CRYPTOCURRENCY AND STOCK MARKETS : COMPLEMENTS OR SUBSTITUTES? EVIDENCE FROM GULF COUNTRIES

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Abstract:
The main goal of this study is to examine whether the cryptocurrency market impacts the stock market returns in the Gulf countries. Understanding this impact is quite interesting to clarify whether the cryptocurrency market and the stock market are substitutes or complements for investors. The author compiles the data on the stock market of the Gulf countries with the cryptocurrency data on a daily basis over the period 2014-2019. Generalized Method of Moments with Instrumental Variable (IV-GMM) approach has been implemented as the main strategy to fulfill the objective of the paper. The results of this paper show that the Stock market and the cryptocurrency market are substitutes for investors in Gulf countries. In fact, each 10 percent increase in the cryptocurrency returns is associated with a decline in the stock market returns by 0.17 percent. The cryptocurrency market hampers the stock market indices in the Gulf countries. Having agreed upon in the literature that the stock market is affected by fundamental factors, market sentiment, technical factors, and anomalies, this study offers robust evidence that the cryptocurrency should be introduced as one of the main determinants of stock market prices and returns.

Keywords: Crytocurrency, Stock Market, Substitutes.

JEL classification:N2, E44, P33

1.   Introduction

This decade has been characterized by a substantial expansion of virtual currencies. Bitcoin, which is considered as a Peer-to-Peer Electronic Cash System (Nakamoto, 2008), has served approximately 250 thousand transactions per day with a total market value $3.5 billion (blockchain.com accessed on November 28th 2018).

Although such a substantial expansion of virtual currencies, there are no studies to devote a specific interest to find their impact on the stock market prices and returns. The existent literature provides evidence that the stock market returns are driven by four main factors: first, the fundamental factors that include an earning base and valuation multiple (Foster, 1973; Iliev, 2010 Edmans & al., 2012). Second, the technical factors that encompass different macroeconomic conditions (Bordo & al., 2009; Gorodnichenko & Weber, 2016). Third, the market sentiment factor that refers to animal spirits of investors and

environmental context (Antweiler & Frank, 2004; Tetlock, 2007). Finally, anomalies that include the impact of different events (for example, day of the week) on the stock market prices (Szakmary & Kiefer, 2004; Gerlach, 2010; Robins & Smith, 2017).

This paper extends the previous literature by including a fifth factor that significantly explains the stock market returns which is the virtual money markets. In particular, the main hypothesis of this study is that virtual money currencies impacts the stock market returns.

More specifically, the main goal of this study is to find whether the cryptocurrency market has a significant impact on the equity markets in Gulf countries. Understanding this impact is quite interesting to clarify whether the cryptocurrency market and the stock market are substitutes (negative relationship) or complements (positive relationship) for investors. On one hand, if the cryptocurrency market and the stock market are substitutes, this might be a warning for policy-makers and academics to note that the higher the index of the cryptocurrency market, the lower the index of the stock market therefore the literature of the stock market should take into account the cryptocurrency market as one of the main determinants of the stock market returns. On the other hand, if the cryptocurrency market and the stock market are complements, therefore, we can note that investors are considering cryptocurrencies as part of their portfolio choice. As a result, if the investors in Gulf countries have positive animal spirits toward speculation and investment, they may place their savings in the stock market as well as in the cryptocurrency market.

In order to reach the goal of the study, the author compiles daily data on the stock market of the Gulf countries with the data on cryptocurrency market obtained from cryptocurrencycharts.com on a daily basis over the period 2014-2019. For the data on the stock market, the author uses the main indices of the Gulf countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates.[1] In particular, the data of stock market indices are mainly collected from: Tadawul All Share Index (TASI) that includes all stock indices in Saudi Arabia (168 listed equity), ADX: Abu Dhabi securities Exchange General Index (41 listed equity), KWSE: Kuwait Main Market index (187 listed equity), DFMGI: Dubai Financial Market General Index (33 listed equity), QE; Qatar Stock Exchange General (20 listed equity) and BAX: Bahrain All Share index (39 listed equity). Moreover, we resort to Federal Reserve Economic data (FRED) in order to have access to selected variables that are considered in the literature as the main determinants of the stock market returns.

