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The Role of Stock Exchange Efficiency in Earnings Quality: Evidence from the MENA Region

Journal Name: Research in International Business and Finance

Biography

Enas A. Hassan is an associate professor in the Department of Accounting. She joined Duhok University in 2004, after holding academic appointments at AL-Hadba University College (private College) and the University of Mosul in Iraq. Enas is an active researcher, with research interests in Corporate Governance, International Financial Reporting Standards (IFRS), Financial Reporting, Stock Exchanges Governance and Structure.

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Abstract

This paper examines the association between stock exchange efficiency and the quality of reported earnings for publicly listed firms from 16 MENA countries between 2001 and 2010. The study shows that there is a positive association between stock exchange efficiency and the quality of reported earnings which is robust to potential endogeneity concerns. Meanwhile, the strength of this relationship is not affected by the other exogenous factors (i.e. investor protection, legal origin, economic and political shocks). These results are robust to the inclusion of industry or country fixed effects, exclusion of oil industry, and the use of alternative measures of earnings quality. The study contributes to the extant literature on expanding the definition of the stock exchange efficiency that goes beyond information efficiency. Further, as countries across MENA region are going through reforms, then a study of the influence of such reforms on stock exchange efficiency and earnings quality provides insights in the factors driving stock exchange efficiency in these countries.

JEL Classifications: F63; M41

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Keywords: MENA; Efficiency; Earnings Quality; Propensity Score

1. Introduction

Over the past two decades, there has been a substantial increase in corporate governance-related reforms in some parts of the Middle East and North Africa region (MENA). For example, new stock exchanges, such as the Iraq Stock Exchange, Damascus Stock Exchange, and Saudi Stock Market have been established. Securities legislation has also been amended in some countries to require all listed companies to prepare their accounting reports in accordance with International Financial Accounting Standards (IFRS) in order to improve transparency (e.g. Egypt, Jordan, Iraq, Oman and United Arab Emirates (UAE)). Investment law has also been reformed to encourage foreign direct investments and to grow domestic investments in Iraq, Jordan, Oman, Saudi Arabia, and UAE. These new investment laws provide equal treatment to both foreign and domestic investors, allowing foreign investors to engage in any economic activity. Further, while there are significant similarities, there is also substantial variation in economic growth and stock market features across countries in the region and across time within each country. Despite the fact that a recent economic and financial integration through mechanisms such as the Arab Federation of Exchanges has boosted development of stock exchanges in many countries across the region; the variation in economic growth and stock market features is expected to significantly influence market efficiency (e.g. El Mehdi, 2007; Jefferis & Smith, 2005). Prior empirical research has predominantly explored Asian economies as emerging markets, with emerging markets in the MENA region being largely overlooked. Moreover, a number of studies document an association between earnings quality and external governance mechanisms, including takeovers (e.g. Scharfstein, 1988); analysts following (e.g. Mei & Subramanyam, 2008); banks (e.g. Ahn & Choi, 2009); and institutional ownership (e.g. Ajinkya, Bhojraj & Sengupta, 2005). However, the efficiency with which the stock exchange

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undertakes this role in ensuring the quality of reported earnings is not well understood. For this reason, this paper aims to examine whether the quality of reported earnings is related to the MENA stock exchanges efficiency.

The remainder of the paper proceeds as follows. The next section discusses the theoretical framework. Section 3 reviews related literature and develops hypotheses. Section 4 describes the research method, sample and data. Descriptive statistics and results of hypotheses tests are discussed in section 5; while section 6 presents results of robustness tests. A number of policy implications are presented in section 7, and the conclusion is made in section 8.

2. Theoretical framework

Stock markets play a major role in economic development as they enhance the efficiency in capital formation and allocation (Tadesse, 2004). In this manner, Levine (1991) and Levine and Zervos (1998) were amongst the first to propose endogenous growth models to explain the association between financial development and the long-run rate of economic growth. Levine (1991) claims that stock markets alter investment incentives in ways that change the growth rate. Likewise, Levine and Zervos (1998) document that well-functioning stock markets promote and predict growth, capital accumulation, and productivity improvements. However, the relationship between stock exchange performance and economic growth is dynamic in nature. Thus, there is some debate about the direction of this relationship (Levine & Zervos, 1998). This debate questions whether stock exchange efficiency boosts growth in the economy (Supply-Leading), or whether economic growth promotes stock exchange efficiency (Demand-Following). A two-way causal relationship between exchange performance and economic growth could also exist (Chen et al., 1986; Gurley & Shan, 1967). Further, the direction can also change during different stages of development (Chen et al., 1986; Wu et al., 2010).

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This paper adopts the demand-following view of economic growth, whereby economic growth leads to stimulating stock exchange efficiency. This is due to two main reasons. First, it is not possible to verify by direct empirical evidence the stage of economic development in each country (for example MENA countries), primarily due to a lack of data (Patrick, 1966). Second, the majority of countries in the MENA region are undergoing a process of transformation to stimulate economic growth (Ben Naceur et al., 2007; Cherif & Gazdar, 2010; Hasan & Javed, 2009).

Under this approach, the stock exchange plays a "passive role" in the economic growth process (Gurley & Shan, 1967; Patrick, 1966). The development and growth of the economy generates a need for capital (Hermers & Lensink, 1996). Relatively, macroeconomic activity plays a prominent role in determining stock exchange efficacy, as it creates the demand for specific roles, which in turn influences stock exchange performance (Demirguc-Kunt & Levine, 1995; Singh, 1997). Meanwhile, motivates more investments in securities that are active and enhance the overall trading volume of the exchange. On the other hand macroeconomic instability can increase the volatility of stock exchanges through stock returns of listed firms and the pricing process and hence stock exchange efficiency(Chen et al., 1986; Wongbangpo & Sharma, 2002).

Stock exchange efficiency is a multimodal concept, since exchanges generally comprise various markets and financial products (e.g. Billmeier & Massa, 2007; Cherif & Gazdar, 2010). However, prior studies of stock exchange efficiency limit their focus to information efficiency;[1] and utilize a narrow range of indicators in determining the degree of efficiency. These comprise: economic factors (Hasan & Javed, 2009; Jung, 1986); market depth or liquidity (e.g. Cumming et al., 2011; Shah & Thomas, 2003); and the institutional

[1] According to the finance literature, efficiency is defined as prices at any time that fully reflect all available information (Fama, 1970). Thus, the notion of informational efficiency focuses on the operational consequences of efficiency, emphasizing the role of information in determining the degree of efficiency.

