International Influences on Selected MENA Stock Markets

By

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Abstract

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In the past few years, many stock exchange markets in the Middle East and North Africa (MENA) region have experienced remarkable booms in their prices, followed by sharp corrections. In the global context, the presence of such phenomenon in stock markets is often attributed to the rapid integration of the global economy and to the surge of capital inflows. However, different empirical works have provided evidences of the segmentation, partial at least, of financial markets in MENA from the world economy. Since only a handful of studies have been conducted to test for the degree of regional financial integration, this study investigates the interdependence between stock markets indices in the region and the extent to which international capital flows have been a major cause of bubbles in the stock market indices in the region. To investigate these relationships we control for a number of other factors that have been found in other studies to affect stock markets.

The dissertation finds evidences that foreign capital inflows do not make a major contribution to the causation of the recent bubbles in MENA markets. Furthermore, the effect of changes in oil prices does not always have consistent impacts on these stock markets. Also, the empirical results did not find strong linkages between movements in stock prices indices in MENA region and the domestic economic and financial fundamentals that were used as controls. Thus, the changes in stock market indices in the region cannot be regarded as good leading indicators of changes in the real economic variables. The study finds the existence of considerable interdependence among some of the MENA stock markets, but that these effects vary a great deal across the region's stock markets.

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CHAPTER ONE

Introduction

1.1. Background

In the past few years, many stock exchange markets in the Middle East and North Africa (MENA) region have experienced remarkable booms in their prices, followed by sharp corrections. In the global context, the presence of such phenomenon in stock markets is often attributed to the rapid integration of the global economy and to the surge of capital inflows. However, different empirical works have provided evidences of the segmentation, partial at least, of financial markets in MENA from the world economy. Until recently, foreign capital inflows to the MENA region remained modest and have had an unsustainable pattern since they fluctuate greatly from one year to another. The international financial institutions estimate that the surge in capital flows towards the emerging markets in the 1990s largely bypassed the MENA region (Yu & Hassan, 2008a). Besides the political instability, other factors likely contributed to the low level of capital inflows, such as the restrictions that face the foreign capital inflows, the dominant role of the public sector in the economic system, the existence of costly bureaucratic procedures, and weak institutional framework.

Most of MENA countries have implemented policies to reform management of the economy in the last two decades. These include enhancing the role of the private sector, downsizing government sectors, having more disciplined monetary and fiscal policies, and opening up for foreign investment (Dasgupta, Keller & Srinivasan, 2002). Recognizing the importance of capital markets for economic development, the reform agenda extended to revitalize stock markets in some countries (e.g. Egypt, Morocco and Tunisia) and to establish stock markets in others (e.g. some Gulf Cooperation Council countries). The reforms in capital markets regulations aim to provide stronger protection for investors, enhance the efficiency of

financial system as an intermediation instrument in the economy, and set up new methods of finance and investment (El-Erian & Kumar, 1995; Naceur, Ghazouani, & Omran, 2008).

The efforts to attract foreign direct investment (FDI) seemed to reach some success in 2000s. As a result, the region's share of FDI has increased dramatically in the last decade. According to the World Investment Report (UNCTAD, 2010), Western Asia countries' share of the world inward foreign investment has increased from less than 1 percent in 1999 to more than 6 percent in 2009. Also, the share of the Northern Africa countries has increased from 0.3 percent to 1.6 percent of the world inward FDI in 1999 and 2009, respectively.

While MENA countries have improved their attractiveness for foreign capital, they are still lagging behind East Asian and Latin American regions. Furthermore, the MENA region remains relatively closed for other forms of capital inflows, like portfolio investment. Most of the region stock markets still impose restrictions on foreign investments in their stock markets. In addition, MENA stock markets are not only segmented from the world markets, some studies (e.g. Al-Kulaib, Najand & Mashayekh, 2009; Amihud, 1996; Girard, Omran & Zaher, 2003; Maghyereh & Al-Zoubi, 2004) have indicated that these markets are not even integrated with each other.

1.2. Purpose of the Study

Since only a handful of studies have been conducted to test for the degree of regional financial integration, this study investigates the interdependence between stock market indices in the region and the extent to which international capital flows have been a major cause of bubbles in the stock market indices in the region. To investigate these relationships the study controls for a number of other factors that have been found in previous research to affect stock markets.

1.3. Contribution of the Study

This study contributes to the literature by investigating the relationship between foreign capital inflows (measured by portfolio investment inflows) and the behavior of stock markets indices in MENA. The study provides insight on how foreign inflows influence the stock indices, and highlights the contributions of the inflows to the causation of recent bubbles in MENA markets. This study adds to the literature on the relationship between movements in stock price indices in the MENA region and the domestic economic and financial fundamentals. This study employs the dynamic methods of vector auto-regression (VAR) models to investigate the interdependence between stock markets indices in the region. The results of this investigation contribute to the growing literature on the integration conditions and spillovers effects among MENA stock markets.

1.4. Limitations of the Study

Though most of the results of this study are in line with outcomes of previous studies (e.g. AlFayoumi, 2009; Amihud, 1996; Tunah, 2010), there are some limitations of the study results. As a result of data constraints, the selected sample includes only four countries. They cannot present the region fully, particularly since the sample does not include any of the major oil exporters. Further, the dataset that is used to represent foreign inflows is collected from different sources, including international financial institutions and national datasets, and their quality may vary.

1.5. Structure of the Study

Chapter one offers an introduction to the study. Chapter Two reviews the theoretical and the empirical literature on financial markets mechanisms and the causation of bubbles in these markets. Besides discussing the neoclassical economic approach of efficient market hypothesis,

the chapter analyzes the factors that may influence bubbles like capital inflows, credit expansions and the psychological factors. Chapter Three highlights the history and characteristics of financial markets in MENA. Also, the chapter reviews some of the issues in these markets such as their experience with bubbles, liberalization, and interdependence among them. Moreover, it provides a survey on the literature on the relationship between macroeconomic variables and stock markets in MENA region. Chapter Four describes sources and problems of the data, and provides the definitions of the variables that are included in the model. Further, the chapter outlines the methodology that the dissertation has employed. Chapter Five presents the empirical results of the first model. The model tests the relationship between macroeconomic variables and stock markets indices, and examines the interdependence among MENA stock markets. Chapter Six describes the empirical results of the second model. Besides providing robustness checks for the results of the first model of the relationship between macroeconomic variables and stock markets indices, the chapter also tests for the connection between the changes in the stock markets indices and some financial ratios such as changes in dividend yield ratio and price/earnings ratio. Chapter Seven presents the conclusion of the dissertation and along with policy recommendations.

CHAPTER TWO

Stock Markets and Bubbles Literature

2.1 Introduction

While media, politicians and academicians attribute the increasing instability in the international financial system to the rapid integration of the global economy and to the surge of capital flows, bubbles and crashes are not new phenomena in the world economy. In the 17th and the 18th centuries, Netherlands and Great Britain lived through the earliest documented bubbles in modern history (Kindleberger & Aliber, 2005; Vogel, 2010). Since then, many countries around the world have seen different types of bubbles (and crashes).

Various historical experiences have shown that bubbles in the advanced economies can help set up and give "big pushes" to new infrastructure and technologies. Railways, computers, and internet are just a few examples of the technological innovations that reflect the positive impacts of bubbles. Those innovations would need a longer time to develop and attract adequate capital in order to achieve their previous standards by the end of the bubble's period. While the ability to create accelerated capacities of financing, production and services are the major advantages of bubbles during a boom, this inflated capacity is also the main downside of bubbles when they burst. After the burst, no one needs the excessive capacity that was generated during the bubble's time. Usually, the result involves a huge waste of society's resources. For the emerging and developing economies, the issue is even more severe. The recently busted bubble does not add new industries or products to the economy, but rather empty buildings (in case of a real estate bubble), worthless financial papers, and citizens with bad habits of spending above their means, slow economic growth rates, and high unemployment rates.

Bubbles, in one way or another, impact the lives of the residents in the economy. In their emergence and expansion, bubbles gain attention, seducing many to join the game, and enjoy the feeling of wealth and well-being. As Kindleberger and Aliber (2005) describe "there is a sense of 'we never had it so good'" (p. 11). Bubbles are always associated with high rates of economic growth, low rates of unemployment, and high levels of corporate investment and individual consumption. When bubbles burst, people suffer from depression and sadness as they watching their "wealth" shrink or disappear. Thus, bubbles should not be left for themselves, since they usually disturb the life of other people sooner or later. Hunter, Kaufman and Pomerleano (2003) identified bubbles as "costly and destabilizing episodes" (p.xii).More dramatically, De Bondt (2003) described the effect of bubbles as "financial earthquakes undermined the public's trust in the integrity of the markets system" (p. 205).

In the 1980s and the 1990s, most of the members in the Organization of Economic Cooperation and Development (OECD) experienced some degree of financial boom and crashes (Allen & Gale, 2000). While Japan and Scandinavia enjoyed periods of bubbles and then suffered from strong crashes, the other OCED countries have their own experiences with bubbles and bursts, though theirs were not as turbulent. Higgins and Osler (1997) reported that during 1984-93, 18 countries in the group observed dramatic increases, followed by sharp decreases in their stock and real estate prices. Their econometric regression model shows that "a 10 percent rise in real residential property prices above the OECD average during1984- 1989 was associated with a 1989-1993 price decline 8 percent steeper than average" (p.118). Higgins and Osler (1997) consider these booms and bust cycles to be indicators of the existence of bubbles. Further, the real stock market valuation in Brazil, France, China, Germany, and Britain, at least, doubled, between 1995 and 2000 (Shiller, 2005).

These experiences have indicated how destructive the consequences of bubbles' bursts are on: asset prices, individuals 'wealth, financial systems, and economic activities. Loosely speaking, bubbles influence the life of people in its financial, social and psychological aspects.[1] For all these reasons, bubbles often attract attention from every corner in the society. Vogel (2010) reports that, "bubbles and crashes have long been of immense interest not only to trained economists but also to the investing public at large" (p. xvi). Nevertheless, the constant debate over bubbles is still far from providing comprehensive and consensus-driven answers to many aspects, such as: definition, causes, characteristics, and behavior. Thus, a large part of the theoretical and empirical work is still devoted not only to the debate over optimal public policies toward bubbles, but also to whether bubbles themselves ever exist, and how can they be identified before they burst.

The disagreement among economists is, however, a common feature of the development in economic theory (Romer, 1993; Woodford, 1999). The debate over bubbles is just another playground of the battle between the main schools of modern economic literature. The neoclassical economic school believes in the rational capacity of the individuals' behavior in making decisions, particularly when it comes to money and investment. The opposite school, the behavioral finance which adopts some of the Keynesian spirit, argues that individuals can be irrational and that emotional and psychological factors have influences over the individuals' decisions (Barberis & Thaler, 2002; Shiller, 2005). While the neoclassical school concludes that bubbles are implausible, behavioral finance provides evidence on how investors and markets behave in reality; they show that speculative bubbles are not invisible events on asset prices.

[1]Bill Powell (2009) describes Japan's 1980s experience by saying that" Bubbles are fun, but when Japan's imploded, it sucked the life of an entire country, stripped it of ambition and of the sense of rapid progress that had come to define its postwar history"(p.71).

This chapter provides a brief background on the debate in the literature about the different aspects of bubbles. The field of literature includes the definition, formation, and causes of bubbles. The chapter is structured as follows: The following section introduces the definition of bubbles, and the mechanisms of bubbles' formation. The next section discusses the principles of the rational paradigm and its approach to the existence of bubbles. Then, a section analyzes the argument of irrational bubbles in the financial markets. The subsequent section presents the behavioral finance argument on individual and market behavior. The final section discusses some economic and policy factors that might contribute to the formation and expansion of bubbles.

2.2 Bubbles: Definition and Formation

2.5.1. The Definition of a Bubble

Basically, a bubble is formed when assets are traded in prices far above the level that can be justified by their fundamental values, i.e. the expected earnings from future cash flows or dividends (Vogel, 2010). The result is a rising movement in price that might affect a sector or more and can affect the whole economy for some time. Sornette (2003) defines a bubble as, "a period of time going from a pronounced minimum to large maximum by a prolonged price acceleration, followed by a crash or a large decrease" (p. 286).

From the behavioral finance perspectives, Shiller (2005) defines a speculative bubble as: "a situation in which news of price increases spurs investor enthusiasm, which spreads by psychological contagion form person to person, in the process amplifying stories that might justify the price increases and bringing larger and larger class of investors, who despite doubts about the real value of investment, are drawn to it partly through envy of other successes and partly through a gambler's excitement."(p.2)

2.5.2. The Formation of Bubbles

Typically, bubbles start with the emergence of a new shift in the routine of people's lives that gives them the impression that they are moving to a higher standard of living and /or perception of changes in the environment climate, i.e. a 'displacement'. Their optimistic view about the economy might be based on a new wave of extended investment in infrastructures or the emergence of a new field in the economic production. Generally, the ability of such a feeling to persist for longer periods of time fuels the booming in asset prices.

Identifying a bubble *ex ant* is a real challenge for policymakers and academic research. Since the increase in prices might reflect favorable fundamental changes in the economy, many economists believe it is inaccurate to deal with appreciation in prices of assets alone as a sign of a bubble, and might be even dangerous (Kroszner, 2003). Thus, bubbles are difficult to identify in their early stages and most bubbles start with that rationally justifies some appreciation. While recognizing a bubble could be easier when it is on or approaching its peak, a bubble often can be definitely confirmed ex post, when it has burst (Calverley, 2009). Sornette (2003) uses three criteria in distinguishing a bubble from a normal prices appreciation. Those criteria are: The existence of a sharp peak in the spirit, the existence of a preceding period of increasing price that extends over at least six months and that should preferably be comparable with those of the larger crashes, and the existence of a fast price decrease following the peak over a time interval much shorter than the acceleration period (p. 285).

John Makin (cited in Fleckenstien & Sheehan, 2008) has a humorous but a plausible description to the present of a bubble, where he states that "a stock market bubble exists when

the value of stock has more impact on the economy than the economy has on the value of stocks" (p. 94).[2]

While each bubble has its own specific features, they have general global characteristics (Sornette, 2003). These include:

- The bubble starts smoothly with some increasing production and sales (or demand for some commodity) in an otherwise relatively optimistic market.
- The attraction to investments with good potential gains then leads to increasing investments, possibly with leverage coming from novel sources, often from international investors. This leads to price appreciation.
- This in turn attracts less sophistical investors and, in addition, leveraging is further developed with small down-payments (small margins), which leads to demand for stock rising faster than the rate at which real money is put in the market.
- At this stage, the behavior of the market becomes weakly coupled or practically uncoupled from the real wealth (industrial and services) production.
- As the price skyrockets, the number of new investors entering the speculative market decreases and the market enters a phase of larger nervousness, until a point when the instability is revealed and the market collapses. (p. 283)

The economic literature has informed debate over the factors that initiate bubbles, and the factors that contribute to the expansion and the burst of bubbles (Garber, 1990; Hunter et al., 2003; Vogel, 2010). The rational paradigm usually denies the existence of speculative bubbles in asset prices and denies that they can last for long time, if they should occur (Fama, 1991; Malkiel, 2003). Even in the extreme case, bubbles can be explained through the interpretation of

[2]This quotation also appeared in Vogel (2010, p.23-4, note 41).

the rational theory (Blanchard & Watson, 1982; Garber, 1990). Other economists attribute bubbles and crashes in asset markets to irrationality of investor behavior (Kindleberger& Aliber, 2005), or so-called irrational exuberance (Shiller, 2005). This includes behavior like herding and positive feedback trading, including their implications for trends in asset prices. Literature also highlights the role of the other factors on the cycle of bubbles and crashes, such as loose monetary policy, financial liberalization and capital inflows (Allen & Gale, 2000; Diaz-Alejandro, 1985, Vogel, 2010).

Youssefmir, Huberman and Hogg (1998) show that bubbles can be formed when speculative trends dominate over fundamental beliefs. This leads asset prices to depart from fundamental values. As a result, the system becomes vulnerable to exogenous shocks that might cause it to collapse suddenly. Vogel (2010) explains that a bubble is:

> *considered to have developed when assets trade prices that are far in the excess of an estimate of fundamental value of the asset, as determined from the discounted expected future cash flows using current interest rates and typical long-run risk premium associated with asset class. (p. 16)*

In such cases, speculators tend to care much more about profiting from selling shares later with higher prices than focusing on the true value of the earning capacity of the assets. Allen and Gale (2000) argue that a bubble typically starts with financial liberalization or a conscious decision by the central bank to increase lending or some other similar event. The resulting expansion in credit is accompanied by an increase in the prices for assets, such as real estate and stocks. This rise in prices continues for some time, possibly several years, as the bubble inflates.

Bubbles and crashes are significant events in the economic history. While economists have their favorite explanations of such events, one specific factor cannot claim to be the only

cause of the phenomenon, regardless of how large it is. More likely, a combination of different factors drives the formation of bubbles and crashes (Shiller, 2005). These factors come from different interpretations of human interaction with financial markets. Various interpretations include political, economic, technological and psychological aspects.

In his analysis of the financial events in the recent American history, Shiller (2005) identified some potential precipitating factors that make up the skin of the bubble. These includes: The capitalist explosion and the ownership society, cultural and political changes favoring business success, new information technology, supportive monetary policy, an expansion in media reporting of business news, analysts' optimistic forecasts, the growth of mutual funds, and the decline in inflation and the effects of money illusion, and the rise of gambling opportunities.

As is clear from the discussions about the causes and the behavior of bubbles, the literature in this area has two main approaches: The rational paradigm and the behavioral finance approach. The following section will be devoted to the former, and the subsequent section will turn to behavioral finance.

2.3 The Rational Paradigm and Bubbles

2.5.1. The Efficient Market Hypothesis

The efficient market hypothesis (EMH) started to take its shape as a respectable theory in finance literature in late 1960s, though its original idea was found decades earlier (Cassidy, 2009; Sornette, 2003). The EMH is the neoclassical paradigm approach to financial market behavior. EMH is based on some strong assumptions: investors or arbitrageurs in the financial markets are rational economic agents. They always act as self-interest wealth maximizers. The arbitrageurs are assumed to have objective probability distribution in their estimation. Hence,

they calculate all the aspects of their investment decision in order to guarantee that the price of a stock is accurately risk-adjusted net present value of its cash flow. One of the positive implications of such a mechanism is that it gives signals to businesses on how they can allocate resources efficiently (Fama, 1970).

The EMH intends to provide a comprehensive interpretation for stock price behavior. The hypothesis affirms the ability of stock market to incorporate fully and timely all the available information into prices of stocks (Fama, 1970, 1991; Jenson, 1978). No one can consistently beat the market by gaining profits over the average of market index, regardless of the analytical capability of investors and the amount of resources that are devoted for such a purpose. The logic behind this is that stock prices change only by the arrival of new information either about the individual stock's rate of earning or changes in the fundamentals of the economy. Since news arrives to the market unpredictably and is incorporated in the prices immediately, the market usually follows an unpredictable path or a random walk, reflecting all available information (Malkiel, 1996). Hence, an average investor can obtain a rate of return that is similar to financial experts' rate of return, if he or she has a diversified portfolio. Malkiel (1996) states that, "a blindfold chimpanzee throwing darts on *Wall Street Journal* can select a portfolio that performs as well as those managed by the experts" (p.14).

Since the current prices of stocks fully reflect all the past information about the stocks, no arbitrage opportunities are available in the markets. Malkiel (2003) describes such efficient markets as the ones who "do not allow investors to earn above-average returns without accepting above-average risks" (p.60). Simply, there is "no free lunch" in efficient markets. Even when some irrational traders enter the markets and create some noise, they either cancel each other out without leaving significant remarks on stock prices or the rational arbitrageurs will override them

quickly through maintaining the belief on the fundamental values. In these models, markets are assumed to be in or close to equilibrium. Suppose that a specific stock becomes "overvalued" relative to its fundamental values. This usually occurs because of the demand by uninformed traders. Observing the emergence of the opportunity, rational arbitrageurs would quickly sell this stock and simultaneously buy an alternative stock to hedge the risk. These trades would continue until the overvalued stock go down to its fundamental value. In the perfect efficient market model, these processes are so effective. Therefore, the competitive arbitrageurs would not just restrict each other's ability to obtain abnormal returns, but would also prevent prices of any stock to part with its fundamental values.

While the proponents of EMH admit that some anomalies might appear in stock market returns, they also affirm that these anomalies remain marginal and can persist for short periods only (Fama, 1970; Malkiel, 2003). The emergence of so-called bubbles implies that prices have departed from their efficient levels for a longer time than the rational arbitrageurs will tolerate. Therefore, the conventional wisdom of the main stream traditional finance theory states that bubbles do not exist. Even in the extreme cases, bubbles could not last since rational arbitrageurs would spot them and would trade against them.

2.5.2. Rational Bubbles

The rational bubbles model assumes that the probability of risk is objectively distributed. Economic agents are homogenous, and have infinite time horizons; therefore, they form their rational expectations perfectly (Meltzer, 2003). While economic agents evaluate the accurate price of stocks according to the expected earnings from future cash flows, their rationality might convince them to participate in the emergence of asset bubbles (Mishkin, 2004). In such circumstances, the increasing rate of prices is hard to satisfy the expected future fundamental

values for rational agents. Those agents are willing to participate as long as they expect future prices to be large enough to satisfy their rate of return (Blanchard & Watson, 1982). In a model composed of an overlapping generation of asset holders with finite planning horizons, Tirole (1985) shows that rational bubbles might exist as long as the rate of growth in the domestic economy is equal to or greater than the required rate of return. Thus, even though prices have deviated from their fundamental values, the situation still can be called rational bubbles. A rational strategy would be to hold the stock for a period. Hence, stocks are not valued for their future cash flows, but rather for their ability to provide capital gains. Hardouvelis (1988) calls these positive abnormal returns the "bubble premium" (p.5). Moreover, Froot and Obstfeld (1991) introduced the concept of "intrinsic bubbles," which refers to rational bubbles that relay exclusively on market fundamentals (p.1192). Implicitly, asset price in such cases would be overreacting to changes in fundamentals.

Sornette (2003) adds a valuable point to the argument of rational bubble by pointing out that it is uncertain that the expansion of a bubble will end with a crash. Therefore, it is very rational for economic agents to realize that it is more beneficial for them to remain in the market, which provides a compensation rate that is higher than it might cost them by the occurrence of the crash. Rationally, the probability of having a smooth landing that ends the bubble without a crash is still positively high.

An important issue for bubbles is the ability to detect bubbles. Proponents of rational bubbles argue that testing for the existing of bubbles is really challenging and might be implausible or, at the very least, insist that the standard testing models have lower explanatory power (Blanchard & Watson, 1982; Evans, 1991; Flood & Hodrick, 1990; Hamilton, 1986). For instance, Flood and Hodrick (1990) showed that the bubbles tests that tend to reject the "no

bubble" hypothesis can be biased because of omitted variables, i.e. the market fundamentals that are not observed by the econometric models. They suggest that bubble tests should be set up on a well-specified model of equilibrium and expected returns. Since such a model was not available yet, Flood and Hodrick (1990) concluded that economists' current ability to interpret the existence of bubble is really quite tenuous.

With all these works to defend the rational paradigm and its interpretation of the existence of rational bubbles, the cycles of bubbles and crashes affect on the ability of EMH to maintain its well-regarded position on the economic map. The EMH was the dominant intellectual power in the interpretation of financial markets behavior for the decades that followed its emergence in 1960s. In fact, Michael Jensen (1978, as cited in Shleifer& Summers 1990) called the hypothesis "the best established empirical fact in economics" (p.19).However, in the last three decades, this powerful position became increasingly under attacks that questioned the validity of the hypothesis. The questions were raised by academics and participants in the markets. De Bondt (2003) argued that the failure of the rational paradigm is obvious in at last two ways: The unsatisfactory ability to predict the market behavior and the falseness of its underlying assumptions. Summarizing the rapidly growing doubts among economists about the rationality of financial markets, Vogel (2010) stated that, "[the traditional finance] literature take rationality as a starting point and a given, even though this axiomatic assumption –itself an outgrowth of neoclassical economics- remain unproven and debatable" (p. xvii).

Questioning the rationality of investors, however, is not a new phenomenon. Economists; like Keynes (1936), Galbraith (1955), Minsky (1986), and Kindleberger and Aliber (2005)

argued that investors have a tendency to behave less than rationally sometimes. In an environment where irrational economic agents can exist, irrational bubbles might also exist.

2.4 Irrational Bubbles

One of the main problems with the rational bubbles model is that it ignores the real world facts and their complexity. People do not always focus on optimizing their utility; psychological and sociological factors might influence their decision-making process. Irrationality might takes forms of systematic errors and biases.

The Keynesian model considers that the effects of uncertainty and limited information on how people approach changes in prices of assets. The feeling of shortage in information relative to the rest of the world encourages people to imitate the actions of others. Therefore, when uncertainty increases in the markets (turbulence and crises times), investors (professional money managers) tend to demonstrate more herding and crowding behaviors. This can be explained by the desire to perform like the others, at least. Since there is a high degree of uncertainty for being rewarded by distinguishing themselves from the herd, it might be better to look like the others. Keynes in *The General Theory of Employment, Interest and Money* (1936) says that "Worldly wisdom teaches that it is better for reputation to fail conventionally than to succeed unconventionally" (p. 158).

If arbitrageurs are not likely to be able to correct the market's trend by trying to drive the prices back to fundamental values; then jumping on the bandwagon might be the solution. This behavior is motivated by the well-known belief that market can stay irrational longer than any individual investor maintains his or her financial solvency (Keynes, 1936). By analyzing the experience of technology and internet bubbles in the US in 1987 and 2000, Vogel (2010) shows that many investors, at the peak of bubble, refused to listen to any warning and tried hard to

discredit them. He quoted a leading technology investor saying, "You either participate in this mania or you go out of business. It's a matter of self-preservation."(Vogel, 2010, p.42).

Irrational bubbles occur when prices of asset show persistence in their deviation from the expected divided stream. Kindleberger and Aliber (2005) used the word "mania" to describe the irrationality of such upward price movement. The phenomenon seems like mass hysteria, though it eventually implies that some values will burst after some time (15-40 months). By not being able to drive prices back to fundamental values, investors show their failure at profiting from such phenomenon. Alan Greenspan (1996), the former chairman of the board of governors of the US's Federal Reserve System, describes such sentiment as "irrational exuberance" where the asset prices are far above their optimal levels. Shiller (2005) defined irrational exuberance as a situation when markets have been going to levels that are clearly high and unsustainable by rational calculation mechanisms. Prices are mainly driven by the influence of market psychology.

Examining the Japan's experience with bubbles and bursts in the late 1980s, Okina and Shiratsuka (2003) argue that the Japanese bubble cannot be described as rational one, since it was driven by a wave of excessively optimistic expectations about the future economic fundamentals. The ease of monetary policy gave this euphoria the chance to persist for several years until the monetary policy was tightened in the late 1980s.

Lamont and Thaler (2003) examine cases like 3Com when it sold 5 percent of the shares of its wholly-owned subsidy, Palm In. Shortly after, the stock of the subsidy became higher than the price of original owner, 3Com. Lamont and Thaler (2003) conclude that people, who bought Palm, rather than its original owner, are irrational since they can buy them later at a cheaper price.

Thus, irrationality of investors is the major challenge to the rational paradigm. Generally, the critics of rational paradigm were intensified by the finding of the empirical evidences of irrationality in the behavior of investors and markets, excessive volatility in the market that cannot be explained by changes in fundamentals, the finding of some possibilities to predict market trends, and the puzzle of frequent crash phenomenon in stock markets. The main critics to the rational paradigm come from behavioral finance.

2.5 Behavioral Finance

2.5.1. Background

Behavioral finance has emerged as a scientific approach that uses broader social sciences' instruments to analyze the behavior of financial markets. Besides the traditional economic and econometrical methods, the new field incorporates the developments in the methodology and the findings of psychology, sociology, decision-making sciences, and neuroscience to provide deeper interpretation for the behavior of investors and markets.

Behavioral finance seeks to provide descriptively realistic assumptions about the cognitive and emotional factors that influence humans' economic decision- making. The approach incorporates into the analysis not only the effects of organizational arrangements and norms of social interaction, but also consideration for the context of specific circumstances (Schwartz, 2008). For instance, it provides alternative explanations for anomalies in the markets by arguing that the volatility in the markets cannot be explained solely by changes in the fundamentals. Analysis needs to include other factors such as irrationality of some investors and uncertainty that limit the arbitrage mechanisms, besides the sentiments of investors that might lead them to make systematic errors in judgments.

The research in behavioral finance demonstrates that some of the economic agents have systematic tendencies to behave less than fully rational. A major reason behind the irrationality is the uncertainty that accompanies the formation of expectations. Uncertainty about the future leaves economic agents under the strong influence of heuristic devices and raw emotion. Hence, they may act as the hypothesis of "madness of crowds" or the animal spirit (Akerlof & Shiller, 2009; Keynes, 1936).

In order to understand how people make their decisions, an examination into the background of their behavior is required. This process takes place through reviewing the psychological roots of such behavior. This review will indicate that systematic errors in human behavior have their impact over investors' financial decisions.

2.5.2. Psychological Roots

Psychological researchers contribute to a general understanding of human behavior, and help in providing more realistic interpretations to the investors' interaction with financial markets. The researchers observe patterns (or systematic biases) in people's behavior while dealing with investment in financial markets. This could be explained as a result of facing some degree of risk and uncertainty. Below is a brief summary of some of these patterns that might influence the process of decision-making by investors. Since the early 1970s, many scholars have contributed to the growing literature that has been critical of the main stream economic theory (Cutler, Poterba & Summers, 1989; De Bondt &Thaler, 1985, Lee, Shleifer &Thaler 1991; Shiller 1981; Shleifer & Summers, 1990; Shleifer & Vishny, 1997). Nevertheless, the seminal work of Daniel Kahneman and Amos Tversky since 1974, particularly the study dealing

with "prospect theory," is the landmark article in this perspective. This review includes only the pieces that concern the psychological biases that are related to the formation of bubbles.[3]

There are some heuristics that might plausibly impact individuals' financial behavior. The heuristics can help individuals to cope with the arrival of new information, and to give them shortcuts of how to deal with the new circumstances. Heuristics have a strong relationship with the common errors of judgments that are made by investors. These include: overconfidence, representativeness, anchoring, loss aversion and framing.

Overconfidence: psychological studies confirm that people tend to be overconfident on their judgments of the wisdom of their decisions, and on the belief that their capability is above average (Weinstein, 1980). People tend to be over-optimistic about the future outcomes of their investment adventures. Camerer and Lovallo (1999) show that over-confidence encourages many individuals to enter competitive markets; although, it is well-known that the rates of failure for start-up businesses are significantly high. The spirit of, "Yes, I expect the others to lose their money, but not me" is a common belief among many investors. Individuals regard history as irrelevant to future outcomes. Thus, they are easily persuaded to believe that, "this time is different." So, they do not consider the previous experiences of bubbles and crashes as a potential path for the current scenarios. The over-confident thinking is likely to contribute greatly to the formation of speculative bubbles (Shiller, 2005).

Representativeness: people tend to have systematic bias when trying to evaluate the connection between two data bases or the likelihood of class events or individuals (Tversky & Kahneman, 1974).They usually try to assess new events by connecting them with similar stereotypes with which they are familiar. Such bias is obvious in the attitude of many individuals

[3]Interested readers are advised to refer to more comprehensive works of Kahneman and Tversky (2000), Barberis and Thaler (2002) and Shiller (2005).

toward assessing the probabilities. Individuals usually suffer from difficulty in dealing with small probabilities; tending to over-estimate their representation. This includes neglecting essential facts to get general conclusions. They may also ignore crucial features such as sample size, when estimating the probability of future outcomes. Thus, people often fail to appreciate the statistical phenomenon of the "regression to mean" (Tversky & Kahneman, 1991)

Anchoring: experiments have shown that when individuals make quantitative estimates, usually they are significantly influenced by the initial values (or the starting points) they had experienced at the beginning of their investment, rather than consider the overall situation (Tversky & Kahneman, 1974). In stock prices, anchoring occurs by a comparison of present prices with the most recent ones of the same stocks, or with stocks in the same sector. The present of such anchoring might explain the tendency of the individual stocks to move together, and the excessive volatility in stock price indexes (Shiller, 2005).