Focusing on the Gulf countries in this study is quite interesting for several reasons: First, the stock market of Gulf countries is representative for the market capitalization of the Middle East region. Besides, the market cap of those six countries represents 86% of the stock market in the Arab World countries. Second, the economic expansion of Gulf countries

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[1] According to United Nartions Classifications, the number of Gulf countries is seven: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates and Yemen. We note that the Yemen has been excluded as it does not have a public stock market and the data is not available.

is critically interesting for worldwide countries. Gulf countries are considered as main exporters of Oil worldwide and their economic indicators as well as their stock markets have a substantial impact on the economic trends of the other nations (Awartani &. Maghyereh, 2013). Third, unlike most of stock market indices, the stock market index of Gulf countries is negatively correlated with the cryptocurrency index at high levels. We can note that for Qatar the correlation reached 89 percent over the period 2014-2019[2]. Fourth, unlike an important number of countries, the Gulf countries issued warnings of purchasing cryptocurrency (Global Legal Research Directorate, 2018)[3]. The reason behind this warning is hard to be totally explained. However, this warning is expected to remain on the long-run. In fact, one of the reasons that may explain this expectation is that in the Islamic faith, economic transactions should be mainly based on real assets. Speculation which includes cryptocurrency transactions is not compliant with the Sharia Law that represents the cornerstone of the laws in those countries.[4]

As the main methodology, the author implements at a first stage the fixed effect model in order to test whether the cryptocurrency market impacts the stock markets of the Gulf countries. The results of this stage show a negative and significant relationship between the two markets. To deal with endogeinty issues, the author implements Generalized Method of Moments Instrumental Variable (IV/GMM) technique at a second stage. The results remain robust, However, the significance and magnitude of the coefficients changed.

Finally, the results of this paper show that each 10 percent increase in the returns of the cryptocurrency market is associated with a 0.17 percent decrease in the returns of the stock market in Gulf countries. The Stock market and the cryptocurrency market are substitutes in Gulf countries. This study is considered as a prior research that takes into account the significance of the cryptocurrency market as one of the main determinants of stock market returns in the Gulf countries. In fact, the cryptocurrency market index is able to hamper the stock market indices in the Gulf countries.

The rest of the study is organized as follows: the next section provides the literature review related to the stock market returns. The third section is devoted to explaining the data and methodology. Empirical findings are provided in the fourth section. The last section of the study is devoted for conclusion and discussion.

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[2] Authors' calculations using stock market indices and cryptocurrency prices of Qatar over the period 2014-2019, on a daily basis.
[3] https://www.loc.gov/law/help/cryptocurrency/cryptocurrency-world-survey.pdf
[4] https://qz.com/1247409/bitcoin-cryptocurrencies-for-muslims-backed-by-gold-are-popping-up/

2. Literature

As previously mentioned, it has been well documented in the literature that the stock market prices and returns are driven by four main factors: the fundamental factors, the technical factors, the market sentiment factors, and the anomalies.

The fundamental factors including the earning base and the valuation multiples are clearly developed in the existing literature. Higher earnings per share and price earnings ratio impact the stock market prices (Foster, 1973; Iliev 2010; Edmans & al., 2012)

Regarding the technical factors, for a purpose to conciliate the macroeconomic environment and the stock market, Shiller & Grossman (1980) introduced the interest rate as one of the main determinants of the stock market prices. Besides, disinflation and low interest rate were always considered to be associated with stock market booms, especially in the United States during 1990s (Anari & Kolari, 2001; Campbell and Vuolteenaho, 2004; Bordo & Wheelock, 2007). Other studies have been developed to include other macroeconomic determinants such as the exchange rate, the banking development, and the trade openness (Garcia & Liu, 1999; Ito $ Hashimoto, 2004; Pan & al., 2007; Bordo & al., 2009; Gorodnichenko, 2016).

For the market sentiment factor, the previous studies highlighted an important relationship between the animal spirits of investors and the stock market prices. These studies assume that the animal spirits are mainly driven by the media and the news that mainly draw the status of the external environment in the stock market (Antweiler & Frank ,2004; Tetlock, 2007).

Previous studies have also identified the impact of regular and precise events on the stock market prices and returns. In fact, several calendar year effects which include January, Holidays, day-of the week and others have been documented in the previous empirical studies. It is noticeable that the impact of these events is critically dependent on the sample period (Szakmary & Kiefer, 2004; Gerlach, 2010; Robins & Smith, 2017).

