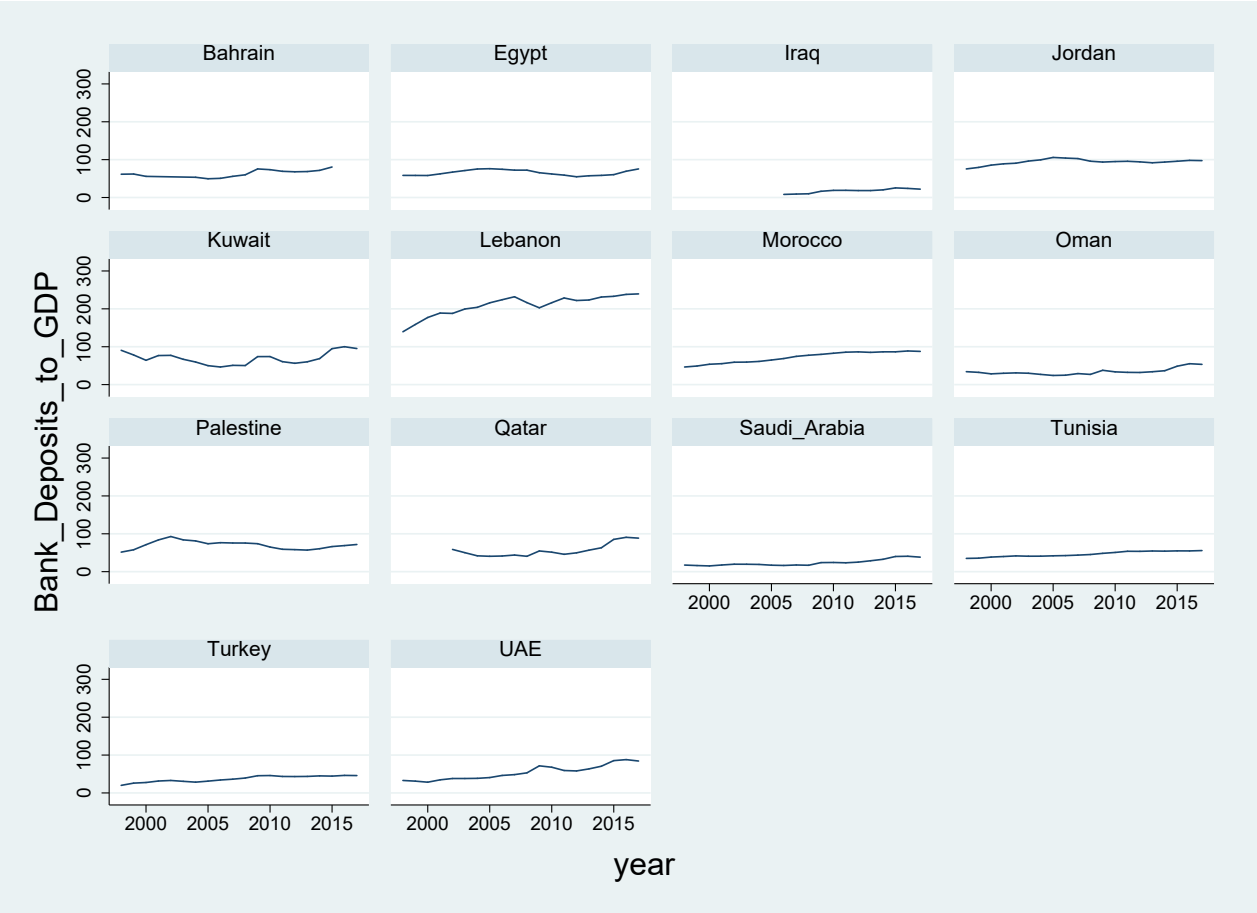
Figure 4. Net foreign assets to GDP, MENA markets (1998 - 2017)



Source: Calculated by the researcher using World Bank data.

The indicator used to assess financial inclusion is bank deposits to GDP. This indicator was selected mainly for data availability reasons. Figure 5 shows some modest increases over time of the percentage of bank deposits to GDP in MENA countries.

