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Causal Links among Stock Market Development Determinants: Evidence from Jordan

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Abstract

The stock market plays a crucial role in the growth of industry and trade, which eventually affects the economy. This paper studies the determinants of stock market development in Jordan using yearly time-series data (1978–2019). The autoregressive distributed lag approach is applied to examine co-integration, while the vector error correction model is employed to estimate (long-run and short-run) causal relationships. The results show that macroeconomic determinants such as gross domestic product, gross domestic savings, investment rate, credit to the private sector, broadest money supply, stock market liquidity, and inflation rate are important determinants of stock market development. These findings provide vital implications for policymakers in developed and emerging stock markets. First, economic development plays an imperative role in stock market development. Second, developing the banking sector is mandatory because it can significantly promote stock market development. Third, domestic investment is a significant determinant of stock market development, especially in emerging countries. However, it is vital to launch policies that lead to encourage investment and promote stock market development, and this could be done through (1) encouraging competition, (2) improving the institutional framework, and (3) removing trade blocks by establishing a mutual connection between foreign private investment entities and government authorities.

Keywords: Stock Market, ARDL, VECM, Jordan

JEL Classification Code: B22, C32, F63, G18

1. Introduction

Over the past five decades, equity markets across the world have witnessed successive developments. Equity markets help economies to build long-term investment projects through efficient utilization of capital. In principle, stock markets are expected to boost economic progress by increasing savings and raising the investment quality (Ahmed et al., 2021). However, the stock market is expected to operate efficiently by allowing long-term investment to be financed through individuals' funds. Basyariah et al. (2021), Rinosha and Mustafa (2021), Chen and Jin (2020), Pradhan et al. (2020), Skintzi (2019) and Levin and Zervos (1998) mentioned that stock market development plays a central role in predicting future economic growth.

This paper studies the macroeconomic determinants of stock market development in an emerging economy like Jordan. Specifically, it investigates the equilibrium and causal relationships among stock market development, gross domestic product, gross domestic savings, investment rate, credit to the private sector, broadest money supply, stock market liquidity, macroeconomic instability.

Whether the stock market promotes economic development has gained extensive attention in policy and academic discussion, but there are few theoretical and empirical research papers on this issue. This research paper will address the following two questions: (a) What is the welfare that stock markets provide to their economies? (b) What are the factors that highlight the expansion of the stock market? While the first question has recently gained significant attention from academic research, the second has not.

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This paper is structured as follows. In Section 2, the past studies have been reviewed. In Section 3, the data, methodology, and results analysis are explained. In Section 4 conclusions of the research paper are provided.

2. Literature Review

The association between equity market development and economic growth is mostly accepted and recognized (King & Levine, 1993; Goldsmith, 1969). A growing economy involves a growing equity market and efficient financial intermediation. Green and Jovanovic (1990) pointed out that there was positive feedback causality between stock market development and economic growth.

Adjasi and Biekpe (2006) examined the effect of equity market development on economic growth in 14 African countries using a dynamic panel data model. The results showed a positive relationship between stock market development and economic growth. The positive influence of equity market development on economic growth was significant for countries classified as upper-middle-income economies. Naceur et al. (2007) investigated the role of stock market development in economic growth using data from 12 Middle Eastern and North African region countries. The results found that saving rate, financial intermediary, and stock market liquidity were essential factors of stock market development. Billmeier and Massa (2009) assessed the macroeconomic determinants of equity market development in a panel of 17 emerging markets in the Middle East and Central Asia. The results showed that remittances and institutions had a positive and significant impact on stock market development.

Duca (2007) examined the role of stock market development on economic growth in five leading countries (i.e., Japan, Germany, the USA, the U.K., and France). The results showed that stock market development significantly influenced economic development. Caporale et al. (2009) applied vector error correction model (VECM) to examine the causal relationships between stock market development and economic growth in a sample of 10 European Union countries. The results found significant causal relationships between the variables. El-Nader and Alraimony (2013) examined the macroeconomic determinants of equity market development in Jordan over (the period 1990–2011). They employed VECM, and the results showed that money supply, total value traded, gross capital formation, consumer price index, credit to the private sector were significantly influenced stock market development. Evrim-Mandaci et al. (2013) studied the determinants of equity market development in advanced and emerging countries over (the period 1960–2007). The results showed that the banking sector's remittances, foreign direct investment, and credits affected stock market development.

