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# Assessing the Impact of Syrian Refugee Influx on the Jordanian Stock Exchange Market

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**Abstract:** The past decade has witnessed significant turmoil and political conflicts in several Middle Eastern countries, such as Egypt, Syria, and Libya, called the Arab Spring. These revolutions did not only affect the countries mentioned previously; their neighboring countries were also directly affected. This study explores the impact of the Syrian refugee influx on the stock exchange market of one of its neighboring countries, namely Jordan. The Syrian civil war represents a recent catastrophic event that has resulted in over three million refugees migrating to various countries worldwide. The main objective of this paper is to examine the effect of the Syrian war on Jordan's stock exchange market. The study utilizes the stock exchange indices as indicators of the performance of the exchange market, including Financials, Services, Industries, and General indices as dependent variables, and seven dummy variables are defined as representatives of the main events occurring in the Syrian civil war during the period 2011–2018 as independent variables. Multiple statistical analysis techniques, including correlation coefficients, error functions, and stepwise regression, are employed to analyze the selected variables. The findings reveal an inverse influence of the Syrian war on Jordan's stock market. These findings can potentially enhance the development of prediction models for stock indices in Jordan and other countries by incorporating relevant variables.

**Keywords:** Syrian civil war; Jordan's stock market; stepwise method; linear regression; market-capitalization-weighted index; correlation analysis



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## 1. Introduction

Since the end of World War II, both developed and developing nations have grappled with the escalating levels of forced displacement. According to the United Nations High Commissioner for Refugees (UNHCR), more than 28 million individuals live as refugees. Among them, the Middle East and North African (MENA) region, which have been beset by political conflicts, has witnessed a significant surge in forced migration, prompting many people to seek asylum. Consequently, MENA countries such as Jordan, Turkey, Lebanon, and Iraq have hosted approximately 46% of these refugees, as reported by the United Nations High Commissioner for Refugees (Alrababa'h et al. 2019).

Since 2011, one of the main points of turmoil in the Middle East has been centered in Syria. The conflict in Syria has led to a serious humanitarian crisis that prompted governments in neighboring countries, including Jordan, Turkey, Lebanon, and Iraq, to host refugees. This has substantially affected neighboring countries' macroeconomic, social, political, and environmental aspects (Fakih and Ibrahim 2016). This study concentrates on the effect of Syrian refugees on Jordan's economy. Jordan can be defined as a developing upper-middle-income economy, small in size, with weak natural resources, especially in terms of water and oil supplies. Politically unstable neighboring countries surround it,

and it relies heavily on public debt, remittances, foreign aid, and foreign direct investment. Moreover, Jordan has faced a combination of external economic challenges, such as the financial crisis named the Great Recession (2008–2009) and the massive consequences of the Arab Spring since 2011. Hence, all of these attributes pose challenges to Jordan's economy, namely, leveraging good economic activities to deal with all of the drawbacks in the domestic economy.

However, researchers and policy makers have recently been interested in studying the impact of geopolitical risks (such as wars, terrorist attacks, and political tension) on stock market returns. Geopolitical risks play a crucial role in shaping investment decisions as they directly influence economic growth and the stability of financial markets. The Middle East and North African region have experienced significant political tension and upheaval since the onset of the Arab Spring in 2011 (El-Chaarani 2015). This turmoil can be defined as a collection of strikes against the governments of specific Arab countries to demand these governments improve the economic conditions, change the regulations, and improve life in those countries. The Arab Spring and instability in the region have obligated thousands of people to immigrate to nearby countries, forcing thousands of people to leave their own countries for others in search of safety, medical treatment, work, and investment. Thus, Jordan is one of the countries strongly affected by the influx of refugees, especially from Syria, since it is a neighboring country. Therefore, the issue of Syrian refugees is considered one of the main challenges that the Jordanian government has faced since 2011.

The news of unstable conditions in the region is defined as one of the types of information that has a direct impact on the performance of financial markets according to efficiency theory, initiated by Eugene Fama in 1970. This theory indicates three forms—weak, semi-strong, and strong—and that the security's price reflects historical, public, or private information on the security's price, respectively. The theory states that all information concerning political events such as wars, terrorist attacks, and elections directly affects the financial stock market performance. Accordingly, Brown (2018) provided a theoretical framework to understand investors' behavior in financial markets based on the external events in an uncertain situation generated by unexpected events such as political shocks. They found that investors are generally assumed to overreact more to bad than good news.

Moreover, various studieshave been conducted by domestic and international institutions on the effect of the Syrian war on the hosting country's economy. For example, Elsayed and Helmi (2021) investigated the impact of geopolitical risk (GPR) on return and volatility in the countries of the Middle Eastern and North African (MENA) region. They employed an ADCC-GARCH model and a spillover approach for their analysis. The GPR index is used to capture associated risks (wars, terrorist acts, and political tensions), and their results highlight that the GPR does not contribute to the ramifications of returns on financial markets in the MENA region. Harris (2019) studied the impact of instability and the Syrian civil war on an important sector, namely, Jordan's stock market. The results indicated that Jordan's stock market performed better before the Syrian civil war. Alshoubaki and Harris (2018) studied the impact of Syrian refugees on Jordan's economy, as Jordan hosted around 1.2 million Syrian refugees. The study revealed that the increasing number of refugees added more pressure on social services and infrastructure. In addition, David et al. (2018) investigated the effect of the massive increase in workers caused by the Syrian civil war in Lebanon. They found that the arrival of Syrian refugees positively impacted on growth. Meanwhile, Rother et al. (2016) studied the impact of the Syrian war on different Arab countries, including Jordan, Syria, Libya, and Lebanon. The analysis revealed a direct impact of the Syrian civil war on Arab countries, characterized by reduced trade with Syria, Turkey, and Europe.

Moreover, there was a massive influx of Syrian refugees into Jordan. El-Chaarani (2015) analyzed the influence of political news announcements in Lebanon on the returns and volatility of the Beirut Stock Exchange (BSE) from 2005 to 2014. By applying ARCH, GARCH, and EGARCH models, the study revealed that favorable political news positively

and significantly impacted on BSE returns. In contrast, negative political news had a negative impact. In addition, both types of political news led to an increase in volatility.

Consequently, this study aims to answer several questions, including:

- Does the Syrian war affect Jordan's stock market?
- Which event(s) has/have the highest impact on the sub-sectors indices available in Jordan's stock market?