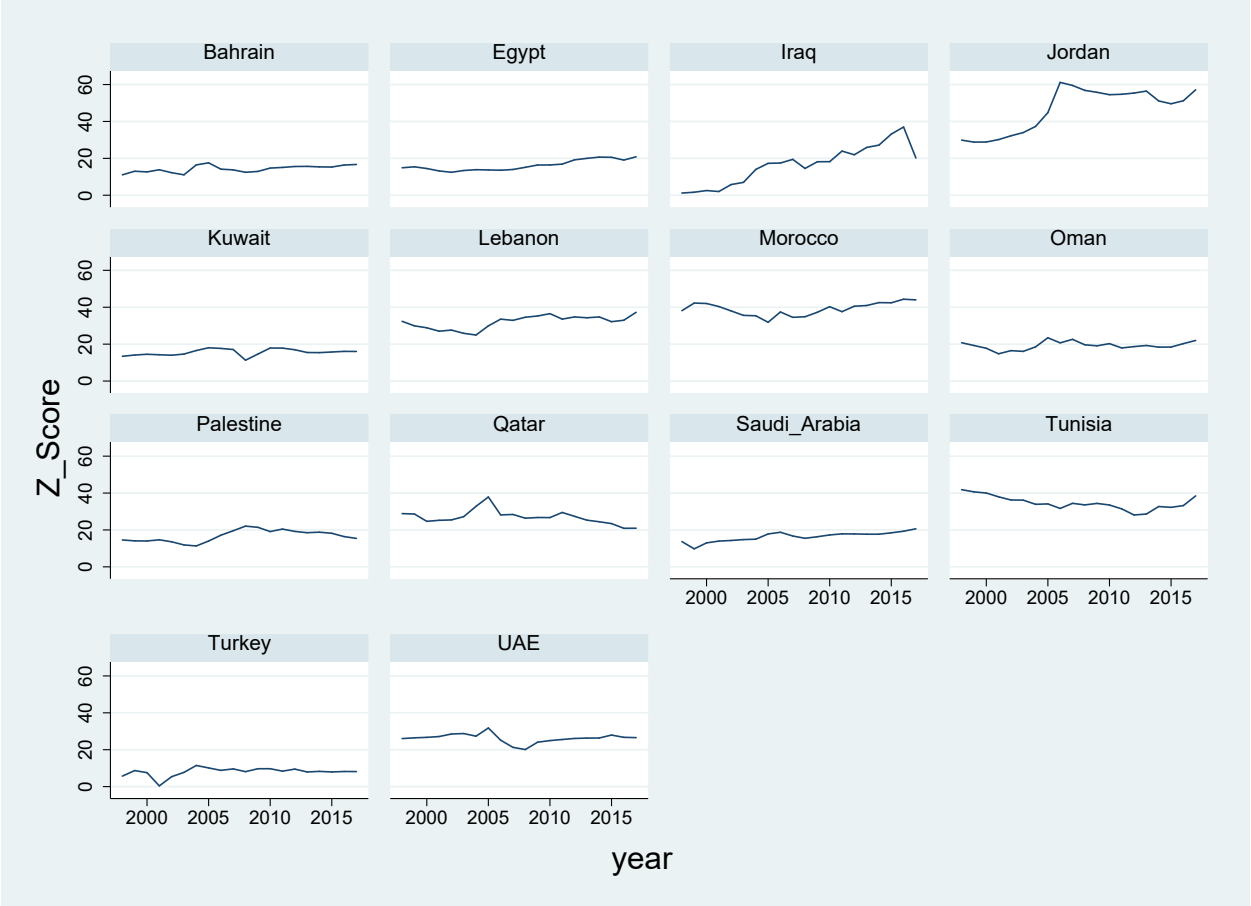
Figure 5. Bank deposits to GDP, MENA markets (1998 - 2017)



Source: World Bank.

Bank Z-score is used to measure financial inclusion in MENA. Higher Z-scores are indicative on more stable banking systems. In general, Figure 6 detects improvements in stability in MENA countries over time.

Figure 6. Bank Z-Score, MENA markets (1998 - 2017)



