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After Brexit: Which Country is Next?

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Abstract: **Objective**: In this paper, we investigate any next potential exit from the European Union after Brexit which has left a distinct scent of a withering Europe in the air. **Prior Work**: Most analyses have concentrated why Brexit and the effect on Britain rather than the remaining countries in the EU. **Approach** The thinking is: Can there be a domino effect? The methodological approach is based on the optimum currency area theory. The study focuses on the economic convergence criterion and a four variable structural vector autoregression model is used to recover the four underlying shocks: domestic demand, domestic supply, external supply, and monetary shocks. **Results** The correlation analysis of the shocks support Brexit and point out unanimously Sweden to be the next most likely to exit from EU given that its shocks' follow a similar pattern to that of the UK. Even though not as imminent as Sweden, Poland's shocks show enough asymmetric trait with the region, for it to be an exit contender. **Implications** There is a possibility of a new wave of "de-europeanisation" if UK succeeds and political will is one such factor that may trigger other potential waverers. **Value** This paper brings in another dimension to the Brexit conundrum and brings in the thought-provoking idea of looking at what may happen if Brexit is successful.

Keywords: European Union; exit, optimum currency area; SVAR

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1. Introduction

Brexit is another nail in the coffin of the European Union (EU hereafter) following the recent crises, economic woes, terrorism and immigration. Created to foster economic integration across Europe, the EU has experienced its very first self-inflicted divorce negotiations and whatever be the endpoint of these negotiations, there is no denying the impact that the EU will feel, both economically and politically (Moschieri & Blake, 2019; Sampson, 2017). The EU will lose clout in foreign, security and budgetary policy for which the United Kingdom has been a vital cornerstone. Losing a permanent member of the United Nations Security Council, the fifth biggest military spender in the world and its second net contributor to its operating budget, the EU is now less of a global force. The budgetary gap will be more likely compensated by either cutting spending or increasing contributions by other member states. If the former scenario may be a threat to Greece, the latter one may trigger potential waverers with sound economy from EU, in the like of Poland (Bulmer and Quaglia, 2018). Brexit can be regarded as a turning point whereby the peak of European integration has now passed and this makes geopolitical one of the biggest post-Brexit concern for the EU (Bailey & Budd, 2019). The type of nationalism seen in the Brexit vote is a sign of a frustrated public with the condescension of elites (Clarke, Goodwin & Whiteley, 2017). As a consequence, the EU may become more protectionist and this may open up the debate on a federal EU and changes in its treaties. The management of migration in Europe and the fear of European Parliament's predispositions to federalise the union make it likely to hear calls for referenda in several other EU countries. In fact, the right-wing populists in France and Netherlands have already called in for their own referendum. Based on the possible impact of Brexit on the rest of the EU, (Irwin, 2015) ranked the most exposed member states to be Netherlands, Ireland, and Cyprus with the Scandinavian countries, Sweden and Denmark pointing at the 7th and 8th position. After Brexit, various claims have been made on the next potential EU exit candidate/s based solely on the relationship of the rest of EU member states with UK.

The approach in this study is based on the theory of optimum currency area which is one of the last stages to form an economic union. Introduced by Mundell (1961), the optimum currency area theory is a concept in which countries located in a geographical area can capitalize on their economy by sharing a single currency. One of the pre-requirements of an OCA is economic convergence of its member states and this is empirically assessed by computing and analysing the correlation of shocks of macroeconomic variables of the countries. The path of work in this study is

justified by the ratification of the Treaty on European Union which had as goal the setting-up of the European Monetary Union for all member states of EU. Europe is considered as an OCA with the Eurozone comprising of, till date, 19 out of the 28-member states of EU sharing the single currency, euro. Now that the EMU is already established, we make use of the OCA theory not to assess the currency union, but the economic viability of the European Union which will answer the question of "Who is next?" by an empirical approach rather than a theoretical one.

1.1. The Euro

In the year 1999, the European Union presented the Euro. At first, the euro was utilised as a medium of exchange among nations within the union whilst nations maintained their own domestic currencies. However, within the first three years, the respective domestic currencies were reinstated by the Euro. Though the euro is still not unanimously endorsed by all the member states as the principal currency, most of the remaining countries still peg their currency against the euro, one of the world's most predominant currency unions.

