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Post Brexit Transatlantic Trade: A Monetary Approach

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Abstract

It is indispensable to assess how trade and FDI among the UK and the rest of world would be affected post-Brexit. This paper investigates how Brexit will affect exports and FDI from China, EU, and the US to the UK economy. Using econometric models with time series quarterly data for the period of 2001 through 2017 the results of this quantitative study indicate that Brexit will have significant impacts on trade and FDI from China, the United States, and EU to the UK. The topic is of great importance because it has severe consequences not only for the UK economy but also for the rest of the world. The quantitative results of this study suggest that Brexit has a negative statistically significant impact on trade and FDI from the EU and the US to the UK; however, trade and FDI from China will increase post-Brexit since China is highly integrated into the UK economy and has already established close trade relationships with the UK through mergers and acquisitions in recent years.

JEL Classifications: F10, F13, F14, F40, F50.

Keywords: Brexit, Foreign Direct Investment (FDI), Trade Pattern, Tariffs, Sovereign Debt, Stock Market, Econometric Models

1. Introduction

1.1. Introduction to the Problem

The outcome of UK's referendum in June 2016 surprised the world and raised waves of uncertainty about the future of trade patterns and FDI from the rest of the world to the UK. Brexit not only has severe consequences for trade between the EU and the UK due to higher tariffs and non-tariff barriers, but also affects trade and FDI between the UK and rest of the world including: China and United States, as it increases the idiosyncratic risk for foreign investors.

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Though Brexit has increased the transaction cost of trade for all European states, the determination of EU states to support a single market could exacerbate the hardship of this momentum for the UK economy. The UK has a huge trade deficit with EU, particularly with Germany and Netherlands, which weakens its ability to negotiate a bilateral trade deal. This quantitative research study implements regression models with quarterly data for the period of 2001 through 2017 to measure the effects of Brexit on trade and FDI between the UK and China, the EU, and the United States. The goal of this quantitative research study is twofold; first it measures the effects of Brexit on exports of China and the US versus the EU to the UK economy; second it measures the effects of Brexit on FDI from China, and the US versus the EU into the UK economy. The results indicate that Brexit have important consequences for world trade and FDI.

1.2. Importance of the Topic

It is very likely that Brexit weakens trade between the UK and the rest of the Europe as Europe will impose tariffs and non-tariff barriers on the UK exports after leaving the EU officially. Similarly, the rise of protectionism in the United States may lead to weakened trade between the US and the UK. Though Brexit has threatened the future of trade between the EU states and rest of the world, solidarity and economic integration among the EU states for conservation of a single market could reduce the transaction costs and lead to higher level of trade and economic growth for the EU. Indeed the final outcome depends on the foreign investors' reactions on how to trade and invest in the UK post-Brexit. The EU has potentials for attracting more trade and capital flow than the UK because it is bigger, and the size of the economy is one of the most important determinants for trade and capital flows.

The United States accounts for a small share of UK exports; almost 60% of UK exports flow to other EU states. The main question that arises here is how trade pattern between the U.S. and UK will evolve during a period of time when both countries are defending protectionism. Another key player that can play a fundamental role in the future trade pattern post-Brexit is China. Given the fact, that investors in the EU states will stay reluctant to do business with British firms, the UK could face substantial losses for trade with EU; however, this loss may be neutralized through higher trade with China, as the main trade and economic partner of the UK. Our goal here is to quantify these effects to see how trade patterns among different regions will be affected post-Brexit.

Another potential loss that may threaten the UK's economy is a sharp decline in foreign direct investment (FDI) due to new restrictions and arrangements post-Brexit. Based on London School of Economics (LSE) if the UK establishes a free trade agreement with the EU post-Brexit it will lose FDI equivalent to 2.2% of its GDP. The momentum would likely enhance FDI flow from rest of the world to other EU states. However, there is no empirical study on the quantitative effects of Brexit on FDI from the rest of the world to the UK economy. One of the novel features of this study is that it investigates how Brexit will affect FDI from China and the US into the UK economy; and how does it affect trade among these countries.

The rest of the paper is organized as follows; Section 2 reviews the literature on the effects of Brexit on the UK economy. Section 3 represents data and research methodology. Section 4 discusses the estimated results for trade and FDI econometric models. Finally Section 5 represents concluding remarks and suggestions for future research.