3. Data and Methodology

3.1. Data

This paper focuses on the determinants of stock market development (SMD) defined as capitalization ratio (market capitalization as a share of gross domestic product, GDP) over (the period 1978–2019). The determinants of SMD that are used in this paper are GDP, gross domestic savings (GDS), investment rate (I.R.), credit to the private sector (CPS), broadest money supply (M3), stock market liquidity (SML), and macroeconomic instability (INF). The data were extracted from the World Bank, Development Indicators Database (https://data.worldbank.org/country/jordan). The definition of explanatory variables is discussed in Table 1 (see Bodie, Kane, & Marcus, 2008).

3.2. Methodology

This study employs the autoregressive distributed lag (ARDL) approach developed by Pesaran, Shin, and Smith (2001). The ARDL approach has several advantages above other co-integration models (Johansen & Juselius, 1990; Engle & Granger, 1987):

(1) It can be employed irrespective of whether the variables are $I(0)$, $I(1)$, or a combination of both (Pesaran & Pesaran, 1997).
(2) The ARDL model is statistically a more assertive approach to determine the co-integration relation in small samples than that of the Johansen and Juselius co-integration model (Pesaran & Shin, 1999).
(3) The error correction model (ECM) can be derived from ARDL through a simple linear transformation, which integrates short-run adjustments with long-run equilibrium without losing long-run information (Pesaran & Shin, 1999).

4. Empirical Results

The ARDL approach to co-integration involves two steps for approximating a long-run relationship. The first step is to examine the existence of a long-run relationship among all variables. If there is evidence of co-integration among variables, the second step is to estimate long-run and short-run relationships.

Table 1: Definition of Variables

Variable	Notation	Definition	Expected Sign
Gross domestic product	GDP Billions (J.D.)	Defined as the market value of final services and goods produced in a stated period	+
Gross domestic savings	GDS Billions (J.D.)	Is a GDP minus final consumption of expenditure	+
Investment rate	I.R. (%)	Is the ratio of gross fixed capital to gross disposable income	+
Credit to the private sector	CPS Billions (J.D.)	Is the domestic credit to the private sector divided by GDP to account for intermediary financial development	+
Broadest money supply	M3 Billions (J.D.)	Is the ratio of broad money supply M3 to GDP. Is a measure of the size of the banking sector concerning the economy	+
Stock market liquidity	SML Billions (J.D.)	Is the ratio of total value traded to GDP, and its measures the amount of stock transactions relative to the size of the economy	+
Macroeconomic instability	INF (%)	The inflation rate is the measurement of macroeconomic instability	−

Note: J.D. represents the Jordanian Dinar, the official currency of Jordan.

Table 2: Results of ADFGLS Test with Trends and Constants

Log Levels (Z_t) – I(0)		Log First Difference (Z_t) – I(1)		Outcome
Variable	ADFGLS stat	Variable	ADFGLS stat	I(d)
$LSMD_t$	−1.6050	$\Delta LSMD_t$	−4.3543*	1(1)
$LGDP_t$	−1.6275	$\Delta LGDP_t$	−6.2332**	1(1)
$LGDS_t$	−1.7067	$\Delta LGDS_t$	−5.4567*	1(1)
LIR_t	−1.9091	ΔLIR_t	−6.9876**	1(1)
$LCPS_t$	−1.5043	$\Delta LCPS_t$	−7.2145***	1(1)
$LM3_t$	−1.5469	$\Delta LM3_t$	−8.2132***	1(1)
$LSML_t$	−1.8078	$\Delta LSML_t$	−7.5462***	1(1)
$LINF_t$	−1.7883	$\Delta LINF_t$	−8.1023***	1(1)

Notes: (1) *L* denotes the Log transformation. (2) Significant at: (10% (*)),(5% (**)), and (1% (***)) levels.
Source: Author's estimation using the EViews software package, version 12.

