The United Kingdom and Brexit: Implications, Consequences and Opportunities

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Abstract *Presently, Brexit and its implications for the United Kingdom (UK), European Union and rest of the world, are regarded as major concerns across the globe. The present study is an attempt to estimate the shock that the UK's economy will likely receive as a consequence of Brexit. It also seeks to find an answer to the question whether costs incurred as a consequence of Brexit are repairable or otherwise for the UK. By applying a vector autoregressive (VAR) model on annual time series data of four important economic variables, i.e. gross domestic product (GDP), imports, exports and foreign direct investment, ranging from 1970-2016, an interdependence relation was found to hold among variables. The result concludes that through Brexit, the UK's economy will face some fluctuations which won't last any longer than 12 to 15 years. In return, it will grant UK sovereignty in the different vital segments of the country like economic policies and political decisions.*

Introduction

Presently, Brexit and post-Brexit UK's economy, are considered as major discussion across the globe. The word 'Brexit' first appeared around 2012, referring to Britain's possible withdrawal from the European Union (EU). While the European Union is an association of European nations established in 1993 for achieving economic and political unity and integration. Countries comprise European Union are France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom (EU, 2019). The idea of integrating European countries existed long ago. However, it was only the post-World War Two period that saw an increasing desire for the integration of the European States. The first practical step towards the EU began in 1951 when six nations namely Belgium, the Netherlands, France, Italy, West Germany, and Luxembourg, signed a proposal for pooling their coal and steel resources, so as to provide a common foundation for economic development (Schuman, 2011). Resultantly, the European Community (EC) was formed in 1957. To further the integration, the Rome Treaty was signed in 1957 for

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consolidating peace, allowing movement of factors and eventually a political alliance. The dream of European integration was further cherished through the Maastricht Treaty, signed in 1992 with the participation of 12 States namely Portugal, Spain, Greece, Ireland, Denmark, the United Kingdom, Luxembourg, Netherlands, Belgium, Italy, Germany, and France. The Maastricht treaty relied on the pillars of the single currency, uniform foreign policy, and close cooperation on citizenship, legal and judicial affairs.

The United Kingdom made its application for membership of the EEC in 1961 and the second one in 1976, both of which were rejected. It was in 1973 that the UK finally became a member of the European Economic Community (EEC). In 1992, through a treaty, the EEC became the European Union. By 2013, 28 countries became members of the EU. While the UK in 2016, during informal voting in its parliament, decided to leave the EU which is popularly termed as Brexit. A referendum took place in 2017 and yielded 51.9% in favor of leaving the EU. The British decision to exit the EU is influenced by a number of factors.

The United Kingdom contributes a significant amount to the EU's budget which according to Britain's perspective is later wasted by being spent on other countries. The free mobility of labor, being a key feature of the EU, is also regarded as a threat to domestic labor. Britain's possible withdrawal from the EU will have numerous economic, political and socio-cultural impacts for her as well as for Europe as a whole. This study attempts to explore the implications of the Brexit decision for the UK's economy. In addition, it also tries to estimate the duration of the shock to be received by Britain's economy as a consequence of Brexit.

Literature Survey

Within the contemporary scenario, Britain's withdrawal from the EU is a central issue for the people of both territories. Thus, the potential consequences from the said withdrawal have attracted the interest of economists, politicians and thinkers.

(Zaderenko, 2017) studied the impact of Britain's referendum for withdrawal from the EU. The study found that workers from other EU countries make significant contributions to Britain's economy in the form of taxes. In addition, they were also found to be less demanding in terms of welfare and public services. Further, no correlation was found between the influx of people from the EU countries and the reduction of jobs for British people. In the post Brexit period, the loss of taxes paid by workers from the EU countries can severely affect the budget deficit in the UK. However, her study lacks the quantification of the exact impacts that Britain will likely face after exiting the EU.