2. Literature Review

As several studies have shown Brexit doesn't seem to have severe consequences for EU members (Van Ham, 2016; Dhingra, Ottaviano, Sampson, & Van Reenen, 2016; Kierzenkowski, Pain, Rusticelli, & Zwart, 2016); however, it is likely that it has severe consequences for the UK economy. Begg and Mushovel (2016) investigate the long-run macroeconomic effects of Brexit and find there will be a loss of ten percentage points in GDP. They conclude that demand from EU countries account for 12% of final demand for the UK products and services, and Brexit will lead to 3.3 million job loss for the UK economy.

European Movement International (2016) estimates a loss of 2.2% GDP up to a benefit of 1.6% GDP in 2030 post-Brexit.

Wood and Jang (2017) investigate economic consequences of Brexit for Asia. Given the highly integrated nature of Asian economy in Europe they indicate that share of Asian's exports to the UK is relatively low (2.5% in 2011) and has been gradually falling over the last 20 years. The share of the Asian exports to EU is higher than that of the UK (with an average of 12.83% per year); the exceptions being India (25.15%) and China (18.62%), Vietnam (15.56%) and Singapore (13.09%). They conclude that a hard Brexit could have potential benefits for China, because China had made significant investment in the UK and have developed mergers and acquisitions in the UK, particularly in recent years.

Emerson, Busse, Di Salvo, Gros, and Pelkmans (2017) estimate the effects of Brexit on FDI with EU. They find that the likely impact of Brexit could be deferral of investments and FDI in the UK and in Europe as a whole. Up to now, UK has been more successful in attracting FDI due to its regulatory system, legal environment, and advantage of English language. However, they conclude there could be a redistribution of FDI in favor of EU countries and in loss of the UK, post-Brexit.

Busch and Matthes (2016) indicate around 60% of the UK trade is with EU or with an EU trade agreement. With the new institutional trade arrangements trade transaction costs would rise sharply and lead to delays for British exports to EU. They estimate the GDP loss of Brexit to be around 10%.

Dhingra *et al*. (2016) investigate the statistical effects of Brexit on GDP and trade. They found that income falls by 1% in the optimistic case and falls by 2.3% in the pessimistic case. Their long-run estimate on the effects of Brexit suggests that reduced trade also lowers productivity; factoring in these effects leads to a huge loss of 6.3% to 9.5% of GDP.

Ebell and Warren (2016) estimate the long term impact of leaving EU for the UK economy. They project that GDP will be around 1.5% to 3.7% lower than the baseline scenario by 2030. Consumption will be hit harder than GDP, falling by 2.4% to 5.4%. And real wages will fall between 2.4% and 5.4%. The most important effect is for FDI, which is estimated to fall between 12% and 28% post-Brexit.

Van Reenen (2016) uses World Input-Output database and a general equilibrium model that investigates the effects of Brexit on UK trade with EU and the rest of the world. In an optimistic soft Brexit scenario, nontariff barriers within the European Union will fall 5.7% during the next decade, while in a hard Brexit scenario they will fall by 12.8%.

Loring (2016) argues that GDP is projected to slow to 1% in 2017 as a result of Brexit, well below the pace in recent years. In addition, access to single market had attracted foreign investors to the UK stocks, accounting for 57% of its GDP; however, with leaving the EU, UK loses foreign investors appeal for investment.

Based on the International Monetary Fund, European Dept. [IMF] (2016) the stock of FDI in the UK is just over £1 trillion or 57% of its GDP. The UK receives the largest share of intra-EU FDI; almost half of the FDI that comes into the UK is from the EU. Though some have questioned whether net effects on UK exports would be significant (Burrage, 2016), others, have emphasized on the loss of productivity and trade income (Dhingra *et al*., 2016). If UK leaves the EU, it would be free to reduce tariffs to zero, which makes the consumers better off, all else equal, as emphasized by Minford (2016). The IMF report concludes that the UK economy would likely be worse off and the output will be lower by 1.5% in the long-run. Indeed, the GDP growth dips by 1.4% in 2017 and by 1.5% below the baseline by 2019. Based on their estimate the unemployment rate will increase to 5.5% in 2019.

According to Jackson, Akhtar, and Mix (2016) the stock market value of UK bank equities fell by 10%, immediately following the Brexit vote. And the British pound depreciated to its lowest level in more than 30 years by 13% since Brexit.

