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**BREXIT Perspectives: Financial Market Dynamics, Welfare
Aspects and Problems from Slower Growth**

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Aspects and Problems from Slower Growth**

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Summary

In this analysis, BREXIT is considered with regard to the main consequences for financial markets; and real economic implications are taken into account while policy options are also highlighted. The role of the interest elasticity of the demand for money is emphasized for both welfare analysis of BREXIT and overshooting – assuming that that elasticity will fall post-BREXIT. Key insights emerge from aspects related to Dornbusch-type exchange rate overshooting problems and insights from the Branson model: This medium-term perspective is used to derive some short-term and long-term BREXIT implications. As regards overall welfare effects, the BREXIT welfare effect related to a lower holding of real money balances – due to a lower gross domestic product post-BREXIT in the long run – is rather high, so that adding this to the HM Treasury finding of a 10% income loss from BREXIT suggests that the long run welfare loss of the UK could be high. Moreover, the quality of financial market integration in the EU countries is highlighted: For the first time, financial services trade restrictiveness indices are empirically analyzed. This leads – on the basis of a restrictiveness index regarding international financial services and additional information about prudential supervision quality – to an assessment of the quality of financial markets. Policy conclusions take into account the new protectionist challenges and use insights from the Welfens enhanced growth model with trade and foreign direct investment.

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1. Introduction

As regards the EU-UK withdrawal deal obtained by Prime Minister May in November 2018, the basic perspective for the UK is to continue its deep link with the EU for several years link in an effective customs union for goods while facing no continued market integration in financial services; the UK would regain control over labor mobility and no longer pay membership contributions to the European Union. After 2018, further EU27-UK negotiations on the future relationship would begin: Once the EU and the UK have struck a free trade agreement – this could take a few years – BREXIT would be fully implemented, but Northern Ireland and the Republic of Ireland would remain in a weak form of EU single market so that a hard border between Northern Ireland and Ireland would be avoided. However, the failure of Prime Minister May to get a majority for her deal in Parliament on December 11, 2018 (with May postponing the vote rather than risk defeat) has raised new uncertainties for the UK and the entire BREXIT process, respectively. High BREXIT-related uncertainties (including potential dynamics towards a No-deal case) will cause considerable financial market volatility as well as a high Pound depreciation rate. Moreover, global capital market volatility has also been reinforced by the US trade policy and other unclear policy signals from the Trump Administration - for example, President Trump's tweets on a truce with China in the field of trade policy conflicts in early December in the context of the G20 meeting in Argentina. Initially, markets understood the President's tweets to mean that there is US-China agreement on no further escalation of the trade conflict between the two countries, but the rather hesitant signals from China and statements by the White House economic advisor Larry Kudlow raised doubts about the message the President had published via his twitter feed. This means that more nervous international financial markets overlap with the BREXIT impulses whose effects have become visible after the June 2016 EU referendum in the UK but which are not so easy to identify and to quantify.

Concerning the UK and the Eurozone, the BREXIT dynamics could create transitory problems for both – and some other EU countries. The December 2018 reforms of the Eurozone – strengthening the EMS as a kind of European IMF – could contribute to stabilizing the Eurozone. However, the bank-national bonds nexus is still rather strong and could indeed remain strong as long as there is no requirement for prudential supervisors (which means the European Central Bank (ECB) for the largest banks in the Eurozone) to provide some special bank equity for government bonds without triple A rating. With many German and other EU banks selling Italian bonds in 2018, there could even be a quasi-de-internationalization of EU bonds markets: EU countries outside Italy are selling Italian bonds to hedge funds in many countries and to banks and other institutional investors in Italy.

The UK will leave the EU on March 29, 2019, possibly under a deal in the sense of a UK-EU agreement that would bring free trade in goods for a few years, followed later by a CETA-type free trade agreement, in this case, there would be a transition period for the UK in the EU single market until 2020. It should be noted that any investor dispute settlement agreement would not be a full substitute for free FDI within the EU single market. The alternative could be a No-deal case which would mean that the UK-EU relations would basically follow current World Trade Organization (WTO) rules and there

would be no transition period. In the latter case, there could be technical problems which could, for example, impair the availability of pharmaceutical products in the UK and the EU27, respectively. The big companies in various sectors have made all kind of preparations for various scenarios. A second referendum on EU membership cannot be ruled out for 2019.

About the output effects of BREXIT, the Bank of England's analysis (BANK OF ENGLAND, 2018) has shown that all variants of BREXIT considered would bring about an extended period of rather modest real income growth for the UK as well as higher inflation for several years (see subsequent table). Many firms in the UK held high liquidity positions in late 2018 as part of firms' investment plans had been postponed in the context of the BREXIT uncertainties which are partly related to the British political system and the politically divided public (Brexiters versus Remainers) and partly related to the anticipated BREXIT process itself (Table 1).

Table 1: Effects of EU Withdrawal Scenarios, Bank of England Forecasts

	Effect in Level of GDP at December 2023 Relative to Pre-referendum May 2016 Trend (in % GDP)	Effect in Level of GDP at December 2023 Relative to BoE's November 2018 <i>Inflation Report</i> Forecast (in % GDP)	Unemployment Peak (%)	Inflation Peak (%)
Economic Partnership – Close	-1.25%	+1.75%	4%	2.25%
Economic Partnership – Less close	-3.75%	-0.75%	4%	2.25%
No Deal, No Transition – No Disruptive.	-7.75%	-4.75%	5.75%	4.25%
No Deal, No Transition – Disorderly	-10.5%	-7.75%	7.5%	6.5%
WTO (at end of transition period) – Prepared	-5.25%	-2.5%	4.5%	3%
WTO (at end of transition period) – Unprepared	-8.25%	-5.5%	5.5%	3.25%

Source: EIIW summary representation of the findings of Bank of England (2018), EU withdrawal scenarios and monetary and financial stability

The study of KORUS/CELEBI (2018) indicates an asymmetric response of the Pound exchange rate to positive BREXIT news – read: soft BREXIT – and negative BREXIT news (i.e. hard BREXIT). The analysis of KADIRIC/KORUS (2018) shows that corporate bond risk premiums (i.e. the corporate interest rate minus government bonds interest rate) for financials sectors in the UK have increased due to the BREXIT referendum result and for certain long-term maturities in the non-financial sectors there are also BREXIT-related

increases in corporate risk premiums in the Eurozone. BREXIT is thus found to be an event which significantly affects financial markets in many sectors and maturities, respectively; as regards the risk premiums of corporate bonds in the Eurozone, some sectors also show a significant rise of risk premiums for certain sectors (in the years immediately before 2019). Hence, the expected BREXIT implies a dampening of investment in the UK and the Eurozone. The findings for the UK and the Eurozone could certainly be applied – with a similar methodology – to countries strongly exposed to BREXIT, such as Denmark, Ireland, Netherlands, Belgium and Germany, as well as Italy. The latter country has no strong trade links with the UK; but the populist Italian Conte government has created a nervous situation in Italian bonds markets in the second half of 2018 – with strong temporary increases of government bond risk premiums (Italian interest rate minus German government bonds interest rate) and hence Italian bonds markets might be exposed to medium-term BREXIT dynamics in particular ways.

Since the UK leaves the EU28 single financial market and banks, investment funds and insurance companies from the UK will relocate part of their activities to the EU27 for regulatory reasons, there will be a doubling of certain financial services in newly fragmented EU28 markets (EU27 plus UK after March 29, 2019) which goes along with reduced liquidity for both the UK and the EU27. This welfare loss is simply the mirror effect of the previous welfare gains from EU integration in the single market for the EU28. The new post-BREXIT fragmentation of financial markets in the EU28 – with EU27 wholesale markets largely remaining in the City of London at first (the starting point in early 2019 is that about 60% of that wholesale market is based in the UK) – raises three questions:

- How strongly will BREXIT affect the level of the British per capita income growth path and the long run growth rate?
- How big are the welfare losses which can be expected from BREXIT for the EU27 and the UK?
- How much could one reduce barriers to financial services trading within the EU27 in order to partly offset the new EU27-UK fragmentation on the one hand, and on the other hand to generate welfare gains for the EU27 per se – a challenge that could be mastered if one knows more about the drivers of barriers to financial services trade in industrialized countries?

BREXIT is a complex historical politico-economic step which is comprised of several major economic changes for the UK (and the Eurozone plus the EU, respectively):

- Trade links between the UK and the EU are likely to be weakened;
- there will be changes in foreign direct investment inflows which should reduce in the long run;
- additionally, there will be changes in immigration, probably lower immigration from EU countries (while public concern about immigration seems to have reduced in the UK as the economy is close to full employment and since immigration figures have declined after 2016);
- part of the adjustment dynamics in the context of BREXIT concern financial markets – dominantly in the first stage of BREXIT implementation. This leads the analytical interest to financial markets and their interaction with the real economy;

- since BREXIT implementation is taking place in a period of increasing US protectionism from the Trump Administration, the broader picture is obtained only if transatlantic perspectives are included; this indirectly relates to the role of the WTO which will be crucial for the UK and the ‘Global Britain’ approach of the May government.

As regards the EU, BREXIT entails losing about 1/5th of GDP, 1/8th of the population and about 1/6th of exports. This means that the EU27’s global positioning will be weaker than that of the EU28. The first Free Trade Agreement that was signed by the EU after the BREXIT referendum in the UK was the treaty with Japan in late 2017. Consider the UK government’s information campaign of 2019 – under PM Cameron – there are serious doubts that this was in line with good standards, for example, those witnessed in the Scottish independence referendum of 2014 (UK popularity functions indeed indicate that a pro-EU majority could have been the result one would normally expect if the aforementioned good standards had been met; see WELFENS, 2017). After the EU referendum of 2016, a two year negotiation process between the EU and the UK has unfolded, but by October 2018, no results were forthcoming except a framework UK-EU Withdrawal Agreement which suggested that close to €40 billion would be paid in several installments once the UK would leave the EU and that Northern Ireland should technically remain in the EU single market in order to avoid the introduction of a new hard border regime between Northern Ireland and the Republic of Ireland, but it is rather unclear how such a solution within BREXIT would look. With time pressure building up strongly for finding a EU-UK trade agreement in autumn 2018, there still little indication of significant nervousness or uncertainty in the markets, however, many markets participants were concerned about BREXIT – and certainly about a No-deal BREXIT on March 29, 2018 which would rule out the envisaged transition period until 2020. Beyond BREXIT itself, markets seem to be concerned about Italy – facing a 3% spread for government bonds in October 2018 - with its populist Conte government whose upward revision of deficit-GDP ratios, reflecting the political will to implement the introduction of a basic (tax-financed) income and returning to a rather generous pension system (the implementation of a hard anti-immigration policy also is part of the new Italian policy whose initiatives focus not least on the European elections in May 2019; anti-immigration policy initiatives in turn, are an element of populism (EICHENGREEN, 2019), and have been the common denominator in the UK under Prime Ministers Cameron and May, in the US under the Trump Administration and in Italy under the new Conte government).

The BREXIT implementation year (i.e. 2019) will be a complex period of challenges in politico-economic terms:

- This is the official BREXIT year which could bring strong changes in exchange rates and short-term interest rates:
- Many London banks will have half-completed the relocation of staff and business fields to the Eurozone where such relocations could stimulate financial innovation – competition in a static sense will hardly be reinforced since the big banks are relocating from the UK to the EU27 and this means that the ‘too big to fail’ problems could be reinforced in the Eurozone and the EU27, respectively.
- Also, skilled supervisors in the Eurozone will be at a premium in a situation with the relocation of specialized banking and other financial services – for example in the field of derivatives – to the Eurozone and this could create new macroprudential

risks; in a situation in which the European Systemic Risk Board (ESRB) will most likely lose the UK (certainly as a member country if there is BREXIT; and it seems that the UK is not very likely to seek observer status).

- The WTO dispute settlement mechanism will be ineffective from mid-2019 as the Trump Administration blocks the re-elections of judges to the WTO appellate body.
- US protectionism has intensified under the Trump Administration and is likely to have negative international effects on trade and output growth in the medium term as already emphasized by the IMF (2018a).
- US interest rates, which have been increased already in 2018, are expected to further increase in 2019; this could then undermine financial stability in countries such as Argentina, Brazil, Turkey, South Africa as well as other countries, while the Eurozone and Switzerland as well as the US itself, could see new safe haven effects; safe haven effects in the UK could also occur but are likely to be weaker than in the US and most Eurozone countries.
- The UK will want to further reduce corporate tax rates, and this is bound to create new political conflicts between the post-BREXIT UK and the EU27. Leaving the EU will strongly weaken UK FDI inflows – following the logic of the FDI gravity equation (WELFENS/BAIER, 2018). The subsequent table shows hypothetical combinations of changes in the statutory corporate tax rate which would be necessary to neutralize the combined effects of losing EU single market membership (hard BREXIT) and the various cases of an assumed increase in the foreign share of the target capital stock (for example, due to increasing M&A activities in the period 2015–2020). Italicized numbers is the required policy action in the sense of reducing the UK statutory corporate tax rate. If, for instance, the increase in the foreign share of the UK capital stock – driven by a real Pound devaluation – would be 5%, the statutory corporate tax rate would have to decrease by 8 percentage points in order to neutralize a hard BREXIT in the long run. The cells with italic numbers indicate the case of a hard BREXIT. The effects of a hard BREXIT on cumulated UK FDI inflows thus could be considerable and indeed could create massive conflicts over corporate taxation in the relationship of UK/EU27 (Table 2).

Table 2: Scenario-matrix for Corporate Tax and FDI Inward Stock Changes on FDI Inflows

Increase in foreign share of target stock, (UK)	in share of capital lagged	Decrease in Corporate Tax Rate					
		-5%	-6%	-7%	-8%	-9%	-10%
0%		18.5%	22.2%	25.9%	29.6%	33.3%	37.0%
1%		20.4%	24.1%	27.8%	31.5%	35.2%	38.9%
2%		22.3%	26.0%	29.7%	33.4%	37.1%	40.8%
3%		24.2%	27.9%	31.6%	35.3%	39.0%	42.7%
4%		26.1%	29.8%	33.5%	37.2%	40.9%	44.6%
5%		28.0%	31.7%	35.4%	39.1%	42.8%	46.5%
6%		29.9%	33.6%	37.3%	41.0%	44.7%	48.4%
7%		31.8%	35.5%	39.2%	42.9%	46.6%	50.3%

	8%	33.7%	37.4%	41.1%	44.8%	48.5%	52.2%
	9%	35.6%	39.3%	43.0%	46.7%	50.4%	54.1%
	10%	37.5%	41.2%	44.9%	48.6%	52.3%	56.0%

Note: For alternative foreign-owned shares in the UK capital stock (bold figures), the required corporate tax rate change for the case of a No-Deal BREXIT is indicated: The figures in italics show the "compensation corporate tax rate change" needed to neutralize a hard BREXIT.