This paper extends the previous literature by including a fifth factor that significantly explains the stock market prices and returns which is the virtual money markets. The main assumption of this study is that virtual money markets appeared nowadays to compete with the stock market. Controlling for the classical factors mentioned by the literature, this study tests the impact of virtual money markets on the stock market returns. Conspicuously, the two main hypotheses of this study are:

H1: Cryptocurrencies are one of the determinants of the stock market returns in the Gulf countries.

H2: The investors in the Gulf countries face a tradeoff between investing in the Stock market and the Cryptocurrency market. Therefore, the two markets might be considered as substitutes for potential investors.

3.   Data

As previously mentioned, we compile the stock market data, obtained from the indices of Gulf countries, with the cryptocurrency market data obtained from cryptocurrencycharts.com on a daily basis over the period 2014-2019. Following Baur & Dimpfl (2018), the indices of top 20 cryptocurrencies (in terms of market cap) have been implemented in the study. Stationarity tests and Unit Root tests have been implemented before any econometric applications.   Moreover, the author obtained the macroeconomic data from the Federal Reserve Economic data (FRED) on the country level. The following table presents the main variables that will be implemented in the next section.

Table 1: Definition and source of variables

Variable	Definition	Source
Log Prices	Log of prices in the stock market basis over Gulf countries.	Historical indices of each country from the stock market data of the country.
Returns	Returns are constructed as follows: $\ln(\frac{Price_t}{Price_{t-1}})$	Authors' construction using indices of each country from the stock market data of the country.
Openness	This variable represents the share of exports and imports from GDP per country.	Authors 'construction using FRED database.
Log Oil Exports	Total Oil exports per country in barrels per day in logarithm.	FRED database.
Log GDP	Constant GDP per country in US dollars.	FRED database.
Inflation	The growth rate of consumer price index (CPI) based on 2011 prices per country.	FRED database.
Log Domestic Credit	Domestic Credit from banks to private sector in millions of US dollars in logarithm.	FRED database.
Log Cryptocurrency Prices	Log of cryptocurrency prices.	Cryptocurrencycharts.com
Cryptocurrency returns	Returns are constructed as follows: $\ln(\frac{Price_t}{Price_{t-1}})$	Authors' construction using indices cryptocurrency indices from Cryptocurrencycharts.com

The following table represents the main descriptive statistics of these variables:

Table 2: Descriptive statistics of the variables for 1984–2017

Variable	Mean	Standard Deviation	Min	Max
Prices	6126.70	3047.40	1092.02	14350.50
Openness	34.70	34.80	50.20	164.20
Log Oil	14.35	0.99	13.19	15.83
GDP constant	3.90	2.50	0.23	9.77
Inflation	1.87	1.27	-0.85	4.20
Domestic Credit	71.20	15.40	44.29	103.77
Cryptocurrency Prices	2633.40	3822.089	120	19379

4. Methodology

At a first stage, the author implements Least squares to find the impact of cryptocurrency market on the stock market returns in Gulf countries. For the purpose of controlling the unobserved heterogeneity across countries, the author implements, at a second stage, a fixed effect model. The estimated specification from the fixed effect model can be written as follows:

$$return_{i,d} = \alpha + \beta X_{i,t} + \Phi\ Crypto\ return_d + \gamma_i + \varepsilon_{i,d} \tag{1}$$

$return_{i,d}$ is the return of the stock market for the country (i)at the day (d). While, $X_{i,t}$ is a matrix that includes the set of observables per country on a yearly basis. Φ is considered as the coefficient that detects the elasticity of stock market returns to Cryptocurrency returns. γ_i represents the fixed effect country. Finally, $\varepsilon_{i,d}$ is assumed to be Independent Identically Distributed (IID). Conspicuously, we are estimating the following specification:

$$Return_{i,d} = \alpha + \beta_1 Openess_{i,t} + \beta_2\ Oil\ Exports_{i,t} + \beta_3 GDP\ capita_{i,t} + \beta_4 Inflation_{i,t}$$
$$+ \beta_5\ Domestic\ Credit_{i,t} + \Phi\ Crypto\ return_d + \gamma_i + \varepsilon_{i,d} \tag{2}$$

In order to control for potential endogeneity between the two markets, the author specifies an IV-GMM specification. Conspicuously, the endogeneity arises from the fact that stock market returns are likely to be affected by the cryptocurrency returns. IV-GMM model overcomes this limitation by instrumenting the cryptocurrency returns by its two lag values. Robustness tests of the instruments and methodology are provided in the next section (Hansen test, Paap LM test and Paap Wald test).