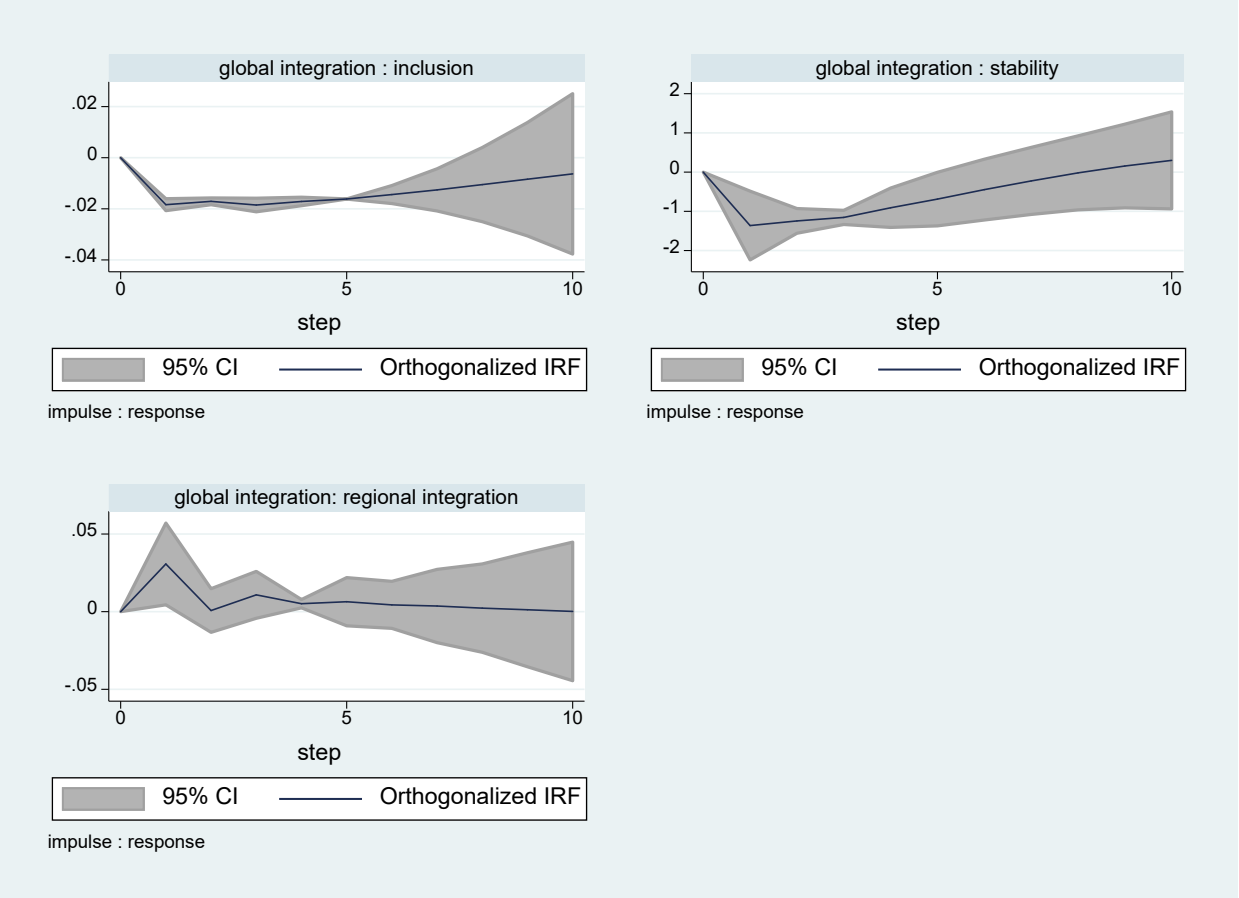
Source: World Bank

To analyze the relationship between financial integration, inclusion, and stability, the study investigated a group of PVAR models with different variable specifications. However, due to the small number of observations available for analysis, only PVAR models of lag one could be fitted. Model 1 in the appendix presents the results of the PVAR model, the endogenous variables of which included: financial inclusion, financial stability, regional integration, the de facto measure of international financial integration, financial development, and governance (regulatory quality index), as well as the two exogenous dummy variables representing the global financial crisis and the Arab uprisings. The model shows that global or international integration negatively affects both inclusion and stability. International integration also leads to more regional integration. This could be justified by the fact that the ratio of foreign assets to GDP used to assess international integration also includes flows that come from the region as well. Furthermore, it appears from the results of the model that the global financial crisis has led to higher levels of regional integration among MENA markets.

The impulse response functions, shown in Figure 7, illustrate the negative short-term impact of global integration on inclusion and stability. However, these negative impacts start to diminish in

the longer run. On the other hand, global integration leads to a positive short-term effect on regional integration, but as time passes, this effect turns into a negative one over the longer run.