Source: Welfens and Baier, 2018

2. UK Growth Aspects in the Context of BREXIT, FDI and Protectionsims

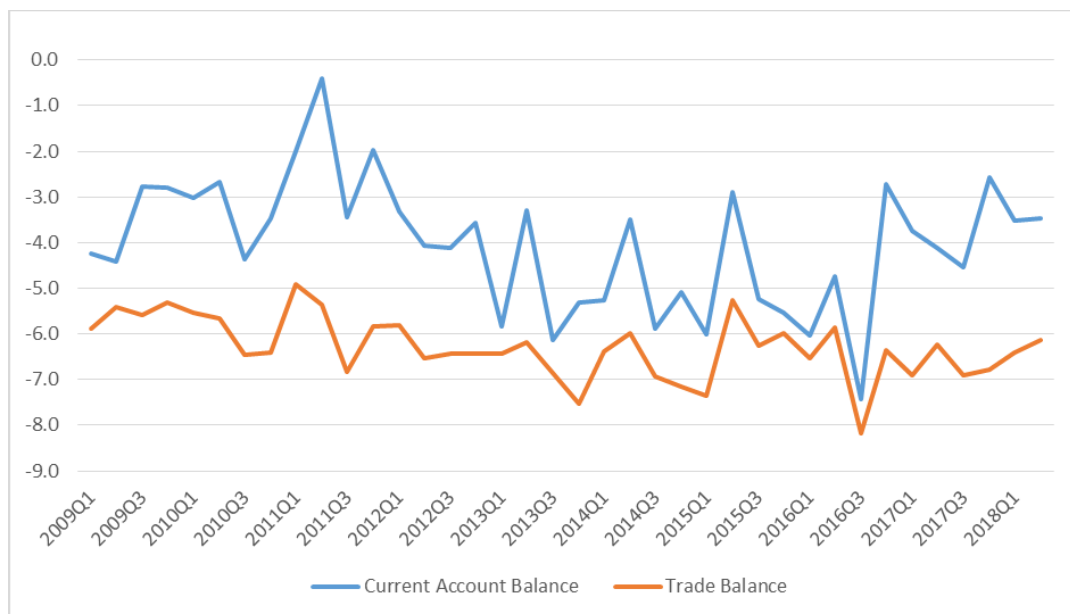
The UK has already suffered from the EU 2016 referendum decision as can be seen from WELFENS/HANRAHAN (2018) who look, amongst others, at the Office for Budget Responsibility (OBR) forecast revisions, namely by comparing the autumn 2015 forecast, when most observers and market participants had not anticipated the BREXIT majority vote of June 23, 2016 – i.e. the OBR had not assumed any BREXIT in its forecast. Comparing the November 2017 OBR revisions with the 2015 forecasting results of OBR for UK output development gives a rough idea of the order of magnitude from BREXIT-related economic losses: 4% is the answer for 2016-2020 (including here the forecast horizon of the OBR forecast of November 2015). BORN ET AL. (2017) in an analysis which compares UK output development with that of an adequately constructed synthetic counterfactual (80% of the synthetic reference group's performance is Japan plus Hungary whose combined GDP growth performance replicated that of the UK to a large extent over many years) that the UK's output loss for the period 2016-end of 2018 – based on forecast values of the Bank of England for output in 2018 – is about 2.2%. Thus, within a decade, an income loss of about 6-12% seems to be realistic; here the case of No-Deal has been excluded and such a case would indeed be worse. A fairly broad free trade agreement between the EU and the UK could thus bring about a 10% output loss (to pick a plausible figure that is roughly in line with the UK's Treasury analysis of 2016 (HM TREASURY, 2016) in the sense that in 2030 the UK income will be about 10% lower than in the case of continued EU membership. This makes quite clear that the UK government will face strong pressure for reducing corporate tax rates, and to start new – and possibly excessive – deregulation of financial markets; and both of these elements of UK post-BREXIT policy are destined to lead to conflicts with EU member countries.

The problem of reduced economic growth in the UK thus has to be picked up in the following analysis, for example, when one considers the demand for money and hence certain aspects of economic welfare – and one may mention that standard insights from the EU's Quest macro model imply that a 6% output loss in the UK will go along with a 1% output loss in the EU27 which in turn should have an adverse repercussion effect on the UK of about an additional -0.2% in terms of output loss.

BREXIT plus overlapping high financial market dynamics will not be easy to digest for certain countries, including the UK – and possibly Ireland, the Netherlands, Belgium and

Malta, just to name the countries which have relatively strong trade links to the UK. As regards the experience gained from the UK financial market reactions of 2016/17, one may emphasize that the strong real Pound depreciation did not significantly improve the UK trade balance (EUROPEAN COMMISSION, 2018; see Figure 1); the improvement of the UK current account-GDP ratio in 2017/18 largely reflects the impact of the Eurozone economic recovery and the expansion of the US economy and indeed the world economy. Strong nominal and real depreciations of the Pound could raise risk premiums in the UK bond market which could dampen investment. At the same time, exports could slightly increase, but the net effect on output would be negative. The main effect of a strong (unanticipated) nominal Pound depreciation is a medium-term increase of the inflation rate and thus a fall of the real wage rate leading to higher employment – this is a specific version of the Philips curve effect (WELFENS, 2017a).

Figure 1: Current Account Balance and Trade Balance of the United Kingdom (% of GDP, quarterly data)



Source: EIIW calculations based on data available from Eurostat

The following analysis looks into financial market perspectives and offers basic theoretical reflections, primarily employing the Dornbusch model of overshooting (DORNBUSCH, 1976) which seems to be relevant in several ways in the context of BREXIT in the medium term. The Branson model (BRANSON, 1977) also lends itself naturally to a short-term analysis of the BREXIT effects. Moreover, it will be asked how the quality of financial markets will evolve in the context of BREXIT in the Eurozone and the UK, respectively; quality could be measured by financial service barriers to trade as well as by the effectiveness of banking/financial services regulation. More long run aspects are addressed in the context of trade diversion aspects and effects related to FDI. Finally, a considerable list of policy issues – including overlapping transatlantic aspects – and options are discussed. In a New International Political Economy perspective, the complex BREXIT case requires to consider more aspects than a standard analysis (and this leaves out the political psychology aspects which to some extent will indeed affect the BREXIT process

– for example, one may doubt that the rather unfriendly atmosphere at the EU summit in Salzburg in September 2018 was a good signal from the EU to PM May who looked to be rather isolated in some scenes shown on TV creating a new impulse for a more emotionalized debate in the UK which subsequently emerged and which makes the already difficult negotiations even more difficult). To the extent that BREXIT is a historical but otherwise rather isolated political step in the history of Western countries' post-World War II, the focus on a kind of normalization in the medium term and the long run could reinforce expectations that stability and prosperity in Europe and worldwide could be restored. If, however, other major international policy changes – linked, for example, to a new protectionism and populism – are on the agenda, the BREXIT dynamics might be part of broader medium-term destabilization of OECD countries and the world economy, respectively. Subsequently, the focus will be at first on selected financial market perspectives, followed by a theoretical analysis – including a welfare analysis of reduced holding real money balances post-BREXIT – institutional perspectives and policy implications.

Theoretical Perspective on Long Run Growth

An adequate macro model is the analytical key to understanding the impact of protectionism – and BREXIT indirectly pushes the EU27 towards imposing certain tariffs (or NTBs) on the UK's exports; this holds if the UK and the EU would ultimately not agree on no BREXIT or a Norway option for the UK, namely to be in the European Economic Area in the future. It is useful to consider a macro model with trade, inward foreign direct investment and a foreign tariff (t^* ; an import tariff of the EU27 imposed on country 1, namely the UK). In a two country model only with trade – no FDI – the findings would be rather simple, namely the foreign tariff in country 2 will cause a substitution effect and an income effect. However, in the presence of cumulated inward FDI (plus possibly also outward FDI), the situation is more complex as has been shown in a compact approach by WELFENS (2018d): Let us denote the export-GDP ratio as x , real GDP as Y , the capital stock as K , knowledge as A and labor as L ($0 < \beta < 1$; parameter $x' > 0$) - the macro production function considered is:

$$(1) \quad Y = K^\beta (AL)^{1-\beta} (1 + x'x)$$

Here, international trade and exports, respectively, are assumed to raise GDP through specialization gains – a formula that should hold for open economies as well as the world economy (which one might otherwise dub a closed economy). L is assumed to be constant.

As regards x (denoting the real exchange rate as q^* ; parameters $q' > 0$, $x'' > 0$) a simple equation is used:

$$(2) \quad x = q' q^* - t'' t^*$$

Denoting the income tax rate as τ and real gross national product as Z , savings S consists of purely domestic savings $S_1 = s(1-\tau)Z$ plus retained earnings/savings (denoted as S_2) by foreign subsidiaries who own a share α^* of the capital stock in country 1 (home country) where – with competition in goods markets and factor markets – the share of profits in Y is equal to β . As foreign subsidiaries (in the UK) export to country 2 (the EU27), the profits

of foreign subsidiaries are negatively influenced by a foreign import tariff t^* (parameter $t^{**}>0$, $s^*>0$) so that the aggregate savings S can be written as $S= S_1+S_2$ (where $Z:= (1-a^*\beta)Y$; savings of foreign subsidiaries are based on profits which are assumed not be taxed in the host country):

$$(3) \quad S = s(1 - \alpha^* \beta)(1 - \tau)Y + s^* \alpha^* \beta(1 - t^{**} t^*)Y$$

Savings thus is negatively influenced by foreign import tariffs (t^* in country 2) and one of the new transmission channels relevant in the open economy growth model is cumulated inward FDI in country 1. Foreign investors' ownership in the UK capital stock was about 16% in 2016 according to OECD figures.

Finally, the following progress function is assumed (a denotes the growth rate of knowledge and a^{**} is a positive parameter, a^* is the exogenous foreign growth rate and x^{**} is a positive parameter) which suggests that the presence of foreign subsidiaries stimulates the international transfer of technology – see the first term in the subsequent equation; on top of which comes an effect related to export intensity which follows the arguments of MELITZ (2003) and JUNGMITTAG (2004); the latter's empirical evidence for EU countries has shown that high-technology exports stimulate productivity growth so that not Smithian specialization (a general specialization effect) but rather Schumpeterian specialization which is crucial for knowledge growth.

$$(4) \quad a = \alpha^* a^{**} a^* + x^{**} (q^* q^{**} - t^{**} t^*)$$

The export intensity x positively influences the knowledge growth rate a . Imposing the goods market equilibrium condition – assuming a balanced budget and zero net exports – means $S= dK/dt + \delta K$ (δ is the rate of capital depreciation) which results, using the function $A(t) = A_0 e^{at}$ (where A_0 is the initial knowledge level, e^* is the Euler number and t time index) in the following steady state solution (#) for the per capita income level $y:= Y/L$.

$$(5) \quad y\# = (1 + x^{**} (q^* q^{**} - t^{**} t^*))^{\frac{1}{1-\beta}} A_0 \left[\frac{s(1 - \alpha^* \beta)(1 - \tau) + s^* \alpha^* \beta(1 - t^{**} t^*)}{\alpha^* a^{**} a^* + x^{**} (q^* q^{**} - t^{**} t^*) + \delta} \right]^{\frac{\beta}{1-\beta}} e^{(\alpha^* a^{**} a^* + x^{**} (q^* q^{**} - t^{**} t^*))t}$$

Thus BREXIT, meaning that the EU27 will impose an import tariff t^* on the part of UK exports, has an ambiguous effect on the UK level of the growth path – an adverse effect is actually likely since the tariff-related negative FDI impact in the numerator is likely to dominate the trade-related negative tariff impact on the growth rate of knowledge in the denominator. There is also a negative tariff effect on the growth rate of knowledge so that BREXIT will dampen both the level of the UK growth path and the steady state growth rate of per capita income. This new approach can also be used with two-way FDI (and could also be useful for a broader analysis of the effects of Trump's tariff policy). The tariff aspects of BREXIT and its impact on growth are crucial, on top of this come financial market effects, part of which refer to higher volatility and to changing capital flows.

3. Financial Market Perspectives

There will be short-term, medium-term and long-term BREXIT effects for the UK, the EU27 and the world economy. Starting with the announcement of December 10, 2018, that the vote on the EU-UK BREXIT deal would be postponed, Prime Minister May has indirectly given an impulse for higher financial market volatility in the UK and a new period of devaluation for the Pound; the less likely it seems that a soft BREXIT works politically, the more likely either a hard BREXIT or No BREXIT scenario – such polar alternatives could be difficult for markets to digest and the Volatility Index (VIX) as well as the CDS prices for UK bonds could go up. The year of the UK's official exit from the EU, 2019, should see economic effects in financial markets that are similar to those of the BREXIT referendum year of 2016. Short-term effects will be a strong depreciation of the Pound and a rise of the UK nominal interest rate as well as a higher inflation rate; a remarkable impact was the rise of FDI inflows in the UK in 2016 when the strong real depreciation occurred, followed by a massive reduction of FDI inflows in 2017 by 92% compared to 2016 (OECD, 2018; global FDI inflows reduced by 18%). This time, however, there will be stronger effects in the real economy – most certainly if there should be a No-deal BREXIT. BREXIT will bring about a series of medium-term economic effects:

- A major depreciation of the exchange rate and therefore a strong increase of the inflation rate; this will reduce the real wage rate and thus should lead to a rise in the demand for labor. The Bank of England is unlikely to reduce the interest rate much in a post-BREXIT scenario since reducing the interest rate would further stimulate a currency depreciation. There is a caveat, namely the No-deal BREXIT which could bring a serious recession so that the Bank of England could reduce the nominal central bank rate and continue or reinforce aggressive open market policies.
- The UK – no longer serving as a hub for the continental EU countries – will face a strong decline of greenfield investment, while international M&As, stimulated by the real depreciation of the Pound, will increase; the latter effect is explained by the Froot-Stein effect and real depreciation, respectively (FROOT/STEIN, 1991). The net effect in the medium term could be higher net capital inflows which would dampen the initially strong nominal and real Pound depreciation.
- The share of foreign ownership in the UK capital stock will increase from 17% in 2016 to about 25% or 30% in 2025, so that the difference between the GDP and gross national product (GNP) will increase: If an additional 15% of the capital stock were owned by foreigners in 2025 – and assuming a share of profits in GDP of 1/3rd (a standard order of magnitude in leading OECD countries), the effect will be a reduction of long run GNP by 5%; one should consider the problem that with higher profits from UK subsidiaries going to parent companies in the US, Japan, Korea, China and EU27, the structural British current account deficit will increase. The current account deficit-GDP ratio will reduce in the medium term if there are increased capital inflows (relative to GDP) in the UK so that net capital inflows reduce; this is a mechanical view of the mirror side of the current account and the capital account balance.

- After a wave of international M&As in the first years after the implementation of BREXIT, the UK current account deficit relative to GDP could increase: (1) because the very strong initial real depreciation will give way to some appreciation – read a more modest medium-term depreciation than in the short term; (2) the implication of disintegrating UK production networks in the EU, partly coming under the pressure of higher local content requirements post-BREXIT, will raise the unit production cost in the UK so that UK export growth should slow down. Moreover, as leading bankers will have moved from London to the EU27, reduced competition in the banking market will bring about higher financing costs in the UK.
- The initial years after the implementation of BREXIT in 2019/20 could go along with considerable financial instability in UK financial markets; this could reflect the effect of a quasi-forced relocation of some of the leading banks from the UK to the EU27, but the UK could also pay the price in the form of facing more powerful competition from financial services firms in the EU27. The adjustment process is not necessarily smooth. Moreover, the risk of insufficient regulatory experience in the EU27 could also contribute to financial instability in the EU27; of course with spillover effects to the UK: If complex financial services, including derivatives markets, are shifted from the UK to the Eurozone, there will be an initial lack of experience on the part of supervisors with respect to financial products that so far have not been the standard focus of Eurozone/EU supervisory institutions. At least the Eurozone reforms from December 2018 – strengthening financial market integration and the role of the ESM – have reinforced the institutional setup of the Eurozone.

