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An Assessment of the Impact of Brexit on Euro-area Stability

Monetary Dialogue

In-Depth Analysis

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DIRECTORATE GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

An assessment of the impact of Brexit on euro area stability

Monetary Dialogue 28 November 2016

COMPILATION OF NOTES

Abstract

The notes in this compilation provide an indication of the possible economic and financial impact of Brexit on the euro-area/EU economy. Notwithstanding the potential adverse effects, Brexit could also provide an opportunity for far-reaching reform to the euro area governance. The notes have been requested by the Committee on Economic and Monetary Affairs as an input for the November 2016 session of the Monetary Dialogue.

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INTRODUCTION

On 23 June 2016 the UK held a referendum on its membership within the EU. On 2 October, the British Prime Minister announced its intentions to trigger the Article 50 (TEU) procedure before the end of March 2017. Art. 50 (TFEU) describes how the EU and the withdrawing state need to negotiate a withdrawal agreement to define the country's future relationship with the EU.

The notes in this compilation provide an indication of the possible economic impact of Brexit on the euro-area/EU on matters in the sphere of the ECON, including financial and monetary policy issues. Notwithstanding the potential adverse economic and financial effects of Brexit on the euro area / EU economy, Brexit is also a manifestation of discontent with the euro area and its governance and could therefore provide an opportunity for far-reaching reform in this field.

The notes have been requested by the Committee on Economic and Monetary Affairs as an input for the November 2016 session of the Monetary Dialogue. The main conclusions and policy options are summarised below.

Using an appropriate index as a measure of country “core-ness”, **Nauro Ferreira Campos** *et al.,* (Brunel University London and London School of Economics) uncover three groups of EU countries: A core (that becomes more homogenous), a periphery (that becomes less homogenous over time) and a mixed set with Denmark, UK, Sweden and Spain. Authors’ results show that Sweden becomes systematically less and less core over time, Spain becomes systematically more and more core over time, and the UK is in-and-out of the core. This calls attention to Sweden as a very important case to understand the future of the euro area as well as that of the European Union. The authors then investigate the determinants of the core-ness index. Econometric estimates suggest that euro membership and Product Market Regulation are key. Euro adoption makes countries more core, more regulation makes countries less core. One conclusion of the paper is that the UK represents less of a threat to the stability of the euro area than the dangers from inaction in terms of rethinking and resetting European integration. Whenever and in whichever form Brexit occurs, for practical purposes, the euro area will become the European Union. When faced with “what is wrong with the euro?” their results hint at “less than commonly thought.”

According to **Christopher Hartwell** *et al.,* (CASE, Centre for Social and Economic Research), the shock of Brexit has worn off, but the uncertainty and the reality of its effect on the stability of EU will exert an influence for years to come. Declining trust in EU institutions has already led to a sharp increase in uncertainty and the possibility of damaging existing trade linkages. Moreover, the backlash against EU economic governance, of which Brexit was another manifestation, shows conclusively that a shift to a rules-based regime in the euro area is needed. As part of this shift, the ECB also has to come to terms with its own role in the euro area and how its policies can affect or hinder the long-term stability of the region. The effects of Brexit are “too early to tell,” and it is how the ongoing negotiations play out which will decide the tone for the short-term. But in the longer-term, stability of the EU and the euro area will be almost wholly in the hands of the EU itself.

For **Michael Hachula** *et al.,* (DIW Berlin and Queen Mary University of London), the Brexit vote has led to a considerable increase in uncertainty about the economic prospects of the United Kingdom (UK) and of the euro area. Also indicators of policy uncertainty show an elevated level of uncertainty. Empirically, adverse uncertainty shocks dampen economic activity in both the UK and the euro area, but more so in the euro area. Historical data suggest that the Bank of England tends to respond more aggressively to uncertainty shocks compared to the European Central Bank. In addition, the attenuated effect of uncertainty

shocks on the UK economy can be partly attributed to a real depreciation of the UK exchange rate following an exogenous increase in uncertainty, while the euro appreciates in real terms. From a legal perspective, there is uncertainty as to the future legal framework that regulates trade between the UK and the EU on the one hand, and between the UK and the rest of the world on the other hand. First, there is uncertainty surrounding the legal interpretation of Article 50 of TEU. Second, it is unclear what the unwinding means in terms of the current membership of the UK in both the customs union and the single market. Third, EU law is deeply embedded in UK law. Finally, there are various options or models which can be followed in terms of the relations between the UK and the EU.

According to **Karl Whelan** (University College Dublin), the British economy has not yet been negatively affected by the referendum result and the impact of the depreciation of sterling on the euro area economy should be limited. Of greater concern are the longer-run economic and political implications of the UK leaving the EU. The evidence points towards the likelihood of a "hard Brexit" in which increased trade barriers between the UK and the EU harm both British and European economies. Proposals for the UK to remain part of the single market while restricting freedom of movement of people are unlikely to come to pass. The UK's anti-EU political factions are unlikely to accept the lack of sovereignty entailed in such an arrangement and many EU member states are unlikely to accept restrictions on freedom of movement. Many EU member's governments will not be disposed to giving the UK a good deal on Brexit, on the grounds that such a deal would encourage populist anti-EU groups in their own countries. These economic effects of a hard Brexit will be asymmetric: It is the UK economy that is likely to suffer more, particularly with the likely reduction in financial sector employment. Over the longer term, the greater risks to the EU are political in nature rather economic. The Brexit referendum illustrates that the European Union is less popular than many imagine. The Brexit result also shows that blaming the EU for a wide range of economic problems can be an effective populist political strategy for anti-EU political groups. Trump's victory in the US presidential election also suggests that the problems associated with globalisation, combined with the weakness of advanced economies since the global financial crisis, have created an environment in which electorates are willing to select new and risky options in the hope that they will produce a better outcome than an economic and political status quo that is viewed as failing to deliver for ordinary people. The political threats to the continued existence of the EU appear to be higher now than ever before.

NOTES

European Parliament

DIRECTORATE GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

The impact of Brexit on the stability of the euro area

Nauro Ferreira CAMPOS, Corrado MACCHIARELLI

IN-DEPTH ANALYSIS

Abstract

What is the impact of Brexit, which is the British decision to withdraw from the European Union (EU), on the stability of the euro area? This is a difficult question that, given the uncertainty surrounding it, may benefit from a novel approach. Euro area asymmetries depend on the degree of integration among euro member states or, more specifically, on the relative strength of core and periphery sets. This paper argues that assessing the "core content" for each member state may help address questions about the stability of the euro area. We first analyse the extent to which economic activity in the United Kingdom is synchronised with that in the euro area and we find it increased with the single currency. We then discuss the need for going beyond this standard analysis of business cycle synchronisation. We construct a "core-ness index" (CMCI) which shows that the core-periphery pattern has significantly weakened after the introduction of the euro. To better characterize this result, we investigate the CMCI determinants and find it is strengthened by euro membership and weakened by product market regulation. In this light, the paper concludes with novel policy implications to increase the "core content" of members states and, consequently, shore up the stability of the euro area after Brexit.

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EXECUTIVE SUMMARY

What is the impact of Brexit, the British decision to withdraw from the European Union (EU) on the stability of the euro area? This paper argues that if one is concerned about stability and cohesion, asymmetry and imbalances, a novel and relevant way of thinking about these issues is offered by the notion of core-ness in terms of the core and periphery framework.

A seminal paper in this respect is Bayoumi and Eichengreen (1993) as it is one of the first to point out the risks of an entrenched core-periphery to the then nascent EMU. Their influential diagnostics was based on data covering 25 years from 1963 to 1988. Using the same methodology, sample, and time window, we replicate their results for 1989-2015 to ask how the EMU affected this core-periphery pattern. Using a new "core-ness index" (CMCI), our results suggest the EMU has significantly increased symmetry and stability in the euro area.

Starting from the approach in Campos and Macchiarelli (2016a), we construct a CMCI measure of "core-ness content" that is theory-driven, simple, continuous and yields a rather intuitive classification of countries. Using CMCI, we obtain three main findings. One is that post-EMU augmented core which became more concentrated, while the periphery shrank and became more dispersed. This increase in dispersion reinforces the value of a simple metric, a continuous measure of core-ness that can help us better understand the contours and dynamics of these core and periphery sets.

A second finding is that the periphery experienced a decrease in demand and an increase in supply correlations. The core experienced a decrease in both supply and demand correlations. Yet, to say that the core-periphery pattern weakened before and after the euro for the EU12 ignores the simple fact that by 2016, there is no EU12, the EU is now a Union of 28. Incorporanting these, we observe a bigger core with the addition of Sweden, Austria and Slovenia (with the third highest CMCI) and a much bigger periphery (with Spain, Finland, Hungary, Poland, Slovakia and Portugal in decreasing order of core-ness).

Yet these are static findings (Bayoumi and Eichengreen EU12 pre-EMU and Campos-Macchiarelli post-EMU EU12 and EU28) which raise the question: what happened in between? How did these groups (core and periphery) change over time? By moving the estimation window, Campos and Macchiarelli (2016b) generate a dynamic version of CMCI with which we uncover three groups. A core (that becomes more homogenous), a periphery (that becomes less homogenous over time) and a mixed set with Denmark, UK, Sweden and Spain. But what is truly remarkable are what their trajectories show: Denmark CMCI changes little over time, while Sweden becomes systematically less core over time, Spain shows a systematically higher CMCI over time and, unsurprisingly, the UK goes in and out of the core.

Finally, we investigate the determinants of CMCI. Our econometric estimates suggest that euro membership and Product Market Regulation are key. Euro adoption makes countries more core, more regulation makes countries less core. Our results have straightforward yet novel policy implications, specifically, by placing the focus of policies intended to increase the stability of the euro area firmly on Sweden.

We thus conclude that the UK represents less of a threat to the stability of the euro area than the dangers from inaction in terms of rethinking and resetting European integration so that it delivers the benefits it can and should. Whenever and in whichever form Brexit occurs, for practical purposes, the euro area will become the European Union. When faced with "what is wrong with the euro?" our results hint at "less than commonly thought." In other words, they suggest that the benefits of keeping the euro area together still exceed the costs of breaking it up. Thus we need to think long and hard about how to find our way out of this once-in-a-lifetime crisis we are currently going through. And the best way to start is

to recognise that there are many crucial questions we have not yet properly framed, let alone provide satisfactory answers for. The size, nature and the dynamics of the core of the euro area are clearly one of them, as these are key to understand the future of the euro and that of Europe.

1. INTRODUCTION

What is the impact of Brexit, that is, the British decision to withdraw from the European Union (EU) on the stability of the euro area? Does Brexit undermine the euro because it undermines the EU as a political and economic project, or does it allow the rest of the EU to better design institutions that will help to make the euro work better? These are difficult and pressing questions that would benefit from a fresh approach. Hence, we introduce the concept and an empirical measure of "core-ness". The latter is a measure of economic symmetry among European economies. Stability depends on the degree of integration among member countries or, more specifically, on the relative strength of core and periphery set of countries. Explaining this divide, and how it evolves over time, can help to frame and address these questions.

The Brussels' plan for a Genuine EMU measures how widely recognised the current shortcomings of the Economic Monetary Union (EMU) are (Begg 2015). Agreement on the need for a solution co-exists with an apparently stark disagreement on the causes. One view is that "design flaws" (De Grauwe 2006) deepened imbalances while another is that "policy mistakes" (Sandbu 2015) hindered convergence. Both views, however, rely upon "asymmetries" or "imbalances," or, conversely, on "stability" or "cohesion," all being terms characterizing this debate. One proposed solution to these shortcomings is a flexible euro (Stiglitz, 2016): a two-tier model of a Northern and a Southern Euro where the latter is said to be "softer." One tautological way to explain such proposal is that the Southern euro would not be part of the "core", or that it would be "less core". However, there remains in the literature a dearth of metrics that could help determine threshold levels of "core-ness" and support the analysis of how it changed over time.

As for Brexit, the June 2016 vote resulted in that 52% of British voters decided that being the first country ever to leave the European Union was a price worth paying for "taking back control", despite extensive advice from economists that Brexit would make the UK permanently poorer (Campos 2016). The referendum on whether or not the UK remains a member of the EU has propelled a renewal of academic economists' interest in the political economy of the UK-EU relationship. This is largely because Brexit is one among a constellation of crises currently inflicting upon the EU (refugees, debt, unemployment, etc). Although one among many, Brexit differs in that it can alone and fully ignite other crises. Brexit raises existential questions about the integration project. It asks questions about the value of membership, the dynamics and distribution of its benefits and costs, and the type of integration that can at least sustain the net benefits we have seen since the 1950s. One of the few benefits of the 'Brexit debate' is that it has fostered a flurry of new research addressing questions that have not been sufficiently investigated previously. One of these questions regards cohesion among euro area members, where the governance structure of the relationship between the countries that use the euro as their currency (i.e. the euro-ins) and those that do not (i.e. the euro-outs) is, by far, the most important issue.

In what follows, we first briefly analyse the extent to which economic activity in the UK is synchronised with economic activity in the euro area and how this has changed over time - especially after the introduction of the single currency. Consistent with the existing literature, we find synchronisation has increased after the introduction of the euro. We then briefly review the available evidence and discuss why we should go beyond a standard business cycle synchronisation analysis and towards a deeper, more comprehensive, understanding of the "core content" (or "core-ness") of various member states. Using this new measure, we show that the core-periphery pattern prevalent pre-EMU has weakened after the introduction of the euro. To better characterize these results, we investigate the determinants of CMCI and find that it is strengthened by euro membership and weakened by product market regulation. In this light, the paper concludes with novel policy implications, through this new measure of "core-ness", which helps increase the stability of the euro area.

2. HOW INTEGRATED IS THE UK WITH THE EURO AREA?

During the negotiations for the 1992 Maastricht Treaty, Denmark and the UK secured rights not to join the European Monetary Union (EMU). Every one of the other 26 European Union members is legally committed to adopt the euro as its currency, when ready (De Grauwe, 2016). In 1997, the new Labour government decided to reconsider this decision to stay out of the first wave of the EMU. The UK Treasury was charged with the policy analysis which focused on the so-called "five tests" involving synchronisation of business cycles, labour mobility, investment, competitiveness of the financial system, growth and stability. Despite several studies showing convergence between the euro area and the UK increased since 1999 (e.g., Canova et al. 2005; Giannone et al. 2010), the final verdict from the Treasury was that long-term convergence of UK and euro area business cycles had not reached satisfactory levels and that "despite the risks and costs from delaying the benefits of joining" a decision to join was not "in the national economic interest." (2003, p.228)

The UK and Sweden have kept a floating exchange rate regime while Denmark participates in the ERM2. The behaviour of the Danish krona is remarkable. The high levels of business cycle synchronization (BCS) and a large share of exports to the euro area suggest the costs of not adopting the euro remain small for Denmark (Holden, 2009). Pesaran *et al.* (2007) provide econometric evidence suggesting that both Sweden and the UK would have benefit significantly had they joined the euro in 1999. By the same token, Saia (2016), focusing solely on the UK, estimates trade flows between the UK and its main trading partners should the UK have joined the euro. He finds that that aggregate flows between the UK and euro area members would have been as much as 13% higher and that similar results obtain for trade with non-euro area member states. He finds the single currency also led to an increase in intra-European trade flows of about 24% to 57%.[1]

In order to understand the extent of synchronisation between the euro area and the UK, we start with a correlation analysis of the cyclical components (i.e. gap) in industrial production. Figure 1 shows our estimates of the conditional correlation (Engle, 2002) between the UK and euro area business cycles (see also Harding and Pagan, 2006.) The series clearly shows both the consequences of the 1992 exit of the British pound from the EMS and the 2007-09 run up to the crisis. In line with the existing studies, we find that there has been an overall increase in synchronisation (De Haan et al. 2008 review the evidence that shows this occurred throughout the EU.) Accordingly, the average correlation coefficient between industrial production growth in the UK and euro for the full period (1991-2015) is 0.54. It started from 0.37 in 1991-1998, increased to 0.77 in 1999-2006, and again to 0.81 in 2007-2015 during the Great Recession (Figure 1).

Our estimates show that, after the introduction of the euro, the UK and euro area business cycles became substantially more synchronised. This result has important, yet still poorly, understood implications in terms of the net benefits of a possible exit from the EU ("Brexit"). Here, three observations are in order. One is that the net benefits from the increases in synchronicity since 1999 are not irreversible. They can be reduced by policy inconsistencies and delays (and many argue this happened between 2010 and 2014). Despite the weakening of the "core-periphery" pattern we uncover, irreversibility should thus not be taken for granted.

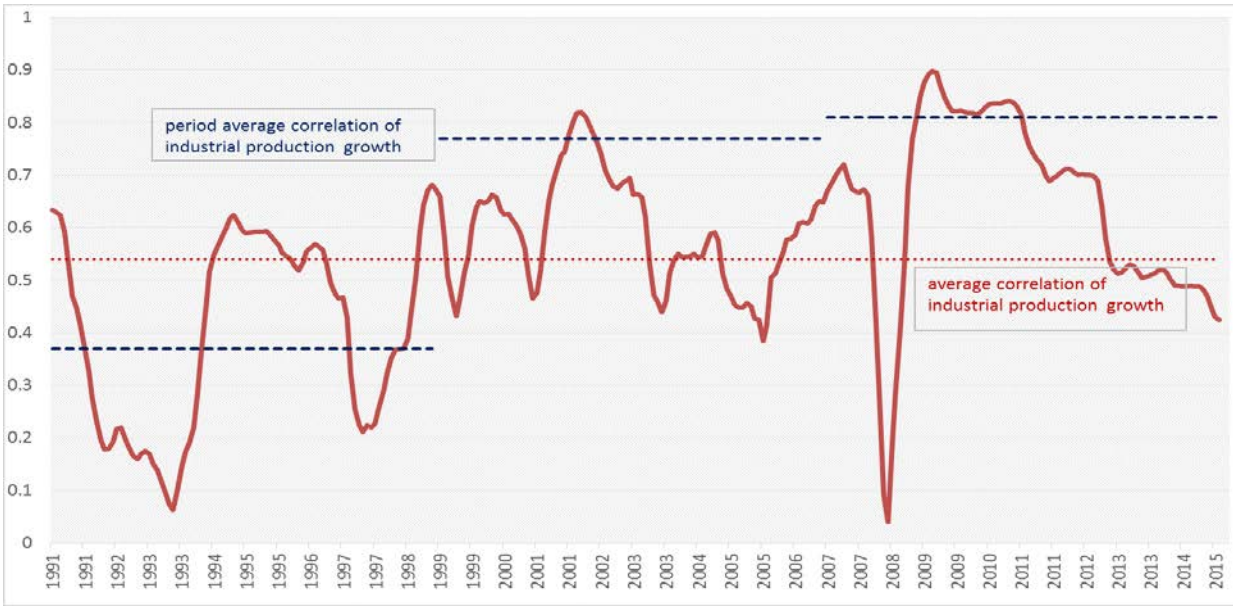
The second observation regards the consequences of this upsurge in synchronisation for the old core of the EU. Our results suggest euro-outs became somehow more integrated even if they do not use the euro as their currency. All else equal, an upsurge in BCS leads to an

[1] Sapir and Wolff (2016) and Macchiarelli (2017) discuss how progress towards the GEMU may affect the UK.

increase in the net benefits of currency union membership. Hence the costs of leaving the European Union, even for euro-outs, may have risen (maybe substantially).

The third remark is that standard business cycle analyses have two main limitations. One is that they only allow country comparisons based on individually independent estimates when interdependence or groupings is the main issue of interest. Secondly, synchronisation is an important (measurable) part of the explanation of core and periphery patterns but surely not the only one.

Figure 1: Conditional correlation: UK and euro area cycles (1990-2015)



***Source*:** Authors' calculations based on industrial production data from Datastream.

Note: In the figure we generate a measure of this correlation that is conditional on cyclical features. We use the exponential smoother from Engle (2002) and obtain cycles using a Kalman filter (Harvey, 1989). Given possible structural breaks, the specification for the trend-cycle decomposition is augmented with standard interventions. To detect influential residuals, we use the Harvey and Koopman (1992) two steps auxiliary regression procedure. In the first step, focus is on outliers and break detection. The second step involves estimating the model with those interventions which were found significant in the first step.

3. CORE-NESS: THEORY AND MEASUREMENT

In this section, we discuss why one should go beyond the standard framework based on the measures of business cycles synchronisation and move towards a more encompassing notion and measurement of "core content" of member states to understand stability in the euro area. Based on optimal currency areas (OCA theory) considerations, we discuss other approaches to identify core-periphery sets and then present our new index.

The main research question driving the OCA scholarship regards the costs and benefits of sharing a currency (Alesina and Barro, 2002). The main cost is the loss of monetary policy autonomy. Benefits are mostly in terms of reduction of transaction costs and exchange rate uncertainty, and of increasing price transparency, trade and competition. The relevant econometric evidence on the trade effects of currency unions is discussed in Glick and Rose (2016).

One insightful way of framing the issue of optimum currency areas (OCA) is by De Grauwe and Mongelli (2005). They study interactions between symmetry, flexibility and integration. Particularly, they show that there exists a minimum combination of, e.g., flexibility and integration, that countries must observe in order for a monetary union to generate positive net benefits. De Grauwe and Mongelli (2005) place the euro area (EU) in line with the OCA-line suggesting those countries are (not yet) sufficiently integrated to generate efficiency gains that can compensate for the macroeconomic costs of the union. In saying so, they note how the degree of economic integration and symmetry may change over time.

Before the EMU, there was an intense debate about the extent to which a monetary union affects symmetry (Krugman, 1993). Focusing on the symmetry-openness dimension, one can see that increased integration may raise income correlation. Their view is that the EU would move in this way: specialisation will bring about less symmetry and thus countries move downwards along the OCA plane.

There are at least two recent developments in OCA theory that should also be noted. The original OCA formulation stressed labour mobility, product diversification and trade openness as key adjustment criteria and explored the possible endogeneity of currency unions (Frankel and Rose 1998). Recent work called the attention to the additional role of credibility shocks. If there are varying degrees of policy commitment (furthering time inconsistency problems), countries with dissimilar credibility shocks should find convenient to join a currency union (Chari *et al*. 2015). A second relevant recent strand highlights that, although OCA criteria are often thought of as independent, they should instead be considered jointly, e.g., by focusing on the interactions between openness and mobility (Farhi and Werning, 2015).

The optimality of a currency area is a function of the relative power and of the relative distance between its members. If relative powers and distance are large, it is common to speak of a core and a periphery. It is expected that core countries would be those more closely meeting the OCA criteria. Given its importance for OCA, it is not surprising there have been various attempts of classifying countries into core and periphery sets. A basic way of distinguishing these methods is whether the authors pre-impose membership or they allow the data to determine whether a country is a member of the core or of the periphery at a certain point in time.

A common statistical technique that is a natural candidate for this type of exercise is cluster analysis. This is a method that helps to determine the overall number and the composition of different groupings (or clusters) given that the elements (countries in our case) that are classified in or assigned to a given cluster are more similar, according to pre-defined criteria, to each other than to those in other clusters. Cluster analysis is a broad methodology that involves various ways of estimating these groups and the distance between them. These

can be thought of as different algorithms (or maybe estimators) which differ in their criteria and efficiency in determining the size and composition of the different clusters.