However, for the past years, the Euro underwent a lot of difficulties. One of the main predicaments experienced by the Euro is the 2008 financial crisis and the Greek government-debt crisis. According to an article by Kirkup, (2015), the author predicts that no matter what happens to Greece; whether Greece will be forced out of the single currency, the Eurozone cannot survive. One of Kirkup's main arguments is that the European countries are becoming more economically divergent thus making a single rate of interest very unsuitable for the bloc. Big economies such as Germany are carrying dead weights along with them. The report also argues that political differences between the countries widen the gap for the future of a single currency. Also, northern European countries such as Germany, Finland and the Netherlands have way better results than southern European countries when it comes to levels of corruptions, quality of domestic regulation and the law and order and thus, these differences will eventually lead to a hitch in the changes required to make the Euro sustainable.

Another dire circumstance experienced by the Euro is the economic flavor of the year; Brexit. The United Kingdom voted out of the European Union and thus caused great chaos on the financial market. Throughout the EU, Euroscepticism is increasing at a high speed; a domino effect succeeding Brexit. According to an article

in (TheMirror, 2016) countries with political parties fighting for their own national currency such as Austria are likely to gain more and more support. Regardless of the French slogan "Advance or face retreat" (Keating, 2015) to describe the current state of the Euro, the leader of the National Front in France, Marine Le Pen has called for France to hold a similar referendum. In her words, 'The British people have given to the Europeans, and also the world, a dazzling lesson in democracy' and this only strengthen the question: 'Will the European Union survive the upcoming years?'

1.2. Literature Review

The point of departure for the literature on single currency might have started in the early 1950s but came in the limelight through the seminal work on the theory of optimum currency areas by (Anon., n.d.). Till date, (Bayoumi & Eichengreen, 1992) is considered as the pioneering paper in the empirical studies of the feasibility of a region as an OCA. They were the first to adopt (Blanchard & Quah, 1989) decomposition method to identify the underlying shocks to output and prices and used the correlation of shocks as empirical evidence to assess whether the Economic and Monetary Union (EMU) would be a beneficial union. However, their analysis resulted on a negative note for the then proposed monetary union.

Since then, there have been numerous studies on the EMU and the single currency, euro; starting from (Ramasawmy & Sloek, 1997) who were among the first researchers to assess the financial possibility of establishing the Euro. Using a VAR model, they concluded that Europe's OCA fall into two groups. More interestingly, they also found great discrepancy in the real effects of monetary policy shocks, but they thought that over time, those differences would decrease, and thus gave a lot of prospects to the 'to-be' Euro.

Following the previous work, (McCoy & McMahon, 2000) also analysed the effects of forming a single currency in Ireland's point of view. The latter found out that though the other countries experience similar average responses and shocks, Ireland on the other hand shows much greater output responses thus making it a weaker member of the economy. Through a much more detailed analysis, (Fidrmuc & Karhonen, 2001) examined the correlation of supply and demand shocks between the euro area and the Central and Eastern Europe countries (CEECs). Instead of assessing the similarity of shocks vis-à-vis German shocks (Germany is considered as the "core" country of the euro area) as previous studies had done, the assessment

was done vis-à-vis the euro area shocks. They used the same methodology as (Bayoumi & Eichengreen, 1992) and obtained an updated result which showed that the general shocks of the member countries of the euro area have become more highly correlated than they were previously. Their second set of analysis involved the feasibility of the CEECs integrating with the euro area. The empirical analysis showed that Hungary and Estonia had the highest correlation of supply shocks with the area. The Slovenian and Estonian economic cycle were found to be quite well correlated with European cycle. Therefore, their study showed supportive evidence for both Slovenia and Estonia to join the euro area which they did later in 2007 and 2011 respectively.

(Fischer, et al., 2011), (Bagus, 2011) and (Holland & Kirby, 2011) are among the few papers which focused on the downfall of the euro; its causes and consequences, especially after the 2008 financial crisis which led to sovereign debt crisis of the euro area triggered by Greece and later by Portugal and Spain.

The structure of this paper is as follows: After a brief overview on the single currency and the Euro in this section, section 2 presents the methodology used to compute the shocks. This is followed by the results and discussions in section 3. We end the paper with the conclusion in the last section.

