

Flash Note

Brexit

How much could it cost the world economy?

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The risk of Brexit is probably one of the major 'known unknowns' of 2016. We use two global models of the kind used by central banks to assess the possible consequences of Brexit for the world economy.

The direct impact of Brexit through trade links would be almost negligible for the world economy. The euro area appears to be among the most exposed regions, with its GDP growth likely to be reduced by 20 bps in both 2016 and 2017.

For the euro area economy, Brexit would require 20bp in additional rate cuts, just when the ECB seems to have reached the zero bound.

The major vector of transmission of any Brexit shock would be through financial markets. European markets appear to be the most exposed. If the FTSE 100 fell by 8%, the Euro Stoxx 600 would fall by 5%. The US market appears to offer good protection, declining by just 0.5%, according to the models.

As in previous notes on [oil price equilibrium](#), to assess the global impact of Brexit, we can use the same econometric models as those extensively employed by central banks. These models allow authorities and multilateral organisations to assess the impact of different shocks on economies and financial systems. Using these models allows us to better anticipate the macro-financial reactions to different events and to better understand central banks' mind-set.

On 23 June, the British will decide whether to stay in the European Union (EU) or leave. According to the latest polls, the 'yes' and 'no' sides are neck to neck, and the outcome is likely to be a close call.

In a [Policy Brief on 25 April](#), the WMIC outlined its expected scenario for the vote. In this note, we discuss what a vote for Brexit would cost the global economy.

Two models are used to conduct this analysis, G-VAR and the P-GIM (*see descriptions at the end of this Flash Note*). These models tend to suggest that due to the relatively small size of the UK economy, the direct impact of Brexit through trade links would be almost negligible for the world economy, although the European economy would be the most exposed.

The political consequences could potentially be huge, as there would be a clear risk of contagion leading towards further disintegration of the EU. But leaving that risk aside, Brexit could delay the ongoing recovery of the euro area economy, leading to a protracted period of slow growth, weak credit dynamics and impaired monetary transmission. The models suggest that Brexit would trim 20 basis points (bps) from euro area growth in both 2016 and 2017. The direct consequences would be on monetary policy, as the shock of a UK exit from the EU would require more monetary easing just when some wonder if the European Central Bank (ECB) is running out of ammunition.

It appears equity markets would be the principal vector of any negative consequences stemming from Brexit. A fall of 8% of the UK FTSE 100 would have lasting consequences on other European markets, primarily the Scandinavian (-6%), euro area (-5%) and Swiss (-4%) equity markets. At the other end of the spectrum, North American markets would be less impacted by the potential turbulence surrounding Brexit. So the US (-0.5%) and Canadian (-1%) markets could offer an interesting hedge for equity investors.

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Impact on the world economy

Global-VAR models have become very popular in recent years among central banks to assess spill-overs of specific events on the global economy.

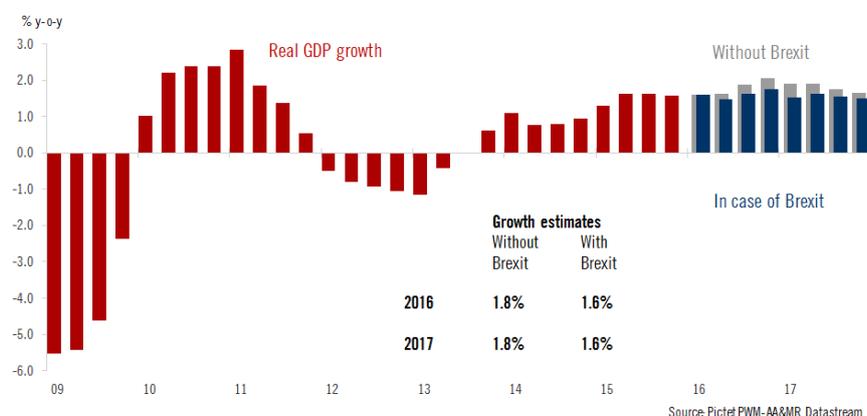
We start our analysis of a possible Brexit with the assumption contained in the [April WMIC Policy Brief](#) that UK GDP would contract by 0.5% quarter on quarter in 3Q16. Due to the relatively small size of the UK economy (2.4% of world GDP), the global impact of Brexit would be almost negligible in strictly economic terms. Unsurprisingly, the most exposed countries would be the UK's European neighbours, whereas a number of large emerging countries (Turkey, China, Indonesia), commodities producers (Argentina, Brazil, Malaysia, Chile), non-OPEC oil producers (Canada, Norway) and the US economy, are all uncorrelated from events in the UK.

