

BREXIT REFERENDUM (PRE AND POST) ON METAL COMMODITY FUTURES PRICES TRADED IN INDIA

ANNIE ABRAHAM¹ALBIN GEORGE SCARIA²

BCom (International Finance), Department of Professional Studies, Christ University, Bengaluru

THANGJAM RAVICHANDRA³

Department of Professional Studies, Christ University, Bengaluru

ABSTRACT:

The Brexit referendum has had varying degrees of impact on the capital and commodity markets of the UK and the EU, along with several other countries. Factors such as ease of doing business, coupled with the fact that London is the center of the financial world has made Britain a prime attraction for foreign investments. Indian investments are the third largest source of FDI in the UK, with over 800 incorporated companies of Indian origin, having a very significant revenue exposure for these investors. Thus, Brexit will cause disruption in free trade, on-going contracts and mobility of human capital, that will ultimately cause a lose-lose situation for the UK and their trade partners. Similarly, on the other side of the exchange, Britain is a significant trade partner of India's, with over \$7bn/ \$304.4bn worth of exports going there.

Keywords: *Brexit, UK, EU, FDI, Export, Metal*

I. INTRODUCTION:

The Brexit referendum has had varying degrees of impact on the capital and commodity markets of the UK and the EU, along with several other countries. Factors such as ease of doing business, coupled with the fact that London is the center of the financial world has made Britain a prime attraction for foreign investments. Indian investments are the third largest source of FDI in the UK, with over 800 incorporated companies of Indian origin, having a very significant revenue exposure for these investors. Thus, Brexit will cause disruption in free trade, on-going contracts and mobility of human capital, that will ultimately cause a lose-lose situation for the UK and their trade partners. Similarly, on the other side of the exchange, Britain is a significant trade partner of India's, with over \$7bn/ \$304.4bn worth of exports going there. In this research paper we are trying to grasp the impact of Brexit on Indian metal commodities' futures prices. (Ailawadi, 2016)

II. REVIEW OF LITERATURE:

- a) (Ailawadi, 2016) *Why should India care about Brexit?* This Bloomberg report gives a basic look into the the implication of Brexit on the trade in India. The report mentions the Tata businesses, and how JLR, Tata Motors and Tata Steel have a significant revenue exposure. India is also the 3rd largest source of FDI so will Indian investors move to country in the EU or not.
- b) (Roy & Mathur, 2016) *Brexit and India-EU free trade agreement* India has been trying to work a free trade agreement with the EU for more than a decade. India looks at Britain as its gateway to Europe, and now that Brexit is happening, it will have serious consequences on India's trade with both Britain and the EU. India needs to figure out its next step or else after the cycle of its current exports, India will have to incur additional costs to do business in the EU.

- c) (Martin & Anderson, 2012) *Export restrictions and price insulation during commodity price booms*
Usage of trade barriers to reduce the volatility of domestic prices compared to world prices. Talks about the stabilization of prices by negotiating terms of trade. Relate this with India's case, as it is not exporting as much as it should because of Brexit; the stabilization of commodity price is done by negotiating new terms of trade with Britain and EU.

III. RESEARCH DESIGN

SCOPE OF STUDY:

COMMODITY	PRE-BREXIT TIME PERIOD	POST-BREXIT TIME PERIOD
ALUMINUM	23 rd June 2015 – 23 rd June 2016	24 th June 2016 – 23 rd June 2017
ZINC	23 rd June 2015 – 23 rd June 2016	24 th June 2016 – 23 rd June 2017
COPPER	23 rd June 2015 – 23 rd June 2016	24 th June 2016 – 23 rd June 2017
GOLD	23 rd June 2015 – 23 rd June 2016	24 th June 2016 – 23 rd June 2017
SILVER	23 rd June 2015 – 23 rd June 2016	24 th June 2016 – 23 rd June 2017

STATEMENT OF THE PROBLEM:

There will be certain inevitable unpredictability regarding the impact of Brexit on Britain and its trade partners (India), until all the impending negotiations are over, and trade deals are made. This will depend on whether it will be a soft exit or a hard exit for Britain from the EU. There are a lot of uncertainties regarding prior commitments made, the human rights bill, and other social frameworks. Brexit will have adverse effects on Indian commodity prices and their underlying futures as exporters would no longer have their gateway to Europe. A lack of demand for finished products is directly correlated to lack of demand for raw materials. This study aims to depict the impact of the Brexit referendum on metal commodity futures prices (Aluminum, Zinc, Copper, Gold, and Silver) traded on MCX, and to find the macroeconomic relationship between the import and export industries of India and UK, respectively. (Roy & Mathur, 2016)

RESEARCH QUESTIONS:

- Was there a significant impact pre and post Brexit referendum on metal commodity futures prices i.e. Aluminum, Zinc, Copper, Gold and Silver, in India?
- What are the affected industries, and underlying causes thereof that had a significant impact due to the Brexit referendum?