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environment (e.g. La Porta et al., 2006). Meanwhile, prior research observes a high correlation between institutional factors and liquidity, as institutional factors are directly reflected in stock exchange liquidity and liquidity is one important macroeconomic indicator (e.g. Billmeier & Massa, 2007; Demirguc-Kunt & Levine, 1995; Garcia & Liu, 1999). Accordingly, macroeconomic indicators are suggested to be comprehensive determinants of stock exchange efficiency. Therefore, it is expected that fluctuations in stock exchange efficiency be attributed to variation in macroeconomic factors across countries, and hence, macroeconomic variables can be used to rank the efficiency levels of stock exchanges. This process occurs at the macro-level, however it creates at the micro-level a potential demand for monitoring mechanisms that stock exchanges can adopt through more stringent financial and governance rules stipulated in their listing requirements, to improve the efficiency in monitoring listed firms which, in turn, suggests stock exchange efficiency as an external monitor.

3. Literature review and hypotheses development

The incentive of stock exchange efficiency is to enhance exchange functions in general, monitoring role in particular, which is, in turn, reflected in: (i) governance and disclosure rules that oversee the release of private information (Cumming et al., 2011); and (ii) the extent to which exchanges provide investors with insights into firms to assess managerial actions (Humphery-Jenner, 2012). For instance, Tadesse (2004) suggests that an exchange's governance function promotes efficiency, leading to improved economic productivity. A number of studies find evidence to suggest that efficient stock exchanges, characterized by high quality governance (comprising high levels of transparency, contract enforcement and investor protection) mitigate information asymmetry and increase investor confidence (e.g. Cumming et al., 2011; La Porta et al., 2006; Shah & Thomas, 2003). As stock exchange governance becomes stronger over time, the level of efficiency in these

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exchanges gradually improves. Jefferis and Smith (2005) provide support for this proposition in the North African region. Consequently, compliance with financial and corporate governance rules increases stockholders' ability to evaluate managerial investment decisions, and put in place effective managerial incentive schemes designed to motivate managers to act in the best interests of the stakeholders in general, and stockholders in particular (Bushmana & Smith, 2001; Humphery-Jenner, 2012; Scharfstein, 1988). However, the strength with which these functions are carried out varies across stock exchanges (Cumming et al., 2011; Humphery-Jenner, 2012); with some exchanges imposing a variety of sanctions (i.e. monetary and nonmonetary costs) when the listing requirements and other provisions have not been complied with (Christiansen & Koldersova, 2009; Ferrer, 2011). Thus, like other monitoring mechanisms, efficient stock exchanges are committed to reporting breaches of market integrity or disclosure rules. To this end, stock exchanges are key facilitators of managerial discipline. This implies that firms listing on efficient exchanges are more likely to have higher levels of earnings quality (Cumming et al., 2011; Humphery-Jenner, 2012). However, prior studies provide an empirical evidence support reverse causality in the relation between governance mechanisms and earnings quality (e.g. Ahn & Choi, 2009; Bhagat & Bolton, 2008; Gul et al., 2009; Velury & Jenkins, 2006). It is, therefore, hypothesized:

H1: *There is a positive association between stock exchange efficiency and the quality of reported earnings, which may run in both ways.*

Further, it is possible that the association between earnings quality and stock exchange efficiency is affected by the level of investor protection. Prior studies document a positive association between investor protection and stock market efficiency (Black, 2001; Goshen & Parchomovsky, 2006; Humphery-Jenner, 2012; La Porta et al., 2006). It is argued that better investor protection is associated with greater transparency and less corruption, and leads to stronger investor confidence (Frost et al., 2006). Consequently, an efficient stock

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exchange with strong investor protection provides stockholders with a market-monitoring mechanism to evaluate past managerial decisions and to discipline opportunistic managerial behaviour, which impacts positively on the quality of reported earnings (Goshen & Parchomovsky, 2006; La Porta et al., 2000). It is expected, therefore, that

H2: *The strength of the relationship between stock exchange efficiency and earnings quality is likely to be stronger in the presence of strong investor protection.*

Moreover, prior studies suggest legal origin, as another exogenous factor that may affect the relation between stock exchange efficiency and earnings quality; since countries with a legal origin based in common law, in general tend to have a more developed stock market than countries with a foundation in code law (La Porta et al., 2000; Leuz et al., 2003). For instance, Burgstahler et al. (2006) find that countries with a common law origin have large equity markets, and firms are less likely to engage in earnings management, supporting the notion that strong capital markets are more likely to improve earnings informativeness. The formal hypothesis is as follows:

H3: *The strength of the relationship between stock exchange efficiency and earnings quality is likely to be stronger in countries with a common law tradition.*

Finally, this paper extends the previous discussion to include the effect of stock exchange efficiency on earnings quality during economic and political shocks. Prior research shows that the Global Financial Crisis (GFC) has a negative impact on emerging stock markets in general and MENA markets in particular (Lagorde-Segot & Lucey, 2006). Extant literature also highlights the role of governance in increasing firm value during financial shocks such as the GFC (Aldamen et al., 2011). Neaime (2012) indicates that stock exchange efficiency in the MENA region has a negative impact on performance during the GFC period. The expectation is that:

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H4: *The strength of the relationship between stock exchange efficiency and earnings quality is likely to be stronger during the GFC period.*

Furthermore, it is often argued that political unrest in the MENA region causes instability in the business environment. This is due to the shift in market expectations resulting from international and domestic investors' behaviour, as high risk leads to an observable structural break in the market linkages (Malik & Awadallah, 2013). In addition, political unrest can also reflect governance weakness and lead to significant reforms in the governance and transparency regime (Saidi & Ahmed, 2012). The expectation is that:

H5: *The strength of the relationship between stock exchange efficiency and earnings quality is likely to be stronger during periods of political unrest (i.e. Arab Spring).*

4. Sample and research design

4.1. Data and sample

The sample comprises 8,383 firm-year observations, obtained from the OSIRIS database for publicly listed firms from 16 economies across the MENA region during the years 2001-2010. Other data related to stock exchange efficiency measure (12 macroeconomic factors) collected from the World Bank indicators, the International Monetary Fund World Economic Outlook (WEO), Economist Intelligence Unit database (EIU), Nation Master and the Trading Economics database.