Through computer simulations and scenario calculations, the various implications of the Brexit were quantified by the Global Economic Dynamics (GED) study. The study estimated that the cost of Brexit for the UK ranges between 0.6% and 3% of GDP per capita income. It was also found that by leaving the EU, the United Kingdom can at most, obtain a potential financial saving of 0.5% of GDP. The uncertainty factor as a consequence of Brexit, for both UK and other 27 EU countries will be significant. Findings also revealed that in preceding years, Britain's fiscal markets and labor markets improved due to migrants from EU member states. However, a 0.5% decrease due to the return of migrants could cause a 2% to 5 % decrease in per capita income of the UK (Reiter, 2015). One of the key reasons behind the Brexit is the rise of economic nationalism.

The rise of economic nationalism in the UK and its consequent withdrawal from the EU is found to have a more significant impact on the former (Born, Müller, Schularick, & Sedláček, The Costs of Economic Na-tionalism: Evidence from the Brexit Experiment, 2018). It is also pertinent to note that the consequences of Brexit will not be limited to the UK or EU only. Rather, it will have implications for the rest of the world as well. The position of the UK and EU across the globe will be significantly influenced by Brexit which, in turn, will affect the rest of the world through numerous channels (Irwin, 2015). Despite the many who regard Brexit as an unfavorable event for the British economy, there are others who believe the opposite.

(Minford, Mahambare, & Nowell, 2005) consider Brexit as a new page of political and economic sovereignty for the United Kingdom. It is further stated that EU membership was thought to have an economic rationale but different treaties under EU membership caused economic as well as political losses, such as the fall of the Berlin wall. Consequently, the EU membership causes intolerable economic costs for the UK and therefore, there should be renegotiations about the UK and EU relationships. It is worthwhile to note that the anticipated British withdrawal from the world's largest trading block, i.e. the EU, has already started yielding its impacts. Britain's GDP experienced a decline of 1.3% by the third quarter of 2017 which is likely to worsen in the years to come (Born, Müller, Schularick, & Sedlacek, 2017). However, the exact extent of shock from the Brexit decision will only unfold after it is actually materialized. This study is an attempt to estimate the shock that Britain's economy is likely to experience in the post Brexit scenario.

Methods and Procedures

The study employed annual time series data extracted mainly from the database of the World Bank titled 'World Development Indicators (WDI)'. The data on the desired variables were used for the period ranging from 1970 till 2016.

Variables of the Study

To estimate the shock that the UK's economy will likely receive as a consequence of the Brexit, the following variables were used.

- Gross Domestic Product (GDP): GDP is one of the important macroeconomic variables that can adequately gauge an economy. For this study, GDP data for Britain's economy, as a constant of 2010 US$, were used.
- Imports: Data on imports were also taken as a constant of 2010 US$.
- Exports: The volume of a country's exports can depict a good picture of its economy. To accomplish this, export data as a constant of 2010 US$, was utilized.
- Foreign Direct Investment (FDI): FDI's annual data was also taken as a constant of 2010 US$.

Data Analytical Technique

To investigate the impact and duration of an economic shock to the British economy due to Brexit, the Vector Autoregressive (VAR) model was used. VAR model yields better results when used for the short-run analysis of economic phenomena. The econometric models are expressed below.

$$GDP = \beta_0 + \beta_1\, import + \beta_2\, export + \beta_3\, FDI + \mu_i \quad\text{(I)}$$

$$Import= \beta_0 + \beta_1\ GDP+ \beta_2\ export + \beta_3\ FDI+ \mu_i\ \dots\dots\dots\dots\dots\dots\dots\dots\dots \text{ (II)}$$
$$Export= \beta_0 + \beta_1\ GDP+ \beta_2\ import + \beta_3\ FDI + \mu_i\ \dots\dots\dots\dots\dots\dots\dots \text{ (III)}$$
$$FDI = \beta_0 + \beta_1\ GDP+ \beta_2\ import + \beta_3\ export + \mu_i\ \dots\dots\dots\dots\dots\dots\dots \text{ (IV)}$$

Data Analysis and Discussion

Prior to further analysis, the stationarity of the time series was checked. All the variables were found to be stationary at first difference which fits the candidature of the data set for VAR treatment.

Table 1. Stationarity of the Time Series

Variables	Prob. At level	Prob. At 1st difference	Conclusion
GDP	0.9947	0.0110	I(1)
Import	1.0000	0.0002	I(1)
export	1.0000	0.0001	I(1)
FDI	1.0000	0.0067	I(1)

Source: Data Analysis

Optimal Lag Selection

While using time series data, it is pertinent to determine the optimal lag. This was accomplished through the VAR lag order selection criteria which revealed 3 as the optimal lag.