Consequences on euro area activity

To refine our analysis of the consequences of Brexit on the euro area we use our own proprietary Pictet Global Impact Macro-Financial (P-GIM) model (see description at the end of this Flash Note).

The P-GIM model suggests that, 20 bps could be knocked off euro area GDP growth in both 2016 and 2017 should the UK vote to leave the EU.

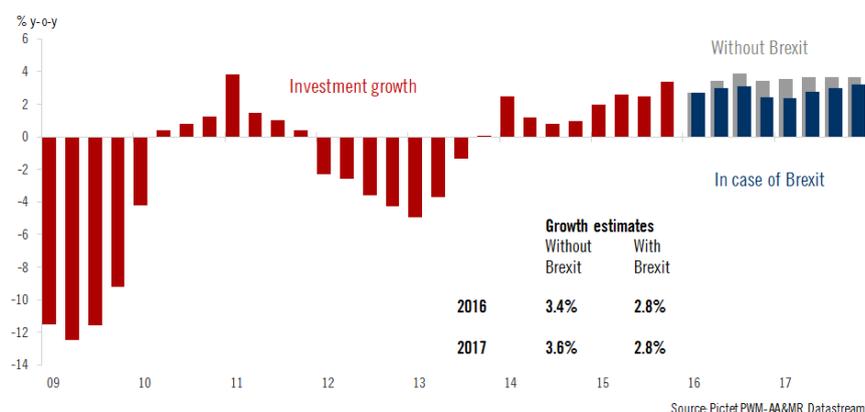
Chart 1: Euro area: Real GDP growth



Investment significantly hurt

According to the P-GIM model, while household consumption in the euro area would be almost unaffected by Brexit, investment would bear the brunt of the shock, with 60 bps knocked from the projected growth in investment spending in 2016 and 80 bps in 2017, the maximum impact being felt after four quarters. So the impact of Brexit on the euro area economy would essentially be propagated through the investment channel.

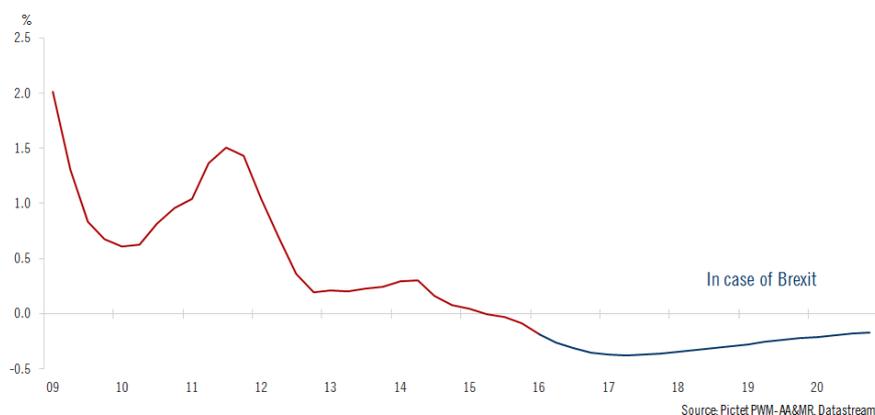
Chart 2: Changes in euro area investment



More monetary relaxation required

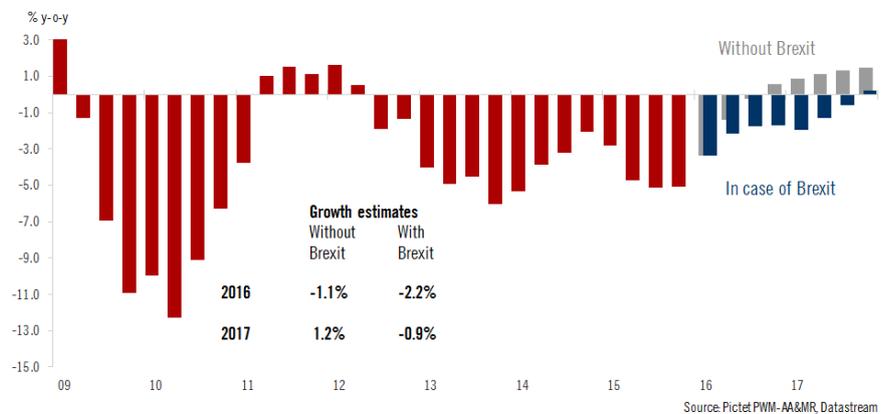
Despite the modest impact of Brexit on the real economy, the adverse outcome on investment would require additional monetary policy relaxation. The P-GIM model suggests some 20 bps of rate cuts would be needed. This might appear modest, but could be problematic as benchmark refi rates already stand at 0% in the euro area.