Artis and Zhang (2001), for instance, empirically investigate actual and prospective membership of the EMU by applying clustering techniques to a set of variables suggested by the theory of Optimal Currency Areas. The OCA criteria they employ are the extent of synchronisation in business cycles (symmetry in output shocks), volatility in the real exchange rate, synchronisation in the real interest rate cycle, openness to trade, inflation convergence, and labour market flexibility. Their analysis reveals that the member countries may be divided into three groups: those belonging to the core (Germany, France, Austria, Belgium and the Netherlands), those part of a Northern periphery (Denmark, Ireland, the UK, Switzerland, Sweden, Norway and Finland) and those belonging to a Southern periphery (Spain, Italy, Portugal and Greece). Economists tend to dislike approaches mostly based on letting the data speak so it is not surprise that Artis and Zhang has not proven to be the most popular method to address the stability and imbalances questions so far. Yet, in its defence it must be said that their method delivers a rather straightforward and intuitive classification of countries and, possibly more useful, it allows the researcher to see how the classifications change according to each of the OCA criteria and to multiple combinations of them.

There are other, more theory-based, approaches to this problem. Bayoumi and Eichengreen (1993) is a seminal piece in this regard. They put forward an approach focusing on business cycle synchronisation embedded in a standard Aggregate Demand and Aggregate Supply framework that help classify Germany, France, Belgium, Netherlands and Denmark as core countries pre-EMU, and Greece, Ireland, Italy, Portugal, Spain, and the UK as the pre-EMU periphery. We will discuss this paper in greater detail below, but at this moment it is important to bring forward a related paper by these authors that produce an objective index to classify countries into core and non-core. Equally, Bayoumi and Eichengreen (1997) offer an “optimum-currency-area index for European countries.” The crucial element of their approach is to identify the determinants of nominal exchange rate variability which, they claim, can be sufficient to reflect OCA characteristics and support predictions of which countries pertain to which sets. This is justified both conceptually and empirically. Conceptually, they make the strong point that OCA focuses on criteria that ultimately make exchange rates more stable and monetary unification less costly (or, conversely, more desirable). In their model, bilateral exchange rate variability is a function of GDP, trade, economic structure dissimilarity, and a measure of output synchronisation. Using 1973 to 1992 data, they find all these determinants carry expected signs and are of statistical significance so they use these to forecast variability in 1987, 1991 and 1995.

Their econometric analysis allows them to identify three groups: in the first “rapidly converging” group are Germany (the numeraire), Austria, Belgium, the Netherlands, Ireland and Switzerland. The second group is characterised as one that has experienced little convergence and is composed of the United Kingdom, Denmark, Finland, Norway and France. The third group is a set of countries that are “gradually converging” to the EMU and includes Sweden, Italy, Greece, Portugal and Spain. The two most consequential results from this analysis, with the benefit of hindsight, are that France is positioned in the set that diverges from the Maastricht criteria but that overall “economic integration has thus increased countries’ readiness for monetary integration” (Bayoumi and Eichengreen 1997, p. 769).

Another good example of a study using a different estimation framework to analyse the issue of asymmetries in the EMU is Basse (2014). He favours a time-series approach using cointegration techniques and structural breaks tests to try to identify EMU core member countries. The OCA dimension he is most interested in is changes in sovereign credit risk

(bond markets) and the sample includes only a few selected EMU member states (Germany, France, Belgium, Austria, Finland, and the Netherlands.) The main finding raises questions about the suitability of France to be listed as a core country.

One final approach that should be mentioned in terms of providing different and useful insights to our understanding of core and periphery in the EMU involves studies in which membership is attributed in advance. Arestis and Phelps (2016) is a good example of such choices. They perform an “endogeneity analysis” of output synchronization (differentiating the output amplitude from its concordance) using panel data estimation (covering from 1994 to 2013), for all members as well as for different country-groups, including core, periphery, central and eastern European countries, northern European countries and the candidate countries that are expected to adopt the euro. The quantification of trade-related and direct spillover channels associated with monetary integration provides an insight into the relative importance of direct and indirect (through trade) synchronization gains arising from EMU membership. For all members, membership and trade appear to increase both amplitude and coincidence of European business cycles. The individual group analysis is similarly insightful. It shows that core and northern countries have experienced larger trade spillovers in terms of BCS than peripheral and Central and Eastern European countries. The authors suggest further research on the direct euro membership effect by trying to unpack the role of institutions and changes in the transmission mechanism since the introduction of the euro.

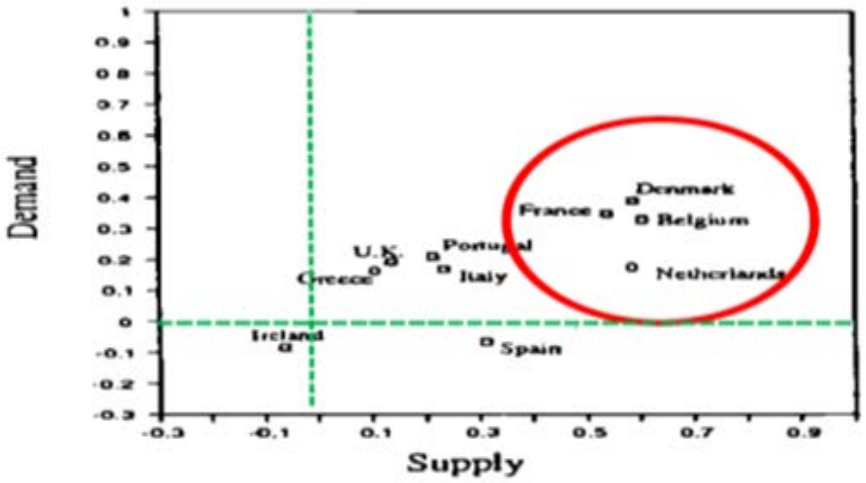
4. HOW HAS the CORE-NESS CONTENT EVOLVED IN THE EURO AREA?

Above we discussed why we should go beyond synchronisation and towards an understanding and measure of the core content of member states. In this section, we briefly review methods to identify core-periphery sets and present our new measure. Our "core-ness index" (CMCI) shows that the core-periphery pattern has significantly weakened after the introduction of the euro with substantial changes observed in both core and periphery sets of countries. Finally, we investigate its determinants and find it is driven chiefly by euro membership and product market regulation. Euro adoption makes countries more core, while more product market regulation makes countries less core.

4.1. Pre-EMU: Bayoumi and Eichengreen 1993

The seminal paper for the period preceding the European Monetary Union (EMU) is Bayoumi and Eichengreen (1993.) They establish the existence of a core-periphery pattern in the run-up to the EMU. Using pre-EMU data to estimate the degree of business cycles synchronization, Bayoumi and Eichengreen convincingly argue that there is a core (Germany, France, Belgium, Netherlands and Denmark) where supply shocks are highly correlated and a periphery (Greece, Ireland, Italy, Portugal, Spain, and the UK) where synchronisation is significantly lower. They correctly reason, in addition, that this pattern would undermine the EMU project if persistent.

Figure 2: Pre-EMU core-periphery pattern (1963-1989)



***Source*:** Bayoumi and Eichengreen (1993)

Bayoumi and Eichengreen's methodology (1993) develops the Blanchard and Quah (1989) procedure for decomposing permanent and temporary shocks. Based on the standard Aggregate Demand-Aggregate Supply (AD-AS) model, supply shocks have permanent effects while demand shocks have temporary effects on output. Both supply and demand shocks have permanent (but opposite) effects on prices.

Using the standard relation between the residuals and demand and supply shocks, exact identification requires four restrictions. Two are normalisations, which define the variance of the shocks, the third restriction is from the assumption that demand and supply shocks are orthogonal to each other, and the fourth is that demand shocks have only temporary effects on output.

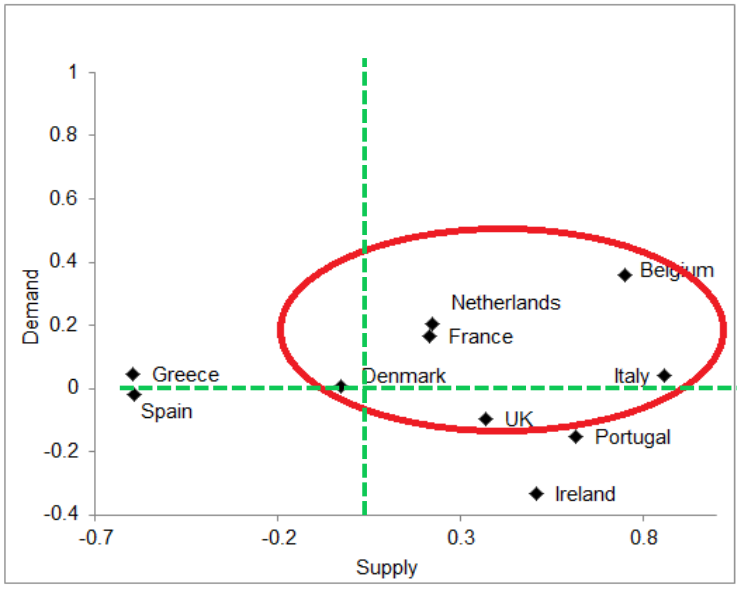
4.2. Post-EMU: Campos and Macchiarelli 1990-2015 for same EU12

We here revisit Bayoumi and Eichengreen (1993) in order to evaluate the effect of the EMU on the core-periphery pattern they find using 1963-1988 data. We use the same estimation methodology, sample, and time window (25 years) to replicate their results for 1989-2015. We ask whether the EMU strengthened or weakened the core-periphery pattern. We introduce an over-identifying restriction test that produces a new "core-ness index" (CMCI) which helps classify countries into core and periphery. Our results suggest that the introduction of the euro weakened the original core-periphery pattern.

Bayoumi and Eichengreen (1993) did not impose any further restrictions leaving their model exactly identified. We extend their framework by imposing an additional, fifth, over-identifying, restriction as we explicitly test for a permanent effect of supply shocks on output. In order to test for this over-identifying restriction, we re-estimate Bayoumi and Eichengreen (1993) SVAR model but, differently from them, bootstrap the original VAR residuals in a *i.i.d.* fashion and generate 10.000 data sets (further details in Campos and Macchiarelli, 2016). For each of these samples, we test for the over-identifying restriction using a LR-test. The percentage of rejections is our "core-ness index". The lower (higher) the percentage of rejections, the more a country is said to be part of the centre (periphery).

We see our results as an empirical test of the endogenous OCA hypothesis (Frankel and Rose 1998.) Figure 3 shows our main results. The residuals (median bootstrapped) are retrieved from a Structural VAR with two lags for all countries. There is no constant. Thus, closely following Bayoumi and Eichengreen (1993) the yearly data with respect to Germany is used. The over-identifying restriction is imposed and the sample is 1989–2015. As dispersion has decreased compared to the pre-EMU era, we argue the results suggest the core-periphery pattern has weakened after 1989.

Figure 3: Post-EMU core-periphery pattern (1990-2015)



Source: Campos and Macchiarelli (2016)

Based on the bootstrapped VAR, we test for the over-identifying restriction described above where (non) rejection supports classifying the country as periphery (centre). The four countries for which we find the rejection of the over-identifying restriction stronger are

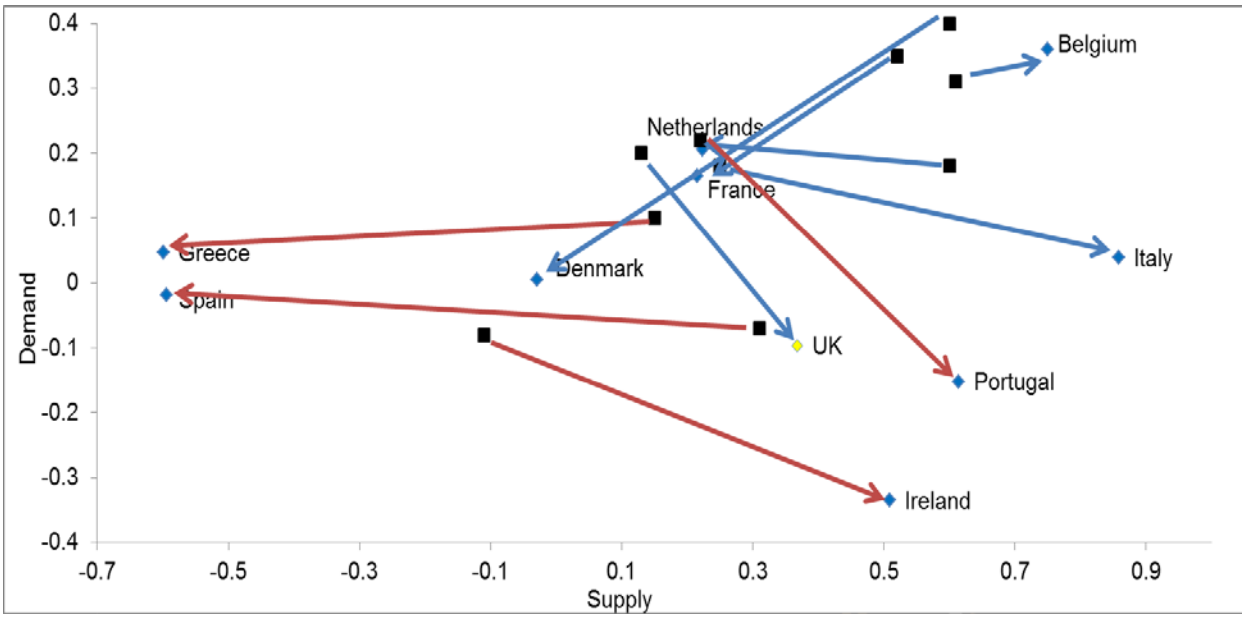
Ireland, Spain, Greece and Portugal. Without imposing this over-identifying restriction for these four countries, the core-periphery pattern in Bayoumi and Eichengreen's terms actually weakens. When the over-identifying restriction is not imposed, Ireland and Portugal move down the demand-axis and Greece and Spain jump to the left (Figure 4).

An important additional consideration regards differences between supply and demand shocks (Ramey, forthcoming). Bayoumi and Eichengreen (1993) famously argue that, based on the degree of supply shocks synchronisation, one can identify a "core" (Germany, France, Denmark and Benelux) where shocks are highly correlated and a "periphery" where synchronisation is much lower. They also note that demand shocks correlations are much lower, even for those countries in the "core."

The EMU may have eliminated autonomous monetary policies as a source of idiosyncratic demand shocks, but national fiscal policies remain independent so the cross-country correlation in movements in demand may persist. Hence, it is important to update this influential Bayoumi and Eichengreen (1993) exercise in order to assess to what extent the EMU has reinforced the core-periphery pattern they identified with data up to 1988, which is, pre-EMU. It should be noted that the direct comparison of Figures 2 and 3 show that although the range on the demand side remains the same, it has increased in terms of the supply shocks (with minimum values of -0.7 in Figure 3 as opposed to -0.3 in Figure 2.)

Figure 4 shows our results suggesting that the EMU has considerably weakened this core-periphery pattern (Campos and Macchiarelli, 2016). The EMU has fostered integration in the EU as a whole and the UK economy was not immune to these changes. The UK business cycles has become more synchronised after the euro and, hence, its economy has become much more integrated.

Figure 4. The dynamics of the correlation of supply and demand disturbances between pre- (1963-1988) and post-EMU (1991-2015)



Source: OECD Statistics data (http://www.oecd.stat). Authors' calculations.

Note: The figure compares estimates from *pre*-Maastricht based on Bayoumi and Eichengreen (1993), covering the period 1963-1988, with Campos and Macchiarelli (2016) equivalent estimates for the period 1991-2015 (*post-EMU*). For each country, a bi-variate SVAR is estimated using (log) real GDP and the (log) deflator, both in first differences. The structural identification of the shocks also follows Bayoumi and Eichengreen (1993) and control for changes in regimes. Red arrows denote movements of the so-called "core" countries and blue arrows movements of the "periphery".

Overall, our results support a re-interpretation of the core-periphery pattern: after the EMU a new, smaller periphery emerges (Spain, Portugal, Ireland and Greece) and its dynamics are systematically different from the rest.

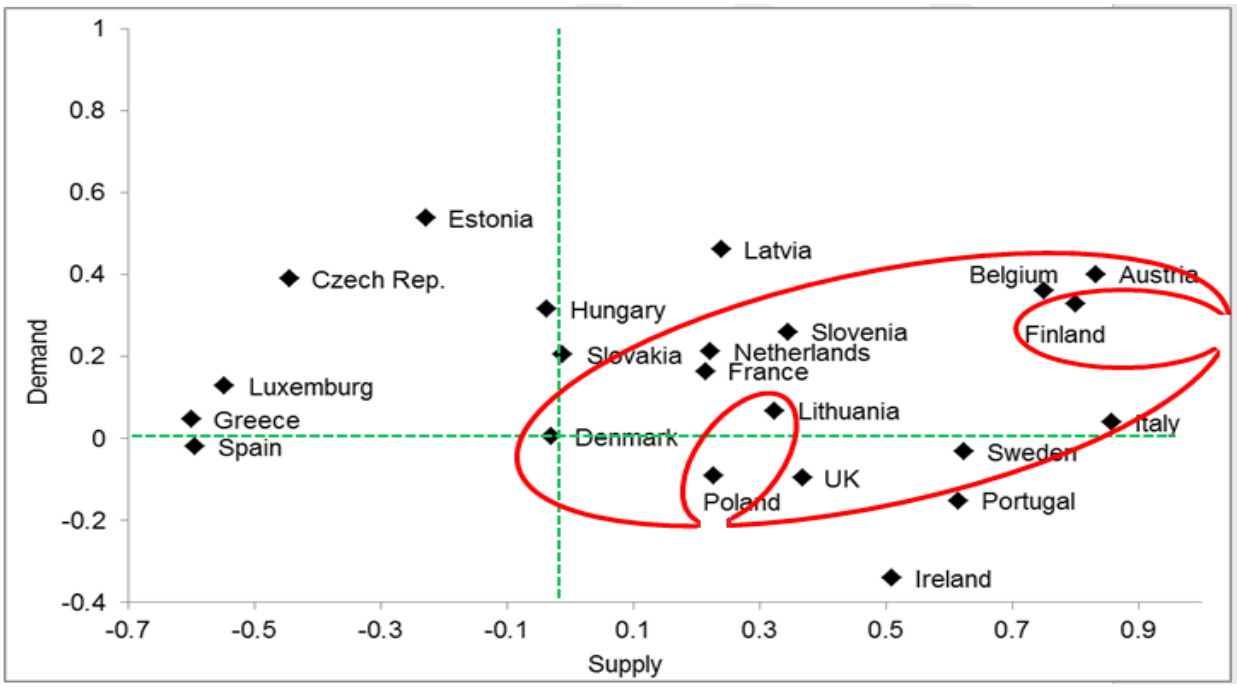
One important finding we present is that CMCI helps us to pinpoint or track how the core and the periphery changed over time. The distance between the core and the periphery could well have increased or decreased in the post-EMU period. The periphery could have fully converged with the core or it could have moved towards the core or both could have moved towards each other. The asymmetry could also have decreased by core and periphery converging by large changes in demand and small changes in supply correlations or the other way around. Given these multiple options, what we find is that the periphery experienced a decrease in demand correlations and an increase in supply. The core experienced a decrease in both.

4.3. Post-EMU: Campos and Macchiarelli 1990-2015 for EU28

Another finding from this exercise emerges when we extend it to the EU28. This shows the value of a CMCI (as well as the need for an additional axis.) When we extend it to the EU28, a bigger core with the addition of Sweden, Austria and Slovenia (with the third highest CMCI value) and a much bigger periphery (with Spain, Finland, Hungary, Poland, Slovakia and Portugal in decreasing order) are found.

For EU12, based on our CMCI we find that (in decreasing order) the periphery is composed of Ireland, Greece, Portugal, and Spain (72.7). While the core contains in increasing order: the UK, Denmark, Germany, France, Netherlands, Belgium, and Italy. For the EU 28 we find that the periphery is composed of (in decreasing order) Latvia, Ireland, Lithuania, Estonia, Luxemburg, Czech Republic, Greece, Portugal, Slovakia, Poland, Hungary, Finland, and Spain, while the core contains the UK Sweden, Denmark, Germany, Austria, France, Netherlands, Slovenia, Belgium, Italy. It should be noted that data for Bulgaria, Croatia, Cyprus, Malta and Romania are not included in the OECD Annual Accounts.

Figure 5: Post-EMU EU28 core-periphery pattern (1990-2015)



Source: Campos and Macchiarelli (2016)

These are the main results using 12 and 28 countries. These two snapshots cover the post-EMU period and are comparable with the results that Bayoumi and Eichengreen and others have produced for the pre-EMU period (Di Giorgio, 2016). But it begs the question: what happened in between these snapshots?

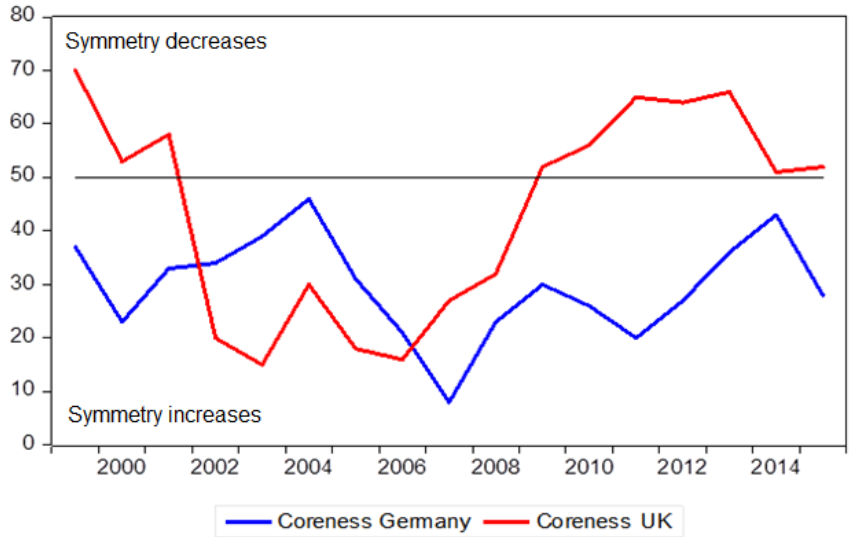
4.4. Core-ness over Time: Campos and Macchiarelli 1990-2015 for EU17

How did these groups (core and periphery) evolve or change over time? By moving the estimation window (see Annex), we can generate a dynamic core-ness measure. The selected time period 1960 to 2015 limits our estimation to the 17 European countries that are either the EU or EEA members. In what follows, we present the result for Germany, i.e. what is commonly used as a numeraire in exercises such as the above, and the UK. Importantly, this dynamic version of CMCI is independent of making assumptions on which country is the anchor, but it rather depends on imposing quantitatively and qualitatively the same type of restriction in a structural framework (see Annex).