Table 2. Optimal Lag Selection

Endogenous Variables: GDP IMPORT EXPORT FDI

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-3062.397	NA	4.01e+55	139.3817	139.5439	139.4418
1	-2869.088	342.6842	1.27e+52	131.3222	132.1332*	131.6229*
2	-2854.831	22.68150	1.40e+52	131.4014	132.8612	131.9428
3	-2829.095	36.26503*	9.47e+51*	130.9589*	133.0674	131.7408

Source: Data Analysis

Cointegration Test

To check for cointegrating vectors, the Johansen test was employed. No cointegration was detected, as shown in results.

Table 3: Johansen Test of Cointegration

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.462366	26.68482	27.58434	0.0648
At most 2	0.198059	9.490991	14.26460	0.2476
At most 3	0.000510	0.021918	3.841466	0.8822
Max-eigenvalue test indicates no cointegration at the 0.05 level				

Source: Data Analysis

VAR Estimates

Prior to estimating the shocks, the short-run relationship was checked through the VAR model, the results of which are given below.

Table 4: VAR Estimates

Standard errors in ( ) & t-statistics in [ ]

	GDP	**IMPORT**	**EXPORT**	**FDI**
GDP(-1)	1.341086	18078422	12921025	-0.136725
	(0.22969)	(8787144)	(8485938)	(0.40510)
	[5.83877]	[2.05737]	[1.52264]	[-0.33751]
GDP(-2)	-0.696940	-28987031	-27391382	-0.432773
	(0.29647)	(1.1E+07)	(1.1E+07)	(0.52288)
	[-2.35082]	[-2.55574]	[-2.50077]	[-0.82767]
GDP(-3)	0.397130	14356005	18737739	0.694946
	(0.21329)	(8159744)	(7880043)	(0.37618)
	[1.86195]	[1.75937]	[2.37787]	[1.84739]
IMPORT(-1)	6.57E-09	0.828179	0.159231	1.63E-08
	(9.2E-09)	(0.35088)	(0.33885)	(1.6E-08)
	[0.71635]	[2.36031]	[0.46992]	[1.00986]
IMPORT(-2)	-7.37E-09	0.422075	0.213978	-2.39E-08
	(9.6E-09)	(0.36705)	(0.35447)	(1.7E-08)
	[-0.76767]	[1.14992]	[0.60367]	[-1.41266]
IMPORT(-3)	-9.55E-09	-0.583861	-0.351172	4.81E-09
	(8.6E-09)	(0.32892)	(0.31764)	(1.5E-08)
	[-1.11068]	[-1.77510]	[-1.10556]	[0.31708]
EXPORT(-1)	-5.13E-09	-0.150125	0.681268	-4.13E-09
	(8.0E-09)	(0.30439)	(0.29396)	(1.4E-08)
	[-0.64464]	[-0.49320]	[2.31758]	[-0.29448]
EXPORT(-2)	1.97E-08	0.371422	0.120147	3.23E-08
	(9.5E-09)	(0.36368)	(0.35121)	(1.7E-08)
	[2.07290]	[1.02130]	[0.34210]	[1.92458]
EXPORT(-3)	-5.09E-09	0.051292	0.017016	-3.18E-08
	(7.3E-09)	(0.28098)	(0.27135)	(1.3E-08)
	[-0.69253]	[0.18255]	[0.06271]	[-2.45231]
FDI(-1)	-0.156151	-12765898	-8607597.	0.526120

	(0.10281)	(3933263)	(3798439)	(0.18133)
	[-1.51881]	[-3.24562]	[-2.26609]	[2.90145]
FDI(-2)	-0.028051	2126324.	1461717.	0.027651
	(0.11894)	(4550418)	(4394438)	(0.20978)
	[-0.23583]	[0.46728]	[0.33263]	[0.13181]
FDI(-3)	0.319201	11785195	6581454.	0.308954
	(0.13700)	(5241286)	(5061624)	(0.24163)
	[2.32991]	[2.24853]	[1.30027]	[1.27861]
C	-539.9876	-6.44E+10	-5.04E+10	-1428.305
	(1009.75)	(3.9E+10)	(3.7E+10)	(1780.92)
	[-0.53477]	[-1.66644]	[-1.35180]	[-0.80201]

Source: Data Analysis

Impulse Response Functions (IRF)

To check the impact of a shock on the variables, impulse response functions were used. In the given scenario, the shock refers to Britain's likely withdrawal from the EU, commonly known as Brexit. The impulse response functions for all the variables are given below.