Chart 3: Euro area 3-month interest rates



Complicating things even more, Brexit could potentially impair monetary transmission in the euro area (which has still not entirely recovered from the crises of 2007-2010). In normal times, banks convert the liquidity provided by central banks into long-term credit, but since the crises the banks' intermediation activity has been impaired. So Brexit would probably force the ECB to find new measures to support the banking sector in order to favour monetary transmission.

Chart 4: Euro area monetary transmission (M3 - M1)



Importance of the financial channel

Spill-over effects from a UK stock market correction are likely to be more harmful to the world economy than the direct macroeconomic effects. The econometric models show that a 8% fall of the FTSE 100 would cause a 2% correction in global equity markets. Again, neighbouring countries are the most exposed (Norway (-7%), Sweden (-6%), euro area (-5%) and Switzerland (-4%)).

The US (-0.5%), Canadian (-1%), Indian (-2%), Japanese (-2.5%) stock markets appear to be the least correlated to a potential UK correction. So the models suggest that overweighting North America and Japan could offer equity investors some protection against Brexit.

Table 1: Sensitivity to an 8% fall of the FTSE 100

Country	Max impact	Country	Max impact
Norway	-6.5%	South Africa	-2.9%
Sweden	-6.2%	Australia	-2.8%
Euro	-5.0%	South Korea	-2.7%
Switzerland	-4.6%	New Zealand	-2.6%
Singapore	-4.0%	Japan	-2.5%
Argentina	-3.8%	Chile	-2.5%
Malaysia	-3.4%	India	-1.8%
Thailand	-3.2%	Canada	-1.1%
Philippines	-3.1%	USA	-0.4%

Source: Pictet WM - AA&MR

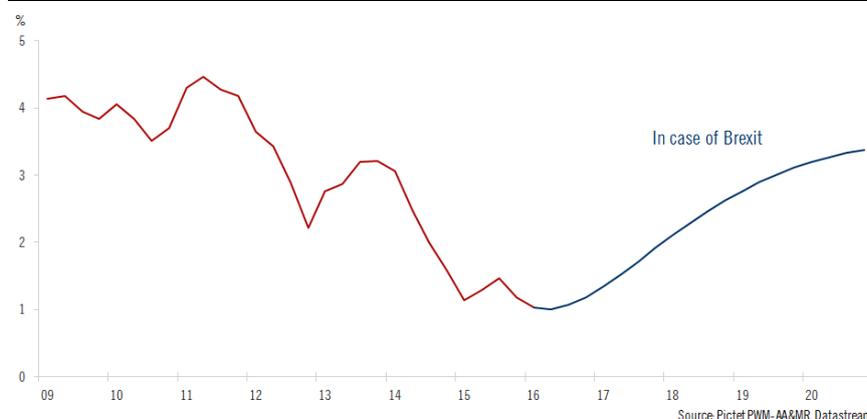
Higher bond yields in the euro area

Although Brexit would be a negative shock for economic activity in the euro area, long-term interest rates are likely to be pushed higher. The P-GIM model suggests that term premiums would increase, with 10-year bond yields likely to rise by 20 bps. As a result, the whole yield curve is likely to steepen.

Higher average interest rates would probably hide big differences among euro area members. As during the sovereign debt crisis of 2010-2012, the yield on German Bunds would likely fall whereas the risk premium would increase for government bonds in the euro area periphery.

A similar impact is to be expected on corporate bonds, with Brexit likely to lead to additional risk premiums being demanded. On average, corporate spreads would widen by close to 30 bps on average, according to the P-GIM model, but with huge differences between countries and market segments. Yields on riskier assets (periphery government bonds, corporate high yield) would widen much more than for safer ones.

Chart 5: Euro area 10-year bond yields



Geographical allocation could offer some protection

To sum up, leaving aside the political consequences, the direct effect of Brexit would appear to be relatively modest for the world economy. The impact would spread through the financial markets channel instead. As such, European economies and markets appear to be the most exposed. European equities and euro area periphery sovereign and corporate high yield bonds appear to be the most exposed assets, whereas US equities and Treasuries are likely to offer an interesting hedge.

There are some differences between the [WMIC Policy Brief](#) assumptions outlined in April and the results of applying the P-GIM model (see Table 2), notably in terms of Bank of England (BoE) monetary policy. The model suggests that the BoE could be tempted to raise interest rates to defend the pound in the case of Brexit. However, the BoE could also choose to let the pound depreciate and so maintain relaxed monetary conditions in order to stimulate the economy. The BoE would have to face this dilemma, but in the end this is a political choice.