In Figure 6, an index above the 50% line indicates less core-ness and vice versa. The results suggest that while Germany has been safely below the threshold, the UK has been moving in and out, with this index now being just above 50. This is all not surprising *ex post*, and consistent with the (summary) of business cycle synchronisation analysis of the previous section.

Based on how our CMCI changes over time, Campos and Macchiarelli (2016b) identify three groups of countries: a core that becomes more homogenous over time, a periphery that becomes less homogenous over time, and a mixed set of countries composed of Denmark and the UK, Spain and Sweden. Their CMCI trajectories are noteworthy: the CMCI for Denmark changes little over time, Sweden becomes systematically less and less core over time, Spain becomes systematically more and more core over time, and the UK is in-and-out of the core set of countries.

Figure 6: Examples of CM Core-ness Index Over Time: Germany and UK



***Source*:** Authors' calculations

In an attempt to explain some of the observed dynamics behind our CMCI, we start by having a quick look at our measure of core-ness against a set of standard indicators. We partition the possible explanatory variables as: *fiscal* (debt to GDP ratio, cyclically adjusted budget balance), *financial* (corporate bond spread, 10-year government bond spread, 3-month interbank interest rate spread, interest on the average on consumer loan spread, return on equity differential), *external* (FDI, and real effective real exchange rate), *structural reforms* (employment protection legislation, EPL, and product market regulation, PMR) and a dummy variable on euro area membership. The financial variables are particularly considered consistent with the European Central Bank's multiple definition of financial integration (ECB, 2011). The estimation includes Austria, Belgium, Germany, Denmark, Spain, Finland, France, Greece, Ireland, Italy, Norway, the Netherland, Portugal, Sweden, Switzerland, and the UK. All spreads are computed vis-à-vis Germany. *EZ membership* takes values of one for countries joining the EMU starting from their accession year. We present the results for the period 1991-2015. The results are generally robust when we stop our estimation in 2007 (these results are available upon request from the authors).

In the Table, a higher regression coefficient has to be interpreted as bringing about a higher index (see Annex), meaning it reduces "core-ness". The overall results (last column in Table 1) suggest that a strong role is played by the strictness of product market regulation – overall economy - whereby a high PMR increases the likelihood of being in the periphery. This is in turn not surprising given that the CMCI is based on supply side dynamics and the extent to which those prompt similar GDP reactions among member states (see Annex). A second factor is the level of debt-to-GDP, again, in reducing the likelihood of a country being in the core, albeit the statistical evidence is not strong.

Membership to the currency union, for the countries in our sample, finally suggests an important role in making countries less "peripheral", with this reduction from periphery to core being as much as 16 percentage points.

These findings are in line with the idea that one of the main concerns for monetary union membership would be again represented by the costs of adjustment in order to deal with asymmetries. In the absence of sufficient labour flexibility, and equally of fiscal transfers at the euro-area level, many countries would suffer from severe adjustment problems. As the crisis made very clear, the lack of such channels, in the presence of asymmetries, has made adjustment *ex post* very high in order for the integrity of the monetary union to be preserved (see for instance De la Dehesa, 2012).

Table 1: Determinants of CMCI – GMM estimates

	1991-2015				
	Fiscal	*Financial*	*External*	*Structural reforms*	
Debt (% GDP)	0.109 **				0.112 *
	(0.041)				(0.131)
Adj. Budget Balance (% potential output)	0.812 *				0.681
	(0.334)				(1.121)
Corborate bond spread		0.390			0.616
		(0.570)			(0.717)
Gvt bond spread		0.905			-2.768
		(0.733)			(1.841)
3-month interbank spread		-4.497 **			-1.317
		(1.321)			(2.128)
Avg on cosumer loans spread		-0.114			0.478
		(0.425)			(0.709)
Return on equity diff.		0.642			-0.516
		(0.409)			(0.387)
FDI (%GDP)			-0.474 ***		-0.491
			(0.150)		(0.208)
Reer (CPI adj.)			-0.249 **		-0.280
			(0.117)		(0.291)
EPL				-14.148 *	-25.358
				(5.905)	(19.894)
PMR				10.345 **	14.481 ***
				(3.539)	(5.348)
EZ membership	-19.070 ***	-27.234 ***	-12.098 ***	-11.662 ***	-16.978 ***
	(2.085)	(2.846)	(1.919)	(2.913)	(5.591)
C	71.079 ***	84.165 ***	99.192 ***	89.086 ***	135.646 **
	(6.591)	(5.161)	(13.024)	(15.513)	(57.111)
Effect	Random	Random	Random	Random	Fixed
Adj-R2	0.183	-0.038	0.078	0.193	0.701
Durbin-Watson	0.551	0.908	0.527	0.703	1.275
J-Stat (p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

***Source*:** Authors' calculations on Campos and Macchiarelli (2016), OECD and IMF data.

5. POLICY IMPLICATIONS

There are various policy implications supported by the analysis above. Based on how our CMCI measure changes over time, Campos and Macchiarelli (2016b) identify three groups: a core that becomes more homogenous over time, a periphery that becomes less homogenous over time, and a mixed set of countries composed of Denmark and the UK, Spain and Sweden. The CMCI trajectories of these four countries is remarkable: the CMCI for Denmark is flat, it changes little over time. But our results show that Sweden becomes systematically less and less core over time, Spain becomes systematically more and more core over time, and the UK is in-and-out of the core. This calls attention to Sweden as a very important case to understand the future of the euro area as well as that of the European Union.

Even before the launch of the EMU, the concern about entrenched asymmetries spurred an alternative approach to European integration: the possibility of a two-tier or 'multi-speed Europe'. From an economic viewpoint, it is true that smaller groups of countries may be better candidates for forming an OCA given that they may be more homogenous (see also De Grauwe, 2016). Looking at the early evidence on the degree of synchronization of shocks across countries before the EMU (1963–88), compared to the same pattern 25 years after the EMU, however, suggest that a new, smaller, periphery has emerged (Spain, Portugal, Ireland and Greece). Thus, the EMU has weakened the core-periphery pattern, leading the countries to become more integrated over time.

The UK, with its mixed experience shown above, represents a much lesser threat to euro area stability than the absence of concerted and forceful action from euro area members states themselves. In this respect, we argue that while the hypothesis of a 'multi-tier' Europe cannot be dismissed on the basis of available evidence, our results support the view that the viable alternative to a 'multi-speed' line of work is a serious process of coordinated reform. This is indeed the spirit of the Five Presidents' Report (Junker *et al.*, 2015).

As mentioned above, there has been considerable thinking and planning on how to make the EMU more effective, that is, how to ensure the stability and integrity of the EMU. The first clear attempt at addressing this matter was the so-called Four Presidents' Report (those of the European Council, European Commission, European Central Bank and Eurogroup) which is put forward in 2012 with an explicit goal of moving towards a Genuine Economic and Monetary Union (Macchiarelli 2016). The choice of words (i.e., Genuine) is indicative of the extent of the consensus about the need for an EMU reform. In 2015, another report was issued by the four presidents, plus the President of the European Parliament, which provides a roadmap for further deepening of the EMU in order to ensure the stability and smooth functioning of the EMU. The Five Presidents' Report stipulates a detailed range of actions and a clear timetable (in three phases) to make a progress in four main areas, namely, economic, financial, fiscal, and political union.

The analysis presented here documents that the introduction of the single currency preceded a substantial increase in the symmetry among member states, thus improving an important dimension of the considerations about the stability of the euro area. The main policy implications we derive, however, complement those put forward by the Five Presidents' Report. This Report indicates what is to be done and when, while our analysis suggests the countries that should receive a special attention in order for these policy actions to be more effective. More specifically, our policy implication turns the focus to Sweden.

Our results suggest that Sweden is a crucial country in order to fulfil the goal of increasing the stability of the euro area. The trajectory of Sweden's CMCI since 1990 is deeply worrisome. It indicates that this is one of the few countries that continues to leave (or it continues to increase its distance from) the core and has done so in a systematic and

sustained way. No other country exhibits such a trajectory. Making matters worse, Sweden is an important trade partner to the Baltics which surprisingly also show extremely low CMCI values (despite their euro membership and relative low levels of product market regulation.) Third and finally, after Brexit, Sweden will become the country with the lowest CMCI score. In other words, it will become the country closer to the border with the periphery. For all these reasons, the EU should focus on Sweden to guarantee a successful implementation of the Five Presidents' Report.

We are fully aware that the Swedish Statistical Office monitors the public opinion towards the single currency. The level of rejection has been above 70% in recent years. Yet, there is a clear economic explanation for this. Campos *et al.* (2016) argue that Sweden benefited relatively little from EU membership after it joined in 1995 (in large part because it was already a high-income country with highly developed institutions) and benefited substantially from not joining the euro (partly because its largest trading partners are not euro zone members.) Indeed, the evidence suggests that while around year 2000 the benefits from not joining were relatively difficult to estimate (or close to zero), a decade later these have become substantial and significant (Gyoerk 2014.)

In terms of the actual UK withdrawal from the EU, most views are that the outcome of the referendum – as a reflection of "British exceptionalism" – will generate heavy economic costs mainly to Britain (Macchiarelli, 2017). The EU would feel some knock-on costs as well, but the economic short-term and reputational loss may not be long-lasting should Europe manage to decisively signal that integration will be successfully re-tooled.

Brexit will certainly challenge both internal and external equilibria, including some EU non-euro area member states such as Poland, Denmark, and Sweden, but also other 'pre-ins', feeling they will lose grip in shaping euro zone policies (Oliver, 2016), especially against an enhanced role of Germany and the other euro area member states. Once again, this may trigger further skepticism, should the EMU fail to provide an attractive alternative model for integration. Deeper integration should carry on to the point of making the euro-outs eager to join, as clearly anticipated in phase 3 of the Five Presidents' Report. Any lesser solutions may turn out to be very costly not only for the future of the EMU but for the future of Europe.

6. CONCLUSIONS

What is the impact of Brexit, the British decision to withdraw from the European Union (EU) on the stability of the euro area? This paper argues that if one is concerned about stability and cohesion, asymmetry and imbalances, a novel and relevant way of thinking about these issues is offered by the notion of core-ness in terms of the core and periphery framework.

Before Maastricht, the seminal contribution of Bayoumi and Eichengreen (1993) generated a picture that was crystal clear. Looking at correlations between demand and supply shocks one could see two distinct groups of countries: a core and a periphery. On this basis, before the euro, Bayoumi and Eichengreen warned us that this pattern could persist or even deepen.

Bayoumi and Eichengreen (1993) is a seminal paper in this respect because, *inter alia*, it is one of the first to point out the risks of an entrenched core-periphery to the nascent EMU. Their influential diagnostics was based on data covering 25 years from 1963 to 1988. Using the same methodology, sample, and time window, we replicate their results for 1989-2015. We ask whether the EMU strengthened or weakened the core-periphery pattern. Using a new “core-ness index” (CMCI), our results suggest the EMU has significantly weakened the original pattern, in that we find, based on demand and supply shocks, significant changes in the clustering of the set of countries they use.

Starting from the approach proposed in Campos and Macchiarelli (2016a), we constructed a CMCI measure of “core-ness” which is theory-driven, simple, continuous, and generates entirely commonsensical results. Using CMCI, we obtain three main findings. One is that in the post-EMU period, we see an augmented core which became more concentrated, while the periphery shrank and became more dispersed. The picture post-EMU is less informative than the picture pre-EMU. This increase in dispersion begs the question: is there a missing variable? Is there a missing axis in this graph? It highlights the need for a simple metric, a continuous measure of core-ness that can help us better understand the contours and dynamics of these core and periphery sets.

A second finding is that the periphery experienced a decrease in demand correlations and an increase in supply. The core experienced a decrease in both supply and demand correlations.

Yet, to say that the core-periphery pattern weakened before and after the euro for the EU12 ignores the simple fact that by 2016, there is no EU12, the EU is now a Union at 28. Recognising this, we observe a bigger core with the addition of Sweden, Austria and Slovenia (with the third highest CMCI) and a much bigger periphery (with Spain, Finland, Hungary, Poland, Slovakia and Portugal in decreasing order) have emerged.

All these findings are from snapshots (Bayoumi and Eichengreen pre-EMU, EU12 post-EMU, EU28). But peering at these raises the question: what happened in between? How did these groups (core and periphery) change over time? By moving the estimation window, Campos and Macchiarelli (2016b) generate a dynamic version of the proposed CMCI. Because the period we look at spans from 1960 to 2015, we are able to produce results only for 17 European countries that are either EU or EEA members.

Using this dynamic version of CMCI, Campos and Macchiarelli (2016b) uncover three groups: a core that becomes more homogenous, a periphery that becomes less homogenous over time, and a mixed set with 4 countries: Denmark, UK, Sweden and Spain. But what is truly remarkable is what their trajectories show: Denmark CMCI is flat, it changes little over time. Yet, Sweden becomes systematically less core over time, while Spain shows a systematically higher CMCI over time. Unsurprisingly, the UK goes in and out of the core.

Finally, we ask the question of what drives CMCI. GMM estimates of our index on a set of standard covariates show that euro membership and Product Market Regulation are key. We find core-ness is driven chiefly by euro membership and product market regulation. Euro adoption makes countries more core, more regulation makes countries less core. This finding provides renewed and direct support for the endogenous OCA hypothesis.

These results are very interesting from a policy point of view because they have some rather straightforward and uncomplicated implications. Specifically, whatever you do, you must start with Sweden.

In conclusion, whenever and in whichever form Brexit occurs, for practical purposes, the euro area will become the European Union. One main policy implication is that when faced with “what is wrong with the euro?” our results hint at “less than commonly thought.” In other words, they suggest that the benefits of keeping the euro area together seem to still exceed the costs of breaking it up. Thus, we need to think long and hard about how to find our way out of this once-in-a-lifetime crisis we are currently going through. The best way to start is to recognise that there are many crucial questions we have not yet properly framed, let alone provide satisfactory answers for. The size, the nature and the dynamics of the core of the euro area are clearly one of them, as these are key to understand the future of the euro and that of Europe.

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ANNEX: TECHNICAL ASPECTS OF CMCI CONSTRUCTION

In what follows we summarize the methodology discussed in Campos and Macchiarelli (2016a; 2016b). The underlying methodology is that of Bayoumi and Eichengreen (1993), which is an extension of the Blanchard and Quah (1989) procedure for decomposing permanent and temporary shocks.

Let us consider a system where the true model is represented by an infinite moving average of a (vector) of variables, X_t, and shocks, ϵ_t. Using the lag operator L, a bi-variate VAR featuring real GDP and its deflator can be written as an infinite moving average representation of demand and supply disturbances:

$$X_t = A_0\epsilon_t + A_1\epsilon_{t-1} + A_2\epsilon_{t-2} + A_3\epsilon_{t-3} + \cdots = \sum_{i=0}^{\infty} L^i A_i \epsilon_t$$

where $X_t = [\Delta y_t, \Delta p_t]$ and the matrices A represent the impulse response functions of the shocks to the elements of X. It follows that

$$\begin{bmatrix}\Delta y_t \\ \Delta p_t\end{bmatrix} = \sum_{i=0}^{\infty} L^i \begin{bmatrix}a_{11i} & a_{12i} \\ a_{21i} & a_{22i}\end{bmatrix}\begin{bmatrix}\epsilon_{dt} \\ \epsilon_{st}\end{bmatrix}$$

where $y_t$and p_t represent the logarithm of output and prices and ϵ_t are $i.i.d.$ disturbances, which identify supply and demand shocks (Ramey, forthcoming). For the i-th country, a_{11i} represents element a_{11}, in matrix A_i and so on.

This framework implies that supply shocks have permanent effects on output, while demand shocks have temporary effects. Both have permanent (opposite) effects on prices. The cumulative effect of demand shocks on the change in output must be zero:

$$\sum_{i=0}^{\infty} a_{11i} = 0$$

The system can be estimated using a VAR. Each element can be regressed on lagged values of all the elements of X. Using B to represent these estimated coefficients:

$$X_t = B_1X_{t-1} + B_2X_{t-2} + \cdots + B_nX_{t-n} + e_t$$

$$= \big(I - B(L)\big)^{-1} e_t$$

$$= (I + B(L) + B(L)^2 + \cdots)e_t$$

$$= e_t + D_1e_{t-1} + D_2e_{t-2} + D_3e_{t-3}$$

where e_t represents the residuals from the VAR equations. Using the standard relation between the VAR's residuals (e_t) and structural disturbances – i.e. demand and supply shocks – i.e. $e_t = C\epsilon_t$, it is clear that, for each country, exact identification of the C matrix requires four restrictions. Two are normalizations, which define the variance of the shocks ϵ_{dt} and ϵ_{st}. The third restriction is from assuming that demand and supply shocks are orthogonal to each other. The fourth that demand shocks have only temporary effects on output (equation 1.3).

The standard AD-AS model implies that demand shocks should raise prices in both the short and long run, while supply shocks should lower prices and increase demand permanently. In order to achieve that, it suffices to impose the additional over-identifying restriction in the VAR that supply shocks have permanent effects on output. We need to impose this restriction in our sample for the demand and supply shocks to be theory-consistent. This differs from Bayoumi and Eichengreen (1993) because they do not impose this last restriction, which leaves the model exactly identified. One reason we adopt the proposed over-identifying restriction is that inflation differentials are often considered a 'normal feature of currency unions. Therefore, we pay particular attention to modelling the effect of shocks on demand. The role of co-movements in output's cyclical fluctuations is further in

line with the business-cycle literature. Since the proposed over-identifying restriction is sufficient to get structural disturbances in line with AD-AS dynamics, any additional long-run restriction may be redundant in this setting.

We test for the above over-identifying restriction, by imposing $\sum_{i=0}^{\infty} a_{12i} = \gamma$, where $\gamma > 0$. Under the latter assumption, demand across each country is restricted to respond qualitative (sign) and quantitative (size) in the same way to supply shocks. In terms of the structural VAR analysis, this implies:

$$\sum_{i=1}^{\infty} \begin{bmatrix} d_{11i} & d_{12i} \\ d_{21i} & d_{22i} \end{bmatrix} \begin{bmatrix} c_{11} & c_{12} \\ c_{21} & c_{22} \end{bmatrix} = \begin{bmatrix} 0 & \gamma \\ . & . \end{bmatrix}$$

We do not restrict γ *a priori*; instead, we vary γ in the interval [0.1, 2]. The value we chose to report, consistent with Campos and Macchiarelli (2016a), is $\gamma = 1$.

In order to construct a test for the over-identifying restriction described above, we estimate the SVAR model consistent with Bayoumi and Eichengreen (1993). Differently from the latter, we bootstrap the original VAR residuals in a *i.i.d.* fashion and generate K = 10.000 data sets. For each of the k-*th* samples we proceed with a structural analysis and test for the over-identifying restriction based on a LR-test. We record the number of rejections of the over-identifying restriction test at each bootstrap replication, and calculate

$$NoR_i = 100 \times \frac{\sum_{k=1}^{K} \left\{ NoR = 1 \middle| -2(L_r - L_u) > \chi^2_{q-\left(\frac{n^2-n}{2}\right)} \right\}_{i,k}}{K}$$

where $\boldsymbol{L_u}$ and $\boldsymbol{L_r}$ are the maximized values of the (gaussian) log likelihood function of the unrestricted and restricted regressions, respectively. under $\boldsymbol{H_0}$, the lr statistic has an asymptotic distribution with degrees of freedom equal to the number of long-run restrictions $(\boldsymbol{q})$ minus $(\boldsymbol{n^2 - n})/\boldsymbol{2}$, where $\boldsymbol{n}$ is the var-dimension (in this case $\boldsymbol{n = 2}$).

The dynamic version of the index is obtained by letting T be larger than before where τ denote the width of a sub-sample or window and define the rolling sample 'metrics'. Here, we define

$$NOR_{\mathrm{t_i}}(\tau) = \frac{1}{\tau - 1} \sum_{j=0}^{\tau-1} NOR_{(t-j)_i}(\tau)$$

The windows are rolled through the sample one observation at a time, so there the procedure returns $T - \tau + 1$ rolling estimates of the CMCI (Campos and Macchiarelli, 2016b).

The basic intuition for our CMCI measure is that it reflects the percentage of times we observe the rejection of the key restrictions needed to estimate the Aggregate Demand-Aggregate Supply model. The higher the percentage of rejections (or the more often they happen), the higher is the value of CMCI. As such, CMCI values range between 0 (perfect core-ness content) and 100 (i.e., core-ness content implying a perfect periphery).

NOTES

DIRECTORATE GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

An assessment of the impact of Brexit on euro area stability

Christopher HARTWELL, Roman HORVATH

IN-DEPTH ANALYSIS

Abstract

The withdrawal of the UK from the European Union ("Brexit") will have several consequences for the stability of the EU, both in the short- and the long-term. Brexit has the potential to decrease trade integration between the EU and UK via direct and indirect trade effects. Heightened political uncertainty as well as uncertainty regarding the outcome of negotiations about the new institutional setup between the EU and UK is likely to amplify the adverse trade disintegration effects. For the longer-term, the fact that Brexit occurred may point to deeper issues with the EU and especially the euro area's reputation. However, Brexit and the continued mistrust of EU institutions allows for an opportunity to substantially re-think the institutional structure of the euro area from first principles.