- ***Gross Domestic Product (GDP)***
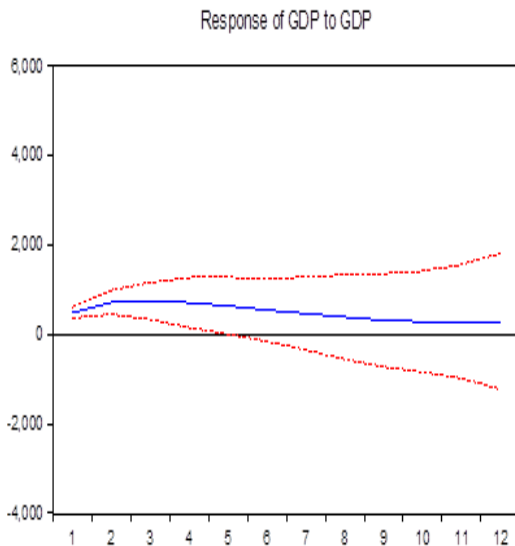
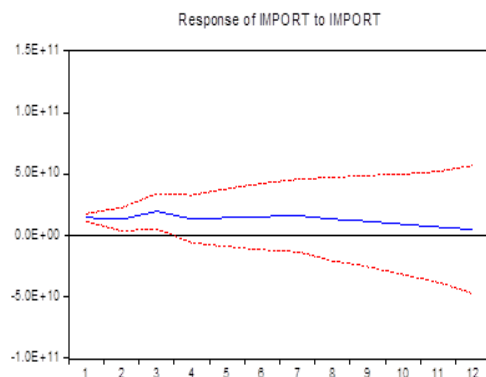**Figure 1**: IRF of GDP to GDP

Source: Data Analysis
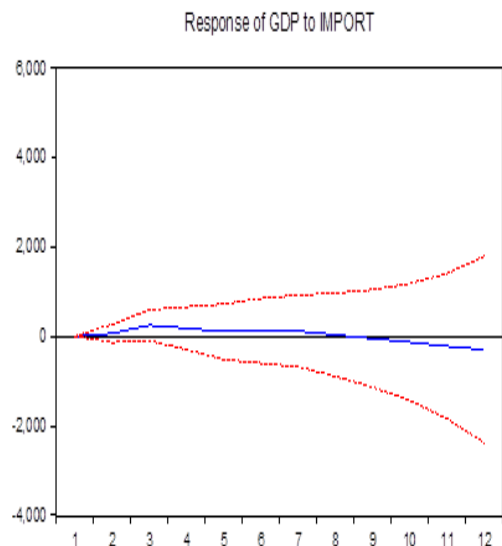
Figure 2: IRF of GDP to IMPORT

Source: Data Analysis
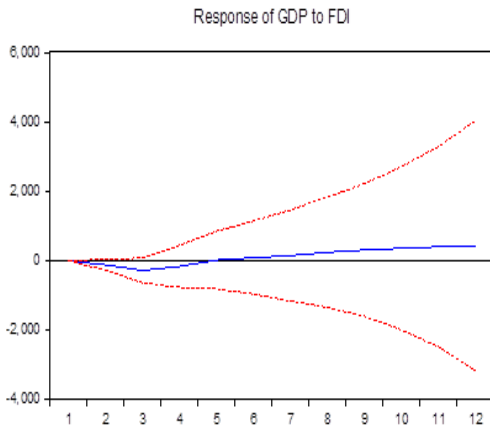
Figure 3: IRF of GDP to Export