A key issue for the UK will be whether or not the UK current account will improve: If the real depreciation of the Pound in 2019/20 should, after several quarters, improve the trade balance and the current account, respectively, the UK's foreign indebtedness would clearly reduce. If, on the other hand, the partial economic destruction of UK production networks in Europe should undermine the UK's export competitiveness (partly due to high local content requirements), the UK's export growth to the EU27 countries could reduce. Assuming that equivalence rules agreed upon by the EU and the UK will not be a full substitute to the passporting status relevant so far, many London City banks will relocate activities to the EU27 or – in the case of US banks – to the US. Thus there are two negative structural impacts on the UK current account:

- Ambiguous impacts on UK net exports of goods and services;
- in the context of the international relocation of London City banks' activities, the bilateral current account surplus in the UK services balance will reduce.

If the net effect on the UK current account is negative, the foreign indebtedness of the UK will increase. This could also put more pressure on the Bank of England to keep interest rates at a higher level than prior to BREXIT; this might in the future be a new constraint on British monetary policy.

As regards the financial system stability analysis, the IMF's FSAP update on the UK from 2016 (IMF, 2016; p. 32) notes that "...effective cooperation and collaboration arrangements have been established with foreign supervisory and resolution authorities. This allows UK authorities, in their capacity as both home and host supervisors of cross-

border banking groups, to share information and cooperate with foreign authorities for the effective supervision of banks and banking groups. At the same time, the implementation of the international post-crisis reform agenda and national initiatives may have implications for correspondent banking relationships and for the provision of financial services by UK banks to certain categories of customers, notably money transmitters and non-profit organizations.”

It is, however, not clear that cooperation and collaboration with the EU27 indeed will be adequate, it is very strange that the IMF has published a financial system stability assessment on the Euro (IMF, 2018b) in July 2018, but for the UK there is no publication of an IMF update, so that there is unnecessary uncertainty amongst market participants in the year prior to the BREXIT date in 2019. It also seems not to be wise that the EU/EBA will publish its stress test only in November 2018 (WELFENS, 2018c).

4. BREXIT in the Branson Model and Overshooting Aspects: A Medium-term Perspective

4.1 BREXIT in the Branson Model

From a British point of view, BREXIT will bring two important changes in the context of the Branson model, which reflects a portfolio theoretical perspective (see Figure 2): The model is a setup with the money market, the domestic bonds market and the foreign bonds market so that investors have a choice between money (M), domestic bonds (B) and foreign bonds (F*). Total nominal wealth is A” and all assets are gross substitutes; the desired share (h”) of money in total wealth is a negative function of both the domestic nominal interest rate i and the foreign interest rate i*. A medium-term perspective on BREXIT is to assume that the current account post-BREXIT – despite a real Pound depreciation - has worsened due to a dominant reduced-EU27 market access effect so that the F*F* curve portraying equilibrium in e-i-space will shift upwards on the MM curve (portraying money market equilibrium). What happens with the MM curve? Let us look at the equilibrium condition for the money market and the MM curve in e-i-space, respectively (h” is the desired share of money in total private sector nominal wealth:

$$(6) \quad A' := M + B + eF^*$$

where M and B is the stock of money and domestic bonds, respectively; F* is the stock of foreign bonds expressed in foreign currency – read \$ - and e is the nominal exchange rate in € per \$; the shares of the three assets are h” for money, b” for bonds and f” for foreign bonds and these must sum up to unity: $1 = h'' + b'' + f''$; due to this condition we have only two independent equilibrium conditions for the three assets):

MM curve (money market equilibrium):

$$(7) \quad M = h''(i, i^*)[M + B + eF^*]; \quad h''_i < 0, \quad h''_{i^*} < 0$$

Alternatively, we can write $M / [M + B + eF^*] = h^c(i, i^*)$; the actual share of money in total wealth must be equal to the desired share. Subsequently a setting with zero expected inflation is considered so that the nominal interest rate i can be replaced by the real interest rate. The equilibrium condition for the domestic bonds market (BB line in e - i space) and the equilibrium condition for the foreign bonds market (F^*F^* line) read:

$$(8) \quad BB: B = b^c(i, i^*)[M + B + eF^*]$$

Where b^c has a positive partial derivative with respect to i (negative with respect to i^*)

$$(9) \quad F^*F^*: eF^* = f^c(i, i^*)[M + B + eF^*]$$

the desired share f^c has a positive partial derivative with respect to i^* (negative with respect to i). Differentiation of the equilibrium condition for the foreign exchange market gives $(1 - f^c)(F^*de + edF^*) = A'(f^c_i di + f^c_{i^*} di^*) + f^c(dM + dB)$. Hence a fall of the stock of F^* ($dF^* < 0$) for a given interest rate i will shift the F^*F^* curve upwards since the exchange rate will have to increase: $de = -edF^*/F^*$.

Differentiation of the equation for the money market equilibrium (MM curve) gives:

$$(10) \quad (1 - h^c)dM = A'h^c_i di + A'h^c_{i^*} di^* + h^c dB + h^c(F^*de + edF^*)$$

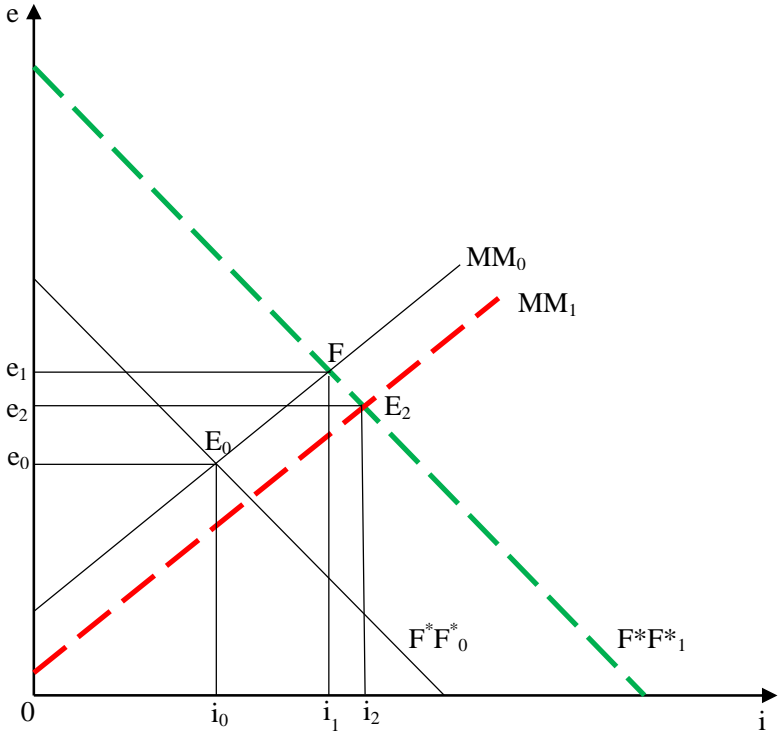
Solving for de/dF^* gives (for given stocks of M and B as well as i^* , respectively) here $de = -edF^*/F^* < 0$. Moreover, $di/dF^* = h^c e / (-A'h^c_i) > 0$. A fall of F^* will thus bring about a rightward shift of the MM curve so that the interest rate will rise in the new equilibrium; the downward shift of the MM curve dampens the depreciation of the exchange rate. The rightward shift of the MM curve would be reinforced if the interest elasticity falls in absolute terms. The F^*F^* curve shifts to the left if the stock of foreign bonds is falling since – as a net effect – the supply of foreign bonds is falling so that at a given exchange rate the domestic interest rate i must rise so that the demand for foreign bonds is falling. The case of a worsening current account in the UK post-BREXIT does not require F^* to be negative. If BREXIT should – unexpectedly – bring about a medium-term improvement of the current account and indeed a current account surplus, the UK's interest rate would fall and the nominal exchange rate might appreciate (or slightly depreciate).

The situation of the UK trade balance has only modestly improved after the strong real Pound devaluation of 2016. To the extent that BREXIT raises the price of imported intermediate inputs or replaces cheap production in EU27 subsidiaries through more costly value-added in the UK – in line with higher local content requirements post-BREXIT - UK export growth will slow down. This, plus a lower bilateral financial services net export to the EU, could bring about the worsening of the current account, at least as a temporary phenomenon.

If BREXIT brings about a financial market fragmentation in the EU28 – as is to be expected: A common financial EU28 market subject to EU regulation will no longer exist post-BREXIT – the interest elasticity will fall in absolute terms ($-A'h^c_i$ will fall). Hence the exchange rate depreciation is reinforced while the interest rate increase is dampened. The most important aspect in the medium term could be the fall of the stock of foreign bonds (relative to GDP which could also enter the demand curve in the Branson model).

With BREXIT bringing a more restricted access to the EU single market, the UK current account deficit may be expected to increase in the medium term.

Figure 2: BREXIT Effects: A Fall of the Stock of Foreign Bonds (F^*) in the Branson Model (Assuming a BREXIT-induced Current Account Deficit of the UK)



Source: Own representation

As regards capital markets adjustment, there are several issues in the context of BREXIT: The market power of banks in the Eurozone could increase since it is mainly the big London banks which are relocating activities to the Eurozone; specialized financial services which so far have been offered by small innovative banks and financial services suppliers might not be available in the EU27 markets post-BREXIT and somewhat higher markups for financial services will be the consequence in the Eurozone and the EU27.

The London financial market could suffer from a reduced range of differentiated financial services since some of the big foreign banks have relocated activities either to New York or to EU27 cities, so that the UK will have to import certain financial services in the future – including services that used to be exported by the UK (the result being a negative impact on the current account).

4.2 Dornbusch-type Overshooting Aspects and Elasticity Considerations

The adjustment mechanics in foreign exchange markets and financial markets will take effect, not least because of the reduced interest elasticity of the demand for money. In a

Dornbusch-type macro model (DORNBUSCH, 1976) with price stickiness there could be overshooting in the foreign exchange market so that the Pound depreciation in the long run will be smaller than in the short run: And a short-run overshooting is likely as monetary policy will react in the UK, however, as the medium term could also bring about supply-side shocks (e.g. government stimulates FDI inflows in order to spur product innovations and process innovations) this could dampen the overshooting phenomenon. It is not fully clear that the Dornbusch-type overshooting is relevant in the BREXIT process, namely if all central banks follow simple Taylor rules. The overshooting problem occurs basically in the case of an unanticipated monetary policy expansion – however, the complexity of the BREXIT dynamics suggest that one should indeed consider this aspect. The subsequent considerations are not intended to replace any full econometric modeling or quantification of BREXIT effects, but they nevertheless highlight crucial transmission aspects which are worthy of attention.

With a lower interest elasticity of the demand for money (in absolute terms), overshooting will be bigger than in a setting with high interest elasticity as is implied, for example, by the Dornbusch model – with sticky prices - in the modified version of GAERTNER (2001); see Figure 2. The initial Dornbusch model version with regressive exchange rate expectations could be useful since rational expectations are rather implausible given the fact that the complex historical BREXIT can hardly be covered by a simple extension of available macro models; in the case of monetary policy, exchange rate overshooting could indeed occur in this context. However, even with perfect foresight about exchange rate developments and supply-side shocks – highly relevant in the context of BREXIT - some overshooting of the exchange rate – depending on parameters – is possible. If there are demand shocks and/or strong supply shocks, monetary policy and fiscal policy might adopt rather strong policy measures.

The empirical findings by FRANKEL (1984); for more recent empirical Pound/dollar exchange rate modelling see DRITSAKI (2018); the paper by SIOUROUNIS (2003) is also useful in the context of the UK, for the various exchange rate models were only partially satisfactory with respect to the Dornbusch model and the Branson model, respectively – at least with some drift parameters included the empirical modelling worked for the UK and some other countries. Hence the implications suggested here for the BREXIT issues have some limitations.

The adjustment of the current account of the UK will be important for BREXIT adjustment in the UK, not least since a change in the current account-GDP ratio would affect the outcome of the Branson model (see also Appendix 1). It is interesting to note that BELKE/PTOK (2018) finds hysteresis export effects of the EU and the Eurozone, respectively, while the UK exports are not affected by hysteresis effects. Hysteresis export effects are mainly explained through sunk international investment/ marketing costs faced by firms that aim to exports goods; one may also add the additional aspect that within international production networks part of the exports relies on imported foreign intermediate products so that hysteresis effects could occur both on the export side and the import side. It is not fully clear why UK exports would show no hysteresis effects; if this is indeed the case, BREXIT-induced real exchange rate changes would have a faster effect on the UK export side (concerning exports going to the EU27) than on the EU27's exports to the UK.

Elasticity aspects of the trade balance could become important in the case of BREXIT for the UK as well as for other countries. One key question of current account adjustments in the context of real exchange rate changes and a strong Pound depreciation, respectively, concerns the Marshall-Lerner condition. As has been shown for the case of an economy with only outward (cumulated) FDI, the augmented Marshall-Lerner condition (WELFENS, 2018a) relevant for such an economy is stricter than the standard Marshall-Lerner condition: To improve the current account, that condition requires that the sum of absolute import elasticities in the home country (η) and the foreign country (country 2; η^*) exceed unity. We must have as the modified new Marshall-Lerner condition that

$$(11) \quad \eta + \eta^* > 1 + \left(1 / \left(1 + \lambda / \alpha \beta^*\right)\right)$$

where β^* is the share of profits in foreign GDP and α is the ratio of the outward FDI stock in the host country's capital stock and λ the ratio of the home country GDP relative to foreign GDP (in home country units). A ranking of countries' outward FDI stock as a percentage of the source country's capital stock in 2014 (with a comparison for 1980) can be found in Appendix 6. The analytical point is that exports are not proportionate to foreign GDP, but to foreign national income ($Z^* = Y^* + \text{net factor income from abroad}$) and that imports are not proportionate to GDP, but to the national income in country 1. This will not necessarily bring a strong sharpening of the traditional Marshall-Lerner condition as the size of parameters in the various cases are important and the case of two-way FDI is different from the asymmetrical FDI case.

Dornbusch shows that overshooting should be expected if there is an aggregate demand shock and particularly if there is a monetary policy shock, but he also shows that the type of disturbance matters for the phenomenon of overshooting (supply-side shocks trigger no overshooting), and that giving up the assumption of perfect substitutability of domestic and foreign bonds could lead to a setting of no-overshooting (and the short-term impact of monetary policy depends on the assumption that market participants have with respect to the future monetary policy orientation).

The interest elasticity of the demand for money also affects the standard policy multipliers in macro models. Empirical analysis will have to clarify how large the change in the interest elasticity of the demand for money in the UK and the Eurozone/EU27 will be. Finally, the size of the interest elasticity of the demand for money plays a role for the UK welfare loss from BREXIT.