RESEARCH OBJECTIVES:

- To elucidate the impact, pre and post Brexit referendum on metal commodity futures prices traded on Multi Commodity Exchange (MCX) i.e. Aluminum, Zinc, Copper, Gold and Silver in India?
- To determine the affected industries, and the underlying causes thereof that had a significant impact due to the Brexit referendum?

ASSUMPTIONS OF STUDY:

- Multi Commodity Exchange (MCX) is a proxy to the commodity futures market and prices thereof, in India.
- Metal commodity prices on MCX represent dependent variables.

- The futures prices on MCX represent the sentiment of the market (hedgers and speculators) in metal commodities.
- Lack of export orders from UK will affect prices of the raw materials of their respective products.
- Aluminum, Zinc, Copper, Gold and Silver are used as proxy or a sample to depict commodities market.
- The Brexit referendum date i.e. 23rd June, 2016 has been considered to be the base date, while prices of commodities pre-Brexit referendum have negative values, arranged chronologically as per the number of trading days i.e. -258 to 0 for June 23rd 2015 to June 23rd 2016, respectively.
- The Brexit referendum date i.e. 23rd June, 2016 has been considered to be the base date, while prices of commodities post-Brexit referendum have positive value, arranged chronologically as per the number of trading days i.e. 1 to 259 for June 24th 2016 to June 23rd 2017, respectively.

EXPECTED OUTCOME:

The self-inflicted harm of Brexit will drastically impact Britain's economy. As the country tries to be domestically self-sufficient, lack of demand and trade barriers with India will reduce WTP (Willingness To Pay). Thus, for a country like India to be able to clear inventory before Brexit's final in-effect exit date would imply that commodities will sell at low rates despite having unjustifiably low price. India cannot lose out on exports as India needs to amass foreign reserves to battle a depreciating rupee. In this study we expect the Brexit referendum has a significant impact on the commodity futures prices of the underlying metals i.e. Aluminum, Zinc, Copper, Gold and Silver. (Parker, 2016)

HYPOTHESIS TESTING USING F-SIGNIFICANCE:

The F-test is used as a test concerning differences between the variances of the two distinct populations, that is based on the ratio of sample variances.

$$F = \frac{s_1}{s_2}$$

with $df_1 = n_1 - 1$ numerator degrees of freedom and $df_2 = n_2 - 1$ denominator degrees of freedom; df_1 and df_2 are the divisors used in calculating s_1 and s_2 , respectively.

Analysis was conducted to test the unique contribution between the predictive variables and the dependent variable by assigning coefficients to each predictive variable.

- NULL HYPOTHESIS (H₀): There is no significant impact, pre and post Brexit referendum, on futures prices of the underlying metal in India.
- ALTERNATIVE HYPOTHESIS (H_A): There is a significant impact, pre and post Brexit referendum, on futures prices of the underlying metal in India.

METAL COMMODITY	CASE	p-value	F-Statistic
ALUMINUM	The trend of Aluminum Futures prices traded on MCX in accordance with its proximity to the date of Brexit referendum (23 rd June 2016)	0.00	1588.76
ZINC	The trend of Zinc Futures prices traded on MCX in accordance with its proximity to the date of Brexit referendum (23 rd June 2016)	0.00	1588.76

COPPER	The trend of Copper Futures prices traded on MCX in accordance with its proximity to the date of Brexit referendum (23 rd June 2016)	0.00	199.9621
GOLD	The trend of Gold Futures prices traded on MCX in accordance with its proximity to the date of Brexit referendum (23 rd June 2016)	0.00	246.0043
SILVER	The trend of Silver Futures prices traded on MCX in accordance with its proximity to the date of Brexit referendum (23 rd June 2016)	0.00	344.0762

Since the P-value in all cases are less than α i.e. 0.05, we will reject the Null Hypothesis and we will accept Alternate Hypothesis which indicates that there exists a significant impact post Brexit referendum, on futures prices of the underlying metal in India.

IV. DATA ANALYSIS REGRESSION ANALYSIS FOR THE METALS

The R Square in a multiple regression represents explained variance that can be contributed to all the predictors in a progression, which gives explanatory power.