Kierzenkowski *et al*. (2016) investigate the economic consequences of Brexit. They emphasize a large capital outflow might threaten the financing of the record high current account deficit of 7% of GDP. By

2020 the cost for the UK economy would be over 3 percentage points of its GDP, equivalent to £2200 per households. The GDP loss for the new EU would be around 1 percentage point. By 2030 the UK GDP would be 5% smaller than if it had remained a member of the EU; the cost would then be £3200 per household.

Oliver (2016) indicates that UK constitutes 14.8% of the EU's economic area and represents 19.4% of EU exports and runs a trade deficit that ranges between £28 billion in 2012 and £61.6 billion in 2014. Pressures from the US and China may force the EU to continue to embrace an outward looking economic agenda; however, if EU becomes more united, its attitude toward the UK might change.

Irwin (2015) emphasizes that UK is the largest recipient of the FDI in the EU; however, Brexit could reduce the attractiveness of the UK as a gateway to EU. Indeed, EU accounts for 46% of FDI in the UK in 2013; though this share has fallen from 53% since 2009, it is likely the share will decline more significantly post-Brexit.

Springford, Tilford, and Whyte (2014) indicate that the impact of the EU demand on UK GDP is six times larger than the impact of UK demand on EU GDP. Though the UK has been the largest EU beneficiary of free capital movement, its vulnerability to FDI will depend on the type of arrangement that replaces EU membership. If the UK adopts for free trade agreements with EU the adverse impact on FDI could be huge. They conclude that lack of free access to EU market would undermine the attractiveness of the UK for foreign investors.

Ottaviano, Pessoa, Sampson, and Van Reenen (2014) investigate the effects of tariffs on EU-UK trade relationship. Using World Input-Output Database for 40 countries and 35 sectors and a quantitative general equilibrium model they find that UK losses due to Brexit could be a 3.09% drop of its GDP, under a pessimistic scenario. When they account for in the loss of the productivity, the loss would increase to 2.2% of GDP under the optimistic scenario, while for the pessimistic scenario the loss would jump to 6.3% to 9.5% of its GDP. They conclude these losses may even be higher if we account for welfare channels associated with EU membership such as immigration, increase in productivity, improve in R&D, and vertical production chain.

Springford, Tilford, McCann, Whyte, and Odendahl (2016) discuss the economic consequences of leaving Brexit. They argue trade with the US or China contributes far less to the UK economy than the EU. The US buys 3.4% of Britain's output, and China only 1%. The EU provides two fifths of the foreign demand for UK services, while the US's share is 17% and the BRICs' just 10%. They conjecture the idea that EU would be freer outside the EU is based on a series of misconceptions and that a medium sized open economy like UK could hold sway in an increasingly fractured trade system dominated by the US, EU, and China.

Honnefelder, Kolassa, Gernert, and Silvestri, R. (2017) estimate that the GDP of the UK as well as GDP of other European countries will grow at a slower path following Brexit than they would have been in case of "remain" outcome.

3. Data and Methodology

To find out how Brexit would affect trade and FDI from China and the United States versus EU into the UK, this study implements OLS models and quarterly data from 2001 to 2017.

Will UK attract more FDI and exports from rest of the world, particularly from China and the United States post-Brexit? This is a fundamental question that we attempt to answer here. Though it is likely that the UK will experience a sharp drop in FDI from the EU post-Brexit as the data for recent months suggest, our goal is to quantify the pattern of FDI from rest of the world including China and the US into the UK economy.

Indeed, one of the novel features of this study is that it estimates the quantitative effects of Brexit on trade and FDI flow from China and the US compared to the EU through econometric models.

3.1. Macroeconomic Variables and Data

Table 1 presents list of variables that are used to estimate trade and FDI from China and the US versus EU into the UK economy.

Table 1. List of variables

EXP	Exports to GDP ratio
GDP	Gross Domestic Production
IRP	Index of Price Ratio
EX	Exchange Rate
Openness	Openness of the UK economy measured by imports plus exports to GDP
FTSE	London Stock market index (FTSE)
Inf	Inflation
Risk	Risk of Sovereign Debt, (Debt to GDP ratio)
Dummy	Dummy for post-Brexit periods

The data has been retrieved from OECD, European Central Bank, US Department of Commerce, Bank of England, and Bank of China websites.