Loss aversion: The recent psychological experiments indicate that people might not calculate risk and reward as the rational paradigm claims they do (Kahneman & Tversky, 1979). Prospect theory and subsequent studies have shown that people, when confronted with the possibility of loss, tend to hate losses more than they love gains, though the rational theory claims that they treat them equally. This asymmetry between gains and losses provides many insights about some economic and financial puzzles. Loss aversion can contribute to the interpretation of the widespread tendency in decision-making processes to maintain the status quo (Kahneman, Knetsch &Thaler, 1991). During a bubbles period, people tend to behave as if losses would never occur. So, they continue buying assets, though it is obvious that prices are far above fundamental values. Such behavior replaces the normal loss aversion that helps keep prices of assets at normal levels (Calverley, 2009). Further, loss aversion can provide a

reasonable explanation of the long-run dry up in the real-estate and financial markets that follow sharp declines in the prices. Facing the reality of a sudden decline in asset prices reminds people of their errors. They start questioning the wisdom of their aggressive participation in the booming market. The financial losses from the burst lead people to be more cautious in re-entering the market for a long time after the crash.

Framing: People have a tendency to keep a mental accounting or framing by using separated mental accounts. Thus, identical information can lead to a variety of decisions as a result of having them framed differently (Thaler 1999; Tversky & Kahneman, 1986). For example, individuals might borrow at a high interest rate to buy a good while maintaining a savings account with a low interest rate (Calverley, 2009).

The combination of the real situation in financial markets and the influence of psychological factors lead to more comprehensive analysis about market behavior. Experiences have shown that people have a hard time when they try to take an independent path apart from the majority trend. This maverick behavior often ends either with job loss or decisions to join the crowds, emulating the behavior of others. This shows that arbitrage, in reality, is risky and costly. Thus, it might be limited.

2.5.3. The Limits of Arbitrage

The classical analysis of EMH is based on the image of many small players in the financial market who do not have market power, but rather drive prices toward fundamentals values. Their actions are tiny as individuals, but enormously effective as a collective movement. This view implies that arbitrage is risk-free, and there is no capital cost which might be involved.

The cornerstone of behavioral finance challenge to EMH is that arbitrage is risky, and costly and therefore limited. There are some seminal papers represent the theoretical and the

empirical arguments of the behavioral finance on this point (Cutler et al., 1989; Shiller, 1981; Shleifer& Summers, 1990; Shleifer & Vishny, 1997).

Shleifer and Summers (1990) present an alternative to the traditional finance theory. Their approach is based on two assumptions. First, not all investors are fully rational and their sentiments might influence their decisions rather than being influenced only by fundamental news. Second, arbitrages in the real world are risky. When arbitrageurs try to derive prices to their fundamentals values, the arbitrageur incurs some risks. This includes a fundamental risk of not finding a perfect substitution to the overvalued stocks and the risk of selling the stocks that seem to arbitrageurs "overvalued," but markets might keep some faith in such stocks and continue uprising. The fear of suffering from such loss limits the ability of arbitrageurs to drive prices to fundamentals. When someone adds to the equation the fact that arbitrageurs' horizon is somehow finite, the role of arbitrageurs become even more complicated. Arbitrageurs, in general, either borrow their capital or they manage other people's money. In both cases, the fear of paying extra interest for the borrowed money or the pressure from investors to gain immediate benefit, limits the arbitrageurs' ability to drive prices down to fundamentals.

Supporting the previous argument, Shleifer and Vishny (1997) point out that the rational model of arbitrage in financial markets does not reflect the reality. Since the strategies that are designed to correct mispricing can be both costly and risky, this can allow mispricing to survive for long time, i.e. longer than traditional finance models expect (Barberis & Thaler, 2002).

Further, Shleifer and Vishny (1997) argue that the real arbitrage in financial markets differs from the one represented by textbook and EMH. The market is driven by relatively few powerful specialized firms who are well-informed and employ other people's money. Hence, such firms benefit from the ability to acquire information and influence the market through

taking large arbitrage positions. Since these firms use the capital of other people, they usually face questions about the wisdom of their position in the market. Investors might punish them for taking extreme positions and losing money in short run. Investors may withdraw their money as a sign of dissatisfaction with the performance. This might force arbitrageurs to liquidate their positions prematurely. The fear of being in such a situation prevents arbitrageurs from doing much to correct the mispricing, even when they argue that they can anticipate the long run fundamental values of stocks. Thus, Shleifer and Vishny (1997) argue persuasively that one of the main implications of the existence of such a fact is that "arbitrage becomes ineffective in extreme circumstances, when prices diverge far from fundamentals values" (p.35).

Shiller (1981) showed empirically that it is unrealistic to try to explain the "far too high" volatility in stock price by just the arrival of new information about future dividends (p.433-4). Using the data series of stock prices indices for more than half century, Shiller (1981) found that the movements in these indices were too volatile to be attributed to changes in fundamentals values. Shiller (1981) asserted that such findings should be regarded as a dramatic failure of the ability of efficient market model to provide respectable interpretation of market behavior.

Another piece of empirical evidence of the inability of EMH to explain stock price movements is presented in Cutler et al. (1989). They showed that the important political events and macroeconomic news do not have equally big impact on the movements of stock prices. Moreover, the volatility in prices cannot be justified by the changes in the fundamental values.

The existence of some financial phenomena that is inconsistent with the EMH principals provides strong evidence of irrationality in financial market behavior. The importance of these phenomena is that they show that mispricing exists and it can persist for longer than the mainstream economic theory claims. Therefore, these phenomena are real evidences of the limit

of arbitrage (Barberis & Thaler, 2002; De Bondt & Thaler, 1985; Lamont &Thaler, 2003; Shiller, 1981). These phenomena include:

- The difference price for the same share. Consider the case of Shell and Royal Dutch on two leading stock markets- where the different of overpriced/underpriced of the stock between the two stock exchanges persisted for a number of years (Froot & Dabora, 1999).
- The inclusion of a stock in the market index always implies a jump of its share's price.
- The price of subsidiary greater than the price of the mother firm's share. Consider the case of 3Com and its wholly owned subsidiary Palm Inc. (Lamont &Thaler, 2003).
- The ability to predict that the shares that did badly in the past will perform well in the future and vis-a-vis for the shares that did well in the past.
- The lag in market response to surprise earning announcements.

2.5.4. Herd Behavior

Herd behavior occurs when many people take the same action, because some of them mimic the action that is taken by others. Seeing other people make good money from buying and selling stocks encourages others to join the wave of trading in the market. Herding is a fact of daily life for practitioners in financial markets. Investors are influenced significantly by the actions or the financial decisions of other investors. Loosely speaking, there are two main polar approaches to herding in the financial economic literature. First, the rational herding that explains the phenomenon as a result of externalities, difficulties in information acquisition and incentive structure that prevents the ability of making optimal decisions (Devenow & Welch, 1996). Second, irrational herding exists because of irrationality in the behavior of some investors. Such herding might be explained by incorporating psychological factors in the

analyses. Keynes (1936) has a famous comparison between beauty contests and stock markets, in regards to the best strategy to pick the winners. In both cases, the optimal strategy is not to vote for the most attractive girl in the contest or to buy the stock that will generate the highest earning in the long run. A winning strategy is to select the one that others, on average, are likely to select. By mimicking the action of others, one guarantees that a vote (or money) will not be wasted. Shiller (2005) summarizes this behavior by stating that "investors are said to be euphoric or frenzied during booms and panic-stricken during market crashes. In both booms and crashes, investors are described as blindly following the herd like so many sheep, with no minds of their own" (p. 147).

Herding behavior can be explained by the inability of the rational and smart investors to override easily the noisy and irrational ones. The current situation of evaluating the performance of hedge funds' managers keeps everyone on the same boat, even when some of them have the belief that the position is unstable. The worries of losing business while the bubble keeps expanding, force many speculators to keep their involvement for the coming future. Charles Prince, former CEO of Citigroup, said "as long as the music is playing, you've got to get up and dance" (cited in Nakamoto & Wighton, 2007).Shiller (2005) stated that "even completely rational people can participate in herd behavior when they take into account the judgments of others, and even if they know that everyone else is behaving in a herd like manner" (p. 159).

Scharfstein and Stein (1990) found that the desire to maintain a reputation in the market and show money managers who are rationally reluctant to take advantage from their substantive private information, and instead simply mimic the investment decisions of other managers. Consistent with this theoretical work, Graham (1999) developed a model to test whether economic conditions and agents' individual characteristics influence their likelihood of herding.

He tests how influential investment recommendations are received from a highly-regarded newsletter; Value Line investment survey. Graham (1999) investigated the incentives that are provided to second-movers to discredit his private information and instead followed the action of the first-mover, the market leader. Graham found that herding was more likely when analysts, i.e. second-movers, had lower market reputations. In comparison, analysts with better private information showed a lower likelihood to herd on the recommendations of the market leader. As Sornette (2003) puts it "the less information you have, the stronger is your incentive to follow the consensus" (p. 95).

In a more comprehensive work, Welch (2000) studied the buy and sell recommendations of security analysts in order to understand the degree that previous recommendations and the prevailing consensus can influence their subsequent analyses. Welch investigated more than 50 thousand stock recommendations from a commercially compiled database accumulated over the period 1989-1994. Welch found that there was a positive relationship between security analyst revisions and the revisions in the recommendations of the next two analysts. He attributed analysts' behavior as attempts to benefit from short-lived information about the fundamental. The revision can be more influential if it came from an analyst who had recently shown high ability to predict the trend accurately. Also, Welch found that the revisions in security analysts' recommendations are positively related to prevailing consensus. The attitude in this case is not strong, however. Welch (2000) interpreted this as evidence that such behavior was not initiated by the news about fundamentals. Further, Welch found that herding during upturns in market was often much stronger, and did not base results on adequate aggregation of information. Initially, this could lead to fragile markets and increase the probability of crashes. One of the important forms of herding in the financial market is the positive feedback strategy.

2.5.5. Positive Feedback Trading

The positive feedback trading strategy (also called momentum investment strategy) is the tendency of investors to buy when prices of stocks rise and sell when prices fall. Their actions are based on past returns of the stock. The strategy instructs: buy more from stock that have prices increased recently (the winners), and sell the ones that their prices fall (the loser stocks). The market has many forms of feedback trading (De Long, Shleifer, Summers & Waldmann, 1990). These include: chasing the trend through having rosy expectations about the future earnings; stop-loss orders where even small signs of prices declines trigger huge selling; the liquidation of the positions of investors when they are unable to meet margin calls; and the attempt to increase exposure as prices rise and diminish it as prices decline.

Positive feedback trading encourages investors to respond to news more aggressively than is predicted by traditional finance models. The positive news about fundamental values encourages investors not to just demand the stock according to changes in news, but to buy more. Informed investors know that uninformed investors emulate the market trends. Therefore, informed investors overreact to good news by buying more than they would initially buy. As the raising movements in the stock gets the attention of more participants in the markets the demand for it increase, as the price rises, the demand increases. Thus, the informed traders can gradually start selling some of their holdings from the stock when they feel that it is approaching the peak. When more informed investors join the group that is selling the stock, the price increase eventually stops. Since the uninformed investors will realize that their expectations were overoptimistic, they will become involved in an aggressive selling trend that leads to a collapse in the stock price.

Kindleberger and Aliber (2005) describe the positive feedback trading as a struggle between informed insiders and uninformed outsiders. The formers have information that allows them to drive the price of stock "up and up and then sell at or near the top to the outsiders" (p.45). The uninformed outsiders, who buy high and sell out low, become the "victims of euphoria" (p.46).

The existence of positive feedback investors is another evidence of the limits of arbitrage (Youssefmir et al., 1998). Informed investors can often distinguish a short run from long run trend. While they are well-aware that prices move far away from fundamentals, those investors might find that it is hard to resist the attraction of the profitable opportunity. Thus, they may not try to trade against the trend of self-reinforcing price changes, but rather jump on the bandwagon with other investors. This involves buying today in order to sell tomorrow for higher prices (Shleifer& Summers, 1990). Thus, by leading the market away from the fundamental levels, positive feedback trading destabilizes the market and contributes to the formation of bubbles. Shiller (2005) describes the mechanisms as "price increases beget further price increases, thus amplifying the precipitating factors and beginning a speculative bubble" (p.xix).

Initially, the feedback trading dynamics can lead to crashes in the financial market when prices take a downward direction. Irving Fisher (cited in Galbraith, 1955) focuses on the feedback dynamics on the psychology of panic in his interpretation of 1929 crash in the American stock market. Fisher states that "the fall in the market was very largely due to the psychology by which it went down because it went down" (p. 15).

Another feature of psychological bias is the optimistic view of investors. Economic boom that always are associated with bubbles often initiate a feeling among public and investors that a new era in economic structure has been achieved.

2.5.6. New Era Economic Thinking

There is strong co-movement between the emergence of speculative bubbles in asset prices and the spread of popular perceptions that a new economic era is beginning. These optimistic views about the economic environment often connect future with higher and less risky income. Galbraith (1955) stated that, "speculation on a large scale requires a pervasive sense of confidence and optimism and conviction that ordinary people were meant to be rich" (p. 174). On the public view, the new era might have been an expression of fundamentals changes in the economic structures, expectations about improvement in labor productivity, extended investment in infrastructure and how it will positively influence the production capacity of the country. The rise in the popularity of a new era does not necessarily reflect a professional evaluation of economic development and scientific forecasts about its trend. Usually, the discussion of such expectations is initiated through the word of mouth. Often, such discussions precede and cause stock market booms. Shiller (2005) argues that the term, indeed, emerges in a later stage of the formation of the boom in the financial market. Eventually, as Shiller (2005) explains "a stock market boom is a dramatic event that calls for an equally dramatic interpretation" (p. 108).

Besides the contribution of markets and investors behavior in setting up bubbles in asset prices, there are some economic and policy factors that participate in the emergence of bubbles. The most important factors are excessive credit and capital inflows.

2.6 Economic Factors

2.6.1 The Role of Credit

There is a common belief among economists that there is a strong relationship between the money and credit conditions (i.e. the availability of easy credit) and the development of bubbles in economies (Allen & Gale 2000; Kindleberger & Aliber, 2005). Speculative manias

are always associated with expansion of money and credit. The abundance of credit gives people a sense that money is free. In some cases, manias get started as a result of initial expansion of credit (Kindleberger & Aliber, 2005). Allen and Gale (1999, 2000) argue that beside the degree of uncertainty in the market, the availability of credit is the major factor in forming and developing bubbles. Vogel (2010) explains that the "extension of credit facilities beyond what can be absorbed readily by the real economy tends to spill over into asset price speculations that, if not early contained, restricted or withdrawn, will inevitably evolve or metastasize into full-blown bubbles" (p. xix).

The linkage between the cost of funds (i.e. interest rates levels) and the formation of bubbles, however, is still debated in the literature. The media often cites the low interest rates as a major responsible factor for creating bubbles in stock markets (Shiller, 2005). This notion is based on the so-called conventional wisdom regarding financial markets that there is an inverse relationship between interest rate and stock prices. Mishkin and White (2003), among others, however, state that linkages between monetary policy and stock market prices are rather thin. Their conclusion is based on an examination of 15 episodes of crashes in the American stock market throughout the 20th century. They found that bubbles and crashes do not always imply financial instability. Therefore, they suggested that central banks should focus on the broader financial stability rather than using monetary policy to response to changes in asset prices.

Further, Shiller (2005) asserts that, in fact, the relationship between interest rates and the price-earnings ratio is rather weak. He shows that the experience of the Great Depression and the year 2000 crises were clear evidences that this specific relation is not as strong as some models assumed. The movement of price in the stock markets is not just a predictable response to changes in interest rates.

From the previous bubbles experiences, however, there are few doubts that the excessive credit from financial institutions contributes significantly to the formation of bubbles. Summarizing the outcomes of bubbles studies, Vogel (2010) reports that, "the creation or destruction of credit may be the central component in the formation of bubble and crash processes and events respectively" (p. xx).

Economists take different approaches to interpret the mechanisms through which the availability of credit leads to the formation of bubbles in stock markets. For example, Stiglitz and Greenwald (2003) show that the problem of asymmetric information prevented the existence of perfect efficient market since: "interest rates is not like conventional price" and "[capital] markets can be fundamentally different from conventional commodity markets" (p.27). They explained that there is an obvious difference between the way that prices are set on commodity markets and prices in the financial markets. In commodity markets, people tend to reduce their demand when prices increase and look for alternatives. Conversely, in stock markets, the increase in stock prices leads people to expect higher prices so they buy in order to sell stock later with higher prices and pocket the profits.

Krugman (1998) argues that the issue of moral hazard plays a central role in the formation of bubbles. Through the deposit guarantee system, governments provide implicit guarantees to bail out financial institutions that have problems making their payments. Hence, this encourages banks to involve themselves in a wide range of credit expansion and risky investments. This enhances the creation of speculative bubbles. Allen and Gale (1999) argue that the US lived through a dramatic increase in the assets prices before the Great Depression while there was no government guarantee for banks. Instead, Allen and Gale (1999) argue that reason behind bubble is the existence of agency problem. The governance system in today's

corporation contributes significantly to the formation of bubbles, since money managers in financial institutions use other people's money to make profits. The ability to generate higher profits is the measure that the markets use to test the managers capability. Hence, those managers are under constant pressure to generate higher and higher profits. This gives them incentives to enter risky practice, just to be sure that higher profits will be obtained later.

Highlighting the importance role of the availability of credit on the sustainability of bubbles and in their sudden sharp burst, Sornette (2003) asserts the role of buying stock on borrowed money, or the practice of buying on the margin. When a significant portion of the money in the market was initially borrowed, it becomes very hard to slow down the rapid increase in stock prices. "Prices must constantly increase, faster and faster"(Sornette , 2003, p.283).If the constant increase in price stops, for whatever reason, investors who borrowed the invested money will face problems when trying to make payments on the interest. They will have no other option except to sell stock at lower prices with losses. The spiral of money withdrawn and lower prices of stocks might end up in a collapse in the stock market and banking failure.

2.6.2 Capital Flows

The rapidly growing literature on the implication of capital account liberalization finds mixed results (Kose, Prasad, Rogoff, & Wei, 2009).Theoretically, all countries, particularly the developing ones, can benefit greatly from opening up their capital accounts. They can use capital inflow as a supplement of domestic savings to finance economic growth. This implies more productive investment with lower capital cost, and better allocation of resources. This boosts national output and enhances the living standards in the recipient economy. Financial liberalization also increases risk-sharing between domestic and foreigners residents and

contributes to the efficiency of financial markets. Hence, higher levels of welfare can be achieved locally and globally (Mishkin, 2006).

This approach has been supported by some recent empirical results. For instance, Henry (2000) find that financial liberalization leads to a notable increase in the real rate of private investment and a considerable revaluation of stock prices in a large number of emerging and developing countries. Also, Bekaert and Harvey (2000) find that capital inflows bring with them a decline in the cost of capital and a substantial increase in the percentage of investment ratio to GDP. Bekaert et al. (2005) find that equity market liberalization triggers a one percentage point increase in annual economic growth, besides enhancing macroeconomic stability.

The theoretical background of this laissez-faire version of benefits from liberalization has its roots in the traditional neoclassical models. Just to mention a few examples of theoretical work, Mckinnon (1973), Shaw (1973), and Mishkin (2006) argue that financial liberalization has positive impacts on the rates of savings, investment, and growth rates. The neoclassical school states that liberalization upraises stock prices and expands credit lending; however, it denies that liberalization can lead to the formation of bubbles.

The economic literature, however, does not have a consensus regarding the virtues of capital account liberalization. Some economists warn that some types of financial liberalization, especially capital inflows, can complicate economic management, create unstable financial sectors, and lead to asset price bubbles. Diaz-Alejandro (1985) argues that financial liberalization was likely to increase the probability of crisis. Distinguishing the gains from free trade on goods and the ones from free trade on financial assets, Bhagwati (1998) states that, " this is a seductive idea: freeing up trade is good, why not also let capital move freely across borders? But the claims of enormous benefit from free capital mobility are not persuasive" (p.7).

Even some neoclassical economists do not ignore the real facts from experience. For example, Mishkin(2006) admitted that, "financial crisis in the aftermath of financial liberalization and globalization have, unfortunately, been a fact of life for many emerging market countries and they have led to depressions that have increased poverty and have stressed the social fabric" (p. 212).

Many studies about capital account liberalization have found that it plays a notable role in the drive to financial crisis. The probability of crisis intensifies when the liberalization is not done in a skillful and orderly manner (Auerbach & Willett, 2003). Willett, Nitithanprapas, Nitithanprapas and Rongala (2004) give detailed analyses about the perverse financial liberalization, which is defined as "either generates or gives private sector actors greater scope to respond to incentive structure that give distorted signals from the stand point of overall efficiency" (p. 43). Besides the inappropriate sequencing of financial liberalization, Willet et al. mention another two common examples of the perverse liberalization that occurred in the Asian financial crisis: bad incentives for borrowing, and lending generated by moral hazard and cronyism. In all cases, the result was massive short-term debts that were channeled into real estate and stock market bubbles. Furthermore, Allen and Gale (1999) observed that, in many cases, an expansion in credit that followed financial liberalization has been a major contributor to phenomenon of sharp rise and then dramatic collapse in the prices of assets.

Capital inflows can contribute to the increase in asset prices in different ways (Kim & Yang, 2009). The first contribution is the creation of a direct channel that enhances the demand for assets, eventually leading to higher prices for them. Kindleberger and Aliber (2005) present an excellent description of the dynamic via which the increase in capital inflows rise prices of domestic stocks, by stating that:

> *As the domestic sellers of the securities to foreigners used a very high proportion of the receipts from the sales to buy other securities from other domestic residents. These transactions in securities occurred at ever-increasing prices. It's as if the cash from the sale of securities to foreigners was the proverbial "hot potato" that was rapidly passed from one group of investors to others, at ever-increasing prices. (p. 8)*

In addition, the increase in the demand for specific assets, such as stocks, usually generates impacts on the other markets in the economy, like real-estate and bonds markets. This occurs by highlighting the difference in the rate of returns between markets, and initiating the demand for higher rates from the investors in the markets that have not received direct capital inflows. The second channel of contribution is the liquidity. The increase in capital inflows, with neutral monetary policy, is likely to generate higher levels of money supply and liquidity, which in turn, create a rise in asset prices. The third contribution is that capital inflows create booms in domestic economic activities that can impact prices of assets positively.

The role of capital inflows in the increase in bank lending and stock market prices as specific types of financial liberalization, have been the subject of several empirical investigations. Kaminsky and Reinhart (1999) studied 76 currency crises and 26 banking crises that occurred in a large group of emerging and developing countries for over a quarter of a century. They concluded that there was a strong relationship between the adoption of financial liberalization policy and the occurrence of banking crises. Further, Hernandez and Landerretche (2002) found that capital inflows often finance bank lending booms that generate over-borrowing and rises on asset prices. This usually increases financial fragility and weakens macroeconomic stability.

In his study of Thailand's experience with capital inflows in the years 1980-1996, Jansen (2003) find that there was strong relationship between capital inflows and the increase in asset

prices, along with the surge in bank lending. The increase in capital inflows is an important factor in creating greater vulnerability of the economy to liquidity crisis as well. The reasons behind this can be: The increase in the risk of "sudden stop" of capital, the rapid expansion of lending often implies a decline in loans quality, and similar behavior occurs in the case of investment booms. In addition, Kim and Yang (2009) find that surges in capital inflows contribute to the appreciation in prices of assets in the emerging Asian economies.

CHAPTER THREE

An Overview of Stock Markets in MENA Region

3.1. Introduction

There is a general consensus on the importance of stock markets as an efficient instrument in mobilizing local and foreign resources and allocate them into the most productive investments. This occurs through enhancing the efficiency of the financial system as an intermediation instrument in the economy, and by reducing the costs of information, facilitating investment initiatives and trading processes, diversifying risk and monitoring managers' performance (see Khan & Senhadji 2000; Levine 1997).

The importance of having such markets increases sharply when one considers the economic conditions in Middle East and North Africa (MENA) countries. Generally speaking, MENA region has recorded low economic growth rates, high rates of poverty and unemployment, lower levels of productivity, low regional economic integration.[4] Also, the region is lacking behind in the technological progress, the quality of education, and public accountability. These economic, demographic, and social issues present the enormous challenges with which the region must cope. The events of spring 2011 demonstrate that the people of the region are looking for higher living standards, more jobs and better governance systems. Apart from improving the quality of education systems and the political institutions, the region has to enhance the role of private sectors in the economic development, and to strengthen its ability to attract foreign investments that bring advanced technology and long experience in production

[4] For example, Sala-i-Martin & Artadi (2003) state that, "GDP per capita in the region as a whole was lower in the year 2000 than in 1980" (p. 22). Apart from oil, MENA region recorded the lowest ratios of exports to GDP among all the regions in the world but Sub-Sahara Africa (Meon & Sekkat, 2004). Furthermore, the World Bank (2004) estimates that the average unemployment rate across MENA countries is at least 15 percent of the work force. The Bank adds that the total labor force in the region will reach 185 million in 2020, compared with 104 million in 2000. Ceteris paribus, the unemployment rate in the region would be even higher than its current one.

processes and marketing skills, besides providing an additional channel to finance productive investment activities, along with domestic savings (El-Erian & Kumar, 1995).

Developing efficient domestic financial markets gives MENA countries the ability to deal with two major financial challenges: absorbing properly the region's current surplus in oil revenues and attracting foreign investment. Overall, the region has a modest record in attracting international capital flows, either foreign direct investment or foreign portfolio investment in the stock markets. Not only poor-natural resources countries need dynamic financial markets, but also oil-exporting countries. The frequent fluctuations in oil price imply a high degree of uncertainty that prevents the ability to have good long-run economic planning. This is just an aspect of what is known as the natural-resources curse (See Auty, 1993). Bakheet (1999) argues that with such character "oil is becoming more of risk than an asset" (p. 73). Hence, MENA countries (including oil exporting countries) need to have more diversified economies in order to get more stable economic environment and to be able to attract the vast migrated money.[5] Having an efficient financial market can be a crucial step on this path.

This chapter introduces the financial markets in MENA. The chapter's goal is to give some background about the region's financial markets: Their establishment, development and general features. It also discusses some issues relevant to the current framework of these markets. These include issues like the region's experience with financial bubbles and foreign capital flows, macroeconomic and financial factors that drive prices of stocks in the markets and interdependence conditions among these markets.

[5] According to McKinsey Global Institute (De Boert et al., 2008) the total foreign assets of Gulf Cooperation Council (GCC) countries was about $ 2 trillion, in 2006. The institute estimates that, if the crude average prices are $70 per barrel, the GCC countries will generate up to $ 6.2 trillion in profit from their oil revenues over the next 14 years.

3.2. Some General Features of Stock Markets in MENA

While the stock markets in the region seem new, historically, the traditions of adopting such method of finance in the region are quite old. For instance, the first Turkish (Ottoman) securities exchange was established in 1866 (Marber, 1995). Also, the Egyptian stock exchanges in Alexandria and Cairo were founded a century ago. By the 1940s, the Cairo stock market was one of the most active markets in the world (El-Erian & Kumar, 1995). Also, other countries in MENA have had stock exchanges for a relatively long time: Casablanca's stock exchange (Morocco) was founded in 1929 and stock exchanges were set up in Iran and Tunisia in 1960s (El-Erian & Kumar, 1995; Marber, 1995).

Nevertheless, until the last two decades, most of these markets had either suspended their activities or had levels of activities that were insignificant. Alterman (2005) describes that the conditions of these markets had been "neglected backwaters for decades" (p.1). Only since the early 1990s were these markets were reactivated. For instance, the Casablanca stock exchange was reopened in 1992 and the Egyptian stock exchanges in Cairo and Alexandria started to be active again in1994. The initiative of the reactivation was motivated by the requirements of the structural reform programs that many countries in the region participated in at that time (Marber, 1995).

A few exceptions that established stock markets occurred in the region during the 1970s and 1980s. For example, the Amman stock market (Jordan) was established in 1976. Also, in the early 1980s, the Kuwaiti regulated stock market commenced operations in 1982, then other GCC countries (i.e. Saudi Arabia, Bahrain, and Oman) took the same action in the second half of the 1980s (Fayyad & Daly, 2010).

El-Erian & Kumar (1995) presented an accurate picture of MENA markets conditions at their emerging time in the early 1990s. The noticeable characteristics of these markets were small, thin and dominated by commercial bank trading. Also, there was limited participation of foreign investors. This could be explained by the dominant role of public sector entities and closed family-ownership of many firms in the region. In addition, El-Erian and Kumar (1995) pointed out the weak institutional framework in these markets, particularly the legal and regulatory framework that concern potential investors.

Table 3.1 presents a comparative overview of the developments in the MENA stock markets in the last decade. In 2010, Israel, Turkey and Jordan have the largest numbers of companies that are listed on the stock exchanges. Because of the enhancement of transparency conditions, the number of the listed companies in the Egyptian stock exchange declined to 211 companies in 2010 from more than a thousand companies listed ten years earlier (Billmeier & Massa, 2007a). While Lebanon remains the country that has the lowest number of companies that are traded in its stock markets, with only ten companies, the recent decade has seen an expansion in the number of companies that are listed in the most of the GCC stock exchanges.

In terms of market capitalization, which represents the price of shares times the number of shares outstanding, Saudi Arabia has the largest market value with $ 353 billion in 2010, followed by Turkey with $307 billion, then Israel with $218 billion. While all the stock markets in the region have experienced extraordinary increases in their market capitalization, Lebanon and Tunisia remain the smallest markets by the value measure. Except for Bahrain, all MENA stock exchanges have seen notable increases in their market values as a percentage of GDP. Jordan and Israel have the highest market value as percentage of GDP with 127 percent and 93 percent, respectively. The significant increase in the market capitalization as a percentage of

GDP in countries like Qatar, Saudi Arabia and UAE reflects the increasingly important role that the stock markets have obtained in the economic activities in these countries over the last ten years.

In terms of value traded, which measures the total value of shares traded during the year, Turkey has the greatest value followed by Saudi Arabia, and Israel with $ 421.6 billion, $203.2 billion, and $133.4 billion, respectively. Comparing the total trade values for the year 2000 and the year 2010 in the region's markets show that the Saudi stock market has surpassed the Israeli stock exchange over the period. By 2010, the Saudi market obtained the second position in regard to the total traded value of shares.

Furthermore, the ratio of turnover, which is the total value of shares traded during the year divided by the average market capitalization for the year, has seen significant increase in most of the regions stock exchanges. This ratio, which is used as an indicator for market activity, recorded its highest level in Turkey with 158.4 percent in 2010. Also, Israel; Saudi Arabia; Egypt and Kuwait markets recorded high ratios of turnover in the year 2010.

3.3. Determinants of the Stock Markets Developments

Many factors have contributed to the development of the MENA stock markets. First, the awareness of the role of financial markets in allocating resources efficiently and enhancing the economic activities has been a strong incentive in convincing many countries in the region to develop stock exchanges. In the last two decades, the region has seen many comprehensive economic reform programs. Most of the MENA countries have implemented policies to reform the economy management through having more disciplined monetary and fiscal policies, downsizing government sectors, enhancing private sector role and opening up for foreign investment (Dasgupta, Keller & Srinivasan, 2002; Dunkley, 2006). Moreover, the reforms of

capital markets' regulations aim to encourage private investment, provide stronger protection for investors, and set up new methods for financing new projects (Ben Naceur, Ghazouani & Omran, 2008).