Moreover, our contributions to this work are as follows:

- Analysis of the impacts of various events related to the Syrian civil war and the influx of Syrian refugees on Jordan's stock exchange market performance.
- Identification of the key events that impacted on Jordan's General, Financials, Services, and Industries stock indices.
- Develop linear regression models that can predict the behavior of the Jordanian stock based on collected data and other Syrian variables.

To answer the previous questions and achieve the contributions of the research, the methodology adopted by this study is divided into three phases, namely correlation analysis, creating Syrian war dummy variables derived from Syrian events, and utilizing stepwise multiple linear regression to select the most significant events on the Jordanian stock market. In addition, long-term data are applied to reach robust conclusions on such an important topic that affects all sectors, covering an updated period from 2008 to 2018. The main three sub-indices include; Financials, Services, and Industries, besides the General stock index for the Amman Stock Exchange Index (ASEI).

The organization of this study starts with a review of the literature in Section 2. Section 3 explains the timeline of the Syrian war. Then, Section 4 explains the Amman stock market indices. Section 5 presents the study's methodology. Section 6 analyzes the collected data to understand the impact of war on the main indices. Finally, Section 6 draws the conclusion of the study.

## 2. Literature Review

Suleman (2012) and Schwert (1989) confirmed the theory of Brown (2018) and pointed out that a political event is a source of volatility in stock markets for different countries. The results indicated that bad news led to more volatility and lower return level, while good news led to the lowest volatility and highest return. La Porta et al. (1998) indirectly confirmed the impact of the political environment on the performance of corporate firms and the financial markets. Similarly, Barro (1991) found that political instability negatively affected the economic indicators in 98 different countries around the world.

In Zetter's (2012) findings, it was concluded that governments often prioritize highlighting the drawbacks and financial burdens of hosting refugees. However, the author puts forward the argument that refugees have the potential to enhance the host economy's productive capacity by fostering increased consumption, as measured by GDP. Conversely, Baez (2011) highlighted that developing nations that experience an abrupt influx of refugees from neighboring countries may encounter the challenge of overpopulation. This, in turn, can intensify competition for the limited available resources. De Groot (2010) notes that neighboring countries bear the consequences of conflict spillover when hosting refugees, adversely affecting economic growth due to the destruction of productive employment.

Some studies were interested in investigating the effect of the Syrian influx on unemployment levels in the host countries such as Alrefai (2021) who investigated the impact of refugees on real per capita income, per capita government spending, and unemployment. The study's findings indicated the absence of a causal relationship between the influx of refugees and the unemployment rate, as well as per capita income and per capita government spending. Al-Dalahmeh and Dajnoki (2021) studied the effect of the Syrian civil war on Jordan's economy from the labor market's perspective. Their main findings supported that Syrian refugees have more employment opportunities in the labor market, which increased the unemployment rate among Jordanians and had a detrimental impact

on average wages. Hence, the level and quality of education are affected negatively. In addition, Esen and Binatlı (2017) studied the impact of both the Syrian war and new rules and regulations that were applied in the Turkish economy (e.g., refugee work permits) on the unemployment levels for the period 2004–2016 in 26 regions. The results supported that Syrian refugees increased the unemployment rate; and had a negative effect on Turkish labor. In the studies of Ceritoglu et al. (2017) and Tümen (2016) in Turkey, they used household survey data to compare labor market outcomes before and after the refugee influx. Their main findings supported that the Syrian refugee influx increased the unemployment rate. Tümen (2016) reported a negative effect of the Syrian refugees influx on the prices of goods and services; on the other hand, a positive effect on housing rents was reported. Both Fakih and Ibrahim (2016) and Stave and Hillesund (2015) studied the impact of Syrian refugees on Jordan's labor market; they concluded that the unemployment and competition rate increased after the war for existing jobs, and there was an overall deterioration in working conditions leading to a work deficit as well.

Nevertheless, many of the studies in this field have specifically focused on the impact of the Syrian civil war on both Jordanian and Turkish cases, through investigating the impact of refugees on different vital sectors in the economy, encompassing; education (Assaad et al. 2018; Krafft et al. 2018; Bataineh and Montalbano 2018; Younes and Morrice 2019); health (Dator et al. 2018; Hosten et al. 2018; Dhaini et al. 2019; Kheirallah et al. 2019; Wells et al. 2019); and the economy (Alrababa'h et al. 2019; Fallah et al. 2019; Wagner 2019). Hence, most of the studies previously mentioned have concentrated on the challenges placed on many aspects related to macroeconomic fundamentals, health, and education in countries hosting refugees. Thus, this study concentrates on shedding light on another essential aspect by investigating the effect on the microeconomic level by studying the impact of the Syrian civil war on Jordan's stock market indices. This study showed significant results due to the global concern surrounding refugees and the potential consequences of hosting them in neighboring countries. However, the literature on the effects of forced migration on various aspects of the economy, social, and political, is still relatively undeveloped and limited. Hence, this study aims to investigate the effect of Syrian refugees' influx on the financial market in Jordan.

Furthermore, there are studies that applied their methodologies to multiple economic aspects of the affected neighboring countries; for example; Ianchovichina and Ivanic (2014) examined the economic impact of the Syrian war on six countries: Egypt, Iraq, Jordan, Lebanon, Syria, and Turkey. The findings revealed that the war disrupted regional trade, led to a decline in economic growth, and increased unemployment levels in the studied countries. Sab (2014) studied the economic impact of Syrian conflicts on its neighbors involving; Jordan, Syria, and Lebanon. The conclusions indicated that high inflation, contraction in economic growth, and large deficits in both fiscal and current accounts have weakened the neighboring countries' financial systems. However, in the case of Jordan's economy specifically and the challenges that Jordan has been facing since the beginning of the conflict in the region, Lozi (2013) explored the effects of Syrian and Iraqi refugees on Jordan, taking into account factors such as foreign direct investment and food pricing. The results indicated that the presence of refugees led to an increase in food prices and impacted the national budget, resulting in an expansionary budget in 2012.

Additionally, there was an increase in government-subsidized fuel and water consumption in Jordan. The Economic and Social Council summarized the main costs and benefits of the Syrian refugees hosted in Jordan; and found that the major cost is the increased pressure by refugees on the domestic labor market, infrastructure, and public services. For the benefits, it included a positive effect on Gross Domestic Product (GDP) levels caused by both the contributions in economic sectors and being one of the main sources of foreign investments. Another study by Olwan and Shiyab (2012) aimed to qualitatively explore the social, economic, and legal circumstances of Syrian refugees residing in Jordan. Their study acknowledged the hosting role played by the government in providing immediate relief to Syrian refugees. It emphasizes the difficulties encountered by the Jordanian government in

crucial areas such as healthcare, housing, and education and underscored the necessity for financial assistance.