The first step is to implement a unit root test to ensure that none of the variables are integrated at an order of $I(2)$ or further. The Augmented Dickey-Fuller generalized least squares (ADFGLS) test is employed to check stationarity levels. The results in Table 2 shows that all variables are stationary at the first difference (i.e., integrated at $I(1)$). Thus, the ARDL approach is applied to examine co-integration and to estimate long-run and short-run relationships. The estimation of the long-run coefficients of the ARDL approach is presented in equation (1), and the measure of the short-run coefficients of the ARDL approach is introduced in equation (2).

$$\begin{bmatrix} \Delta LSMD_t \\ \Delta LGDP_t \\ \Delta LGDS_t \\ \Delta LIR_t \\ \Delta LCPS_t \\ \Delta LM3_t \\ \Delta LSML_t \\ \Delta LINF_t \end{bmatrix} = \begin{bmatrix} \beta_{1t} \\ \beta_{2t} \\ \beta_{3t} \\ \beta_{4t} \\ \beta_{5t} \\ \beta_{6t} \\ \beta_{7t} \\ \beta_{8t} \end{bmatrix} + \sum_{i=1}^{k=1} \begin{bmatrix} \lambda_{11i} & \lambda_{12i} & \lambda_{13i} & \lambda_{14i} & \lambda_{15i} & \lambda_{16i} & \lambda_{17i} & \lambda_{18i} \\ \lambda_{21i} & \lambda_{22i} & \lambda_{23i} & \lambda_{24i} & \lambda_{25i} & \lambda_{26i} & \lambda_{27i} & \lambda_{28i} \\ \lambda_{31i} & \lambda_{32i} & \lambda_{33i} & \lambda_{34i} & \lambda_{35i} & \lambda_{36i} & \lambda_{37i} & \lambda_{38i} \\ \lambda_{41i} & \lambda_{42i} & \lambda_{43i} & \lambda_{44i} & \lambda_{45i} & \lambda_{46i} & \lambda_{47i} & \lambda_{48i} \\ \lambda_{51i} & \lambda_{52i} & \lambda_{53i} & \lambda_{54i} & \lambda_{55i} & \lambda_{56i} & \lambda_{57i} & \lambda_{58i} \\ \lambda_{61i} & \lambda_{62i} & \lambda_{63i} & \lambda_{64i} & \lambda_{65i} & \lambda_{66i} & \lambda_{67i} & \lambda_{68i} \\ \lambda_{71i} & \lambda_{72i} & \lambda_{73i} & \lambda_{74i} & \lambda_{75i} & \lambda_{76i} & \lambda_{77i} & \lambda_{78i} \\ \lambda_{81i} & \lambda_{82i} & \lambda_{83i} & \lambda_{84i} & \lambda_{85i} & \lambda_{86i} & \lambda_{87i} & \lambda_{88i} \end{bmatrix} \begin{bmatrix} LSMD_{t-1} \\ LGDP_{t-1} \\ LGDS_{t-1} \\ LIR_{t-1} \\ LCPS_{t-1} \\ LM3_{t-1} \\ LSML_{t-1} \\ LINF_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \\ \varepsilon_{7t} \\ \varepsilon_{8t} \end{bmatrix} \quad (1)$$

The F-statistics can be compared against the upper and lower bounds' critical values (Pesaran & Pesaran, 2009). If the F-statistics value is higher than the upper bound critical value, then the null hypothesis, H0, is rejected, and the long-run relationships exist among variables. If the F-statistics value is lesser than the lower bound critical amount, then the H0 is accepted, and the long-run relationships do not exist among variables. If the F-statistics values are observed to be within the lower and upper bounds, then the decision is inconclusive.