CONTENTS

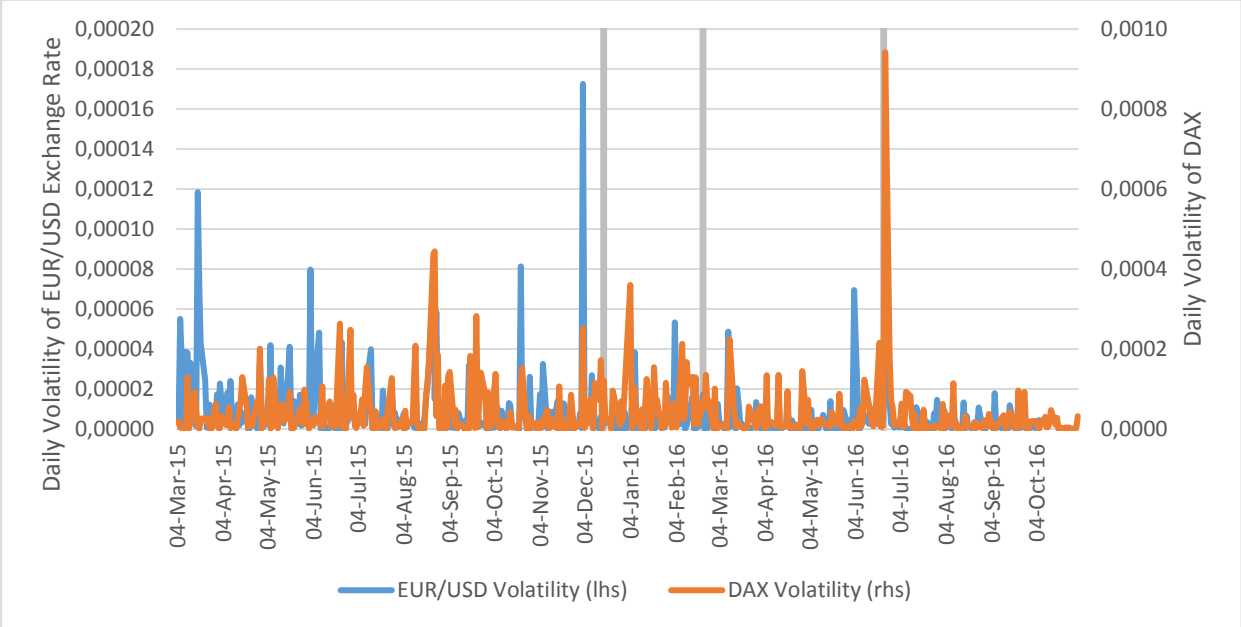
EXECUTIVE SUMMARY

- The withdrawal of the UK from the European Union ("Brexit") will have several consequences for the stability of the EU, both from a short-term and a long-term perspective.
- The current economic discussion focusing on the implications of Brexit for the EU focuses largely on trade, labour and foreign direct investment issues. We argue that an additional element to focus on is increased economic and political uncertainty, both in short and long-term. The uncertainty may act as amplification mechanism to standard economic mechanisms and intensify the effects stemming from Brexit.
- In the short-term, Brexit has increased uncertainty enormously. According to the widely-used economic policy uncertainty index, uncertainty in the EU and specifically in the UK increased to historically unprecedented levels in late June and July 2016, levels much higher than those observed at the time of the fall of Lehman Brothers.
- Structural estimates of the likely consequences of Brexit differ, with the vast majority of available estimates focusing on the consequences of Brexit for the UK economy rather than on other EU countries. A pre-Brexit survey from the Bertelsmann Foundation suggested that individual Member States (apart from Belgium, Luxembourg, and Ireland) would lose only 0.5% of GDP due to Brexit. In other models, however, the issues with Brexit return to the possibility of uncertainty, leading to depressed investment in the largest Eurozone economies.
- The extent of trade integration between the UK and individual EU countries is modest, but the trade patterns are complex, with potentially strong spillovers from third countries. For example, following Brexit, trade disintegration between Hungary and the UK may be strongly affected by the trade disintegration between the UK and Germany, as Germany is a major trading partner for Hungary and the Hungarian exports patterns to Germany and German export patterns to the UK are similar.
- Higher uncertainty surrounding the Brexit may help the UK economy to gain competitiveness through a weaker currency and cushion some of the adverse effects of trade and labor disintegration in the short-term following the Brexit.
- Longer-term issues of stability revolve around the EU's reputation and the institutions of the euro area.
- The reputational hit that the EU has taken as a result of Brexit is substantial but is part of a persistent trend since 2010. A large reason behind this has been the convergence in the EU, not of economic metrics but of the institutional convergence of the EU with the euro area. While Brexit will feed into the narrative of the problems of the euro area, we anticipate that the built-in advantages of the EU will help to dampen short-term volatility.
- Longer-term stability in the euro area will be predicated on the successful reform of euro area institutions, since they are likely to become synonymous with the EU's institutions. In particular, the move towards an explicitly rules-based regime, including a fiscal contract to bear the costs of convergence and an exit mechanism to spell out the rules of withdrawal, will help to create the conditions for institutional stability.
- The greatest long-term challenge for the EU and the euro area, however, will be a resumption of growth. From an institutional standpoint, the ECB's policies have contributed to stagnation in the euro area, which suffers from structural and not monetary flaws. In addition to providing a clear, rules-based regime for the operations and membership of the euro area, the ECB must also re-think its role within the currency union and pursue limited and conventional monetary policies.

1. INTRODUCTION

Great Britain's possible exit from the European Union ("Brexit") created dramatic economic and financial volatility the minute the European Union Referendum Act was introduced in May 2015, volatility which only increased once the Act was passed in December 2015, the referendum was set in February 2016, and, of course, once the surprise results were known in June 2016. The unprecedented nature of the vote, coupled with uncertainty about how the process was to play itself out once the results were known, rocked both exchange and equity markets (Figure 1) and has the potential to continue to impact markets for years.[1]

Figure 1: Volatility in the EU, 2015-2016



Source: Authors' calculations based on data from the European Central Bank (ECB) and the website of the Deutsche Börse AG. Grey areas indicate Brexit milestones. Volatility is calculated as the square of log returns between time *t* and time *t-1*.

The timing of Brexit comes at a most unpropitious moment for the euro area, as the push for "ever closer union" has floundered with the emergence of critical issues regarding the common currency on one hand and the EU's overall economic policy on the other. Emerging crises and challenges such as continued economic stagnation, foreign economic and political obstacles (i.e. the resurgence of Russia), the need to forge a common refugee policy, difficulties in convincing Member States to support new trade and/or Association Agreements, and deficiencies in the relationship between euro area members and those outside of it (but still in the EU) have all competed with each other for the EU's attention. With the additional challenge of holding the Union together, a host of questions regarding the future path of the EU and the euro area in a post-Brexit Europe have been raised.

Before one may even consider the long-term ramifications of Brexit, however, the short-term issue of how the Article 50 process plays out also looms large. Questions regarding the timing and modalities of such an exit, as well as the framework that may be put in place to negotiate the process of Brexit and beyond, are all virgin territory for the EU. Indeed, the daunting mission before the EU and the UK for this process may, as an independent analytical group termed it, "test constitutional and legal framework[s] to their limit and

[1] The only point exhibiting more volatility in Figure 1 was on 3 December 2015, after the ECB's decision to cut its deposit rate.

possibly beyond" (Political Studies Association 2016). Given the size and unprecedented nature of the task at hand, the importance of answering these questions correctly and ensuring the comprehensive nature of the process cannot be understated, in order to avoid unnecessarily prolonging the current volatility and irreparably harming the EU going forward.

This brief will examine both the short-term and long-term consequences of Brexit for stability in the euro area, with a focus on the economic and monetary ramifications. In particular, we examine four specific aspects of the volatility engendered by Brexit:

- *The role of policy uncertainty*: A large and growing literature in economics has started to examine the effect of policy volatility in addition to policy direction, on economic aggregates in an economy (Baker *et al.* 2016). Given that Brexit has generated an enormous amount of uncertainty regarding the future of EU economic policies and the reality of a Britain-less EU (as well as an EU-less Britain), such uncertainty may be driving behaviour with longer-term consequences, i.e. in investment decisions, as well as affecting current and future monetary policy. The effects of this uncertainty, and how likely it is to persist, will be examined in Section II of this brief.

- *The short-term reputation of the EU:* As noted above, the EU has suffered quite a bad run of press as of late, between the lingering euro area/sovereign debt crisis, the rejection of CETA by Belgium and of the EU-Ukraine Association Agreement by the Netherlands, and of course the rejection of the EU that was encapsulated in Brexit. Has Brexit, as a manifestation of resentment with the EU, undermined the Union in the short-term? Will the EU find it more difficult to handle the pressing challenges noted above given the withdrawal of the UK? What effect does Brexit have on solidarity within the EU or on the immediate work to be done in the euro area? Section III will try to answer these questions, with an emphasis on the economic policy-making in the euro area that will be required in coming years.

- *Disintegration of trade*: Beyond the uncertainty of Brexit and the effect it will have on the EU's policies in the short-run, there are much longer-term ramifications from the reorientation of trade links between the EU and the UK. While the extent of this reorientation will depend heavily on the on-going negotiations between the two partners, there is no doubt that some disruption in trade relations will occur, disruptions which may fall heavily on some of the EU's smallest members (Oliver 2016). How the severing of trade links may affect producers, value chains, and consumers in the EU and the UK will be examined in Section IV, attempting to understand the significance of the trade channel for the stability of the euro area.

- *The effect on EU institutions:* Finally, while Brexit has possibly undermined the EU in the short-term, a more important outcome will be what effect Brexit has on the euro area and the EU in the long-run. As Campos and Macchiarelli (2016) recently noted, "Whenever and in whichever form Brexit occurs, for practical purposes the euro area will become the EU." This is an important distinction, for the EU has been delicately juggling the idea of the euro area "ins" and "outs" for years; the withdrawal of the UK provides a shock to the EU's current institutional make-up, but also provides an opportunity to improve institutions which have become ossified and complacent. Section V will survey the obstacles and opportunities for reforming the EU's institutional make-up and putting in place a system that guarantees the stability of the euro area.

The conclusion of this policy brief is that what will really decide the stability of the euro area in the long-run will not be Brexit, although it will create short-term volatility due to policy uncertainty, trade disruption, and the need for a re-thought monetary approach. The reality is that the euro area's stability will be decided by the EU itself, and how it rises to the challenge associated with building the proper institutions for the euro.

2. BREXIT AND UNCERTAINTY

It appears that the main short-term channel of Brexit is its effect on uncertainty, which translates into greater volatility in financial and exchange rate markets. However, uncertainty may have long-term effects given the expected lengthy trade negotiations of the UK vis-à-vis the EU as well as UK with the non-EU countries. Barrero *et al.* (2016) distinguish between so-called short-term and long-term uncertainty and find that, for example, firm investment responds only to long-term uncertainty, while employment reacts both to short-term and long-term uncertainty.

2.1. Short-term effects

The uncertainty accompanying Brexit is likely to have mild negative effects on euro area stability in the short-term. The weaker British pound, accompanied by a likely economic slowdown in the UK due to the withdrawal is likely to have an adverse effect on euro area exports to the UK.

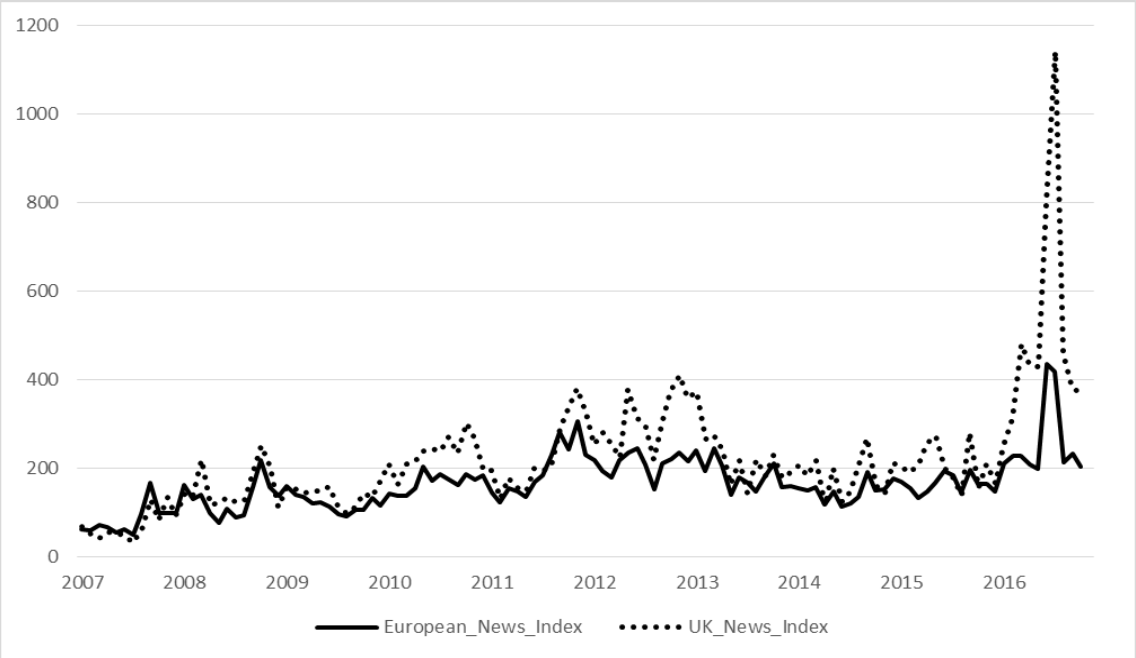
In addition, consumer confidence in Europe may also be negatively impacted. Following Brexit, international organizations such as the International Monetary Fund (IMF) have revised their growth forecasts for the euro area mildly downwards from 1.7% to 1.4% in 2017 (figures from the latest World Economic Outlook). Other estimates present similar figures, with the European Commission (2016) predicting 1.5% for the euro area.

Somewhat paradoxically, the resulting uncertainty of the effects of Brexit may help cushion adverse short-term growth effects for the UK via a temporary weakening of the British currency. However, this could also have a spillover effect for the conduct of monetary policy in the euro area, as the ECB may prolong its accommodative monetary policy to account for economic factors (i.e. a sinking pound) and financial factors such as higher volatility in the financial markets. It is conceivable that ECB's QE program might be prolonged beyond the current horizon of March 2017.

An additional challenge, beyond these broad effects, is understanding just how much uncertainty has been created by Brexit. Although the measurement of uncertainty is a relatively new area of economics, Baker *et al.* (2016) propose a comprehensive economic policy uncertainty index, an aggregate indicator based on the newspaper coverage of policy-related economic uncertainty.[2] Figure 2, detailing the index for Europe, shows the enormous effect of Brexit on short-term uncertainty. According to this index, uncertainty in the EU and specifically in the UK increased to historically unprecedented levels in late June and July 2016, much higher than those observed at the time of the fall of Lehman Brothers or of European debt crisis (this is interesting because the VStoxx volatility index, another possible proxy for uncertainty, exhibited greater volatility after the fall of Lehman Brothers rather than after the referendum on Brexit). This result suggests that, unlike financial markets, the European media has seen Brexit as more dramatic and anomalous event. And while economic policy uncertainty levels in the EU decreased shortly thereafter to a level more typical of the crisis period, uncertainty remains very high in the UK (as of October 2016).

[2] The European economic policy uncertainty index includes the following newspapers: *Le Monde* and *Le Figaro* for France, *Handelsblatt* and *Frankfurter Allgemeine Zeitung* for Germany, *Corriere Della Sera* and *La Repubblica* for Italy, *El Mundo* and *El Pais* for Spain, and *The Times of London* and *Financial Times* for the United Kingdom.

Figure 2: Economic Policy Uncertainty Index, Europe and UK



***Source*:** http://www.policyuncertainty.com/. The index is developed by Baker *et al.* (2016). The European News Index is based on the data from France, Germany, Italy, Spain and the UK.

2.2. Long-term effects of uncertainty

While immediate levels of uncertainty surrounding Brexit have settled down, the simple fact is that the exit of a Member State from the EU represents a major geopolitical shock for Europe. With potentially lengthy negotiations regarding Single Market access, a prolonged period of higher long-term uncertainty can be expected both during negotiations and during implementation of the divorce (Brexit may also have consequences for political stability in the EU, a question we explore below).

Given the recent nature of Brexit, there are few concrete analyses which concentrate on the possible longer-term ramifications of the uncertainty engendered by the process. Thus, we can only make some general points regarding how uncertainty may play out in the longer-term. As noted, recent research has focused on the measurement of uncertainty and its effects on the economy (Bloom, 2014), offering a clue to the possible effects of Brexit over the coming years. According to the series of research contributions on uncertainty by Bloom (2014), uncertainty may increase rapidly, feeding in on itself, and strongly propagate initial economic shocks, serving as amplification mechanism. To the best of our knowledge, most current estimates of the effects of Brexit are based on economic models which typically do not explicitly incorporate uncertainty effects. Therefore, the effects which these models capture might be stronger in reality, as uncertainty contributes an additional factor.

As an example, Bloom *et al.* (2007) find that uncertainty is a major factor affecting investment dynamics, meaning that uncertainty not only harms investment levels today but postpones investment for tomorrow. In the current environment, this means that, as a consequence of Brexit, foreign direct investment to the UK may be weaker in addition to internal investment dynamics (a point noted by van Reenen, 2016). This point was also noted by the European Commission (2016), who attempted to incorporate uncertainty shocks in their QUEST model via risk premia, arguing that uncertainty shocks will materialize mostly through investment dynamics.

3. POLITICAL UNCERTAINTY, INTERNATIONAL TRADE AND ECONOMIC PERFORMANCE

While there is little tangible work on the magnitude of the effects of uncertainty over the long-term, a plausible area related to Brexit where uncertainty may affect longer-term economic development is related to the effects on trade. Recent research from Handley and Limao (2015) finds that trade policy uncertainty prevented Portuguese firms from exporting prior to EU entry, which shows that uncertainty is an important driver in preventing trade integration. However, in the case of Brexit, uncertainty (as well as the very process itself, by design) is likely to cause trade disintegration between UK and EU. The degree of disintegration will depend on the new trade arrangements between the UK and EU, which are subject to upcoming negotiations; however, as noted above, the effects of trade disintegration are likely to be amplified by the uncertainty related to the results of trade negotiations.

In principle, the results of these trade negotiations are uncertain and may resemble arrangements close to barrier-free trade in goods and (largely) services, i.e. similar to current arrangements under Single Market. This option is often labelled as “soft” Brexit. On the other hand, there is also the possibility of negotiations being unable to reach such an expansive and favorable agreement outside of the EU framework, leading to the so-called “hard” Brexit, i.e. when WTO rules would in principle apply for trade relations between UK and the EU at a lower level of coverage than the Single Market. Wyplosz (2016) provides an extensive summary of the likely positions of individual EU countries in terms of negotiations on trade and labor issues, noting that these country interests are likely to be heterogeneous, with preferences both for soft and hard Brexit (see Table 4 in Wyplosz (2016), which summarizes these positions).

Depending upon which form of Brexit occurs, there are a number of different estimates of the impact of Brexit on economic performance in the UK and EU. However, the literature on long-run uncertainty suggest that the adverse effect stemming from likely trade disintegration between the UK and EU may be larger than the estimates based on models, which do not account explicitly for uncertainty effects. We examine the current research in three sub-sections based on modelling approach these studies apply because the choice of modelling approach largely influences the questions these studies can address. We include both the studies, which examine the likely effects of Brexit on the UK as well as the EU. There are more studies examining the effects of Brexit on UK and we find them illustrative for the EU case. Before discussing the estimates, we provide a short overview of current trade patterns between UK and the euro area countries.

3.1. Trade integration between the UK and EU countries

Figures 3 through 6 provide information on the top export and import destinations of the UK, focused on the world and on European countries. The UK exports and imports are well diversified in terms of country coverage and unlike for some small countries, there is no major trading partner at the individual country level. Nevertheless, EU countries combined represent major trading partner for the UK and approximately 44% UK’s goods and services were exported to the EU in 2015.

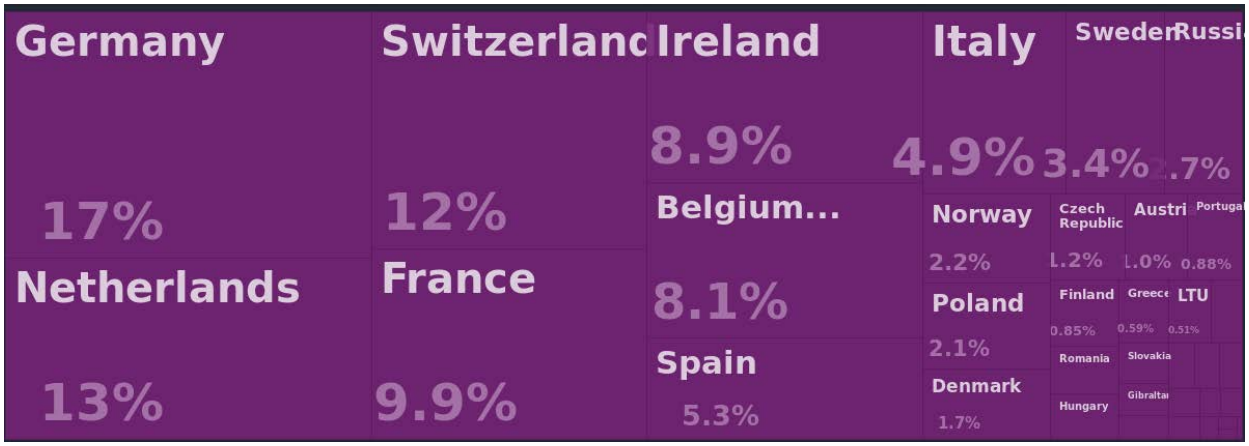
Halpern (2016) makes an interesting point about direct vs. indirect trade. Halpern (2016) notes that it is not only the volume of bilateral trade (direct trade), which matters but also the second round effects (indirect trade). He mentions the case of Hungary, for which the trade integration with the UK is rather modest. On the other hand, Hungarian and German, and the UK and German trade integration is much stronger. As a consequence, the Hungarian export performance may be hit by the trade disintegration between the UK and

Germany more strongly than by the disintegration directly between Hungary and the UK. This effect may be especially important if the Hungarian export patterns to Germany are similar to the export patterns of Germany to the UK (value chain), which is indeed the case.