Furthermore, numerous researchers have directed their attention toward comprehending the influence of various events on stock market indices across different countries, employing diverse methodologies. Al-Najjar et al. (2022a) estimated the stock indices in Gulf countries by considering Ramadan as studied variable. The study showed that Ramadan has a strong relationship with stock indices in some Gulf countries, and in other countries, there is no effect. Al-Najjar et al. (2022b) conducted a study to enhance stock prediction in Jordan by employing a feature selection method that incorporating stock indices. This approach aims to identify the most significant variables that can improve the prediction accuracy. The results showed that using feature selection will improve the performance of the stock market prediction. On the other hand, Al-Najjar et al. (2022c) studied the effect of the air quality index on the stock index movement using machine-learning models. The results indicated an effect between the Saudi stock index movement and PM10, AQI, and O3 pollutants.

## 3. Syrian War Timeline

The Syrian civil war involves several international players from different countries and organizations (i.e., USA, Russia, and Iran). It was primarily between the official Syrian government, unofficial armed forces, Islamic groups, and other subgroups created from divisions of the official army. The war officially started in 2011 and has continued until the present. Numerous events and peace initiatives have been launched during this time. To simplify the process of reviewing the main events that took place during the Syrian war from 2011 to 2018, it is more convenient to divide it into chronological phases, including:

1. Protests and Intifada (March–July 2011) (Omri 2012);
2. Early armed rebellion (July 2011–April 2012) (Landis 2011; Omri 2012);
3. Escalation of the fighting (2012–2013) (Chulov 2013; Davy 2014)
4. The Rise of Islamic Groups (January–September 2014) (Schwartz 2014; Guthrie 2015);
5. US Intervention, Rebel Group Attacks (September 2014–September 2015) (Mazzetti et al. 2017);
6. The Syrian–American conflict, areas of de-escalation, breaking the siege of Deir Ezzor (April–December 2017) (Avenäs 2017);
7. Army advance in northern Hama and Ghouta, Turkish intervention in Afrin (January–March 2018) (Brown 2018);
8. Army advance in the south, US-led airstrikes (April–August 2018) (Al Jazeera 2018).

Since each phase includes numerous events and activities that are considered beyond our main concern in this study and also for brevity, only the period of the phase is included in the analysis. For extra information on the Syrian war and its phases, many literature reviews and reports have included the full details, such as Burns (2019), Lesch (2019), and Tucker (2019).

## 4. Amman Stock Market Indices

The market indices of the Amman Stock Exchange (ASE) are divided into two major categories: the unweighted index and the weighted index. Both indices share the same list of stocks, and every year the constitutents of all indices are calculated at the end of the year to determine the most effective firms in the market. The indices are categorized based on the sector covered by each index, including the banking, insurance, services, and industrial sectors. ASE combined all of the sub-indices into four main indices that reflect the performance on various levels for each of the three major sectors and the market. The main indices in ASE are; Financials, Services, Industries, and the General index. In other words, each index includes the following sectors: the Financial index includes the banking and insurance sectors, the Services index covers the firms in the service sector, the Industries index comprises all the firms in Jordan's industrial sector, and the General index includes all sectors listed at the exchange. Regarding the General index of ASE, it

reflects the performance of the largest and most influential 100 firms from both the First and Second Markets. While the remaining indices, including Financials, Services and Industries, display the performance of all the firms based on the respective sector of each index. Accordingly, the General index and three sub-indices of the Amman Stock Exchange represent all the firms listed at Jordan's stock market. Table 1 represents the statistical description of the Financials, Services, Industries and General indices in Jordan's stock market from 2008 to 2018.

**Table 1.** Descriptive analysis of Financials, Services, Industries, and General Indices.

| Metrics | Financials | Services | Industries | General Index |
|---|---|---|---|---|
| Mean | 3024.462 | 1793.193 | 2344.509 | 2337.213 |
| Median | 2881.000 | 1659.900 | 2133.000 | 2139.700 |
| Mode | 2875.800 | 1625.300 | 2116.600 | 2129.000 |
| Standard Deviation | 706.7279 | 386.5841 | 671.2242 | 581.6383 |
| Sample Variance | 499,464.3 | 149,447.3 | 450,541.9 | 338,303.1 |
| Kurtosis | 5.162510 | 5.455794 | 8.493455 | 6.487163 |
| Skewness | 2.353500 | 2.232712 | 2.732706 | 2.618843 |
| Range | 3520.300 | 2430.900 | 4250.400 | 3242.700 |
| Minimum | 2277.300 | 1241.300 | 1644.300 | 1801.000 |
| Maximum | 5797.600 | 3672.200 | 5894.700 | 5043.700 |
| Sum | 8,241,659 | 4,886,451 | 6,388,788 | 6,368,905 |
| Count | 2725.000 | 2725.000 | 2725.000 | 2725.000 |

All indices have a mean of approximately four times their standard deviations. Similarly, the maximum value is approximately four times the minimum value. The skewness is positive for all indices, indicating that the data are skewed to the right. Additionally, kurtosis is above 3, suggesting that the data are expected to have leptokurtic distribution.

## 5. Research Methodology

The methodology adopted in this study is divided into three sections, defining the dummy variables representing the Syrian civil war, conducting correlation analysis, and applying the stepwise multiple linear regression. The next section is dedicated to explaining the methodology in detail.

### *5.1. Syrian Civil War Indicators*

To accomplish our main objective of studying the impact of the Syrian civil war on Jordan's stock market, it is essential to consider all the significant activities and events that took place in Syria between 2011 and 2018. The first obstacle we must face is transforming the events into measurable indicators by converting them into dummy variables containing two values: zero or one. In more detail, one is assigned to the variable based on the period of each event, whereas zero is for the other dates. Table 2 classifies the Syrian war into periods and defines the dummy variables.

After creating the dummy variables, the first step is to apply the Pearson correlation coefficients to examine the influence of the dummy variables on the three major sub-indices of Jordan's stock market, which include Financials, Services, Industries, and the General Index. If available, the Pearson correlation coefficient will provide a preliminary indicator for the effect of war dummy variables on stock indices in the Amman Stock Exchange (ASE). As for the second step, the stepwise multiple linear regression is applied to study the impact of war. The stepwise method aims to build different mathematical models based on the correlation between the selected independent variables and one of the stock market indices as a dependent variable, relying on the probability of removing and entering the variables. The generated models are compared to extract the optimum model based on the determination coefficient ($R^2$) and error function. Furthermore, an analysis of variance (ANOVA) test is applied to verify the impact of adding and removing one dummy variable to the model at a time.