2. Methodology

To assess the economic viability of the European Union, the path taken in this paper is to identify and analyze different macroeconomic shocks to the member states of the EU. Based on the approach of (Bayoumi & Eichengreen, 1992), we employ a four-variable SVAR model to recover the underlying shocks. Gross Domestic Product (GDP) is one of the predominant indicators used to estimate the health of a country's financial status. The four variables used are the European Union real GDP $\left(y_t^*\right)$, domestic real GDP $\left(y_t\right)$, real exchange rate $\left(\pi_t\right)$ and domestic price level $\left(p_t\right)$. Since we are interested in the comparative analysis of the countries' economies, we use not only the countries' domestic GDP but the GDP of EU as well. Consumer Price Index (CPI), often referred as inflation, which is used to measure changes in prices and to better estimate the cost of living, is another important economic indicator. Since 19 out of the 28-member states of EU share the single currency, euro while the others use their distinct national currency, the analysis in monetary terms is achieved by the use of exchange rate as economic variable.

The relationships among the macroeconomic variables can be modelled by the Structural VAR of equation (1), also expressed in the form of equation (2).

$$A_0 X_t = A_1 X_{t-1} + \ldots + A_n X_{t-n} + B_0 \varepsilon_t, \quad (1)$$

$$A_0 X_t = A(L) X_t + B_0 \varepsilon_t, \quad (2)$$

where $X_t = \left[\Delta y_t^* \quad \Delta y_t \quad \Delta \pi_t \quad \Delta p_t\right]$ is a (4×1) vector of the stationary macroeconomic variables at time t, A_0 and B_0 are (4×4) matrices indicating contemporaneous relationship of variables in X_t and ε_t respectively, A_i's are (4×4) coefficient matrices for $i = 1,\ldots,n$, $A(L)$ is the lag polynomial of the form, $A(L) = a_1 L + a_2 L^2 + \ldots + a_n L^n$ and $\varepsilon_t = \left[\varepsilon_{st}^* \quad \varepsilon_{st} \quad \varepsilon_{dt} \quad \varepsilon_{mt}\right]$ is a (4×1) vector comprising of external supply shocks, domestic supply shocks, domestic demand shocks and monetary shocks respectively. ε_t is a multivariate white noise process with $E(\varepsilon_t) = 0$ and $E\left(\varepsilon_t \varepsilon_\tau^{'}\right) = \sum_\varepsilon \ \forall t = \tau$.

The first stage of estimating the SVAR parameters is to formulate the reduced form of the model by multiplying equation (2) by A_0^{-1} yielding equation (3):

$$X_t = A^*(L) X_t + e_t, \quad (3)$$

where $A^*(L) = A_0^{-1} A(L)$ and the relationship between reduced form of shocks e_t and structural shocks ε_t is given by equation (4)

$$e_t = A_0^{-1} B_0 \varepsilon_t. \quad (4)$$

The reduced VAR parameters in (3) are estimated by ordinary least squares and the innovations e_t are obtained. The variance-covariance matrix of the reduced form innovations, $\sum_e$ is related to that of the structural shocks by

$$\sum_e = \left(A_0^{-1} B_0\right) \sum_\varepsilon \left(A_0^{-1} B_0\right)^{'}. \quad (5)$$

The second stage consists of determining the instantaneous matrices A_0, B_0 and the variance-covariance matrix $\sum_\varepsilon$. With X_t being stationary, we can represent equation (3) into its moving average form:

$$X_t = B(L) e_t, \quad (6)$$

where $B(L) = \left[I_4 - A^*(L)\right]^{-1}$ whose elements represent the accumulated impulse response of the elements of X_t to the VAR residuals.

In this study we focus on the structural moving average

$$X_t = C(L)\varepsilon_t, \quad (7)$$

where

$$C(L) = B(L)A_0^{-1}B_0 \quad (8)$$

whereby the elements of $C(L)$ represent the accumulated impulse response of the endogenous variables of X_t to the structural innovations.