Figure 3: Top Export Destinations of the UK: World

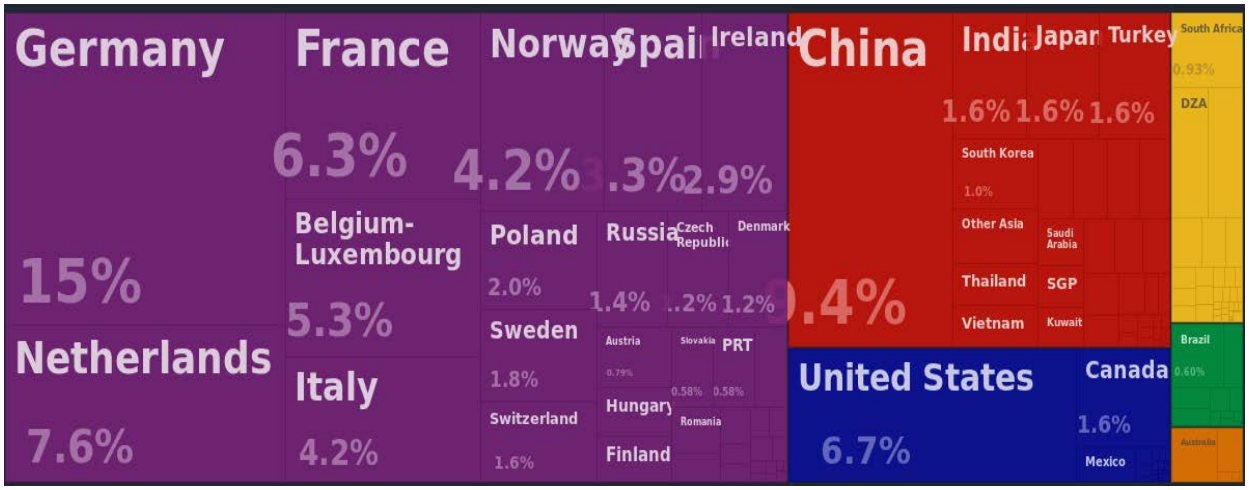
***Source*:** MIT Atlas of Economic Complexity. http://atlas.media.mit.edu/en/profile/country/gbr/

Figure 4: Top Export Destinations of the UK: Europe



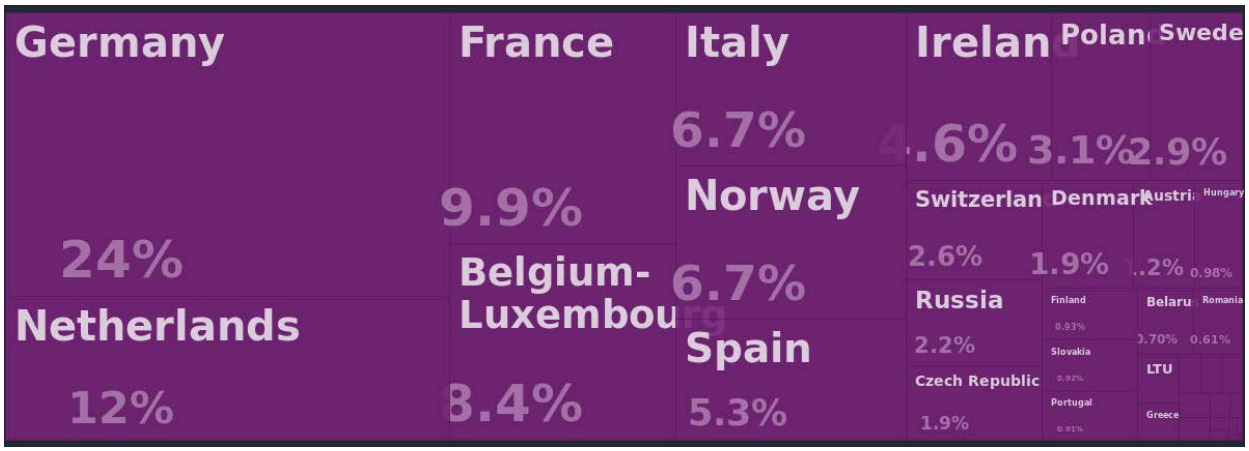
***Source*:** MIT Atlas of Economic Complexity. http://atlas.media.mit.edu/en/profile/country/gbr/

Figure 5: Top Import Destinations of the UK: World



***Source*:** MIT Atlas of Economic Complexity. http://atlas.media.mit.edu/en/profile/country/gbr/

Figure 6: Top Import Destinations of the UK: Europe



***Source*:** MIT Atlas of Economic Complexity. http://atlas.media.mit.edu/en/profile/country/gbr/

3.2. Structural estimates of the benefits and costs of Brexit

We refer as structural estimates to those which are based on reasonably rich multi-country models and which try to model the structure of an economy in a systematic manner, covering all relevant characteristics of the economy and how it responds to exogenous shocks.

As of this writing (November 2016), the vast majority of available estimates focus on the consequences of Brexit for the UK economy rather than Brexit's effect on other EU countries, or the euro area. We think it is useful to discuss the evidence for the UK because it can be informative for the euro area (and the EU), although the strength of the economic effects may differ between these two. For example, Dingra *et al.* (2016) models the trade effects and fiscal transfers, while Booth *et al.* (2015) also consider the regulatory effects (such as setting social issues, employment, health regulations regardless the EU) and the trade effects vis-à-vis non-EU countries. Both Booth *et al.* (2015) and Dingra *et al.* (2016) find that tariff and non-tariff barriers to trade with the EU after Brexit will have a negative effect on the UK's GDP, costing up to 3% of GDP yearly. This negative effect could be at least partially compensated by greater trade liberalization with non-EU countries. Not surprisingly, both studies find that the UK will economize on fiscal transfers to the EU. Booth *et al.* (2015)

also finds that Brexit could be beneficial in terms of economic performance if accompanied by greater deregulation in social or labor issues.

As noted, although the effects of Brexit have been examined mostly only for the UK economy, some scattered estimates of the effect of Brexit on the euro area economy exist as well. For example, the Bertelsmann Foundation (2015) estimates the costs of Brexit for individual EU countries, finding that the highest costs are naturally for the UK, followed by Ireland. In their estimates, GDP per capita will be lower by approximately 2.5% for these countries. However, the effects on other EU countries are weaker and, with the exception of Belgium and Luxembourg (in addition to Ireland, already mentioned) they are below 0.5%. In a more rigorous approach, Rieth *et al.* (2016) estimate a structural vector autoregression model for European countries and simulate the effects of Brexit on investment and GDP growth. They find that heightened uncertainty will undermine investment and growth in the EU and the effects across EU countries will generally not differ greatly from each other.

Table 1: Welfare effects of Brexit (%GDP), UK

	Hard Brexit		**Soft Brexit**	
	Dingra *et al.*	Booth *et al.*	Dingra *et al.*	Booth *et al.*
Fiscal Transfers	+0.31	+0.53	+0.09	+0.22
Regulation				+0.7 to +1.3
Tariff Barriers to EU Trade	-0.14	-0.95	+0.00	
Non-Tariff Barriers to EU Trade: Initial	-0.73	-1.81	-0.34	-1.03
Non-Tariff Barriers to EU Trade: Future	-2.05		-1.03	
Reduced Barriers to Non-EU Trade			+0.30	+0.75
Total	-2.61	-2.23	-0.98	+0.64 to + 1.24

***Source*:**. Booth *et al.* (2015), Dingra *et al.* (2016). Adapted from Crafts (2016). Note that hard Brexit denotes the case, when the UK exits the Single Market. Soft Brexit represents the Norway-type arrangements, i.e. The UK remains to participate in the Single Market and pays some fiscal transfers for the access.

3.3. Is economic and political integration beneficial?

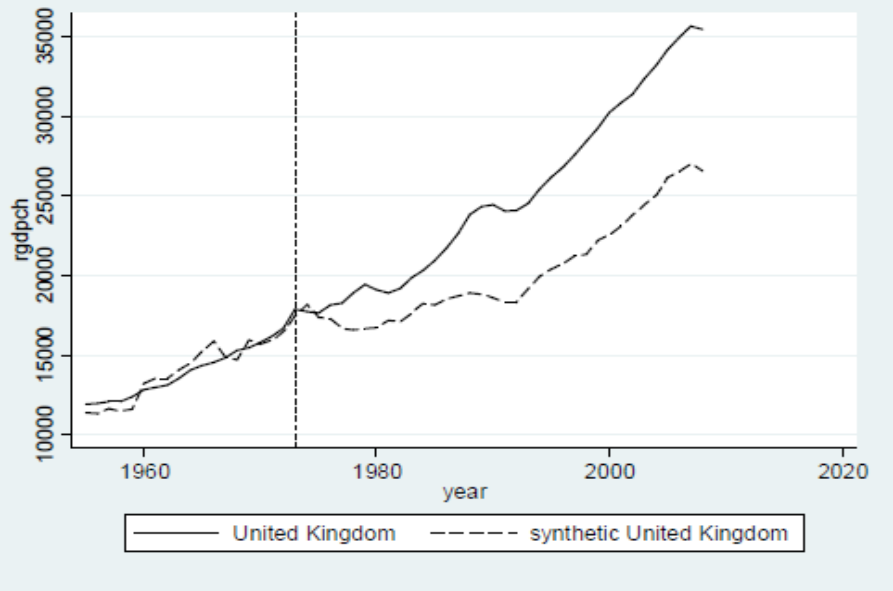
In addition to the structural approach, several research articles have used a so-called "synthetic control method" to evaluate the effect of political integration on economic performance or the interactions of economic and political integration on economic performance.

The synthetic control method is a relatively new statistical technique and has several benefits, mainly due to its ability to rigorously construct counterfactuals, i.e. what would happen if, for example, EU member country such as UK had never become an EU member (as opposed to the reality that the UK became a member in 1973). The statistical technique generates a synthetic (non-existent) UK, which is a weighted average of similarly-situated

countries; in short, to examine whether the UK's entry into the EU was beneficial in terms of economic performance, the synthetic control method would find the most similar countries which did not became EU members and compare the economic performance of the real UK to this synthetic UK.

Campos *et al.* (2014) use this synthetic control method and estimate that the effects of EU membership for UK's economic performance have been positive. Their estimates suggest that the UK real GDP per capita would be lower by approximately 24% had the UK not joined the EU (Figure 7). At first glance, this is an enormous effect, but it is important to note that Campos *et al.* (2014) compare the period between 1973 and 2008, i.e. over nearly four decades, and the statistical technique assumes that the UK would stay out of EU for the entire sample period. Nonetheless, these results suggest that EU membership has been beneficial for its members. Of course, based on these results, it is highly speculative to say whether these positive effects of EU membership would be translated into adverse effects of equal magnitude, if the UK leaves the EU.

Figure 7: The Effect of EU Membership on UK's Real GDP per capita



***Source*:** Campos *et al.* (2014). Real GDP per capita on axis y.

In a further piece of work, Campos *et al.* (2015) examine whether political integration is necessary for economic integration to reap benefits of greater economic performance (in other words, whether we can have economic integration without political integration and exhibit similar economic growth trajectories). Campos *et al.* (2015) again apply synthetic control method and use Norway as the "natural experiment," as Norway completed all accession requirements to become an EU member in 1995 but EU membership was rejected in a referendum. Examining the effects of not joining the EU on productivity, Campos *et al.* (2015) find that productivity levels between 1995 and 2001 would have been 6% higher on average if Norway had joined the EU in 1995. Therefore, these results also point to the reality that political integration into the EU may provide an extra benefit to economic integration.

3.4. Effects of political disintegration on trade disintegration

Synthetic control and especially the structural model methods can be tailored better to the UK's and EU's conditions, examining specific policy questions and different scenarios. Moreover, the popularity of structural and synthetic control estimates stems from the unavailability of actual disintegration episodes in EU countries. On the other hand, structural model estimates are essentially forecasts, which are inherently surrounded by non-negligible amount of uncertainty. Similarly, synthetic control methods assume that economic developments in one country (and its response to unexpected events) can be accurately modelled by the weighted average of economic developments in other countries. Synthetic control methods also ignore various second round effects among economic variables. Therefore, it is vital to examine the actual experience of (the block of) countries with economic (and political) disintegration in the past.

Fidrmuc and Fidrmuc (2003) examine the effects of political disintegration on trade (dis)integration between the Czech Republic and Slovakia. The political disintegration between these two countries was peaceful and thus, given that other disintegration episodes in the Eastern Europe and former Soviet Union were not, the "Velvet Divorce" is especially relevant for Brexit. Fidrmuc and Fidrmuc (2003) use a gravity model to find that the degree of trade integration between the Czech Republic and Slovakia has fallen markedly after the break-up of Czechoslovakia. Before 1993, trade links between the Czech Republic and Slovakia were 43 times higher than what their model would predict based on the economic and geographical characteristics. Five years later, the trade links were only 7 times higher than what the model would predict. On the one hand, this result shows that trade integration may fall substantially after political disintegration. On the other hand, the results of Fidrmuc and Fidrmuc (2003) also document hysteresis in trade relations because the trade intensity between the Czech Republic and Slovakia remained at the high level. Nevertheless, it is important to emphasize that the Czech and Slovak case is special because the 1990s has been marked by strong trade reorientation from Eastern European to Western European markets and therefore, the trade integration between these two countries would fall, to a certain extent, regardless of political disintegration.

In a more comprehensive approach, De Sousa and Lamotte (2007) examine the effect of political disintegration in the Czechoslovakia, the Soviet Union and Yugoslavia using data from 1993 to 2001. They extend the modelling approach of Fidrmuc and Fidrmuc (2003) and adjust their model for multilateral trade resistance and put it forward as a more appropriate specification in recent theoretical gravity model literature. Regarding Czechoslovakia, the results by De Sousa and Lamotte (2007) largely confirm the findings by Fidrmuc and Fidrmuc (2003).

Thom and Walsh (2002) examine a related issue - the effect on monetary disintegration on trade disintegration using the case of Ireland and UK. Ireland joined the Exchange Rate Mechanism and abandoned the anchor to sterling in 1979. Interestingly, Thom and Walsh (2002) find nearly no effect of monetary disintegration on trade links in the case of Ireland and UK and suggest that the trade integration does not have to fall markedly for well-developed and economically synchronized countries.

In addition, there is a vast literature which focuses on the effects of political integration on trade integration (different from our discussion above on the effects of political disintegration on trade disintegration). For the sake of brevity, we shall focus on Baier *et al.* (2008), who examine the effect of EU membership on bilateral trade flows. They find that the EU membership effect is large, with bilateral trade among EU members increasing by between 127 and 146% after 10 to 15 years. They argue that some of the previous estimates on the importance of EU membership are biased downwards because of econometric issues such as self-selection.

3.5. Policy implications

Overall, the estimates regarding the effect of political (dis)integration on trade (dis)integration are heterogeneous but all suggest that some level of trade disintegration between the UK and EU may reasonably be expected.

Moreover, the empirical literature does not explicitly consider various so-called second round effects related to trade, such as those emphasized by Halpern (2016), who notes that merely looking at the size of bilateral trade flows is insufficient to gauge effects of disintegration. For example, he mentions the case of Hungary and argues that Hungarian export performance will be hit more by the trade disintegration between the UK and Germany (Germany is major trading partner for Hungary) rather than the trade disintegration between the UK and Hungary itself.

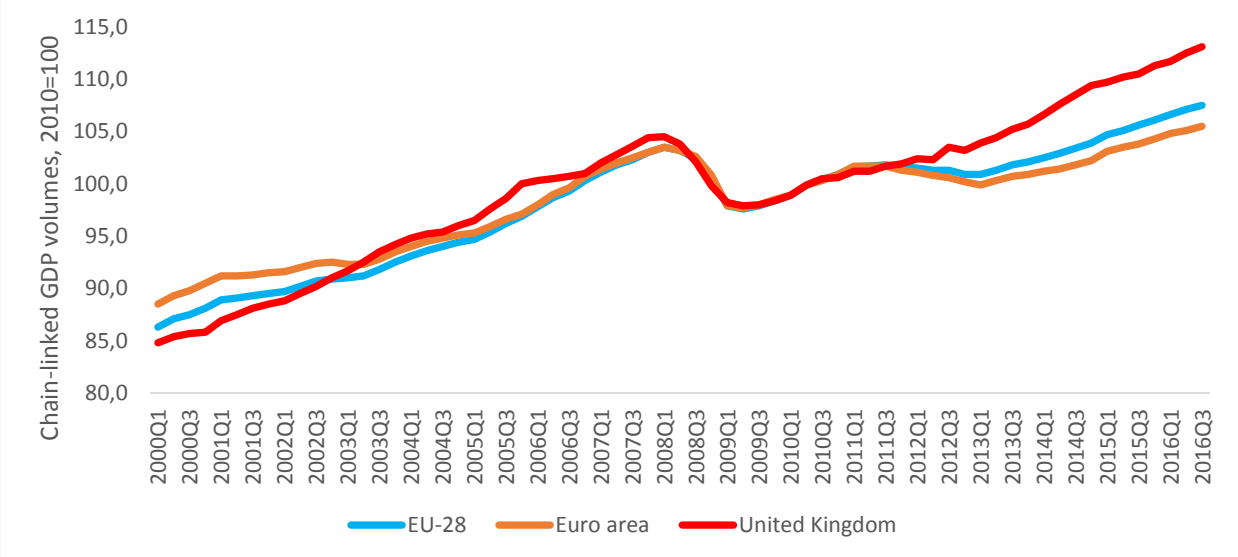
In addition, as we argued above, the empirical evidence on the political-trade integration nexus does not explicitly consider the effects of uncertainty, which may amplify the effect of political disintegration. Higher uncertainty may translate into lower investment, delay investment projects, and decrease consumer confidence. Therefore, as compared to the existing empirical literature, the effects of political disintegration may be higher because of indirect trade and uncertainty effects.

4. UNDERMINING THE EU...

While continuing uncertainty has the potential to inflict more damage on already-weakened currency and financial markets (as well as the real economy), there is another avenue, related but distinct, that could create difficulties for the future. In particular, the reputational damage that the EU has suffered due to Brexit might also have longer-term consequences, especially in regards to the single currency project. Does Brexit cast doubt on the ideas of ever-closer union, or does it instead show the resilience of the EU for the longer-term? And most importantly, how does the withdrawal of a member of the EU potentially harm the euro area?

These questions, while weighty, are focused on short-term political dynamics rather than long-run economic ones. However, today's politics may make tomorrow's economics, and thus the first point to note regarding these questions is that Brexit is an additional manifestation of resentment that has been building for over half a decade against certain facets of EU policy-making, rather than marking the beginning of such frustration. Dissatisfaction with economic governance in the EU was widespread well before Brexit became a possibility, tied intimately to the institutional convergence of the EU with the euro area as laid out in the Lisbon Treaty. As the global financial crisis mutated into a sovereign debt crisis, striking at the euro area periphery, the euro proved to be a fallible mechanism that required constant attention. The still on-going euro area crisis in Greece, with the real threat of spread to Spain or Italy, coupled with stagnant growth in the euro area (especially compared to the EU as a whole or even the UK, see Figure 8) and the political unpopularity of further bailouts (Ardagna and Caselli 2014) have all combined to make euro area membership much less attractive in 2016 than it was in the mid-2000s. And as the EU's institutions were explicitly becoming more oriented towards the euro area and favouring the Euro "ins," the perils of the euro were bound to become inextricably linked with the EU in the public's mind.[3]

Figure 8: Growth Trajectories in the EU, Euro Area, and the UK



Source: Eurostat.

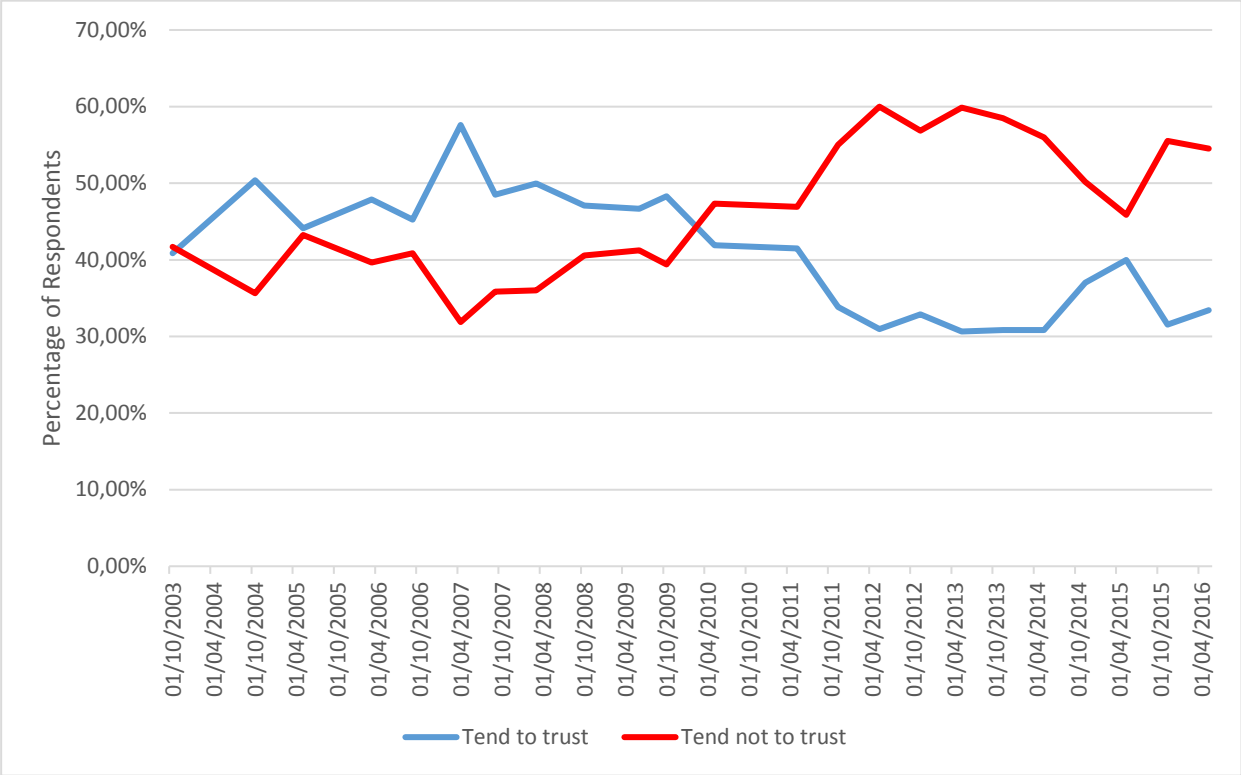
[3] This shift towards the primacy of the Eurozone in the EU's economic governance, and the seeming faltering of the architecture of the euro, has ironically been a key criticism from the UK, as policymakers and specifically then-Prime Minister David Cameron had highlighted the issue of economic governance, specifically how the EU treats euro "ins and outs," and the growing divide between the two sides (and the adamant refusal of French and German policymakers to allow euro "outs" a veto of Eurozone decisions).

The blurring of the lines between the EU and the euro area, and the deliberate nature of this move, has spurred a backlash against EU institutions that began well before Brexit and has encompassed many other topics beyond economics (e.g. the refugee crisis or EU social policies). The election of Viktor Orbán in Hungary and his protégés in Poland in 2015, the results of the 2014 European Parliamentary elections, and the rejection of the EU-Ukraine Association Agreement by referendum in the Netherlands all occurred before Brexit but after the euro area crisis. Indeed, as Eurobarometer data (Figure 9) shows, the euro area crisis was the turning point for general trust in EU institutions, with distrust of the EU outstripping trust since 2010, with the gap only widening in 2015. This trend was already noted by Pew Research (2013) three years ago, as their polling of seven EU countries (France, Italy, Spain, Poland, the UK, the Czech Republic, and Germany) showed an average 10 percent drop in support for European integration over 2009 to 2013 (with the biggest drop, 21 percent, coming in France, one of the largest supporters of the euro project). Ironically, this shift has occurred even though majorities in most countries in the EU note that the euro has, on balance, been good for the countries that have adopted it; however, amongst the Euro "outs," there are growing numbers of people who believe that the euro still should not be adopted in their own country (Flash Eurobarometer 2016).

Despite the negative perception (and perhaps reality) of the euro, the rumours of the EU's demise are greatly exaggerated in terms of both its authority and its reputation. In this sense, Brexit is also just one piece of bad news among many, albeit one that could have a larger effect on the actual day-to-day operations of EU institutions. In the first instance, the combined economic strength of the EU and the benefits it garners as a collective entity in global economic negotiations are issues that both have been highlighted by Brexit and the negotiations over Britain's exit from the Union. Indeed, the spotlight has been on how the UK economy will survive leaving the EU, how London will maintain its primacy as an international financial centre, and how UK citizens will fare having lost their automatic right to work on the continent. Questions on if the EU is threatened by the loss of 17.5% of its collective GDP have taken a back-seat to the worry about Britain's future.