Source: Data Analysis
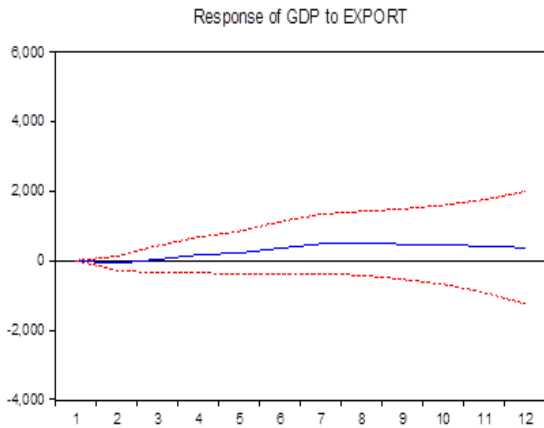
Figure 4: IRF of GDP to FDI

Source: Data Analysis

The impulse response functions show that GDP will show a positive response to an economic shock to its own value from the second year onwards and the trend of shock will be declining, given in figure 1.

The response of GDP to imports would be positive and almost equal to the mean value from the second to the ninth year. In year 9, the response of GDP will converge and will tend to be negative for the next three years, shown in figure 2.

GDP showed no response to exports till the second year. Onwards, the response of GDP would be positive to a change in exports due until the twelfth year. In addition, dispersion from mean value is less, depicted in figure 3.

Due to an economic shock, FDI to GDP shown a negative response from the first year to the fourth. Afterward, the values of GDP tend to converge and depict positive response, as seen in figure 4.

- **Imports**
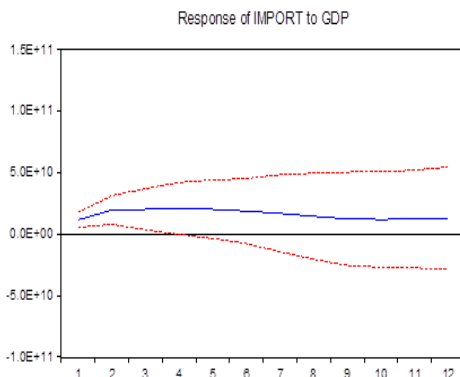
Figure 5: IRF of IMPORT to GDP
Source: Data Analysis

Figure 6: IRF of IMPORT to IMPORT
Source: Data Analysis
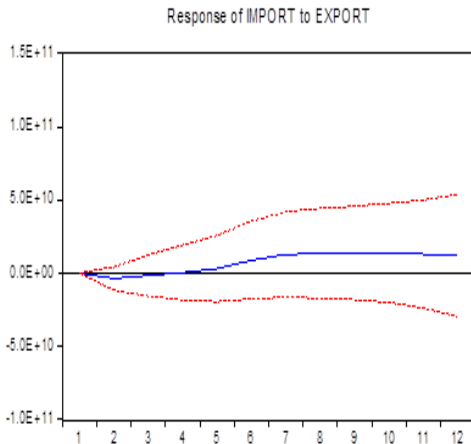
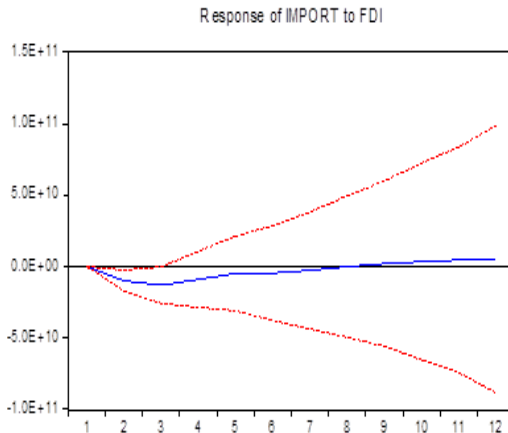**Figure 7**: *IRF of IMPORT to EXPORT*
Source: Data Analysis

Figure 8: *IRF of IMPORT to FDI*
Source: Data Analysis

Import showed a positive response to a change or shock to GDP starting from the second year onwards as shown in figure 5.

Import shows a positive response to an economic shock to its own values from the second year until the eleventh year. After the eleventh year, the response tends to converge and equalize to mean value as demonstrated by figure 6.

Import shows no response to a change in exports until the fourth year. Afterwards, it shows a positive response to a change in exports, given in figure 7.