4.3 UK Welfare Loss: Money Market Aspects

Standard aspects of BREXIT-related welfare losses have been analyzed for the case of a No-deal BREXIT (WELFENS, 2017b), however, one may add additional aspects related to the real demand for money: Here, additional welfare costs have to be considered and if the real income elasticity of the real demand for money in the UK should be close to unity, a long-run BREXIT-related output loss of 10% would imply an additional welfare loss of a similar size through a dampening of the real demand for money in the UK. It is true that one should anticipate that a BREXIT-related income dampening effect of 10% (UK Treasury medium estimate in 2016 report) to 18% (ERKEN ET AL., 2017) will materialize over about 15 years so that part of the future welfare losses has to be discounted by the

long run real interest rate of the UK which, however, is fairly low since the Transatlantic Banking Crisis.

The highly integrated EU28 wholesale banking market will partly disintegrate which implies that the range of financial assets available post-BREXIT in the EU27 and in the UK, respectively, could become more narrow so that the substitutability of assets will reduce; hence the interest elasticity the demand will reduce which implies welfare losses both in the EU27 and in the UK: In i -(M/P) space – with i denoting the nominal interest rate and M/P real money balances (M is the nominal stock of money, P is the price level; $m^d(Y, i)$ is the real money demand that depends positively on the given real income Y_0 and negatively on the nominal interest rate i) - the real demand for money curve will become steeper than before. Post-BREXIT, the reduction of asset substitutability in the EU27/UK could deepen over time to the extent that the UK adopts a deregulation of banks and financial markets that impose a different institutional and legal framework on UK banking activities. Indeed deregulation, or “regulatory optimization and the reduction of anti-competitive market distortions” is a key concept in the Institute of Economic Affairs ‘Plan A+ Creating a prosperous post-Brexit UK’ which was launched in September 2018 and which was hailed by leading Brexiteers as an alternative approach to Prime Minister May’s so-called “Chequers Plan”. An in-depth review of the modelling employed by the IEA would shed some light on the role of banking and financial market deregulation, unfortunately, the relevant footnote (Footnote 28) is missing from the document (SINGHAM/TYLECOTE, 2018). Only in the second quarter of 2019, immediately post-BREXIT, will there still be a common single market framework for the EU27 and the UK in the case of a No-Deal situation (with a treaty adopted in the UK and the EU there will be a transition period until the end of 2020).

4.4 GBP Foreign Reserve Holdings: Welfare Aspects

In mid-2018 the British Pound stood for a market share of about 5% of global foreign exchange reserves. Those reserves could reach about \$12,000 billion in the global economy in 2019. If one assumes that the difference between the interest paid on UK bonds (and \$ bonds and € bonds) held by foreign central banks is 0.5% while the global yield on capital is 2.5% the annual seigniorage obtained globally from reserve holding in foreign central banks is \$240 billion. The Eurozone, standing for a 20% market share in global reserve holdings, thus obtains \$48 billion, the US (with 60% market share) \$144 billion and the UK \$12 billion. If BREXIT reduces the market share of the British Pound in global reserves by 1 percentage point, the UK loses \$2.4 billion and if the GBP market share – after a strong devaluation of the Pound – would fall by 2 percentage points, the UK would lose \$4.8 billion which seems to be a likely figure in the medium term; capitalized at 3% this amount to a loss of \$148 billion which is about 6% of UK GDP. This aspect has thus far not been considered in the literature. Only if the Global Britain policy would be successful, so that the UK’s global trade would increase considerably, could one expect that the GBP market share could increase. However, as the main challenger among reserve currencies is China – and its GDP will increase in absolute terms and relative to world GDP, therefore, China’s role as a global trader is rising in the long run – one may anticipate that China’s market share will strongly increase in the long run. A strong competition between the \$, the € and the Renminbi might squeeze out the GBP over time.

This problem might have emerged anyway in the medium term (assuming that the € will survive as a stable currency in the long run), but with BREXIT this process could accelerate considerably. The experience of a strong Pound devaluation and higher inflation in 2016 and possibly in the BREXIT implementation year plus the following year will reduce the demand for GBP currency reserves if one follows the standard wisdom in the theory of foreign exchange reserve holdings (TAVLAS, 1990; EICHENGREEN et al., 2016; 2017).

To the extent that the Pound depreciation will lead to a higher inflation rate and a higher nominal interest rate (i^*_1) there will be a welfare loss for the UK that can be shown in the usual way (triangle $E^*F^*E^*$) in a graph with the real demand for money. It should also be noted that the reduction of the output growth due to BREXIT implies that the normally occurring leftward shift of the real demand for money in the UK will not occur – due to lower growth of output in the first post-BREXIT decade - so that an additional welfare loss $A^*_0A^*_1Z^*_1Z^*_0$ (see Figure 3) is occurring. The output dampening of BREXIT thus has a significant welfare effect which thus far has not been discussed in the literature. One may recall that $M3/Y$ is about unity in the Eurozone. The welfare loss from a reduced real demand for money can easily be calculated. Using a real money demand function in a simplified zero inflation-setting gives

$$(12) \quad m^d = hY - h'r$$

Here h and h' are positive parameters; and therefore by solving for r_0 and r_A (for point A), the m^d_0 curve leads to the solutions:

$$(13) \quad r_A = hY / h' \quad (\text{from setting } m=0 \text{ in the money demand function})$$

Using the point E on m^d (m_0/r_0) we get:

$$(14) \quad m_0 = hY - h'r_0$$

Therefore

$$(15) \quad r_A - r_0 = hY / h' - (hY - m_0) / h' = m_0 / h'$$

It should be noted that the ratio of $(M3/P)/Y$ is about unity for the Eurozone.

The welfare gain Ω from holding money therefore is given by the term (standing for the triangle surface AEH'):

$$(16) \quad \Omega = 0.5m_0(m_0 / h') = m_0^2 / 2h'$$

The elasticity of the welfare gain with respect to the real money stock is 2. The lower h' , the higher the welfare gain.

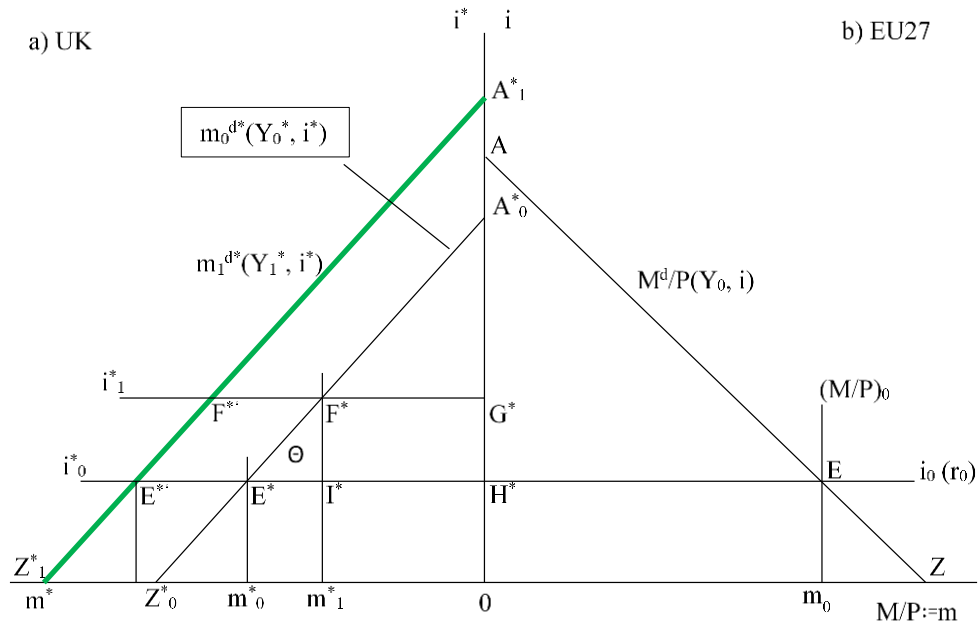
The welfare loss can be restated – with the elasticity of the demand for real money balances with respect to the interest i denoted as $E_{m,i}$ – as $\Omega = rm_0^2 / (2|E_{m,i}|m_0) = rm_0 / (2|E_{m,i}|)$ and with profit maximization, namely $\beta Y / K - \delta = r$ (we use the production function $Y = K^\beta (AL)^{1-\beta}$), one obtains:

$$(17) \quad \Omega = (\beta Y / K - \delta)m_0 / (2|E_{m,i}|)$$

If the absolute value of the above elasticity is 0.2, $\beta=1/3$ and $Y/K=1/4$, one gets for the simplified case of $\delta=0$ a welfare loss from a 10% GDP reduction of 0.67 times that

reduction: Thus the welfare loss in the money market from the 10% GDP reduction will be 6.7% of GDP in the UK.

Figure 3: Welfare Impact of the Decline of the BREXIT-Related Output Dampening in the UK and the Reduction of the UK Interest Elasticity, Respectively



Source: Own representation

It should be emphasized that the Eurozone has brought about a long-run reduction of the nominal interest rate and thus there was a considerable welfare gain from holding real money balances; at the same time, there is a low interest elasticity of the demand for money in the Eurozone (DREGER ET AL. 2016) and a lower Eurozone interest rate has parallel spillover effects on the UK. One should also point out that the creation of the Eurozone - and before the EU single financial market - has raised the interest elasticity of the demand for money as those holding liquidity face a higher range of alternative liquid assets in an integrated financial market; hence h' has increased and this negatively affected the welfare gain Ω .

4.5 Long Term Equilibrium and Welfare Gains from Holding Real Money Balances

With profit maximization and (with K denoting capital, A knowledge, L labor, δ is the capital depreciation rate; $0 < \beta < 1$) a Cobb-Douglas production function $Y = K^\beta (AL)^{1-\beta}$, a modified calculation of the welfare loss is rather easy; profit maximization will lead to $(\beta Y/K - \delta) = r$ where r is the real interest rate (and $r = i$ in a setting with price stability).

Considering additionally profit maximization in the form $\beta Y/K - \delta = r$ - this represents an aggregate equilibrium (money market equilibrium and a supply-side equilibrium) we have

$$(18) \quad m_0 = hY - h'(\beta Y / K - \delta)$$

Hence we get

$$(19) \quad m_0 = (h - h'\beta / K)Y + h'\delta$$

Assuming that δ is close to zero, the welfare gain is given by

$$(20) \quad \Omega = [Yh - (Yh'\beta / K)]^2 / 2h'$$

which can be transformed into

$$(21) \quad \Omega = Y^2[h^2 / 2h' - h\beta / K + h'\beta^2 / 2K^2]$$

For a given stock of capital K – hence in the short run – the elasticity of the welfare gain with respect to Y is 2 (see Appendix 7). This is fairly high and a dimension of the BREXIT welfare losses not considered thus far. Hence if output falls by 1%, the welfare gain from holding real money balances will fall by 2% ($\ln\Omega = 2\ln Y + \ln[\dots]$). If the UK GDP falls through BREXIT by 6%, which is the estimate of the UK Treasury Study of 2016 (HM TREASURY, 2016) the welfare loss of holding real money balances would be 12%. In the long run K will change along with Y and one may assume that the ratio is given by $K=4Y$ and hence we get:

$$(22) \quad \Omega = Y^2h^2 / 2h' - Yh\beta / 4 + h'\beta^2 / 32$$

In the special case of h equal to unity and h' equal to 2, we get

$$(23) \quad \Omega = (Y^2 - Y\beta) / 4 + \beta^2 / 16$$

Since $\beta^2 / 16$ is close to zero, we can write for the long run (with capital adjustment) which is fairly large:

$$(24) \quad \Omega \approx (Y^2 - Y\beta) / 4$$

The ratio of Ω/Y is

$$(25) \quad \Omega/Y = Y/4 - \beta/4$$

Calculate the ratio of the welfare gain as a percent λ of $Y[(\Omega - Y)/Y = \Omega/Y - 1]$:

$$(26) \quad \lambda = [(Y^2 - Y\beta) / 4] / Y - 1$$

This is equal to

$$(27) \quad \lambda = Y/4 - \beta/4 - 1$$

It should be noted that a BREXIT-related reduction of the absolute value of the interest elasticity of the demand for money will make the demand for money curve for the UK somewhat steeper which reduces the negative welfare effect somewhat. To the extent that a hard BREXIT will bring an output decline of 6-16% of GDP in the UK (see WELFENS, 2017b; see also Appendix 2 for a summary table showing the true cost of BREXIT) and since there will be negative spillover effects to the EU27 one may assume that real GDP in the EU27 would decline by 1-3% in the long run so that a negative welfare effect also could be observed in the EU27. If the interest elasticity of the UK real demand for money would reduce post-BREXIT, the demand for money schedule would be steeper than shown in MM_1 which would reduce the above welfare loss from the demand for money effect.

There is, however, some chance that the welfare effect for the EU27 will remain neutral in the context of the demand for money, namely if additional UK foreign direct investment flows would bring a positive output effect from the supply side – probably through combined greenfield investment effects plus positive international technology spillovers. Much will depend on UK economic policy reforms.

4.6 What to Expect for UK FDI and International Capital Flows Post-BREXIT

The years 2016 and 2017 have shown in the referendum year of 2016 a strong nominal and real devaluation of the Pound and increased FDI inflows (reflecting a Froot/Stein effect); in the following year 2017. The massive reduction of FDI inflows apparently reflected the perception of a worsening future British access to the EU single market, and such a series of adjustment effects could also be observed in the face of BREXIT implementation. In the year with the massive Pound devaluation – i.e. the year BREXIT is implemented – FDI inflows will increase as UK firms can be acquired by foreign bidders both at a discount and more easily. As the Pound exchange rate will gradually recover and the cost of BREXIT for UK firms will become more clear within a year, one may anticipate a strong decline of FDI inflows in 2020/21 and massive outflows of British FDI which could reach a swing of 10% of GDP if one combines the reduced inflows and the enhanced outflows of FDI. Thus, the UK would have to replace the FDI swing effect by a corresponding portfolio capital inflow through higher interest rates; the rise of interest rates will be rather limited if a crisis in Turkey, Argentina or other newly industrialized countries would trigger a reinforcement of safe haven effects which would stimulate capital outflows from these countries to the US, (rather modestly for) the UK and the Eurozone/EU27 plus Switzerland and Singapore. Given the uncertainties related to BREXIT, the capital inflows would concentrate more than normally on the US, the Eurozone (mainly Germany, France, Ireland and Luxembourg), Switzerland and Singapore. It cannot be excluded that the interest differentials within the Eurozone would start to rise: while the nominal and real interest rate in Germany and France would decline, the interest rate of Italy would increase. The benefit for France might be bigger than for Germany since the trade exposure to the BREXIT shock is stronger for Germany than for France; it also is relatively strong for Ireland, Netherlands, Belgium and Malta.

With London banks relocating activities to the Eurozone these banks will face the requirement to put up additional equity capital. Therefore, there will be politically determined UK capital outflows over several years in this context since the ECB and other prudential authorities will give these banks a certain transition period.