Figure 7. Impulse response functions, PVAR Model 1

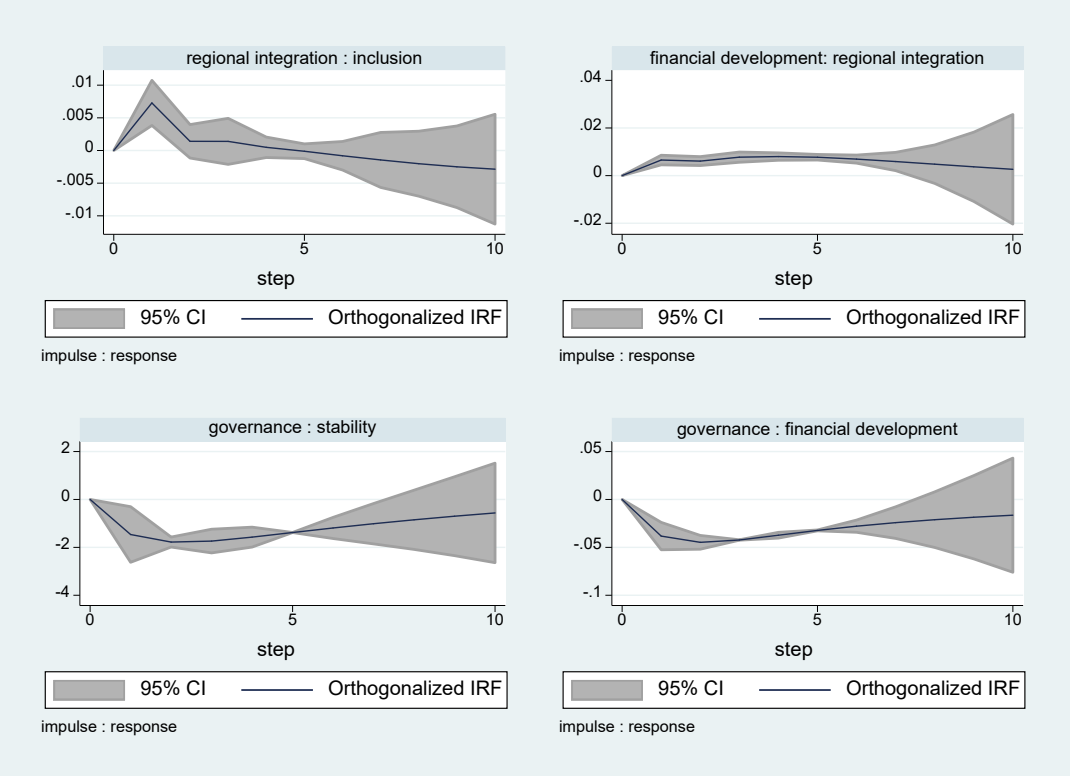


Source: Constructed by the researcher based on Model 1 results.

The study fits another PVAR model (Model 2 in the appendix) by replacing the de facto measure of international integration with the de jure Chinn-Ito KAOPEN index. Results presented in the appendix refer to the positive impacts of regional integration on financial inclusion in the MENA region. As for regional integration, results highlight the positive impacts of financial development and the role of crises (both the global financial crisis and the Arab uprisings) in motivating regional integration among countries in MENA. However, it is worth noting that the model showed negative impacts of governance, in terms of regulatory quality, on banking stability. The same results also apply to financial development. The study tried building the same model using other indicators of governance, including political stability and the rule of law; however, no significant results were obtained. Moreover, the study also tested the impact of Arab uprisings by changing the specification of its dummy variable and restricting it for only Egypt and Tunisia; however, its impact was found to be insignificant for all models.

The impulse response functions presented in Figure 8 showed that the short-term negative impacts of governance on stability and financial development start to shrink over the long run. Moreover, the positive impacts of regional integration on inclusion decrease over time.

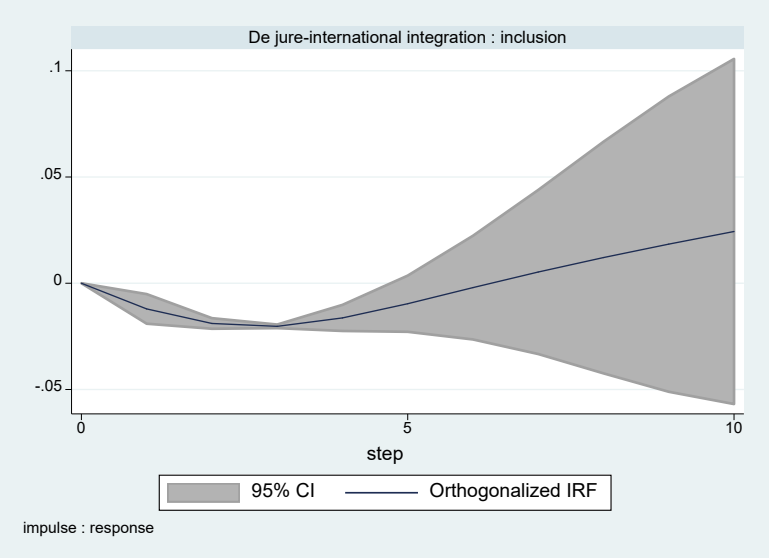
Figure 8. Impulse response functions, PVAR Model 2



Source: Constructed by the researcher based on Model 2 results.