The P-GIM and G-VAR models alike suggest that the euro would be more resilient than supposed by the WMIC. The models do not include political consequences. In fact, Brexit would very likely trigger other referenda (Netherlands, Italy...) that could potentially weaken the euro, a risk that is taken into account in April's WMIC Policy Brief (see Table 2) .

Table 2: A Comparison of the possible macroeconomic and financial impact of Brexit

Post referendum impact		WMIC Policy Brief	Estimated by the models
Real GDP	UK	-50 to -100 bps	-50 bps
	Euro area	-20 to -50 bps	-20 bps
	US		-5 bps
	World		-5 bps
Monetary policy	UK	To 0 %	+0.15 %
	Euro area	+ QE	-20 bps
	US		unaffected
FX	GBP/USD	1.25 to 1.35 (-13% to -6%)	-10%
	EUR/USD	<1 (-13%)	-3%
Bonds	UK	+20 to +50 bps	
	Bund	-10 to -20 bps	EA average: +20 bps in 2016 +70 bps in 2017
	US Treasuries	-10 to -20 bps	unaffected
Equities	FTSE	-7 to -10%	-7% to -8%
	Euro stoxx	-5% to -7%	-5%
	S&P500	-5% to -7%	-0.5%
	World		-2%

Source: Pictet WM - AA&MR

Global-VAR

The Global-VAR¹⁾ is part of a class of global models that aims to encompass the transmission mechanisms of shocks at a global level. For a while, researchers' approach to the analysis of global shocks had been to extend single country models, with the aim to model inter-relationships across different economies. However, data limitations restricted the usefulness of this approach. The Global-VAR approach avoids some of these shortcomings, while at the same time enabling an assessment of the interconnections and interdependencies that exist between national and international factors, and macro and financial variables. The Global-VAR model is constructed by combining separate models for 26 economies, linking domestic variables to their foreign equivalent. In this way, the model is able to provide a global modelling framework to analyse different shocks and channels of transmission mechanisms. The Global-VAR is widely used by central banks, the IMF, and the World Bank to analyse the reaction of various potential shocks to the world economy.

In more technical terms, the Global-VAR model is a vector autoregressive model (VAR) that encompasses vector error correction models (VEC) of each country. Every VEC is based on real GDP, inflation, equity price, short-term and long-term interest rate, exchange rate and related trade-weighted foreign variables. The VAR includes also global variables like oil prices and financial stress indicators.

1) Pesaran, M.H., Schuermann T., Weiner S.M. (2004) Modelling regional interdependencies using a global error-correcting macroeconomic model. *Journal of Business and Economics Statistics* 22: 129-162.

Dées S., di Mauro F. Pesaran M.H. and Smith L.V. (2007) Exploring the international linkages of the euro area: a global VAR analysis. *Journal of Applied Econometrics* 22: 1-38

The P-GIM model

P-GIM is a proprietary Dynamic Stochastic General Equilibrium model (DSGE) that covers the US and Europe and includes the banking sector. It is based on recent academic and central bank research²⁾. It is a model that uses wide-ranging inputs and encompasses most economic agents (households, firms, capital producers, entrepreneurs, banks and governments). In all, it includes 34 endogenous variables and 50 equations. Using this model, it is possible to measure potential shocks to the system in 16 different ways. In order to simulate a Brexit shock, we used the stock market correction in the wake of the 1992 Exchange Rate Mechanism (ERM) crisis as our starting point. In the months ahead of the pound sterling's exit from the ERM, the British stock market fell by 17%, while both Germany's DAX and the French CAC 40 fell by -22%. Our starting assumption is that Brexit would produce a similar correction on European stock markets. So we introduce a shock of this magnitude to equities into the model to study the reaction of the euro area economy.

DSGE models have become one of the workhorses of modern macroeconomics and are extensively used for forecasting and policy analysis by central banks. They provide a stylised representation of an economy, focusing on the key interactions among critical economic actors. In DSGE models, agents' choices are dynamic, in the sense that they take into account both current and future expected conditions. Agents solve inter-temporal optimisation problems, subject to constraints. The outcome of the optimisation problem is a decision rule that describes how each agent reacts to changes.

- 2) Christiano L., Motto R., Rostagno M. (2010) Financial factors in economic fluctuations. European Central Bank, working paper series n° 1192

Christiano L., Motto R., Rostagno M. (2013) Risk shocks. NBER Working Paper n°18682

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