It should be noted that the US could record high banking services exports post-BREXIT since US banks with big subsidiaries in the UK are likely to relocate part of those activities back to New York or other US cities. This should reinforce the US services account surplus and help to improve the US current account position. To the extent that US subsidiaries in the non-banking sector of the UK should suffer from reduced profitability due to BREXIT, one should expect from US subsidiaries lower reinvestment and net FDI in the UK. Some US firms, as well as Japanese and Korean firms will relocate activities to the EU27 market, particularly those firms that used the UK as a gateway to the EU27 but

are anticipating post-BREXIT new EU barriers to import from the UK in relevant sectors. Clearly, some EU27 countries are to gain from BREXIT through relocation of multinational companies activities away from the UK; for instance, Ireland, Germany, France, the Netherlands, Belgium and Austria can expect to benefit here. This also is a list of prospective winners when one considers the decision of EU27 immigrants in the UK who consider moving back to the EU27. This is a process that could take some time. Certain EU countries also stand to benefit from wealthy UK citizens who will want to get a citizenship in EU27 countries – Ireland, Spain, Portugal, Malta, Cyprus, France and Germany could be winners here and this could also trigger additional capital inflows into these countries. It is unclear to which extent Italy could benefit here. Luxembourg might face some problems with its big investment funds: With BREXIT, they are partially losing access to the special knowledge of UK investment funds with whom the funds in Luxembourg are closely linked. The investment funds of Luxembourg might have to create therefore special subsidiaries in London in order to minimize this effect.

As regards the UK's current account balance, one may anticipate that the trade balance will improve modestly after a real depreciation of the Pound – the increasing prices of imported intermediate products from the EU27 will partly offset the competitive price advantage from a devaluation of the Pound. With the UK exports of financial services to the EU27 declining in the short term there will be a negative transitory effect on the UK's current account. However, the long-run effect could be that London banks and financial service providers will launch a strong export initiative in Asia, North America and elsewhere which – due to higher innovation dynamics and global network effects - could contribute to an improving financial services export surplus of the UK vis-à-vis the EU27.

5. Financial Services Barrier Dynamics

5.1 How will the quality of financial markets evolve in the context of BREXIT?

The quality of financial markets can be measured through two dimensions:

- The financial services trade barriers;
- the quality of financial regulations.

For the first dimension, the service trade restrictiveness index (STRI) and the FDI regulatory restrictiveness index (FDI index) which conducted by the OECD can be used as informative instruments to understand the trade and FDI barriers in financial services of EU countries. As regards financial services trade barriers, the OECD has published data for 2014 to 2017. There is also data available for FDI barriers which, of course, undermine optimal global growth – assuming the absence of negative externalities and adequate internalization of externalities, respectively (the latter is partly doubtful if important and influential OECD countries including the UK and the US push for excessive deregulation).

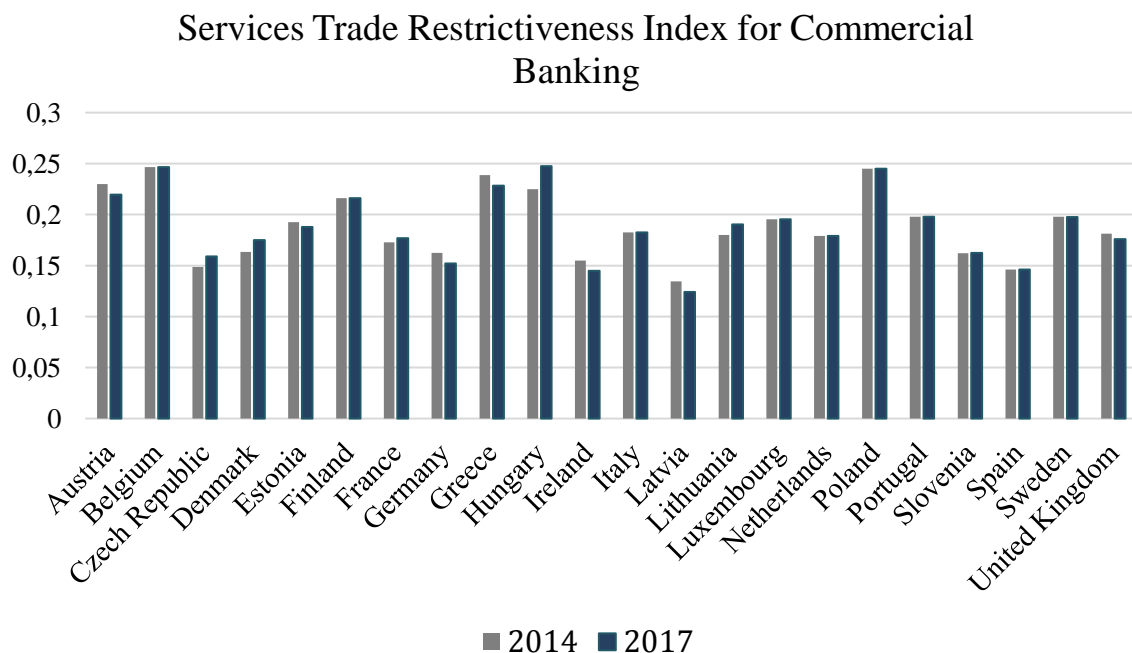
By comparing the data of the STRI for the commercial banking sector in selected 22 EU countries between 2014 and 2017, the following Figure 4 shows that there are considerable

differences in commercial banking trade barriers across EU countries in general. After three years since 2014, Austria, Estonia, Germany, Greece, Ireland, Latvia and the UK were the only EU countries which had reduced barriers to commercial banking. When we look at the figures for all the financial services covered by the STRI in 2017 (see Figure 5). The situation in insurance sector is very similar to commercial banking; instead, barriers for accounting services are fairly high in many EU countries. After observing the data from figures mentioned above, the UK is not a country with particularly low barriers for financial services trade, which is a point that has so far not been visibly debated in the EU Commission. It could be a useful strategy for EU27/Eurozone countries to push the UK to reduce its trade barriers to financial services or to encourage innovation in the EU27 banking markets favored by the relocation of London-based international banks to the Eurozone by having reduced intra-Eurozone/EU27 financial services trade restrictions. One may emphasize two points in the field of financial services trade barriers:

- A reduction of financial services trade barriers in EU27 countries is possible and could easily compensate for anticipated increases in the price of specialized financial services no longer easily available from London post-BREXIT;
- the EU should consider the reduction of financial services trade barriers as a new strategic field for regional free trade agreements in the future, not only since financial services' share relative to GDP are bound to increase in the long run due to the accumulation of capital, but it also an efficient solution to face the challenges from the demographic development, namely the aging of societies.

It is up to the European Commission and the EU member countries to pick up these points in the near term and include it in a new EU growth strategy. Individual EU countries also could be asked to include these points in the future presentation on the European semester.

Figure 4: Financial Services Barriers (Commercial Banking)



Source: Own representation using data available from the OECD

Austria	0.050	0.050	0.050	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Denmark	0.017	0.017	0.017	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Estonia	0.018	0.018	0.018	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Luxembourg	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Netherlands	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Slovenia	0.223	0.017	0.018	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Spain	0.047	0.047	0.047	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Sweden	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
United Kingdom	0.106	0.083	0.083	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002

Note: .. represents missing data

Source: Own representation of data available from the OECD

Table 4: Volume-weighted* FDI Restrictiveness in Selected EU Countries

FDIRRI * FDI/CS	1997	2003	2006	2010	2011	2012	2013	2014
Belgium	0.0175	0.0095	0.0110	0.0104	0.0108	0.0056	0.0061	0.0049
Ireland	0.0059	0.0169	0.0088	0.0030	0.0029	0.0037	0.0038	0.0037
France	0.0029	0.0024	0.0029	0.0032	0.0034	0.0032	0.0035	0.0031
Luxembourg	..	0.0012	0.0014	0.0023	0.0028	0.0020	0.0013	0.0025
Portugal	0.0042	0.0084	0.0011	0.0012	0.0010	0.0011	0.0012	0.0011
Finland	0.0033	0.0133	0.0047	0.0010	0.0010	0.0010	0.0009	0.0009
Czech Republic	0.0017	0.0004	0.0006	0.0008	0.0007	0.0008	0.0008	0.0007
Italy	0.0004	0.0007	0.0010	0.0005	0.0005	0.0006	0.0005	0.0005
Hungary	0.0018	0.0004	0.0005	0.0005	0.0005	0.0005	0.0006	0.0005
Netherlands	0.0001	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0004
Lithuania	..	..	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004
Sweden	0.0001	0.0003	0.0003	0.0005	0.0005	0.0005	0.0005	0.0004
Latvia	..	0.0004	0.0002	0.0003	0.0003	0.0003	0.0004	0.0003
United Kingdom	0.0046	0.0065	0.0103	0.0002	0.0002	0.0003	0.0003	0.0003
Germany	0.0008	0.0014	0.0014	0.0004	0.0004	0.0004	0.0003	0.0003
Poland	0.0022	..	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
Estonia	0.0004	0.0016	0.0021	0.0002	0.0002	0.0003	0.0003	0.0003
Greece	0.0010	0.0013	0.0015	0.0004	0.0004	0.0003	0.0003	0.0003
Austria	0.0011	0.0025	0.0041	0.0002	0.0002	0.0002	0.0002	0.0002
Denmark	0.0006	0.0022	0.0017	0.0002	0.0002	0.0002	0.0002	0.0002
Spain	0.0014	0.0032	0.0034	0.0002	0.0002	0.0002	0.0001	0.0001
Slovenia	0.0037	0.0006	0.0007	0.0001	0.0001	0.0001	0.0001	0.0001

Source: Own calculations using data available from the OECD

Note: *Share of inward FDI stock relative to host country capital stock: own calculations;

.. represents missing data

5.2 Financial Market Quality and New Challenges

The income share of capital in national income is rising in many countries – prior to the Transatlantic Banking Crisis 2007–09, the profit share of banks in particular had strongly increased with some normalization after 2010. As long as the new Basel III rules are not implemented, there are an additional risk of a new banking crisis, but one may hope that in

the BREXIT year the Bank for International Settlements (BIS) member countries will have implemented the new rules.

There is still a recent history of considerable redistribution from labor to banks and this artificially increased banks' profitability in OECD countries: The key problem is that loans to private households have been provided on the basis of artificial bundling, namely of loans and payment protection insurance (PPI). Typically, borrowers were pushed by banks into also taking out PPI from the same bank which offered the original loan; this strange and anti-competitive bundling which reduces the price elasticity of the demand for loans (and raises overall loan costs artificially) had been declared illegal in the UK in 2011 and by August 2018, the clients of banks have reclaimed more than £30 billion in the UK. Such anti-competitive bundling, which does not reflect the normal result of competitive market dynamics, is also a problem in Germany and many other EU countries where the system still exists. Nevertheless, a study of iff/ZEW (2012) argued in a strange report commissioned by the German government that interest rates in Germany are in line with competition – the study, however, uses neither the analytical concepts of the relevant market in a meaningful way, nor does it critically focus on the anti-competitive bundling. The German and British case study is not only an example of redistribution of worker/household's income to profits of banks, but it also is a bad precedent in the sense that such anti-competitive behavior in loan markets can continue over decades and distorts both capital flows and resource allocation. Any professional economic analysis would have come to the conclusion that overdraft interest rates in Germany, much higher than those in the Netherlands, Austria and many other EU countries, were incompatible with competitive markets; and that the bundling of loans and PPI should have been banned (it is this artificial anti-competitive bundling in credit markets that brings about the strangely high overdraft interest rates).

A rough estimate of losses imposed by this strange situation on households buying PPI and loans indicates that about €4 billion per year should be repaid to bank customers - cumulated over a decade, roughly 1.3% of annual GDP).

5.3 Empirical Analysis of the Cross-Border Barriers in Financial Services

As explained, the cross-border barriers in various types of financial services is an important analytical challenge in Europe. One may assume that financial services barriers of country i reflect a public and political attitude towards capital inflows in general, and hence an explanatory variable could be the FDI barriers for the financial sector in the respective country. The internet density of firms stands for the ability to screen international investment opportunities, and if many firms have internet access, one may expect more lobbying for reducing capital import barriers in banking, insurance and other financial services fields. With a higher trade intensity, there should also be a broader need to cope with the volatility of exports and imports, thus, there could be an increased interest in free financial services inflows. Higher inward FDI stock figures should, in turn, reinforce the lobbying of foreign companies to reduce barriers for financial services in the host countries and should contribute to a lowering of barriers in financial services. A

higher per capita income should normally reinforce the interest of people in having reduced barriers for financial services imports: The latter would mean better services and lower prices of financial services. However, there could be a counterargument according to which a high per capita income is largely reflecting high incomes earned in a few sectors, including financial sectors and ICT: These are usually highly concentrated sectors which could easily lobby for higher barriers to financial services inflows since higher foreign inflows imply more import competition and thus lower profit rates for domestically offered financial services. A higher outward FDI stock could be a signal that firms have limited confidence in government in the source country – and a rather limited ability of government in economic policy management suggests to limit financial sector openness, since otherwise, the country's economy could be more exposed to rather volatile international capital flows. An alternative view is that higher outward FDI stocks represent a strong economy with many very competitive firms that seek to improve the company's respective international market position via higher outward FDI and in the presence of a perception of a strong home country, the willingness to push for lower financial services barriers could be rather strong – thus outward FDI has an ambiguous effect on financial services barriers.

In the process of collecting the adequate and relevant data to analyze the dynamics of the financial services barriers for the EU, we covered 23 countries (EU28 excluding Bulgaria, Croatia, Cyprus, Malta and Romania) over the period from 2014 to 2017 in our study. The small data sample is primarily due to the limits of data regarding the services trade restrictiveness index. The panel data in this study is strongly balanced, it has been collected from the secondary resources, namely from the Organisation for Economic Co-operation and Development (OECD), the European Statistical Office (Eurostat), and the World Bank.

The dependent variables are constructed as follows: The STRI for the financial sector is chosen as a proxy for financial service trade barriers. It contains 19 major service sectors, we selected all the sectors which are relevant to financial services. In the end, we have three sectors, namely commercial banking, insurance, and accounting, based on the industry and service classification of the service trade restrictiveness index. Furthermore, we also constructed an overall financial service trade barrier index by taking the mean of the above three financial service sectors' trade restrictiveness index.

The explanatory variables are as follows: The FDI barriers on financial services are taken from the FDI regulatory restrictiveness indices. They are considered to have a positive relationship with the dependent variable. Similarly, the FDI restrictiveness index for financial services, banking, and insurance are included. Despite the influential effects of institutional elements, the impact from FDI inward and outward stock also plays an essential role to understand the dynamics of financial services trade barriers. In the empirical analysis, the FDI inward and outward stock intensity, which is the ratio of stocks to GDP, will be used separately. Furthermore, it is also necessary to include the trade openness of each nation. We measure the indicator by the percentage of the sum of imports and exports relative to GDP. Moreover, GDP per capita for each country during the period is used to control for the effect of the differing stages of economic development. Finally, the internet intensity of enterprises is taken due to the consideration that rising ICT technology might also largely influence the reduction of financial service trade restrictiveness among the countries. An overview and description of the variables is provided in the following table (Table 5).