For IV-GMM model, the first stage is specified as follows:

$$Crypto\ return_d = \alpha + L.Crypto\ return_{d-1} + L2.\ Crypto\ return_{d-2} + v_d \tag{3}$$

$L.Crypto\ return_{d-1}$ and $L2.\ Crypto\ return_{d-2}$ represent the first lag and second lag of cryptocurrency returns respectively.

Then the new values of cryptocurrency returns are inserted into the following new equation:

$$Return_{i,d} = \alpha + \beta_1 Openess_{i,t} + \beta_2\ Oil\ Exports_{i,t} + \beta_3 GDP\ capita_{i,t} + \beta_4 Inflation_{i,t}$$
$$+ \beta_5\ Domestic\ Credit_{i,t} + \Phi\ Crypto\ return_d + \gamma_i + \varepsilon_{i,d} \tag{4}$$

Further tests to test the robustness of the final specification (IV-GMM) will be implemented. In particular, we resort to Hansen J Statistic (Over identification test for instruments), under identification test by Kleibergen-Paap LM Statistic and Kleibergen-Paap Wald (Weak identification test). The results of the tests show that instruments are significant and strong and the problem of endogeneity has been resolved.

5. Empirical Findings

Table (5) provides the main empirical findings of the specifications mentioned in the previous section. The first two specifications provide the results of first stage estimations

without and with fixed effect country. While, the last specification provides the results of IV-GMM estimation after instrumenting the cryptocurrency returns by their lag values. It is noticeable that the impact of cryptocurrency returns remains the same across the three specifications. While, the sign and magnitude of some variables vary after controlling the country unobserved heterogeneity and the endogeneity problem.

All interpretations will be based on the results of IV-GMM model that provides robust standard errors and exogeneity of independent variables. This can be well detected from the statistics of the tests in the last equation. We note that Hansen J Statistic is not significant which means that the null hypothesis of valid instruments cannot be rejected. While, Kleibergen-Paap LM Statistic is significant and shows that the null hypothesis of under-identified model is rejected. Finally, Kleibergen-Paap Wald has a quite high F statistic with significant P-value, which shows that the instruments are not weak.

Regarding the interpretation of coefficients, first the macroeconomic variables provide estimations that go in parallel with the findings of the existing literature. In particular, trade openness shows a significant and positive impact on the stock market returns and investments[5]. Moreover, the oil exports variable plays a significant role in determining the stock market returns in the Gulf countries. These results are similar to existent studies on Gulf countries (Arouri & Rault, 2012). Economic growth is associated with a higher level of returns in the stock market and investments (Segal & al., 2015; Montout & Sami, 2016; Sami & Eldomiaty, 2019). Besides, the development of the banking sector has a significant and positive impact on the stock market returns. On the other hand, inflation hampers the stock market returns. More specifically, inflation may have a substantial negative impact on the profits, production of the operating firms which can be transmitted to income and employment levels in the economy (Campbell and Vuolteenaho, 2004; Said & al.,2019; Ayad & Abd El-Aziz, 2018; Sami & El Bedawy, 2019).

Finally, cryptocurrencies have an adverse effect on the stock market returns in Gulf countries. This finding can be detected from the three specifications of the empirical models. As previously mentioned, the coefficient from IV-GMM is considered as the preferred one as it is corrected from all endogeinty and unobserved heterogeinty biasness . The last column of table (5) shows that each 10 percent increase in the cryptocurrency market is associated with a decrease in the stock market returns by 0.17 percent. Therefore, the higher the returns in the cryptocurrency market, the lower the returns in stock market in Gulf countries.

This finding is considered as an indicator that the cryptocurrency market is able to hamper the stock market returns in Gulf countries. Investors in those countries consider the stock market and the cryptocurrency market as substitutes rather than complements. Future capital flows are likely to be directed away from investments into corporations in benefit of the cryptocurrencies markets. Following the portfolio selection theory introduced by Markowitz (1952), this study shows that the cryptocurrency is considered

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[5] See (Braun & Raddatz 2005; Niroomand et al. 2014 and Said & al., 2018) for further details and explanations of such a relationship.

nowadays as a part of the portfolio of investors. As a result, the cryptocurrency is likely to affect their decision to invest in the stock market[6].