$$\begin{bmatrix} \Delta LSMD_t \\ \Delta LGDP_t \\ \Delta LGDS_t \\ \Delta LIR_t \\ \Delta LCPS_t \\ \Delta LM3_t \\ \Delta LSML_t \\ \Delta LINF_t \end{bmatrix} = \begin{bmatrix} \beta_{1t} \\ \beta_{2t} \\ \beta_{3t} \\ \beta_{4t} \\ \beta_{5t} \\ \beta_{6t} \\ \beta_{7t} \\ \beta_{8t} \end{bmatrix} + \sum_{i=1}^{k=1} \begin{bmatrix} \alpha_{11i} & \alpha_{12i} & \alpha_{13i} & \alpha_{14i} & \alpha_{15i} & \alpha_{16i} & \alpha_{17i} & \alpha_{18i} \\ \alpha_{21i} & \alpha_{22i} & \alpha_{23i} & \alpha_{24i} & \alpha_{25i} & \alpha_{26i} & \alpha_{27i} & \alpha_{28i} \\ \alpha_{31i} & \alpha_{32i} & \alpha_{33i} & \alpha_{34i} & \alpha_{35i} & \alpha_{36i} & \alpha_{37i} & \alpha_{38i} \\ \alpha_{41i} & \alpha_{42i} & \alpha_{43i} & \alpha_{44i} & \alpha_{45i} & \alpha_{46i} & \alpha_{47i} & \alpha_{48i} \\ \alpha_{51i} & \alpha_{52i} & \alpha_{53i} & \alpha_{54i} & \alpha_{55i} & \alpha_{56i} & \alpha_{57i} & \alpha_{58i} \\ \alpha_{61i} & \alpha_{62i} & \alpha_{63i} & \alpha_{64i} & \alpha_{65i} & \alpha_{66i} & \alpha_{67i} & \alpha_{68i} \\ \alpha_{71i} & \alpha_{72i} & \alpha_{73i} & \alpha_{74i} & \alpha_{75i} & \alpha_{76i} & \alpha_{77i} & \alpha_{78i} \\ \alpha_{81i} & \alpha_{82i} & \alpha_{83i} & \alpha_{84i} & \alpha_{85i} & \alpha_{86i} & \alpha_{87i} & \alpha_{88i} \end{bmatrix} \begin{bmatrix} \Delta LSMD_{t-1} \\ \Delta LGDP_{t-1} \\ \Delta LGDS_{t-1} \\ \Delta LIR_{t-1} \\ \Delta LCPS_{t-1} \\ \Delta LM3_{t-1} \\ \Delta LSML_{t-1} \\ \Delta LINF_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \\ \varepsilon_{7t} \\ \varepsilon_{8t} \end{bmatrix} \quad (2)$$

Table 3 reports the results of the calculated F-statistics values. The H0 of no co-integration is rejected for all variables since the calculated F-statistics values are more significant than the upper bound critical values. After identifying co-integration relationships among variables, this paper preceded to estimate causal relationships among variables.

The ARDL approach tests the existence or absence of co-integration relationship among variables, but not the direction of causality. If the co-integration does not exist among variables, then the Granger causality test specification will be a vector autoregressive (VAR) model in the first difference (Mugableh & Oudat, 2018; Bekhet & Mugableh, 2016). Nevertheless, if the co-integration has existed among variables, then the causal relationships among variables are examined using VECM as in equation (3).