Table 5: Description of the Variables

Variable	Proxy	Expected sign	Period	Data source
Financial Services Trade Barriers	Cbank Services trade restrictiveness index of the commercial banking sector		2014-2017	OECD
	Insu Services trade restrictiveness index of the insurance sector		2014-2017	OECD
	Acc Services trade restrictiveness index of the accounting sector		2014-2017	OECD
FDI Barriers	STRI_FA The mean of the above three indices		2014-2017	OECD
	FDIRes_F FDI regulatory restrictiveness index of the financial service sector	+	2014-2017	OECD
	FDIRes_B FDI regulatory restrictiveness index of the banking sector	+	2014-2017	OECD
	FDIRes_I FDI regulatory restrictiveness index of the insurance sector	+	2014-2017	OECD
Internet Density	LN_INT_E Internet density of enterprises in logarithm	-	2014-2017	Eurostat
Trade Openness	LN_Openness Trade openness in logarithm	-	2014-2017	WDI
IFDI Stock intensity	LN_IFDI The ratio of Inward FDI stock to GDP in logarithm	-	2014-2017	OECD
OFDI Stock intensity	LN_OFDI The ratio of Outward FDI stock to GDP in logarithm	+/-	2014-2017	OECD
GDP per capita	LN_GDPpc gross domestic product per capita in logarithm	-	2014-2017	WDI

Source: Own representation

Note: OECD is the Organisation for Economic Co-operation and Development; Eurostat refers to the European Statistical Office; WDI is the abbreviation of the World Development Indicator database from the World Bank.

In this study, we are interested in understanding the effects of selected determinants on the financial service trade barriers of 23 EU countries from 2014 to 2017; thus, a panel data analysis is seen as an appropriate method. The summary of all variables can be found in Appendix 4. Since the risk of unobserved individual effects or the specific characteristics of individual countries is relatively high, fixed-effects and/or random-effects panel data models are usually chosen to deal with the potential concern (PARK, 2011). We will first test whether the fixed effects model gives a significant increase in terms of goodness-of-fit using an F-test compared with the pooled ordinary least squares (OLS) estimator. Following this, the Breusch-Pagan Lagrange multiplier (LM) test will be used to test whether there is a significant random effect in the panel data. When significant results for

both fixed and random effects can be observed in the test outcomes, then the Hausman specification test is conducted to examine which model is superior.

According to the aforementioned test results, neither the fixed-effect nor random-effect specification show a significant rise in the goodness-of-fit; therefore, the pooled OLS model is preferred. Resulting in the moderate correlation between inward FDI stock intensity and trade openness, as well as high levels of correlation between GDP per capita and outward FDI stock intensity (see Appendix 5), thus, regressions are run separately to avoid multicollinearity. The estimated regression results can be found in the subsequent Table 6.

Table 6: Analysis of Regression Results

Dependent Var.	Cbank		Insu		Acc		STRI_FA	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FDIRes_F	-0.057 (0.268)	-0.001 (0.265)	0.635 (0.443)	-0.765 (0.468)	4.790** *	4.523*** (1.010)	1.366*** (0.445)	1.252** *
FDIRes_B	0.013 (0.027)	0.016 (0.028)	0.077** (0.038)	0.070** (0.031)	0.132* (0.070)	0.123** (0.058)	0.074* (0.039)	0.069** (0.032)
FDIRes_I	0.125 (0.168)	0.138 (0.162)	0.208 (0.184)	0.154 (0.204)	0.041 (0.259)	-0.006 (0.236)	0.124 (0.160)	0.095 (0.163)
LN_IFDI	0.003 (0.005)		0.024*** (0.007)		-0.020** (0.009)		-0.013** (0.006)	
LN_GDPpc	-0.002 (0.007)		0.020** (0.009)		0.036** (0.017)		0.018* (0.009)	
LN_INT_E	-0.455*** (0.086)	-0.460*** (0.082)	0.292*** (0.096)	0.302*** (0.092)	-0.120 (0.254)	-0.145 (0.218)	-0.289*** (0.108)	0.302** *
LN_OFDI		-0.0002 (0.003)		0.006** (0.003)		0.014* (0.007)		0.007* (0.004)
LN_Openness		0.009 (0.007)		0.041*** (0.009)		0.045*** (0.011)		0.026** *
Constant	2.273*** (0.372)	2.284*** (0.376)	1.456*** (0.439)	1.649*** (0.426)	0.061 (0.901)	0.221 (0.886)	1.263*** (0.424)	1.384** *
Observations	86	86	86	86		86	86	86
R-squared	0.231	0.243	0.283	0.320	0.14	0.563	0.389	0.407

Notes: LN means the variable took the natural logarithm; robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Columns (1) and (2) present the regression results for trade barriers in the commercial banking sector for 23 EU countries. In general, the trade barrier does not largely affect by the selected determinants despite internet intensity even at the .10 significance level. The estimated coefficients of the internet density of enterprises are negatively and statistically significant ($p < .01$). They show that a one unit increase in terms of internet density will lead to a decline of 0.455 or 0.460 units in the level of the trade barrier in model (1) and model (2), respectively.

As can be seen in columns (3) and (4), the results of both models highlight the positive relationship and important role of the FDI restrictiveness index of the banking sector to insurance trade restrictions. However, a similar effect cannot be found for the FDI restrictiveness index of financial services and insurance. The estimated results of inward FDI stock intensity, internet density, and trade openness showed an expected negative sign under the significance level of 5%. Model (3) reveals a highly significant and positive relationship between GDP per capita and insurance trade barrier ($p < .05$). This finding should be considered carefully as, in general, for more developed economies, a more open trend is expected to be seen vis-à-vis the financial service trade.

The FDI regulatory restrictiveness index of the financial service sector exhibits a significant and positive impact on the barriers to trade with regard to accounting in columns (5) and (6). The estimated coefficients show that every one unit increase of the level of FDI restriction is associated with a rise of the financial trade barriers in the accounting sector by 4.79 units and 4.52 units at the .01 significance level in models (5) and (6), respectively. Also, a higher level of FDI restriction on banking also contributes to a stricter service trade environment for accounting in both models. Interestingly, the internet density of enterprises does not have a strong influence on the openness of the accounting services trade for 23 EU countries.

The results in the last two columns indicate that a higher level of FDI regulatory restrictiveness index of financial services and banking contribute positively and significantly to the increase of financial trade restrictions. However, the same influence is not found for the FDI restrictive index for insurance. The other independent variables, namely inward FDI stock intensity, internet density of enterprises, trade openness, all show an expected negative sign and have a strong influence on financial trade barriers. However, GDP per capita illustrated a relatively important positive influence on the growth of financial services trade barriers.

6. Policy Conclusions

There are broad risks for the world economy in the context of BREXIT in the medium term:

- An overlapping dynamics of the strong exchange rate and interest movements in the EU28 could bring instability to the UK and for the Eurozone new stability risk.

- Higher exchange rate volatility could undermine global growth of foreign direct investment and the same is true if financial market actors perceive a broader new risk of political instability in the BREXIT context.
- Emerging market economies might face new problems if strong financial market reactions in Western Europe overlap with rising US interest rates and increasing protectionism of the US.
- A badly managed disorderly BREXIT process could stimulate populist forces in Europe and elsewhere. The EU elections 2019 will take place in the shadow of BREXIT anyway.
- The Deutsche Bundesbank's decomposition of the VIX (DEUTSCHEBUNDESBANK, 2017, p. 27) shows that the BREXIT referendum went along with increased policy uncertainty; the VIX, however, had reduced relative to its long-term historical mean (i.e. since 1990) because the financial market uncertainty had reduced and monetary policy also decreased the VIX – a serious problem would occur if BREXIT implementation would go along with the combination of new financial market uncertainty and policy uncertainty. Interestingly, the BIS 2018 Annual Report seems to ignore the BREXIT issue which might be interpreted in a way that the BIS does not want to destabilize financial markets. However, by not analyzing the historical BREXIT challenge, the BIS signals implicitly how big potential risk could be.

The G7, the OECD, as well as the IMF and the G20, might face the need to pick up the special challenges of BREXIT. If there would an international economic crisis in the context of BREXIT dynamics, one may anticipate a massive weakening of the West: The Trump Administration suffers from a lack of competence, particularly in the Treasury and in the Department of Commerce as the Trump Administration has filled only about three-quarters of the roughly 4,000 political appointees of the Obama Administration.

As the analysis of KADIRIC/KORUS (2018) shows, one may expect that corporate bond markets in the UK should face increasing risk premiums and this in turn will dampen UK investment and innovation dynamics. To the extent that the UK government cannot conclude a clear EU-UK trade treaty and adopt a convincing BREXIT transition policy, the doubts in capital markets about the long-run quality of UK corporate bonds could be reinforced over time. UK firms could come under pressure to finance investment more on a medium-term basis instead of through long-run bond placements which brings a bigger exposure of UK firms to post-Brexit shocks and could thus negatively affect UK stock market valuations. This could bring in the context of shorter maturities a higher recession risk for the UK in the future, possibly mitigated by the general dampening effect of output growth through BREXIT so that overinvestment should be less likely than in periods of a rather high trend growth rates. Monetary policy has limited room to maneuver, as the interest rate will be very low at the beginning of the BREXIT year. Thus, the role of fiscal policy might be more needed than in previous recessions. However, the rather high debt-GDP ratio of about 85% will restrict fiscal policy options here. One may recommend that the UK government should in any case consider three policy measures to mitigate the BREXIT problems:

- It would be adequate to implement additional government support aimed at reinforcing the innovation dynamics of UK firms; such innovation dynamics could help stimulate export and output growth in the UK.
- BREXIT will mean an accelerated structural change and this in turn requires that many workers will have to adjust in terms of skills and competences: The traditionally ultra-low UK public expenditures on retraining should increase from almost zero to about 0.4 percent of GDP which would be twice what full-employment Switzerland has recorded in the 2004-2016 period (Germany recorded 0.2% of GDP in 2014-2016; the US had 0.03%, Austria was close to 0.45% and Denmark close to 0.55%, France 0.4% - see Table 7).
- The UK might want to consider co-operation in financial regulation with the EU27. If the UK would refuse such co-operation, the EU27 is likely to impose capital controls on the UK in future crisis periods since the EU27 will want to avoid full exposure to negative spillovers from excessive UK deregulation. The most important barrier to consider by EU countries would be barriers against take-overs in the banking sector from the UK, the US or other third countries whose regulations are not fully in line with BIS rules and at least broadly equivalent to EU27 regulations.

There is no reason why the EU27 should not be able to develop a globally competitive banking system and adequate financial services dynamics. However, careful reforms for a sustained stable capital market union would be necessary.

Table 7: Public Expenditure on Labor Market Programs in % of GDP(Training)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Australia	0.01	0.01	0.01	0.01	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01
Austria	0.29	0.32	0.39	0.36	0.36	0.50	0.50	0.44	0.44	0.47	0.50	0.46	0.45
Belgium	0.16	0.16	0.14	0.14	0.17	0.17	0.16	0.15	0.16	0.16	0.16	0.16	0.15
Canada	0.08	0.08	0.08	0.08	0.09	0.14	0.13	0.10	0.09	0.08	0.07	0.07	0.07
Denmark	0.52	0.49	0.42	0.37	0.35	0.46	0.68	0.64	0.61	0.60	0.59	0.60	0.53
France	0.31	0.31	0.31	0.30	0.28	0.39	0.41	0.37	0.37	0.38	0.38	0.37	..
Germany	0.44	0.38	0.35	0.30	0.30	0.35	0.27	0.25	0.22	0.22	0.21	0.20	0.19
Greece	0.03	0.04	0.06	0.05	0.09	0.02	0.02	..	0.06	0.10	0.13	0.09	..
Italy	0.22	0.20	0.17	0.18	0.18	0.17	0.15	0.14	0.14	0.15	0.14	0.17	..
Japan	0.04	0.00	0.00	0.00	0.01	0.01	0.03	0.05	0.01	0.01	0.01	0.01	0.01
Netherlands	0.12	0.11	0.10	0.09	0.09	0.12	0.13	0.12	0.10	0.09	0.07	0.07	0.07
Poland	0.09	0.10	0.10	0.10	0.12	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.01
Spain	0.14	0.17	0.16	0.15	0.17	0.18	0.19	0.19	0.15	0.12	0.12	0.12	..
Switzerland	0.28	0.26	0.21	0.17	0.15	0.18	0.20	0.17	0.16	0.17	0.17	0.18	0.19
UK	0.03	0.02	0.01	0.01	0.01	0.02	0.02	0.01	..	..	..	..	..
US	0.05	0.05	0.04	0.04	0.07	0.05	0.04	0.04	0.04	0.04	0.03	0.03	..

Note:.. represents missing data

Source: Own representation based on data available from the OECD

6.1 Adverse Effects on EU27 Countries

One cannot rule out that BREXIT will seriously adversely affect a small number of EU27 countries, possibly including Ireland, the Netherlands and Malta through trade links and Italy and Greece through confidence problems whose core is not actually BREXIT itself but rather self-inflicted reform deficits, mainly in the institutional setting of the two respective countries (the Transatlantic Banking Crisis sharply raised deficit-GDP ratios; not least in the UK where the Cameron government resorted to massive cuts to fiscal transfers from central government to cities/local communities reaching 3.5% of GDP within five years which, in turn, stimulated anti-EU immigration sentiment as the implied under-provision of local public services was very often considered to be reflective of the impact of immigration which was not in fact the case – EU immigrants became the scapegoat of many politicians in a partly populist and very unfair anti-immigration campaign that received visible support from the Cameron and May governments both of which have claimed that EU immigration stood for a long-term economic burden for the UK while OECD figures have shown the opposite: WELFENS, 2017a).

The European Commission should be expected to help countries facing a particularly high adjustment burden. Given the BREXIT-related shortfall in terms of EU budget financing, achieving a consensus for the next budget period could be rather difficult, given the fact that Italy's populist government is likely to delay any agreement to the last minute in order to get concessions in the field of EU refugee policy. BREXIT financial market dynamics could in turn destabilize the Eurozone, not least since BREXIT raises risks in UK and EU27 markets, above all liquidity risks in the UK as well as investor risk in the banking sector. Italian as well as Greek banks might face problems in maintaining investor confidence. With populist governments active in both countries, there is considerable potential for new intra-EU conflicts and one should not assume that populist governments have a strong tendency to follow the reform recommendations of national or international experts (incidentally, in the BREXIT referendum campaign in 2016, Minister Michael Gove of the Cameron government had also emphasized that the British public “have had enough of experts” which is a typical view of a populist pro-BREXIT politician).

- The UK will face a massive medium-term decline in FDI inflows. Facing lower FDI inflows and modest economic growth rates, the UK government will consider policy options to raise output growth:
- As a consequence, one can expect that the UK government will strongly reduce its statutory corporate income tax rate (as has been announced by PM May in official conversation (HM GOVT, 2018; GIEGOLD, 2018)); taking into account the FDI gravity modeling analysis of WELFENS/BAIER (2018) the implication is that UK tax rates will strongly decline – most likely in the face of resistance from trade unions and the Labour Party, respectively.
- If the UK reduces the statutory corporate tax rate – which is a parallel move to the Trump tax reforms of 2017 – this will put the EU27 under strong pressure to also reduce corporate tax rates; the effect on income distribution will be to raise the post-tax capital income share in GDP so that social tensions could be generated by BREXIT across the whole of Europe.