4.2. Construction of variables

4.2.1 Dependent variable: Earnings quality

Eearnings quality is measured using performance-adjusted abnormal accruals (Kothari et al., 2005), based on an industry-specific (two-digit SIC code) performance-adjusted cross-sectional accruals. First, Equation (1) is employed to estimate normal accruals in each year from 2001 to 2010 to obtain the coefficient estimates $\hat{\beta_0}$, $\hat{\beta_1}$, $\hat{\beta_2}$, $\hat{\beta_3}$ and $\hat{\beta_4}$ (normal

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accruals).

$$\frac{TA_{it}}{AT_{t-1}} = \beta_0 + \beta_1 \frac{1}{AT_{t-1}} + \beta_2 \frac{\Delta SALES_t}{AT_{t-1}} + \beta_3 \frac{PPE_t}{AT_{t-1}} + \beta_4 \frac{ROA_t}{AT_{t-1}} + \varepsilon_{ijt} \qquad \text{(Equation 1)}$$

Where: $TA_{it}$is Total accruals in year t; AT_{t-1} represents lagged total assets; $\Delta SALES_t$ is the change in sales from time t-1 to time t; PPE_t is gross property, plant and equipment at time t; ROA_t = the ratio of net income to total assets at time t; and ε_{ijt} represents the error term. A description of each variable is provided in Appendix A.

Equation (2) is a re-arrangement of Equation (1) where the industry-specific coefficients estimates $\hat{\beta_0}$, $\hat{\beta_1}$, $\hat{\beta_2}$, $\hat{\beta_3}$ and $\hat{\beta_4}$ are applied to the right-hand side variables in Equation (1) in each year and each SIC Code to determine ε_{it} (residuals) which represents abnormal accruals (earnings quality). The higher the residuals are, the lower the quality of earnings.

$$\varepsilon_{ijt} = \frac{TA_{it}}{AT_{t-1}} - \left(\hat{\beta_0} + \hat{\beta_1} \frac{1}{AT_{t-1}} + \hat{\beta_2} \frac{\Delta SALES_t}{AT_{t-1}} + \hat{\beta_3} \frac{PPE_t}{AT_{t-1}} + \hat{\beta_4} \frac{ROA_t}{AT_{t-1}} \right) \qquad \text{(Equation 2)}$$

Where: $\hat{\beta_2}$ to $\hat{\beta_4}$ are estimated intercept and coefficients representing expected accruals for firm i. The remaining variables are defined as in Equation (1), with descriptions provided in Appendix A. Given that the direction of residuals is not of interest in the tests, the absolute value of residuals is used. It is calculated by multiplying negative residuals by (-1).

4.2.2 Test Variable: Stock Exchange Efficiency

Stock exchange efficiency (SE_EFF_t) is measured as an aggregate of the quartile rankings of the 12 macroeconomic factors. Each macro-indicator variable is described in Appendix A.[2] A continuous measure of Stock exchange efficiency (SE_EFF) is created over

[2] Note that income level and exchange rate variables are in US$ million, while others are ratios. In order to linearize the exponential trend of income level and exchange rate (if any) and to minimise the scale, the natural logarithm of income level and exchange rate are taken.

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three steps.[3] First, an ascending (descending) quartile ranking is used for factors that increase (decrease) stock exchange efficiency. Second, an aggregate score on country level and years is created from the mean score of quartile rankings for all factors. A higher (lower) mean score indicates higher (lower) stock exchange efficiency.

4.2.3 Control variables

Prior literature (for example Ahn & Choi, 2009, Anderson & Reeb, 2003, Barth et al., 2008, Biddle et al. (2009), Demirguc-Kunt & Levine, 1995, Fernando et al. (2012), Klapper & Love, 2004, Matsumoto, 2002, and Maury, 2006) suggests that stock exchange characteristics (i.e. market size), other external governances (i.e. institutional ownership, analysts' following, auditor quality), and firm specific characteristics (i.e. firm size , firm age , leverage, market-to-book ratio, and adopting IFRS) are important determinants of earnings quality. Finally, categorical variables for the industry using the Fama-French (Fama & French, 1997) forty-eight industry classifications and year are also used to control for any industry and year fixed effects. Variable descriptions are provided in Appendix A.

5. Results

5.1 Descriptive statistics

Table 1 reports the summary statistics for dependent, the lower the absolute value of abnormal accruals, the higher, the quality of earnings. The mean (median) of the absolute value of abnormal accruals, as a measure of earnings quality (EQ), is 0.1832 (0.0880) ranging from 0.0366 in Quartile 1 to 0.2057 in Quartile 3. The average value of EQ varies across countries, from an average of 0.0806 in Lebanon to 0.3940 in Iraq. This suggests a notable

[3] Basu (2004) suggests that using a continuous market efficiency measure provides large benefits such as improved ability to evaluate regulatory initiatives ex post, exploring the impact of market development on market efficiency, and better demonstrating investors decision.

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variation in mean EQ across firms. These results are consistent with prior research (e.g. Becker et al., 1998; Klein, 2002).

[Table 1 about here]

Table 2 shows that the mean (median) stock exchange efficiency is 2.6593 (2.7500), and varies from a country average of 2.2715 for Oman to 2.7045 for the United Arab Emirates. While Lebanon does not have the highest stock exchange efficiency in the region, it is represented in the three countries with the best stock exchange efficiency after United Arab Emirates and Bahrain. The composite measure of SE_EFF is constructed in such a way that a smaller (larger) value corresponds to lower (higher) stock exchange efficiency.

[Table 2 about here]

Figure (1) reports country-level stock exchange efficiency level (SE_HL) high versus low by country over the sample period 2001 to 2010. The level of efficiency varies across time for sample countries. While there is a generally improving efficiency trend across the sample period which is consistent with prior study's findings (e.g. Arshad et al., 2016), this is not necessarily the case for all countries. For instance, Oman, Malta and Jordan move from high efficiency to low efficiency throughout the period. Hence, it can be said that United Arab Emirates has the more frequencies of high stock exchange efficiency during the sample period versus low stock exchange efficiency (only in 2001 and 2002), illustrates a better picture compared to other countries sample such as Iraq, which has the highest frequency of low efficiency in seven sample years. These results are consistent with prior research (e.g. Li, 2003; Jefferis and Smith, 2005)[4].