Finally, the study runs a PVAR model that incorporates both the de facto and de jure measures of international integration with other analyzed variables. Results of Model 3 presented in the appendix and the impulse response function shown in Figure 9 show the negative short-term effect of de jure international integration on inclusion that reverses to positive over the longer run.

Figure 9. Impulse response function (Chinn-Ito de jure index and financial inclusion), PVAR Model 3



Source: Constructed by the researcher based on Model 3 results.

5. Conclusion and policy implications

This study is an attempt to explore the interrelationships between financial integration, inclusion, and stability in the MENA region. It showed that regional integration is still limited in the MENA region, despite growing linkages with other international markets. Regional integration in the MENA region is more pronounced among countries that lie within closer geographical proximities. Moreover, crises, whether financial or political, also tend to increase regional correlations and linkages among MENA markets, although the impact of financial crises is higher compared to political instabilities. The analysis highlighted the positive short-term impacts of regional integration on inclusion in the MENA region; however, these impacts could not be maintained for longer periods. In contrast, international integration had negative effects on inclusion and stability that diminish over time. No linkages were found between financial inclusion and stability in the MENA region.

Limitations on data availability restricted the use of few indicators. Therefore, despite being an essential aspect of financial inclusion, banking services are not the only formal financial services meant by financial inclusion. Future research should also try to explore testing other potential indicators for measuring financial integration. Additionally, constructing composite indices to measure financial integration, inclusion, and stability seems to be an area worth exploring more in future studies of financial markets in the developing countries, including the MENA region. Finally, the same study could be applied to a bigger sample of developing countries for a deeper investigation of the topic.

To conclude, it can be argued that global integration cannot be avoided; however, regional integration might be part of the solution to mitigate the short-term negativities of instability and crisis contagion from developed markets. Therefore, it is crucial to strike a balance between international and regional integration in MENA financial markets.

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Appendix

Stock markets indexes used in analysis

Country	Index
Bahrain	Bahrain All Share Index (.BAX)
Egypt	EGX 30 Index (.EGX30)
Iraq	Iraq Stock Exchange Main 60 Index (.ISX60)
Jordan	Amman Stock Exchange All-Share Index (.AMMAN)
Kuwait	Boursa Kuwait All Share Index (.BKA)
Lebanon	Banque du Liban et d'Outre-Mer SAL (BLOM) Lebanese Stock Index (.BLSI)
Morocco	Casablanca SE All Share Index (.MASI)
Oman	Muscat SE General Index (.MSI)
Palestine	Palestine Exchange general index (.PLE)
Qatar	Qatar Exchange General Index (.QSI)
Saudi Arabia	Tadawul FF Index (.TASI)
Tunisia	Tunis All Shares Index (.TUNINDEX)
United Arab Emirates	Abu Dhabi Securities Exchange General (Main) Index (.ADI)
Turkey	BIST All shares Index (.XUTUM)
United Kingdom	FTSE 100 Index (.FTSE)
Germany	Deutsche Boerse DAX Index (.GDAXI)
Brazil	Sao Paulo SE Bovespa Index (.BVSP)
Russia	MOEX Russia Index (.IMOEX)
India	S&P BSE Sensex Index (.BSESN)
China	Shanghai Shenzhen CSI 300 Index (.CSI300)
South Africa	Johannesburg Stock Exchange All Share Index (.JALSH)
United States	S&P 500 Index (.SPX)

The parameter estimates of the fitted DCC GARCH Models

	Egy&Leb.	Egy&Mor.	Egy&Oman	Egy&Saudi.
Egypt				
L.arch	0.142***	0.137***	0.140***	0.142***
	(8.21)	(7.39)	(8.22)	(8.17)
L.garch	0.139*	0.183**	0.147**	0.171**
	(1.88)	(2.14)	(1.98)	(2.14)
_cons	1.775***	1.719***	1.756***	1.717***
	(10.17)	(8.47)	(10.14)	(9.09)
Lebanon				
L.arch	0.405***			
	(19.00)			
L.garch	0.628***			
	(40.26)			
_cons	0.0462***			
	(5.88)			
corr(Egypt,Lebanon)				
_cons	0.0272**			
	(2.00)			
Adjustment				
lambda1	0.00487	0.0137	0.0459***	0.0248**
	(0.67)	(1.13)	(2.78)	(2.01)
lambda2	0.731**	0.00939	0.0273	0.285
	(2.50)	(0.07)	(0.13)	(1.63)
Morocco				
L.arch		0.227***		
		(9.69)		
L.garch		0.548***		
		(8.47)		
_cons		0.187***		
		(4.42)		
corr(Egypt,Morocco)				
_cons		0.0667***		
		(4.35)		
Oman				
L.arch			0.278***	
			(17.77)	