On some issues, there is no doubt that the UK will be missed for certain initiatives that have dragged on for too long or that face concerted opposition; Transatlantic Trade and Investment Partnership (TTIP), for example, could have benefited from the UK's presence to help conclude negotiations. But the EU also has a full plate of trade negotiations it is undertaking with countries around the world, and the momentum is such that the UK's presence is not required for completing these measures (indeed, what is needed is convincing EU citizens of the merits of such agreements rather than convincing another Member State). Similarly, the sheer size of the EU internal market, coupled with the likely advantageous negotiating position that the EU will have *vis a vis* the British in negotiating their exit, means that trade linkages and value chains will show minor disruptions compared to UK firms. The EU's reputation may be momentarily tarnished by the fact that one of its Member States has decided to leave, but the economic clout of the EU remains and will do more for the reputation of the Union in the long-run.

Figure 9: Trust of EU institutions, 2003-2016



Source: Eurobarometer. Respondents from the EU (thus changing composition from year-to-year).

In sum, the fact that Brexit occurred, even if the process is delayed or averted, is not beneficial to the EU's reputation by any means in the short-run. It compounds the perception that the EU is somewhat adrift, simultaneously working on too many issues while also focusing far too stringently on the single currency project. Brexit, on the heels of events such as the euro area crisis, victories of Eurosceptic parties throughout Europe, and the rejection of the EU-Ukraine Association Agreement, is another manifestation of general dissatisfaction with the direction that EU economic policymaking is heading in. Subsequent difficulties, such as the rejection of the EU-Canada Comprehensive Economic and Trade Agreement (CETA) by Belgium, the heart of the EU, have also shown that the scepticism of the EU is much more persistent than evanescent. While the EU will weather the specific event of Brexit, due to the inherent economic and political advantages that the EU enjoys, such a broad-based repudiation of the EU ideal calls into question the longer-term prospects of the EU and especially the euro area project. Perhaps fortuitously, however, the current situation and the impetus of Brexit does bring with it its own opportunities for reform.

5. ...OR CREATING AN OPPORTUNITY FOR GETTING THE INSTITUTIONS RIGHT?

As just noted, the reputational hit that the EU has taken as a result of Brexit has been a manifestation of deeper trust issues with EU institutions more generally, issues that accelerated at the moment that the euro area began to falter economically. This reputational issue is grounded in and almost exclusively attributable to the euro area, and not other facets of the EU such as trade, the single market, Schengen, or European democracy (although all of these issues have now been caught up in the general resentment pervading the continent). Given the root of the EU's malaise, the wellspring of the mistrust of EU institutions, comes back to the euro area, Brexit offers a huge opportunity for the EU to step back and re-assess its own institutional development in regards to the euro area project. Brexit allows for much-needed soul-searching in order to understand the mistakes of the past decade and how they can be remedied going forward.

To be clear, this opportunity is not predicated on the actual ramifications on economic governance that Brexit has caused. The direct effect of Brexit on the EU's economic policy-making institutional structure will be minimal: the UK was never going to be part of the euro (notwithstanding Buiter's [2008] admonitions), so the (possible) removal of a member-state that was not part of the Euro "ins" means nothing need change in that regard. But the scope of Brexit, and its position as the latest and largest manifestation of Euroscepticism, means that it does offer the EU some flexibility in its institution-building across various euro area projects (banking/capital markets union, fiscal harmonization, or other macroeconomic coordination). Indeed, the self-removal of the UK, the largest and most important of the Euro "outs" in the EU, means that the EU will necessarily be more and more identified by an expanded euro area. EU institutions, which have already been converging with euro area ones, now may accelerate this process of convergence and focus narrowly on the indivisibility of the EU and the euro area, at least for the longer-term.

As noted in the previous section, the perception of such a unification is already present in the public's mind across Europe, meaning that it is more imperative than ever for the existing structures surrounding the euro, including its feasibility to involve all EU Member States, to be reformed to take on this new challenge. Even with the UK gone, the flaws in the institutional design surrounding the euro persist, as it is important to note that the euro area crisis did not start in the UK nor was it driven by the UK, it was driven by Greece and the euro area periphery. Indeed, from an economic standpoint, the underlying issue of the euro area is not the reputation of the EU, but the reality of the euro area as an "optimal currency area" (OCA).

It has long been argued that the euro area writ large does not fulfil all the criteria of an OCA, even though "core" members of the euro do fulfil such criteria;[4] this, more so than recent political trends, is a more damning critique of the EU and the euro area going forward, especially when it seems the current benefits of a currency area (reduced transaction costs) outweigh the costs (loss of monetary flexibility in the face of divergence) across the entire euro area. And even the OCA argument has a reputational component, as recent work from Costantini *et al.* (2014) shows that markets made their own determination on who is and who is not an optimal member, punishing those still inside the euro area with much higher yield spreads. In a similar vein, De Grauwe and Ji (2013) show that such a determination, once made, was self-fulfilling; they show empirical evidence that investor reactions post-

[4] Eichengreen (2014) is a notable exception, arguing that the theory of OCA was incomplete by neglecting the role of banks. Accounting for financial transmission of shocks would counsel for a banking union, which the EU is moving towards. However, Eichengreen (2014) also notes that the euro's architects overestimated the convergence of wages and labour flexibility.

2010 overshot the fundamentals of the euro area periphery countries, an overreaction as large as the underreaction that registered in the years prior to the crisis, when investors ignored unsustainable debt ratios and public spending. Thus, markets have already made their determination on where reform should begin (even if such determination may not be entirely justified by fundamentals) and how a reformed euro area should look going forward.

The question institutionally then becomes, how can the EU/euro area overcome these perceptions (or if it can't, how should it accommodate them)? The first, crucial step will be dispelling the assumption that the euro area is an implicit supra-sovereign guarantee, a key factor which drove risk-taking and incorrect pricing of risk (Chinn and Frieden 2012). As De Grauwe (2012) correctly notes, financial markets have great power in monetary unions, due to the lack of monetary control by any one country. But financial markets also respond well to certainty and especially to rules, and well-defined "exit rules" such as those proposed by Fahrholz and Wójcik (2013) or Huck and Valasek (2012) may be a remedy. In Huck and Valasek (2012), an orderly exit mechanism is envisaged which re-converts the currency of the exiting member, but says little about the circumstances which would trigger such an exit; on the other hand, Fahrholz and Wójcik (2013) note that the triggering threshold should be set according to the benefits created by the currency union. Practically, this would mean basing the decision for exit on Maastricht criteria, but with some discretion to allow for temporary fiscal distress. In any case, the presence of an exit rule would reduce the "brinksmanship" and implicit guarantee that one member of the euro will be bailed out simply because their failure would have negative externalities for the rest of the currency area.

The exit rule debate helps to understand the worst-case scenario, but perhaps more importantly, the focus of the EU should be on forging the institutions that will drive needed convergence but only *where it is possible*. A way forward in this vein was suggested by Moravcsik (2012), who noted succinctly that the underlying issue of the euro area is not that Greece did not become more like Germany (or vice versa), but rather the fundamental disequilibrium in the euro area amongst countries economically – that is, the initial conditions rather than any the progress towards convergence. His suggestion, instead of advocating large-scale fiscal policies or designing a new formal architecture of banking union, is that the "fundamentally democratic nature of the EU" should be utilized to design a new contract amongst countries for burden-sharing, in order to bear the costs of convergence. Such a contract would recognize the time dimension needed for countries to converge (absent from the original architecture), as well as provide concrete criteria on which to base exit rules. A full step short of fiscal union, it would too provide a rules-based architecture under which the euro area could operate.

Both of these institutional mechanisms will provide more stability to the euro area in the longer-term, but a final, overarching point needs to be made here. The long-run stability of the euro area can be guaranteed by a more explicit, rules-bound architecture which provides certainty and consistency; however, without a resumption of growth in the euro area, there is little chance that it will be seen as an attractive alternative to national currencies. The EU of 2016 is not the EU of 2004, which countries (especially in Central and Eastern Europe) were instinctively drawn towards, and this has harmed both the reputation of the EU as well as its prospects for stability. Given that the largest institution at the heart of the euro area is the European Central Bank (ECB), an institution which has gone deeper and deeper into unconventional monetary policies, it is likely that institutional change will be needed here as well. This does not mean a removal of central bank independence or the augmentation of the ECB's mission to include additional metrics such as full employment or nominal GDP targets, but a substantial re-think of the desirability of unconventional monetary policy. As one of us has noted before to the European Parliament (Hartwell 2016), the ECB's policies have been a major reason why investment, and hence, growth, has not resumed in the euro

area. Without the ECB understanding that its policies are not creating the conditions for the resumption of growth (and without an understanding that investment issues in the euro area are structural, not monetary, in nature), the necessary growth for long-term stability will remain ever off in the distance.

6. CONCLUSIONS

The shock of Brexit has worn off, but the uncertainty and the reality of its effect on the stability of EU will exert an influence for years to come. Declining trust in EU institutions has already led to a sharp increase in uncertainty and the possibility of damaging existing trade linkages. Moreover, the backlash against EU economic governance, of which Brexit was another manifestation, shows conclusively that a shift to a rules-based regime in the euro area is needed. As part of this shift, the ECB also has to come to terms with its own role in the euro area and how its policies can affect or hinder the long-term stability of the region. The effects of Brexit, as Chinese Premier Zhou Enlai (may have mistakenly) quipped about the French Revolution, are “too early to tell,” and it is how the ongoing negotiations play out which will decide the tone for the short-term. But in the longer-term, stability of the EU and the euro area will be almost wholly in the hands of the EU itself.

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European Parliament

DIRECTORATE GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

Uncertainty after the Brexit vote: economic effects and legal aspects

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IN-DEPTH ANALYSIS

Abstract

The Brexit vote has led to an increase in uncertainty about the economic prospects of the United Kingdom and of the European Union. We first document this generalized increase in uncertainty using a variety of indicators. We then assess empirically the impact of the uncertainty shock from the Brexit vote using a counterfactual analysis based on historical data. We find that adverse uncertainty shocks dampen economic activity in both the UK and the euro area, but more so in the latter region. We trace these differences back to different monetary and real exchange rate responses across regions. Lastly, we highlight the main sources of legal uncertainty: the interpretation of Article 50 of TEU, the litigation pending before the UK Supreme Court, the unwinding of the membership in both the customs union and the single market, and the models for the future trading and financial relations between the EU and the UK.

CONTENTS

EXECUTIVE SUMMARY

- The Brexit vote has led to a considerable increase in uncertainty about the economic prospects of the United Kingdom (UK) and of the euro area. Financial markets reacted markedly to the outcome of the referendum. The sterling has strongly depreciated and various indicators of financial market uncertainty show a pronounced increase. Also indicators of policy uncertainty show an elevated level of uncertainty.

- Empirically, adverse uncertainty shocks dampen economic activity in both the UK and the euro area, but more so in the euro area. Historical data suggest that the Bank of England tends to respond more aggressively to uncertainty shocks compared to the European Central Bank. In addition, the attenuated effect of uncertainty shocks on the UK economy can be partly attributed to a real depreciation of the UK exchange rate following an exogenous increase in uncertainty, while the euro appreciates in real terms.

- Overall, the level of industrial production decreases by 0.5% in the UK and by 1% in the euro area one year after the shock, relative to a situation where this shock did not occur. For the interpretation of these numbers, it is important to bear in mind that they are not forecasts for the period following the Brexit vote. They are a counterfactual scenario, based on historical data, where all other driving forces of the two economies are held constant.

- From a legal perspective, there is uncertainty as to the future legal framework that regulates trade between the UK and the EU on the one hand, and between the UK and the rest of the world on the other hand. First, there is uncertainty surrounding the legal interpretation of Article 50 of TEU. Second, it is unclear what the unwinding means in terms of the current membership of the UK in both the customs union and the single market. Third, EU law is deeply embedded in UK law. Finally, there are various options or models which can be followed in terms of the relations between the UK and the EU.

1. INTRODUCTION

The Brexit vote on June 23, 2016, has led to a considerable increase in uncertainty about the economic prospects of the United Kingdom (UK) and of the euro area. Uncertainty mainly remains on how Brexit will be implemented and on how the economic relations between the UK and the European Union (EU) will change in the medium to long term. Negotiations are likely to be lengthy and complex, and different possible outcomes are conceivable. The consequences for trade, investment, businesses and financial markets can be significant in the UK, the EU and globally. However, the quantification of such impact is challenging. Some firms are expected to reduce investment and postpone hiring decisions in this uncertain environment. This can significantly dampen economic growth in the UK in the short and medium term. From a legal point of view Brexit has raised new challenges which are still yet to be resolved, and which will shape the economic prospects of both the UK and the euro area in the long term.

In this policy brief we investigate the nature of the increase in uncertainty following the Brexit vote to leave the European Union, and we assess empirically the effect of the uncertainty shock that occurred on the night of the referendum. We first document a generalized increase in uncertainty following the vote, as measured by several measures of uncertainty. We then assess empirically the impact of the uncertainty shock from the Brexit vote using a counterfactual analysis. For this analysis, we start from the intuition that, since both the UK and the euro area economies have also experienced uncertainty shocks in the past, historical data on the years before the vote are a valuable starting point to study how uncertainty shocks affect the two economic regions on average. Last, we focus on the legal uncertainties of the Brexit and provide a discussion of the constraints that have emerged from the decision to leave the European Union, highlighting the ongoing main sources of legal uncertainty surrounding Brexit.

We find that financial markets in Europe reacted markedly to the Brexit decision. The sterling has strongly depreciated against the euro since the vote. Various indicators of financial market uncertainty like stock market volatility, the price of gold, or the yields of 'safe-haven' assets show a pronounced increase after the vote. Also indicators of policy uncertainty based on newspaper articles show a pronounced level of uncertainty in both the UK and Europe as a whole after the vote.

Empirically, we find that adverse uncertainty shocks dampen economic activity in both the UK and the euro area, although they generate different monetary responses across the UK and the euro area. Historical data suggest that the Bank of England tends to respond more aggressively to uncertainty shocks compared to the European Central Bank. This, in turn, explains why the UK economy is less negatively affected by the shock. In addition, we find that the attenuated effect of uncertainty shocks on the UK economy can be partly attributed to a real depreciation of the UK exchange rate following an exogenous increase in uncertainty, while the euro appreciates in real terms. Overall, after calibrating the shock to replicate an impact effect on the option-implied volatility of the UK's benchmark stock market index (VFTSE) of size comparable to the one observed after the vote, we find that the level of industrial production decreases by 0.5% in the UK and by 1% in the euro area one year after the shock, relative to a situation where this shock did not occur. For the interpretation of these numbers, it is important to bear in mind that they are not forecasts for the period following the Brexit vote. They are a counterfactual scenario, based on historical data, where all other driving forces of the two economies are held constant to isolate the average effects of an unexpected increase in uncertainty. In the period following the actual Brexit vote, the other diving forces are of course not constant. Moreover, each individual uncertainty shock in the past might be different in nature and therefore have different than average effects.

From a legal perspective, we argue that there is uncertainty as to the future legal framework that regulates trade between the UK and the EU on the one hand, and between the UK and the rest of the world on the other hand. We discuss first the uncertainty that surrounds the legal interpretation of Article 50 of TEU, in the light of the litigation pending before the UK Supreme Court following the High Court's decision of 3 November 2016. We then dissect what the exit of the Britain means in terms of the current membership of the UK in both the customs union and the single market, and we briefly consider how deeply embedded EU law is in UK law. We also consider the various options or models which can be followed in terms of the relations between the UK and the EU, bearing in mind that uncertainty does not regard only the model that Brexit will take, but also its timing and length, and whether or not there will be a transitional period.

The report is structured as follows. Section 2 summarizes the response of financial markets to the Brexit vote. Section 3 contains the empirical analysis of uncertainty effects in the UK and euro area based on historical data. Section 4 discusses the legal issues underlying the Brexit, showing that their complexity points towards uncertainty not being reduced in the near future. The last section concludes.

2. UNCERTAINTY INCREASED IN THE UK AND THE EURO AREA AFTER THE REFERENDUM

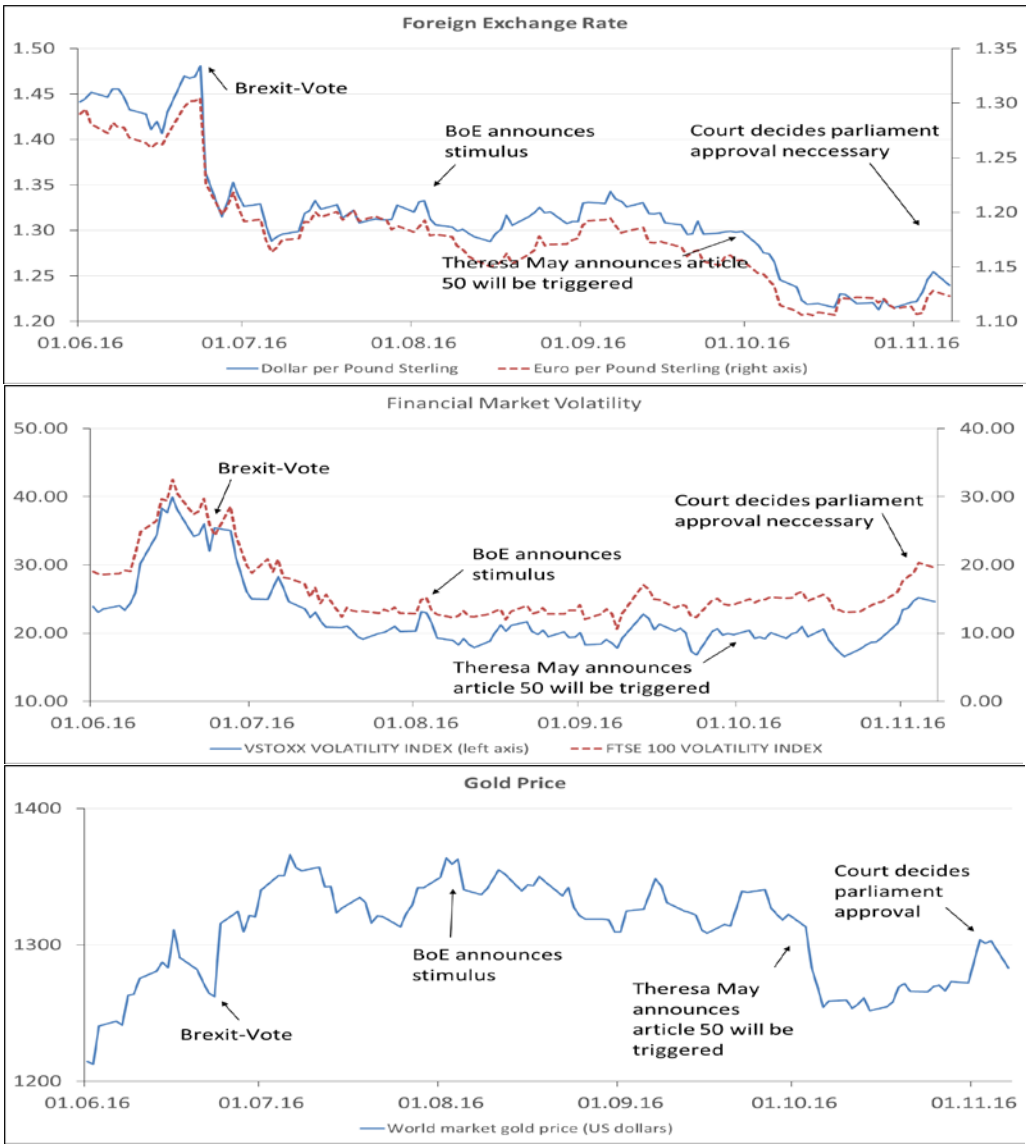
The outcome of the Brexit referendum in the UK has taken financial markets by surprise. As an immediate reaction, the sterling strongly depreciated against both the euro and the dollar, and several financial and non-financial indicators displayed a marked increase in uncertainty. In this section, we display and discuss this response to the vote in detail.

Figure 1 shows the daily development of different financial market variables between June 2016 and the beginning of November 2016. The top panel displays the response of sterling's nominal exchange rate against the euro (dashed line) and against the dollar (solid line). The exchange rate is defined such that a decrease in its value corresponds to a depreciation of the pound. It can be seen that the sterling strongly depreciated against both the euro and the dollar, with the depreciation against the dollar being more pronounced. The reaction is driven by the immediate response of markets to the vote, with the sterling depreciating against the dollar by 8% and against the euro by 6%. This initial drop remains present until now. Moreover, the depreciation against the dollar becomes stronger after the announcement that Article 50 is due to be triggered in May 2017.

The middle panel of Figure 1 reports common measures of financial market volatility for both the UK and the euro area, namely the option-implied volatility of stock market indexes for the two markets. The figure shows an increase in volatility around the referendum, and then a progressive decrease. This decrease is partly explained by the positive stock market performance of in particular large and export-oriented firms listed in London, as investors anticipated that these firms will benefit from the depreciation of the sterling.

While implied equity market volatility does not indicate a prolonged period of higher uncertainty, a different conclusion has to be drawn from the dynamics of the price of gold. As gold is usually perceived as a safe haven asset by market participants, the price of gold is an important approximation of changes in uncertainty, broadly intended as uncertainty coming from all type of events capable of affecting the agent's ability to forecast the future (Piffer and Podstawski 2016). As shown in the last panel of Figure 1, the price of gold jumped by more than 4% in the immediate aftermath of the vote, and remained elevated for the next months. It only started to decrease again at the time of the announcement of when Article 50 will be triggered, which appeared to have partly reduced the uncertainty in the gold market surrounding the unfolding of Brexit.

Figure 1: Financial market reaction to Brexit decision

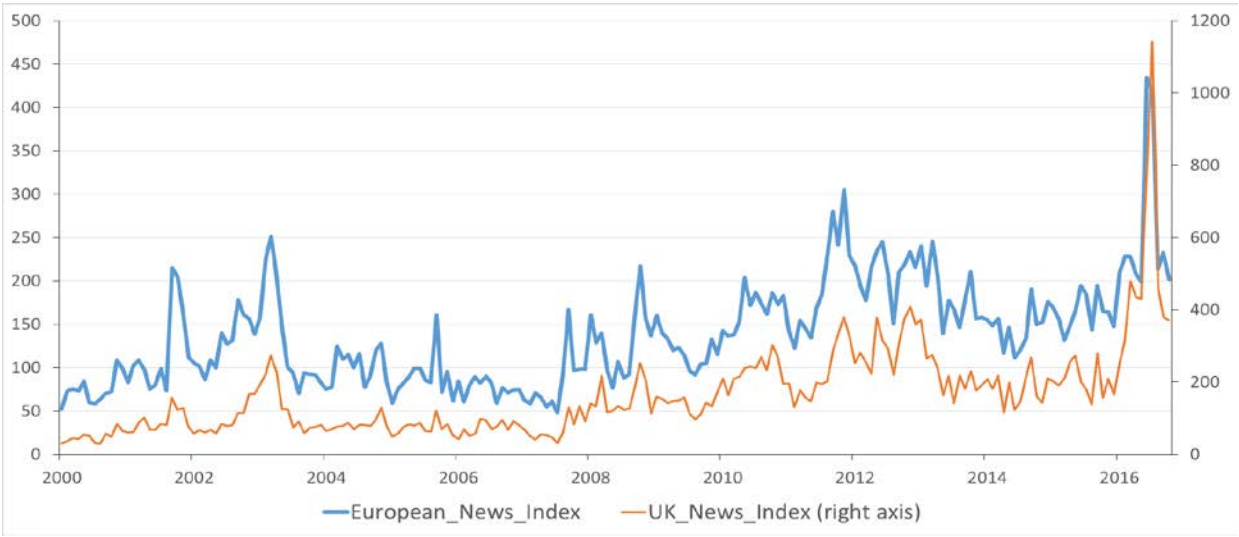


***Source*:** Datastream.

Figure 2 complements the financial market responses depicted in Figure 1 by showing the evolution of economic policy uncertainty in Europe from 2000 until the Brexit vote. The indicator shown is constructed by Baker, Bloom and Davis (2016), who apply a text-based strategy on newspaper articles that measures political uncertainty. The figure displays a strong increase in political uncertainty after the Brexit vote. In fact, the increase is large enough not to have any precedent in the period considered. While this increase also reflects a potential self-referential increase in the media coverage of the Brexit and, thus, might exaggerate the underlying level of uncertainty, it still indicates that the referendum had a strong impact on policy uncertainty.