The approach undertaken in the SVAR is that the structural shocks ε_t are orthogonal and normalised resulting in $\sum_{\varepsilon} = I_4$ and

$$\sum_e = \left(A_0^{-1}B_0\right)\left(A_0^{-1}B_0\right)'. \quad (9)$$

The VAR identification scheme of (Blanchard & Quah, 1989) is used to identify the structural parameters. The identification is achieved by imposing restrictions on the long run impulse response coefficients. The long run restrictions render the contemporaneous matrix A_0 to be identity matrix I_4 but set no restriction on the matrix B_0. Therefore, the long run impact matrix from (8) and the variance-covariance matrix of the reduced form shocks from equation (9) are linked to the matrix B_0 as in equation (10)

$$\sum_e = B_0 B_0', \quad (10)$$

whilst equation (8) can be expressed in the form of equation **Error! Reference source not found.**

$$C(L) = B(L)B_0.$$

However, at this stage, the matrix B_0 is unknown. While the matrix $\sum_e$ is identified using the parameter estimates of the reduced VAR computed from the first stage, it has only $4(4+1)/2$ distinct values and B_0 has 4^2 unknown parameters. Therefore, for the SVAR system to be just identified, we need to impose $4(4-1)/2$ number of restrictions on the structural model in (7). The restrictions imposed are as follows:

(i) EU real GDP is affected only by external supply shock in the long run, thus $C_{12} = C_{13} = C_{14} = 0$;

(ii) Monetary and domestic demand shock have no long run effect on domestic real GDP, thus $C_{23} = C_{24} = 0$;

(iii) In the long run, real exchange rate is not affected by monetary shocks, thus $C_{34} = 0.$

Hence, in matrix form (7) becomes

$$\begin{bmatrix} \Delta y_t^* \\ \Delta y_t \\ \Delta \pi_t \\ \Delta p_t \end{bmatrix} = \sum_{i=0}^{\infty} \begin{bmatrix} C_{11i} & 0 & 0 & 0 \\ C_{21i} & C_{22i} & 0 & 0 \\ C_{31i} & C_{32i} & C_{33i} & 0 \\ C_{41i} & C_{42i} & C_{43i} & C_{44i} \end{bmatrix} \begin{bmatrix} \varepsilon_{s,t-i}^* \\ \varepsilon_{s,t-i} \\ \varepsilon_{d,t-i} \\ \varepsilon_{m,t-i} \end{bmatrix}$$

These restrictions allow matrix C to be uniquely defined and from equation (10) the matrix B_0 is obtained and thus from equation (4) the structural shocks are then computed using the relationship in equation (11)

$$e_t = B_0 \varepsilon_t. \tag{11}$$

3. Results and Discussions

Annual data spanning the period 1980 to 2015 were obtained from the IMF database and the time series properties of the macroeconomic variables were investigated. Stationarity of data was investigated using the Augmented Dickey-Fuller test and we note that Real EU GDP was stationary at level whereas for the other three variables, those which were not stationary at level attained stationarity after first differencing with the exception of Estonia and Italy inflation and Lithuania and Romania exchange rate which became stationary after second differencing. A uniform optimal lag length of one was selected using the Akaike Information Criteria.

After performing the calculations, the correlation results for the four respective shocks were extracted. A total number of 3136 (28 × 28 × 4) correlation results were obtained. In order to better explain this, the outcomes were placed into four categories as defined in

If the shocks are positively correlated, then they are said to be symmetric, else asymmetric. It is to be noted that, the more symmetric the shocks between the countries, the better it is for the European Union.

Table 1. Classification of Degree of Correlation Coefficient

Strong		0.7 to 1.0
Average		0.4 to 0.7
Weak		0.0 to 0.4
Poor		-0.5 to 0.0
Bad		-1.0 to -0.5

3.1. Domestic Supply Shocks

From Figure 1, the domestic supply shocks are mostly *asymmetric* with most of the correlations being either weak or poor. Very few countries have strong symmetric correlations between them. Germany and Austria, being close, have a correlation of 0.8724 which is the highest result among the group. This can be explained by their shared history across the years. Some other notable results are Estonia-Latvia (shared history, occupied by USSR), Bulgaria-Romania (shared borders), Austria-Romania (shared borders) and Croatia-Lithuania.

France and Belgium, two sister countries having an average correlation of 0.5531, are two countries experiencing a similar reaction towards other members. For example, both of them are weakly correlated to Germany, averagely correlated to the UK, poorly correlated to Malta.

For the United Kingdom, the domestic demand shocks being mostly asymmetric is supportive to Brexit. One of the main reasons that the United Kingdom has mostly asymmetric shocks towards the other economies in the group is that United Kingdom do not share the common currency, thus not fully involve in intra-trade affairs. The same thing can be noticed for Sweden and Poland who still use the Swedish krona and the Polish zloty respectively. Certainly, countries who have not adopted the Euro will show a lesser correlation results toward the others and this can lead to another potential exit candidate.