• ALUMINIUM

The polynomial equation (of the third order) for regression analysis is:
 $y = -7E-07x^3 + 0.0001x^2 + 0.083x + 107.15$

<i>Regression Statistics</i>	
Multiple R	0.868816
R Square	0.754841
Adjusted R Square	0.754366
Standard Error	4.551462
Observations	518

The above table shows the results of the predictive variables in regression analysis. 75.4366% of the variance is explained in the predictors of the variables (R Square .754366 x 100 = 75.4366; 75.4366 + 24.5634 = 100%). The table shows the R Squared of .754841 (.754841 x 100 = 75.4841%) or 75.4841 of the variances in the dependent variable (Aluminum Futures prices).

• ZINC

The polynomial equation (of the third order) for regression analysis is:
 $y = -5E-06x^3 + 0.0002x^2 + 0.353x + 139.09$

<i>Regression Statistics</i>	
Multiple R	0.868816
R Square	0.754841
Adjusted R Square	0.754366
Standard Error	14.09759
Observations	518

The above table shows the results of the predictive variables in regression analysis. Seventy-five and four tenths percent of the variance is explained in the predictors of the variables (R Square .754366 x 100 = 75.4366; 75.4366 + 24.5634 = 100%). The table shows the R Squared of .754841 (.754841 x 100 = 75.4841%) or 75.4841 of the variances in the dependent variable (Zinc Futures prices).

• COPPER

The polynomial equation (of the third order) for regression analysis is:
 $y = -4E-06x^3 + 0.0008x^2 + 0.275x + 325.79$

<i>Regression Statistics</i>	
Multiple R	0.52848
R Square	0.279291
Adjusted R Square	0.277895
Standard Error	25.99
Observations	518

The above table shows the results of the predictive variables in regression analysis. Twenty-seven and eight tenths percent of the variance is explained in the predictors of the variables (R Square .277895 x 100 = 27.7895; 72.2105 + 27.7895 = 100%). The table shows the R Squared of .279291 (.279291 x 100 = 27.9291%) or 27.9 of the variances in the dependent variable (Copper Futures prices).

• GOLD

The polynomial equation (of the fourth order) for regression analysis is:
 $y = 2E-06 x^4 - 9E-05x^3 - 0.1776 x^2 + 11.029x + 30326$

<i>Regression Statistics</i>	
Multiple R	0.568189
R Square	0.322838
Adjusted R Square	0.321526
Standard Error	1575.783
Observations	518

The above table shows the results of the predictive variables in regression analysis. Thirty-two and one tenths percent of the variance is explained in the predictors of the variables (R Square .321526 x 100 = 32.1526; 67.8474 + 32.1526 = 100%). The table shows the R Squared of .322838 (.322838 x 100 = 32.2838%) or 32.2838 % of the variances in the dependent variable (Gold Futures prices).

• SILVER

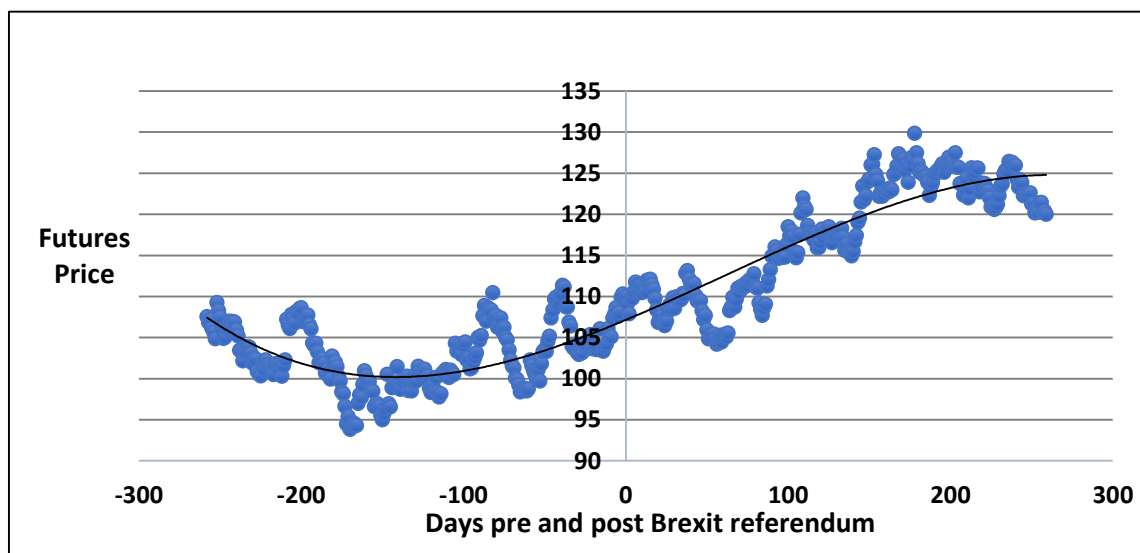
The polynomial equation (of the fourth order) for regression analysis is:
 $y = 3E-06x^4 - 0.0005x^3 - 0.2332x^2 + 37.614x + 42180$