Import shows a negative response to a change in FDI for 7 years, afterward the response converges to mean value which can be observed from figure 8.

- **Exports**
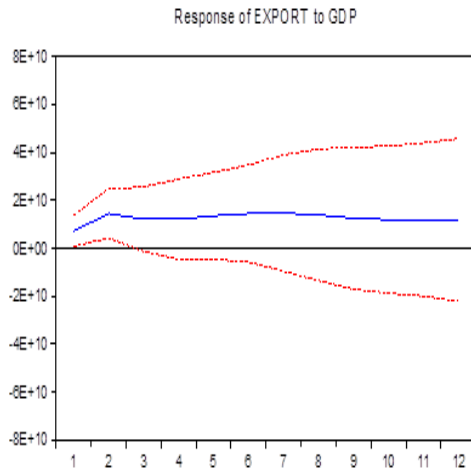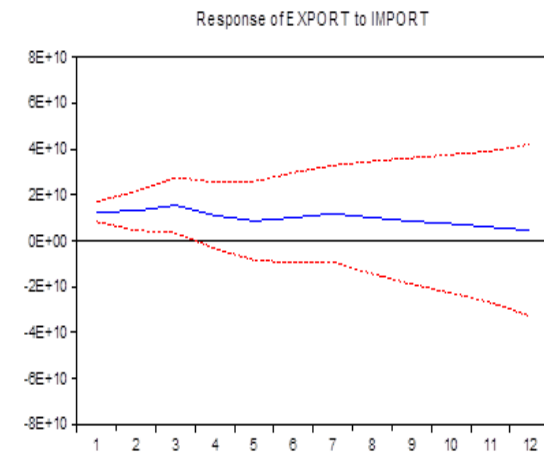

Figure 9: *IRF of EXPORT to GDP*

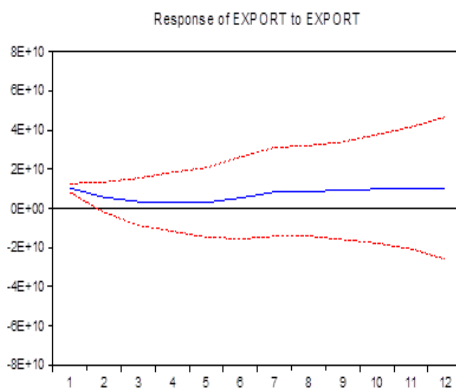**Figure 10**: *IRF of EXPORT to IMPORT*

Figure 11: *IRF of EXPORT to EXPORT*
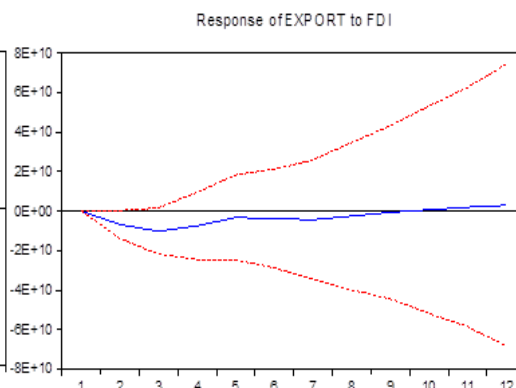*Source: Data Analysis*

Figure 12: *IRF of EXPORT to FDI*
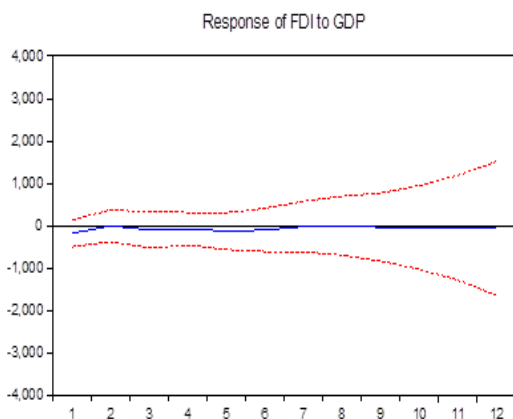*Source: Data Analysis*

From the sixth month onwards, export shows a continuous positive response to an economic shock to GDP, shown in figure 9.