3.2. Methodology

To measure the effects of Brexit on exports and FDI from China and the US versus EU to the UK we use OLS econometric models with time series quarterly data for the period of 2001-2017. The cointegration technique is used to make sure that data is stationary I(0); if not the first difference of the variables will be used to ensure that data is stationary.

3.2.1. Trade Flow (Exports)

The first equation estimates exports from China and the US versus EU to the UK as the main trade partners; where exports to GDP ratio (EXP) is dependent variable; and real GDP, index of price ratio (IPR), exchange rate (EX), openness of the economy (Openness), and a dummy variable for Brexit (Dummy) are independent variables. The following equation has been used by several authors including Guisan and Cancelo (2002). However, a dummy variable (Dummy) is embedded into the model to proxy the effects of shocks such as Brexit, or entrance of new countries to the EU. The use of dummy variables in trade model has a historic background and this type of dummy has already been used by Springford *et al*. (2014) to estimate the effects of Brexit on trade patterns. For post-Brexit period, the dummy would be one, and for pre-Brexit periods it would be equal to zero. The estimated coefficient on the dummy variable enables us to measure the effects of Brexit on exports from China, the US, and EU to the UK.

$$EXP = a_0 + a_1 GDP + a_2 IPR + a_3 EX + a_4 Openness + a_5 Dummy \quad (1)$$

If the estimated model indicates that coefficient of Dummy is statistically significant, it means that Brexit would have a significant impact on exports to the UK. The magnitude of coefficient indicates how trade from China, the US, and the EU to the UK would be affected post-Brexit.

3.2.2. Foreign Direct Investment (FDI)

An econometric model with quarterly data for the period of 2001-2017 will be used to quantify the effects of Brexit on FDI from China, the US, and EU into the UK. The equation represents the traditional approach of FDI model as suggested by several economists including (Blonigen & Piger, 2014; Walsh & Yu, 2010); where FDI is a function of GDP, stock market index in the host country (FTSE), inflation (Inf), exchange rate (EX), openness of the economy (Openness), risk of sovereign debt (Risk) measured by debt to GDP ratio, and a dummy variable that will be measured as identified in the export equation.

$$FDI = a_0 + a_1 GDP + a_2 FTSE + a_3 Inf + a_4 EX + a_5 Openness + a_6 Risk + a_7 Dummy \quad (2)$$

If the dummy variable in this model is statistically significant and of negative sign it means that Brexit has a statistically significant negative impact on FDI flow to the UK as expected due to idiosyncratic risk and waves of uncertainty which arises after leaving the EU.

4. Results and Discussion

4.1. Estimated Results for Trade

To investigate whether data is stationary we use augmented Dickey Fuller and Phillips Perron tests. Both tests indicate that data is non-stationary in level form (0); therefore we used the first differences. The results as presented in Table 2 suggests that all variables are stationary in the first difference level (integrated of degree one).

Table 2. Unit root tests of first order

Variable	ADF	Phillips Peron
GDP	1.47 (2.65)*	2.11 (3.17)*
IRP	1.75 (3.44)*	1.65 (4.25)*
EX	1.18 (3.59)*	1.24 (4.65)*
Openness	2.34 (5.17)*	1.47 (3.87)*
Stock	2.14 (3.78)*	1.89 (5.4)*
Inf	3.12 (4.56)*	1.24 (4.27)*
Risk	1.76 (3.59)*	2.17 (4.78)*

* Rejection of null hypothesis of the presence of the unit root.

We also use Johansen approach to test whether a long-run relationship exists between these variables. The null hypothesis of no cointegration is rejected, leading us to conclude that there exists a long-term relationship between all variables (Table 3).

Table 3. Johansen's co-integration tests for variables

H0	Eigenvalue	Likelihood ratio	5% critical value	1% critical value
r=0	0.34	47.16*	45.15	50.31
r<1	0.27	48.23**	39.27	47.18
r<2	0.25	37.15*	31.14	43.29
r<3	0.21	32.18*	27.17	40.17
r<4	0.20	36.98**	22.56	35.26
r<5	0.18	34.15**	20.14	32.63
r<6	0.15	29.76**	19.78	28.97
r<7	0.12	27.17**	18.76	25.14

* Rejection of null hypothesis at 5% significance level; ** Rejection of hypothesis at 1% significance level.