<i>Regression Statistics</i>	
Multiple R	0.632498
R Square	0.400053
Adjusted R Square	0.39889

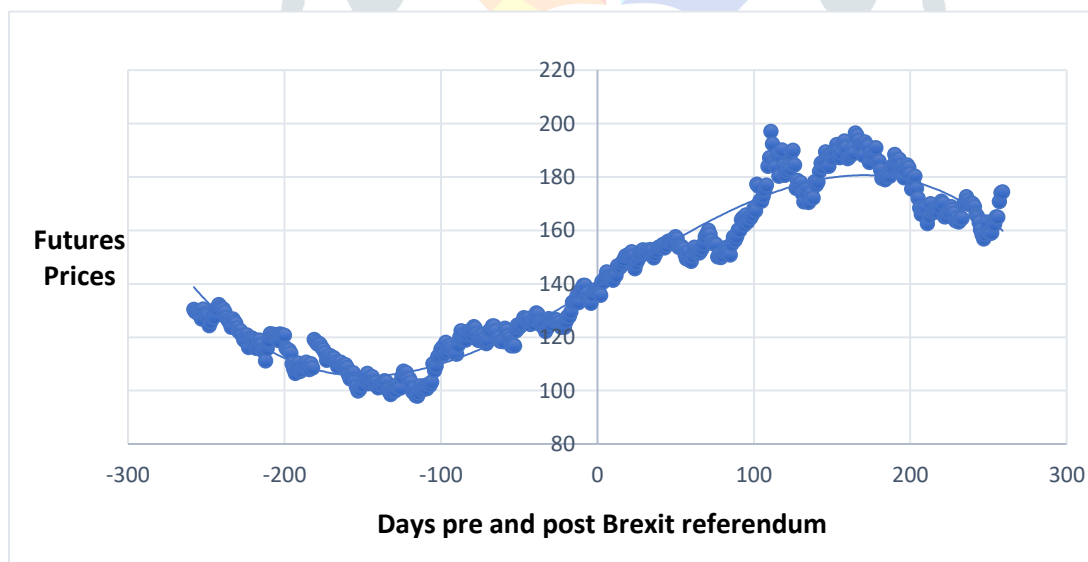
Standard Error	3046.391
Observations	518

The above table shows the results of the predictive variables in regression analysis. Thirty-nine and nine tenths percent of the variance is explained in the predictors of the variables ($R^2 \text{ Square } .39889 \times 100 = 39.889$; $60.111 + 39.889 = 100\%$). The table shows the R^2 squared of $.400053$ ($.400053 \times 100 = 40.0053\%$) or 40.0053 % of the variances in the dependent variable (Silver Futures prices).