Second, the recent wave of globalization has driven many countries in MENA toward adopting more liberal economic policies. In the last two decades, some countries faced crisis in their balance of payments accounts or public finances. So, in order to obtain financial assistance, these countries participated in the economic structural programs that were designed by the international Monetary Fund (IMF) and the World Bank. One of the main requirements of these programs was to have a more market-oriented financial system. In addition, most of the countries in the region have become members in the World Trade Organization (WTO). Besides lowering trade barriers, WTO membership encourages countries to adopt more liberal approach toward foreign participations in the different sectors of the economy. Furthermore, five countries in the region (i.e. Bahrain, Israel, Jordan, Oman and Morocco) have signed free trade agreements (FTAs) with the USA in the last decade. Opening up financial sectors for foreign investments is a common feature in such agreements.

Third, the increase in oil price allows oil-exporting countries to accumulate huge financial surpluses. A part of these funds have been recycled in the local stock markets and the neighbors' markets (Alterman, 2005; Billmeier& Massa, 2007b). For instance, even in the early 1990s, Marber (1995) observes that while the Western investors were reluctant to invest in the Egyptian economy because of the political instability, the private Gulf investors have been willing to do so.

Fourth, the September, 11^{th,} 2001 event led to significant effects. MENA investors have searched for local and regional opportunities rather than keeping their money in the Western

economies where they might be mistakenly expropriated by the governments in the Western world (Balli, Louis & Osman, 2009).

Fifth, the spillover from the recent successful reform programs in the neighboring countries encourages others to follow similar steps in order to have more dynamic economies and efficient stock markets (ESCWA, 2009).

Despite all these indications of positive progress, most of MENA stock markets remain relatively small by international standards, suffer from structural and regulatory weaknesses, and concentrate a major part of the traded stocks in the hands of governments and a few business families (Yu & Hassan, 2008a). Also, these markets tend to be traditional. For example, trading in derivatives such as stock options and futures was introduced just recently in the Kuwait stock market. It is the first market, among the Arab markets, to have such investment instruments (Sabri, 2008). Only some corporate and government bonds and treasury bills are available but their markets are unlikely to be active. Furthermore, while the Saudi stock exchange is ranked as one of the largest emerging markets, it is still lacking a formal stock exchange setting. The market, in fact, is an informal electronic exchange (over-the-counter transactions) overseen by the national monetary authority (Balli et al., 2009). In addition, Martin (2007) argues that lack of institutional investors and the high presence of retail investors are major challenges for the development of efficient markets in the region. Furthermore, Creane et al. (2004) assert that the poor quality of institutions in the region limits the ability of economic activities to function in a proper way. These include the judicial system, bureaucracy, and property rights. These factors seem to contribute to the region's experience with financial bubbles.

3.4. Bubbles

While having active financial markets in MENA is a new phenomenon, these markets have experienced some trends of sharp uprising and sudden adjustment in stock prices (e.g. Oman's stock market in 1998, Saudi Arabia in 2005, Jordan and Egypt in 2007, and Dubai in 2008).The most infamous experience in the region, however, is the collapse of the unregulated Kuwaiti Souk Al-Manakh in 1982. The government stepped in and bailed out investors.[6] The interventions of the Kuwaiti government and similar actions taken by governments in the region over time can have dangerous psychological effects on the investors in the region. Such policies give investors some guarantees that their governments would not leave them alone but will bail them out; regardless of the aggressive risk they have taken (Alterman, 2005). Such beliefs create an obvious moral hazard problem. The previous chapter provides intensive discussions of this issue in its global context.

Besides the behavioral finance approach, analysts provide many explanations for the soaring in stock markets indices in MENA region, and the subsequent collapse.[7] These include the increase in oil prices, the surge in property values, the limited opportunities of alternative investments, the benefits from economic and business deregulation, the limited opportunities of alternative investments, and the structure of participants in the stock market trading.

There is the positive spillover from the surge in oil price on the other economic activities. While the increase in stock markets in the oil exporting countries is obvious, as a

[6]Al-Loughani (2000) reports that the value of the post-dated checks used in favored trading registered after the crash was around $93 billion (quoted in Arifa, Ghali and Limam, 2002, p.144, note 2).

[7] As happened in other regions with similar experiences, the presence of speculative bubbles is a debatable issue. Yu & Hassan (2008b), for instance, employ fractional integration test and duration dependence tests, but they could not find strong evidence of speculative bubbles in nine of the region stock markets for their dataset span that ends in March 2003. Nevertheless, more recent studies find evidence of bubbles. Using cointegration tests on the Egyptian stock index for the period 2001-2006, Billmeier and Massa (2007a) find evidence in favor of unstable relationships between Egypt stock index and its underlying fundamentals. Moreover, Jaradat (2009) employs a non-parametric duration dependence test to study the presence of speculative bubbles in the Jordanian stock market over the period 1992-2007. He observes some evidence of the presence of speculative bubbles in the market.

result of the liquidity glut, the effects have been transformed across the region through two channels: The tendency of Gulf investors to invest the surplus in the neighboring countries, and through the surge in the remittances of MENA workers in the Gulf countries to their home countries (Billmeier& Massa, 2007b). Hence, the boom in the Gulf economies and the rising bubble in their stock markets have influenced the situation in the neighboring countries. Jordan, for instance, has experienced a boom in its economic activities in the last few years. Gulf capital flows have been taking a great share in the stocks that are traded in Amman stock exchange; whereas half of the owners are foreigners as early 2006. Lidstone (2006) describes the situation in Jordan as follows:

> *The value of shares traded on the Amman Stock Exchange (ASE) leaped to $23,000 million in 2005, from $5,300 million the previous year. Across the city, foreign capital and repatriated earnings from the GCC are being ploughed into everything from stocks and shares to restaurants and real estate. (p. 6-7)*

In addition, the limited alternative investment opportunities in some economies in the region contributed to the speculative bubble recorded in the region (Arifa et al., 2002; Balli et al., 2009). It is common in the GCC countries to have oversubscribed initial public offerings (IPOs) by far beyond expectations. This trend reflects investors' appetite for having shares in all types of traded companies. Martin (2007) explains that, "the recent valuations of the Gulf equity market are widely recognized as a true bubble, driven by too much liquidity, with not enough stocks in which to invest" (p. 32).

Another factor that contributes to the creation of bubbles in MENA stock markets is the lack of institutional investors and the irrational behavior of retail investors (Alterman, 2005; Fadlallah, 2005; Martin, 2007). These small inexperienced investors have a high presence in the region stock exchanges. For example, up to 60 percent of the activities on Egyptian stock

exchanges are done by retail investors. Institutional investors only account for one fifth of the daily volume in the markets (Martin 2007).

Consistent with the argument in the bubble literature on the positive feedback trading, insiders (or big players) in some of MENA stock markets employ sentiment and rumor for their own benefits. Martin (2007) quotes a local financial analyst saying:

> *There are still some surprises when you see stocks that have achieved nothing and the share price keeps going up. In some cases, it is because big market players, like some of the region's high net worth individuals, have agreed to do some speculative trading and talk up stocks so the market follows. This allows the first investors out of these stocks to make a quick profit, while those who are just following the pack are left holding shares that are probably not worth what they paid for them. (p. 33)*

It is a similar situation to what Kindleberger and Aliber (2005) describe as a struggle between informed insiders and uninformed outsiders**.**

Further, the retails investors have some specific characteristics in MENA stock markets. While they often borrow heavily, they "embrace risk without concern and plunge wholeheartedly into stocks for fear of being excluded from the enriching party", (Fadlallah, 2005, p.2). In such an environment, it is common for investors to form their expectations of future level of prices on rumor and speculations rather than on financial fundamentals.

Another feature of the region markets is the poor quality of financial research (Martin, 2007). Hammoudeh and Choi (2007) observe that the GCC stock exchanges are different from other developing countries and other emerging markets. They state that:

In the GCC markets herding, fads, and speculative attacks do not occur because of capital flows quickly into and out of markets as is the case in other emerging markets. Volatility can be traced back to the types of companies that are publicly traded and dominate the stock

markets—largely banks, and real estate, construction and communications companies. Herding, fads and speculative attacks exist in these companies because their returns are particularly uncertain, which also combined with lax information disclosure requirements, may cause problems of rash trading based on patchy news" (p. 233).

Furthermore, economic reform programs and business deregulation have contributed to the rise in the region stock markets. These include enhancing private sector role in running the economy through privatization of many public enterprises and improve the efficiently of public sector institutions, improving corporate governance, besides the different initiatives that have been taken by the stock markets themselves in order to enhance their sophistication (Fadlallah, 2005; Martin, 2007). The next section turns attention to the relationship between MENA stock markets and foreign investment.

3.5. Liberalization Foreign Capital Inflows

Until recently, foreign capital inflows to the MENA region remained modest and have unsustainable pattern since they fluctuate greatly from one year to another. The international financial institutions estimate that the surge in capital flows towards the emerging markets in the 1990s had largely bypassed the MENA region (Yu & Hassan, 2008a). Beside the political instability, other factors might contribute to this situation, such as the restrictions that face the foreign capital inflows, the dominant role of public sector in the economic system, the existence of costly bureaucratic procedures, and weak institutional framework (Dasgupta et al., 2002, Ben Naceur et al., 2008).

Nevertheless, the efforts for attracting foreign direct investment (FDI) seem to have gained some success in 2000s. The region's share of FDI has increased dramatically in the last decade. According to the World Investment Report (UNCTAD, 2010), Western Asia countries'

share of the world inward foreign investment has increased from less than one percent in 1999 to more than six percent in 2009. Also, the share of the Northern Africa countries (including Egypt) has increased from 0.3 percent to 1.6 percent of the world inward FDI in 1999 and 2009, respectively.

Moreover, while openness toward foreign direct investment varies across the countries in the region, the trend is to have more welcoming policies (IMF, 2010). While Morocco and Turkey, for instance, do not impose any restrictions on inward direct investment, Tunisia and Egypt allow all foreigners to invest freely in most economic sectors. Only permissions are required in few sectors for a share of more than 50 percent of capital. At present, Oman limits foreign ownership of shares of Omani companies to 70 percent but it might be increased to 100 percent. Further, a nonresident portfolio investor my not hold more than ten percent of the shares of an Omani company (IMF, 2010). In UAE and Jordan; at least 51 percent of the equity of companies must be held by the residents. In turn, in Saudi Arabia nonresidents foreign investors are limited to indirect investment through authorized mutual funds (Ben Naceur et al., 2008).

Ben Naceur et al. (2008) investigate the effect of stock market liberalization on economic growth in the region. They study the annual data of 11 MENA countries during the period of 1979-2005. They conclude that stock market liberalization does not have an impact on economic growth rate or investment level. In fact, the impact of liberalization on stock market development is likely to be negative in the short run and tends to take a positive trend in the long run. Ben Naceur et al. (2008) highlight the importance of having some pre-requirement conditions in order to benefit from liberalization such as less government intervention and foreign trade liberalization as benchmark for obtaining positive results from financial markets liberalization.

3.6. Macroeconomic Variables

Many studies have focused on investigating the relationships and the dynamic interactions between stock markets and macroeconomic variables world-wide[8]. These studies identify some macroeconomic variables that seem to have significant power in influencing stock markets returns. Among these variables are inflation rates, money supply, capital expenditure, industrial production index, and the interest rate. Few studies, however, have been conducted to examine the relationship between stock markets and macroeconomic variables in the MENA region. One of the earliest is Amihud (1996) to study the relationship between stock price and unexpected inflation rate in Israel. Further, there are a series of studies on the Turkish stock market (Erdem, Arslan, & Erdem. 2005; Kandir, 2008; Tunah, 2010). Also, there are some studies that focused on the Arab countries (Alqudsi, Obeid, Numan, & Kaloti, 2007; Al-Rjoub, 2005; Hammoudeh& Choi, 2006).

The empirical findings of Amihud (1996) revealed that there was negative relationship between Israel stock prices and unexpected inflation rate. He explained that this negative and strongly significant relationship reflects the negative association among investors in Israel between unexpected inflation and future real economic activities. The negative relationship between stock market and unexpected inflation, however, is not limited to Israel alone. Al-Rjoub (2005) had a sample of five Arab countries: Bahrain, Egypt, Jordan, Oman and Saudi Arabia. He employed the Exponential Generalized Autoregressive Conditional

[8]Studying the relationships between stock markets and macroeconomic variables in the developed countries has been a dominant force in this area literature (See, Abdullah & Hayworth, 1993; Asprem, 1989; Chen et al., 1986; Cutler et al., 1989; Darrat& Dickens, 1999; Flannery & Protopapadakis, 2002; Hamoa). Studies examining the dynamic interactions among stock markets and macroeconomic variables in emerging and developing economies have increased over the last decade. Some of the noteworthy papers are; Kwon and Shin (1999) for South Korea, Maysami and Koh (2000) for Singapore, Bhattacharya and Mukherjee (2002) for India, Ibrahim and Aziz (2003) for Malaysia.

Heteroscedasticity (EGARCH) model for different period spans across these countries. His results reveal that there is a negative and strongly significant relationship between unexpected inflation and stock returns in these countries.

Using the EGARCH model, Erdem et al. (2005) found that there is significant unidirectional spillover from macroeconomic variables to Istanbul stock price indexes. These include negative and positive effect from inflation and interest rate to stock price index, respectively. Kandir (2008) used a standard Ordinary Least Squares (OLS) regression model to investigate spillovers from macroeconomic variables over a group of stock portfolios in Istanbul stock exchange for the period July 1997 to June 2005. He found that there are spillovers from exchange rate, interest rate and world market return to all of the portfolio returns, while inflation rate is significant for only three of the twelve portfolios. On the other hand, industrial production, money supply and oil prices do not appear to have any significant effect on stock returns.

More recently, Tunah (2010) uses monthly data, for the period from January 2002 to August 2008, to investigate the relationship between the Turkish stock market and macroeconomic variables. He finds that there are spillovers to stock returns from Dow Jones industrial average, industrial production index, crude oil price, import, and total credit volume.

Alqudsi et al. (2007) studied the effect of a set of economic and monetary variables on the Jordanian's Amman stock exchange. They employed different empirical models and the significance of their results depends on the empirical techniques they employed. Using the GARCH model; they found that changes in prices of potash and phosphates were the most influential factors over this stock market. These products are among the primary sources of export earnings in the country. When the researchers, however, use Autoregressive Moving Average (ARMA), the empirical evidence was weak even for the effect from changes in potash

and phosphates prices. Hammoudeh and Choi (2006) examined the long-term relationship among the GCC stock markets in the presence of the US oil market, the S&P 500 index and the US Treasury bill rate. They found that the T-bill rate has a direct impact on these markets, while oil prices and the S&P 500 have indirect effects. They concluded that global variables contribute marginally to the total variations in the GCC stock markets. Since MENA is widely known as a hub for oil production, the effect of changes in oil prices on the region stock exchanges will be discussed next.

3.7. Oil Effect

There is a growing body of literature on the effect of changes in oil prices on stock markets and on macroeconomic variables, in general. Until recently, most of the works focused mainly on the effects on oil importing countries (see Cuñado & Pérez de Gracia, 2003; Hamilton 1983, 1996; Huang, Masulis, & Stoll, 1996; Jones & Kaul, 1996; Nandha & Faff, 2008). Few analyses, however, have investigated the relationship of changes in oil prices and stock markets in oil exporting countries. For instance, Bjørnland (2009) studied the effects of oil price shocks on stock returns in Norway, a European oil-exporting country. Using the structural VAR analysis to investigate the transmission channels of oil prices for macroeconomic behavior, Bjørnland found that an increase in oil prices by ten percent leads to increase of the stock returns by 2.5 percent. This impact, however, disappears after a short span. While the effects of shocks in the other macroeconomic variables seem to be more moderate, some of them, particularly shocks from monetary policy, make important contributions to the changes in stock markets returns.

Recently, MENA countries have gotten attention in the literature on the theme of oil price influence over stock markets behavior. Some recent works focused on the GCC countries address this theme (e.g. Alterman, 2005; Arifa et al., 2002; Arouri & Rault, 2010; Hammoudeh & Eleisa,

2004; Onour, 2007). Other work, however, has been on the overall region. For instance, Billmeier and Massa (2007b) tested for the variables that drive the stock market in the Middle East and Central Asia, i.e. macroeconomic factors that determine changes in the stock markets' capitalization in a panel of 17 economies over the period 1995- 2005. Nine resource-rich countries are included (GCC countries, Egypt, Iran and Kazakhstan). While the researchers find that good-quality institutions and high levels of remittances have positive and significant impacts on market capitalization in the more diversified economies, oil is the most influential variable in driving stock market capitalization in the resource-rich countries. Oil, however, has an indirect impact on the stock markets of the net oil importers in the region. This occurs through remittances channel. Higher oil prices usually imply higher levels of remittances transform into the workers-exporting countries in the region.

Al-Fayoumi (2009) investigated the relationship between changes in oil prices and stock market returns in three MENA oil importing countries (Turkey, Tunisia and Jordan). Using the monthly data of oil prices, interest rate, industrial production and stock market indices for the period December 1997 to March 2008, Al-Fayoumi employed Vector Error Correction Model (VECM) to uncover the dynamic relationship among these macroeconomic variables. Al-Fayoumi's empirical results are inconsistent with the previous works that argue that oil prices shocks influence stock markets in these countries. While Al-Fayoumi (2009) does not find strong evidence of such impacts from oil price shocks, the study indicates the important effect of the local macroeconomic factors on the changes in the returns of stock markets.

3.8. Interdependence

A few studies of have been conducted about interdependence among MENA stock markets in the last decade (e.g. Girard, Omran & Zaher, 2003; Maghyereh, 2006; Maghyereh&

Al-Zoubi, 2004). Girard et al. (2003) employed GARCH methodology to investigate the correlation among a sample of 11 MENA countries. While the spans of their data have different starting dates, they all end by mid-2001. With the exception of Israel and Turkey, Girard et al. (2003) observed that MENA markets are not correlated with the world markets, or even among themselves. Maghyereh and Al-Zoubi (2004) analyzed the dynamic interdependence among four MENA stock markets; namely Egypt, Jordan, Morocco and Turkey. They employed EGARCH model to test for lead-lag relationships and volatility transmission mechanism among these markets. Though their empirical results indicated that there were no mean spillovers among MENA markets, they found that there was strong evidence of volatility-spillovers effects among these markets. They explained that these inter-linkages might be due to trade linkages or financial interdependence.

Also, Maghyereh (2006) studied dynamic interdependence among those four markets. His empirical results suggested that although MENA markets were not completely isolated from each other, the linkages among these markets were relatively weak. His results showed that Jordan's stock market is the most influenced by changes in the other markets. Thus, it is the most endogenous market in the region, while Turkey is the most exogenous market. He explains that this result is in line with the fact that Jordan is highly engaged in intra-regional trade with other MENA countries. This result is consistent with Alqudsi et al. (2007). Using daily stock price data, they attempted to unravel potential volatility transmission from regional and international financial forces into the Jordanian exchange. They found that the Saudi stock exchange exerts a strong influence on Amman stock exchange. Other financial variables, such as Egypt stock index, S&P 500, oil price, the US T-bill, showed a weak impact on Jordan stock markets.

Furthermore, using daily data for the period from January, 1999 through December 31, 2005, Yu and Hassan (2008a) observed that a long-run equilibrium relation was strengthening between the same four markets (i.e. Egypt, Jordan, Morocco, and Turkey) and US stock markets. The interdependence among MENA stock market is growing but still weak. Also, Al Kulaib, Najand and Mashayekh (2008) used daily data over the period 1999-2004. They investigated linkages and interaction within and among the three regions within MENA (North Africa, Levant, and GCC). They found no causality or spillover from one country to another in the North Africa region. In the Levant region, however, they found that there was a bi-directional causality between Turkish and Lebanese stock markets, Jordan's market, however, was not influenced by either market. Further, Al Kulaib et al. (2008) found that there is more interaction among GCC markets. Consistent with Girard et al. (2004), Cheng, Jahan-Parvar, and Rothman (2009) found that while Turkey and Israel markets are integrated with world financial markets, most of the Arab markets in the region are, to some extents, segmented from international financial markets. In other words, there is no correlation on the returns between the Arabs stock markets and the world markets. Pricing of the risk and returns in Arabian MENA markets are strongly influenced by domestic information. Also, Arouri and Rault (2010) find that the GCC markets are largely segmented from the international markets and are overly sensitive to regional political events.

CHAPTER FOUR

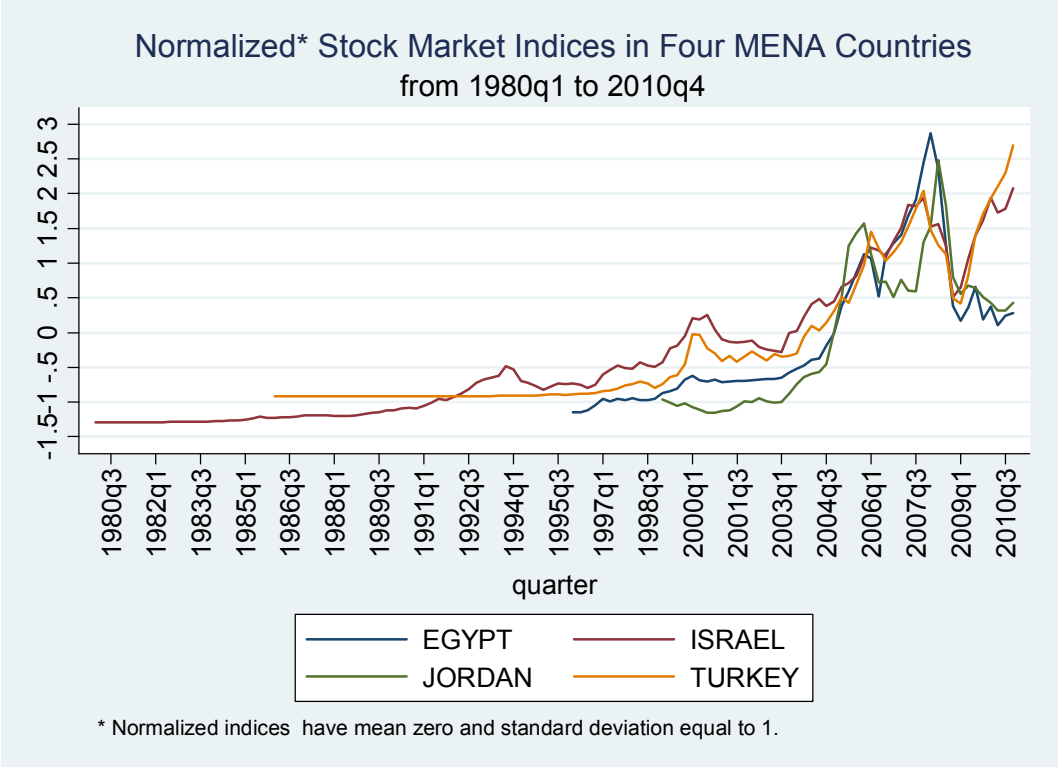
Data and Methodology

4.1. Introduction

This chapter presents information about the data that are used in this dissertation: sources, definition, and the expected relationship between the dependent variable and other variables. In addition, the chapter gives details about the methodology that is employed in the empirical work of this study. The sample contains only four countries: Egypt, Israel, Jordan, and Turkey. These countries are selected because of the problem in data availability. The investigated variables are: US Treasury-bill (T-bill), oil price, portfolio investment, money supply, wholesale price index, total foreign reserves, real gross domestic product, dividends yield, price/earnings ratio, and stock market indices of the counties in the sample. Figure 4.1 illustrates the movements in the stock markets' indices of the four countries that are included in the sample. The movements in the indices are normalized by having approximately a normal distribution with mean equal to zero and standard deviation equal to 1.

The basic model in this study intends to test the impact of the different variables on stock market index in the MENA region, particularly the effect of portfolio investment inflows. Also it examines the degree of integration and interdependence among these stock markets through studying the sensitivity of each index to changes in the other indices. The goal of the second model is to investigate how much changes in stock indices reflect stock market fundamentals. Both models share all the major macroeconomic variables. An inadequate time series for some variables is the rationale behind conducting two models, as will be explained latter.

Figure 4.1
Normalized Stock Market Indices in Four MENA Countries



This study uses VAR models and employs the following empirical tests: unit root tests, Granger-causality tests, Impulse Response Functions, and Forecast Error Variance Decomposition analysis.

4.2. Data

The MENA region is understudied. There are few studies that focus on the region financial systems (e.g. Ben Naceur et al., 2008; Billmeier and Massa, 2007a, 2007b; Creane et al., 2004; El-Erian & Kumar, 1995). This could be the result of a lack of data or a short span of data. Limited data and lack of detailed data prevent conducting serious work.

One of the main purposes of this study is to examine how capital inflows (measured by portfolio investment) contribute to changes in stock markets in the MENA region by effecting stock indices. The data on portfolio investment are reported quarterly only. As a result, the four

countries listed above are included because they have quarterly data available either in the database of International Monetary Fund (IMF) or on the websites of their national central banks or statistics departments. According to data availability, the time spans of data vary in the starting quarter but all data end by the last quarter of 2010. Data for Israel started in 1980, Turkey in 1986, Egypt in 1996, and Jordan in 1999. Besides portfolio investment, some macroeconomic variables that previous empirical studies have been included in order to test for factors that influence stock market. Here also, the selection of variables is based on the availability of quarterly data for all the countries in the sample. The selected variables, however, are not much different from the ones that previous studies have included (e.g. Alqudsi et al., 2007; Arifa et al., 2002; Ibrahim and Aziz, 2003; Tunah, 2010)

The data of portfolio investment is obtained from the International Monetary Fund's Balance of Payments (BOP) Statistics. Data for Turkey and Israel are available for all the time spans covered in this dissertation. Most of Jordan's series are also obtained from the IMF except for the last year (2010), which is obtained from the statistical database on the website of the kingdom's monetary authority (Central Bank of Jordan 2011). The series of portfolio investment for Egypt, however, is not available in the IMF'S BOP statistics. It is compiled from the Egyptian Ministry of Finance website, particularly from different issues of the Egyptian Economic Review, which is published by the ministry (Egypt's Ministry of Finance, 2011). Portfolio investment data are in current millions of US dollars.

The macroeconomic variables series are obtained from the International Monetary Fund's International Financial Statistics (IFS). These include money supply, wholesale price index, total foreign reserves minus gold, nominal gross domestic product, and US's T-bills. Money supply data are measured by millions of the nominal local currency unit. GDP data are in billions of the

local currency unit. Total foreign reserves figures are in billions of current U.S. dollars. The wholesale price index has a different base year for each country in the sample. The crude Oil price (Brent) series is obtained from the World Bank's Global Economic Monitor (GEM) Commodities. Data are measured by US dollar per one crude oil barrel. They are in constant on the year 2000 US dollar price. Stock price indices (end of the month) of Israel and Turkey are obtained from IFS, while stock price indices of Egypt and Jordan are obtained from the Global Financial Data (GFD) database. Stock indices have a different base year for each country in the sample.

The real GDP series for Turkey and Israel are obtained from the IFS database. However, since the available time series data of quarterly GDP numbers of Egypt have used different base years to calculate the real GDP, there is no completed time series for this variable for all our study period of Egypt (1996-2010).Consequently , the study uses the base year of 2002 (2002=100) to calculate the real GDP for the whole period. The real GDP of the period is calculated by dividing the nominal GDP figures by the GDP deflator, and then the result was multiplied by 100. The data of GDP deflator are collected from the publications of the Egyptian ministry of finance (Egypt's Ministry of Finance, 2011).

The real GDP numbers for Jordan are available in the IFS for the whole study period except for the quarters of the last year (2010). These recent figures were obtained from the statistical database on website of the Jordanian monetary authority (Central Bank of Jordan, 2011).

For the second model, data of stock price indices, dividends yield and price/earnings ratio are obtained from Standard & Poor's (S&P) database. All these data series are stated in local

currency unit. For the macroeconomic variables that are included in the second model, this study uses the same dataset as the basic model.

4.3. Definitions of Variables

Portfolio Investment, *pi*, includes net inflows from equity securities other than those recorded as direct investment and including shares, stocks, debt securities, depository receipts, and direct purchases of shares in local stock markets by foreign investors. Since foreign portfolio inflows imply larger liquidity in the stock market, a rise in the stock index is expected. Kim and Yang (2009) find evidence of such impact (of broader capital inflows) on the Korean stock market prices.

Oil price percentage change, *dloil*, is a measure of energy cost effect. This study selects Brent crude oil price as a benchmark for prices in the world crude oil market. According to Thomson Reuters, Brent is a blended crude stream produced in the North Sea region which serves as a reference or "marker" for pricing a number of other crude streams. In this study, Brent is selected to represent oil price variable for two reasons. Firstly, Brent is used as a price benchmark for more than 60 percent of crude oil barrels that are traded daily in the world (Magayrah, 2004, p.31). Secondly, there are empirical evidences that the prices of all types of crude oil have been following a similar fluctuating trend over time (Chang & Wong, 2003). There is no substantial bias in whatever crude is chosen, but the larger share of Brent in the global oil market affirms its selection over the other crude market benchmarks. Changes in oil price imply a higher production cost that might cause a slowdown in economic activities. Such a pessimistic outlook could generate a decline in stock returns, and lower the stock index.

The rationale behind such an inverse relationship between oil price and stock market index is that an increase in oil price implies higher cost of production, and that would result in

less economic activities. In turn, this would cause lower stock returns that would drive the stock index down. However, the empirical studies on the region do not support this assumption. For instance, Kandir (2008) finds that there is no effect from changes in oil price in the Turkish stock market. Further, AlFayoumi (2009) finds that there is no evidence of effect from changes in oil price on stock markets of Jordan and Turkey.

Money Supply percentage change, *dlm2*, is an indicator of liquidity conditions in the economy. The study uses a broad definition of money supply (M2) as a proxy for that purpose. M2 is a category within the money supply that includes a narrow measure of money supply (M1) in addition to all time-related deposits, savings deposits, and non-institutional money-market funds (cash in the hands of the public, the deposits and the quasi-cash). A positive change in money supply implies more available credit in economy some of which might be channeled to the stock market. Hence, change in money supply could lead to higher stock index.

Real Gross Domestic Product (GDP) growth rate, *dlrgdp*, is a measure of the healthiness of the economy. Real GDP is an inflation-corrected measure that reflects the sum of gross value of all goods and services produced in an economy in a given year, expressed in base-year prices. Since real GDP growth rate reflects overall economic activities, changes in it could influence stock market performance by affecting corporate profitability and cash flows. Thus, an increase in real GDP growth rate is expected to have a positive impact on the stock index. The opposite response is expected during economic slowdowns or recessions.

Inflation Rate percentage change, *dlwpi*, is an indicator of inflation. The wholesale price index (WPI) is used as measure of price changes in the wholesale market during the production processes before goods get to the consumer. The wholesale index generally leads movements in the consumer price index (CPI) by two or three months. Because if data availability constraints,

the model considered the wholesale price index and not the consumer index prices (Data for CPI was not available for Egypt, Turkey for the time period). Further, Billmeier and Massa (2007a) use WPI in their study about Egypt because, as they state, specialists in the region considered the index more reliable than the CPI, in particular for the period before 2004 (p.10). Inflation changes are regarded as a measure of macroeconomic stability. High levels of inflation are associated with greater uncertainty. Hence, persistent positive changes in the inflation rate might lead investors to be less interested in trading in the stock market. This will have negative impact on stock index.