[4] Li (2003) examines the impact of enhancing stock exchange governance (i.e., disclosure requirements and regulation enforcement) on stock exchange efficiency at the Shanghai and Shenzhen Stock Exchanges from 1991 to 2001. Results show that efficiency levels across the Shanghai and Shenzhen stock markets changed gradually from being highly significant to being insignificant over the 10 years of the study. Jefferis and Smith (2005) provide support for these results in the context of the North African region, where they investigate seven African stock exchanges: Egypt, Kenya, Mauritius, Morocco, Nigeria, South Africa and Zimbabwe between

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[Figure (1) about here]

Table 3, panel A, shows that the mean (median) of the natural log of market capitalisation (LnMK) is 4.1293 (4.3033). Untabulated results report that market capitalisation in MENA countries range from a minimum of USD$ 576,099,211 million to a maximum of USD$ 646,000 billion, indicating a moderate market size compared with market capitalization presented in prior studies such as Yartey (2008) and Frost et al. (2006)[5]. The mean (median) firm size (LnSIZE) is 11.4129 (11.2183). Untabulated results show that on average the value of total assets is US$1,161,444.65 million, ranging from a minimum of US$22,383,000 to a maximum of US$92,468,301 million. The average (median) leverage (LEV) is 0.56 (0.51), implying that sample firms, on average, have low borrowings in their capital structure.

[Table 3 about here]

Table 3, panel B, results indicate that in general 41.82 percent of sample firms operate in countries classified by the World Bank Index (IVEPRT) to have weak investor protection, whereas 58.18 percent of the sample firms are domiciled in countries classified to have strong investor protection. Further, 56.96 percent of sample firms operate in countries with a code law tradition (LOR= 0), while 43.04 percent of sample firms operate in countries with a common law tradition (LOR= 1).

The majority of sample firms have institutional ownership (87.23 percent). This high proportion of institutional ownership is likely to reflect better monitoring of corporate managers (e.g. Cornett et al., 2008). On the other hand, only 7.31 percent of sample firms has

1993 and 2001. Their results suggest that a variation in efficiency across exchanges during the sample period tends to increase significantly as a result of the reforms that have been made in the governance function of sample exchanges.

[5] Yartey (2008) studies 42 emerging markets (Israel and Jordan are included in Yartey's sample), and Frost et al. (2006) examine 50 exchanges which are members of the World Federation of Exchanges (Iran and Israel are included in Frost's sample).

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analysts' following (ANALY), which is very small compared to other studies (e.g. Yu, 2008). Finally, a BIGN audit firm audits only 27.61 percent of sample firms.

A Pearson correlation matrix, together with variance inflation factors (VIF), presented in Table 5, reveal no issues with multicollinearity amongst independent variables.

[Table 4 about here]

5.2 Main results

Table 5 presents the results of the association between SE_EFF and earnings quality (EQ) using pooled Ordinary Least Squares (OLS) regression analysis. Column 1 reports the empirical test of (H1). The results shows the coefficient estimate of SE_EFF for the full sample to be negative and significant (*t*-statistic = -4.270, *p*-value = <.0001), indicating that as MENA stock exchanges efficiency increases, earnings quality of their listed firms increases (firms have lower levels of abnormal accruals). This finding is in line with the extant literature exploring the association between other forms of external monitoring and reporting quality (see for example Velury & Jenkin, 2006; Ahn & Choi, 2009). Supplementary analyses using sub-samples that exclude financial firms (untabulated) present consistent findings. Gujarati (2004) test is next used (untabulated) to determine the economic significance of the explanatory variable (SE_EFF). The Gujarati (2004) F-statistic is 27.17 and significant (p-value <0.01), indicating that SE_EFF significantly increases the explanatory power of the regression model.

[Table 6 about here]

Further, to investigate the reverse causality concern, a lead-lag approach is adopted by regressing the dependent variable on a one-year lagged measure of SE_EFF (test variable) and lagged control variables. Results show that the coefficient of the lagged SE_EFF is negatively and significantly associated with the absolute value of abnormal accruals (*t*-

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statistic = -3.540, *p*-value = 0.0004), suggesting that the current earnings quality is related to the prior level of SE_EFF[6].

To test (H2) an interaction term (SE_EFF*IVEPRT) is added into the main model. Results (see Column 3, Table 6) show that the coefficient of SE_EFF*IVEPRT is not significant, which is inconsistent with our prediction. The coefficient of IVEPRT is in the expected direction but also insignificant. Nevertheless, the coefficient on SE_EFF is significant and in the expected direction (*t*-statistic = -3.990, *p*-value = <.0001), indicating that stock exchange efficiency as an external mechanism has a profound impact on listed firms accruals even in MENA countries with weak investor protection (IVEPRT=0).

To test (H3) the interaction between LOR and SE_EFF is employed. Results in Table 6, column 4, indicate that the coefficient estimate of SE_EFF*LOR is not statistically significant. This result is inconsistent with expectations, however it aligns with the results reported in relation to the association between SE_EFF*IVEPRT and accruals. The coefficient of SE_EFF is statically significant at the 1 percent level (*t*-statistic = -3.330, *p*-value = 0.0009) and in the expected direction. The coefficient on LOR also shows an insignificant result. These results are inconsistent with prior studies that suggest firms performing in countries with a foundation in common law to have a higher earnings quality (e.g. Burgstahler et al, 2006; La Porta et al., 2000; Leuz et al., 2003). More precisely, the result indicates no differences in the earnings quality of listed firms between code and common law countries in the MENA region. This may explained as legal system of most countries in the MENA region is rooted in various origins and many of them are adopting a

[6] In supplementary tests one-year lagged dependent variables for earnings quality (the absolute value of abnormal accruals) is used instead of the current accruals level as dependent variable (e.g. Ahn & Choi, 2009; Bhagat & Bolton, 2008; Gul et al., 2009; Velury & Jenkin, 2006;). Another approach adopted by prior studies (e.g. Klein, 2002) includes controlling for lagged dependent variable (i.e., EQ) as an independent variable on the right-hand-side of the model. Untabulated results report that the coefficient of SE_EFF is negatively and significantly associated with the absolute value of abnormal accruals (*t*-statistic = -3.420, *p*-value = 0.0006). Similarly controlling for lagged dependent variable, untabulated results show a significant coefficient, but only at the 10 percent level (*t*-statistic = -1.870, *p*-value = 0.0612).