$$\begin{bmatrix} \Delta LSMD_t \\ \Delta LGDP_t \\ \Delta LGDS_t \\ \Delta LIR_t \\ \Delta LCPS_t \\ \Delta LM3_t \\ \Delta LSML_t \\ \Delta LINF_t \end{bmatrix} = \begin{bmatrix} \beta_{1t} \\ \beta_{2t} \\ \beta_{3t} \\ \beta_{4t} \\ \beta_{5t} \\ \beta_{6t} \\ \beta_{7t} \\ \beta_{8t} \end{bmatrix} + \sum_{i=1}^{k=1} \begin{bmatrix} \alpha_{11i} & \alpha_{12i} & \alpha_{13i} & \alpha_{14i} & \alpha_{15i} & \alpha_{16i} & \alpha_{17i} & \alpha_{18i} \\ \alpha_{21i} & \alpha_{22i} & \alpha_{23i} & \alpha_{24i} & \alpha_{25i} & \alpha_{26i} & \alpha_{27i} & \alpha_{28i} \\ \alpha_{31i} & \alpha_{32i} & \alpha_{33i} & \alpha_{34i} & \alpha_{35i} & \alpha_{36i} & \alpha_{37i} & \alpha_{38i} \\ \alpha_{41i} & \alpha_{42i} & \alpha_{43i} & \alpha_{44i} & \alpha_{45i} & \alpha_{46i} & \alpha_{47i} & \alpha_{48i} \\ \alpha_{51i} & \alpha_{52i} & \alpha_{53i} & \alpha_{54i} & \alpha_{55i} & \alpha_{56i} & \alpha_{57i} & \alpha_{58i} \\ \alpha_{61i} & \alpha_{62i} & \alpha_{63i} & \alpha_{64i} & \alpha_{65i} & \alpha_{66i} & \alpha_{67i} & \alpha_{68i} \\ \alpha_{71i} & \alpha_{72i} & \alpha_{73i} & \alpha_{74i} & \alpha_{75i} & \alpha_{76i} & \alpha_{77i} & \alpha_{78i} \\ \alpha_{81i} & \alpha_{82i} & \alpha_{83i} & \alpha_{84i} & \alpha_{85i} & \alpha_{86i} & \alpha_{87i} & \alpha_{88i} \end{bmatrix} \begin{bmatrix} \Delta LSMD_{t-1} \\ \Delta LGDP_{t-1} \\ \Delta LGDS_{t-1} \\ \Delta LIR_{t-1} \\ \Delta LCPS_{t-1} \\ \Delta LM3_{t-1} \\ \Delta LSML_{t-1} \\ \Delta LINF_{t-1} \end{bmatrix} + \begin{bmatrix} \eta_{1t} \\ \eta_{2t} \\ \eta_{3t} \\ \eta_{4t} \\ \eta_{5t} \\ \eta_{6t} \\ \eta_{7t} \\ \eta_{8t} \end{bmatrix} \left[ECT_{t-1} \right] + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \\ \varepsilon_{7t} \\ \varepsilon_{8t} \end{bmatrix} \quad (3)$$

Table 3: Results of the Calculated *F*-Statistics Test Values

Dependent Variable	AIC Lag	Calculated *F*-Statistics Value	Outcome
FLSMD (LGDP, LGDS, LIR, LCPS, LM3, LSML, LINF)	3	41.212***	Co-integrated
FLGDP (LSMD, LGDS, LIR, LCPS, LM3, LSML, LINF)	3	36.881**	Co-integrated
FLGDS (LSMD, LGDP, LIR, LCPS, LM3, LSML, LINF)	3	32.511*	Co-integrated
FLIR (LSMD, LGDP, LGDS, LCPS, LM3, LSML, LINF)	3	40.115***	Co-integrated
FLCPS (LSMD, LGDP, LGDS, LIR, LM3, LSML, LINF)	3	37.897**	Co-integrated
FLM3 (LSMD, LGDP, LGDS, LIR, LCPS, LSML, LINF)	3	33.110*	Co-integrated
FLSML (LSMD, LGDP, LGDS, LIR, LCPS, LM3, LINF)	3	34.123**	Co-integrated
FLINF (LSMD, LGDP, LGDS, LIR, LCPS, LM3, LSML)	3	41.234***	Co-integrated
Critical values of Pesaran and Pesaran (2009)	*I*(0)		*I*(1)
1% Significance level	28.979		39.697
5% Significance level	23.432		33.715
10% Significance level	20.611		30.443

Notes: (1) Significant at: (10% (*)), (5% (**)), and (1% (***)) levels. (2) The lag length is estimated using the Akaike Information Criterion (AIC).
Source: Author's estimation using Microfit software package - version 5.5.