Foreign reserves percentage change, *dlres*, is an indicator of the external position of the economy. Foreign reserves comprise special drawing rights, reserves of IMF members held by the IMF, and holdings of foreign exchange under the control of monetary authorities. An increase in foreign reserves usually reflects a surplus in the balance of payments accounts.

US T-bill change, *dustbill,* is a proxy for global interest rates. Treasury bills are debt obligations backed by the U.S. government. In the investment world, treasury bills are considered as the least risky investment available to investors (Malkiel, 1996). It also represents the opportunity cost of holding domestic assets. It is not clear how changes in the US T-bill can affect stock markets in the region, since the direction of response depends on final outcomes of different factors such as the degree of openness in the economy, the adopted exchange rate regime, financial deepening, and investors' preferences of portfolio allocation.

Stock market index percentage change for each country is the change in the capitalization-weighted stock market index that measures the performance of all listed stocks weighted in relation to their market capitalization. Stock indices are the proxy of benchmark portfolio

returns. In the data, the stock index of Egypt, Israel, Jordan and Turkey are named as the following: *dlse_EGY*, *dlse_ISR*, *dlse_JOR*, *dlse_TUR*, respectively.

Standard & Poor's indices, *dlindexsp*, are intended to represent the performance of the most active and liquid stocks in each respective market. Thus, the index includes 70-80 percent of the total capitalization of all locally exchange-listed shares.

Dividends yield change, *divyld,* is calculated through multiplying the cash dividend per share recorded for each index constituent by the shares outstanding for the constituent in order to arrive to a gross amount of cash dividend paid, then, adding these over a period of 12 months and dividing the sum by the end-of-period market capitalization of the index.

Price/Earnings ratio change, *pe*, is calculated from total shares outstanding and as-reported earnings over the whole year.

All the variables are transformed into their log-differences (the first difference the log levels), with the exception of using first differences for the US T-bill and using levels for portfolio investment. The reason for having portfolio investment in levels is that it is already in the form of net inflows. This implies that the figures represent net changes in portfolio investment at the end of the period. According to the IMF's Monetary and Financial Statistics: Compilation Guide (2008), flows are the period to period change in the outstanding amounts of financial assets and liabilities. Therefore, the closing value of portfolio investment flows equals its initial value at the beginning of the period plus the flows (or changes) arising from transactions, revaluations, and other changes in the volume of assets. Taking first differences on such numbers will be like taking a second difference. Further, unit root tests show that portfolio investment is stationary in levels (See table 5.1).

The second model includes domestic macroeconomic factors (from IMF and the other mentioned sources) and stock market variables (from S&P's database). All variables are in log-differences (the first difference the log levels), with the exceptions of using levels for portfolio investment (*pi*) and first differences for US T-bill (*dustbill*), price/earnings ratio (*pe)*and dividends yield (*divyld*). The reason for conducting a second model, rather than conducting all the empirical tests with the same dataset, is the shorter spans for stock market indicators, i.e. price/earnings ratio (*dpe*) and dividends yield (*divyld*). In general, S& P datasets have shorter spans than the original dataset in the basic model for all the countries in the sample. The market coverage by S& P database of most of MENA countries just started in the second half in 1990s. The spans of obtained data from S&P are as follows:1997:1-2010:4 for Egypt, 1996:4- 2010:2 for Israel, 1999:1- 2008:3 for Jordan, and 1989:3- 2010:4 for Turkey. Thus, while the data about stock market indicators are available through S&P, running the model using this dataset for the whole work will imply have many missed data. For example the number of observations for Israel in the S&P is 55 observations compared with 124 observations in the basic model dataset. All the other counties have lower numbers of observations in the S&P dataset than the one used in the basic model. Therefore, the tests about macroeconomic variables and stock indices impacts are conducted using the relatively longer spans dataset, while the tests for the impact of financial fundamentals is conducted using the shorter dataset. This approach has its advantages. It offers a comparative view about the dynamic interaction among macroeconomic variables and stock indices, with different standardized stock indices and some different variables in each model. Thus, the approach provides another opportunity for robustness testing.

Tables 4.1-4.4 (in the Appendix) represents data description of the included variables. As the tables show, Turkey receives the highest level of portfolio investment with a period average

of US$ 800.3 million, followed by Israel with a period average of US$ 314.5 million, then Egypt with an average of US$ 39.2 million, and Jordan with an average of US$ 19.9 million. Turkey also has the largest average of foreign reserves (US$ 25.9 billion), followed by Egypt (US$ 20.1 billion), Israel (US$ 16.5 billion) and Jordan (US$ 5.9 billion). These figures, besides the figures of real GDP reflect the relative size of the economies in the sample. Israel has the largest standard deviation of 106.3 in Price/earnings ratios, while the standard deviations of P/E ratios of the remaining countries are around 10. Egypt, however, has the highest standard deviation in dividends yield by 2.7, followed by Turkey with 1.6, while the standard deviations of the ratio in Israel and Jordan are less than 1 over the period.

4.4. Methodology

The vector autoregressive (VAR) model is a general framework that enables researchers to test for the dynamic interrelationship among the investigated variables. This dynamic system of equations works in a way that generate the current level of each variable in the model depending on past movements in that specific variable and all other variables involved in the system. The outcomes of the empirical work can be useful in informing policymakers how economic variables (such as stock market index in our study) respond over time to changes (or innovational shocks) in policy and other variables.

The reduced form of the VAR mode is identified as follows:

$$Y_t = A + BY_{t-1} + u_t$$

Where Y_t = (UST-Bill, oil, wholesale price index ,money supply, real GDP, portfolio investment , foreign reserves, stock index of Egypt, stock index of Israel, stock index of Jordan, and stock index of Turkey). T is an 11×1 vector of endogenous random variables at time t.

A is an 11×1 vector of constant terms

B is an 11×11 matrix of coefficients

Y_{t-1} is an 11×1 vector of one-period lagged endogenous variables at time t.

U_t is an 11×1 vector of error terms. U_t is assumed to be white noise; that is,

$E(U_t) = 0$,

$E(U_tU'_t) = \Sigma$, and

$E(U_tU'_S) = 0$ for $t \neq s$

In other words, U_t is a vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged values and uncorrelated with all the right-hand side variables.

Note that the second model is a 10×1 vector of endogenous random variables at time t. But have all the specifications that describe the first model here, except using few different variables, as explained above.

The outcome of the VAR model is sensitive to the ordering of the variables within the model because the order reflects the degree of endogeneity of the variables. Consequently, it is important which one of the variables is called Y_1 and which one is called Y_2 and so forth. Regarding the ordering of the variables, the statistical analyses do not have much to contribute. Such a decision should be based on economic theory. The ordering should follow the economic logic that the most exogenous variable should be the first and so on. Thus, the first variable should have a potential contemporaneous effect on the other variables, and the second one should have a potential impact on the other k-2 variables but not on the first variable in the system, and so on (Lütkepohl, 1991). According to this assumption, the US T-bill is the most exogenous variable among the investigated variables. Thus, it is the first variable in the Cholesky order. Oil is next in the system since changes on its price has some influential power on the

domestic variables in the model. Domestic factors are ordered according to their potential immediate impacts on the other domestic factors. Consequently, inflation rate (WPI) and money supply (M2) affect the remaining variables. So, they come first in the domestic factors' order. The real GDP (RGDP) is the outcomes of the transactions and changes in the economy. Therefore, it is placed next to the variables mentioned above.

Portfolio investment levels in MENA are still relatively low compared to other regions. MENA countries just recently started to welcome portfolio investment without many restrictions. Further, the level of portfolio investment is mainly decided by changes in the global environment. Portfolio investment levels impact the reported country's foreign reserves level and the stock market index. Thus, its place in the order is just before foreign reserves and stock market index. Foreign reserves level is the outcome of the interaction among domestic and foreign macroeconomic indicators. Hence, it is located just before the stock index and after the remaining variables in the model. Stock market indices are assumed to be the most endogenous variables. They have the least influence over the variables in the model, since they are impacted by shocks on foreign and domestic variables in the model. Another goal is to examine how stock index is affected by changes in other variables. Therefore, the stock index is the last in the ordering of the system. For robustness testing, this study tries different ordering, particularly for the location of portfolio investment, but could not find much difference in the results.

4.5. Unit Root Tests

Many time series are nonstationary because they grow over time and do not have a fixed "stationary" mean. A regular pre-requirement condition of running VAR test is to be sure that the time series of the observed variables are stationary. Running the VAR with nonstationary variables can produce misleading (or spurious) results and illusionary rise in the values of R-

squared and t-statistics. Hence the first step in the setting up of the model is to test for the stationary of the variables. The study tests for the stationarity using unit roots tests. First, the test run on levels of the variables, using the Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test. The null hypothesis of the test is to check whether the variable under investigation has a unit root, against the alternative that it does not. As mentioned above, if the tests show that the data are nonstationary (i.e. have unit roots), then the standard econometric techniques can produce spurious estimation (misleading) results. To avoid such a problem, the study takes the first differences of the variables and runs the tests again. Further, in order to obtain more meaningful results and clear interpretations, this study takes log-differences of some variables, as many previous studies have done.

4.6. VAR models

The estimated VAR model opens the door for conducting further empirical research that can be used in analyzing short-term dynamics such as Granger-causality tests, impulse response functions, and forecasting error variance decomposition. These tests are more informative about the relationships among variables than the VAR regression coefficients or R-squared statistics. Some descriptive details about each test are presented as follows:

Granger-causality: Granger (1969) presents a simple definition of causality. He argues that a cause cannot come after the effect. Hence if variable x has an effect on variable y, then the former should have explanatory power in the changes on the latter. In other words, including x in the model should help to improve the predictions related to the potential changes in y more efficiently than when the ability of x in causing y is not taken into account.

Impulse Response function (IRF): IRF analyzes the dynamic response of a variable in the model to unexpected change (referred to as a shock or innovation) in an error term in one of the

model variables. Hence, it works to capture the direction of response of a variable to a one standard deviation shock in another variable.

Forecast Error Variance Decomposition (FEVD) analysis: Once a VAR is estimated, it is a useful instrument in giving us the ability to simulate the response over time of any of the investigated variables to either its own disturbance or the disturbance to any other variables in the system and to produce variance decomposition of the variables. The decomposition separates the variation in the endogenous variable into the component shocks to all the endogenous variables in the VAR system. The analysis shows the relative importance (both direct and indirect) of each random innovation in the variations of the variables in the VAR. Hence, FEVD captures the direction of response of a variable to a one standard deviation shock in another variable. Simply, it presents the percentage of the variance of error made in forecasting a variable due to a specific shock at a specific time horizon. Consequently, the dynamics that exist among these variables are addressed.

Finally, this dissertation uses the software STATA11 program in conduction all econometric applications. The following chapter will report the empirical results of this dissertation.

CHAPTER FIVE

Empirical Results: Macroeconomic Variables and Interdependence among Markets

5.1. Introduction

This chapter summarizes the results obtained from estimating VAR models described in the previous chapter. The regression model analyzed uses the dataset for four MENA countries: Egypt, Israel, Jordan and Turkey. Different variables are considered in the regression models to empirically test and analyze the dissertation hypotheses. The model includes 11 variables. They are as follows: US T-bill changes (dustbill), oil price percentage change (dloil), portfolio investment (pi), money supply growth rate (dlm2), wholesale price index percentage change (dlwpi), total foreign reserves percentage change (dlres), real gross domestic product growth rate (dlrgdp), and the percentage change in stock market indices of the counties in the sample (dlse_EGY, dlse_ISR, dlse_JOR, dlse_TUR). All the variables are in log differences, with the exceptions of using levels for portfolio investment and first differences for US T-bill. The VAR models for each country are regressed individually. Prior regression data checks and analysis were carried-out to check stationarity of the variables for time series datasets. After this step, the study runs VAR models for each country. The estimated VAR models allow conducting further empirical research that can be used in analyzing dynamic interrelationships among variables. These include Granger-causality tests, impulse response functions, and forecasting error variance decomposition analysis.

5.2. Unit roots test

Using the STATA econometric analysis software, the data analysis of the variables were performed for checking the stochastic properties of the observed series: stock market index, US T-bill (USTBILL), portfolio investment (PI) money supply (M2), oil price (OIL), total foreign reserves (RES), wholesale price index (WPI), real gross product price (RGDP), and stock market

index of each country (SE). The results of the Augmented Dickey-Fuller test and Phillips-Perron test, with trend and without, are reported in Tables 5.1- 5.3 in the Appendix. As expected, the null hypothesis of the present of unit root is not rejected for most of the series. However, for the portfolio investment series null hypothesis of the existence of a unit root in the series is rejected. This implies that the series is stationary in levels for the entire sample, both with and without trends. These results are confirmed using both tools Augmented Dickey-Fuller test and Phillips-Perron test. Also, the null hypothesis of the presence of unit roots can be rejected for the series of real GDP for Egypt, Jordan and Turkey, when the trend is included.

The second step is to take the first difference of the data series, with one lag. The results are reported in Table 5.2. With first differences, the null hypothesis of unit root is rejected for all the series. As explained in chapter 4, the study chooses to run the models with log-difference of the variables in order to have meaningful results. The unit roots tests results of the variable, with log differences, are reported in Table 5.3.

5.3. Regression Analysis of VAR Model 1

The results of the first VAR models; Granger-causality, impulse response functions, forecast error variance decomposition for Egypt, Israel, Jordan and Turkey, respectively, are analyzed below.

5.3.1. VAR Results for Egypt

Granger-causality test is a strong empirical instrument to determine the direction of interrelationships between variables. Since our main goal is to test for variables that cause changes in stock market index, we first report such impact, and then we report the direction of effect between the remaining variables in VAR model.

The results of the Granger-causality tests show that there is unidirectional causality from money supply growth rate and changes in US T-bill to Egypt's stock index (dlse_EGY). Thus, changes in money supply (*dlm2*) Granger-cause changes in the Egyptian stock market index. This effect is significance at 1 percent level. Also, changes in the US T-bill (*dustbill*) Granger-cause changes in the stock index. This effect is also significant at 5 percent level. The other stock markets in the region, however, do not seem to Granger-cause any changes in the Egyptian stock market index. This implies that the stock market in Egypt is independent, or is segmented, from changes in the other regional financial markets.

The finding of unidirectional causality from changes in money supply to stock price index in the case of Egypt is inconsistent with the finding of Billmeier and Massa (2007). They check for the existence of a relationship between the movements in the major stock market index in Egypt's market (CASE-30) and the growth of broad money (M2 growth rate). They could not find evidence of a relationship between the two variables. This dissertation and the study of Billmeier and Massa (2007) have used different stock indices, yet the regression results are comparable and consistent with the economic theory. The Billmeier and Massa (2007) index covers the top 30, the most liquid, firms listed in the market only, while this dissertation has employed more general index of the market that includes a larger number of listed firms. Further, while Billmeier and Massa (2007) findings are based on a simple graphical technique without using empirical work to support their argument, this dissertation uses VAR model which is known for its capability to catch the dynamics of interrelationship between variables (Lütkepohl, 1991).

Also, there is unidirectional causality from changes in stock index to inflation rate, at 1 percent significance level.

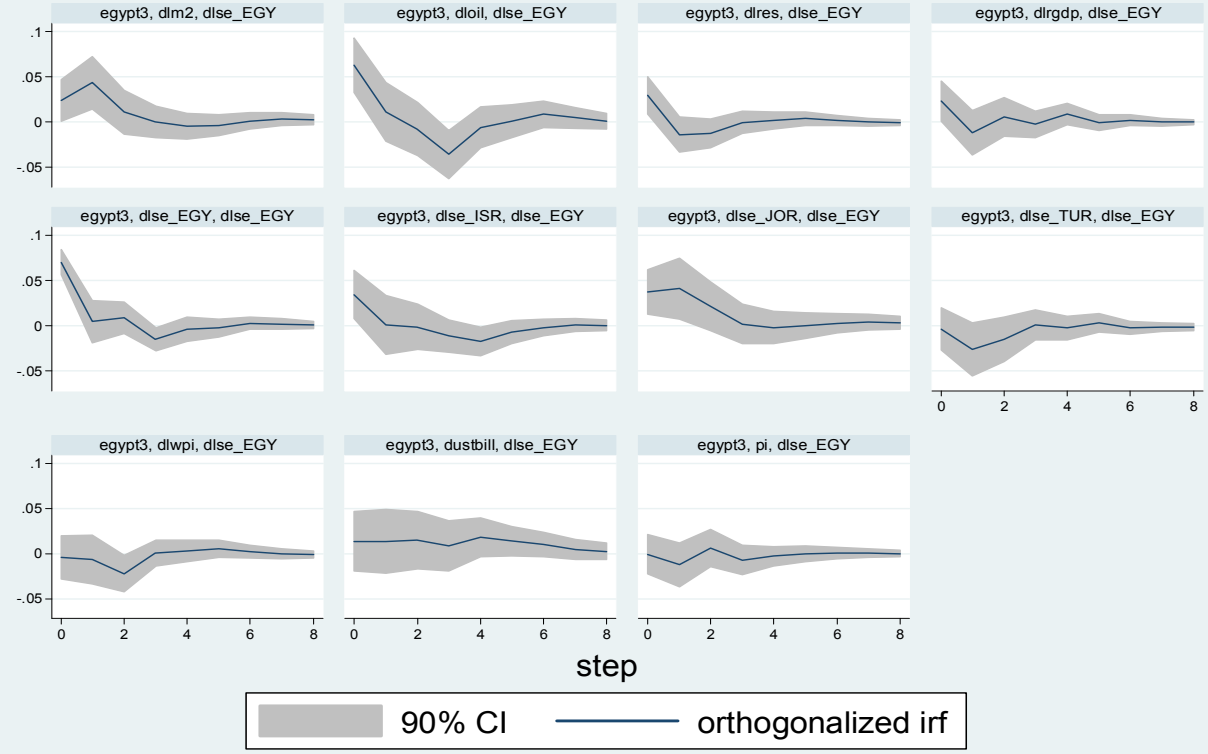
Apart from these stock index-macroeconomic interactions, Granger-causality tests provide further details of the interrelationships between the other variables in the model. The analysis shows that there is unidirectional causality from changes in US T-bill to some domestic macroeconomic variables in Egypt. The changes in US T-bill (*dustbill*) Granger-cause changes on the growth rate of inflation (*dlwpi*) and changes in the Egyptian foreign reserves (*dlres),* significant at 1 percent level for both variables. Changes in US T-bill also Granger-cause changes on portfolio investment level (pi) at 5 percent level of significance.

Furthermore, percentage changes in inflation rate Grange-cause changes in portfolio investment level (pi) and real GDP growth rate (*dlrgdp*), statistically significant at 1 and 10 percent levels, respectively. As expected, there is unidirectional causality from changes in money supply (dlm2) to inflation rate (dlwpi), significant at 10 percent level. Moreover, the lagged changes in foreign reserves (dlres) granger-cause changes on inflation rate (dlwpi) that is significant at 5 percent level.

Regarding the effect from other regional stock markets on Egypt's domestic variables, the empirical results show that there is unidirectional causality from changed in the Turkish and Israeli stock markets indices to the level of portfolio investment in Egypt. These impacts are significant at 10 percent level for both markets. These impacts might reflect some competitive attitude among stock markets in the region over attracting more foreign investment. Further, the effect of these stock markets in Egypt's level of portfolio investment could be an indicator of portfolio management behavior which tends to categorize a group of markets in a region as a single unit. So, the amounts of investment that are allocated to a such region changes according to the economic conditions of the whole region, not giving much accounts to the economic

conditions in a specific country. Thus, changes in trends in a country's stock market might lead to changes in the level of portfolio that is invested in another country in the region.

Figure 5.1
Egypt: Impulse Response Functions



In order to examine how the stock market index is affected by shocks in other variables in the model, this study takes advantage of the impulse response functions that are generated from the VAR model. Figure 5.1 plots impulse response functions for Egypt stock index. It provides visual analysis of the response of a given variable to a positive, one standard deviation shock, in another variable. In the context of this study, impulse response functions help to determine variables that have impact on the dependent variable, the stock market index. The solid line in the graphs represents the estimated impulse response. The gray area; with upper and lower

boundaries; represents the one standard deviation error that is used to determine statistical significance from zero. In this study we select the 10 percent confidence intervals.

Impulse-response analysis shows that one standard-deviation shock in oil price (*dloil*) has contemporaneous positive effect of about 6 percent change in the stock market index. By the third quarter, a one standard-deviation shock causes a 4 percent decline in the index. This effect gradually diminishes and dies out by the fifth quarter ahead. The whole graphical results indicate that a shock in oil price is the most significant variable in moving the index of Egyptian stock exchange.

The response of stock index to one-standard-deviation shock in money supply makes an immediate effect in the first period. The shock leads to up to 4 percent positive change in the index. But the strength of the effect dissipates along the time horizon. A one-standard-deviation shock in inflation rate has negative effect on stock index two quarters ahead. At that point, the shock causes the stock index to decline by 2 percent, with a significant level. This effect, however, dies out quickly.

The response of Egypt's stock index to a one standard-deviation in the region stock market index has immediate impact but varies over time. The Egyptian stock index has an immediate positive response to shocks in the Israeli stock market index. The effect lasts up to the six quarter when it dies out. In the case of a shock in Jordan index, it has positive impact (4 percent change) but it dies out quickly, as well. The Egyptian stock index responses negatively to one standard deviation in the Turkish stock index, but the effect disappears by the third quarter.

A one standard deviation shock in US T-bill rate (*dustbill*) has immediate small and positive effect on the Egyptian stock market index that lasts for more than one year.

A one-standard-deviation shock in portfolio investment (*pi*) has negative impact on the stock market index one quarter ahead. However, this effect becomes statistically insignificant after the first quarter following the impulse. Furthermore, a one standard-deviation shock in real GDP's growth rate (*dlrgdp)* and foreign reserves (*dlres)* have immediate positive impacts that would be absorbed quickly. The impacts of both variables do not last for long before dying out.

Figure 5.2 represents Forecast Error Variance Decompositions of the Egypt stock index. All the results in these analyses are based on 10 percent significance level. The analysis shows that changes in oil prices (*dloil*), explain up to 29 percent of the error variance in the stock market index in Egypt in the first period and afterword. The effect maintains its explanatory power for some periods ahead.

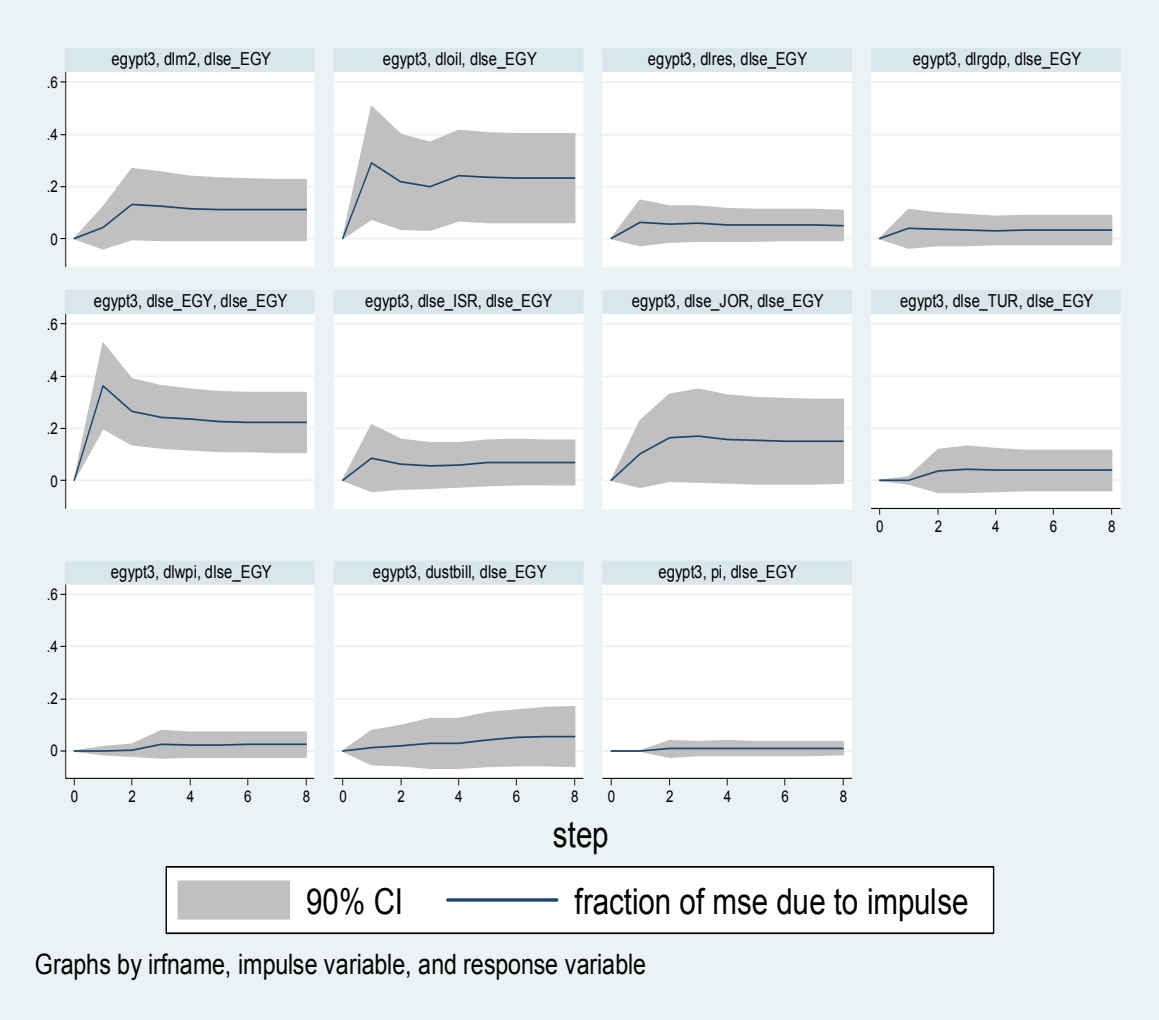
Changes in money supply (*dlm2*) start to show their explanatory power of error variance two quarters ahead. At that period, changes in money supply have an explanatory power of more than 13 percent of error correction in the forecast of the index.

Among the region stock markets, changes in the Jordanian stock index (*dlse_JOR)* have more powerful explanation to changes in the Egyptian stock market index. By the second quarter ahead, changes in Jordan stock index are able to explain about 17 percent of forecast error variance of changes in Egypt index. The changes in Israel (*dlse_ISR)* and Turkey (*dlse_TUR)* indices are able to explain up to 7 percent and 4 percent, of forecast error variance in Egypt's index, respectively. Moreover, about 40 percent in the forecast error variance of index (dlse_EGY)can be explained by changes in the market itself.

Changes in foreign reserves (*dlres*) can explain about 6 percent of the variance in the forecast error of changes in the Egyptian stock market index in the peak period of its impact, the first quarter. The impact of changes in the remaining domestic macroeconomic variables, i.e. real

GDP growth rate (*dlrgdp*) and inflation rate (*dlwpi*) have an explanatory power of about 3 percent and 4 percent of forecast error variance of changes in the index, respectively.

Figure 5.2
Egypt: Forecast Error Variance Decomposition



In conclusion, there is unidirectional causality from two factors to stock market index in Egypt. They are changes in money supply and US T-bill. Further, there is unidirectional causality from stock market to the inflation rate. However, Granger-causality tests show that there is no evidence of unidirectional causality caused by any other regional stock markets on the Egyptian market.

Impulse response functions of Egypt's stock index indicate that a one standard deviation shock in portfolio investment inflows has negative impact in the market. Nevertheless, a shock in oil price has significant positive impact on the index. The shock in oil price has the most power to influence Egypt's market. The results of FEVD analysis confirm the impact of changes in oil price in Egypt stock index. Also, a shock in money supply has positive impact in market, while a shock in the inflation rate has negative impact. Regarding the spillovers from the other regional markets, impulse response functions show that while the Egypt's stock index response negatively to a shock in its Turkish peer, it responses positively to shocks in Jordan and Israel markets.

Forecast error variance decomposition analysis shows that a shock in oil price has immediate power to explain 29 percent of forecast variance in Egypt stock index. The influence from other regional markets can explain a reasonable share of the forecast variance in the Egyptian index. Thus, changes in Israel stock index can explain, immediately, 9 percent of error variance in Egypt stock market. Two periods ahead, the explanatory power of changes Jordan and Turkey indices can explain 16 and 4 percent of forecast variance in the Egyptian index.

5.3.2. VAR Results for Israel

In the case of Israel, the Granger-causality analysis finds that there is unidirectional causality from only one macroeconomic variable to stock market index (*dlse_ISR*). Changes in domestic inflation rate (*dlwpi*) Granger-cause changes in the index of the stock market (at 1 percent significant level). The impact of changes in the stock index (dlse_ISR), however, seems to be significant and is spread over many variables. Thus, there is unidirectional causality from changes in stock market index to real GDP growth rate (significant at 1 percent level), money supply growth rate (significant at 10 percent level), and portfolio investment level (pi), with 10

percent significant level. The ability of changes in stock market to influence other variables in the economy is a sign of market deepening.

For the remaining macroeconomic variables, the analysis shows that the external macroeconomic variables in the model, i.e. US T-bill and oil price, have obvious and significant impact on Israel's domestic macroeconomic indicators. There is unidirectional causality from changes in the US T-bill (*dustbill)* to changes in inflation rate (*dlwpi)*, with 10 percent level of significant. However, changes in the other external factor, percentage change in oil price (*dloil*), have more significant effects. Changes in oil prices Granger-cause changes in four variables: portfolio investment (pi), inflation rates (*dlwpi*), foreign currency reserves (*dlres*), and real GDP growth rate, with level of significance at 1 percent for inflation rate, 5 percent for portfolio investment level and foreign reserves percentage change and at 10 percent significant level for the growth rate in real GDP. The Israeli stock market seems to be segmented from the influence of other stock market in the region since their lagged changes do not Granger-cause any changes on Israel stock index.

For the domestic macroeconomic variables, the growth rate in real GDP Granger-causes changes in money supply growth (*dlm2)*, with a 5 percent level of significance. In addition, changes in the inflation rate Granger-cause changes in growth rate of real GDP (*dlrgdp)* at 10 percent significant level. Further, there is unidirectional causality from changes in foreign reserves (*dlres)* to some other variables. Changes in foreign reserves Granger-cause changes in the following variables: inflation rate, real GDP growth rate, and money supply growth rate (all at 10 percent significance level).