L.garch			0.597***	
			(36.96)	
_cons			0.0499***	
			(9.12)	
corr(Egypt,Oman)				
_cons			0.107***	
			(7.77)	
Saudi Arabia				
L.arch				0.435***
				(14.30)
L.garch				0.495***
				(30.53)
_cons				0.0374***
				(7.76)
corr(Egypt,Saudi Arabia)				
_cons				0.102***
				(7.68)
N	5819	4602	5835	5533

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

	Leb&Oman	Leb&Saudi.
Lebanon		
L.arch	0.403***	0.411***
	(19.05)	(18.32)
L.garch	0.628***	0.598***
	(40.27)	(33.22)
_cons	0.0463***	0.0635***
	(5.88)	(6.10)
Oman		
L.arch	0.282***	
	(17.83)	
L.garch	0.593***	
	(36.71)	

_cons	0.0502***	
	(9.16)	
corr(Lebanon,Oman)		
_cons	0.0330**	
	(2.09)	
Adjustment		
lambda1	0.0443***	0.0152
	(3.32)	(1.12)
lambda2	0.586***	9.14e-08
	(6.72)	(.)
Saudi Arabia		
L.arch		0.444***
		(14.45)
L.garch		0.492***
		(30.46)
_cons		0.0366***
		(7.69)
corr(Lebanon,Saudi Arabia)		
_cons		0.0537***
		(4.10)
N	5819	5533

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

	Oman&Saudi.	Oman&Turkey
Oman		
L.arch	0.308***	0.305***
	(16.99)	(16.67)
L.garch	0.552***	0.554***
	(34.70)	(35.05)
_cons	0.0457***	0.0454***
	(9.96)	(9.98)
Saudi Arabia		
L.arch	0.431***	
	(14.41)	
L.garch	0.497***	
	(30.99)	

_cons	0.0365***	
	(7.73)	
corr(Oman,Saudi Arabia)		
_cons	0.0999***	
	(6.55)	
Adjustment		
lambda1	0.0224***	0.00454
	(3.50)	(1.17)
lambda2	0.764***	0.866***
	(18.10)	(10.86)
Turkey		
L.arch		0.244***
		(13.51)
L.garch		0.619***
		(18.95)
_cons		0.861***
		(5.41)
corr(Oman,Turkey)		
_cons		0.0347**
		(2.46)
N	5533	5693

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

	Qatar&Saudi.	Qatar&Turkey	Qatar&UAE
Qatar			
L.arch	0.213***	0.212***	0.206***
	(19.80)	(20.23)	(14.20)
L.garch	0.746***	0.742***	0.787***
	(89.36)	(89.62)	(58.44)
_cons	0.0657***	0.0663***	0.0254***
	(19.25)	(19.52)	(7.46)
Saudi Arabia			
L.arch	0.133***		
	(17.12)		

L.garch	0.860***		
	(124.49)		
_cons	0.0221***		
	(8.92)		
corr(Qatar,Saudi Arabia)			
_cons	0.979**		
	(2.03)		
Adjustment			
lambda1	0.00128**	0.00922	0.0384***
	(2.23)	(0.79)	(7.18)
lambda2	0.998***	0.00229	0.928***
	(5347.04)	(0.02)	(79.61)
Turkey			
L.arch		0.0984***	
		(14.50)	
L.garch		0.888***	
		(111.44)	
_cons		0.102***	
		(6.17)	
corr(Qatar,Turkey)			
_cons		0.0380***	
		(2.91)	
UAE			
L.arch			0.146***
			(15.44)
L.garch			0.837***
			(87.00)
_cons			0.0172***
			(8.36)
corr(Qatar,UAE)			
_cons			0.375***
			(16.04)
N	6866	6916	5919

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

	Saudi&Turkey	Saudi&UAE
Saudi Arabia		
L.arch	0.131***	0.125***
	(17.35)	(15.51)
L.garch	0.860***	0.858***
	(125.59)	(107.78)
_cons	0.0215***	0.0311***
	(8.90)	(8.82)
Turkey		
L.arch	0.0908***	
	(14.38)	
L.garch	0.896***	
	(119.03)	
_cons	0.0934***	
	(6.00)	
corr(Saudi Arabia,Turkey)		
_cons	0.109***	
	(4.66)	
Adjustment		
lambda1	0.0119***	0.0293***
	(3.05)	(3.97)
lambda2	0.969***	0.897***
	(93.81)	(28.98)
UAE		
L.arch		0.151***
		(14.86)
L.garch		0.833***
		(81.28)
_cons		0.0176***
		(8.12)
corr(Saudi Arabia,UAE)		
_cons		0.171***
		(8.71)
N	6866	5919