**Table 2.** Syrian war dummy variables and description.

| Variables | Descriptions |
|---|---|
| V1 | Protests and Intifada (March–July 2011) |
| V2 | Early armed rebellion (July 2011–April 2012) |
| V3 | Phase III: Escalation of the fighting (2012–2013) |
| V4 | The Rise of Islamic Groups (January–September 2014) |
| V5 | US Intervention, Rebel Group Attacks (September 2014–September 2015) |
| V6 | The Syrian–American conflict, areas of de-escalation, breaking the siege of Deir Ezzor (April–December 2017) |
| V7 | Army advance in northern Hama and Ghouta, Turkish intervention in Afrin (January–March 2018)<br>Army advance in the south, US-led airstrikes (April–August 2018) |

Regarding the selection of the optimal model, it is determined by choosing the highest $R^2$ and lowest error function. Therefore, the variables included in this model are considered the optimal variables that influence the stock market indices in Jordan. Therefore, the adopted methodology contains multiple tests explained thoroughly in the following sections, including the correlation coefficient and stepwise methods. In addition, the main objective is to extract the main events in the Syrian war that affected the Jordanian stock market by selecting the war dummy variables embedded in the optimal model.

### *5.2. Correlation Analysis*

One of the preliminary steps in building statistical analysis is the Pearson correlation coefficient, considered a major and common method to study the relationship between two variables. The range for the Pearson correlation coefficient is between +1 and −1; however, the magnitude of the Pearson coefficient indicates the strength of the relationship between two variables based on the extent the coefficient is close to either −1 or +1 when two variables have an exact match of +1 or −1. The Pearson coefficients indicate the availability of a strong relationship. At the same time, the sign of the correlation coefficient indicates whether the relationship is positive or negative. In this study, year, day, and Syrian civil war variables are correlated with four indices to study the relationship between the Syrian war and the stock market in Jordan. Moreover, to understand whether the relationship is significant for each variable against each of the Jordanian indicators, the *p*-value is used with each correlation coefficient to indicate whether the relationship is significant.

Pearson correlation coefficient is calculated as follows (Erdem et al. 2014):

$$\text{correlation coefficient} = \frac{\sum_{i=1}^{n}\left(x_i - \bar{x}\right)\left(y_i - \bar{y}\right)}{\sqrt{\sum_{i=1}^{n}\left(x_i - \bar{x}\right)^2}\sqrt{\sum_{i=1}^{n}\left(y_i - \bar{y}\right)^2}} \quad (1)$$

where $n$ is the number of samples; $x_i, y_i$ are the single samples indexed with $i$; and $\bar{x}, \bar{y}$ are the means of samples.

Hence, the hypothesis can be accepted or not depending on the significance level (*p*-value) as follows:

Null hypothesis → No relationship between the Syrian Refugee Influx and Jordan's stock indices.

Alternative hypothesis → There is a relationship between the Syrian Refugee Influx and Jordan's stock indices.

A low value of the *p*-value coefficient suggests the rejection of the null hypothesis and supports the acceptance of the alternative hypothesis. To reject the null hypothesis, the

$p$-value should be less than 0.05. To calculate the $p$-value of Pearson's correlation coefficient, the t-distribution formula is used as follows (Paternoster et al. 1998):

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} \tag{2}$$

Therefore

$$p - value = 2 \times \mathrm{P}(\mathrm{T} > t)$$

where T follows a t-distribution with $n$-2 degrees of freedom.

*5.3. Stepwise Multiple Linear Regression*

After building the Correlation Matrix, the next step is to select the most effective variables on Jordan's stock indices. Multiple selection methods are adopted in the literature, including forward, backward, minimum MSE, and stepwise. The selection method aims to make a complete and realistic regression model and minimize the number of independent variables unrelated to Jordan's stock indices. All facilities are investigating the most effective event(s) on Jordan's stock exchange market. This study applies stepwise selection since it combines forward and backward selection methods. The stepwise method starts with validating and classifying variables into significant and non-significant. The non-significant variables are rejected to improve the performance of the regression model. Therefore, the significant variables are considered in the adding and removing phase, thus building up various models containing significant variables.

Furthermore, to avoid an infinite loop while adding and removing variables and to assist in specifying the Syrian war events that affect the stock exchange market, the cutoff probability for adding should be less than the cut-off probability for removing. Hence, this study uses 0.05 and 0.10 as the probability of removing and adding, respectively. To calculate the Jordanian stock indices, the following equation is used:

$$Stock\ Index = \beta_0 * 1 + \beta_1 * v_{i1} + \beta_2 * v_{i2} + \ldots\ldots\ldots + \beta_n * v_{in} + \varepsilon_i \tag{3}$$

$$Stock\ Index = \beta * {v_i}^T + \varepsilon \tag{4}$$

where $\beta$, and $\varepsilon$ are variables' coefficients and errors, respectively. $T$ is the transpose for vector or the matrix, so that $\beta * {v_i}^T$ is the inner product between two vectors $\beta$ and $v_i$:

$$Stock\ index = \beta * V + \varepsilon \tag{5}$$

To develop different equations, the stepwise linear method will feed the linear equation with different variables at every step. After generating different models by applying stepwise regression methods, the outcome models are compared to find the optimal and most realistic model. The performance metrics adopted to compare models depend mainly on both $R^2$ and error function, side by side with an analysis of variance test (ANOVA). To calculate $R^2$ and error function, the following formulas are applied (Rawlings et al. 2001):

$$R^2 = 1 - \frac{\sum_{i=1}^{N}(y_i - \hat{y}_i)^2}{\sum_{i=1}^{N}\left(y_i - \bar{y}\right)^2} \tag{6}$$

$$Mean\ Absolute\ Error = \frac{1}{N}\sum_{i=0}^{N}|y_i - \hat{y}_i| \tag{7}$$

where $y_i$, $\hat{y}_i$, $\bar{y}$ and $N$ denotes the original output values, the predicted output values, the mean output values, and the number of samples, respectively.

To sum up all the steps of the proposed methodology, Figure 1 depicts the flowchart for the steps that are adopted in this study.