Table 3: Regression results (Dependent variable= Stock Market Returns)

	(1) OLS	(2) Fixed Effects	(3) IV-GMM
Openness	0.028*	0.046*	0.520***
	(0.024)	(0.046)	(0.046)
Log Oil Export	-0.139***	2.420***	1.872***
	(0.036)	(0.063)	(0.094)
Log GDP constant	0.373***	0.199***	0.594***
	(0.050)	(0.044)	(0.039)
Inflation	-3.244***	-2.397***	-0.365***
	(0.384)	(0.179)	(0.105)
Log Domestic Credit	-0.217***	0.048***	0.034***
	(0.035)	(0.009)	(0.013)
Cryptocurrency Returns	**-0.013*****	**-0.028*****	**-0.017*****
	(0.004)	**(0.003)**	**(0.001)**
Constant	11.021***	-25.338***	
	(0.164)	(1.190)	
Observations	3,447	3,447	1,994
R-squared	0.23	0.68	0.63
Hansen J Statistic (P-value)	------	------	0.2651
Kleibergen-Paap LM Statistic (P-Value)	------	------	0.0000
Kleibergen-Paap Wald (F statistic)	------	------	205
Country FE	NO	YES	YES

HAC standard errors in parentheses (*** $p<0.01$, ** $p<0.05$, * $p<0.1$), Number of observations has been reduced in the third specification as the first two Lags of Cryptocurrency Returns have been used as the main instruments to control the correlation between Cryptocurrency returns and residual term.

4.   Conclusion and Discussion

This study provides an estimation of the impact of cryptocurrency market on the stock market returns in Gulf countries over the period 2014-2019. At a first stage this paper shows that the macroeconomic variables impact the stock market returns in Gulf countries. Oil exports, Openness to trade, GDP per capita and banking development have a significant positive impact on the stock market returns. While inflation impacts negatively the stock market returns. Moreover, the author shows that each 10 percent increase in the returns of cryptocurrency, the stock market returns in Gulf countries decreases by 0.17 percent.

Unlike other countries, the situation of Gulf countries is quite interesting as legalizing cryptocurrency in those countries is complicated. In the Islamic faith, economic transactions should be mainly based on real assets. The speculation which includes the cryptocurrency transactions is not compliant with Sharia Law that represents the cornerstone of laws in those countries. As noted by Milton Friedman (2004) "the world is

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[6] See Frijns & al. (2008) for further details about the portfolio choice theory.

flat" and isolating the impact of cryptocurrency is complicated. Therefore, policy-makers in Gulf countries should take into account that the cryptocurrency market affects the stock markets in their countries, even if these speculations are considered illegal in those countries. Regulators and policymakers also are invited to review their monetary and financial system in the light of the rapid growth of the cryptocurrency market and the increasing interactions between their potential investors and such a market. Besides, it is important to note that the investors have now more options to diversify their portfolios. The choice of such a portfolio is becoming more complex, especially with the appearance of new potential channels of investments associated with potentially higher returns.

This research has its limitations: on one hand, the results are merely focusing on the Gulf countries and cannot be generalized to other countries. Studies in other regions and countries should be developed. In particular, distinguishing the relationship between the two markets is interesting if some studies were developed to distinguish between the countries that have a legal system and illegal system of cryptocurrency. On the other hand, due to data constraints, the period of study is covering 2014-2019. Further studies on the long run may be able to consider larger time spans.

References

Anari, A. and Kolari, J. (2001). Stock Prices and Inflation. Journal of Financial Research, 24(4), pp.587-602.

Antweiler, W. and Frank, M. (2004). Is All That Talk Just Noise? The Information Content of Internet Stock Message Boards. The Journal of Finance, 59(3), pp.1259-1294.

Arouri, M., & Rault, C. (2012). Oil prices and stock markets in GCC countries: empirical evidence from panel analysis. International Journal of Finance and Economics, 17, pp. 242–253.

Awartani, B. and Maghyereh, A. (2013). Dynamic spillovers between oil and stock markets in the Gulf Cooperation Council Countries. Energy Economics, 36, pp.28-42.

Ayad, M. and Abd El-Aziz, A. (2018),The Impact of remittances on children's educational attainment: evidence from Egypt, Socio Economic Challenges, 2(2), pp. 49-59.