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

	Turkey&UAE
Turkey	
L.arch	0.0854***
	(12.52)
L.garch	0.897***
	(113.19)
_cons	0.0888***
	(5.89)
UAE	
L.arch	0.151***
	(14.75)
L.garch	0.832***
	(80.35)
_cons	0.0177***
	(8.10)
corr(Turkey,UAE)	
_cons	0.143***
	(3.18)
Adjustment	
lambda1	0.00112
	(0.83)
lambda2	0.997***
	(1342.26)
N	5919

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

PVAR Models Results

Model 1:

	(1)
	inclusion
inclusion	
L.inclusion	0.898***
	(0.000)
L.stability	-0.00510
	(0.487)
L.Reg-Integration	0.0731
	(0.377)
L.de facto	-0.258*
	(0.081)
L.development	-0.00473
	(0.917)
L.Regulatory Quality	-0.0146
	(0.929)
GFC Dummy	0.00409
	(0.859)
Arab Uprisings Dummy	0.00321
	(0.915)
stability	
L.inclusion	-3.120
	(0.785)
L.stability	0.291
	(0.453)
L.Reg-Integration	0.0837
	(0.985)
L.de facto	-21.58*
	(0.061)
L.development	5.315
	(0.103)
L.Regulatory Quality	0.596
	(0.956)
GFC Dummy	1.828
	(0.262)

Arab Uprisings Dummy	1.571
	(0.401)
Reg-Integration	
L.inclusion	0.163
	(0.485)
L.stability	0.00521
	(0.613)
L.Reg-Integration	-0.273**
	(0.033)
L.de facto	0.447*
	(0.067)
L.development	-0.00173
	(0.977)
L.Regulatory Quality	0.156
	(0.482)
GFC Dummy	0.166***
	(0.000)
Arab Uprisings Dummy	0.0241
	(0.586)
de facto	
L.inclusion	-0.424
	(0.113)
L.stability	-0.00913
	(0.396)
L.Reg-Integration	0.146
	(0.333)
L.de facto	0.470
	(0.107)
L.development	0.0621
	(0.375)
L.Regulatory Quality	-0.312
	(0.202)
GFC Dummy	0.00795
	(0.838)
Arab Uprisings Dummy	0.0209
	(0.662)

development	
L.inclusion	-0.519
	(0.401)
L.stability	-0.0213
	(0.232)
L.Reg-Integration	0.0225
	(0.910)
L.de facto	-0.799
	(0.106)
L.development	1.053***
	(0.000)
L.Regulatory Quality	-0.218
	(0.699)
GFC Dummy	-0.0793
	(0.298)
Arab Uprisings Dummy	-0.0212
	(0.826)
Regulatory Quality	
L.inclusion	-0.0717
	(0.837)
L.stability	0.000238
	(0.985)
L.Reg-Integration	0.0643
	(0.759)
L.de facto	0.283
	(0.471)
L.development	0.0472
	(0.627)
L.Regulatory Quality	0.902***
	(0.010)
GFC Dummy	0.0258
	(0.639)
Arab Uprisings Dummy	0.00544
	(0.933)
Observations	159

p-values in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Model 2:

	(1) inclusion
inclusion	
L.inclusion	0.919***
	(0.000)
L.stability	-0.0103
	(0.317)
L.Reg-Integration	0.161**
	(0.041)
L.de jure	-0.192
	(0.120)
L.development	-0.0121
	(0.691)
L.Regulatory Quality	-0.0288
	(0.771)
GFC Dummy	-0.00506
	(0.828)
Arab Uprisings Dummy	0.0122
	(0.701)
stability	
L.inclusion	-0.449
	(0.941)
L.stability	0.430
	(0.280)
L.Reg-Integration	4.585
	(0.310)
L.de jure	-5.189
	(0.416)
L.development	1.477
	(0.463)
L.Regulatory Quality	-15.56**
	(0.022)
GFC Dummy	0.985
	(0.442)

Arab Uprisings Dummy	1.143
	(0.469)
---	---
Reg-Integration	
L.inclusion	-0.144
	(0.214)
L.stability	-0.000860
	(0.915)
L.Reg-Integration	-0.306***
	(0.001)
L.de jure	-0.0450
	(0.670)
L.development	0.0667**
	(0.015)
L.Regulatory Quality	0.186
	(0.163)
GFC Dummy	0.205***
	(0.000)
Arab Uprisings Dummy	0.0699**
	(0.018)
---	---
de jure	
L.inclusion	-0.0711
	(0.690)
L.stability	-0.0160
	(0.167)
L.Reg-Integration	0.0484
	(0.718)
L.de jure	0.675***
	(0.001)
L.development	-0.0140
	(0.771)
L.Regulatory Quality	-0.232
	(0.165)
GFC Dummy	0.0342
	(0.349)
Arab Uprisings Dummy	0.00556
	(0.901)
---	---
development	