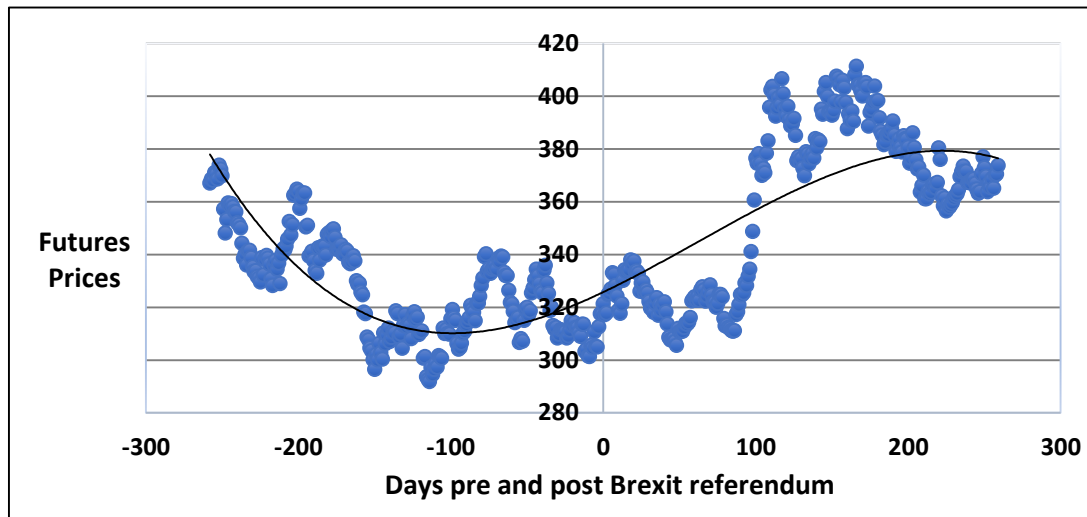
- ALUMINUM:**



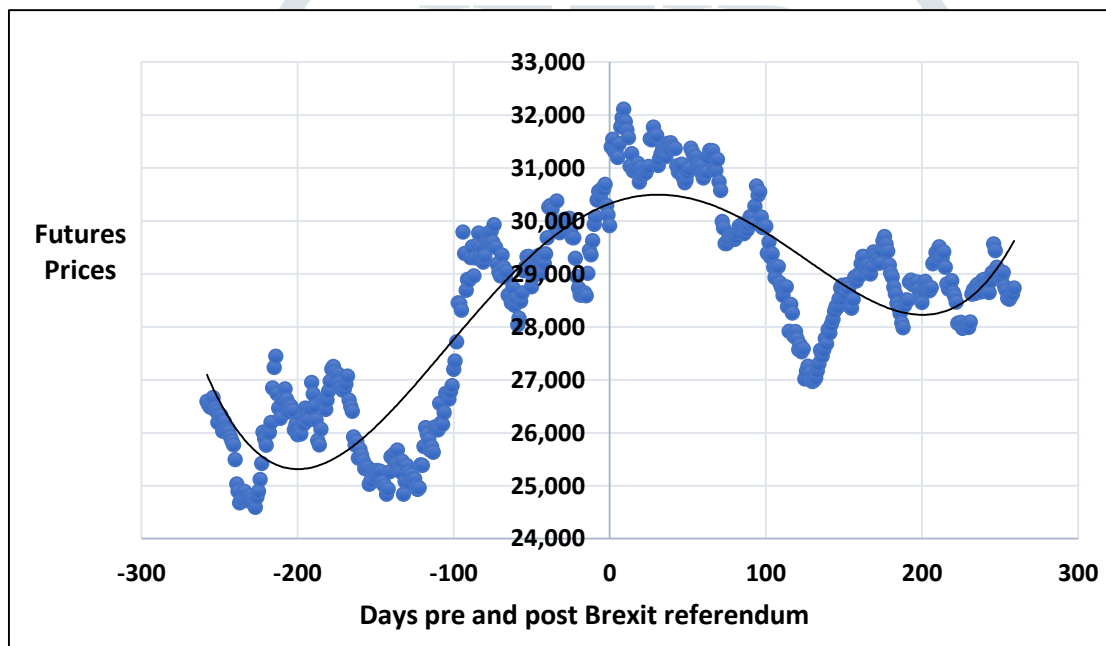
- ZINC:**



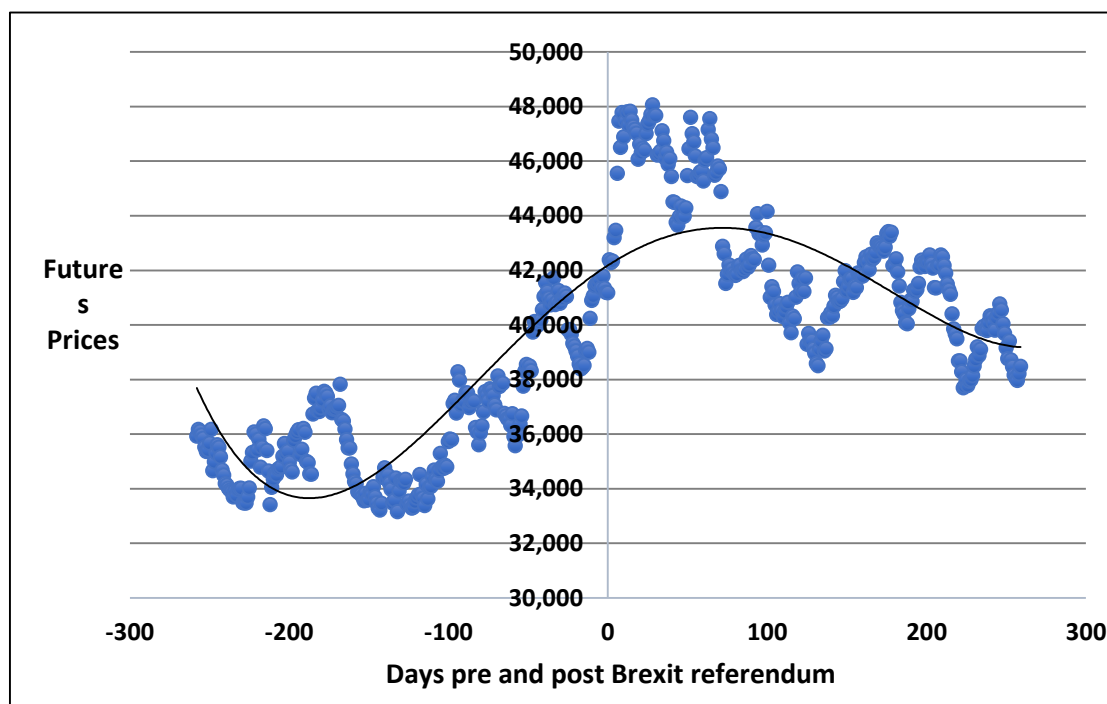
- **COPPER**



- **GOLD**



- SILVER



V. FINDINGS

- The trendline and scatter diagram to plot the Futures prices of Aluminum traded on MCX shows that there has been a positive relationship between the Futures prices of Aluminum and the number of days post the Brexit referendum. Thus, the prices have proved to be constantly increasing till the one-year, post Brexit referendum.
- The trendline and scatter diagram to plot the Futures prices of Zinc and Silver traded on MCX shows that there has been an overall positive, but recently declining relationship between the Futures prices of Zinc and Silver, and the number of days post the Brexit referendum. Thus, the prices have proved to be constantly increasing, and subsequently falling after reaching a peak till the one-year, post Brexit referendum.
- The trendline and scatter diagram to plot the Futures prices of Copper traded on MCX shows that there has been an overall positive, but recently stabilizing relationship between the Futures prices of Copper and the number of days post the Brexit referendum. Thus, the prices have proved to be constantly increasing, and subsequently stabilizing till the one-year, post Brexit referendum.
- The trendline and scatter diagram to plot the Futures prices of Gold traded on MCX shows that there has been very high volatility, with the prices increasing and reaching a peak, falling, and subsequently increasing again, this is the relationship between the Futures prices of Gold and the number of days post the Brexit referendum. Thus, the prices have proved to be constantly increasing, and subsequently stabilizing till the one-year, post Brexit referendum.

VI. CONCLUSION:

Britain is a significant trade partner of India's. The metal commodity prices that this study analyzes will impact 15 out of 75 exporting categories directly as all those products use those base metals (aluminum, copper, zinc). Further, precious metals such as Gold and silver are often used to denote store of value, and their fluctuations provide meaningful insight into investor confidence and the way the market perceives the macroeconomic environment at large. High volatility in the price movements of Gold and Silver prove that

investor confidence and market perception is constantly changing, and has not stabilized. As the tests proves, the commodity futures prices of the underlying metals show statistical significance, which proves that it will definitely impact the commodity futures prices. The high level of volatility in the price movements of the metals will only stabilize once India re-establishes bilateral trade relations with the UK and enters into a separate trade agreement with the EU.

VII. REFERENCES

1. Ailawadi, A. (2016, June). Why Should India Care About 'Brexit'? *Bloomberg*. Retrieved from <https://www.bloombergquint.com/business/why-should-india-care-about-brexit>
2. Martin, W., & Anderson, K. (2012). Export restrictions and price insulation during commodity price booms. In *American Journal of Agricultural Economics*. <https://doi.org/10.1093/ajae/aar105>
3. Parker, G. (2016, December 18). How David Cameron lost his battle for Britain. *Financial Times*. Retrieved from https://www.ft.com/content/3482b434-c37d-11e6-81c2-f57d90f6741a?ftcamp=traffic/social_promo/YouTube/Diagonal_View/auddev&utm_source=YouTube&utm_medium=social_promo&utm_campaign=Diagonal_View
4. Roy, A., & Mathur, S. K. (2016). Brexit and India-EU free trade agreement. *Journal of Economic Integration*. <https://doi.org/10.11130/jei.2016.31.4.740>