To build a linear regression model, the first step is to define the null and alternative hypnoses as shown below:

- Null hypothesis (H0): the Syrian Refugee Influx does not affect Jordanian stock indices.
- Alternative hypothesis (Ha): the Syrian Refugee Influx does affect Jordanian stock indices.

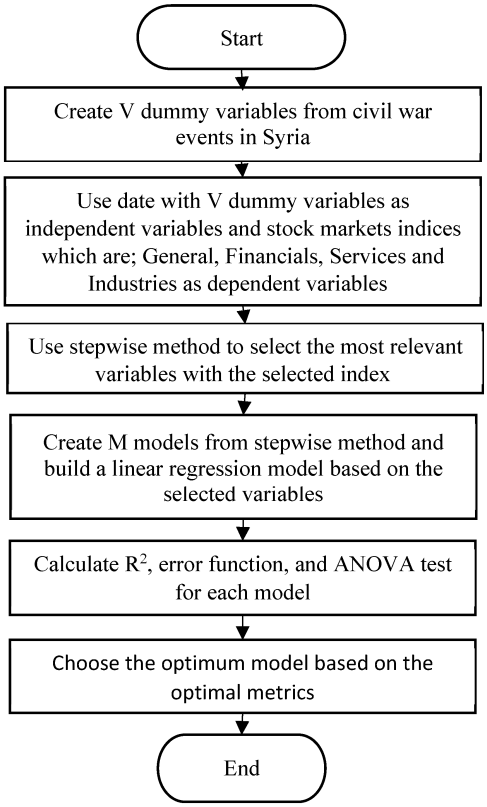


**Figure 1.** Flowchart of the proposed methodology.

## 6. Analysis Results and Discussion

This section discusses the results of the tests applied to investigate the impact of the Syrian civil war on Jordan's stock market. Therefore, the outcome is presented successively, starting from the correlation analysis between independent variables and the Jordan market's four main indices (i.e., General, Financials, Services, and Industries) of the Jordan market. Then, multiple linear regression using the stepwise method is analyzed to validate the models and the important variables that affect the stock market and conclude concerning the major events that have affected the Jordanian stock market, if any. For the analysis and development of various stepwise linear regression models and correlation matrix, the SPSS statistic software is used.

### *6.1. Correlation Analysis*

The Pearson correlation coefficients between the Jordanian indices (i.e., General, Financials, Services, and Industries) and the studied variables (i.e., day, month, year, and Syrian war variables) are presented in Table 3. The correlation analysis revealed that the day variable is not significantly correlated with Jordan's stock market indices. Therefore, using the day variable is ineffective for predicting the market trend. Moreover, it is found that month and year variables have a high significant inverse correlation with all indices. All Syrian war variables are significant except for V2 (Early armed rebellion (July 2011–April 2012)) and V4 (The Rise of Islamic Groups (January–September 2014)). Regarding V2, it is not significant with both the Services and Industries indices, while V4 is not significant with the Financials index. However, the Financials index showed a high correlation with

V1 (Protests and Intifada (March–July 2011)) and V3 (Escalation of the fighting (2012–2013)) with negative Pearson values equal to (0.214) and (0.242), respectively. Similarly, the General index negatively correlates with V1 and V3 with values equal to (0.165) and (0.180), respectively. For the Services index, V6 (Army advance in northern Hama and Ghouta, Turkish intervention in Afrin (January–March 2018)) and V7 (Army advance in the south, US-led airstrikes (April–August 2018)) are the dominant variables compared to other variables with a negative Pearson correlation coefficient equal to (0.191) and (0.231), respectively. In addition, it is found that the Industries index has a high negative Pearson correlation coefficients with both V4 (The Rise of Islamic Groups (January–September 2014)) and V5 (US Intervention, Rebel Group Attacks (September 2014–September 2015)) variables with magnitudes equal to (0.138) and (0.247), respectively.

The correlation analysis revealed that Syrian civil war variables negatively correlate with all indices. The results indicate that the Syrian war influences Jordan's stock market. That may facilitate building a prediction model for the movements in Jordan's exchange market.

**Table 3.** The correlation test between the General index and independent variables.

| Index | Variables | Day | Month | Year | V1 | V2 | V3 | V4 | V5 | V6 | V7 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General** | Correlation | −0.011 | −0.124 | −0.602 | −0.165 | −0.058 | −0.180 | −0.072 | −0.114 | −0.089 | −0.090 |
| | Sig | 0.555 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **Financials** | Correlation | −0.009 | −0.131 | −0.483 | −0.214 | −0.09 | −0.242 | −0.031 | −0.064 | −0.041 | −0.046 |
| | Sig | 0.620 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.111 | 0.001 | 0.031 | 0.017 |
| **Services** | Correlation | −0.015 | −0.141 | −0.732 | −0.107 | −0.020 | −0.127 | −0.089 | −0.041 | −0.191 | −0.231 |
| | Sig | 0.438 | 0.000 | 0.000 | 0.000 | 0.293 | 0.000 | 0.000 | 0.034 | 0.000 | 0.000 |
| **Industries** | Correlation | −0.011 | −0.086 | −0.656 | −0.083 | −0.009 | −0.083 | −0.138 | −0.247 | −0.089 | −0.056 |
| | Sig | 0.551 | 0.000 | 0.000 | 0.000 | 0.629 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 |

### *6.2. Stepwise Multiple Linear Regression*

According to the results of correlation tests, the variables with high significant correlation are adopted to generate different predictors based on the change in the variables considered each time the regression runs. The stepwise multiple linear regression method is employed to examine the impact of the considered variables on all of Jordan's stock market indices. To assess the generated predictors, $R^2$ and error function are calculated for each predictor, as shown in the following tables. Additionally, the number of independent variables is increased while running successive models, which facilitates picking the optimal models containing the variables directly affecting the selected stock index (dependent variable). Starting with the financial index as the dependent variable, the results showed that the model using all Syrian variables with year and month, which is model 9, could improve the prediction of the Financials index with $R^2$ and error function values of 0.956 and 650, respectively.

Furthermore, the ANOVA test is applied to all the models generated by stepwise regression. Tables 4 and 5 present the nine generated models, all exhibiting the main characteristic of statistical significance. According to the results in Table 5, the optimal model is model number 9, with an F value of 6611 and a significant *p*-value of 0, based on (9,2716) degrees of freedom. For information of multi-collinearity and variables' coefficients, the Supplementary Materials contain the full analysis of the proposed models.