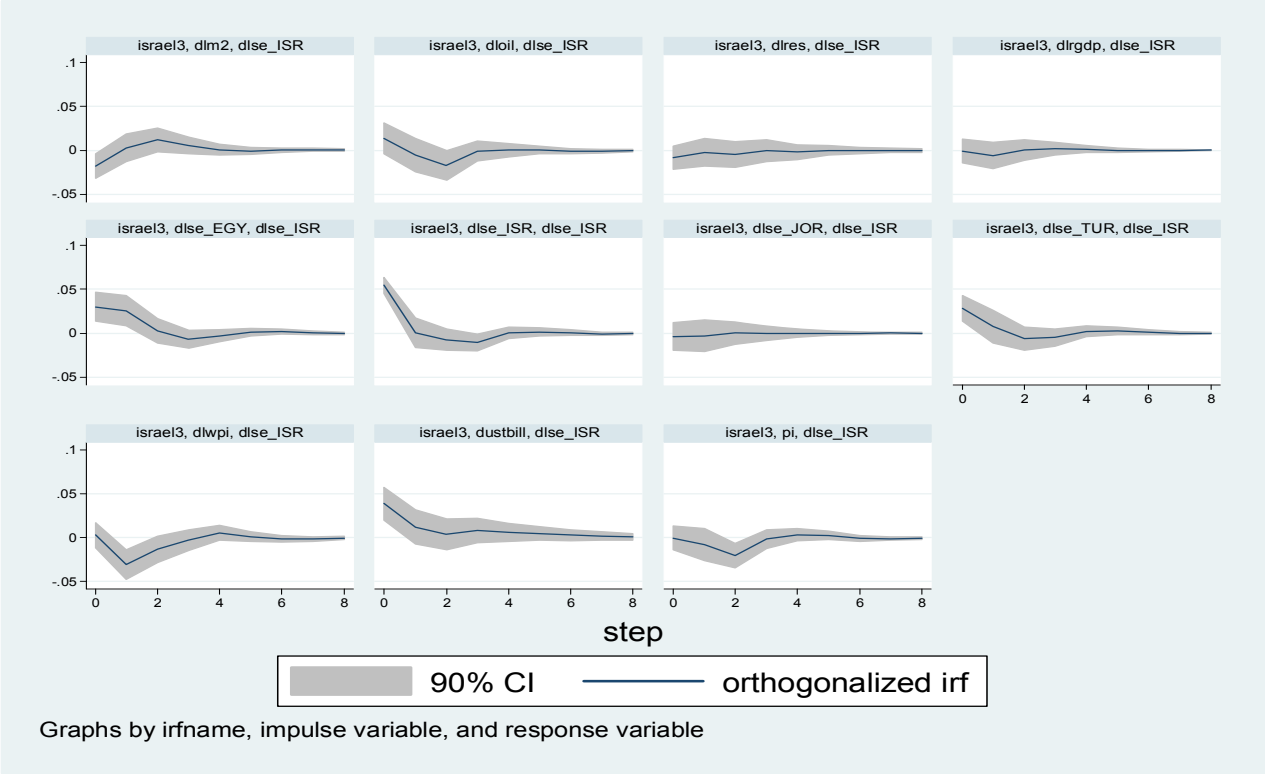
Figure 4.3 plots impulse response functions for Israel stock market index (*dlse_ISR)*. A one standard-deviation shock in the inflation rate (*dlwpi*) has a negative significant effect on the

stock index one-quarter ahead, where it affects a more than 3 percent change in the exchange index. The effect dies out soon beyond that point. Among all the variables in the model, the Israel index seems to response more significantly to a shock in inflation rate. This might reflect the general attitude of investors toward any rise in inflation rate and their worries about the consequences of any rise in local price because of the bad experience of Israelis with hyperinflation rates during 1970s and 1980s. This result is in line with the outcomes of the Granger-causality test that shown in the previous section. Also, the result is consistent with the findings of Amihud (1996) of the negative relationship between Israel stock prices and unexpected inflation rate. He explains that this negative and strongly significant relationship reflects negative association, among investors in Israel, between unexpected inflation and future real economic activities.

Impulse response analysis shows that a one standard-deviation shock in the oil price (*dloil*) has contemporaneous negative effect. This effect dies out beyond the third quarter. Nevertheless, impulse response analysis shows that a one-standard-deviation shock in the US T-bill rate (*dustbill)* has positive effect on stock index for two quarters.

The Israeli stock index responds negatively to a one-standard-deviation shock in portfolio investment level (*pi*). The effect, however, gradually disappears before the end of the first year. Furthermore, a one-standard-deviation shock in the money supply (*dlm2*) has a positive impact on the stock market index one-quarter ahead. The impact has a life span of 6 months, and then disappears. Also, a one standard-deviation shock in foreign reserves levels (*dlres)* has a small negative insignificant impact on the index.

Figure 5.3
Israel: Impulse Response Functions



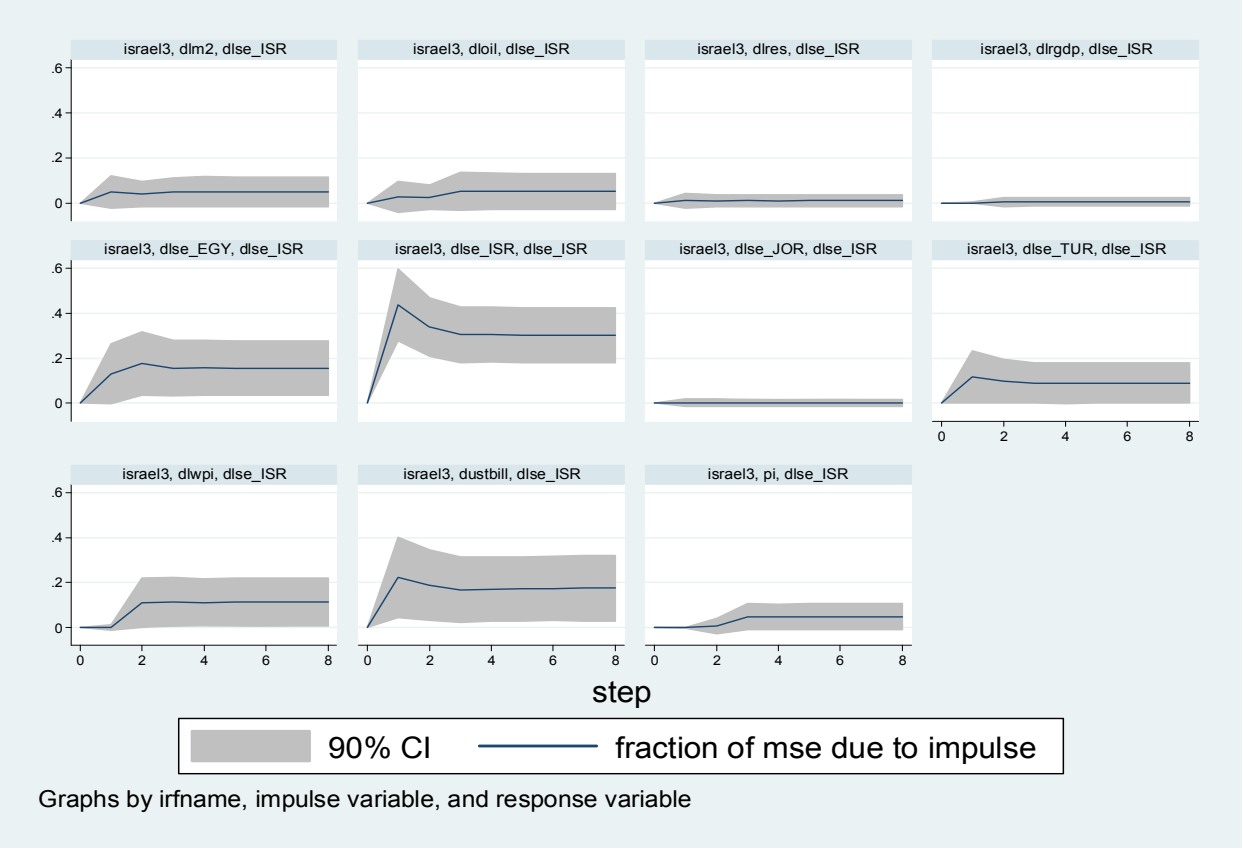
While the Israeli stock index does not seem to response to a one-standard deviation shock in the Jordanian stock index (*dlse_JOR*), shocks in the Egyptian and the Turkish stock market have more obvious impacts on the Israel index. The immediate response of a shock in the Egypt index (dlse_EGY) is positive and significant in the first quarter. It effects up to 2.5 percent of changes in the index in one-quarter ahead. A shock in the Turkish stock market (*dlse_TUR*) has relatively less impact than the Egyptian one. The effect from both markets lasts for two quarter ahead.

Figure 5.4 shows the forecast error variance decomposition of the Israel stock index (*dlse_ISR*). The analysis indicates that changes in inflation rate (*dlwpi*) have the power to explain more than 11 percent of the error variance in the index. This effect is significant for the entire

forecast horizon. For all the techniques this study employs, the impact of a shock in inflation rate in Israel's stock index is strong and significant.

Also, changes in US T-bill (*dustbill*) have the power to explain 22 percent in the error variance in the index. Changes in money supply (*dlm2*) have the ability to explain about 5 percent of changes in the error variance. Also, changes in oil price (*dloil*) have the ability to explain another 3 percent of changes in the error variance one quarter ahead.

Figure 5.4
Israel: Forecast Error Variance Decomposition



While a shock in the Jordanian stock index (*dlse_JOR*) does not have any notable impact in Israel's index, changes in Turkish (*dlse_TUR*) and Egyptian (dlse_EGY) stock markets indices have the power to explain 13 and 12 percent of the error variance in Israel stock index one

period ahead, respectively. And the changes in Israeli stock market index itself are able to explain 44 percent of variance in the forecasted error.

In conclusion, there is unidirectional causality from changes in the inflation rate to Israel's stock index. In turns, there is unidirectional causality from Israel's index to three macroeconomic variables: changes in portfolio investment level, real GDP growth rate, and percentage change in money supply.

Impulse response functions of Israeli market show that a one standard deviation shock in inflation rate has negative impact on Israel index. Nevertheless, a shock in money supply has positive effect. Furthermore, Israel market response negatively to as shock in portfolio investment inflows. Nevertheless, a shock in US T-bill has positive impact on the Israeli market. Also, Israel market is affected positively by shocks in Egypt and Turkey markets, while there no impact from shocks in Jordan market.

The forecast error variance decomposition analysis shows that a US T-bill can explain 20 percent of error forecast in Israel index. Also, the FEVD results indicate that while there is no transmission impact from Jordan markets to explain error forecast in the Israeli index, shocks in Egypt and Turkey markets can explain 13 and 12 percent of error variance in the Israeli market, respectively. Further, a shock in inflation rate can explain 11 percent of error variance in the Israeli market two periods ahead.

5.3.3. VAR Results for Jordan

The macroeconomic variables that are included in our VAR model do not seem to have significant power in explaining much of the dynamic changes in the country's stock market behavior. The Granger-causality test indicates that there is unidirectional causality to Jordan's stock index (*dlse_JOR*). Only changes in the Egyptian stock market index (dlse_EGY) Granger-

cause changes in the Jordanian index. This effect is significant at the 5 percent level. With the exception of the impact from changes in Egypt's stock market, foreign and domestic macroeconomic variables do not seem to have influence on the index. Also, changes in the stock index do not seem to have impact on any of the variables included in the model.

The inability of all the variables to cause changes in the stock index is consistent with the finding of Alqudsi et al. (2007), though their models include different variables than the ones we have. Their model includes the following variables: interest rate spread, consumer price index, potash price, phosphate price, industrial production index and claims on private sector. Using an autoregressive moving average (ARMA) process, Alqudsi et al. (2007) find that the variables do not make a significant contribution in influencing the movement in the Jordanian stock index. They re-estimate the model using the modified version; autoregressive integrated moving average (ARIMA), incorporating the Kalman filter specification in order to deal with some gaps in the data. They find that phosphate and potash prices are the most powerful drivers of changes in stock index, with the coefficient results of most of the other variables are statistically significant but have marginal contributions to the change in stock index. Our study, however, includes the oil price because it is the main source of energy in the world today. No indicators for international trade or main export products are included here because of data availability constraints. Since our study takes a sample of four countries, we search for common variables that can give us insightful comparative views of factors that impact stock markets in MENA region. Therefore, for the sake of consistency, phosphate and potash prices are not included in the model since such variables are irrelevant to the other countries in the sample, either as product, source of income or energy. As mentioned in the previous chapter, the model considered the wholesale price index (WPI) and not the consumer index prices (CPI) as a proxy

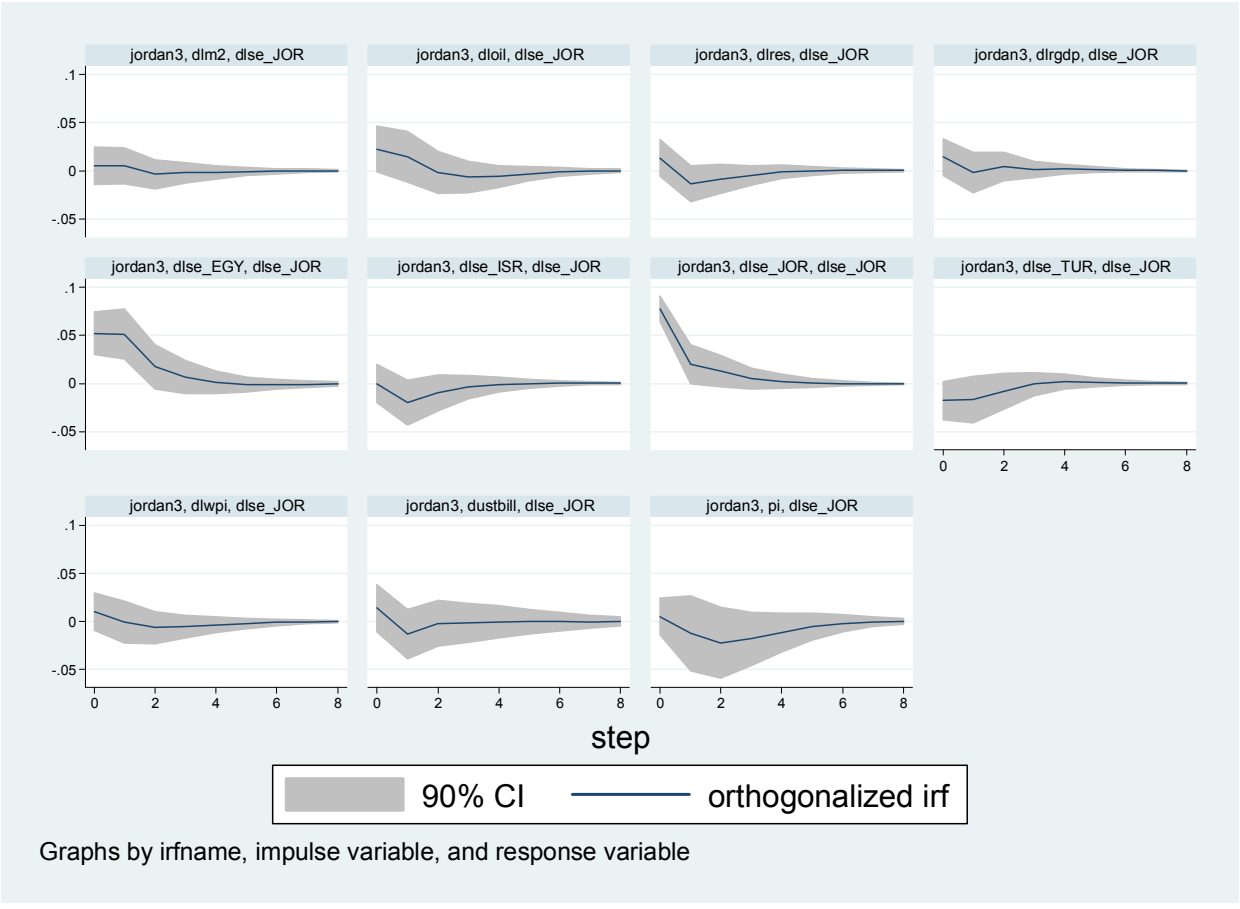
of inflation rate since data for CPI was not available for Egypt and Turkey for all the time period considered in this model.

The result that Jordan's stock index is impacted by changes in the Egyptian stock index is inconsistent with the findings of Bilson, Railsford & Hooper (2001). They find that regional market indices do not significantly impact Jordan's stock index. The difference in the outcomes of this study and Bilson et al. (2001) might be explained by the fact that the span of their study was between1985 to 1997. Since the Egyptian stock market was reactivated around the mid-1990s, it is expectable that its influence on other markets was weak, if ever existed then. Since 2000, MENA region adopts many deregulation processes in order to attract investors from within the region and outside. As a result of these progresses, stock markets in MENA have become relatively more integrated during the last decade. Hence, I believe that the efforts of regional investors to adjust their portfolios among the region markets could explain the indirect channel of Egypt stock market's impact on Jordan's index.

For the remaining macroeconomic variables, Granger-causality test finds that there is no unidirectional causality from changes US T-bill (*dustbill*) to any Jordanian domestic macroeconomic variables that are included in the VAR model for any reasonable level of statistical significance. Changes in oil price (*dloil*); however, seem to have more power to influence Jordan's economic conditions, though it is limited to just one variable. The empirical test confirms that changes in oil prices Granger-cause changes in Jordan's real GDP growth rate (*dlrgdp*), with 5 percent significance level. This might be explained by the positive effect of the increase in oil price in the income of the Jordanians who work in the Arab Gulf states, which is reflected through the increase in the amounts of remittances that are transferred by those workers to their native country (Alqudsi et al, 2007).

Moreover, there is bidirectional causality between changes in money supply and inflation rate. Changes in money supply Granger-cause changes in inflation rate and changes in inflation rate Granger-cause changes in money supply. The effect of both variables is significant at 1 percent level. Also, changes in money supply Granger-cause changes in real GDP growth rate, with 5 percent level of significant. Further, changes in portfolio investment level Granger-cause changes in the growth rate of real GDP, with 10 percent level of significance.

Figure 5.5
Jordan: Impulse Response Functions



Consistent with Granger-causality analysis, impulse-response analysis, as displayed on Figure 5.5, shows that a one standard-deviation shock in the Egyptian stock market index (*dlse_EGY*) has significant impact in Jordan's stock index (*dlse_JOR*). The impact is strong

contemporaneously. It leads to 5 percent change in the Jordanian index. This effect lasts for more than two quarters. Jordan's stock index response to a one standard deviation shock in the other stock markets in the region is different than its positive response to a shock in Egypt's stock market. A one standard deviation shock in either the Turkish (*dlse_TUR*) or the Israeli (*dlse_ISR*) stock indices have immediate negative impacts in the Jordanian index. The effect of such a shock dies out gradually over the time horizon.

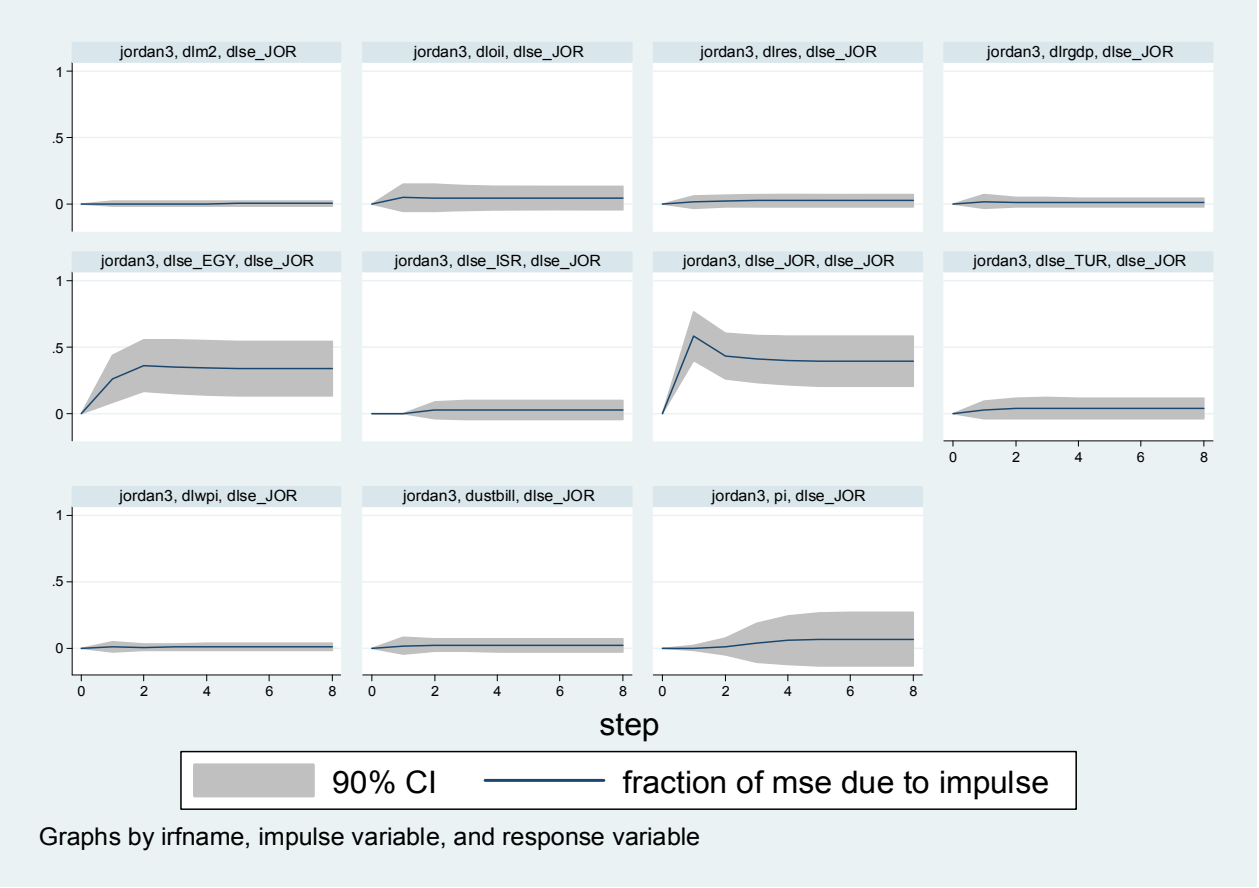
Impulse-response analysis shows that a one standard-deviation shock in oil price (*dloil*) has contemporaneous positive but insignificant effect in the first quarter ahead. This effect dies out beyond the first quarter. Furthermore, impulse- response analysis shows that a one-standard-deviation shock in the US T-bill rate (*dustbill)* has a negative effect on the stock index. A one-standard-deviation shock in portfolio investment level (*pi*) also has negative impact in the stock market index one quarter ahead and this effect disappears gradually.

All the domestic macroeconomic variables that are included in the model seem to have very little impact on the stock market index at any reasonable level of significant. Thus, a one standard-deviation shock in inflation rate (*dlwpi*) has marginal positive effect on the stock index up to the second quarter ahead when its effect disappears. A one standard-deviation shock in growth rates of real GDP (*dlrgdp)*, money supply (*dlm2*) and foreign reserves (*dlres)* have very small and positive impacts on the index that die out quickly. Hence, domestic macroeconomic variables that are included in the VAR model of Jordan seem to lack any significant power to influence stock market index. The results of impulse response function here is in line with the outcomes of Granger-causality test.

Figure 5.6 plots forecast error variance decomposition of Jordan stock index (*dlse_JOR*). The analysis finds that changes in the Egyptian stock market index (*dlse_EGY*)explain 26

percent of the variance in the forecast error of changes in the Jordanian stock market index in the second quarter ahead. Changes in the Turkish (*dlse_TUR*) and Israeli (*dlse_ISR*) stock indices can explain 3 and 4 percent in the forecast error variance of the Jordanian index in two quarters ahead. Also, changes in oil price (*dloil*) can explain about 5 percent of the error variance in the index. Moreover, changes in US T-bill (*dustbill)* have the power to explain just 2 percent of the error variance.

Figure 5.6
Jordan: Forecast Error Variance Decomposition



Among the domestic macroeconomic variables in the model, only changes in foreign reserves (*dlres)* have an explanatory power of 2 percent of forecast error variance of the index. The empirical model indicates that changes in money supply (*dlm2*), real GDP growth rate (*dlrgdp)*, inflation rate (*dlwpi*) do not provide a clue to changes in stock index.

A shock in oil price (*dloil*) does not changethe Jordanian stock market index. This result is consistent with the outcomes of AlFayoumi (2009). He uses Vector Error Correction Model (VECM) to test for variables that drive stock markets in a sample of MENA countries, including Jordan. He finds that there no evidence of effect from changes in oil price on Jordan's stock market.

In summary, Granger-causality tests show that there is unidirectional causality from changes in Egypt stock market index to the Jordanian stock index. Further, there is no unidirectional causality from Jordan's stock market to another variable in the economy.

Impulse response functions indicate that Jordan's stock index response positively to a shock in Egypt's market. This effect is significant and it appears to be the most powerful variable in moving Jordan's index. Also, a one standard deviation in oil price has immediate positive impact in Jordan's stock index.

Forecast error variance decomposition analysis shows that changes in Egypt index can explain 26 percent of forecast variance in Jordan's market one period ahead. The impacts from changes in Israel and Turkey in Jordan's index are smaller and have some lags. Shocks in Turkey and Israel markets can explain 3 and 4 percent of error variance in Jordan's index two periods ahead. Also, changes in portfolio investment explain1 percent of forecast error in Jordan index two periods ahead.

5.3.4. VAR Results for Turkey

Granger-causality tests of the direction and power of the included variables to affect stock market in Turkey shows significant results. Percentage changes in money supply (*dlm2*) Granger-cause changes in the stock market index in Turkey, and this effect is significant at 5 percent level. On the other hand, changes in the stock index (dlse_TUR) Granger-cause changes

in real GDP growth rate (*dlrgdp*) at 10 percent level of significance. The result in this model is consistent with Tunah (2010) results regarding the ability of changes in money supply to cause changes in the Turkish stock index. But in his model, there are more variables that Granger-cause changes in the stock index than what this study has; such as Dow Jones industrial average, industrial production index, crude oil price, import, and total credit volume. It can be noted that the two studies include different variables in their empirical works. Thus, finding different results is initially expected. Further, the different in the outcomes of both results could be explained, partially at least, by the data time frequently. While this study uses quarterly data, Tunah (2010) uses monthly data, which usually have more capability to catch changes between variables.

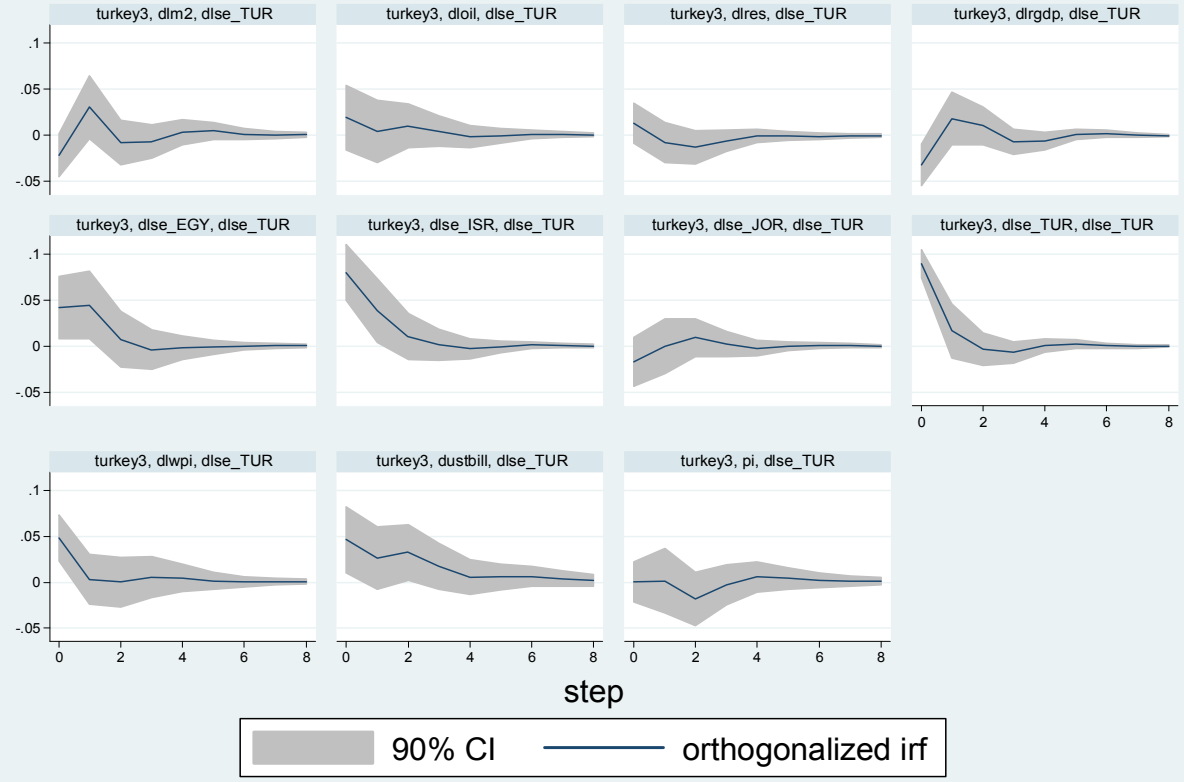
In the case of Turkey, Granger-causality tests indicate some types of causality among a few macroeconomic variables. Changes in US T-bill (*dustbill*) Granger-cause changes in money supply growth rate, with 1 percent significance level. Furthermore, there is bidirectional causality between changes in money supply growth (*dlm2*) and real GDP growth rate (*dlrgdp*). Changes in the former Granger-cause changes in growth rate of real GDP, while changes in the latter Granger-cause changes in money supply growth rate, as well. Both effects are significant at 10 percent level.

Another finding of Granger-causality tests is that other stock markets in the region do not appear to Granger-cause changes in the Turkish stock market index.

Figure 5.7 plots impulse response functions for Turkey's stock index (*dlse_TUR*). A one standard-deviation shock in money supply (*dlm2*) has positive effect on the stock index one quarter ahead. The shock affects up to 3 percent of the index at that period, but the impact dies out after that. Additionally, a one-standard-deviation shock in portfolio investment level (*pi*) has

small positive impact immediately. This effect, however, dies out quickly. Furthermore, impulse-response analysis shows that a one standard-deviation shock in oil price (*dloil*) has contemporaneous small positive effect but insignificant in one quarter ahead. But this effect disappears eventually beyond the second quarter. Also, a one-standard-deviation shock in UST-bill (*dustbill*) has significantly positive effect on stock index for almost one year ahead. The strength in the shock occurs in the third quarter. The effect from US T-bill seems to have permanent effect on the Turkish stock index

Figure 5.7
Turkey: Impulse Response Functions



A one standard deviation shock in the Egyptian and the Israeli stock indices influence the Turkish index positively for two quarters ahead. Then they die out. A shock in Egypt's stock

index (dlse_EGY) can impact the index significantly by more than 4 percent one-quarter ahead. Also, a shock in Israel's stock index (*dlse_ISR*) can significantly introduce a change of about 4 percent in the first quarter ahead. A shock of one standard deviation in the Jordan stock index (*dlse_JOR*), however, has no noteworthy impact on the Turkish index.

A one-standard-deviation shock in inflation rate (*dlwpi*) has an immediate positive impact in the index. It disappears beyond the three quarter ahead. A one standard deviation shock in growth rate of real GDP (*dlrgdp*) has positive impact stock market index in the first quarter ahead but the effect disappears quickly.