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legal system that mixes an inherited origin with religious law. Further, many of them have made major reforms to westernise their institutions and regulations.

Finally, to test (H4), results (see column 5 of Table 6) show an insignificant coefficient on the interaction term. However, the coefficient of SE_EFF is negative and significant (*t*-statistic = -7.790, *p*-value = <.0001), suggesting that in non-GFC years, firms listed in efficient stock exchanges in the MENA region have lower level of accruals than their counterparts listed in inefficient stock exchanges. These results are consistent with prior studies that suggest stock exchange efficiency in the MENA region has a negative impact on performance during the GFC period (e.g. Lagorde-Segot & Lucey, 2006; Neaime, 2012). The GFC variable is negative and insignificant.

When H5 examines the effect of the Arab Spring (see Column 6 of Table 6), the coefficient on SE_EFF*ASPRING is positive and significant at the 1 percent level (*t*-statistic = 5.050, *p*-value = <.0001), implying that the impact of SE_EFF on accruals is more profound in non-ASPRING years than in ASPRING years. Consistent with expectations, the coefficient estimate on SE_EFF is negative and significant (*t*-statistic = -10.250, *p*-value = <.0001), suggesting that SE_EFF has an important role in reducing the value of abnormal accruals in non-ASPRING year. Further, the results report a negative and significant coefficient on ASPRING, reflecting the differences in accruals during ASPRING years and non-ASPRING years. The result suggests that the quality of reported earnings in non-ASPRING years is higher than in ASPRING years through MENA countries.

5.3 Propensity matching approach

Further analysis conducted using propensity score-matched samples across two groups subject to high and low stock exchange efficiency (e.g. Bellak et al., 2006; Krishnan et al., 2011). A modification of Nearest Neighbour Matching used to match all control variables

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across the two groups, so the difference in stock exchange efficiency across the two samples is free from the potential effects of control variables. The matching algorithm based on a next neighbour within an a priori specified range, or a calliper width of 0.05 to reduce the probability of bad matches, since there is a lower selectivity bias compared to other matching methods.

A logistic regression performed using SE_HL [7] (a dichotomous variable) as the dependent variable for 4,875 matched-pairs of high and low stock exchange efficiency firm-year observations. The untabulated logistic regression has good explanatory power, with an adjusted pseudo-R^2 of 44.63 percent. The likelihood ratio and Wald Chi-square are 3080.2585 and 1108.5503, respectively. The results (see Panel A of Table 7) indicate a negative and significant coefficient for SE_HL (*t*-statistic = -4.480, *p*-value = <.0001). This suggests that firms with higher (relative to lower) stock exchange efficiency have incrementally lower abnormal accruals. Panel B of Table 7 reports a statistically significant difference between the two groups in relation to abnormal accruals (*t*-statistic = -7.12, p-value = <.0001).

[Table 7 about here]

6. Robustness tests

In order to mitigate the possibility of any validity threats relating to earnings quality measurement, the main model is re-estimated using different measures of earnings quality including timely loss recognition and earnings toward target suggested by prior studies (e.g. Lang et al., 2006). The results (untabulated) of using timely loss recognition measure[8] show that the coefficient on SE_EFF is positive and significant at the 1 percent level (*t*-statistic =

[7] The continuous measure of stock exchange efficiency is converted to a dummy variable, where SE_HL=1 if the mean of the aggregate score is above the median (indicate high stock exchange efficiency), and SE_HL=0 if the score is below the median (indicate low stock exchange efficiency).

[8] The dependent variable is an indicator set to one for observations for which annual net income scaled by total assets is less that -0.20 and set to zero otherwise.

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3.700, *p*-value = 0.0002), implying that firms listed in efficient stock exchanges are more likely to report large negative earnings. However, the results (untabulated) of using earnings toward target measure[9] indicate that the coefficient on SE_EFF is positive and significant at the 5 percent level (*t*-statistic = 2.350, *p*-value = 0.0186), suggesting that the main results are not sensitive to using earnings toward target measure. Further, prior research argues that income-increasing (positive) and income-decreasing (negative) accruals are likely to be of separate concern and individually associated with opportunistic earnings management (Gul et al., 2009; Prawitt et al., 2009). Following Gul et al. (2009), the model is re-estimated using positive and negative sub-samples. In contrast to the results for the full sample, untabulated result shows that the SE_EFF coefficient is negative and significant (*t*-statistic = -2.120, *p*-value = 0.0338) when the positive sub-sample is examined, confirming the main results. The results for the sub-sample of negative abnormal accruals (untabulated) show a positive and significant coefficient on SE_EFF (*t*-statistic = 2.730, *p*-value = 0.0064), suggesting that the effect of stock exchange monitoring on mitigating earnings management is likely to be greater with respect to income-increasing accruals than income-decreasing accruals. This result is consistent with the interpretation of income decreasing (negative) as a conservative approach rather than opportunistic behaviour (e.g. Gul et al., 2009). Further, another supplementary analysis explores the issue of the MENA region attributes, as most of the countries are heavily dependent on natural resources[10]. The untabulated result of the interaction term between stock exchange efficiency measure and Ind_Oil[11] shows insignificant coefficient. However, the coefficient on SE_EFF is negative and significant at 1

[9] The dependent variable is an indicator set to one for observations for which annual net income scaled by total assets is between 0 and 0.01 and set to zero otherwise.

[10] Billmeier and Massa (2007) empirically examine 17 MENA and Central Asia stock exchanges between 1995 and 2005, and conclude that stock exchange efficiency stimulates economic growth in non-oil countries more than oil countries in the region. Further, Hall (1993) documents that managers in companies involved in the oil industry are more motivated to engage in earnings management practices, due to the high volatility of oil prices.