Baur, D. and Dimpfl, T. (2018), Asymmetric volatility in cryptocurrencies, Economics Letters, 173, pp. 148-151

Bordo, M., Dueker, M. and Wheelock, D. (2009). Inflation, Monetary Policy and Stock Market Conditions: Quantitative Evidence from a Hybrid Latent-Variable VAR. SSRN Electronic Journal.

Bordo, M. and Wheelock, D. (2007). Stock Market Booms and Monetary Policy in the Twentieth Century. Review, 89(2).

Braun, M. and Raddatz, C. (2005). The Politics of Financial Development: Evidence from Trade Liberalization. SSRN Electronic Journal.

Campbell, J. and Vuolteenaho, T. (2004). Inflation Illusion and Stock Prices. American Economic Review, 94(2), pp.19-23.

Edmans, A., Goldstein, I. and Jiang, W. (2012). The Real Effects of Financial Markets: The Impact of Prices on Takeovers. The Journal of Finance, 67(3), pp.933-971.

Foster, G., (1973). Stock market reaction to estimates of earnings per share by company officials. Journal of Accounting Research, 11, pp. 25-37.

Frijns, B., Koellen, E. and Lehnert, T. (2008). On the determinants of portfolio choice. Journal of Economic Behavior & Organization, 66(2), pp. 373-386.

Garcia, F. V. and Liu, L. (1999), Macroeconomic determinants of stock market development. Journal of Applied Economics, 2(1), pp.29-59.

Gerlach, J. (2010). DAYLIGHT AND INVESTOR SENTIMENT: A SECOND LOOK AT TWO STOCK MARKET BEHAVIORAL ANOMALIES. Journal of Financial Research, 33(4), pp.429-462.

Gorodnichenko, Y. and Weber, M. (2016). Are Sticky Prices Costly? Evidence from the Stock Market. American Economic Review, 106(1), pp.165-199.

Iliev, P. (2010). The Effect of SOX Section 404: Costs, Earnings Quality, and Stock Prices. The Journal of Finance, 65(3), pp.1163-1196.

Ito, T. and Hashimoto, Y. (2005). High-Frequency Contagion of Currency Crises in Asia. Asian Economic Journal, 19(4), pp.357-381.

Markowitz, H. (1952). Portfolio Selection. The Journal of Finance, 7(1), pp.77-91.

Montout, S. and Sami, M. (2016), Determinants for locating research and development activity in Europe, International Economics. 145, pp. 7-20.

Nakamoto, S. (2008). Bitcoin: A peer-to-peer electronic cash system. https://bitcoin. org/bitcoin.pdf

Niroomand, F., Hajilee, M. and Al Nasser, O. (2014). Financial market development and trade openness: evidence from emerging economies. Applied Economics, 46(13), pp.1490-1498.

Pan, M., Fok, R.C. & Liu, I.A. (2007). Dynamic Linkages Between Exchange Rates and Stock Market Prices: Evidence from East Asian Markets. International Review of Economics and Finance, 16, pp. 503 – 520.

Robins, R.P. & Smith, G. P. (2016), No More Weekend Effect. Critical Finance Review, 5(2), pp. 417-424.

Sami, M. and El Bedawy, R. (2019), Assessing the impact of knowledge management on total factor productivity. African Journal of Economic and Management Studies, 11(1), pp. 134-146.

Sami, M. and Eldomiaty, T. (2019), Modeling dynamic location expansion of multinational firms in France", Empirical Economics, pp. 1-29, available at: https://link.springer.com/article/10.1007/s00181-019-01747-9

Said, M., Galal, R., Joekes, S. and Sami, M. (2018). Gender Diversity, Productivity, and Wages in Egyptian Firms, Working Papers 1207, Economic Research Forum.

Said, M., Galal, R., and Sami, M. (2019). Inequality and Income Mobility in Egypt, Working Papers 1368, Economic Research Forum.

Segal, G. , Shaliastovich, I. , Yaron, A. (2015). Good and bad uncertainty: Macroeconomic and financial market implications. Journal of financial Economics, 117(2), pp.369-397.

Szakmary, A. C., & Kiefer, D. B. (2004). The Disappearing January/Turn of the Year Effect: Evidence from Stock Index Futures and Cash Markets. Journal of Futures Markets, 24(8), pp. 755-784.

Tetlock, P. (2007). Giving Content to Investor Sentiment: The Role of Media in the Stock Market. The Journal of Finance, 62(3), pp.1139-1168.