Figure 2: Economic policy uncertainty indices for UK and euro area

(normalized to mean 100 from 1997 to 2010)



***Source*:** www.policyuncertainty.com, Baker, Bloom and Davis (2016)

3. ECONOMIC EFFECT OF UNCERTAINTY FROM THE BREXIT VOTE: COUNTERFACTUAL ANALYSIS

The previous section documented an increase in uncertainty following the Brexit vote to leave the EU. In this section we aim to quantify to what extend the uncertainty shock that followed the Brexit vote potentially affects the UK and the euro area economy. To do so, we use a counterfactual analysis based on historical data. The analysis is based on the fact that, since uncertainty shocks have hit the UK and the euro area economies already in the past, historical data can be used to assess how the UK and the euro area economies respond on average to unexpectedly higher uncertainty.

The empirical economic literature analyses the impact of uncertainty shocks on the economy using Vector Autoregressive models (Bloom, 2009). We follow this approach and study how uncertainty shocks propagated to the UK and the euro area economy in the period before the Brexit vote. The model used can be written as

$$y_t = c + A_1 y_{t-1} + \ldots + A_p y_{t-p} + u_t$$

where y_t is a vector including the variables discussed below and c is a constant term. The residuals in the vector u_t capture reduced form shocks driven by several structural shocks. These structural shocks include the uncertainty shock that we use to simulate the uncertainty generated by the Brexit vote.

We include 14 variables in the model, representing together the UK economy and the Euro Area. The first two variables are the economic policy indicator for Europe computed by Baker, Bloom and Davis (2016) and shown in Figure 2, and the monthly average of the VFTSE shown in the middle panel of Figure 1. We then add the one-year interest rate on government bond, the log of industrial production, the unemployment rate and the log of the consumer price index for both the UK and the euro area. We also include real exchange rates for both the UK and the euro area, as well as the respective log of real investment. We estimate the model with Bayesian techniques following Banbura, Giannone and Reichlin (2010) and use one lag in the specification of the model. To estimate the historical average relation between the variables in the system, we use data for the period before the vote, that is, from 2000M1 through 2016M2.

In the model, uncertainty shocks are defined as variations in uncertainty not caused by the endogenous response of uncertainty to the state of the economy, but generated by factors that are exogenous with respect to the economy. Defined in this way, uncertainty shocks allow isolating the causal effect from the unfolding of uncertainty to the economy, hence controlling for the fact that uncertainty is itself affected by the evolution of the economy. To identify uncertainty shocks we follow the approach by Piffer and Podstawski (2016), who construct an instrument for uncertainty shocks using the price of gold.[1] We use their approach to extract from u_t the variations driven by uncertainty shocks, and use these variations to simulate an uncertainty shock in our model. We calibrate this shock such that it replicates the unexpected increase in uncertainty which occurred in the aftermath of the Brexit vote.[2]

[1] After isolating geopolitical events associated with exogenous variations in uncertainty, Piffer and Podstawski (2016) show that the percentage variation in the price of gold around the events is correlated with uncertainty shocks, due to gold being perceived as a safe haven asset.

[2] We generate a shock of the size required to imply an impact increase in the financial volatility in the UK equal to the volatility observed overnight after the Brexit vote, after adjusting for the difference in the frequency of the data used in the model. This led to a shock that increases the VTFSE by 4.70. Within the VAR model estimated, this increase in the VFTSE corresponds to a shock of approximately two standard deviations. The calibration raises two main challenges. First, one needs to isolate the high frequency change in uncertainty due to the event.

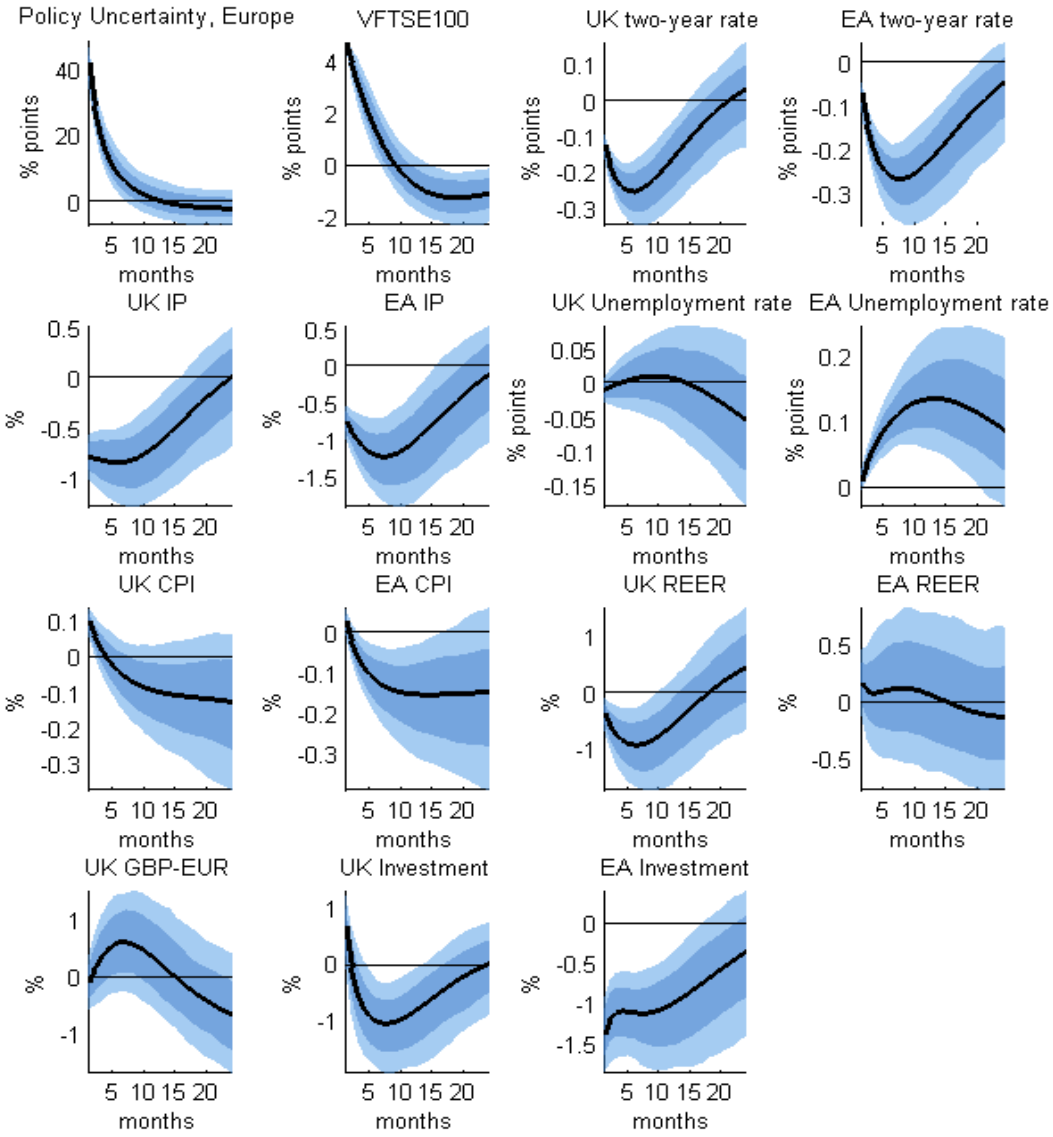
Figure 3 shows the impulse responses to the uncertainty shock, together with 95% and 68% coverage intervals computed from 1000 posterior extractions. These intervals indicate whether the response of a given variables is statistically significantly different from zero. As implied by our calibration of the shock, the VFTSE increases by 4.7 points on impact. We find that it remains above trend for about one year, before slightly undershooting. Consistent with the increase in stock market volatility, the economic policy uncertainty increases by 40%. This confirms the initial increase in uncertainty, which then unfolds through the economy.

The unexpected increase in uncertainty leads both central banks to respond by lowering interest rates, with the Bank of England easing more upon impact. Despite the accommodative monetary policy, the unexpected increase in uncertainty leads to an immediate drop in industrial production, taken as monthly measure of economic activity, in both regions, with a maximal decline after roughly eight months of about 0.5% and 1%. Economic activity only returns to the level where it would have been without the shock after two years. Mirroring these developments, unemployment in the euro area increases significantly, whereas the respective response is indistinguishable from zero in the UK. In both regions consumer prices tend to fall several months after the shock, but again the decline in the UK is not significant. Nevertheless, the results overall suggest that the adverse effect from the exogenous increase in uncertainty from the Brexit vote is statistically significant and economically relevant for both regions, which is consistent with existing evidence on the macroeconomic effects of uncertainty shocks.

As mentioned above, monetary policy responds more aggressively in the UK than in the euro area. This differential response offers one potential explanation for the stronger effects on the euro area relative to the UK. An additional interpretation builds on the response of investments and of the external sector. We find that the drop on impact in investment is significantly larger in the euro area. Unreported results suggest that the decline is mainly driven by investment in Germany and France. This finding is consistent with the fact that machinery plays a larger role in the level of investment in these countries relative to the UK, and that machinery is particularly sensitive to changes in uncertainty. The result that the uncertainty shock has a stronger effect on the euro area than on the UK is also consistent with the evolution of the real exchange rate. In fact, the responses show that the sterling significantly depreciates in real terms, whereas the euro tends to appreciate, possibly due to safe haven demand, although the real appreciation is not statistically significant.

Second, this change needs to be mapped into a monthly measure consistent with the accounting unit of the model. For the first step, we use an `event study' approach and choose a narrow window around the release of the outcome of the vote. In particular, we use the change in the VFTSE between the closing price on June 23, 2016, and the price after the first 30 minutes of trading on June, 24, 2016. Then, to translate this overnight change into a monthly frequency, we construct a counterfactual monthly level of the VFTSE, had the shock not occurred. To do so, we compute a counterfactual evolution of the VFTSE by setting the opening value for the day after the vote equal to the closing value before the vote. We then construct values for one month after the vote by replicating the daily opening-to-opening percentage changes starting from two days after the vote. Last, we compare the monthly average of the VFTSE including the change on the event day to its monthly average excluding it. The difference is 4.7.

Figure 3: Impulse responses to an uncertainty shock from the proxy VAR



4. THE LEGAL UNCERTAINTIES SURROUNDING BREXIT

The previous sections documented an increase in uncertainty following the Brexit shock and provided an economic framework to quantify the possible implications for the UK and the euro area economies. This uncertainty is certainly multi-dimensional. It reflects political, economic as well legal uncertainties. In this final section we document the sources of legal uncertainty. In particular, in subsection 4.1 we discuss briefly the uncertainty that surrounds the legal interpretation of Article 50 of TEU in the light of the litigation pending before the UK Supreme Court, following the High Court's decision of 3 November 2016. In subsection 4.2 we dissect what Brexit means in terms of the current membership of the UK in both the customs union and the single market, and offer a brief consideration of how deeply embedded EU law is in UK law. The various options or models that can be followed in terms of the trading and financial relations between the UK and the EU are considered in subsection 4.3, bearing in mind that the uncertainty does not concern only the model that Brexit will take, but also its timing and length, as well as whether there will be a transitional period. Subsection 4.4 concludes with some observations regarding the future of financial integration in Europe in the post-Brexit period.

4.1. Article 50

The referendum was advisory, which means that the referendum *per se* does not constitute the decision to trigger Article 50 of TEU. Once the UK notifies the European Council of its intention to withdraw from the Union under Article 50 of the Lisbon Treaty, a maximum two-year negotiation period for a withdrawal agreement governing the future relationship between Britain and the EU will be triggered.

The UK Prime Minister, Theresa May announced on 2 October that she will trigger article 50 before the end of March 2017, setting in motion the two-year process for leaving the European Union. Shortly after the referendum on 23 June 2016 a number of separate claims were lodged in the English High Court concerning Article 50. These proceedings, commenced variously by a hairdresser, a fund manager and some expats, have been joined and heard together as Santos & Miller v Secretary of State for Exiting the European Union (the Article 50 Proceedings). The Claimants submitted that, as a matter of English law, it is not open to the UK Government to send an Article 50 notice of withdrawal without an Act of Parliament authorising such a notice. The High Court ruled on 3 November 2016 against the UK Government, declaring that the Government cannot trigger the process of leaving the European Union without the consent of Parliament. The Government has chosen to appeal to the Supreme Court and the hearing is scheduled to begin on 5 December, with a judgment to follow in the New Year.

The timing of Brexit will of course have a material impact on the approach that commercial parties take to their Brexit contingency planning. Some firms are already considering the relocation of part of their business to other EU/euro area countries, or in the case of some of the US investment banks, back to New York. It is interesting to observe that though some of those that voted to leave are in favour of laissez-faire (free trade and economic liberalism), many voted in order to turn back the tide on immigration in favour of economic nationalism.

4.2. Understanding the unwinding

The EU is the UK's largest trading partner. Assessing the UK-EU relationships after the UK leaves the EU is to some degree an exercise in futurology, as negotiations have not formally commenced yet. What we know is that since the UK is part of the Customs Union and Single

Market (it had also accepted certain rules of economic union), Brexit refers in the first place to the Customs Union and to the Single Market.

The EU has exclusive competence in matters concerning its customs union (Article 3(1)(a), TFEU). In line with the normal definition of customs union, the EU customs union involves (i) a prohibition of customs duties and equivalent charges as between EU Member States, and (ii) a common customs tariff *vis-à-vis* third countries (Articles 28 and 30, TFEU). The external tariff to be imposed on trade with third countries is fixed by the Council on a proposal from the Commission (Article 31, TFEU). A free trade area, in contrast, involves free trade among the parties to the agreement but no common external tariffs – this is the EFTA/EEA model, but this appears to have been rejected by the UK Government.

The single market is now one of the core objectives/functions of the EU. Article 3(2), TEU states that "…The Union shall establish an internal market. It shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress…" This connotes an open area of free trade. Single market refers to the EU as a single territory without internal borders or regulatory obstacles to the free movement of goods or services (Article 26, TFEU). "…The internal market shall comprise an area without internal frontiers in which the free movement of goods, persons, services and capital is ensured in accordance with the provisions of the Treaties…".

Access to the single market carries rights as well as obligations. This has implications in terms of the contribution to the EU budget and in terms of the four basic freedoms (goods, services, people and capital). The most contentious freedom is the unrestricted movement of people, workers (labour), which since 1992-3 also includes the notion of citizenship.

The legal unwinding is far more complex than the Great Repeal Bill proposed by the Prime Minister suggests, since EU law is deeply embedded in UK Law and since the submission to EU law (the supremacy and direct effect of the EU Law) also entails the submission to the jurisdiction of the Court of Justice of the EU. The future relationship between the EU law and international law is yet to be determined.

As Philip Wood states in "A Brexit Act in 19 ¾ pages" (Intelligence Unit of Allen & Overy of 30 August 2016), on the Brexit date, the UK and its representatives shall cease to be a member of or eligible for or entitled to the benefits or subject to the obligations of the agencies and bodies of the EU (a large number of them).

4.3. Models for Brexit

The EU maintains different types of agreements with different countries, such as the Agreement on the European Economic Area with EFTA countries (the Norwegian model), a series of bilateral agreements with Switzerland (the Swiss model) or the customs union agreement with Turkey (the Turkish model). But there is no obvious Brexit model. The terms and conditions for accessing the EU single market in the aftermath of Brexit will only become clear after an intensive period of negotiations, which will commence with the formal trigger of Article 50. It remains to be seen whether Brexit will be hard or soft, rigid or flexible, open or closed.

To retain access to the Single Market the UK must contribute to the EU budget, accept or make concessions regarding free movement and be subject to the EU standards and regulations.

Since the single passport is predicated on the basis of free movement, there have been talks about using other regulatory models, notably third country 'equivalence', which refers to the possibility of market access to groups or entities based in countries who can show that their

financial sector regulation is equivalent (just as tough as the EU law). This possibility is set out in a patchwork of rules, including MIFID II and other pieces of EU regulation governing financial trading, but covers a narrow range of services, and thus it is a partial solution for certain parts of the financial industry. For most banks equivalence may not prevent them from relocating their operations. There have also been suggestions of having a 'tailored deal' or 'bespoke deal', but this is likely to require some concessions on freedom of movements and budgetary contributions.

The UK appears to rule out the Norwegian and Swiss model and may wish to either go for WTO rules or unilateral free trade zone (allowing imports into the UK on a tariff-free basis, as Charles Proctor has advocated in a briefing of October 2016). But for the UK to cut tariffs unilaterally might not be economically beneficial, since countries might then be unwilling to negotiate reciprocal tariff reductions. That is why the most likely component of what appears will be a "hard" Brexit is the need to rely on WTO rules. As acknowledged, the WTO rests on the General Agreement on Tariffs and Trade (GATT) and on the General Agreement on Trade in Services (GATS).

The UK is an original member of the WTO, so leaving the EU does not mean that it will have to renegotiate its accession to the WTO. However, the UK trade concessions to other WTO members are currently part of the EU schedule of concessions in goods and services. Once the UK leaves the EU, a process will have to be observed to disentangle the UK's trade concessions from the EU's schedule of concessions annexed to GATT 1994 and GATS, followed by a certification of the new UK schedules by other WTO members.

4.4. Financial integration in Europe post-Brexit

Some argue that Brexit undermines the euro and the European project of integration, a project that has brought peace and security, liberal democracy and tolerance. Some others argue that it provides an opportunity to move forward, allowing the rest of the EU Member States to agree on the design of institutions and rules that will help the Union work better; for example, completing the banking union and advancing towards a fiscal union, developing a European sovereign debt restructuring mechanism and creating a functioning Capital Markets Union.

We need to reconsider the reliance on intergovernmental structures (such as the Fiscal Compact or the ESM Treaty) and we should strengthen instead the legitimacy of the EU law. The latter of course needs to be accompanied by 'societal legitimacy'. The referendum could be seen as a 'wake up call' to reconnect elites, politicians and bureaucrats in Europe with the needs of ordinary EU citizens. The EU has been subject to external shocks: the global financial crisis, the Eurozone sovereign debt crisis, the refugee crisis, Brexit and, possibly, another banking crisis (i.e. NPL problems in Italy.) and a new narrative based on growth and prosperity is needed.

CONCLUSIONS

This paper has considered different sources of economic and legal uncertainty in the UK and Europe in the light of the result of the UK referendum to leave the EU. An analysis with a structural model is used to gauge the effects of the uncertainty shock that hit the economy following the Brexit vote. The counterfactual analysis, which holds constant all other driving forces of the model economy, shows that the uncertainty shock lowers economic activity both in the UK and the euro area, relative to a situation where this shock did not occur. Even two years after the shock, economic activity is estimated not to have fully recovered from the shock. One main driver of the deterioration is investment. In this context, it would be beneficial to clarify the relationship between the UK and the European Union, in order to avoid any further uncertainty for firms.

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European Parliament

DIRECTORATE GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

Brexit and the future of the Euro

Karl WHELAN

IN-DEPTH ANALYSIS

Abstract

This paper discusses the potential implications of Britain's exit from the EU for the future of the euro. The British economy has not yet been negatively affected by the referendum result and the impact of the depreciation of sterling on the euro area economy should be limited. Of greater concern are the longer-run economic and political implications of the UK leaving the EU. The evidence points towards the likelihood of a "hard Brexit" in which increased trade barriers between the UK and the EU harm both British and European economies. That said, the risks are asymmetric: It is the UK economy that is going to suffer more, particularly with the likely reduction in financial sector employment. Over the longer term, the greater risks to the EU are political in nature rather economic. The Brexit referendum illustrates that the European Union is less popular than many imagine. It also shows that blaming the EU for a wide range of economic problems can be an effective populist political strategy for anti-EU political groups. The political threats to the continued existence of the EU appear to be higher now than ever before.

CONTENTS

EXECUTIVE SUMMARY

- This paper discusses the potential implications of Britain's exit from the EU for the future of the euro.
- The British economy has not yet been negatively affected by the referendum result and the impact of the depreciation of sterling on the euro area economy should be limited.
- Of greater concern are the longer-run economic and political implications of the UK leaving the EU. The evidence points towards the likelihood of a "hard Brexit" in which increased trade barriers between the UK and the EU harm both British and European economies.
- Proposals for the UK to remain part of the single market while restricting freedom of movement of people are unlikely to come to pass. The UK's anti-EU political factions are unlikely to accept the lack of sovereignty entailed in such an arrangement and many EU member states are unlikely to accept restrictions on freedom of movement.
- Many EU member's governments will not be disposed to giving the UK a good deal on Brexit, on the grounds that such a deal would encourage populist anti-EU groups in their own countries
- These economic effects of a hard Brexit will be asymmetric: It is the UK economy that is likely to suffer more, particularly with the likely reduction in financial sector employment.
- Over the longer term, the greater risks to the EU are political in nature rather economic. The Brexit referendum illustrates that the European Union is less popular than many imagine.
- The Brexit result also shows that blaming the EU for a wide range of economic problems can be an effective populist political strategy for anti-EU political groups.
- Trump's victory in the US presidential election also suggests that the problems associated with globalisation, combined with the weakness of advanced economies since the global financial crisis, have created an environment in which electorates are willing to select new and risky options in the hope that they will produce a better outcome than an economic and political status quo that is viewed as failing to deliver for ordinary people.
- The political threats to the continued existence of the EU appear to be higher now than ever before.

1. INTRODUCTION

The UK referendum vote to leave the European Union is perhaps the most momentous event in the EU's history. After decades of increased European integration with Europe's elites planning a future of "ever deeper union", one of the largest member states has decided to exit from the European Union altogether. The exact impact that this development will have on the future shape of the EU is highly uncertain but the effects are likely to be profound.

This paper discusses the potential implications of Britain's exit from the EU for the future of the euro. Section 2 discusses the narrow question of the shorter-run macroeconomic impact and argues that the effects on the euro area economy over the next year are likely to be small. Section 3 considers the longer-run economic implications for both the UK and EU of the British decision to leave.