Figure 5.8
Turkey: Forecast Error Variance Decomposition

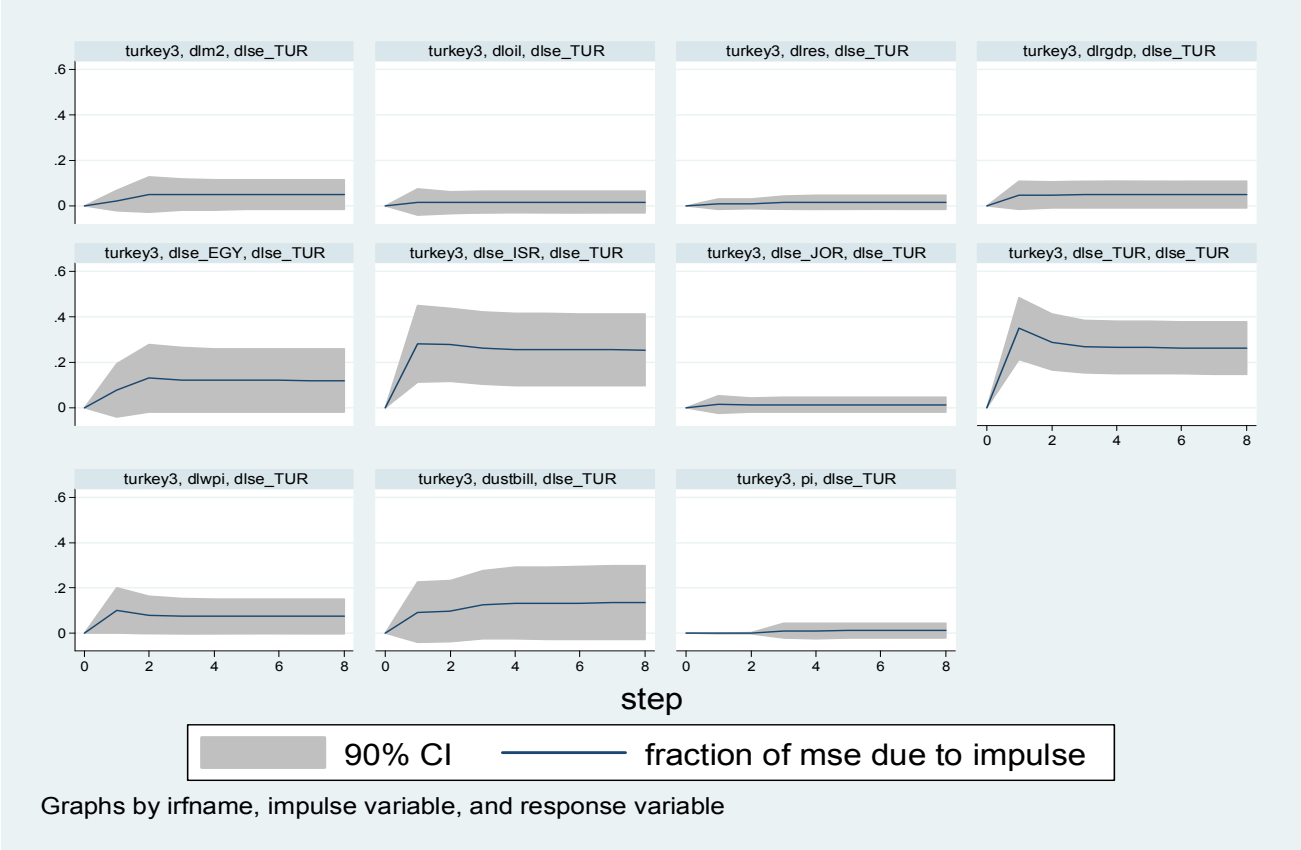


Figure 5.8 shows the forecast error variance decomposition of Turkey stock index (*dlse_TUR*). In the case of the Turkey stock index, regional financial markets behavior has

strong power in explaining forecast error variance of the index. A shock in the Israeli (*dlse_ISR*) and Egyptian (dlse_EGY) stock markets have significant power to explain 28 percent and 13 percent of forecasted error in the Turkish stock market index, respectively. This explanatory power remains significant for all time horizons. The relatively smaller stock market of Jordan (*dlse_JOR*) does not seem to have any power to explain changes in the Turkish exchange.

A third powerful explanatory variable is changes in in US T-bill (*dustbill*). It has power to explain more than 10 percent of error variance in the index beyond the first quarter.

For the domestic macroeconomic indicators, a shock in the inflation rate (*dlwpi*) can explain up to 8 percent of the forecast error. Shocks in the money supply and real GDP growth rate (*dlrgdp*) together have the power to explain up to 10 percent of forecast error variance of the index one period ahead. A shock in the index itself has the power to explain up to 35 percent of the variance in the forecasted error in the index.

In addition, a shock in the oil price does not seem to lead to changes in Turkish stock market index. This result is consistent with the outcomes of AlFayoumi (2009). He uses a Vector Error Correction Model (VECM) to test for variables that drive stock markets in a sample of MENA countries, including Turkey. He find that there no evidence of effect from changes in oil price into Turkey's stock market.

To conclude, the results for Turkey show that there is unidirectional causality from changes in money supply to the Turkish stock index. Further, there is unidirectional causality from Turkey's stock market to real GDP growth rate. Impulse response functions of show that a one standard deviation shocks in US T-bill and money supply have positive impact in Turkey market. Also, the Turkish stock index responses positively to shocks in the Egypt and Israel stock indices.

Forecast error variance decomposition analysis shows that while there is no transmission impact from Jordan markets to explain error forecast in the Turkish index, shocks in Israel and Egypt markets can explain 28 percent and 8 percent of forecast variance in the Turkish index one period ahead, respectively. In addition, The FEVD analysis show that changes in US T-bill can explain 10 percent of error variance in Turkey. Changes in the inflation rate and real GDP growth rate can explain 10 and 5 percent of error variance in Turkey's stock index.

5.4. Interdependence among MENA stock indices:

This section is devoted to investigate the dynamic interdependence among the indices of the four MENA stock markets in my sample. The results of the impulse response functions and the forecast error variance decomposition analysis are reported below.

The results of impulse response functions of stock markets interdependence in MENA region are presented in Table 5.4 (in the Appendix). The table shows that, in the case of Egypt, a one standard deviation shock to Jordan's stock index has an immediate positive effect on the Egyptian stock market. A one standard deviation shock from Jordan's market seems to have the strongest impact on Egypt's market. The effect dies out beyond the second period. A shock to Israeli market has negative effect on Egypt market that starts to appear in the second period. Also, a shock in Turkey stock index has immediate negative impact in the Egyptian index.

In the case of Israel, impulse response functions show that a shock in the Egyptian market has immediate and positive impact on the Israel index. Besides that there is no notable effect from Jordan market on the Israeli stock index, a shock to the Turkish market index does not seem able to make significant influence on the Israeli market, as well.

The Jordanian stock index responses positively to one standard deviation shock to Egypt's stock market. The impact from the latter is the source of the strongest impact on

Jordan's index. However, the Jordanian stock index responses negatively to a one standard deviation shock to the Turkish and Israeli indices. In fact, the impacts from both markets on Jordan's stock index are marginal and insignificant.

In case of Turkey, a one standard deviation shock to Egypt stock index has positive impact on the Turkish index. Moreover, a one standard deviation shock to Israeli market has immediate positive impact on the Turkey's market. However, there is no evidence of impact from Jordan's stock market in the Turkey's index.

The impulse response analysis shows that Egypt's stock market is the most influential market among the markets included in the sample. A shock in Egypt's market has its most powerful impact on Jordan market, but such a shock impacts Turkey and Israel markets, as well. All these markets response positively to a one standard deviation in the Egyptian stock market. While there is no evidence of the impact from Jordan's stock market into Israel and Turkey markets, the Jordanian a shock in Jordan index has the strongest impact in the Egyptian stock index. Moreover, Jordan and Egypt stock market indices response negatively to a shock in Israel stock index. But Israel's market has positive impact in the Turkish market. In turns, a shock in Turkey stock index has positive impact on Israel stock index, but negative impact in Egypt and Jordan markets. More insights about the interdependence among these markets can be generated from the forecast error variance decomposition analysis below.

Table 5.5 shows the results of forecast error variance decomposition analysis for MENA stock markets indices. The table shows that changes in Jordan stock index can explain more than 10 percent of error variance in Egypt index immediately. Changes in Israel stock index can explain about 9 percent of changes in Egypt stock's error variance. While there is no evidence of

immediate explanatory power from Turkey stock index, it can explain about 4 percent of error variance in Egypt's index by the second quarter ahead.

The forecast error variance decompositions analysis shows that changes in Egypt and Turkey index have the ability to explain notable part of error variance in Israel market. Changes in Egypt stock index can explain more than 13 percent of error variance in the Israel index. Changes in Turkey index, in turns, can explain about 12 percent of the error variance in Israel's index. Jordan market does not seem to have notable impact in Israel's index.

In addition, while changes in Israel and Turkey stock index have the power to explain small percentage of the error variance in Jordan index, Egypt's stock index has a dominant share in this context. Changes in Egypt's stock index can explain 26 percent of the error variance in Jordan index immediately and 36 percent of changes in the error variance of the index one quarter ahead.

Furthermore, changes in Israel's stock index can explain 28 percent of the error variance of Turkey stock index. Also, changes in Egypt stock can explain 7 percent immediately and about 13 percent one period ahead of error variance in Turkey stock index.

The peak of Egypt's stock explanatory power in other market occurs in the second period where it can explain 36, 18 and 13 percentages of the error variances in Jordan, Israel and Turkey stock indices, respectively. Changes in Israel's stock index have the power to explain 28, and 9 percent of error forecast in Turkey and Egypt stock indices immediately. Changes in Turkey's stock index can explain 12 percent of the error variance in the Israel's stock index. The changes in Turkey's market, however, have limited power to explain error variance in Egypt and Jordan stock indices. Additionally, changes in Jordan stock have 10 percent power to explain error variance in Egypt stock index, without much explanatory power on the other stocks.

To summarize, the preceding analyses have some interesting remarks. First, changes in Egypt's stock index have the strongest spillovers on the other markets while Jordan has the weakest spillovers on the other indices. Second, there is relatively stronger interdependence between the indices of the two Arab countries, i.e. Egypt and Jordan. Also, there is stronger interdependence between Turkey and Israel indices. The existence of strong interdependence can be explained mainly by higher engagement in trade and investment between each two partners here. According to the report of the Economic and Social Commission for Western Asia (ESCWA, 2009), the Jordanian economy is the most integrated economy with the Arab world. Jordan's Arab intraregional trade represents roughly 37 per cent of its total foreign trade. Another channel of connection between Egypt and Jordan is the remittance transfers. The Egyptian workers have a large share of immigrants in Jordan. Recent statistics report that the Egyptian labors constitute around 70 percent of foreign workers in Jordan (Hazaimeh, 2011). Further, there is the indirect channel of connection between these two countries which is that the major source of investment in both of economies is the capital inflows from Arab oil-exporting countries (Marber, 1995).

The interdependence between Israel and Turkey can be explained by the strong economic cooperation and trade ties between them. The two countries have signed a Free Trade Agreement (FTA) ten years ago. The two countries have large bilateral trade balances. Besides the bilateral relationship, both stock markets are expected to be influenced by the behavior of global investment institutions. International capital movements, spurred by portfolio adjustments of international investors, affect stock prices across countries, including stock markets in Turkey and Israel.

Third, the effect of changes in the Turkish stock market into the other markets does not seem to reflect its size. As shown in table 3.1, the market capitalization of Turkey in 2009 was US 307 Billion dollars, compare with US$ 218 billion for Israel, US$ 82.5 billion for Egypt and US$ 31 billion for Jordan. However, the spillovers from innovations in Turkey index are inconsistent with its market size. This result is consistent with the findings of Maghyereh (2006). This might be explained by the European-orientation of Turkey. It is integrated more in the European economy than with the smaller economies in MENA region.

In conclusion, while stock markets in MENA are not isolated, they are not fully integrated yet. The spillovers among them are still limited. Hence the current interdependence conditions among them provide a great scope for portfolio diversification across these markets.

5.5. Summary of the Analysis

There is unidirectional causality from a specific variable to stock market in each country of the sample. In case of Egypt, there is unidirectional causality from two factors, i.e. changes in money supply and US T-bill, to its stock market index. Changes in money supply also Granger-cause changes in the Turkish stock index, while changes in inflation rate do the same job in case of Israel stock index. In turn, changes in Egypt stock market index is the single variable that Granger-cause changes in the Jordanian stock index.

With the exception of the impact from Egypt stock market over the Jordanian one, Grange-causality tests show that there are no spillovers among the largest three markets in our sample viz., Egypt, Israel and Turkey. There is no evidence of unidirectional causality caused by one on others. Regarding unidirectional causality from stock market to other variables in the economy, there is a unique trend. In the case of Egypt and Turkey, there is unidirectional causality from the stock market to a specific variable; inflation rate in the Egyptian case and real

GDP growth rate in case of Turkey. While there is no unidirectional causality from Jordan's stock market to another variable in the economy, stock market of Israel has the greatest influence over the other variables in the model. There is unidirectional causality from Israel's index to three macroeconomic variables: changes in portfolio investment level, real GDP growth rate, and percentage change in money supply.

Impulse response functions of MENA markets provide some notable insights. The shock in portfolio investment inflows has negative impact in entire markets of the region. This result is counter to the expected sign according to economic theory. This result also is inconsistent with the findings of Kim and Yang (2009) in the case of Korea, using a broader definition of capital inflows than this study employs. Further, shocks in US T-bill and money supply leave positive impact in most of these markets, while a shock in inflation rate has negative impact on Israel and Egypt markets, but small positive impact in Turkey. A shock in oil price has significant positive impact on Egypt's stock index, but negative impact on the Israeli index. The effect of such shock is insignificant in the other markets.

Regarding the impact of each market in the others, impulse response functions present wider picture (impact) than the one captured by Granger-causality tests. While there is almost no transformed impact from a shock in Jordan stock market to the other markets in this sample, it is affected positively by a shock in Egypt market, and negatively by shocks in Israel and Turkey markets. Israel market, in turns, is affected positively by shocks in Egypt and Turkey markets. A similar response is seen in the Turkish stock index to shocks in the Egypt and Israel stock indices. While the Egyptian stock index responses negatively to a shock in its Turkish peer, it responses positively to shocks in Jordan and Israel markets.

Many notable features about MENA stock markets can be obtained from forecast error variance decomposition analyses. In this model, the influence from other regional market can explain reasonable share of the forecast variance in the prediction of indices. A shock in Egypt index can explain up to 36 percent of forecast variance in Jordan's market, while a shock in Turkey and Israel markets can explain 3 and 4 percent of the error variance in Jordan index, respectively. On the other hand, shocks in Jordan and Israel indices can explain 9 and 10 percent of forecast variance in the Egyptian index, respectively. While there is no transmission impact from Jordan markets to explain error forecast in the Turkish and Israeli indices, shocks in Egypt and Turkey markets can explain 13 and 12 percent of error forecast in the Israeli market, respectively. Also, shocks in Israel and Egypt markets can explain 28 percent and 13 percent of forecast variance in the Turkish index, respectively.

The forecast error variance decomposition analyses also show that a US T-bill can explain 20 percent of error forecast in Israel index, 10 percent in Turkey and 5 percent in Egypt, with lagged effect. While a shock in oil price have power to explain 29 percent of forecast variance in Egypt stock index, its explanatory power do not exceed 5 percent of forecast error in the other markets in the region. Further, a shock in inflation rate can explain up to 14 percent of forecast variance in the Israeli market, but it has no explanatory power in the other markets. On average, a shock in portfolio investment explains up to 6 percent of forecast error in Jordan and Israel stock indices. Most of the remaining domestic variables do not seem to have significant power in explaining the errors variances in MENA markets.

CHAPTER SIX

Empirical Results: Macroeconomic Variables and Stock Markets Indicators

6.1. Introduction

This chapter continues summarizing the results obtained from estimating VAR models described in chapter four. Regression model analyzed has dataset for four MENA countries: Egypt, Israel, Jordan and Turkey. Different variables are considered in the regression models to empirically test and analyze the dissertation hypothesis. This model includes 10 variables. They are as follow: US T-bill changes (*dustbill*), oil price percentage change (*dloil*), portfolio investment (*pi*), money supply growth rate (*dlm2*), wholesale price index percentage change (*dlwpi*), total foreign reserves percentage change (*dlres*), real gross domestic product growth rate (dlrgdp), and the percentage change in the Standard & Poor's stock market index of each country in the sample. Also, two stock market indicators are included. They are changes in dividends yield (divyld) and changes in price/earnings ratio (dpe). Like the first model, in this model all variables are in log differences with the exceptions of using levels for portfolio investment, and using first differences for US T-bill, dividends yield, and the price/earnings ratio. The VAR models for each country are regressed individually. Prior regression data check and analysis was carried-out to check stationarity of the variables for time series datasets. After this step, the study runs VAR models for each country. The estimated VAR models allow conducting further empirical research that can be used in analyzing dynamics interrelationship among variables. This includes Granger-causality tests, impulse response functions, and forecasting error variance decomposition analysis.

6.2. Unit Roots Test

Using the STATA econometric analysis software, the data analysis of the variables were performed for checking the stochastic properties of the observed series. The results of Augmented Dickey-Fuller test and Phillips-Perron test, with trend and without, are reported in Tables 5.1- 5.3 in the Appendix.

As explained in chapter four, the study chooses to run the models with log-difference of the variables in order to have meaningful results. The unit roots tests results of the variable, with log difference, are reported in Table 5.3 in the appendix.

The results of the VAR models of each country are reported below.

6.3. VAR Results for Egypt

Granger-causality tests indicate that there is unidirectional causality from some variables to the Egyptian stock market index (dindexsp). These causality effects can be summarized as follows. Changes in money supply (*dlm2*) Granger-cause changes in the index. This effect is significant at the 5 percent level. Also, changes in portfolio investment level (*pi*) Granger-cause changes in the index that is significant at the 10 percent level. Changes in the US T-bill (*dustbill*) Granger-cause changes in the index. This effect is significant at the 5 percent level.

Regarding the effect of changes in stock index on the other domestic macroeconomic variables, changes in stock market index (dindexsp) Granger cause changes in the inflation rate (with 5 percent significant level) and the price/earnings ratio (significant at 1 percent level).

Comparing the results of the first model that is shown in chapter five and the second model her, we can note that there is a systematic causality relationship between Egypt's stock index and the other variables, though there is different dataset of stock index have been included in the models. In both models, changes in money supply and US T-bill Granger-cause changes

on stock index. Also, changes in the stock market index Granger-cause changes in the inflation rates in both models. The difference between the outcomes of the two models is limited to the significant impacts, in the second model, from an extra variable in either direction. In other words, in the second model, there is unidirectional causality from portfolio investment level to the stock index, and another unidirectional causality from stock index to the price/earnings ratio.

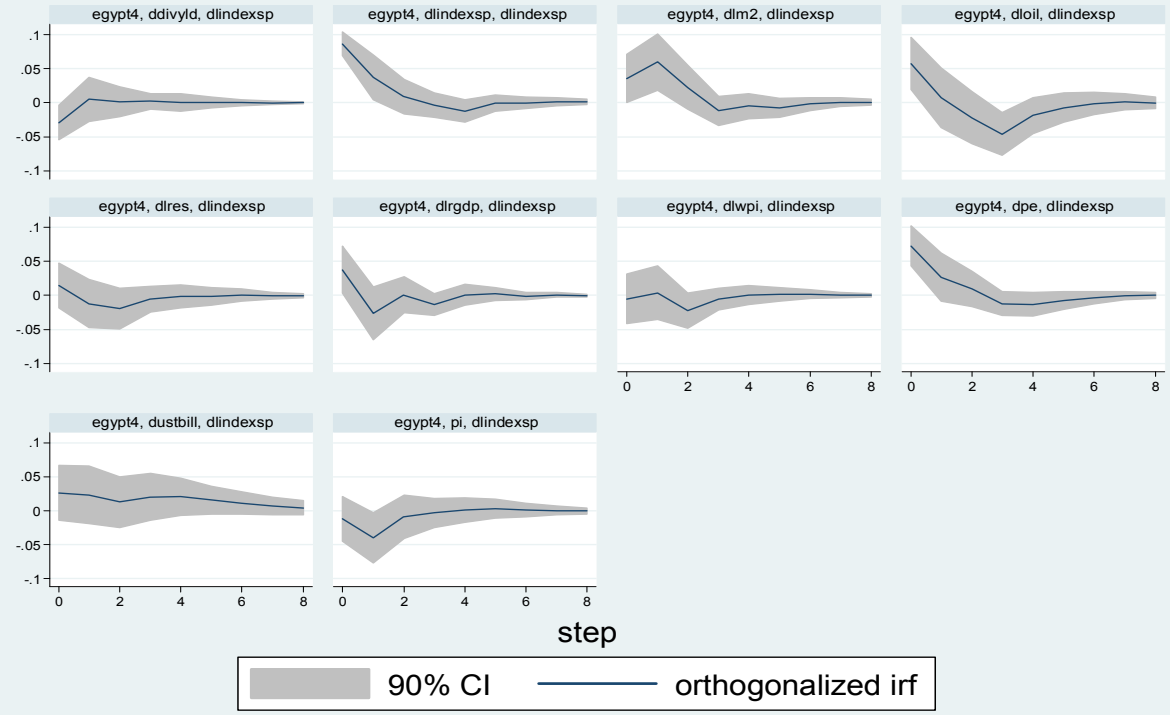
Analysis of the causality relationship between macroeconomic variables shows that there is unidirectional causality from US T-bill (*dustbill*) to several variables in VAR model. Hence, changes in US T-bill rate Granger-cause changes in two main macroeconomic indicators; the percentage change in the inflation rate (significant at 5 percent level) and foreign reserves at 10 percent levels of significance. Further, changes in the US T-bill Granger-cause changes in level of portfolio investment (significant at 10 percent level) and in the dividends yield (significant at 5 percent level). The effects from the US T-bill to domestic macroeconomic indicators are consistent in both of the models.

While changes in oil price have less powerful impact compare with the one of the US T-bill, it influences some variables. These variables, however, are stock market indicators, not any macroeconomic indicators. Thus, changes in oil price Granger-cause changes in the price/earnings ratio and the dividends yield ratio, with significant levels of 5 and 10 percent, respectively. This result is also consistent with the outcomes of the first model, where changes in oil price do not Granger-cause any impact in the macroeconomic variables, as well.

Moreover, changes in money supply (*dlm2*) Granger-cause changes in the inflation rate (*dlwpi*), significant at 10 percent level, and real GDP growth rate (*dlrgdp*), with 5 percent level of significance. Moreover, it Granger-causes changes in the dividends yield at 1 percent level of significance. In addition, changes in growth rate of real GDP Granger-cause changes in dividend

yield (*divyld*) at 10 percent level of significance. Lastly, changes in foreign reserves (*dres*) granger-cause changes in inflation rate that is significant at 10 percent level, and in dividend yield ratio (*divyld*), with 1 percent level of significance.

Figure 6.1
Egypt: Impulse Response Functions



The impulse response functions provide visual analysis of the response of stock exchange index to a positive, one standard deviation shock, in the other variables in the model. All the results in these functions are based on 10 percent significance level.

As shown in Figure 6.1, impulse-response analysis shows that a one standard-deviation shock in oil price (*dloil*) has a contemporaneous positive effect of about 5 percent change in the stock market index. This effect gradually diminishes and dies out by the sixth quarter.

The response of the stock index to a one-standard-deviation shock in money supply (*dlm2*) shows an immediate positive and significant effect in the first period ahead. The shock leads to an almost 5 percent change in the index, but the effect dissipates with the time horizon.

A one-standard-deviation shock in the inflation rate (*dlwpi*) has a small positive effect on the stock index one quarter ahead. This effect, however, dies out quickly. Further, a one standard deviation shock in US T-bill rate (*dustbill*) has an immediate small and positive effect on the Egyptian stock market index that lasts for more than one year.

For the stock market indicators, a shock in the price/earnings ratio (*dpe*) causes an immediate positive impact of about a 3 percent change in the index. A shock in dividend yield (*divyld*) has small positive impact on stock index. This effect dies out soon.

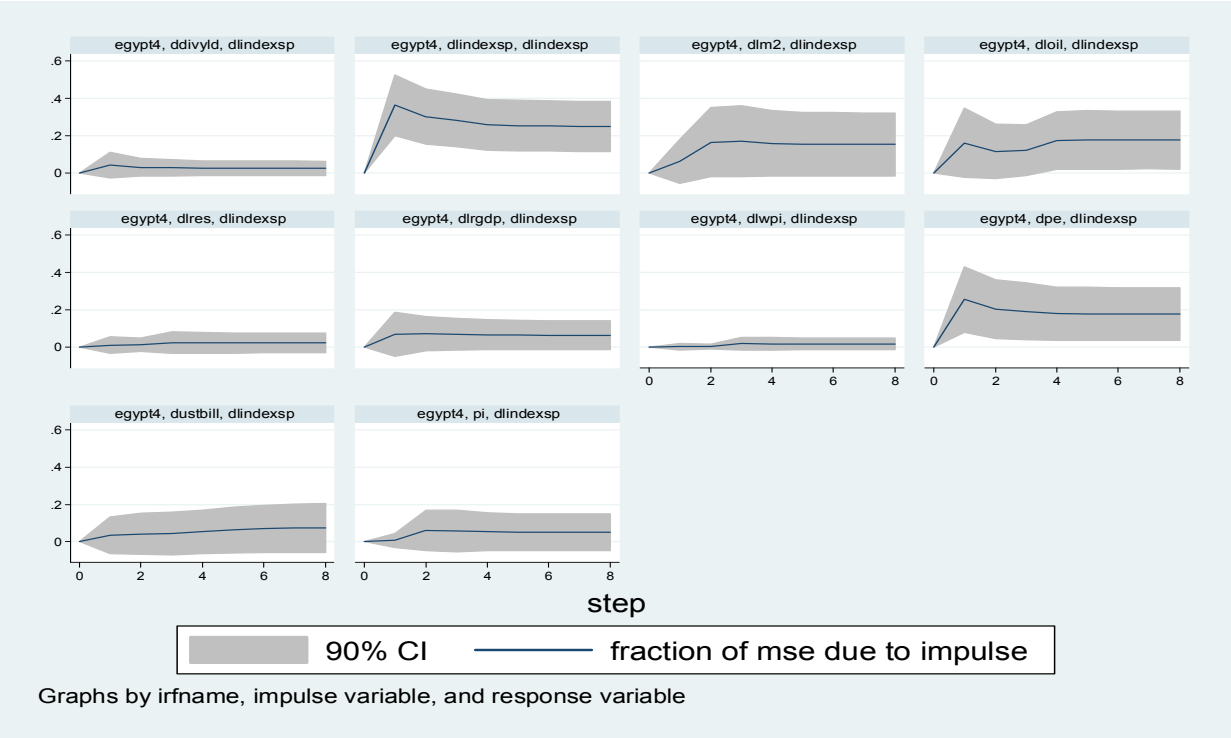
In addition, a one-standard-deviation shock in portfolio investment (*pi*) has caused negative impact in the stock market index on the first quarter ahead. However, this effect is statistically insignificant and dies out beyond the first quarter following the impulse.

Further, a one standard-deviation shock in real GDP's growth rate (*dlrgdp)* has an immediate negative impact. A similar trend occurs as a result of a one standard deviation in foreign reserves (*dlres)*. It has an immediate small negative impact. However, eventually the effect disappears quickly.

Figure 6.2 shows the forecast error variance decomposition analysis of the Egypt stock index (*dlindexsp*). The analysis shows that a shock in oil prices explains up to 16 percent of the errors variance in the index one period ahead. Like the first model, a change in oil price has significant impact in moving Egypt's index.

The changes in money supply (*dlm2*) are able to explain the forecasted error correction after the first quarter. More than 16 percent of the forecast variance in the index is explained by innovations in the money supply two quarters ahead.

Figure 6.2
Egypt: Forecast Error Variance Decomposition



Changes in portfolio the investment level (*pi*) explain about 6 percent of the variance in the forecast error of changes in the Egyptian stock market index in one quarter ahead. This explanatory power of portfolio investment continues over the entire forecasted periods.

For the remaining macroeconomic variables, innovations in the inflation rate (*dlwpi*) and foreign reserves (*dlres)* explain up to 2 percent in the index's forecast variance three quarters ahead, for each of them. Changes in the growth rate of real GDP (*dlrgdp)* have more explanatory power than the previous two variables. Changes in real GDP growth rate can explain up to 7 percent in forecast variance in the index one quarter ahead.

Changes in US T-bill (*dustbill)* have explanatory power of changes in Egypt stock market index. One quarter ahead about 4 percent of the errors variance in the index is explained by innovation in US T-bill.

Among stock market indicators, a shock in the dividend yield ratio (*divyld*) has relatively lower explanatory power of forecast variance in the index. It can just explain up to 4 percent of forecast variance one quarter ahead. On the other hand, the price/earnings ratio (*dpe*) has powerful explanatory ability. One quarter ahead, an innovation in the price/earnings ratio is able to explain up to 25 percent of forecasted error variance in the index. Therefore, it is the most powerful variable in the model that explains forecast variance in the index. Lastly, about 40 percent the forecasted error correction of index can be explained by changes in the market itself.

In summary, the empirical results for Egypt show that there is unidirectional causality from changes in portfolio investment levels, money supply, US T-bill, and inflation rates to the Egyptian stock index. Impulse response functions show that a one standard deviation shock in money supply has positive impact on the stock index in Egypt. The market follows a similar pattern in response to a shock in oil price. Furthermore, stock index responses positively to a shock in the price/earnings ratio and a shock in the dividends yield.

Forecast error variance decomposition analysis shows that a shock in money supply can explain up to 16 percent of error variance in the Egypt index two periods ahead. Also, changes in oil price can explain 16 percent of error variance immediately. In addition, changes in the price/earnings ratio have explanatory power of 25 percent of the error variance in the Egyptian index.

6.4. VAR Results for Israel

In the case of Israel, percentage changes in domestic inflation rate (*dlwpi*) Granger-cause changes in the index of the stock market (at 1 percent significance level). Further, changes in the portfolio investment level (*pi*) Grange-cause changes in the stock market index with a 5 percent level of significance. The results in this model are consistent with the ones of the first model, shown in the previous chapter, regarding the impact of changes in inflation rate in stock index. Portfolio investment level here also cause changes in the stock market index, like what was found in Egypt's model.

Regarding the effect of changes in stock market index on other domestic macroeconomic variables, changes in the stock index (dlindexsp) Granger-cause changes in real GDP growth rate (*dlrgdp*) and money supply growth rate (*dlwpi*), significant at 1 percent and 10 percent levels, respectively. The unidirectional causality from the stock index to these two variables exists in the first model, as well. In that model also there is unidirectional causality from the stock market to portfolio investment. In this model, unidirectional causality is from portfolio investment, not the other way around, as in the first model.

Regarding the causality relationship between macroeconomic variables in the model, there are some interesting results. Changes in the US T-bill (*dustbill*) do not Granger-cause any changes in any of the macroeconomic and financial market indicators at any reasonable significant level. Changes in the other foreign factor (oil price), however, have more significant effects on the Israeli domestic macroeconomic factors. There is unidirectional causality from oil prices to percentage changes in two macroeconomic variables; inflation rates (*dlwpi*) and foreign currency reserves (*dlres*), with levels of significance at 5 and 10 percent, respectively. In this model, there is a weaker impact from changes in US T-bill and oil price, compared with the

results in the first model. While there is no unidirectional causality from the US T-bill to any variable in the second model, the first model shows the existence of such causality to changes in inflation rate. Besides unidirectional causality from changes in oil price to inflation rate and foreign reserves, the first model shows unidirectional causality of changes in oil price to real GDP and portfolio investment.

Additionally, there is unidirectional causality from the growth rate in real GDP to percentage changes in money supply and the inflation rate, with 1 and 5 percent levels of significance, respectively. Likewise, changes in the inflation rate Granger-cause changes in the dividend yield at the 1 percent level of significance.