**Table 4.** Stepwise Linear regression models using the Financials Index as a dependent variable and different independent variables.

| Model | Predictors | $R^2$ | Error |
|---|---|---|---|
| 1 | Year | 0.948 | 709 |
| 2 | year, V3 | 0.951 | 688 |
| 3 | year, V3, V1 | 0.953 | 676 |
| 4 | year, V3, V1, month | 0.954 | 667 |
| 5 | year, V3, V1, month, V7 | 0.954 | 663 |
| 6 | year, V3, V1, month, V7, V5 | 0.955 | 659 |
| 7 | year, V3, V1, month, V7, V5, V2 | 0.956 | 654 |
| 8 | year, V3, V1, month, V7, V5, V2, V6 | 0.956 | 651 |
| 9 | year, V3, V1, month, V7, V5, V2, V6, V4 | 0.956 | 650 |

**Table 5.** Variance analysis of different stepwise linear regression models using the Financials Index.

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 24,917,684,462 | 1 | 24,917,684,462 | 49,565 | 0.000 |
| | Residual | 1,369,440,861 | 2724 | 502,732 | | |
| | Total | 26,287,125,323 | 2725 | | | |
| 2 | Regression | 24,997,255,967 | 2 | 12,498,627,984 | 26,385 | 0.000 |
| | Residual | 1,289,869,355 | 2723 | 473,694 | | |
| | Total | 26,287,125,323 | 2725 | | | |
| 3 | Regression | 25,042,388,130 | 3 | 8,347,462,710 | 18,254 | 0.000 |
| | Residual | 1,244,737,193 | 2722 | 457,288 | | |
| | Total | 26,287,125,323 | 2725 | | | |
| 4 | Regression | 25,075,285,098 | 4 | 6,268,821,275 | 14,076 | 0.000 |
| | Residual | 1,211,840,225 | 2721 | 445,366 | | |
| | Total | 26,287,125,323 | 2725 | | | |
| 5 | Regression | 25,090,177,279 | 5 | 5,018,035,456 | 11,403 | 0.000 |
| | Residual | 1,196,948,044 | 2720 | 440,054 | | |
| | Total | 26,287,125,323 | 2725 | | | |
| 6 | Regression | 25,107,000,416 | 6 | 4,184,500,069 | 9641 | 0.000 |
| | Residual | 1,180,124,907 | 2719 | 434,029 | | |
| | Total | 26,287,125,323 | 2725 | | | |
| 7 | Regression | 25,125,448,461 | 7 | 3,589,349,780 | 8398 | 0.000 |
| | Residual | 1,161,676,862 | 2718 | 427,401 | | |
| | Total | 26,287,125,323 | 2725 | | | |
| 8 | Regression | 25,134,985,140 | 8 | 3,141,873,142 | 7409 | 0.000 |
| | Residual | 1,152,140,183 | 2717 | 424,049 | | |
| | Total | 26,287,125,323 | 2725 | | | |
| 9 | Regression | 25,139,598,566 | 9 | 2,793,288,730 | 6611 | 0.000 |
| | Residual | 1,147,526,757 | 2716 | 422,506 | | |
| | Total | 26,287,125,323 | 2725 | | | |

Including all Syrian war variables, along with the month and year as independent variables, yields the most significant improvement compared to models that exclude or have fewer Syrian variables, particularly for the Services index. Therefore, the optimal results are obtained from model (9), demonstrating the highest $R^2$ value of 0.964 and the lowest error function of 348, as shown in Table 6. Table 7 illustrates the output of the ANOVA test which gives a clear idea that all the generated models are significant. In addition, model (9) demonstrates the optimal model with an F value (9,2716) equal to 8104 and a statistically significant *p*-value = 0.

**Table 6.** Stepwise Linear regression models using the Services Index as a dependent variable and different independent variables.

| Model | Predictors | $R^2$ | Error |
|---|---|---|---|
| 1 | Year | 0.955 | 389 |
| 2 | year, V7 | 0.958 | 378 |
| 3 | year, V7, V6 | 0.96 | 369 |
| 4 | year, V7, V6, V3 | 0.961 | 364 |
| 5 | year, V7, V6, V3, month | 0.962 | 358 |
| 6 | year, V7, V6, V3, month, V4 | 0.963 | 355 |
| 7 | year, V7, V6, V3, month, V4, V1 | 0.963 | 351 |
| 8 | year, V7, V6, V3, month, V4, V1, V5 | 0.964 | 349 |
| 9 | year, V7, V6, V3, month, V4, V1, V5, V2 | 0.964 | 348 |

**Table 7.** Variance analysis of different stepwise linear regression models using the Services index.

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 8,757,985,951 | 1 | 8,757,985,951 | 57,981 | 0.000 |
| | Residual | 411,459,725 | 2724 | 151,050 | | |
| | Total | 9,169,445,676 | 2725 | | | |
| 2 | Regression | 8,780,150,515 | 2 | 4,390,075,257 | 30,707 | 0.000 |
| | Residual | 389,295,161 | 2723 | 142,966 | | |
| | Total | 9,169,445,676 | 2725 | | | |
| 3 | Regression | 8,798,090,695 | 3 | 2,932,696,898 | 21,496 | 0.000 |
| | Residual | 371,354,980 | 2722 | 136,427 | | |
| | Total | 9,169,445,676 | 2725 | | | |
| 4 | Regression | 8,808,883,466 | 4 | 2,202,220,866 | 16,619 | 0.000 |
| | Residual | 360,562,210 | 2721 | 132,511 | | |
| | Total | 9,169,445,676 | 2725 | | | |
| 5 | Regression | 8,821,426,194 | 5 | 1,764,285,239 | 13,789 | 0.000 |
| | Residual | 348,019,482 | 2720 | 127,948 | | |
| | Total | 9,169,445,676 | 2725 | | | |
| 6 | Regression | 8,827,277,416 | 6 | 1,471,212,903 | 11,691 | 0.000 |
| | Residual | 342,168,260 | 2719 | 125,843 | | |
| | Total | 9,169,445,676 | 2725 | | | |
| 7 | Regression | 8,833,657,446 | 7 | 1,261,951,064 | 10,215 | 0.000 |
| | Residual | 335,788,230 | 2718 | 123,542 | | |
| | Total | 9,169,445,676 | 2725 | | | |
| 8 | Regression | 8,837,981,656 | 8 | 1,104,747,707 | 9056 | 0.000 |
| | Residual | 331,464,020 | 2717 | 121,996 | | |
| | Total | 9,169,445,676 | 2725 | | | |
| 9 | Regression | 8,840,246,675 | 9 | 982,249,631 | 8104 | 0.000 |
| | Residual | 329,199,001 | 2716 | 121,207 | | |
| | Total | 9,169,445,676 | 2725 | | | |

The results of the Industries Index are demonstrated in Tables 8 and 9. Table 8 represents the outcome of $R^2$ and error function, which supports the acceptance of model 9 as the optimal model compared to the other eight models caused by the highest amount of $R^2$ and lowest for error function, which are 0.934 and 626, respectively. Similarly, the ANOVA test analysis presented in Table 9 confirms that model number 9, with an F value of 4298 and degrees of freedom (9,2716), is statistically significant and preferable over all the other models listed in Table 9.