One should not rule out that the UK will face a rather isolated situation once BREXIT has been implemented and that political pressure will mount to push for other countries to

leave the EU. This will be a long-term challenge for the EU27, not least since it seems that Russia is trying to undermine EU stability in some countries in Eastern Europe. With the US no longer supporting EU integration under the Trump Administration – and possibly pushing for disintegration (e.g. by reinforcing populist forces in Italy and elsewhere) – there is a considerable risk that the EU27 could face rising internal conflicts and sooner or later this would also destabilize the Eurozone; indeed this could also mean risk for monetary stability in the Eurozone, namely once the consensus about the Stability and Growth Pact is further weakened. While medium-term growth and economic policy analysis – for example, the European Semester approach of the EU - is useful, one should not overlook that permanent long-term monitoring is also needed. The situation that Italy in 2015 had the same real disposable per capita income as it had in 1995 should never occur: Growth policy monitoring is a gap at the EU and at the IMF level as well. The EU27 and the Eurozone countries should carefully consider national barriers to financial services – indeed in the interest of more competition and efficiency gains as well as more innovation dynamics one may recommend the following:

- Financial services barriers within the EU27 should be strongly reduced where France and Germany as well as Austria, Belgium, Finland, Estonia, Portugal and Luxembourg as well as Greece are countries that follow the good example of Ireland, Italy and the Czech Republic; this is a rather easy way to stimulate economic growth.
- Progress in terms of the EU banking union and capital market union should be pursued, although this is a field where some adjustment time is needed and sorting out key details is difficult.

6.2 Monetary Policy

With output growth declining in OECD countries in the medium term – and inflation rates above 2% - it is quite important that interest rates in the Eurozone should come back to a normal level. Without such a normalization of monetary policy, Eurozone monetary policy would have hardly any room to maneuver in a future recession. The Eurozone will, however, face a special problem with respect to Italy where the populist Conte government wants to maintain rather high deficit-GDP ratios even in an economic upswing which is rather contradictory: The announcement not to reduce the deficit-GDP ratio will bring about a higher interest rate for Italian bonds – already visible in September 2018 (Italian interest rates jumped above the interest rate of government bonds of Portugal in late September) – that could eliminate any additional room for government purchase expenditures in the medium term. Since the envisaged higher additional government expenditures are mainly earmarked for raising social expenditures, not for enhanced innovation dynamics or better education, the growth effect of Conte's economic policy will be almost zero so that one cannot expect a long run decline of the Italian debt-GDP ratio; following the Domar rule that the ratio is determined by the trend deficit-GDP ratio divided by the trend output growth rate.

In the UK, monetary policy post-BREXIT will face a difficult choice. In the case that there is a No-deal BREXIT, and hence the UK experiences a recession, the Bank of England may be expected to reduce the interest rate despite the rise of the inflation rate associated

with a strong devaluation of the Pound. If there is a BREXIT on the basis of an EU-UK treaty, the UK might face only a mild recession or a modest stagflation situation so that the Bank of England could increase the interest rate in order to avoid a strong rise of the inflation rate. The case for a higher interest rate in the UK is all the more convincing since the largely unanticipated rise of the inflation rate will bring about a fall of the real wage rate which should help to stabilize the employment situation in the UK. If the UK should raise the interest rate – more or less in parallel to the US – the pressure on the ECB to also raise the interest rate will become strong. The US would point to a further strong increase of the Eurozone current account surplus (or a rise of the trade balance surplus) and the transatlantic trade conflict, actually a US-EU27 trade conflict, would intensify. This would also create a potential conflict between the UK and the EU27 since the UK would have to decide on what side it takes a position at G7/G20 meetings – the side of the populist US Trump Administration or of the EU27.

6.3 Multilateralism

The US under the Trump Administration has adopted a rather protectionist trade policy in 2018, in particular starting an open trade conflict with China where alleged Chinese violations of US intellectual property rights is part of the conflict; to some extent, the arguments seem similar to claims made in the course of the US-Japan trade conflict of the 1980s, although the case of Japan was different in many ways – the US was not facing a big bilateral trade conflict and not in the US complaining about infringements of US intellectual property rights. The US economic policy of 2017/18, emphasizing expansionary fiscal policy in an economic upswing, is not in line with textbook wisdom as this only reinforces the trade deficit-GDP ratio – a frequent subject of complaint of the Trump Administration – and also the current account deficit-GDP ratio. The Trump Administration faces a current account deficit vis-à-vis the Eurozone and China and other countries; it has pulled out of the initial G7 declaration in Canada and has blocked the re-election of judges to the World Trade Organization's appellate body so that the WTO trade conflict resolution mechanism will be not operational as of summer 2019. For the UK (also facing trade deficits vis-à-vis the EU and China) this is an unfortunate development since the UK's Global Britain approach for BREXIT suggests that concluding many new free trade agreements with countries outside Europe could compensate for the likely reduction of UK-EU trade after the implementation of BREXIT. The UK cannot implement a functional Global Britain approach – except for a UK-US free trade agreement - if the WTO is not working. However, the post-BREXIT UK is likely to become very dependent on the US which would create a political odd couple as the UK normally promotes free trade but now would have to largely follow protectionist US policy. To the extent that the US would actively try to undermine the stability of the EU, this would also create an indirect conflict line between the UK and the EU27. The EU27 could have no alternative for saving multilateralism than to seek stronger cooperation with the countries of ASEAN, Mercosur, ECOWAS and other regional trade groups.

US protectionism will slow down global growth and it also has no positive welfare effect for the US except in the short run; the long-run US welfare effects are clearly negative as shown by KIM/SHIKHER (2017; see also FELBERMAYR/STEININGER/YALCIN (2017)). A big risk for EU financial stability would be if the US further deregulates

financial markets while the UK would follow suit. This would impose strong pressure on the Eurozone to also come up with new financial market and banking deregulation; the pressure from stock markets would be too strong not to do so and the mechanism is already well known from the years prior to the Transatlantic Banking Crisis 2007-09: US/UK banking deregulation will bring new profit opportunities for banks in the US and the UK so that banks' stock market valuations would increase strongly and make several big Eurozone banks easy prey for an international takeover from the US and the UK, respectively, so that banks in the Eurozone would in turn start to lobby strongly for deregulation similar to steps taken in the US and the UK: A US-EU transatlantic mechanism emphasized already prior to the Transatlantic Banking Crisis by ARTUS/VIRARD (2005).

US populism, in the form shown by President Trump, is a serious challenge for Western Europe and the stability of the world economy. This holds not least since US protectionist policy vis-à-vis China will cause trade and FDI diversion effects, namely from a big economy such as China which since 2016 is already the largest country in the world economy if one considers World Bank figures at Purchasing Power Parity (PPP). The FDI of China will largely be redirected to ASEAN countries so that the EU's leading role in foreign direct investment in that area will be undermined in the medium term. Moreover, the share of China's exports which can no longer be exported to the US will be redirected to Europe. The biggest potential problem for the EU28 is that Trumpism could be a structural US problem (WELFENS, 2018b): US surveys show that the majority of voters hold the view that hard work is the key to moving up economically, at the same time there is a broad perception that increased inequality in the US is a problem – the share of national income accruing to the lower half of income earners has fallen from 20% in 1981 to just 13% in 2015 (much more than in Western Europe where it remained roughly constant around 20%); at the same time the majority of US voters think that the inequality problem should be corrected not by government but rather by big companies. This, however, is a totally illusory expectation and is bound to lead to recurrent voter frustration among the lower income half of US society – and the Democrats in 2016 had no convincing political offer to make: Suffice to say that in the 2016 presidential elections Hillary Clinton received only 53% of the votes from income earners with less than \$30,000 a year, while in earlier elections Obama had obtained 63% from this group. Donald Trump by contrast emphasized the need to take care of the “forgotten men and women” relentlessly in his campaign and he regularly promised new jobs for industry, mining and agriculture (whether or not his policy promises will become reality is, of course, an open question with rather doubtful perspectives).

It should be emphasized that there is no reason to expect that economic globalization and digital expansion generates much rising inequality in the world economy if national policymakers adopt adequate reforms and if more international cooperation in the field e.g. of tax policy could be achieved (WELFENS/UDALOV, 2018). If there is structural Trumpism in the US, the combination of US populism and UK populism – BREXIT is without doubt a populist project based largely on misinforming voters in the 2016 EU referendum campaign (WELFENS, 2017a) – could seriously undermine EU integration and the Eurozone, respectively. To the extent that there is a structural issue of Trumpism, the conclusions to be drawn in EU27 countries are certainly rather broad and most likely will take time to determine at the political level in Brussels and in EU member countries.

It seems that BIS Annual Report of 2017 stated an adequate position when it formulated the view that political instability in OECD countries has become a serious challenge for economic stability (BIS, 2017). In this context, macro-prudential supervision and the analysis of macro-prudential risk should naturally be emphasized:

- In the EU there should thus be a much greater role for the European Systemic Risk Board (ESRB).
- An adequate framework of cooperation between the UK's relevant institutions and the ESRB should be established; this could be a rather difficult challenge given the reluctance to cooperate as shown by some UK institutions in the ESRB work in 2017/2018
- The Basel III rules should be implemented broadly, and this should include the US – again a challenge that could turn out to be very serious.

The biggest challenge in the context of BREXIT is a weakening of multilateralism and free trade as well as undermining the role of the West for the world economy. Finally, BREXIT is a negative signal to all regional integration areas and this in turn could bring about less regional trade integration and more nationalism and protectionism in the world economy. The global cost of BREXIT could, in the end, be higher than the cost of BREXIT for the UK. International policy cooperation and rational crisis management should be re-emphasized by European countries. Only four institutions lend themselves to the role of stabilizing the global rules-based system:

- The G20 and the IMF, respectively; G20 is a rather new international actor which consists of a group of heterogeneous countries. However, the Brisbane G20 summit of 2014 showed that the group could nevertheless come up with useful global growth initiatives and even involve adequate monitoring and organize technical support for the countries involved – namely by involving the OECD which, for example, helped to verify for individual countries the extent to which proposed policy measures would add up to deliver the promised additional 2% of economic growth by 2019.
- The OECD and its global outreach program which includes, for example, China and India through the OECD Development Centre – with US funding declining, the other OECD countries should consider topping up their funding; the OECD has crucial expertise in organizing international cooperation and could also contribute to analyzing the new global interdependency of US-China-Japan-EU27/UK.
- The World Trade Organization whose role is indispensable for anchoring the rule of law in international trade relations.
- The Bank for International Settlements: Establishing a consistent set of rules for prudential supervision and for cooperation in monetary policy is absolutely crucial for national, regional and global stability.

BREXIT has many crucial challenges for the UK and the EU27. It is a unique historical step and will bring about serious policy problems. One may hope that in the medium term there will be a new consensus about maintaining open markets and international policy cooperation. For Germany and some other EU countries, there could be specific challenges in the field of current account imbalances. If the UK and US current account deficits should increase relative to the respective GDP, while Germany's and thus the Eurozone's current account surplus-GDP ratio should rise, fiscal appreciation in

Germany could be considered in combination with a fiscal devaluation in France and Italy: While Germany, in a period of slow growth and low capacity utilization, would reduce its VAT rate and modestly increase social security contribution rates, France and Italy could adopt a VAT increase and a considerable reduction of social security contribution rates which brings down real wage costs – and more jobs - while stimulating the export of goods and services (the VAT increase dampens domestic demand for tradable goods). This could help to bring more stability to the Eurozone while helping to reduce the Eurozone current account deficit-GDP ratio. There is at least a risk that US protectionism will further intensify in the medium term and could indirectly or directly affect some EU countries.

The overlap of transatlantic and BREXIT problems imply that the challenges faced by EU27 policymakers are considerable. In the end, it is also clear that the EU27 should adopt serious institutional reforms in order to reinforce the efficiency of allocation and to contribute to more stability in the community and indeed worldwide.

One of the possible surprise events in BREXIT dynamics could be that BREXIT is not actually fully implemented – for example, after a second referendum. Such a development would certainly also be accompanied by considerable financial market adjustment. One may argue that - beginning with the year 2016 - it has become obvious that policymakers in Europe are not particularly adept at risk management. While governments require that banks and insurance companies undertake all kinds of risk management, there is the apparent paradox that policymakers themselves show very modest ambitions in undertaking risk monitoring and risk management regarding their own activities. Here there is certainly room for improvement and many governments might indeed learn from national central bankers and prudential supervisory authorities.

If a No-Deal BREXIT should occur, one can only hope that the central banks in the EU28 have a plan for jointly setting special rules for a transition regime with potential limitations on international capital flows or other measures that would help to bring about an orderly transition process. A certain minimum transition time period would also be useful.

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Appendix

Appendix 1: Basic Dornbusch Model and BREXIT-Related Overshooting

Overshooting means that during the transition path the exchange rate will exceed the long run new equilibrium exchange rate. In the basic Dornbusch model (following largely the simplified approach of GAERTNER, 2001) it is assumed that the expected devaluation rate

$$(28) \quad d \ln E(e) / dt = \theta (\ln e^{\#} - \ln e)$$

where θ is an adjustment parameter/“learning coefficient” for the new long run equilibrium exchange rate $e^{\#}$. The smaller the parameter θ is, the slower the change in the exchange rate expectation for a given difference between the long run nominal equilibrium exchange rate $e^{\#}$ and the current exchange rate e_t (the time index t is dropped for simplicity). Such a regressive expectation formation could be adequate in the case of a very unusual shock – such as BREXIT; rational expectations, based on a macro model, might not work because there is no model which can analytically integrate the complex step of BREXIT (it should be noted that overshooting could also occur under perfect foresight and in the case of a supply-side shock if $-\phi' + (1-\psi)/\delta' < 0$, but then the interest elasticity does not matter (GAERTNER, 2001, chapter 2).

The interest rate parity – assuming that domestic bonds and foreign bonds are nearly perfect substitutes - must be written as $i = i^* + d \ln E(e) / dt$ where i is the domestic nominal interest rate and i^* is the given foreign interest rate. The price level dynamics is described by a Phillips curve of the following form (with P standing for the price level, H is a positive parameter, Y^d is aggregate demand):

$$(29) \quad d \ln P / dt = H (\ln Y^d - \ln Y)$$

$$(30) \quad \ln Y^d = \delta' (\ln e - \ln P) + \psi \ln Y + \ln G$$

Hence

$$(31) \quad \ln P = \ln e + \delta' \ln G - ((1-\psi) / \delta') \ln Y$$

Money market equilibrium is (with η' denoting the semi-interest elasticity in the demand for money)

$$(32) \quad \ln(M / P) = \phi' \ln Y - \eta' i$$

Inserting the interest parity condition along with the exchange rate expectations gives

$$(33) \quad \ln(M / P) = \phi' \ln Y - \eta' i^* - \eta' (\ln e^{\#} - \ln e)$$

This is the curve for the combined monetary and capital market equilibrium which holds at any point of time and thus implies an instantaneous nominal exchange rate adjustment.