3.2. Domestic Demand Shocks

The correlations of Domestic demand shocks across the EU show brighter results (Figure 2). Most countries are positively correlated, with Hungary and Ireland being both strongly positively correlated to Bulgaria, Croatia, Cyprus, Czech and Denmark. Austria and Germany are also very strongly correlated to Belgium, France, Luxembourg, Italy and Netherlands.

Nonetheless, being mildly or poorly correlated with many economies in the group, once again the United Kingdom displays an asymmetric correlation with respect to the other countries. The UK is actually among the few countries to be very negatively correlated to Germany. Following its path, Sweden displays a similar trend.

However, emphasis should be laid more on the correlations between the supply shocks. Supply shocks "are unaffected by changes in demand management policies" (Bayoumi & Eichergreen, 1994), demand management policies being the control of aggregate demand to avoid recession. In broader terms, it means that demand shocks such as fluctuations in fiscal and monetary policies are more country-related factors and therefore less probable to have regional repercussions. Thus, they are less pertinent to the subject.

3.3. External Supply Shocks

The external supply shocks are mostly significantly symmetric excluding that of Sweden and UK (Figure 3). The strongest correlated shock is between France and Poland. This is hardly surprising since Poland's exports comprise of manufacturing products for French-owned groups. Though *insignificantly symmetric* with Czech Republic, Germany, Greece, Malta and Slovakia, Sweden's and UK's only *significant symmetric* external supply shock, that is a correlation of 0.8527, is related to each other. The correlation of Sweden's shocks across the region shares great similitude with that of the UK which reiterates the fact of it being the next potential candidate of an EU exit.

Compared to the others, Germany's and Malta's external supply shocks are mildly correlated with the rest of the region, including with each other as well. This can be explained by the German economy being the region's largest with the other countries at a disadvantage to Germany since the latter's growth model has been so efficaciously sailing across the stormy waters of crises, be it financial or social, that the rest of the region is not able to compete neither by austerity nor restructuring. The fact that the German economy grew by 0.4% in the second quarter of this year, outpacing the Eurozone average attest to the difference in what may be called two classes of Europe. However, the strong positive correlation of the country with Belgium, Luxembourg and Netherlands is due to strong trade links in exports and imports.