**Table 8.** Stepwise Linear regression models using the Industries Index as a dependent variable and different independent variables.

| Model | Predictors | $R^2$ | Error |
|---|---|---|---|
| 1 | Year | 0.924 | 674 |
| 2 | year, V5 | 0.928 | 653 |
| 3 | year, V5, V4 | 0.929 | 648 |
| 4 | year, V5, V4, V6 | 0.931 | 643 |
| 5 | year, V5, V4, V6, V3 | 0.932 | 638 |
| 6 | year, V5, V4, V6, V3, V1 | 0.933 | 634 |
| 7 | year, V5, V4, V6, V3, V1, V7 | 0.934 | 629 |
| 8 | year, V5, V4, V6, V3, V1, V7, month | 0.934 | 627 |
| 9 | year, V5, V4, V6, V3, V1, V7, month, V2 | 0.934 | 626 |

**Table 9.** Variance analysis of different stepwise linear regression models using the Industries index.

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 14,969,703,006 | 1 | 14,969,703,006 | 32,988 | 0.000 |
| | Residual | 1,236,147,815 | 2724 | 453,799 | | |
| | Total | 16,205,850,822 | 2725 | | | |
| 2 | Regression | 15,044,843,439 | 2 | 7,522,421,720 | 17,643 | 0.000 |
| | Residual | 1,161,007,382 | 2723 | 426,371 | | |
| | Total | 16,205,850,822 | 2725 | | | |
| 3 | Regression | 15,062,478,270 | 3 | 5,020,826,090 | 11,953 | 0.000 |
| | Residual | 1,143,372,552 | 2722 | 420,049 | | |
| | Total | 16,205,850,822 | 2725 | | | |
| 4 | Regression | 15,079,825,697 | 4 | 3,769,956,424 | 9110 | 0.000 |
| | Residual | 1,126,025,124 | 2721 | 413,828 | | |
| | Total | 16,205,850,822 | 2725 | | | |
| 5 | Regression | 15,098,938,956 | 5 | 3,019,787,791 | 7420 | 0.000 |
| | Residual | 1,106,911,866 | 2720 | 406,953 | | |
| | Total | 16,205,850,822 | 2725 | | | |
| 6 | Regression | 15,113,503,063 | 6 | 2,518,917,177 | 6270 | 0.000 |
| | Residual | 1,092,347,758 | 2719 | 401,746 | | |
| | Total | 16,205,850,822 | 2725 | | | |
| 7 | Regression | 15,130,051,808 | 7 | 2,161,435,973 | 5461 | 0.000 |
| | Residual | 1,075,799,013 | 2718 | 395,805 | | |
| | Total | 16,205,850,822 | 2725 | | | |
| 8 | Regression | 15,139,103,570 | 8 | 1,892,387,946 | 4820 | 0.000 |
| | Residual | 1,066,747,251 | 2717 | 392,620 | | |
| | Total | 16,205,850,822 | 2725 | | | |
| 9 | Regression | 15,142,525,768 | 9 | 1,682,502,863 | 4298 | 0.000 |
| | Residual | 1,063,325,053 | 2716 | 391,504 | | |
| | Total | 16,205,850,822 | 2725 | | | |

Finally, the fourth model adopts the General Index of the Amman Stock Exchange (ASE) as the dependent variable. Table 10 presents different models that vary based on the predictors included in the regression model tests. The results indicate that model 9, with $R^2$ and error values of 0.95 and 539, emerged as the optimal model compared to the other eight models. Model 9 achieved the highest $R^2$ and the lowest error function among all the applied models. In addition, the ANOVA test outcome explained in Table 11 indicates that model 9 with all the independent variables is the optimal model similar to the outcome of $R^2$ and error function, with a significant value of F (9,2716) equals 5738 and significant $p$-value = 0.

**Table 10.** Stepwise linear regression models use the General Index as a dependent variable and different independent variables.

| Model | Predictors | $R^2$ | Error |
|---|---|---|---|
| 1 | year | 0.941 | 584 |
| 2 | year, V3 | 0.943 | 575 |
| 3 | year, V3, month | 0.944 | 568 |
| 4 | year, V3, month, V1 | 0.945 | 563 |
| 5 | year, V3, month, V1, V5 | 0.947 | 557 |
| 6 | year, V3, month, V1, V5, V7 | 0.948 | 550 |
| 7 | year, V3, month, V1, V5, V7, V6 | 0.949 | 545 |
| 8 | year, V3, month, V1, V5, V7, V6, V2 | 0.949 | 542 |
| 9 | year, V3, month, V1, V5, V7, V6, V2, V4 | 0.950 | 539 |