[11] To capture the effect of operating in the oil industry, the Ind_Oil variable is employed as a dummy variable coded (Ind_Oil =1) if the firm is involved in the oil industry, and (Ind_Oil =0) otherwise. Further, there are 304 firm-year observations involved in the oil sector, which accounts for 1.18% of sample firms.

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percent level (*t*-statistic = -2.950, *p*-value = 0.0032), suggesting that SE_EFF as governance has a significant impact on accruals level in non-oil firms.

7. Implications of the results

The results of this study are of importance to the academic body of knowledge, and to investors and policy makers in the MENA countries. For academics, it adds to the very limited literature (Holmstrom & Tirole, 1993) that focuses on the theoretical aspects of the stock exchange mechanism role, whereas this study empirically measure the strength of stock exchange mechanism and expands prior studies by focusing on comprehensive proxy for stock exchange efficiency that goes beyond information efficiency. Meanwhile, it helps for better understanding the role of external monitoring mechanisms in mitigating agency problems, leading to improved earnings quality. For investors, local and international, interested in investing in the MENA region, the conclusion drawn about the effectiveness of the stock exchange as an external monitor provides support for the reliability of information regarding the quality of reported earnings for the firms in the region before taking investment decisions. For MENA policy makers, the results of this study provide timely findings given the current reforms in progress by the MENA authorities for improving corporate governance standards and market efficiency to assess whether their reforms, aimed at improving the investment environment, have achieved their objectives. Further, the evidence on the role of stock exchange efficiency as an external monitor encourages rule makers and regulators to strengthen and develop policies to establish legislations to improve the quality of reported earnings. Such actions have positive impact in attracting FDI especially in countries with weak legal/institutional environment. In addition, the study shows that stringent stock exchange regulation accompanied by strong investor protection and major reforms to institutions and regulations are needed to encourage market efficiency to reduce reliance on the non-renewable oil revenues in order to promote local and regional economic growth. It

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also puts pressure on the other MENA countries to adopt effective policies with a view to improving legislative frameworks for corporate governance and market efficiency.

8. Conclusion

There has been limited examination of the association between stock exchange monitoring and firm outcomes. Those that do, capture only limited aspects of stock exchange governance functions (i.e. securities regulation, trading system), and examine their association with a limited range of firm outcomes such as cost of equity and corporate valuation. Thus, this study attempts to fill this gap and adds to this line of literatuer by using macroeconmic factors as adeterminits of stock exchange efficiency which provides a comperhencive measure of efficiency that goes beyond information efficiency. Consequently, this study answers an important research question, whether MENA stock exchanges efficiency influences earnings quality of their listed firms. The results indicate that there is a negative associated between stock exchange efficiency and the absolute value of abnormal accruals (a proxy of earnings quality). These results are in line with the extant literature that documents a positive association between external mechanisms (e.g. Big *N* auditor firms, banking, and institutional ownership) and earnings quality (e.g. Ahn & Choi, 2009; Gul et al., 2009; Teoh & Wong,1993; Velury & Jenkins, 2006). These findings supported by the propensity score-matching approach, suggesting that firms listed on more efficient stock exchanges have higher earnings quality (lower accruals) than their counterparts listed in less efficient stock exchanges. Meanwhile, this association continues to be evident in the presence of other exogenous factors shown in prior research to affect earnings quality, comprising investor protection, legal origin, and instability resulting from economic and political events.

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Appendix A. Data description and sources

Variables used to obtain the measure of earnings quality (EQ)	
Total accruals (TA_{it})	Current net income minus current cash flows
Lagged total assets (AT_{t-1})	Total assets at the end of the previous year
Change in sales ($\Delta SALES_t$)	Change in sales from time t-1 to time t
Property plant and equipment (PPE_t)	Gross property, plant and equipment at time t
Return on assets (ROA_t)	Ratio of net income to total assets at time t
Variables used to obtain the measure of stock exchange efficiency (SE_EFF)	
Income level (GDP)	Gross domestic product (GDP) in U.S. dollars
Savings rate (Sav)	Ratio of gross savings divided by GDP
Investment rate (Inv)	Ratio of gross fixed capital divided by GDP
Inflation change (CPI)	Consumer price index (CPI) over an annual period
Bank sector development (Liquid)	Liquid assets as a percentage of GDP
Stock market liquidity	Measured by two ratios: the ratio of last year's value traded to GDP (Vtrade) and turnover ratio (turn)
Interest rate (InteR)	Real rate of interest
Exchange rate (Exch)	U.S. dollar has been used as the benchmark currency
Foreign direct investment (FDI)	Net foreign direct investment flows to GDP
Private capital flows (PrivCa)	Net private capital flows to GDP
Rate of unemployment (Unempl)	Last year's unemployment rate
Remittances (Remit)	Net amount of workers' remittances to GDP
Other independent test variables	
Legal origin (LOR)	1 if the country has a common law legal origin; 0 otherwise
Investor protection (IVEPRT)	The rank on the World Bank Investor Protection Index measured as 1 (0) if ranked above (below) the median rank
Global Financial Crisis (GFC)	1 in years 2008 and 2009; and 0 otherwise
Arab Spring (ASPRING)	1 in years 2009 and 2010; and 0 otherwise.
Control variables	
Stock exchange characteristics:	
Size (LnMK)	Natural log of market capitalization
External governance:	
Institutional ownership (INOWER)	1 if there is one or more institutional owner over the sample period; 0 otherwise
Analyst following (ANALY)	1 if there is analyst following; 0 otherwise
Audit quality (BIGN)	1 if the firm uses the services of a Big *N* auditor; 0 otherwise
Firm-specific characteristics:	
Firm size (LnSIZE)	Natural log of total assets at the end of the year
Firm age (LnAGE)	Natural log of firm age (in years)
Leverage (LEV_t)	Total debt divided by total assets at the end of year t
Market to book (MB)	Market value divided by the book value of the firm's equity at year-end
Accounting standards quality (ACS)	1 if the firm adopted IFRS; 0 otherwise
Industry and year controls:	
Industry fixed effects	Categorical variable to classify the firm's industry based on Fama and French's (1997) 48 industry groups
Year fixed effects	Categorical variable to control for year fixed effects

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Table 1: Earnings quality by country