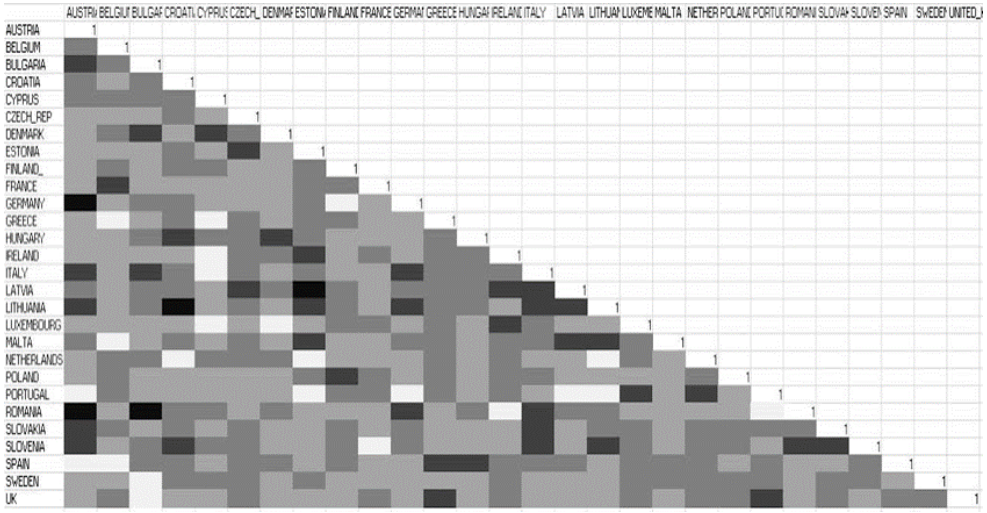

Figure 1. Correlation Results of Domestic Supply Shocks

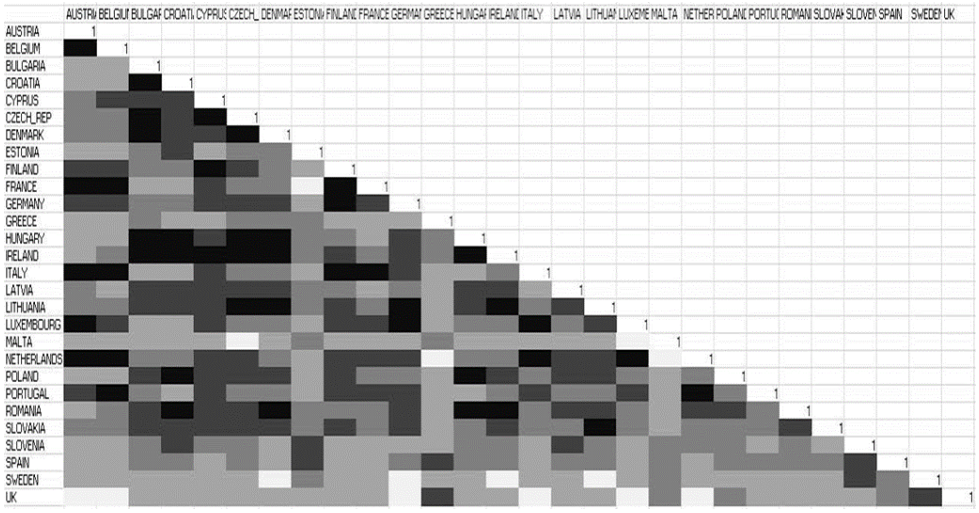

Figure 2. Correlation Results of Domestic Demand Shocks

Despite being the smallest economy of the Eurozone, Malta's economy coped better with the financial crisis than most of the other EU countries and its mild correlated external supply shock is consonant to that.

3.4. Monetary Shocks

Figure 4 shows that the monetary shocks are either *asymmetric* or mostly *insignificantly symmetric*. The monetary shocks of Sweden, UK, Poland and Portugal are mostly asymmetric. Out of the four, only Portugal uses the euro. It was among those Eurozone economies which suffered most from the financial crisis of 2008 and thus with high unemployment, high tax and high public debt whereby its financial independence may be threatened by another bailout program, a possible Eurozone crisis is envisaged again unless strict fiscal rules of the EU are adopted (Kowsmann, 2016).

Poland's free market economics with its high dependence on foreign capital and added to that the significant rise of the zloty (polish currency) against the euro, explain the asymmetry of its monetary shocks with the other member states of EU excluding Bulgaria, Croatia, Sweden and UK which are countries outside the Eurozone. This may lead to Poland being one of the financial creditors to the other Eurozone countries in case of financial crisis, especially after Brexit. To minimize this risk, Poland can either join the Eurozone or quit the EU.

Contrary to what might have been expected, countries of the Eurozone are not all negatively correlated to non-euro using countries. Bulgaria and Hungary, both outside the Eurozone, share the second worst correlation, -0.604. This may be explained by the squeezing out attitude of the Hungarian towards the foreigners which resulted in a slump in foreign investment. The worst correlation, -0.652 is between Greece and Sweden whereby the former is considered as a fail out of the EU and the latter's economy seems to diverge from the rest of the member states of EU except with UK.

Most symmetric shocks are Austria-Belgium, Austria-Netherlands, Belgium-Italy, Cyprus-Ireland and Denmark -Italy with correlation in the range of 0.81 to 0.86. With the exception of Denmark, all these countries are found in the Eurozone. Austria's and Belgium's shocks are more symmetric with the rest of the region than the other countries are and this is in accordance with trade flows among the EU countries. Around three-quarters of Belgium's trade is with other EU countries.

4. Conclusion

In this paper we have used a four variable structural vector autoregression model to compute the instantaneous shocks: domestic supply, domestic demand, external supply and monetary shocks. The purpose is to find potential EU exit candidate/s after Brexit through the correlation analysis of the shocks. The analysis revealed that the domestic supply shocks are mostly asymmetric, with Sweden and UK showing similar asymmetric shocks with the rest of the region and Poland following closely behind with its own asymmetric shocks. The domestic demand shocks showed a mixed picture with the shocks being almost equitably proportioned into symmetric and asymmetric categories and reiterate the similar pattern of Sweden and UK. This time it is Malta which showed mostly asymmetric shocks after the pair Sweden-UK. The monetary shocks are found to be either asymmetric or typically insignificantly symmetric, with Sweden, UK, Poland and Portugal having mostly negatively correlated shocks with the region except among themselves. Among the four shocks, the external supply shocks are the most significantly symmetric one with the exception of the pair Sweden-UK again. Though weakly correlated with the rest of the region, the pair are strongly positively correlated to each other. We conclude that the analysis of the four shocks is consonant to Brexit and underscores the strong relationship between Sweden and UK which makes it the next likely to exit EU. This can be explained by both countries being non-Eurozone members with similar policy tradition. Thus, the Swedes fear about their voice power in Brussels without their best ally, the UK. In fact, according to a polling firm in Sweden, 36% of the "Swedes tell Britain: if you leave the EU, we'll follow" with 32% preferring to stay (Nelson, 2016). With two of its shocks being in the most asymmetric category after Sweden, Poland is another serious candidate to exit EU. Also, a non-Eurozone member and a major source of immigration to the UK, its main concern will be the EU budgetary policy and UK's border controls.