Table 4: Causality Test Results Based on VECM (Dependent Variable is $\Delta LSMD_t$)

Variable	Short-Run Wald Test–*F*-Statistics		Diagnostic Tests	
	Coefficient	*P*-Value	Test	Value
$\Delta LGDP_t$	0.501	0.001***	R^2	0.82
$\Delta LGDS_t$	0.313	0.043**		
ΔLIR_t	0.441	0.001***	*F*-statistics	580 (0.00)
$\Delta LCPS_t$	0.345	0.002***		
$\Delta LM3_t$	0.476	0.001***		
$\Delta LSML_t$	0.521	0.001***		
$\Delta LINF_t$	−0.301	0.048**		
	Long-Run *t*-Statistics			
	Coefficient	*P*-Value	Normality test, Jarque Bera	1.551 (0.211)
ECT_{t-1}	−0.652	0.001***		

Notes: (1) Significant at: (10% (*)), (5% (**)), and (1% (***)) levels. (2) Feedback means that the causal relationships run in both directions (i.e., long-run and short-run).
Source: Author's estimation using EViews software package, version 12.

The VECM allows capturing both long-run and short-run Granger causality. The long-run causality can be estimated through the *t*-statistics on the lagged error correction term (η_{it}). In contrast, the short-run causality can be assessed through the *F*-statistics on the lagged explanatory variables (α_{ijt}).

Table 4 reported the VECM Granger causality test results in the long-run and short-run, where stock market development is a dependent variable. Starting with the long-run consequences, the estimated coefficient of the lagged error correction (−0.652) is statistically significant at the 1% level. Thus, there is a long-run causality running from gross domestic product, gross domestic savings, investment rate, credit to the private sector, broadest money supply, stock market liquidity, and inflation rate to stock market development. Checking out the short-run side, there is a causality running from all variables to stock market development. These results are the same to the results achieved for the USA, the UK, Germany, France, and Japan (Duca, 2007), European Union countries (Boubakari & Jin, 2010; Caporale, Rault, Sova, & Sova, 2009), advanced and emerging countries (Tsaurai, 2018; Abdelbaki, 2013; Evrim-Mandaci, Aktan, Kurt-Gumus, & Tvaronaviciene, 2013; Yartey, 2008).

The growth of gross domestic product has a positive impact on financial market development, which encompasses the stock market's development. The gross domestic savings consist of savings of household, private corporate, and public sectors. The growth of gross domestic savings may help keep up high growth rates through its effect on investment. The growth of investment rates would speed up the growth of stock market development. The growth of domestic credit to the private sector increases the financial resources provided to the private sector, which accelerates the growth of stock market development. The growth of the broadest money supply typically lowers interest rates, which, in turn, generates more investment, especially in financial assets and stock markets. The growth of stock market liquidity enables investors to sell large amounts of shares, which accelerates the growth of stock market development. The inflation rate has a deceptive effect on stock market development. The rise in the price level of goods and services reduces the purchasing power, which in turn declines revenues and profits, and the economy and a stock market, slowed down.

5. Conclusion

The current paper investigates the macroeconomic determinants of stock market development in Jordan. It employs different models and annual time series data over (the period 1978–2019). The Augmented Dickey-Fuller generalized least squares test results show that all variables are stationary at the first difference (i.e., integrated at I(1)). The results of the ARDL bounds testing approach confirm the existence of co-integration among variables. The empirical analysis of the VECM Granger causality shows two exciting developments. First, there is a long-run causality running from gross domestic product, gross domestic savings, investment rate, credit to private sector, broadest money supply, stock market liquidity, and inflation rate to stock market development. Second, there is a short-run causality running from all variables to stock market development.

The findings of this paper provide vital implications for the policymakers in developed and emerging stock markets. First, economic development plays a crucial role in stock market development. It is essential to launch policies to foster the growth of the economy. Second, developing the banking sector is mandatory because it can significantly promote stock market development. Third, domestic investment is a significant determinant of equity market development, especially in emerging countries. It is vital to launch policies that lead to encourage investment and promote stock market development. This could be done through:

(1) Encouraging competition.
(2) Improving the institutional framework.
(3) Removing trade blocks by establishing a mutual connection between foreign private investment entities and government authorities.

Future research could expand this paper by considering quality effects on stock market development. Another future research could compare Jordan's stock market with developed stock markets.

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