BREXIT stands for an unusual and historical policy decision in the UK and market participants might find it rather difficult to form exchange rate expectations so that the parameter θ would be rather small. Such a low parameter θ along with a reduced interest elasticity in the demand for money reinforces the overshooting problem for the Pound.

This in turn would mean that in 2019/20, UK FDI inflows could be rather high as foreign investors will exploit the strong devaluation of the Pound that partly would come in the long run anyway since nominal devaluations since 2016 have raised inflationary expectations while the weakening of UK's EU production networks and BREXIT, respectively, should contribute to a higher equilibrium UK price level in the long run. It is not fully clear to what extent the Bank of England will adopt an accommodating monetary policy. For the EU27, there would be a strong appreciation effect that would dampen the inflation rate; the nominal – and real – appreciation of the Euro would be rather modest if the Bank of England would strongly increase the nominal interest rate.

Appendix 1: Modified Branson Model with Stocks

Stock Market Perspective

A useful specification of the Branson model is as follows (with positive parameters h , h' , b and b' as well as f and f'):

$$(34) \quad M = (1/(1 + hr + h'r^*)) [M + B + eF^*]$$

$$(35) \quad B = (1/(1 - br + b'r^*)) [M + B + eF^*]$$

$$(36) \quad eF^* = (1/(1 + fr - f'r^*)) [M + B + eF^*]$$

Since the desired shares h' , b' and f' add up to unity, only two of the three equations are independent. Let us consider the MM curve and the F^*F^* curve. Dividing the money market equilibrium condition by M we get (assuming zero expected inflation so that one may replace the nominal interest rate i by r):

$$(37) \quad 1 = (1/(1 + hr + h'r^*)) [1 + (B + eF^*)/M]$$

Taking logs gives, under the assumption that $hr + h'r^*$ and $(B+eF^*)/M$ are close to zero, the approximation (using $\ln(1+x) \approx x$ for x close to zero) after division by M for the MM curve:

$$(38) \quad hr + h'r^* \approx B/M + (F^*/M)e$$

$$(39) \quad r \approx (B/hM) - h'r^*/h + eF^*/hM$$

$$(40) \quad e \approx [(h'r^*)(M/F^*) - B/F^*] + (hM/F^*)r$$

Note that a rise of F^* makes the curve flatter and also causes a downward shift of the MM curve. For the F^*F^* curve we can state the equilibrium condition with the specification for the demand function as shown gives after division by eF^* :

$$(41) \quad 1 = (1/(1 + fr - f'r^*)) [1 + (M + B)/(eF^*)]$$

Hence we get:

$$(42) \quad 1 + fr - f'r^* = 1 + (M + B)/(eF^*)$$

$$(43) \quad e = (M + B)/(fr - f'r^*)$$

This is a hyperbola F^*F^* in $e-i$ space and there is a downward shift of the F^*F^* curve if F^* is raised and an upward shift if F^* is reduced. It can be seen that Quantitative Easing ($dM = -dB$) will not change the position of the F^*F^* curve. There is no doubt that a fall of F^* - due to a current account deficit - will bring about a rise of the nominal exchange rate. As regards the interest rate, the result of a fall of F^* is not unambiguous, but a rise of the interest rate is likely.

The following modified Branson model (BRANSON, 1977) looks at the money market, the bonds market and the stock market. The desired share of stocks in total wealth is v (z denotes the marginal product of capital, $q := P'/P$ where P' is the stock market price index and P is the output price index). In principle this analysis can be combined with a modified neoclassical growth model. In the short run considered here, stocks of M , B and K are given. One should also note that foreign direct investment could be considered in an enhanced model version where a share of K would be owned by foreign investors. A setting with zero expected inflation rate is considered (real interest rate is r) and real wealth is defined as

$$(44) \quad A' := M/P + B/P + qK$$

MM curve (money market equilibrium):

$$(45) \quad M/P = h^c(r, z)[M/P + B/P + qK]; h^c_r < 0, h^c_z < 0$$

KK curve (stock market equilibrium):

$$(46) \quad qK = v^s(r, z)[M/P + B/P + qK]; v^s_r < 0, v^s_z > 0$$

The MM curve and the KK curve can be displayed in $q-r$ space. One may use a simple specification where z is assumed to be given:

$$(47) \quad (M/P) = (1/(1 + hr + h^2z))[(M/P) + (B/P + qK)]$$

Dividing by (M/P) gives

$$(48) \quad 1 = (1/(1 + hr + h^2z))[1 + (B/P + qK)/(M/P)]$$

Let us assume that $hr + h^2z$ is close to zero and that $((B/P)+qK)/(M/P)$ is also close to zero. Taking logs and using the approximation $\ln(1+x) \approx x$ gives

$$(49) \quad hr + h^2z \approx ((B/P)/(M/P)) + qK/(M/P)$$

$$(50) \quad q \approx \left[- (B/P)/K + ((M/P)/K)h^2z \right] + ((M/P)/K)hr$$

The MM curve has a positive slope in $q-r$ space. For the KK curve we specify

$$(51) \quad qK = (1/(1 + vr - v^2z))[(M/P + B/P) + (qK)]$$

After dividing by qK we get:

$$(52) \quad 1 = (1/(1 + vr - v^2z))[1 + (M/P + B/P)/(qK)]$$

$$(53) \quad 1 + vr - v^2z = [1 + (M/P + B/P)/(qK)]$$

$$(54) \quad q = [1 + (M/P + B/P)/(qK)]/(vr + 1 - v^2z)$$

This is a hyperbola in q-r space. Quantitative easing in the sense $dM=-dB$ shifts the MM curve upwards and leaves the KK curve in its position so that Tobin's q is raised which means an increase of the real stock market price index while the interest rate is reduced.

Appendix 2: True Cost of BREXIT

A Cost-Benefit Analysis of BREXIT for the UK (assuming no UK-EU deal is reached)

1) Avoiding annual net contributions to the EU of 0.4% of Gross Domestic Product (GDP)	Capitalized at an interest rate of 3% gives a present value (long-term) of 13.3% of annual national income
2) Effect of UK imports from the EU burdened with tariffs after BREXIT: 0.25% of Gross Domestic Product	8.3% of UK Gross Domestic Product (2016)
3) Reduced profits for UK firms due to lowering net prices (before EU tariffs) in the Single Market	8.3% of UK Gross Domestic Product (2016)
4) Reduced output in the UK of 6% in the long term due to worsened access to the EU single market	6% of Gross Domestic Product (2016) according to the UK Treasury analysis (2016) on the advantages of British membership of the EU: assuming a UK-EU deal (in the no deal scenario: 7.0% of UK Gross Domestic Product)
5) Macro feedback effect from 4), which would lead to a 1% reduction of income in the EU27 which, in turn, causes an associated further reduction of 0.2% of income in the UK. of 1	0.2% of UK Gross Domestic Product
6) Non-realization of the benefits due to single market deepening which was negotiated by Cameron with the EU at the beginning of 2016	4% of UK Gross Domestic Product (according to the UK Treasury analysis (2016) on the advantages of British membership of the EU
7) Effect of a raised share of foreign ownership of the UK's capital stock as a result of the real depreciation of the Pound from 17% in 2016 to 30% in 2030	4.3% of UK Gross National Income
8) Unilateral abolition of tariffs on agricultural products	1% of UK Gross Domestic Product
9) UK-USA "mini-TTIP" agreement	2% of UK Gross Domestic Product
Total Effect in % of Gross National Income	-15.8% (net) of UK national income
Cost of post-BREXIT border controls (2.1% of GDP)* *see Institute for Government (2017)	Capitalized at an interest rate of 3% gives a present value (long-term) of -6.9% income quasi-loss

Source: Welfens (2017b)

Appendix 4: Complementary Data on the Regression Analysis

Variable	Obs	Mean	Std. Dev.	Min	Max
Country	92	12	6.669596	1	23
Year	92	2016	1	2014	2017
LN_Cbank	92	-1.678	0.175	-2.086	-1.396
LN_Insu	92	-1.768	0.242	-2.178	-1.385
LN_Acc	92	-1.293	0.339	-2.293	-0.443
LN_STRI_FA	92	-1.546	0.223	-2.161	-1.147
FDIRes_F	92	0.009	0.012	0.002	0.054
FDIRes_B	89	0.052	0.109	0.000	0.500
FDIRes_I	91	0.016	0.027	0.000	0.150
LN_IFDI	89	3.967	0.768	2.338	5.930
LN_OFDI	89	3.460	1.282	1.027	5.957
LN_Openness	92	0.127	0.490	-0.584	1.445
LN_GDPpc	92	10.320	0.572	9.427	11.689
LN_INT_E	92	4.565	0.036	4.443	4.605

Source: Own representation

Appendix 5: Correlation Matrix

	Cbank	Insu	Acc	STRI_FA	FDIRes_F	FDIRes_B	FDIRes_I	LN_IFDI	LN_OFDI	LN_Openness	LN_GDPpc	LN_INT_E
Cbank	1.000											
Insu	0.622	1.000										
Acc	0.279	0.434	1.000									
STRI_FA	0.627	0.763	0.889	1.000								
FDIRes_F	0.063	0.070	0.692	0.511	1.000							
FDIRes_B	0.089	0.234	0.245	0.263	0.151	1.000						
FDIRes_I	0.060	0.173	0.444	0.373	0.539	0.177	1.000					
LN_IFDI	-0.077	-0.389	-0.270	-0.327	-0.270	-0.133	-0.109	1.000				
LN_OFDI	-0.119	-0.019	0.145	0.064	0.051	-0.133	0.238	0.592	1.000			
LN_Openness	0.039	-0.451	-0.427	-0.426	-0.354	-0.155	-0.270	0.766	0.211	1.000		
LN_GDPpc	-0.171	-0.003	0.149	0.060	0.026	-0.132	0.261	0.392	0.862	0.123	1.000	
LN_INT_E	-0.465	-0.251	-0.034	-0.214	-0.091	-0.077	0.052	0.284	0.338	0.134	0.405	1.000

Appendix 6: Outward FDI Stock as Percentage of the Source Country Capital Stock, 1980 vs 2014

Country	Outward FDI-Stock available since:	Outward FDI-Stock as Percentage, in 1980:	Rank 1980:	Outward FDI-Stock as Percentage, in 2014:	Rank 2014:
British Virgin Islands	1998			24384,90%	1
Cayman Islands	1980	10,5%	1	824,81%	2
Malta	1992			171,47%	3
Cyprus	1987			126,09%	4

Luxembourg	2002			90,62%	5
China, Hong Kong SAR	1980	0,1%	31	87,14%	6
Ireland	1985			61,70%	7
Switzerland	1983			60,65%	8
Liberia	1980	7,5%	5	39,59%	9
Singapore	1980	1,2%	17	39,59%	10
Netherlands	1980	7,7%	4	29,51%	11
Barbados	1980	0,4%	22	24,34%	12
Sweden	1980	0,9%	21	23,37%	13
Belgium	1980	1,4%	16	19,66%	14
Canada	1980	2,8%	8	17,41%	15
Iceland	1985			15,89%	16
United Kingdom	1980	3,5%	7	15,82%	17
Denmark	1980	0,9%	20	15,12%	18
Norway	1980	0,3%	26	13,50%	19
Austria	1980	0,2%	29	12,27%	20
United States	1980	2,3%	9	11,56%	21
Australia	1980	0,9%	19	11,03%	22
Finland	1980	0,3%	24	10,69%	23
France	1980	1,2%	18	10,57%	24
Israel	1980	0,0%	40	9,80%	25
Germany	1980			9,48%	26
Bahamas	1998			8,73%	27
Taiwan (Province of China)	1980	8,5%	3	8,47%	28
Azerbaijan	1996			8,46%	29
Chile	1980	0,1%	32	8,09%	30
Bermuda	1997			7,28%	31
Malaysia	1980	0,4%	23	6,80%	32
Kuwait	1980	2,1%	10	6,79%	33
South Africa	1980	1,4%	15	6,41%	34
Japan	1980	1,7%	13	6,18%	35
Bahrain	1980	3,5%	6	6,10%	36
Togo	1998			6,00%	37
Spain	1980	0,2%	30	5,98%	38
Russian Federation	1993			4,21%	39
Qatar	1995			4,06%	40
Estonia	1992			4,01%	41
Italy	1980	0,3%	25	3,94%	42
New Zealand	1982			3,86%	43
Hungary	1990			3,85%	44
Korea, Republic of	1980	0,1%	34	3,72%	45
Kazakhstan	1997			3,45%	46
United Arab Emirates	1981			3,25%	47
Lebanon	1984			3,12%	48
Portugal	1980	0,2%	28	3,04%	49
Seychelles	1980	2,0%	11	2,72%	50
China, Macao SAR	2001			2,71%	51
Angola	1990			2,49%	52
Georgia	1999			2,34%	53
Brunei Darussalam	1992			2,26%	54
Colombia	1980	0,1%	33	2,25%	55
Slovenia	1992			2,20%	56
Mexico	1980	0,2%	27	2,15%	57
Aruba	1991			2,12%	58

Panama	2009			2,05%	59
Greece	1986			1,78%	60
Philippines	1980	0,0%	38	1,70%	61
Thailand	1980	0,0%	42	1,65%	62
Argentina	1980	1,6%	14	1,65%	63
Mauritius	1989			1,61%	64
Costa Rica	1980	0,0%	37	1,55%	65
Montenegro	2008			1,44%	66
Croatia	1992			1,36%	67
Oman	2003			1,30%	68
Poland	1981			1,27%	69
Brazil	1980	2,0%	12	1,25%	70
Belize	1984			1,25%	71
China	1981			1,24%	72
Honduras	2004			1,17%	73
Lithuania	1995			1,13%	74
Venezuela (Bolivarian Rep. of)	1980	0,0%	44	1,13%	75
Fiji	1980	0,1%	36	1,12%	76
Czech Republic	1993			1,03%	77
Turkey	1985			1,01%	78
Saudi Arabia	1980	0,0%	39	0,81%	79
Armenia	2003			0,69%	80
Serbia	2008			0,67%	81
Bulgaria	1987			0,62%	82
Slovakia	1993			0,61%	83
Botswana	1980	10,5%	2	0,58%	84
India	1980	0,0%	41	0,57%	85
Zimbabwe	1983			0,55%	86
Egypt	1980	0,1%	35	0,52%	87
Nigeria	1980	0,0%	43	0,52%	88
Viet Nam	2005			0,52%	89
Cambodia	1992			0,50%	90

Source: Outward-FDI-Stock from UNCTAD; last requested on 25 July 2018; Capital Stock was taken from the Penn World Tables 9.0; last requested on 25 July 2018.

Appendix 3: Welfare Gain from Holding Real Money Balances (with $\delta > 0$)

$$(55) \quad \Omega = \{[h - (h' \beta / K)]Y + h' \delta\}^2 / 2h'$$

With assumption $K=4Y$ we get

$$(56) \quad \Omega = \{Yh - (h' \beta / 4) + h' \delta\}^2 / 2h'$$

For the special case that h equals unity and h' equals 2, we get

$$(57) \quad \Omega = (Y/2 - \beta/4 + \delta)^2$$

If $-\beta/4 \approx \delta$ the welfare gain $\Omega = Y^2/4$. This implies that the medium term elasticity of the monetary welfare gain with respect to the real GDP is equal to 2.

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