	N	Mean	Q1	Median	Q3	Std.
All sample	8,383	0.1832	0.0366	0.0880	0.2057	0.2663
Bahrain	107	0.1670	0.0182	0.0408	0.1094	0.3240
Egypt	1,324	0.1716	0.0323	0.0736	0.1767	0.2590
Iran	15	0.1698	0.0540	0.0932	0.1921	0.2024
Iraq	7	0.3940	0.1622	0.1746	0.8725	0.4194
Israel	2,630	0.2051	0.0418	0.1114	0.2470	0.2757
Jordan	1,235	0.1900	0.0377	0.0900	0.1979	0.2833
Kuwait	557	0.2152	0.0618	0.1289	0.2404	0.2738
Lebanon	17	0.0806	0.0581	0.0649	0.0904	0.0534
Malta	57	0.1194	0.0250	0.0839	0.1235	0.2151
Morocco	153	0.1342	0.0319	0.0757	0.1588	0.1603
Oman	777	0.1586	0.0318	0.0784	0.1837	0.2335
Palestinian Territory	22	0.1457	0.0365	0.0741	0.1337	0.2305
Qatar	142	0.1596	0.0299	0.0652	0.1492	0.2605
Saudi Arabia	777	0.108	0.0406	0.1036	0.1149	0.1019
Tunisia	193	0.1278	0.0296	0.0749	0.1295	0.1691
United Arab Emirates	370	0.1604	0.0284	0.0762	0.1690	0.2287

Notes: This table provides a description of firm-level earnings quality (EQ) for each country in the sample. The sample period is from 2001 to 2010. All variables are defined in Appendix A.

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Table 2: Stock exchange efficiency by country

Panel A: Stock exchange efficiency composite measure (SE_EFF), 2001-2010

	N	Mean	Q1	Median	Q3	Std.
All sample	160	2.6593	2.4167	2.7500	2.9231	0.4255
Bahrain	10	2.6569	2.3182	2.4500	3.0545	0.5065
Egypt	10	2.5064	2.1538	2.5385	2.8846	0.5118
Iran	10	2.5090	2.3750	2.6250	2.7750	0.4574
Iraq	10	2.3527	2.0000	2.3542	2.6667	0.5421
Israel	10	2.2715	1.5057	2.5265	2.8636	0.7566
Jordan	10	2.3819	2.0769	2.4391	2.7917	0.4413
Kuwait	10	2.2715	1.5057	2.5265	2.8636	0.7566
Lebanon	10	2.6313	2.1667	2.6783	3.0417	0.5002
Malta	10	2.5121	2.1364	2.4615	2.9231	0.4267
Morocco	10	2.5112	1.7147	2.6923	3.1987	0.7746
Oman	10	2.5417	2.4583	2.625	2.7083	0.2694
Palestinian Territory	10	2.5000	2.2250	2.4318	2.8500	0.5018
Qatar	10	2.3336	2.0556	2.3542	2.6500	0.4440
Saudi Arabia	10	2.6068	2.3750	2.5994	2.9167	0.3926
Tunisia	10	2.4931	2.1250	2.4583	2.8750	0.4760
United Arab Emirates	10	2.7045	2.3667	2.6717	3.0556	0.4220

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Table 3: Descriptive statistics

Panel A: Continuous Variables

	N	Mean	Q1	Median	Q3	Std.
LnMK	15,761	4.1293	3.6088	4.3033	4.6775	0.7808
LnSIZE	16,458	11.4129	10.1360	11.2183	12.6657	2.0262
LnAGE	16,794	1.5816	1.0986	1.6094	2.0794	0.5354
LEV	16,326	0.5628	0.3235	0.5138	0.7736	0.3345
MB	11,754	1.9600	0.9562	1.6286	2.3696	2.0004

Panel B: Dichotomous Variables

	Value	Frequencies	%
IVEPRT	0	7,024	41.82
	1	9,770	58.18
LOR	0	9,566	56.96
	1	7,228	43.04
INOWNER	0	2,145	12.77
	1	14,649	87.23
ANALY	0	15,567	92.69
	1	1,227	7.31
BIGN	0	12,158	72.39
	1	4,636	27.61
ACS	0	11,677	69.53
	1	5,117	30.47

Notes: This table presents the descriptive statistics of dependent and control variables. The sample period is from 2001 to 2010. Summary statistics are based on firm-year observations. All variables are defined in Appendix A.

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Table 4: Pearson correlation matrix

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	VIF
SE_EFF	[1]	1.00										1.5673
LnMK	[2]	**0.284**	1.00									1.4866
INOWNER	[3]	0.002	**0.284**	1.00								1.2850
ANALY	[4]	**0.191**	-0.001	**0.066**	1.00							1.2513
BIGN	[5]	**-0.161**	**-0.240**	**-0.225**	**-0.034**	1.00						1.1465
LnSIZE	[6]	**0.063**	**-0.042**	**0.163**	**0.233**	**-0.059**	1.00					1.6594
LnAGE	[7]	**0.352**	**0.109**	**0.026**	**0.125**	**-0.175**	**0.157**	1.00				1.3528
LEV	[8]	**0.123**	0.000	**-0.056**	**0.057**	0.006	**0.159**	**-0.093**	1.00			1.2372
MB	[9]	0.008	-0.002	0.006	-0.007	**0.019**	**0.021**	-0.006	**-0.025**	1.00		1.0072
ACS	[10]	**0.275**	**0.229**	**0.129**	**0.023**	**-0.181**	**0.174**	**0.074**	**0.095**	0.004	1.00	1.5997

Notes: This table provides the correlation matrix for dependent, test and control variables. Correlations significant at two-tailed 0.01 and 0.05 levels are in bold figures. All variables are defined in Appendix A.