Figure 6.3
Israel: Impulse Response Functions

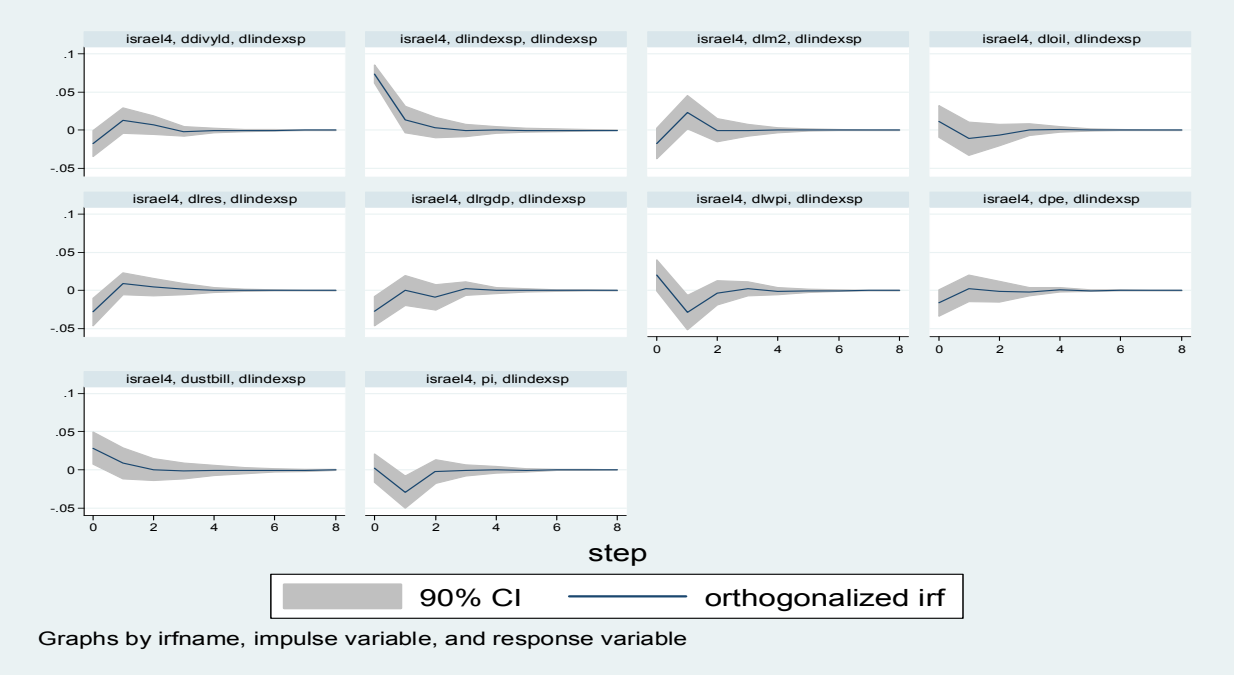


Figure 6.3 displays impulse-response functions of Israel's stock index to a shock in the other variables in the model. The analysis shows that a one standard-deviation shock in the

inflation rate (*dlwpi*) has a significant negative affect on the stock index one-quarter ahead. The shock has sizable impact of about 3 percent of the index.

A one-standard-deviation shock to portfolio investment level (*pi*) has significantly negative impact of about 3 percent of the stock market index one-quarter ahead. But the effect gradually disappears before the end of the year. Moreover, a one standard-deviation shock in oil price (*dloil*) has a contemporaneous negative effect. This effect dies out as it approaches the third quarter.

The impulse- response analysis shows that a one-standard-deviation shock to the US T-bill rate (*dustbill)* has a positive effect on the stock index for two quarters. The shock has its peek effect immediately when it occurs but that impact declines quickly over less than two quarters ahead. Moreover, a one-standard-deviation shock in money supply (*dlm2*) has a significantly positive effect on the stock market index one quarter ahead. The impact dies out quickly. Also, a one standard-deviation shock in foreign reserves growth rate (*dlres)* has a small positive impact in the index one quarter ahead. A similar story can be told about a one standard deviation shock in real GDP growth rate (*dlrgdp)*; there is small positive impact one quarter ahead. The effect, however, disappears quickly.

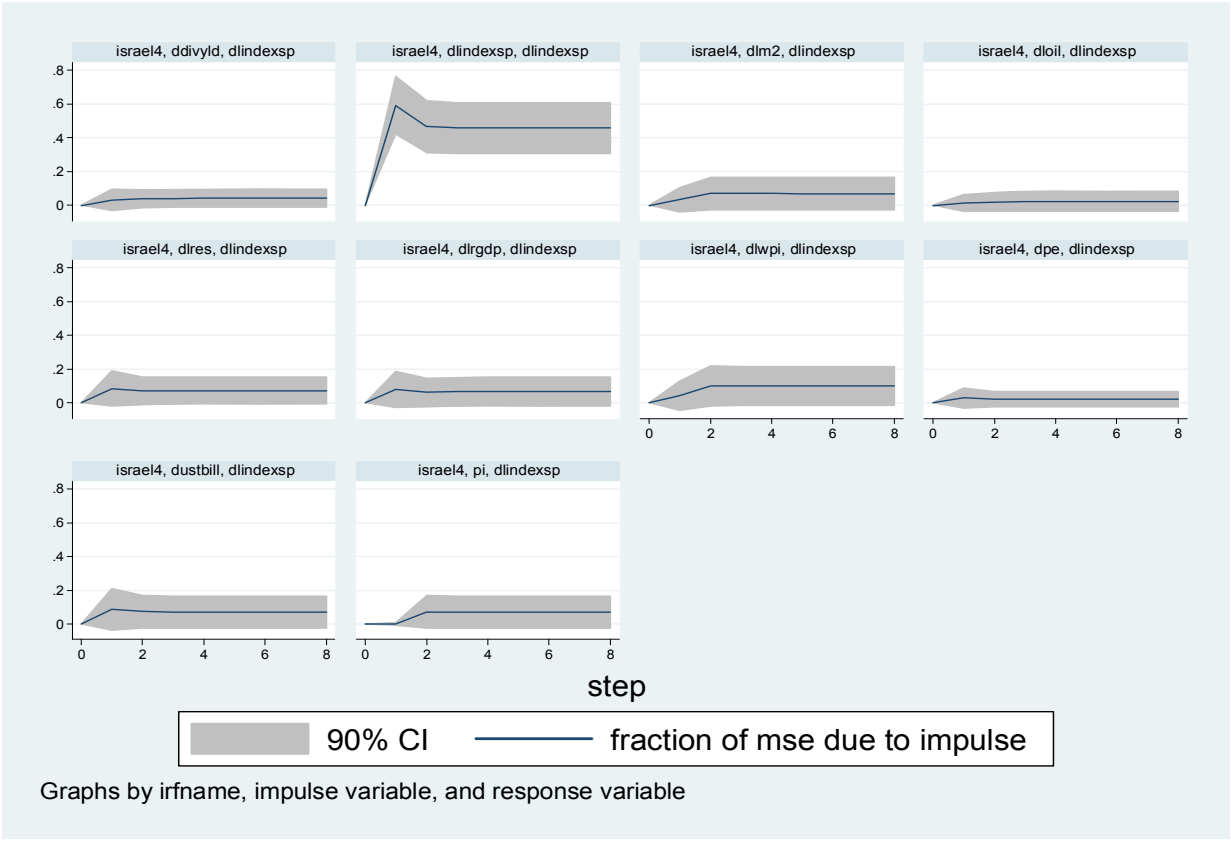
For stock market indicators, a one standard deviation shock in dividend yield (*divyld*) has a positive impact on the stock index one quarter ahead. Also, the Israeli stock index responses to a shock in the price/earnings ratio (dpe) in positive, but with small insignificant reaction. Its impact lasts for less than two periods.

The forecast error variance decomposition analysis of Israel stock index is presented in figure 6.4. The analysis illustrates that changes in inflation rate (*dlwpi*) have the power to explain more than one tenth of the forecast variance in the index two quarter ahead. Besides, the

changes in the index itself; changes in the inflation rate is the strongest variable in explaining forecast variance in the index.

While changes in the US T-bill (*dustbill)* have the power to explain up to 9 percent in of the variance in the forecasted errors, in one period ahead, changes in oil price (*dloil*) have very limited capability of explaining the index forecast error. One period ahead, a shock in oil price can explain just 1 percent of forecast variance.

Figure 6.4
Israel: Forecast Error Variance Decomposition



Two periods ahead, changes in money supply (*dlm2*) have the power to explain up to 7 percent of changes in the errors variance. Furthermore, changes in portfolio investment level (*pi*) explain another 7 percent of the forecast error, two quarters ahead. Moreover, changes in real

GDP growth rate (*dlrgdp)* and foreign reserves (*dlres)* have the ability to explain up 8 and 9 percent of forecast variance in the index, one period ahead, respectively.

In the case of Israeli stock index, financial indicators do not seem to have strong explanatory power. Both dividend yield (*divyld*) and price/earnings ratio (*dpe*) have the power together to explain only 6 percent of forecast variance in the index one quarter ahead. Finally, changes in the Israeli stock market index (*dlindexsp*) itself are able to explain about 59 percent of the error variance in the index.

In conclusion, the empirical results for Israel show that changes in the inflation rate and portfolio investment Granger-cause changes in the Israeli stock market. Impulse response functions show that a positive one standard deviation shock in the inflation rate introduces immediate negative effect on Israel's stock market. Further, a shock in portfolio investment affects stock market in Israel negatively. Also, shocks in the price/earnings ratio and dividends yield have immediate positive and small impact on Israel's index. Nevertheless, a shock in money supply has a positive impact on the stock index in Israel.

The analysis of forecast error variance decomposition shows that changes in the inflation rate have the power to explain more than 10 percent of error variance in Israel index two periods ahead. Also, as changes US T-bill can explain 9 percent of error variance in the index immediately. Moreover, changes in money supply can explain 7 percent of the error variance of the Israel stock index.

6.5. VAR Results for Jordan

In the case of Jordan, none of the variable included in the model seems to Granger-cause changes in stock market index at any reasonable statistical significance level. Also, changes in stock market index do not Granger-cause any changes in all the variables included in this model.

This is consistent with what have been found in the first model, and compatible with finding and results of Alqudsi et al. (2007) and Bilson et al. (2001).

Likewise, neither changes in the US T-bill nor oil price Granger-cause changes in the Jordanian domestic macroeconomic variables that are included in the VAR model at any reasonable level of significance.

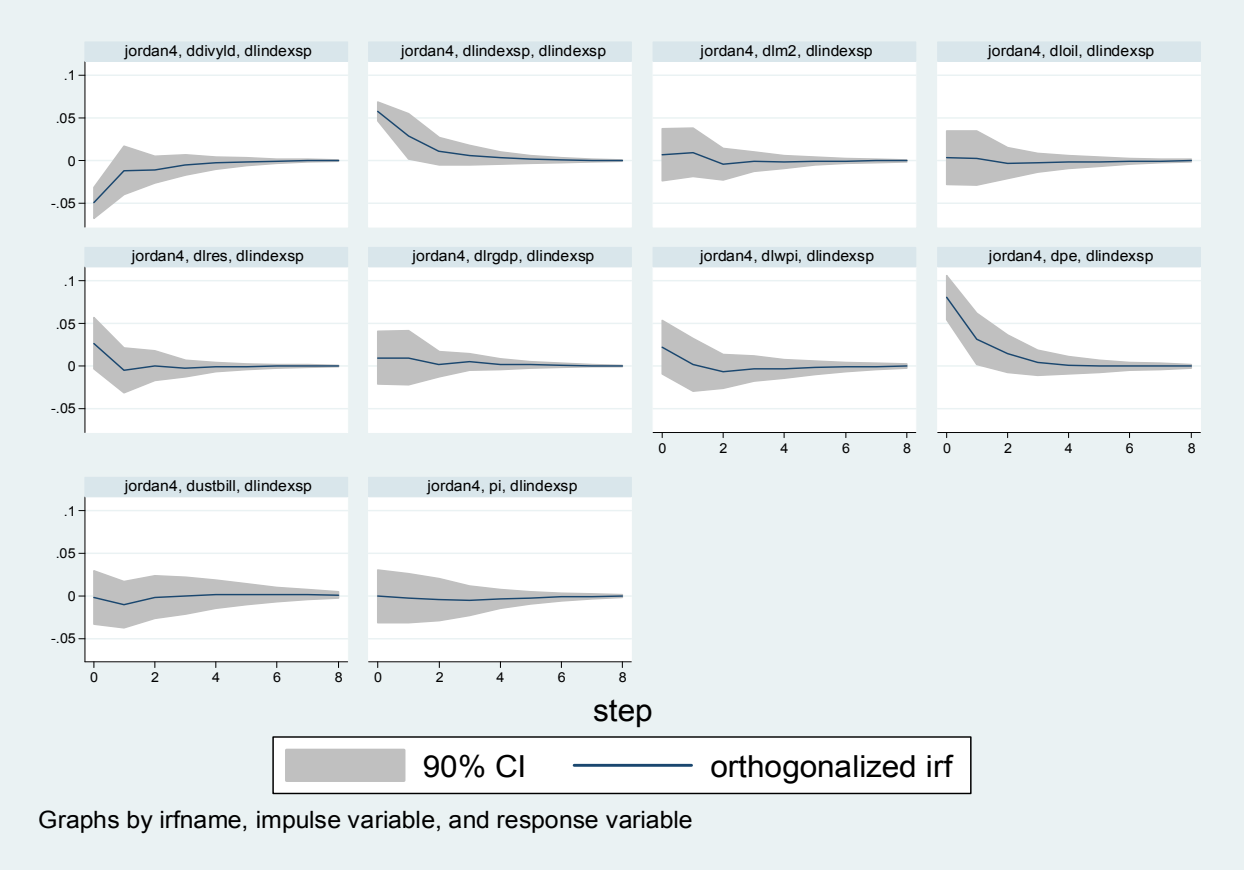
For domestic macroeconomic variables, there is bidirectional causality between percentage changes in money supply and the inflation rate with 5 percent level of significance for money supply effect and 1 percent significance level for the inflation rate effect. Additionally, changes in money supply Granger-cause changes in real GDP growth rate, with a 10 percent level of significance. Furthermore, changes in the inflation rate Granger-cause changes in portfolio investment level and foreign reserves growth rate, at 5 percent, and 10 percent significance level, respectively. In turn, changes in foreign reserves Granger-cause changes in money supply, with 1 percent significance level. Also, changes in portfolio investment level Granger-cause changes in the growth rate of real GDP, with a 10 percent level of significance.

Figure 6.5 displays impulse- response functions of Jordan's stock index to a shock in the other variables in the model. The analysis shows that a one-standard-deviation shock in the US T-bill rate has negative effects on the stock index.

A one-standard-deviation shock in portfolio investment level (*pi*) has small negative effects on the index in the first quarter ahead and beyond. Further, a one standard-deviation shock in inflation rate (*dlwpi*) has small negative effect on the stock index two quarters ahead, but the effect disappears gradually. Also, a one standard-deviation shock in foreign reserves (*dlres)* has a small negative impact of the index in one quarter ahead, and then it dies out quickly.

A shock in money supply (*dlm2*) has a positive impact in one quarter, where it participates in moving the index by about 1 percent. This effect, however, dies quickly.

Figure 6.5
Jordan: Impulse Response Functions



The stock market indicators have different paths in the case of Jordan's stock market. A one standard deviation shock in the price/earnings ratio (*dpe*) has an immediate positive significant impact on stock index that lasts for almost one year. A one standard deviation shock in dividends yield, however, has negative impact that lasts for a year. Further, a shock in index itself can cause 3 percent change in itself immediately.

Figure 6.6
Jordan: Forecast Error Variance Decomposition

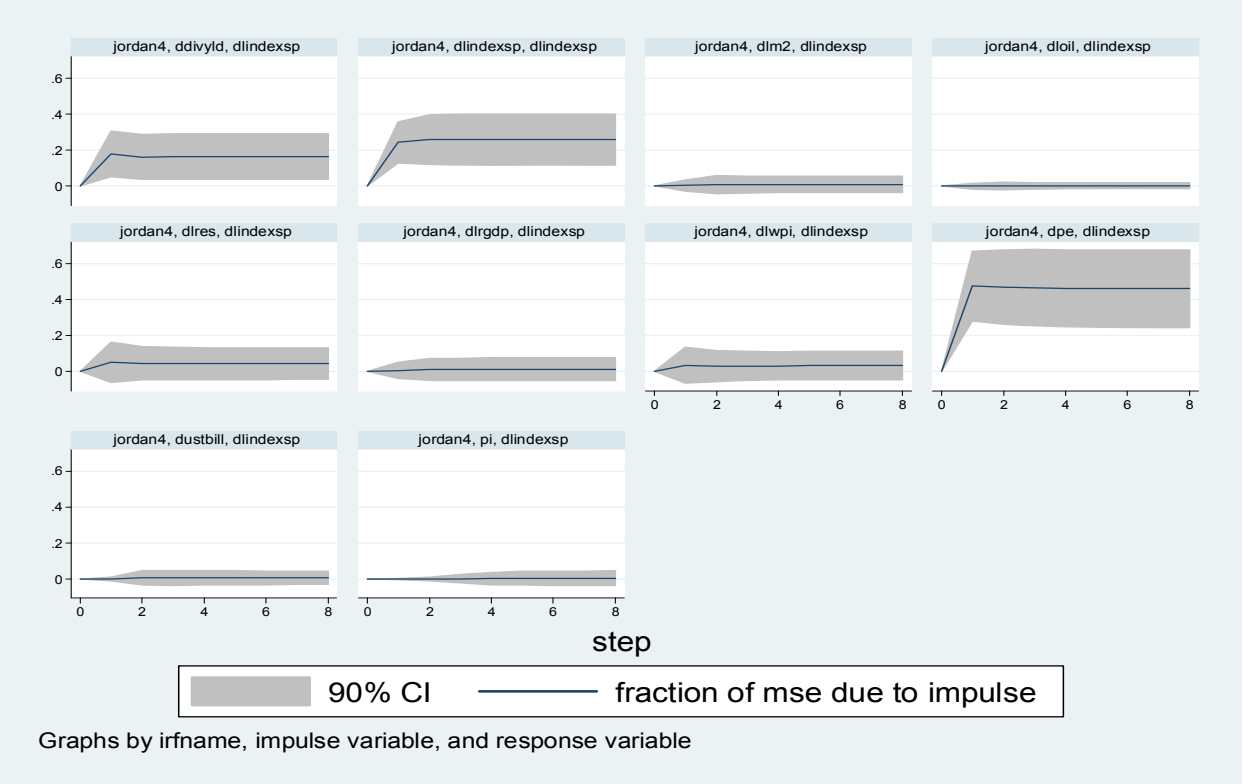


Figure 6.6 shows the forecast error variance decomposition analysis of Jordan's stock index. Besides the changes in the index itself, only the stock market indicators have significant power to explain forecast variance in the Jordanian stock index. With the exception of changes in foreign reserves and inflation rate, foreign and domestic macroeconomic variables do not have any remarkable power to predict errors variance in the index. While changes in foreign reserves (*dlres)* can explain up to 5 percent in forecast variance of index one quarter ahead, its explanatory power remains statistically insignificant. Also, changes in inflation rate (*dlwpi*) can explain about 4 percent of future variance in the index, but the results are insignificant, as well.

Forecast error variance decomposition shows that changes in the price/earnings ratio (*dpe*) explain significantly up to 48 percent in changes in the forecasted error in the index one period ahead. Also, changes in dividend yield (*divyld*) explain significantly up to 18 percent of

error forecast. Lastly, changes in the index itself able to explain up to 24 percent of changes in the errors variance.

To conclude, the empirical tests for Jordan show that all the variables that are included in the model do not seem to have the ability to Granger-cause changes in the Jordanian stock market. Impulse response functions find that one standard deviation shock in the price/earnings ratio has an immediate positive significant impact on stock index that lasts for almost one year. However, a one standard deviation shock in dividend yield has negative impact. Furthermore, a shock US T-bill has negative impact in the index.

Forecast error variance decomposition analysis shows that changes in the price/earnings ratio have explanatory power of 47 percent of error variance and Jordan's stock index. Furthermore, changes in dividends yield have an explanatory power of 18 percent of the error variance of Jordan's market index.

6.6. VAR Results for Turkey

Granger-causality tests reveal that there is a unidirectional causality from changes in the US T-bill (*dustbill*) to the Turkish index, and this effect is significant at 5 percent significance level. The domestic macroeconomic variables do not seem to have an impact on the stock market index at any reasonable level of significance. Regarding the effect of changes in the stock index on the other domestic macroeconomic variables, changes in stock market index (dlindexsp) Granger cause changes only in real GDP growth rate *(dlrgdp)*, with a 10 percent level of significance. The unidirectional causality from the stock market to real GDP growth rate is consistent with the findings of the first model. It is also in line with the results of Tunah (2010). This relationship can be explained as a result of investors' anticipation of changes in GDP growth rate. Accordingly, they form their expectations about the outlook of the whole economy.

The results of Granger-causality test on macroeconomic variables have more economical insightful. Changes in the US T-bill Granger-cause changes in the money supply growth rate at a 1 percent significance level. It also, Granger-cause changes in the dividends yield (*divyld*) that is significant at the 5 percent level.

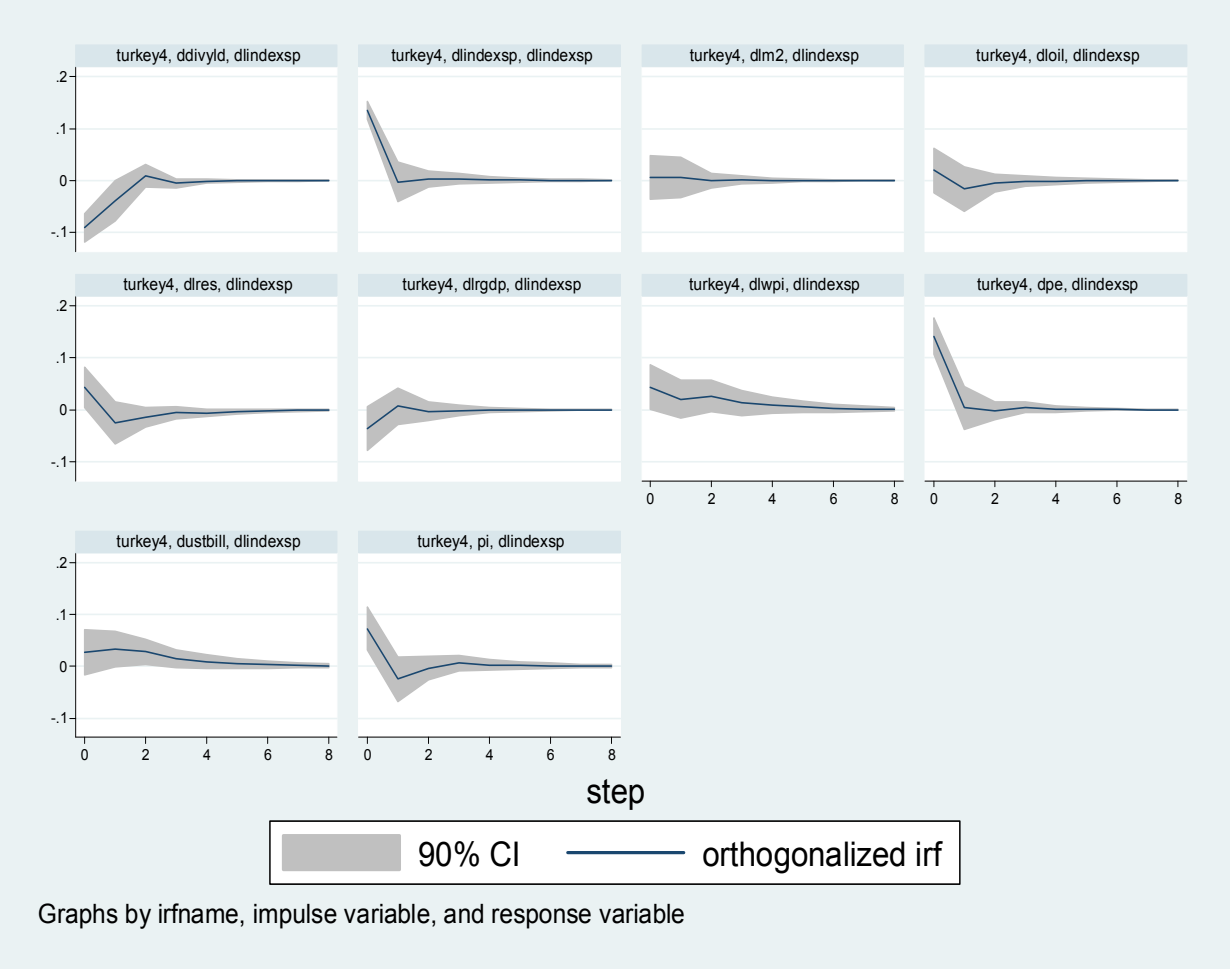
Further, there is bidirectional causality between the real GDP growth rate (dlrgdp) and money supply growth rate (*dlm2*), with a significance level of 1 percent for the impact from the former and 10 percent significance level for the impact from the latter. Changes in real GDP growth rate Granger-cause changes in the price/earnings ratio (*dpe*), with a significance level of 1 percent. In addition, there is bidirectional causality between changes in foreign reserves (*dlres*) and the inflation rate (dlwpi) with 5 percent level of significance for both. There is unidirectional causality from changes in foreign reserves to changes in money supply (*dlm2*), with a 10 percent significance level and to changes in dividend yield (*divyld*), with at 5 percent level of significance. Moreover, changes in the inflation rate Granger-cause changes in the money supply growth rate, and the real GDP growth rate, both with1 percent levels of significance.

Figure 6.7 plots impulse response functions for the stock index in Turkey to shocks in other variables in the model. The figure shows that index responds negatively to a one-standard-deviation shock in portfolio investment level (*pi*) one quarter ahead. However, this effect disappears quickly beyond that period. Also, a one-standard-deviation shock in the UST-bill (*dustbill)* has a positive and significant effect on the stock index for almost one year ahead. The shock generates more than 3 percent change in the index one quarter ahead.

Furthermore, the impulse-response analysis shows that a one standard-deviation shock in the oil price (*dloil*) has a contemporaneous negative insignificant effect in the first quarter. This effect disappears beyond that period. Further, a one standard-deviation shock in money supply

(*dlm2*) has a small positive effect on the stock index for less than two quarters ahead. A one-standard-deviation shock in the inflation rate (*dlwpi*) has to an immediate positive impact in the index, which makes a contribution of more than 2 percent of the change in the index one quarter ahead. This impact lasts for a year ahead.

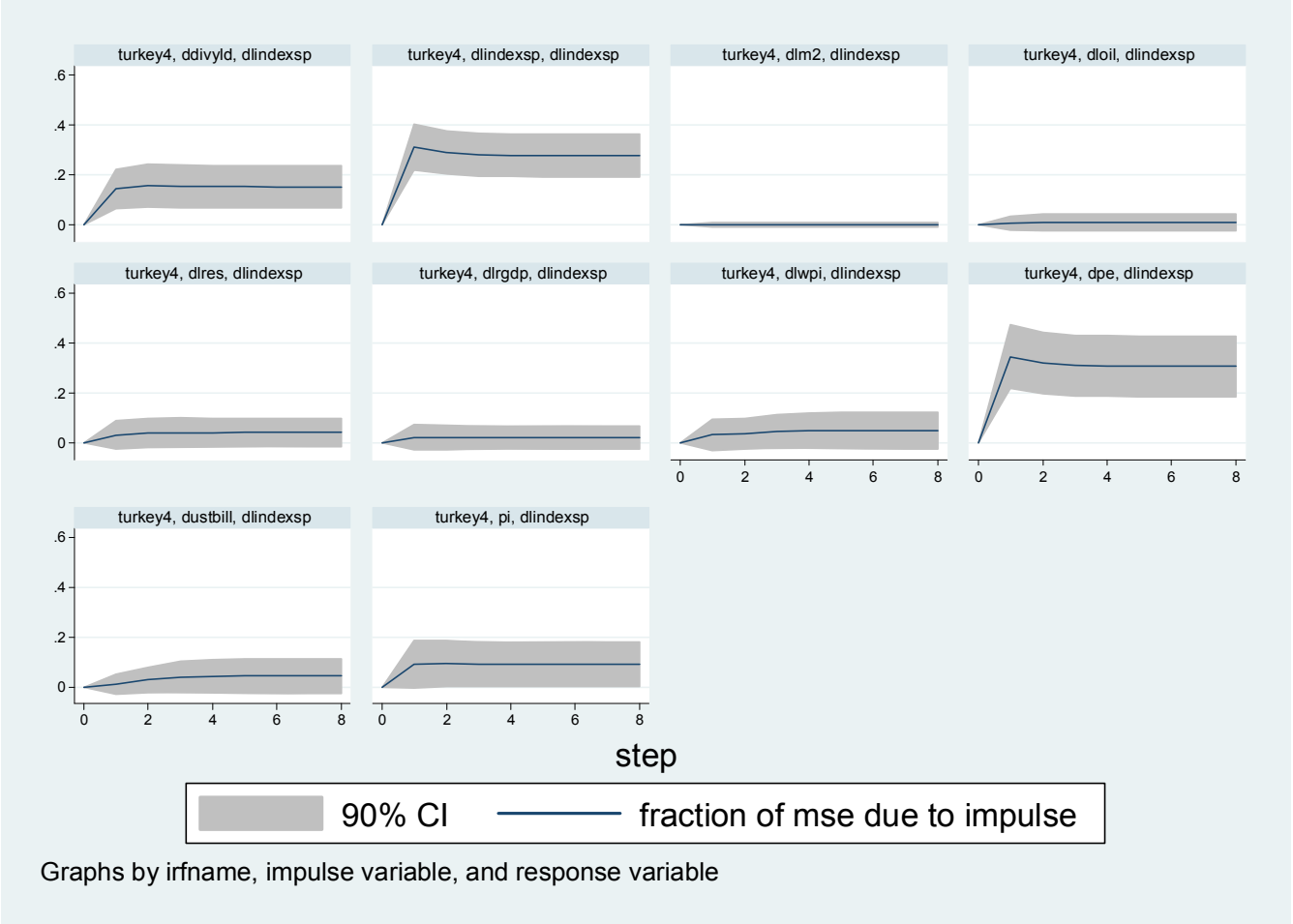
Figure 6.7
Turkey: Impulse Response Functions



A one standard deviation shock in growth rate of real GDP (*dlrgdp)* has a small positive impact on the stock market index in the first quarter ahead but the effect disappears quickly. A one standard deviation shock in foreign reserves (*dlres)*, however, has a negative impact on stock index one quarter. It introduces a change of about 3 percent in the index at that period.

Additionally, a one standard deviation shock in the dividend yield (*divyld*) has a negative significant impact on the stock index. However, this effect gradually declines and dies out as it approaches two quarter ahead. Nevertheless, a one standard deviation shock in the price/earnings ratio (*dpe*) impacts stock index positively, but the effect was timely-short.

Figure 6.8
Turkey: Forecast Error Variance Decomposition



The forecast error variance decomposition analysis of the Turkey stock index is presented in Figure 6.8. The analysis illustrates that a shock in portfolio investment levels (*pi*) can significantly explain up to 9 percent of errors in forecasting index. The explanatory power of changes in the US T-bill (*dustbill*) on the index increases over time. While it is able to explain 1

percent of forecast variance in the index one quarter ahead, it has the power to explain up to 4 percent three quarter ahead. A similar pattern is taken by changes in inflation rate (*dlwpi*); its explanatory power grows over time, as well. Interestingly, changes in oil price (*dloil*) do not seem to have an explanatory power of future variance in stock index, though Turkey has an industrial sector that should be sensitive to changes in oil price. As shown in the results of the first model, this result is consistent with the finding of AlFayoumi (2009). He also finds that there is no evidence of changes in oil price having influence over the movement in the Turkish stock market.

Changes in foreign reserves and real GDP growth rate (*dlrgdp)* can explain up 2 and 3 percent of forecast variance in index one quarter ahead, respectively.

Stock market indicators have significant power in explaining the future variance in the Turkish exchange index. An innovation in the price/earnings ratio (*dpe*) has power to explain up to 34 percent of forecast error in the index. Furthermore, the dividend yield ratio (*divyld*) is able to explain up to 14 percent of forecast variance in index. In addition, changes in the index itself have the power to explain up to one third of forecast variance.

In summary, there is unidirectional causality from US T-bill to Turkey's stock index. In turn, changes in stock index Granger-cause changes in real GDP growth rate. Impulse response functions show that a one standard deviation shock in the dividend yield has a negative significant impact on the stock index, while a one standard deviation shock in the price/earnings ratio, however, has positive impact on stock index. Also, a shock in portfolio investment affects stock market Turkey negatively.