Finally, Section 4 addresses the crucial question of the impact of Brexit on the future existence of the euro as a common currency. One argument that has been aired in the wake of the British referendum has been that the UK leaving the EU opens an opportunity for the rest of the EU to take additional steps towards economic integration in a way that will help to put the euro on a sounder economic footing. While this is possible, I argue that this kind of integration is unlikely. Conversely, Britain's exit is likely to fuel political movements throughout Europe that threaten to bring an end to the EU, and with it, the euro.

2. SHORT-RUN MACROECONOMIC EFFECTS

The first macroeconomic impact of the news that the UK public had voted to leave the EU was a sharp decline in the value of the pound on foreign exchange markets. Against the euro, the pound dropped immediately from €1.30 to below €1.20 and has continued to fall in value since then with one pound worth €1.17 at the time of writing. See Figure 1 below.

The foreign exchange market reaction provided a summary of the many different negative channels through which financial markets believe Brexit will affect the UK economy. Currency traders need to be forward-looking: They need to anticipate what the demand for a currency will be in the coming years and even macroeconomic news about events that will not happen for a number of years can have a significant impact on the current value of an exchange rate.[1] Financial markets likely anticipated a reduction in the demand for sterling in the coming years due to reduced financial activity in the City of London as well as lower interest rates on sterling-denominated assets due to easier monetary policy because of a weaker UK economy.

Figure 1: The UK-Euro exchange rate

Source: ECB Statistical Data Warehouse[2]

Despite warnings of the possibility of a swift recession following the referendum vote, there is little sign of the UK economy contracting at present. Retail sales have continued to grow and the labour market has remained strong. Still, a range business and consumer confidence indicators have declined, indicating unease about the future. There have also been a significant number of stories of multinational firms reconsidering investments in the UK economy. These could translate into a recession in 2017 but at present it appears that the

[1] For a discussion of models of how financial markets price exchange rates, see chapter 7 of my collected lecture notes on macroeconomics. http://www.karlwhelan.com/Macro2/Whelan-Lecture-Notes.pdf
[2] https://www.ecb.europa.eu/stats/exchange/eurofxref/html/eurofxref-graph-gbp.en.html

depreciation in sterling and the additional easing in monetary policy from the Bank of England have acted to counteract an immediate slump.

For now then, the principle short-run macroeconomic impact of the Brexit vote on the euro area economy has been the fall in the value of sterling relative to the euro. This development will have made it easier for British firms to export to those countries that use the euro while euro area firms will now find it less profitable to export to the UK. While this will have a negative impact on the euro area economy, it is unlikely this effect will tip the euro area economy back into recession because the UK accounts for a relatively small fraction of exports from the euro area. Indeed, as shown in Figure 2 below, the nominal effective exchange rate of the euro (calculated by the ECB by weighting each exchange rate by the amount of trade that occurs between the euro area and the relevant countries) has not increased by much this year. Figure 1 also shows that the sterling-euro exchange rate is similar now to what it was in 2013.

Figure 2: The Nominal Effective Exchange Rate of the Euro

Source: ECB Statistical Data Warehouse[3]

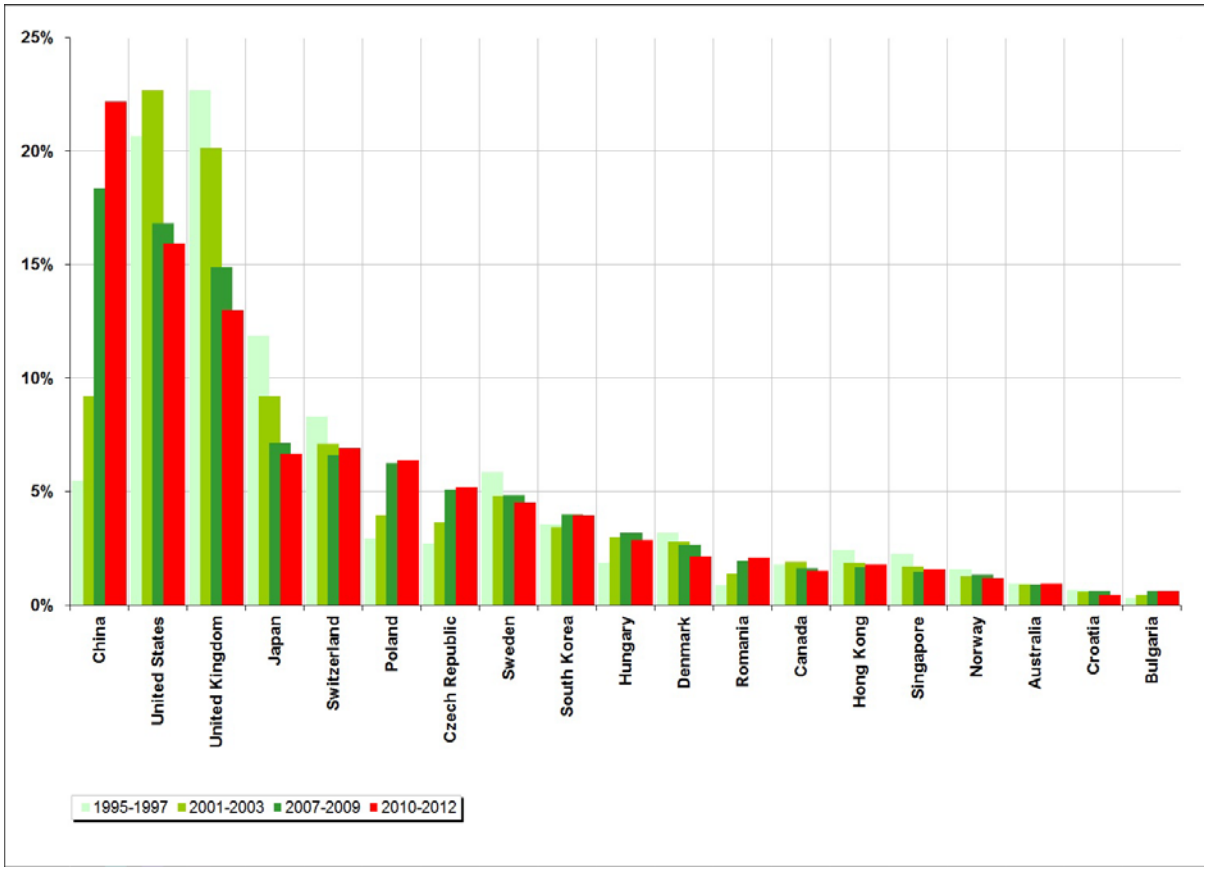
The reason for the limited impact of the sterling exchange rate on the nominal effective exchange rate is the relatively low weight given to the UK. The exchange rate between sterling and the euro gets a weight of only 13 percent in this calculation, making it the third most important foreign currency behind the Chinese yuan (22 percent) and the US dollar (16 percent). Indeed, this is part of a trend that has seen trade with the UK become less important over time. See Figure 3 below for the weights used over time in this calculation.

It is possible, of course, that the negative effects on sentiment currently visible in the UK could translate into a wider euro-area slump in confidence. The current euro area recovery is relatively shallow and it may not take much to stop it in its tracks. However, for now,

[3] https://www.ecb.europa.eu/stats/exchange/effective/html/index.en.html

Brexit does not appear to be inducing a wider European slump and should not be a major factor in the ECB's decision-making processes in the coming months.

Figure 3: Trade Weights for the Nominal Effective Exchange Rate



Source: ECB

3. LONGER-RUN MACROECONOMIC EFFECTS

The short-run effects of the Brexit referendum on the UK economy have been limited. While there is a dramatic increase in uncertainty about the future of the UK economy, for now the negative impact of this uncertainty has been limited while the decline in sterling and the Bank of England's easing of monetary policy are having a positive effect.

Over the longer-run, however, the UK leaving the EU is likely to have a sizeable impact on its economy as well as the economy of the rest of the EU. The size and nature of this impact depends upon the nature of the arrangements that the UK and EU settle on in the coming years.

3.1. What form will Brexit take?

There are many uncertainties surrounding the form that Brexit is likely to take. Brexit could happen in a few different ways. One way is that two years after the UK notifies its intention to withdraw from the EU under Article 50, no negotiation has been concluded with the EU and the EU chooses not to extend the negotiations. At that point, the European Treaties will cease to apply to the UK and the UK will need to negotiate new arrangements with the EU from the outside. A second way is an agreed conclusion of negotiations under Article 50. It is unclear what exactly will be negotiated under this process. Article 50 states

> *"In the light of the guidelines provided by the European Council, the Union shall negotiate and conclude an agreement with that State, setting out the arrangements for its withdrawal, taking account of the framework for its future relationship with the Union."*

This suggests that the mechanics of the withdrawal are to be the key focus of negotiations, with the future relationship merely being "taken into account", which may not mean much. Indeed, the current tone in comments from EU member state governments (and Commissioner Barnier) is that Article 50 negotiations will be narrowly based with little emphasis on negotiating transitional arrangements or planning for a new trade relationship. A more optimistic scenario would suggest that the stakes for all sides are too high to go this route and that the future relationship of the UK with the EU will necessarily be a central part of these negotiations. However, the more complex the negotiations become, the less likely it is that they will come to a successful conclusion before the two-year limit described in the Treaty and agreement on an extension of the negotiations, though feasible under Article 50, requires unanimity and this may be hard to achieve.

My current assessment is that the UK is likely heading for a "hard Brexit" with an exit that will ultimately see access for UK firms to the European market significantly curtailed and vice versa.

Soft Brexit options

The essential element of any "soft Brexit" scenario is the UK retaining full access to the EU single market. This could happen, for example, if the UK chose to retain membership of the European Economic Area. This option is extremely unlikely to be pursued as a long-term solution. It is impossible (and perhaps meaningless) to "read the minds" of the 52 percent of the British public that voted to leave the EU, so we do not know which non-EU set of arrangements would have widespread approval. Prime Minister Theresa May appears to have decided, however, that the key thing the public voted for was control of immigration to the UK. While very little about the British government position on Brexit is clear, freedom of movement between the UK and the EU does appear to have been explicitly ruled out.

Another form of "soft Brexit" is one in which the UK negotiates a new form of agreement retaining access to the single market but restricting freedom of movement. This new type

of “continental partnership” has been proposed in a recent Bruegel paper by the all-star team of Jean Pisani-Ferry, Norbert Röttgen, André Sapir, Paul Tucker and Guntram Wolff.

There is much to commend the proposal from an academic economic perspective but my assessment is that, politically, this kind of arrangement is unlikely to be approved. From the UK side, a deal of this sort is still likely to involve too much acceptance of rule-making from Brussels (this time without an explicit UK involvement in the decision-making process) to be accepted by the anti-EU elements of the Conservative party and UK press. The proposed continuing contributions to the EU budget are also likely to be unpopular in light of the promises made to the UK public about contributions to this budget would be spent on other items.

From the EU side, approval of a “continental partnership” would require the backing of a qualified majority of the European Council and a majority of the European Parliament. It is also possible that a wide-ranging deal would require approval from every national parliament in the EU. This level of approval means a deal of this sort is unlikely to be put in place over the next few years. Freedom of movement is an important element of the membership of the single market for many member states, particularly those in Eastern Europe. Other countries will also be keen to avoid the perception that the UK is getting an “a la carte” form of associate membership of the EU, where they will get to pick and choose the elements of European integration that they like while leaving aside those they do not like. Thus some will view driving a hard deal with the UK as necessary to discourage populist anti-EU groups in their own countries and to encourage other EU member states to remain in the union.

Harder Brexit options

On the other side, there is a hard Brexit, in which the UK does not have access to the single market and trades with the EU on the same terms as other states that are outside the EEA.

One complication to this kind of arrangement is the UK’s current status with the World Trade Organisation. It is commonly been presumed that a “hard Brexit” would see Britain face the same kinds of trade restrictions as other WTO members that are not in the EU. However, this would require the UK to renegotiate its status as a WTO member. The UK is a member of the WTO but the terms of its membership are set by its status as an EU member state. These terms would have to be renegotiated, by consensus, with over 160 members of the WTO. The simplest starting point for such a process would be for the UK to propose to retain the EU’s schedule of trade concessions as its own. Even that process however, could still be fraught with potential stumbling blocks and delays if some countries decided that concessions agreed with the EU should not necessarily be applied to the UK as a stand-alone country.[4]

These complications suggest that one possible route for the UK out of the EU may retaining full access to the single market via temporary EEA status (thus retaining freedom of movement for a period). This temporary period could allow the UK time to negotiate new terms of WTO membership on the basis of continuing the EU’s existing set of WTO schedules. This could then be followed by a period in which the UK could negotiate new trade deals with the EU and the rest of the world which could then lead to the elimination of freedom of movement. The advantages of new international trade deals with the rest of the world have been widely promoted by pro-Brexit politicians but it would come with downsides in relation to trading with the EU. In particular, it would require leaving the EU’s custom union and thus the application of “rules of origin” regulations to British exports to the EU, which are time-consuming and bureaucratic.

[4] See Ungphakorn (2016)

Another possibility is what could be termed the "Turkey option", which would see the UK negotiates to remain part of the EU's customs union but without any agreement on freedom of movement. This would provide less access to the European markets than full membership of the single market but would be less disruptive than the WTO rules option. Membership of the customs union would mean no need to apply regulations relating to rule of origin but as Andre Sapir (2016) points out: "*Leaving the EU but remaining a member of the EU customs union would mean that the UK would have little or no autonomy and no say in setting its trade policy*." Sapir concludes that the UK is unlikely to choose this option.

Ultimately, in the absence of any clear public plan from the UK government, this is all speculation but the evidence to date points against continued membership of the UK in the single market over the long run. Indeed, the consistent discussion of trade deals with non-EU countries by pro-Brexit UK ministers points towards the UK ultimately moving outside of the wider customs union as well as the single market.

3.2. Economic effects of a hard Brexit

So what would be the economic effect of a hard Brexit? International trade is not a zero-sum game, so it is likely that there will be economic losses for both the UK and the EU if, for example, the UK traded with the EU under standard WTO trade rules.

The importance of the UK market for exports from Europe has been regularly cited by the pro-Brexit British politicians as a reason why the EU will be anxious to do a free trade deal with the UK even if the UK does not agree to freedom of movement of people or other elements of the single market. This assessment misses that the costs of a hard Brexit are likely to fall asymmetrically on the UK. The EU is a far more important export market for the UK than the UK is for EU as a whole. To quote some figures provided to me by Martina Lawless and Edgar Morgenroth of the Economic and Social Research Institute (ESRI), 44 percent of the UK's goods exports are sold to the EU.[5] Conversely, for the countries that make up the continuing EU, the UK accounts for only 7 percent of goods exports. Lawless and Morgenroth estimate than the imposition of standard WTO tariffs would result in UK exports dropping by almost 10 percent, while EU exports would drop by about 2 percent.

Underlying these aggregate figures, there would be many different groups of winners and losers and important changes in the structure of the UK economy. The direct effect of lost exports on GDP would be partly offset by lower imports and more domestic spending on home-produced goods. Trade between the UK and EU in food-based sectors would drop sharply while sectors like motor vehicles would probably also see substantial reductions in trade. These reallocations would see imported products replaced in UK by less efficiently produced domestic products, resulting in higher costs of living and lower real household incomes. Dhingra, Ottaviano, Sampson and van Reenan (2016) estimate the likely reduction in average incomes in the UK due to trade following Brexit being governed by World Trade Organisation (WTO) rules at 2.6 percent.

There are a number of uncertainties around estimates like this but, my guess is that they are perhaps under-estimating the cost of a hard Brexit to the UK economy. Dhingra, Ottaviano, Sampson and van Reenan include estimates of the effect of non-tariff barriers on UK trade in their analysis but, relative to the effect of tariffs on trade in goods, the effect of regulatory non-tariff barriers are less certain. If the UK leaves the EU's customs union, these non-tariff barriers may include substantially increased times for processing goods through ports, which could add substantially to trade costs.

It is also difficult to quantify the likely effect on services of the UK's exit from the single market. Of particular importance here is the role of financial services. While London will

[5] See Lawless and Morgenroth (2016).

continue to be a major centre for global financial services, the early signs are that many financial institutions are looking to redeploy resources out of London and towards other European cities. One particular type of business that is clearly under threat is euro-denominated clearing. This type of business had been under threat in recent years due to the ECB preference that euro-denominated clearing activities take place within the euro area and the UK's role in this business was only saved due to a European Court of Justice ruling that pointed to the requirement to allow free movement of capital inside the EU. Once the UK has left the EU, this defence no longer holds. The Financial Times has reported that there could be 83,000 job losses in banking and related sectors over the next seven years if euro-denominated clearing is forced out of London.[6]

A hard Brexit would also likely change the patterns of foreign direct investment (FDI) seen in the UK and EU. The UK may see some increase in FDI due to firms locating inside the UK to avoid tariffs. However, to the extent that some multinationals have located in the UK with a view to serving the wider European market as well as the UK, this will see some multinationals re-locate their operations back inside the EU.

Overall, there are not likely to be many economic winners from a hard Brexit. Both the UK and the EU are likely to be negatively affected by higher trade costs, though the hit will be smaller for the EU than for the UK. It is possible that the EU may see additional benefits that could partially or fully offset higher trades costs, such as increased employment and tax revenue from the financial sector but it is difficult at this point to quantify these effects.

[6] https://www.ft.com/content/b3e34540-a9a1-11e6-809d-c9f98a0cf216

4. THE BIGGER PICTURE: THE FUTURE OF THE EURO

The negative economic effects of higher trade barriers is one reason to be concerned about Brexit. That said, the size of these effects should not be over-emphasised. The negative impacts will likely be spread over years. The result will be to depress economic growth rates that are already on a disappointing long-run trend but the outcome is unlikely to be too dramatic. The greater reason to worry about Brexit is that it represents an important step on a political path that could end up with the disintegration of the euro and possibly also the EU.

4.1. A more integrated and cohesive EU?

Not everyone is worried about the effect of Brexit on the future of the EU. Indeed, the Brexit vote triggered a wave of opinion pieces arguing that the UK leaving the EU could lead to a stronger European Union. The argument goes that the UK was an opponent of greater European integration and that an EU without UK obstructions could pursue a more cohesive set of policies focused on deeper integration. In particular, it is argued that the absence of the UK would make it easier to pursue policies that will help to make a success of the euro as a common currency, e.g. a common deposit insurance scheme or a shared unemployment insurance programme.

I do not agree with this positive viewpoint. This viewpoint is unnecessarily negative about the role the UK has played in the EU. The UK's lack of enthusiasm for certain aspects of integration had led to a form of "two-speed" Europe, in which the UK had a number of derogations from some aspects of integration such as membership of the euro. However, the UK did not obstruct the key reforms that were put in place to support the euro such as the introduction of the European Stabilisation Mechanism or the appointment of the ECB as the single supervisor of the European banking system.

This viewpoint also over-states the political appetite among the remaining EU countries for deeper integration and reform. There is little support in countries such as Germany for steps towards fiscal integration, with concerns that the EU will turn into a "transfer union". These concerns extend to policies such as a common European deposit insurance fund, which would provide a considerable boost to financial stability. Deeper political reforms to the EU that would require revisions to the European Treaty are also highly unlikely to even be suggested over the next few years given the absence of agreement and the requirement for unanimity across all member states.

Those who cheer the UK's exit from the EU also perhaps under-estimate the positive role played by the UK in European economic policy. The UK has traditionally been a strong advocate of growth-enhancing economic reforms such as completing the single market and (ironically) maintaining free trade with the rest of the world. Without the UK's voice at the debating table in the EU, the likelihood of growth enhancing reforms in the coming years is reduced.

4.2. Political risks to the Euro

Rather than a step towards a newly thriving EU, a more realistic assessment is that the Brexit vote represents a possible step towards the end of the EU as we have known it, including the end to the euro as a common currency.

From a political perspective, Brexit represents an important signal that the European Union is less popular than many imagine. It also shows that blaming the EU for a wide range of economic problems can be an effective populist political strategy for anti-EU political groups. It is simplistic to suggest that Donald Trump's victory in the US presidential election can be viewed as a pointer to what will happen in future European elections. However, it does

suggest that the problems associated with globalisation, combined with the weakness of advanced economies since the global financial crisis, have created an environment in which electorates are willing to select new and risky options in the hope that they will produce a better outcome than an economic and political status quo that is viewed as failing to deliver for ordinary people.

If there is one thing we have learned from Brexit and Trump's victory, it is that we should be mistrustful of consensus political forecasts. At present, it is assumed that Marine Le Pen is unlikely to win the French presidential election next year. But if she does, a referendum on EU membership may be triggered and who knows what the outcome could be? Italy—with higher unemployment and almost no GDP growth over the past 15 years—probably provides even a stronger ground for populist movements. Again, the political consensus is that the Five Star Movement will not form a government in Italy in the next few years. But if they do, there would likely be a referendum on Italian membership of the euro. Even in countries without strong populist movements, the problems related to the ongoing refugee crisis will continue to put pressure on centrist pro-European parties. In time, Brexit may be seen as the first step in a wider unwinding of the European Union.

From a more practical perspective, a British exit from the EU will provide a roadmap for others to potentially follow. The enormous uncertainties surrounding exiting the EU are an important reason to be wary of calling for such an action. However, the British have decided to be "guinea pigs" to allow the rest of the EU to see how the process works. In a few years from now, we will be a lot clearer about how the process of exiting the EU works in practice.

Even if the UK economy does not prosper from leaving the EU, the economic downsides will probably be less dramatic than many pro-EU commentators have warned. All of the economic evidence also suggests that placing restrictions on freedom of movement is likely to prove damaging to the UK fiscal budget and wider economy.[7] However, the British public has largely ignored the evidence on the economic benefits of immigration and are unlikely to pay any more attention to evidence that reduced immigration has had negative effects. Populists and nativists across Europe will probably point to the UK economy as an example of the feasibility and desirability of eliminating free movement of people.

These comments should not be interpreted as a forecast that the EU is about to break up or that the euro is doomed. We have come through a period in which the economic contradictions of a common currency across many different countries have threatened to end the euro. Those specific threats have receded somewhat in recent years thanks to welcome (if delayed) actions from the ECB. However, there are multiple scenarios in which the euro ceases to exist and the political disintegration of the EU is one of those scenarios. The political threats to the continued existence of the EU appear to be higher now than ever before.

[7] See, for example, Dustmann and Frattini (2014).

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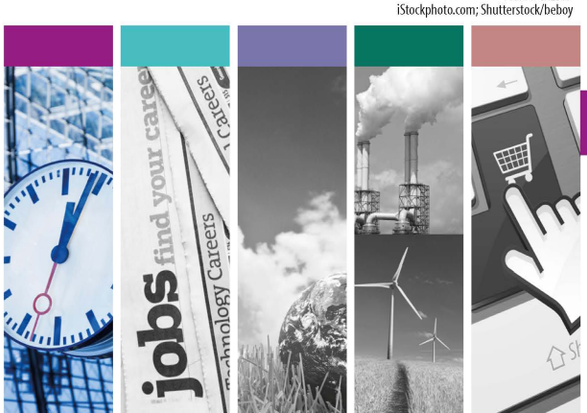

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