L.inclusion	-0.114
	(0.638)
L.stability	-0.0146
	(0.311)
L.Reg-Integration	0.128
	(0.429)
L.de jure	-0.0436
	(0.850)
L.development	0.941***
	(0.000)
L.Regulatory Quality	-0.407*
	(0.067)
GFC Dummy	-0.144***
	(0.005)
Arab Uprisings Dummy	-0.0800
	(0.146)
Regulatory Quality	
L.inclusion	-0.149
	(0.555)
L.stability	-0.0000669
	(0.996)
L.Reg-Integration	-0.125
	(0.362)
L.de jure	0.205
	(0.265)
L.development	0.0786
	(0.190)
L.Regulatory Quality	0.880***
	(0.000)
GFC Dummy	0.0186
	(0.647)
Arab Uprisings Dummy	0.0114
	(0.841)
Observations	145

p-values in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Model 3:

	(1) inclusion
inclusion	
L.inclusion	0.954***
	(0.000)
L.stability	-0.00877
	(0.180)
L.Reg-Integration	0.161**
	(0.043)
L.de facto	0.0692
	(0.807)
L.de jure	-0.170*
	(0.064)
L.development	-0.0278
	(0.655)
L.Regulatory Quality	-0.0553
	(0.696)
GFC Dummy	-0.00918
	(0.575)
Arab Uprisings Dummy	0.00543
	(0.819)
stability	
L.inclusion	3.031
	(0.650)
L.stability	0.577*
	(0.053)
L.Reg-Integration	4.584
	(0.287)
L.de facto	6.741
	(0.583)
L.de jure	-3.036
	(0.590)
L.development	-0.0520
	(0.987)
L.Regulatory Quality	-18.14**

	(0.024)
GFC Dummy	0.584
	(0.618)
Arab Uprisings Dummy	0.481
	(0.732)
Reg-Integration	
L.inclusion	0.0349
	(0.824)
L.stability	0.00669
	(0.372)
L.Reg-Integration	-0.306***
	(0.007)
L.de facto	0.346
	(0.331)
L.de jure	0.0657
	(0.506)
L.development	-0.0118
	(0.892)
L.Regulatory Quality	0.0534
	(0.776)
GFC Dummy	0.184***
	(0.000)
Arab Uprisings Dummy	0.0359
	(0.296)
de facto	
L.inclusion	-0.333
	(0.179)
L.stability	-0.0172
	(0.107)
L.Reg-Integration	0.187
	(0.186)
L.de facto	0.328
	(0.536)
L.de jure	-0.137
	(0.331)
L.development	0.130
	(0.347)

L.Regulatory Quality	0.0243
	(0.923)
GFC Dummy	0.000695
	(0.985)
Arab Uprisings Dummy	0.0193
	(0.690)
de jure	
L.inclusion	0.0280
	(0.872)
L.stability	-0.0118
	(0.151)
L.Reg-Integration	0.0484
	(0.689)
L.de facto	0.192
	(0.573)
L.de jure	0.736***
	(0.000)
L.development	-0.0575
	(0.499)
L.Regulatory Quality	-0.305
	(0.114)
GFC Dummy	0.0228
	(0.447)
Arab Uprisings Dummy	-0.0133
	(0.708)
development	
L.inclusion	-0.277
	(0.451)
L.stability	-0.0215
	(0.140)
L.Reg-Integration	0.128
	(0.479)
L.de facto	-0.316
	(0.671)
L.de jure	-0.145
	(0.550)

L.development	1.013***
	(0.000)
L.Regulatory Quality	-0.285
	(0.405)
GFC Dummy	-0.126**
	(0.037)
Arab Uprisings Dummy	-0.0489
	(0.494)
Regulatory Quality	
L.inclusion	-0.154
	(0.548)
L.stability	-0.000285
	(0.976)
L.Reg-Integration	-0.125
	(0.364)
L.de facto	-0.00999
	(0.983)
L.de jure	0.201
	(0.222)
L.development	0.0809
	(0.469)
L.Regulatory Quality	0.884***
	(0.002)
GFC Dummy	0.0192
	(0.616)
Arab Uprisings Dummy	0.0124
	(0.817)
Observations	145

p-values in parentheses
* p<0.10, ** p<0.05, *** p<0.01