**Table 11.** Variance analysis of different stepwise linear regression models using the General index.

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 14,878,448,762 | 1 | 14,878,448,762 | 43,646 | 0.000 |
| | Residual | 928,575,972 | 2724 | 340,887 | | |
| | Total | 15,807,024,734 | 2725 | | | |
| 2 | Regression | 14,907,967,316 | 2 | 7,453,983,658 | 22,576 | 0.000 |
| | Residual | 899,057,418 | 2723 | 330,172 | | |
| | Total | 15,807,024,734 | 2725 | | | |
| 3 | Regression | 14,927,501,554 | 3 | 4,975,833,851 | 15,400 | 0.000 |
| | Residual | 879,523,179 | 2722 | 323,117 | | |
| | Total | 15,807,024,734 | 2725 | | | |
| 4 | Regression | 14,944,983,308 | 4 | 3,736,245,827 | 11,793 | 0.000 |
| | Residual | 862,041,426 | 2721 | 316,811 | | |
| | Total | 15,807,024,734 | 2725 | | | |
| 5 | Regression | 14,963,641,414 | 5 | 2,992,728,283 | 9652 | 0.000 |
| | Residual | 843,383,320 | 2720 | 310,067 | | |
| | Total | 15,807,024,734 | 2725 | | | |
| 6 | Regression | 14,985,457,489 | 6 | 2,497,576,248 | 8266 | 0.000 |
| | Residual | 821,567,244 | 2719 | 302,158 | | |
| | Total | 15,807,024,734 | 2725 | | | |
| 7 | Regression | 15,000,263,665 | 7 | 2,142,894,809 | 7219 | 0.000 |
| | Residual | 806,761,068 | 2718 | 296,822 | | |
| | Total | 15,807,024,734 | 2725 | | | |
| 8 | Regression | 15,008,754,979 | 8 | 1,876,094,372 | 6385 | 0.000 |
| | Residual | 798,269,755 | 2717 | 293,806 | | |
| | Total | 15,807,024,734 | 2725 | | | |
| 9 | Regression | 15,017,287,334 | 9 | 1,668,587,482 | 5738 | 0.000 |
| | Residual | 789,737,400 | 2716 | 290,772 | | |
| | Total | 15,807,024,734 | 2725 | 14,878,448,762 | | |

As mentioned earlier, four models were applied, each containing one of the indices in the Amman Stock Exchange (ASE) for the period of 2011–2018. The tests encompass the Correlation Coefficient ($R^2$), error function, and stepwise regression to investigate the impact of the Syrian civil war on Jordan's stock exchange market.

All four models produced comparable results, and the optimal model encompassed all independent variables that represented the key events of the Syrian civil war. Each of the four models considered various stock market indicators as dependent variables. Moreover, these models exhibited shared characteristics, such as negative correlation, low error, and a statistically significant relationship. These findings collectively indicate that the Syrian war had/has a negative impact on the trend of Jordan's stock exchange market.

Moreover, as of the present (i.e., 2020), the conflict in Syria remains unresolved, and all negotiations have failed to reach a fair agreement among all parties involved. This implies that the influx of Syrian refugees continues to pose a significant challenge for neighboring countries with shared borders, particularly Jordan, Turkey, and Lebanon. As a result, Jordan continues to face a growing burden, particularly regarding the accelerated military expenditures that impact other crucial sectors, including healthcare, education, and the economy. This places a sustained strain on Jordan's resources. Thus, since all the corporations are listed on the Amman Stock Exchange (ASE), Jordan's stock exchange is one of the fields affected negatively by the struggle in Syria. On average, the "Rise of Islamic Groups" and "Early armed rebellion" are the main important variables negatively affecting the General stock market index. "Army advance in the south", "US-led airstrikes", and "Escalation of the fighting" are the least important variables on the General stock market. All the war variables negatively affect Services, Financials, Industries, and the General stock market. Consequently, further support for the findings presented in this study can be summarized as follows: an inverse correlation exists between the Syrian civil war and the influx of refugees, impacting Jordan's stock exchange market.

## 7. Conclusions

The main objective of this study is to investigate the effects of different events associated with the Syrian civil war on the performance of Jordan's stock exchange market. Developing an appropriate methodology that includes defining measurable and interrelated dependent and independent variables is essential to accomplish this goal. Firstly, the dependent variables are the major stock indices that reflect the behavior of the stock market (Amman Stock Exchange); that is because the indices contain all the firms listed at ASE, which makes it an appropriate indicator for representing the performance and trend behavior of the stock market in Jordan. The main indices examined in this study include Financials, Services, Industries, and the General index. These indices were analyzed before and during the Syrian conflict (2008–2018). Secondly, specifying the independent variables related to the struggle in Syria can be represented by defining seven dummy variables classified according to the main events (2011–2018). Thus, various statistical models are applied to conclude impact availability and its direction, if any, through stepwise multiple regression. The results of the tests revealed that the Syrian civil war had a negative effect on the Amman Stock Exchange (ASE). Hereafter, the outcome indicates that adding more dummy variables that are directly related to the main events in the Syrian conflict can enhance the accuracy of the results while building prediction models that are used to predict the movements of stock markets, which is considered to be one of the main concerns of financial experts interested in financial markets. However, predicting the trend of fluctuations in the stock market can also facilitate managers and investors who are taking various financing and investing decisions in different fields of business.

Moreover, the research is limited to the chosen data period since the data were analyzed between 2008 and 2018. To comprehend the connection between stock market indices and the influx of Syrian refugees, the study took into account the variables associated with the war and omitted the regulations and new rules implemented on the Jordanian side. In addition, the study uses a stepwise linear regression model to study the relationship between independent and dependent variables. As part of their future work, the researchers intend to create a novel machine-learning model that incorporates a thorough analysis of significant variables, allowing for reevaluation of the influence of the Syrian refugee influx on stock indices. The authors also plan to introduce extra independent variables into the stock indices, such as work permits granted to Syrian refugees in Jordan, the stress on economic and resource infrastructure in Jordan, and the increased unemployment rate.

## 8. Research Implications and Limitations

This research is practically and theoretically important for policymakers, managers, and regulators. This study will help the government, decision-makers, and companies

in their decisions to develop recruiting in the manpower sector and economics sectors. The results will help specialists understand the movements of the Financials, Services, Industries, and General indices in local and international markets. This would help to understand the decisions and make the correct ones that would improve people's social lives. Policymakers can use the output of the linear regression models to understand the main affected variables and periods on the Jordanian stock market. Moreover, policymakers can use linear regression models to estimate future stock market values. Policymakers should consider the potential spillover effects of regional events on their financial markets. Policymakers must consider the social and economic implications of hosting a large refugee population when formulating economic policies and investment strategies. The findings suggest that investors and market participants should carefully evaluate the potential risks of geopolitical events and regional conflicts. Measures should be taken to diversify portfolios and mitigate the negative effects of such events. Moreover, the research gives a reference for policymakers to understand the impact of the Syrian influx on the Jordanian economy.

However, the study's limitations arise from its narrow scope, which is confined to a specific period, and its reliance on a limited range of regression models. The study's primary focus is the Syrian Civil War and how it has affected Jordan's stock market. The findings cannot be generalized too quickly because they might not immediately apply to other nations or situations. The study is constrained by the limited number of factors considered and the duration of the study period. Moreover, the study did not consider the impact of the Arab Spring on the Jordanian Stock Exchange indices. Furthermore, the stock market experiences rapid and dynamic changes, influenced by various factors that can lead to unexpected fluctuations in stock prices.

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