The estimated results for exports equation from China, the US, and EU to the UK (Table 4) suggest that independent variables are able to explain more than 81% of changes in exports to the UK. The (t) statistics for all variables are statistically significant. Interestingly enough, the results suggest that the dummy variable is statistically significant and of the negative sign for the US and EU, but of positive sign for China. In other words, based on our estimated results exports from China to the UK will increase post-Brexit by 1.8%, while exports from the US and EU will decrease by 2% and 1.5%, respectively. The reason for the increase of exports from China to the UK is that it is highly integrated into the UK economy and has established close trade relationship with the UK in recent years.

Table 4. Estimated results for exports from different regions to the UK

Independent variables	Exports from the US	Exports from China	Exports form EU
GDP	0.024 (2.17)**	0.017 (1..89)*	0.014 (1.96)*
IRP	0.017 (3.18)**	0.015 (2.64)**	0.021 (3.18)**
EX	0.014 (4.12)**	0.008 (3.12)**	0.005 (2.87)**
Openness	0.017 (5.27)**	0.012 (3.24)**	0.017 (4.36)**
Dummy	-0.020 (3.18)**	0.018 (2.56)**	-0.015 (2.98)**
R-Squared	0.83	0.89	0.81
F-Statistics	124.16	143.78	156.17
Durbin Watson Statistics	2.14	1.78	2.18

Note: Numbers in parenthesis are standard errors. ** Significant at 1% level; * significant at 5% level.

4.2. Estimated Results for FDI

Table 5. Estimated results for (FDI) from different regions to the UK

Independent variables	Capital flow from US	Capital flow from China	Capital flow from EU
GDP	0.014 (2.23)**	0.010 (1.87)*	0.007 (1.95)**
FTSE	0.015 (2.79)**	0.021 (3.56)**	0.009 (2.46)**
Inf	0.007 (3.26)**	0.012 (4.23)**	0.021 (3.78)**
ER	0.021 (4.79)**	0.016 (3.12)**	0.009 (2.86)**
Openness	0.018 (3.78)**	0.014 (4.15)**	0.008 (3.56)**
Risk	0.025 (4.36)**	0.022 (3.12)**	0.025 (2.78)**
Dummy	-0.022 (2.78)**	0.019 (3.27)**	-0.017 (2.67)**
R-Squared	0.85	0.87	0.89
F-Statistics	166.17	154.31	178.19
Durbin Watson Statistics	2.10	1.87	2.25

Note: Numbers in parenthesis are standard errors. ** Significant at 1% level, * significant at 5% level.

The estimated results for the FDI equation from different regions to the UK (Table 5) suggest that more than 85% of changes in FDI stock from different regions to the UK economy is explained by our independent variables. Our results suggest that dummy variable for Brexit is statistically significant and of negative sign for the US and the EU, but of positive sign for China. In other words, based on our results FDI from China to the UK is expected to increase by 1.9% post-Brexit, while it is expected to decrease by 2.2% and 1.7% for the US and the EU, respectively. The reason is that China has closer economic and trade ties with the UK and is highly integrated into the UK economy through mergers and acquisitions in recent years. Therefore, it is likely to observe an increase in trade and FDI from China to the UK economy post-Brexit, particularly, given the fact that China's economy is more reliant on external demand.

5. Discussion and Policy Implications

The estimated econometric results of this study suggest that China will likely be the winner of Brexit since its trade and FDI flow to the UK economy will increase significantly post-Brexit. The UK economy can partially neutralize the negative consequences of Brexit by creating closer trade relationships with China. Indeed, since China is highly integrated into the UK economy through mergers and acquisitions, it is likely to remain integrated in to the UK economy and be the main player as trade tensions escalate between the U.S. and the rest of the world.

Our estimated results here are close to those of Wood and Jang (2017) who find a hard Brexit could have potential benefits for some Asian countries including China. Our results are also in accordance with those Ebell and Warren (2016) who find FDI from EU falls substantially after leaving the EU.

This paper can be extended in several directions. One direction is to carry out more empirical studies on how the waves of protectionism that induced Brexit could affect macroeconomic variables such as income distribution, employment, inflation, fiscal deficit, trade deficit, and consumption among other variables. Another area that needs further investigation is to incorporate tariffs into the export model in order to see how changes in tariff rates between the U.S., China and the EU may affect the dynamics of transatlantic trade as trade war escalate between the US and the rest of the world.

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