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Table 5: Test of hypotheses

	Pred. Sign	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	?	0.504*** (9.730)	0.387*** (7.000)	0.604*** (7.680)	0.525*** (8.330)	0.602*** (10.550)	0.724*** (12.520)
SE_EFF	-	-0.069*** (-5.620)	-0.047*** (-3.540)	-0.081*** (-3.990)	-0.053*** (-3.330)	-0.095*** (-7.840)	-0.126*** (-10.320)
IVEPRT	-			-0.056 (-0.810)			
SE_EFF * IVEPRT	+/-			0.018 (0.750)			
LOR	-				0.073 (1.190)		
SE_EFF * LOR	+/-				-0.027 (-1.320)		
GFC	+/-					-0.024 (-0.390)	
SE_EFF * GFC	+/-					0.007 (0.370)	
ASPRING	+/-						-0.326*** (-5.460)
SE_EFF * ASPRING	+/-						0.104*** (5.050)
LnMK	-	0.007 (1.440)	0.011** (2.140)	0.005 (0.940)	0.007 (1.360)	-0.001 (-0.140)	-0.002 (-0.390)
INOWER	-	0.002 (0.110)	0.001 (0.050)	0.000 (0.040)	0.000 (0.030)	0.000 (0.040)	-0.000 (-0.020)
ANALY	-	-0.004 (-0.370)	-0.005 (-0.490)	-0.004 (-0.380)	-0.006 (-0.590)	-0.029*** (-3.150)	-0.029*** (-3.150)
BIGN	-	0.008 (1.030)	0.015* (1.730)	0.008 (1.010)	0.008 (0.940)	0.002 (0.290)	0.004 (0.490)
LnSIZE	-	-0.011*** (-6.580)	-0.007*** (-4.030)	-0.010*** (-6.310)	-0.011*** (-6.660)	-0.010*** (-5.930)	-0.009*** (-5.880)
LnAGE	-	-0.006 (-1.060)	-0.007 (-1.340)	-0.007 (-1.110)	-0.006 (-1.010)	0.007 (1.210)	0.001 (0.120)
LEV	+	0.017** (2.130)	-0.001 (-0.060)	0.019** (2.320)	0.019** (2.420)	0.019** (2.440)	0.017** (2.100)
MB	-	-0.000*** (-3.660)	-0.001 (-0.140)	-0.000*** (-3.650)	-0.000*** (-3.640)	-0.000*** (-3.890)	-0.000*** (-4.010)
ACS	-	0.011* (1.760)	0.010 (1.330)	0.012* (1.690)	0.016** (2.290)	-0.014*** (-2.600)	-0.014** (-2.510)
Year fixed effects		Included	Included	Included	Included	Included	Included
Industry fixed effects		Included	Included	Included	Included	Included	Included
N		8,383	8,383	8,383	8,383	8,383	8,383
Adj-R^2		0.3978	0.4010	0.3982	0.3984	0.3877	0.3920
F-value		70.90***	64.12***	67.82***	67.87***	72.55***	73.85***

Notes: This table reports the results from pooled OLS regressions of testing hypotheses. All variables are defined in Appendix A. T-statistics are given in parentheses. Next to coefficients ***, ** and * indicate significance levels at 1%, 5% and 10% (2-tailed), respectively.

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Table 6: Test of stock exchange efficiency using propensity score matching with earnings quality

Panel A: Regression results of EQ on SE_HL using propensity score matching sample

	Predicted Sign	(1)
Intercept		-1.425*** (-6.380)
SE_HL	-	-0.146*** (-4.480)
Controls #		Included
Year fixed effects #		Included
Industry fixed effects#		Included
N		4,875
Adj-R^2 (with test variable) (without test variable)		0.4501 (0.4485)
F-value		82.43***

Panel B: Comparison of mean EQ using propensity score matched high and low SE_EFF

Variable	Low SE_HL	High SE_HL	*t*-statistic	*p*-value
EQ	-2.3214	-2.6544	-7.12	<0.0001

Notes: This table presents the results of pooled OLS regression where stock exchange efficiency is determined from a propensity matched sample and measured as a dichotomous variable as high and low stock exchange efficiency (in Panel A). Panel B presents a comparison of the mean EQ between propensity matched high and low stock exchange efficiency sub-samples. All variables are defined in Appendix A. T-statistics are given in parentheses. Next to coefficients ***, ** and * indicate significance levels at 1%, 5% and 10% (2-tailed), respectively. #The coefficients are not reported for brevity.

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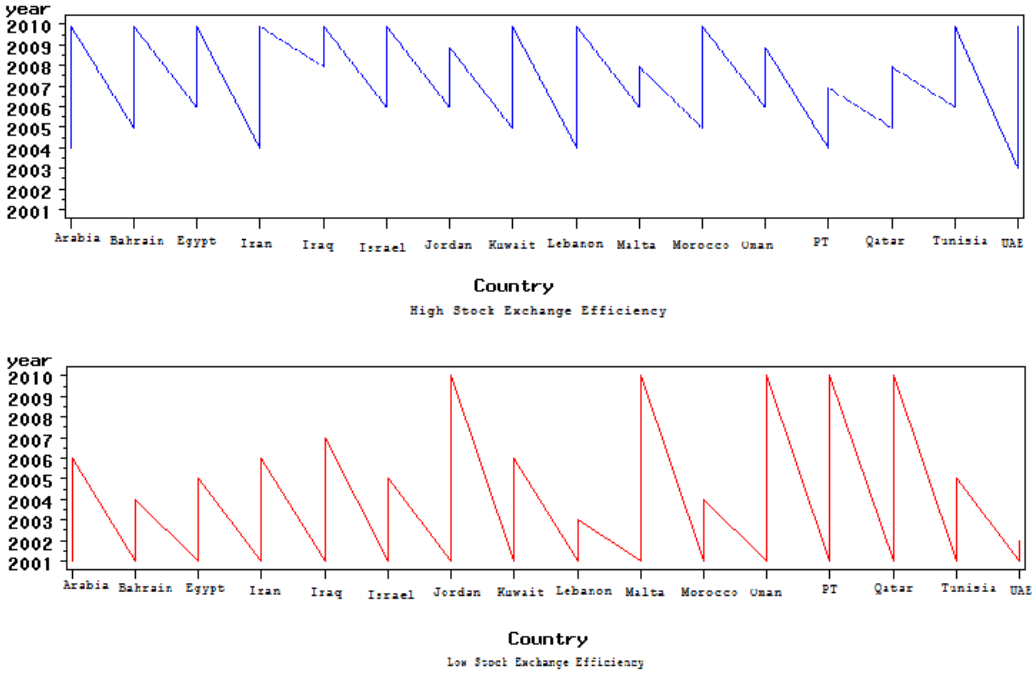
Figure 1: Country–level Stock Exchange Efficiency