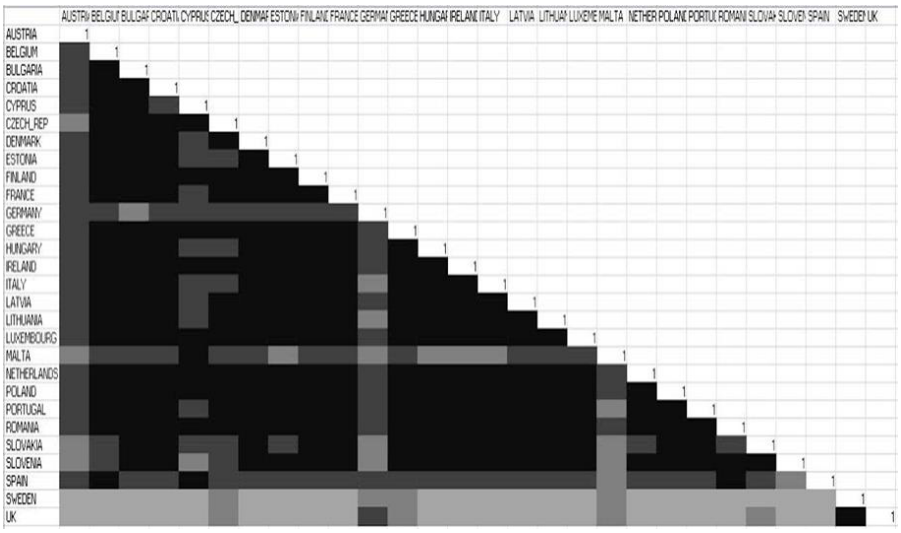

Figure 3. Correlation Results of External Supply Shocks

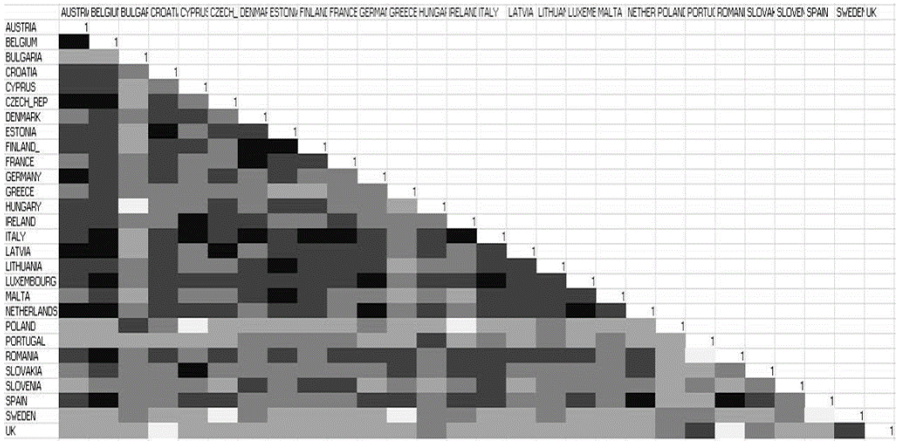

Figure 4. Correlation Results of Monetary Supply Shocks

However, our results are not in line with (Irwin, 2015) where contrary to the work of the latter, Netherlands, Ireland and Cyprus do not share negatively correlated shocks with the region to the same extent as Sweden. Moreover, this paper caters only for the economic aspect of the situation while the political will is an equally important factor. With Brexit heightening the internal ruptures of the EU, the leaders of some, if not most, of its member states will start scrutinizing their own EU membership.

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