From the middle of the first year, export shows a positive response to a change in import. At the end of the eleventh year, the response of export tends to converge to mean value, given in figure 10.

Export shows a continuous positive response to any change in its own value from the middle of 1st year onwards, depicted in figure 11.

From the start of the second year, exports show a negative response to an economic shock to FDI till the ninth year and after that, the response will converge to mean value as revealed by figure 12.

- *Foreign Direct Investment*

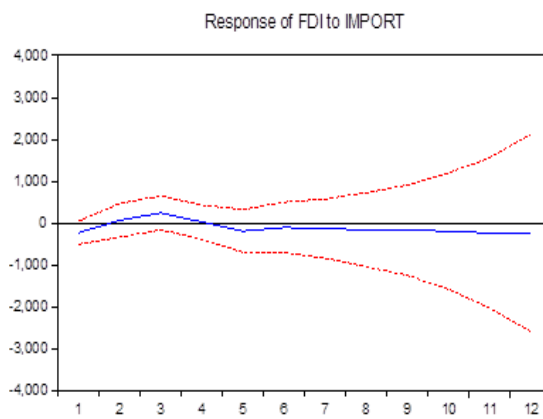*(FDI)***Figure 13**: *IRF of FDI to GDP*
Source: Data Analysis

Figure 14: *IRF of FDI to IMPORT*
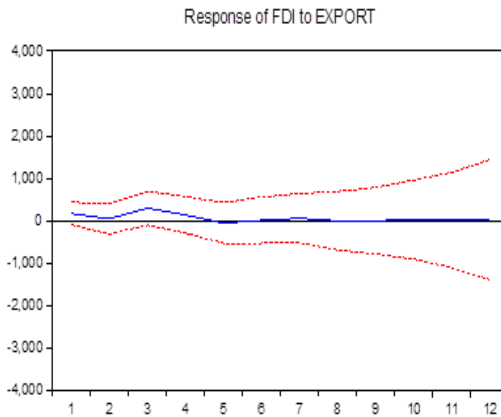*Source: Data Analysis*

Figure 15: *IRF of FDI to EXPORT*
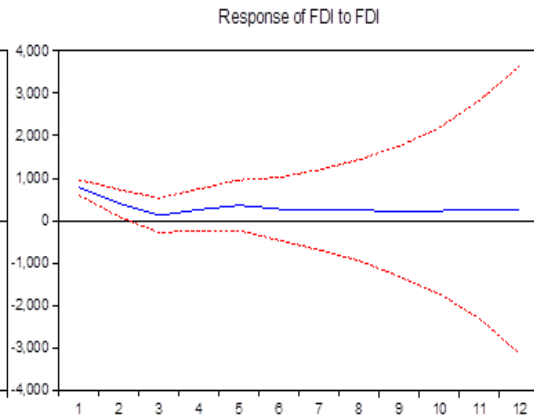*Source: Data Analysis*

Figure 16: *IRF of FDI to FDI*
Source: Data Analysis

FDI shows almost no response to an economic shock in relation to GDP, shown in figure 13.

The response of FDI to a change in imports is initially negative. From the second year until the middle of the third year, the response becomes positive. However, afterwards it again converges and remains negative for upcoming years, demonstrated by figure 14. The response of FDI to an economic shock, in relation to exports, is positive and subject to fluctuation in the first 5 years. Afterward, the response converges to mean value which can be observed in figure 15.

FDI shows a positive but decreasing response to an economic shock to its own value from the middle of the first year until the middle of third year. After the third year, FDI shows a positive response to changes in its own values and remain near to mean values, stated in figure 16.

Conclusion

The study attempted to estimate the short-run implications of Brexit on Britain's economy by considering key variables related to the health of its economy namely the GDP, imports, exports, and FDI. It was found that Brexit is likely to cause fluctuations in the said variables for the UK's economy. While the shock received in the shape of Brexit will continue for about 12 to 15 years, afterwards the variables are expected to revert to their usual trend. The costs incurred in the short run, as a consequence of Brexit, won't be irreparable. However, Brexit will enable the UK to regain political and economic sovereignty which, in turn, can aid its economy. It will also be able to save a significant amount of money in the form of EU's membership fee which can be used to further economic and political goals across the globe.

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