Forecast error variance decomposition analysis shows that shocks in the price/earnings ratio and dividends yield can explain 34 and 14 percent of error variance in the Turkish index.

Also changes in portfolio investment can explain 9 percent of error variance in the index of Turkey.

6.7. Summary and Conclusion

The results of the second model have some interesting results about the factors that affect stock markets in MENA region. In general, there are four factors that appear to have power to explain, partially, stock markets behavior in the region. These factors are: changes in portfolio investment levels, money supply, US T-bill, and inflation rates. Portfolio investment inflows influence stock index in the case of Egypt and Israel. Also, change in US T-bill, which can be seen as a proxy for the opportunity cost of investing in the domestic economy, have impact on the stock markets in MENA, particularly in Egypt and Turkey. Further, changes in money supply have the ability to affect stock market behavior in the case of Egypt. Changes in the inflation rate seem to Granger-cause changes in the Israeli stock market. No factor among the ones included in this model has the ability to cause changes in the Jordanian stock market.

Impulse response functions present other aspects of relationships between stock markets in MENA and other variables in the models. There are mixed results of the impact of variables. A positive shock in money supply, for instance, has a positive impact on the stock index in Egypt and Israel but there no obvious impact on Turkey and Jordan stock market of such effect. Another case is the effect of a shock in oil price. While such a shock has a positive impact in case of Egypt, it has negative effects on the Turkish and Israeli markets. Also, though a shock in the inflation rate causes Israel's stock market to decline by almost 3 percent immediately, not much impact can be witnessed in the other stock markets of the region. A shock in portfolio investment affects negatively stock markets in all the sample, and particularly Israel and Turkey, which is against the expected results.

Regarding the stock market index, there is positive relationship between shocks in price/earnings ratio and stock market index in all the countries in the sample. The impact of a shock in dividends yield has inconsistent outcomes. Stock markets in Turkey and Jordan seem to response negatively to a shock in dividends yield, while such a shock has positive impact in the case of Egypt and Israel.

The analyses of forecast error variance decomposition provide further evidence of the variety in the behavior of stock markets in the region. A shock in money supply, for instance, can explain up to 9 and 16 percent of forecast variance in the indices of Turkey and Egypt, respectively. Such a shock can explain about 7 percent of the forecast variance of the Israel stock index. However, in respect of the Jordan's stock market, the forecast variance can't be explained by a shock in money supply. Similarly, we can infer about shocks in portfolio investment, inflation rate and US T-bill variables.

With the exception of the Israeli stock market, a shock in the price/earnings ratio has great power to explain the forecast variance in the region's indices. The percentage of such explanatory power is between 25 percent to 47 percent of forecast variance in Egypt and Jordan. Turkey's figure is located in the middle (34 percent). A shock in the other stock market indicator, dividends yield, has strong explanatory power in Jordan and Turkey, with 18 and 14 percent of forecast error, respectively. But such shocks seem to have substantial explanatory power in the case of Egypt and Israel.

CHAPTER SEVEN

Final Conclusion and Further Research

7.1. Final Conclusion

A growing body of finance literature has been devoted to examining stock market behavior. The popular themes that attract attention in the recent empirical works include: a dynamic linkage between macroeconomic variables and stock returns, the contribution of foreign capital inflows on trends that stock prices have taken, and interdependence among global or regional exchange markets.

The MENA region is understudied. There are few studies that focus on the region's financial systems or its stock exchanges (e.g. Ben Naceur et al., 2008; Billmeier & Massa, 2007a, 2007b; Creane et al., 2004; El-Erian& Kumar, 1995). This could be the result of a lack of data or a short span of data, as is the case in many developing countries.

This study is intended to partly fill the gap in the literature by first investigating the relationship between movements in stock price indices in the MENA region and the domestic economic and financial fundamentals. Second, this study adds to the literature on the relationship between foreign capital inflows (measured by portfolio investment inflows) and the behavior of stock markets indices in MENA. The study provided insights on how foreign inflows influence the stock indices, and highlights the contributions of the inflows to the causation of recent bubbles in MENA markets. Third, the study employed the dynamic methods of vector auto-regression (VAR) models to investigate the interdependence between stock markets indices in the region. The results of this investigation contribute to the growing literature of the integration conditions and spillover effects among MENA stock markets.

The data sample contained only four countries: Egypt, Israel, Jordan, and Turkey. These countries were selected because of the problem in data availability. They are the only countries in MENA that have relatively long time series data for different economic variables, on quarterly basis. The investigated variables were: US T-bill, oil price, portfolio investment, money supply, wholesale price index, total foreign reserves, real gross domestic product, dividends yield, price/earnings ratio, and stock market indices of the counties in the sample. The selection of these variables is consistent with the literature on the factors that have been found to affect stock markets. According to data availability, the time spans of data vary in the starting quarter but all data end by the last quarter of 2010. Regarding the techniques, the study used VAR models and employed the following empirical tests: unit root tests, Granger-causality tests, Impulse Response Functions, and Forecast Error Variance Decomposition analysis.

The empirical tests found that there was unidirectional causality from some specific variables to stock market in the region, though there was a heterogeneous trend across the countries. The common factors that Granger-cause changes were: money supply growth rate, T-Bill, and inflation rate. Those variables seemed to influence the movement of stock markets in the region. The effects of a rapid expansion of money supply and credit can imply that a larger amount of savings are channeled through stock markets. Further, changes in US T-bill influence MENA stock markets since T-bill can be seen as a proxy for the opportunity cost of investing in the domestic economy. Shocks in inflation rates affect stock market trends (negatively) because of the economic cost of inflation and the negative association between inflation and future real economic activities (Amihod, 1996). The empirical tests demonstrated there are few variables that have the power to influence MENA stock markets. This suggests that there is no strong

linkage between movements in stock prices in the region and domestic economic and financial fundamentals.

Impulse response functions of MENA markets provided some notable insights. The shock in portfolio investment inflows has negative impact on the entire markets of the region. This result is counter to the expected sign according to economic theory. This result also is inconsistent with the findings of Kim and Yang (2009) and Jansen (2003) in the case of Korea and Thailand, respectively. The different responses of stock markets toward shocks in portfolio inflows in MENA and East Asia regions might have been the result of the size effect. The MENA region attracted far lower level of portfolio inflows than East Asian countries. So, inflows to MENA did not have significant impacts on the behavior of the region markets. Domestic factors might have more powerful explanatory ability of MENA stock markets behavior.

Further, shocks in US T-bill and money supply had positive impacts on most of these markets, while a shock in inflation rates had negative impacts on Israel and Egypt markets, but a small positive impact in Turkey. The quantitative analysis also revealed that a shock in oil price had significant positive impact on Egypt's stock index, but negative impact on the Israeli index and the Turkish index. This outcome was expected since Egypt is the only country in the sample that can be regarded as an oil producer.

The forecast error variance decomposition analyses also showed that a shock in the US T-bill could explain 20 percent of error forecast in Israel index, 10 percent in Turkey and 5 percent in Egypt, with lagged effect. While a shock in oil price had power to explain 29 percent of forecast variance in Egypt stock index, its explanatory power did not exceed 5 percent of forecast error in the other markets in the region. Further, a shock in the inflation rate could explain up to

14 percent of forecast variance in the Israeli market, but it had no explanatory power in the other markets. On average, a shock in portfolio investment explained up to 6 percent of forecast error in Jordan and Israel stock indices. Most of the remaining domestic variables did not seem to have significant power in explaining the errors variances in MENA markets.

Regarding the interdependence conditions among stock exchange in the region, Granger-causality tests showed that there were no spillovers among the largest three markets in the study's sample viz., Egypt, Israel and Turkey. There was no evidence of unidirectional causality caused by one on others. The impulse response functions, however, found stronger impacts than the one captured by Granger-causality tests. While there was almost no effect from a shock in Jordan stock market into the other markets in this sample, the former was affected positively by a shock in Egypt market, and negatively by shocks in Israel and Turkey markets. The Israel market, in turns, was affected positively by shocks in Egypt and Turkey markets. A similar response was seen in the Turkish stock index to shocks in the Egypt and Israel stock indices. While the Egyptian stock index responded negatively to a shock in its Turkish peer, it responded positively to shocks in Jordan and Israel markets. Furthermore, forecast error variance decomposition analyses provided a numerical picture of such interdependence conditions. The influence from other regional market could explain a reasonable share of the forecast variance in the prediction of indices. A shock in Egypt index could explain up to 36 percent of forecast variance in Jordan's market, while a shock in Turkey and Israel markets could explain 3 and 4 percent of the error variance in Jordan index, respectively. On the other hand, shocks to the Jordan and Israel indices could explain 9 and 10 percent of forecast variance in the Egyptian index, respectively. While there was no transmission impact from Jordan markets to explain error forecasts in the Turkish and Israeli indices, shocks in Egypt and Turkey markets could

explain 13 and 12 percent of error forecast in the Israeli market, respectively. Also, shocks in Israel and Egypt markets could explain 28 percent and 13 percent of forecast variance in the Turkish index, respectively. The analyses indicated that there is relatively stronger interdependence between the indices of the Arab countries (i.e. Egypt and Jordan) on one side and the non-Arab countries (i.e. Israel and Turkey) on the other side. The stronger interdependence within each group reflects greater economic and financial integration.

Since the analysis found that there is low correlation among stock markets included in the sample, this provides substantial portfolio diversification advantages for investors. The findings of this study and the previous studies on MENA stock markets indicate that the Arab markets, in particular, are less integrated with the global markets. Hence, Arab markets might potentially give investors valuable instrument to hedge against shocks in the developed and emerging stock markets. In turn, the governments in these economies should continue improving the business environment and enhancing investment incentives. The required initiatives here include strengthening the institutional framework, more accountability, transparency and frequent disclosure of information.

In addition, the findings of this study indicated that international capital inflows do not have significant contributions to the region recent experiences with bubbles. The evidence suggests that there is a need to search for the causes of the problem internally. Some aspects of structural weakness in MENA stock markets might be behind the phenomena, such as the dominant role of government and business elites in the economy and the presence of small retail investors in stock markets. From the experience, such weaknesses could lead to resource misallocations and heavy economic costs. Thus, policymakers in the region should consider

implementing strong laws to enhance competition, increase the role of private sector, and promote institutional investors in stock markets

7.2. Further Research

Finally, though most of the results of this study corroborated outcomes of previous studies (e.g. AlFayoumi, 2009; Amihud, 1996; Tunah, 2010), there are some limitations of the study's results. As a result of data constraints, the selected sample included only four countries not including any of the major oil exporters. Even within the selected countries, the empirical results were heterogeneous. Thus, the ability to extrapolate lessons from the empirical work is limited.

For future research, one can consider studying Saudi Arabia, UAE and Kuwait market indices and the correlations among them, if any. Also, new studies on this area might consider adding international stock indices like S&P 500 or Dow Jones to examine the interdependence and potential volatility transmission.

Moreover, the dataset that was used in this dissertation to represent foreign inflows is collected from different sources. The quality of some of this data might not be high. Further research may be able to find better sources of data to model time series cointegration analysis to examine further the relationships considered in this dissertation.

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Appendix

Table 3.1*:* Stock markets in selected MENA countries (selected indicators: 2000 and 2010)

	Number of companies		Market Capitalization ($ billion)		Market Capitalization (% GDP)		Value traded ($ billion)		Turnover ratio (%)	
	2000	2010	2000	2010	2000	2009*	2000	2010	2000	2010
Bahrain	42	44	6.6	20.4	83	82	0.25	0.29	3.58	1.54
Egypt	1076	211	28.7	82.5	29	48	11.1	17.4	36.1	43
Israel	654	596	64.1	218	51	93	23.4	133.4	36.6	66.7
Jordan	163	277	4.9	31	58	127	0.42	9.45	7.72	30.1
Kuwait	77	215	20.8	120	55	72	4.21	41.8	21.3	38.8
Lebanon	12	10	1.58	12.6	9	37	0.12	1.87	6.73	14.7
Morocco	53	73	11	69.2	29	69	1.09	10.8	8.89	16.3
Oman	131	120	3.5	20.3	17	38	0.55	3.4	14.2	18.2
Qatar	22	43	5.2	124	29	89	0.24	18.4	4.9	17.3
Saudi Arabia	75	146	67.2	353	36	85	17.3	203.2	27.1	60.5
Tunisia	44	54	2.8	10.7	15	23	0.63	1.7	22.6	17.2
Turkey	315	337	70	307	26	37	179	421.6	196.5	158.4
UAE	54	101	5.7	105	8	48	0.12	27.4	1.76	25.4

Source: The World Bank's the World Development Indicators database.
* The most recent available data is for 2008 for Kuwait and for 2009 for all other countries.

Table 4.1
Descriptive statistics of the Data for Egypt (period 1996:1-2010:4)

	Observations	Mean	Standard deviation	Minimum	Maximum	Skewness	Kurtosis
Stock exchange index	60	1184.7	898.3	202.4	3795.9	1.1	3.4
S&P Egypt index	56	217.5	189.2	30.4	669.1	0.6	2.1
Portfolio investment (PI)	60	39.2	1136.9	-3902.4	5547.5	0.9	14.1
Money supply (M2)	51	501.7	234.7	211.6	973.9	0.5	1.9
Oil Price	60	43.1	27.3	11.09	122.5	0.9	3.1
US T-bill	60	3.1	1.9	.07	6.0	-0.2	1.5
Inflation (WPI)	60	92.4	31.1	58.9	162.1	0.7	2.1
Real GDP	36	117.4	19.4	92.5	158.8	0.6	2.3
Foreign Reserves (RES)	60	20.1	7.2	12.6	33.6	0.8	2.0
Dividend Yield	56	4.1	2.7	0	12.0	0.7	3.3
Price/Earnings ratio	56	15.6	10.1	3.4	51.7	1.7	6.1

Source: Calculated by the author from different sources including IMF's IFS database, Standard &Poor's (2011), World Bank's World Economic Indicators database, and Egypt's Ministry of Finance (2011).

Table 4.2
Descriptive statistics of the Data for Israel (period 1980:1-2010:4)

	Observations	Mean	Standard deviation	Minimum	Maximum	Skewness	Kurtosis
Stock exchange index	124	44.3	46.2	.04	159.4	0.9	2.8
S&P Israel index	55	240.630	82.190	100	403.14	0.1	1.8
Portfolio investment (PI)	124	314.5	869.3	-1486.9	6359.5	3.8	24.3
Money supply (M2)	124	278.2	260.2	0.01	804.4	0.5	1.9
Oil Price	124	32.9	22.1	11.09	122.5	1.8	6.1
US T-bill	124	5.3	3.4	0.07	15.1	0.7	3.6
Inflation (WPI)	124	58.4	38.4	0.04	125.6	-0.1	1.8
Real GDP	124	108.6	39.9	54.52	187.8	0.3	1.8
Foreign Reserves (RES)	124	16.5	15.4	2.42	70.9	1.5	5.2
Dividend Yield	55	1.9	0.918	0	3.52	-0.481	2.5
Price/Earnings ratio	55	32.6	106.3	-517.12	472.3	-0.9	19.9

Source: Calculated by the author from different sources including IMF's IFS database, Standard &Poor's (2011), World Bank's World Economic Indicators database

Table 4.3
Descriptive statistics of the Data for Jordan (period 1999:1-2010:4)

	Observations	Mean	Standard deviation	Minimum	Maximum	Skewness	Kurtosis
Stock exchange index	48	4230.9	2538.7	1326.5	10490.8	0.4	2.0
S&P Jordan index	39	726.6	508.5	233.4	1703.7	0.5	1.7
Portfolio investment (PI)	48	19.9	140.2	-301.7	756.3	2.9	17.3
Money supply (M2)	48	2.8	1.1	1.5	5.1	0.7	2.1
Oil Price	48	49.5	26.8	11.1	122.5	0.8	2.9
US T-bill	48	2.6	1.9	0.07	6.0	0.1	1.6
Inflation (WPI)	48	105.8	22.2	84.2	146.9	0.7	1.9
Real GDP	48	1.8	0.4	1.1	2.6	0.2	1.7
Foreign Reserves (RES)	48	5.9	2.9	1.9	13.1	0.9	2.9
Dividend Yield	39	2.3	0.8	.62	4.1	-0.1	2.4
Price/Earnings ratio	39	23.1	12.6	11.4	57.1	1.6	4.6

Source: Calculated by the author from different sources including IMF's IFS database, Standard &Poor's (2011), World Bank's World Economic Indicators database, and Central of Jordan (2011).

Table 4.4
Descriptive statistics of the Data for Turkey (period 1986:1-2010:4)

	Observations	Mean	Standard deviation	Minimum	Maximum	Skewness	Kurtosis
Stock exchange index	100	45.3	61.1	0.0	230.5	1.3	3.4
S&P Turkey index	86	130932.2	155101.1	209.8	546572.1	1.1	2.9
Portfolio investment (PI)	97	800.3	2215.4	-6478	7762	-0.1	5.4
Money supply (M2)	100	99.6	162.3	0.0	587.3	1.6	4.1
Oil Price	100	33.0	24.6	11.1	122.5	1.6	4.9
US T-bill	100	4.1	2.2	0.1	8.5	-0.2	2.3
Inflation (WPI)	100	43.8	52.0	0.0	148.0	0.7	1.9
Real GDP	96	126.9	37.4	60.9	205.5	0.3	2.2
Foreign Reserves (RES)	100	25.9	24.6	1.2	80.7	0.9	2.5
Dividend Yield	86	2.7	1.6	0	8.5	0.8	3.9
Price/Earnings ratio	86	17.3	9.9	3.2	69.5	2.4	11.6

Source: Calculated by the author from different sources including IMF's IFS database, Standard &Poor's (2011), World Bank's World Economic Indicators database.

Table 5.1
Unit Root Tests Results with Levels (Mackinnon Approximate p-Values for z(T) Are in Parentheses)

Variable	Egypt				Israel			
	ADF		PP		ADF		PP	
	Trend	No trend	Trend	No trend	Trend	No trend	Trend	No trend
SE	-1.297	-1.312	-1.816	-1.518	-1.493	1.012	-1.879	0.675
	(0.888)	(0.623)	(0.696)	(0.524)	(0.831)	(0.994)	(0.665)	(0.989)
S&P index	-1.873	-0.679	-2.177	-0.946	-2.972	-1.538	-3.181*	-1.546
	(0.668)	(0.852)	(0.502)	(0.772)	(0.140)	(0.514)	(0.088)	(0.510)
PI	-4.892***	-4.935***	-4.899***	-4.943***	-11.916***	-9.921***	-11.932***	-10.251***
	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
M2	-1.028	5.403	-1.031	4.929	-2.072	5.035	-1.955	3.991
	(0.940)	(1.000)	(0.939)	(1.000)	(0.561)	(1.000)	(0.625)	(1.000)
OIL	-2.945	-1.097	-3.072	-1.100	-2.112	-1.040	-1.960	-0.851
	(0.148)	(0.716)	(0.112)	(0.715)	(0.539)	(0.738)	(0.623)	(0.803)
RES	-0.816	1.259	-1.051	0.489	3.343	5.843	1.857	3.990
	(0.964)	(0.996)	(0.936)	(0.984)	(1.000)	(1.000)	(1.000)	(1.000)
WPI	-1.395	1.279	-1.407	1.330	-2.723	-0.123	-3.019	-0.145
	(0.862)	(0.996)	(0.858)	(0.996)	(0.226)	(0.947)	(0.126)	(0.944)
USTBILL	-1.137	-0.458	-1.842	-1.139	-2.859	-2.027	-3.239*	-2.130
	(0.922)	(0.899)	(0.684)	(0.699)	(0.176)	(0.274)	(0.076)	(0.232)
RGDP	-4.022 ***	-0.071	-3.924 **	1.559	-2.545	1.225	-2.212	1.950
	(0.008)	(0.952)	(0.011)	(0.997)	(0.305)	(0.996)	(0.483)	(0.998)
P/E Ratio	-2.349	-2.178	-2.617	-2.426	-7.486***	-7.546***	-7.613***	-7.680***
	(0.407)	(0.214)	(0.271)	(0.134)	(0.000)	(0.000)	(0.000)	(0.000)
Dividend Yield	-2.810	-2.594*	-2.812	-2.660*	-2.351	-2.522	-2.407	-2.564
	(0.193)	(0.094)	(0.192)	(0.081)	(0.406)	(0.110)	(0.375)	(0.100)

Note: *, ** and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Table 5.1 (Continued)

Variable	Jordan				Turkey			
	ADF		PP		ADF		PP	
	Trend	No trend	Trend	No trend	Trend	No trend	Trend	No trend
SE	-1.500	-1.246	-1.947	-1.422	-0.438	1.776	-1.043	1.121
	(0.829)	(0.653)	(0.630)	(0.571)	(0.985)	(0.998)	(0.938)	(0.995)
S&P index	-2.056	-0.331	-2.331	-0.598	-1.439	0.886	-1.725	0.684
	(0.570)	(0.921)	(0.417)	(0.871)	(0.849)	(0.992)	(0.739)	(0.989)
PI	-4.000***	-3.046**	-3.802**	-3.093**	-6.497***	-6.170***	-6.405***	-6.084 ***
	(0.008)	(0.030)	(0.016)	(0.027)	(0.000)	(0.000)	(0.000)	(0.000)
M2	-1.652	0.912	-1.285	1.818	2.453	6.586	2.395	6.205
	(0.771)	(0.993)	(0.891)	(0.998)	(1.000)	(1.000)	(1.000)	(1.000)
OIL	-2.787	-1.465	-2.944	-1.472	-2.528	-0.942	-2.589	-0.898
	(0.201)	(0.550)	(0.148)	(0.547)	(0.314)	(0.773)	(0.284)	(0.788)
RES	-0.579	1.388	-0.238	1.936	-1.034	1.640	-1.179	1.393
	(0.980)	(0.997)	(0.990)	(0.998)	(0.939)	(0.998)	(0.914)	(0.997)
WPI	-1.647	1.263	-1.686	0.929	-1.582	3.810	-1.490	2.760
	(0.773)	(0.996)	(0.757)	(0.993)	(0.799)	(1.000)	(0.832)	(1.000)
USTBILL	-0.976	-0.618	-1.625	-1.250	-1.430	-0.623	-2.336	-1.367
	(0.947)	(0.866)	(0.782)	(0.651)	(0.852)	(0.865)	(0.414)	(0.597)
RGDP	-4.916***	-0.986	-4.731***	-0.497	-7.626***	-2.608*	-7.381***	-1.572
	(0.000)	(0.758)	(0.000)	(0.892)	(0.000)	(0.091)	(0.000)	(0.497)
P/E Ratio	-1.828	-1.531	-2.258	-1.868	-4.321***	-4.352***	-4.283***	-4.314***
	(0.691)	(0.518)	(0.457)	(0.347)	(0.002)	(0.000)	(0.003)	(0.000)
Dividend Yield	-4.337***	-2.925**	-4.329***	-2.957***	-4.470***	-4.148***	-4.342***	-4.053***
	(0.002)	(0.042)	(0.002)	(0.039)	(0.001)	(0.000)	(0.002)	(0.001)

Note: *, ** and *** represent significance at the 10%, 5%, and 1% levels, respectively

Table 5.2
Unit Root Tests Results for First Differences (Mackinnon Approximate p-Values for z(T) Are in Parentheses)

Variable	Egypt				Israel			
	ADF		PP		ADF		PP	
	Trend	No trend	Trend	No trend	Trend	No trend	Trend	No trend
SE	-4.913***	4.930***	-4.843***	-4.865***	-8.320***	-8.172***	-8.216***	-8.097***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
S&P index	-5.023***	-5.051***	-4.987***	-5.017***	-6.567***	-6.640***	-6.514***	-6.590***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PI	-10.132***	-10.205***	-10.453***	-10.515***	-19.455***	-19.514***	-29.744***	-29.610***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
M2	-6.835***	-4.440***	-6.843***	-4.505***	-9.473***	-7.797***	-9.554***	-8.084***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
OIL	-7.851***	-7.791***	-11.569***	-14.932***	-15.380***	-14.988***	-15.910***	-15.122***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
RES	-5.746***	-5.781***	-5.537***	-5.579***	-8.706***	-8.639***	-8.439***	-8.351***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
WPI	-4.621***	-4.299***	-4.663***	-4.337***	-7.009***	-6.156***	-7.200***	-6.317***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
USTBILL	-5.441***	-5.200***	-5.174***	-4.941***	-8.480***	-8.515***	-8.277***	-8.316***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
RGDP	-3.816***	-3.848***	-3.86***	-3.895***	-9.327***	-9.388***	-9.396***	-9.451***
	(0.015)	(0.002)	(0.013)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
P/E Ratio	-7.095***	-7.165***	-7.107***	-7.175***	-10.904***	-11.012***	-15.465***	-15.655***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Dividend Yield	-6.256***	-6.244***	-6.172***	-6.160***	-7.690***	-7.641***	-7.692***	-7.649***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Note: *** represents significance at the 1 percent level.

Table 5.2 (Continued)

Variable	Jordan				Turkey			
	ADF		PP		ADF		PP	
	Trend	No trend	Trend	No trend	Trend	No trend	Trend	No trend
SE	-4.155***	-4.171***	-4.147***	-4.175***	-7.773***	-7.542***	-7.789***	-7.586***
	(0.005)	(0.000)	(0.005)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
S&P index	-3.845**	-3.957***	-3.917**	-4.016***	-8.536***	-8.496***	-8.532***	-8.493***
	(0.014)	(0.001)	(0.011)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
PI	-6.756***	-7.201***	-8.280***	-8.774***	-11.780***	-11.893***	-13.317***	-13.416***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
M2	-10.872***	-10.790***	-11.306***	-10.852***	-9.654***	-9.098***	-9.682***	-9.193***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
OIL	-5.159***	-5.238***	-5.015***	-5.123***	-8.498***	-8.533***	-8.430***	-8.472***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
RES	-6.795***	-6.904***	-6.873***	-6.994***	-9.564***	-9.566***	-9.563***	-9.564***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
WPI	-6.925***	-6.396***	-6.925***	-6.480***	-6.095***	-4.692***	-5.940***	-4.448***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
RGDP	-7.726***	-7.817***	-18.471***	-18.900***	-9.945***	-10.000***	-24.259***	-24.566***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
P/E Ratio	-4.777***	-4.862***	-4.785***	-4.871***	-8.950***	-9.008***	-9.061***	-9.130***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Dividend Yield	-8.486***	-8.602***	-9.032***	-9.170***	-10.789***	-10.855***	-11.117***	-11.184***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Note: ** and *** represent significance at the 5%, and 1% levels, respectively.

Table 5.3
Unit Root Tests Results for Log Differences (First Differences of Log Levels), where Absolute First Differences Are Used
(Mackinnon Approximate p-Values for z(T) Are in Parentheses)

Variable	Egypt				Israel			
	ADF		PP		ADF		PP	
	Trend	No trend	Trend	No trend	Trend	No trend	Trend	No trend
SE	-5.856***	-5.647***	-5.852***	-5.650***	-8.813***	-8.011***	-8.782***	-8.082***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
S&P index	-5.032***	-5.004***	-5.081***	-5.052***	-6.976***	-6.996***	-6.965***	-6.985***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PI	-5.192***	-5.372***	-5.190***	-5.373***	-11.876***	-11.998***	-14.077***	-14.132***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
M2	-6.750***	-6.814***	-6.761***	-6.822***	-8.254***	-6.670***	8.462***	-6.815***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
OIL	-5.606***	-5.644***	-5.461***	-5.505***	-9.153***	-9.041***	-8.989***	-8.871***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
RES	-4.727***	-4.470***	-4.799***	-4.534***	-11.229***	-11.154***	-11.227***	-11.154***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
WPI	-5.740***	-5.594***	-5.558***	5.418***	-3.419***	-2.803***	-3.405***	-2.659***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.048)	(0.057)	(0.050)	(0.081)
RGDP	-8.145***	-8.184***	-17.658***	-14.932***	-15.157***	-15.221***	-16.908***	-16.992***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
P/E Ratio	-7.695***	-7.764***	-7.724***	-7.798***	-6.289***	-6.352***	-6.242***	-6.311***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Dividend Yield	-5.796***	-5.862***	-5.719***	-5.793***	-6.800***	-6.884***	-6.885***	-6.959***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Note: *** represents significance at the 1 percent level.

Table 5.3 (Continued)

Variable	Jordan				Turkey			
	ADF		PP		ADF		PP	
	Trend	No trend	Trend	No trend	Trend	No trend	Trend	No trend
SE	-4.155***	-4.171***	-4.147***	-4.175***	-7.773***	-7.542***	-7.789***	-7.586***
	(0.005)	(0.000)	(0.005)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
S&P index	-3.845**	-3.957***	-3.917**	-4.016***	-8.536***	-8.496***	-8.532***	-8.493***
	(0.014)	(0.001)	(0.011)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
PI	-6.756***	-7.201***	-8.280***	-8.774***	-11.780***	-11.893***	-13.317***	-13.416***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
M2	-10.872***	-10.790***	-11.306***	-10.852***	-9.654***	-9.098***	-9.682***	-9.193***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
OIL	-5.159***	-5.238***	-5.015***	-5.123***	-8.498***	-8.533***	-8.430***	-8.472***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
RES	-6.795***	-6.904***	-6.873***	-6.994***	-9.564***	-9.566***	-9.563***	-9.564***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
WPI	-6.925***	-6.396***	-6.925***	-6.480***	-6.095***	-4.692***	-5.940***	-4.448***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
RGDP	-7.726***	-7.817***	-18.471***	-18.900***	-9.945***	-10.000***	-24.259***	-24.566***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
P/E Ratio	-4.777***	-4.862***	-4.785***	-4.871***	-8.950***	-9.008***	-9.061***	-9.130***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Dividend Yield	-8.486***	-8.602***	-9.032***	-9.170***	-10.789***	-10.855***	-11.117***	-11.184***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Note: ** and *** represent significance at the 5%, and 1% levels, respectively

Table 5.4
Impulse Response Functions: Interdependence among MENA Exchange Markets

Market	Step	dlse_EGY	dlse_ISR	dlse_JOR	dlse_TUR
dlse_EGY	1	0.005	0.026	0.051	0.044
	2	0.009	0.002	0.017	0.007
	3	-0.015	-0.007	0.006	-0.004
dlse_ISR	1	0.001	0.000	-0.020	0.039
	2	-0.001	-0.007	-0.010	0.010
	3	-0.011	-0.010	-0.004	0.001
dlse_JOR	1	0.041	-0.003	0.020	-0.000
	2	0.022	0.000	0.013	0.009
	3	0.002	-0.000	0.005	0.002
dlse_TUR	1	-0.026	0.007	-0.017	0.017
	2	-0.015	-0.006	-0.008	-0.003
	3	0.001	-0.005	-0.001	-0.007

Table 5.5
Forecast Error Variance Decomposition:
Interdependence among MENA Stock Exchange Markets

Market	Step	dlse_EGY	dlse_ISR	dlse_JOR	dlse_TUR
dlse_EGY	1	0.361	0.131	0.264	0.076
	2	0.264	0.177	0.363	0.129
	3	0.244	0.157	0.353	0.122
dlse_ISR	1	0.087	0.438	0.000	0.280
	2	0.063	0.339	0.027	0.276
	3	0.057	0.305	0.031	0.261
dlse_JOR	1	0.101	0.002	0.585	0.013
	2	0.163	0.003	0.436	0.010
	3	0.171	0.002	0.411	0.012
dlse_TUR	1	0.000	0.119	0.030	0.349
	2	0.037	0.099	0.040	0.299
	3	0.044	0.090	0.041	0.269